



INSTRUCTION MANUAL

MARINE RADAR **MR-1220** series



INTRODUCTION

Thank you for choosing this Icom product. This product is designed and built with Icom's state of the art technology and craftsmanship. With proper care, this product should provide you with years of trouble-free operation.

■ IMPORTANT

READ ALL INSTRUCTIONS carefully completely before using the marine radar.

SAVE THIS INSTRUCTION MANUAL— This instruction manual contains basic operating instructions for the following MR-1220 series marine radar:

MODEL NAME	DISPLAY UNIT	SCANNER UNIT
MR-1220R4	MR-1220 12.1-inch color display unit	SC-R40 (Radome type)
MR-1220T4		SC-T40 (Open array, 4 kw, 4 ft type)
MR-1220T6		SC-T60 (Open array, 6 kw, 4 ft type)
MR-1220T6L		SC-T60L (Open array, 6 kw, 6.5 ft type)

■ SUPPLIED ACCESSORIES

① Some accessories are not supplied, depending on the radar version.

● MR-1220: Display unit

Quantity

- Front cover 1
- NMEA connector (PLT-167-P-R) 1
- NMEA connector (PLT-168-P-R) 1
- Spare fuse (FGB 15 A) 1
- Spare fuse (FGB 5 A: for over 24 V power supply).. 1
- DC power cable 1
- Mounting bracket 1
- Mounting knob bolts 2
- Installation bolts (M6×30) 5
- Installation nuts (M6) 5
- Spring washers (M6) 10
- Flat washers (M6)..... 10
- Instruction manual (this manual) 1
- Template for display unit..... 1

● SC-R40: Scanner unit (Radome type)

Quantity

- System cable (15 m) 1
- Installation bolts (M10×50) 4
- Installation bolts (M10×25) 4
- Installation nuts (M10) 4
- Flat washers (M10)..... 4
- Spring washers (M10) 4
- Template for scanner unit 1

● SC-T40/SC-T60/SC-T60L: Scanner units (Open array type)

Quantity

- System cable (20 m) 1
- Installation bolts (M10×40) 4
- Installation nuts (M10) 4
- Flat washers (M10)..... 4
- Spring washers (M10) 4
- Allen wrench 1
- Cap bolts (M8×18 mm)..... 4
- Belleville washers (8L) 4
- Sealing washers (T) 4
- Flat washers (M8)..... 4
- Flat washers (AW) 4
- Ferrite EMI filter 1
- Silicon sealant 1
- Template for scanner unit 1

This marine radar is supplemental aids to navigation and is not intended to be a substitute for accurate and current nautical charts.

■ FEATURES

The MR-1220 series MARINE RADARS are designed especially for fishing boats. They have powerful transmitting power, a 12.1-inch Color LCD display and many other advanced features.

- The Simplified ARPA (Automatic Radar Plotting Aids) function tracks up to 30 targets (including up to 20 automatic acquiring targets)
 - The Plot function tracks your route on the radar echo
 - Built-in 3D Bird's-eye view
 - The DSC (Digital Selective Calling) information function shows received DSC Messages with Icons
 - An External Alarm can be connected to warn of danger in a noisy environment
 - Built-in AIS (Automatic Identification System) overlay function
 - The Multiple language display
 - A Sub display is connectable
- ① An optional UX-234 VIDEO OUTPUT UNIT is required.

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- Force majeure, including, but not limited to, fires, earthquakes, storms, floods, lightning, other natural disasters, disturbances, riots, war, or radioactive contamination.
- The use of Icom radars with any equipment that is not manufactured or approved by Icom.

■ TO DETECT SART SIGNALS

SART signals may no be detected and displayed on the screen, depending on the SEA, RAIN, and IR settings.

Make the settings below to detect a SART signal on the screen.

1. Set the screen range to between 6NM and 12 NM with Range (量程) [+] or [-].
2. Set the GAIN control (**GAIN** / (增益)) as high as possible.
3. Minimize the SEA control (**SEA** / (海浪抑制)).
4. Minimize the RAIN control (**RAIN** / (雨雪抑制)).
5. Turn OFF the Interference Reduction (IR) function.
6. Turn OFF the Echo stretch (ES) function.

■ EXPLICIT DEFINITIONS

WORD	DEFINITION
⚠ DANGER!	Personal death, serious injury or an explosion may occur.
⚠ WARNING!	Personal injury, fire hazard, or electric shock may occur.
CAUTION	Equipment damage may occur.
NOTE	If disregarded, inconvenience only. No risk of personal injury, fire or electric shock.

■ RECOMMENDATION

CLEAN THE DISPLAY UNIT THOROUGHLY with a soft, damp (fresh water) cloth, then dry it before operating.

Otherwise, the display unit's keys, switches may become unusable, due to salt crystallization.

- ① The connectors on the rear panel meet IPX4 requirements while connecting to the scanner unit.

NOTE: If the display unit's splash resistance appears defective, carefully clean it with a soft, damp (fresh water) cloth, then dry it before operating.

The display unit may lose its splash resistance if the case, or connectors are cracked or broken, or the display unit has been dropped. Contact your Icom distributor or your dealer for advice.

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■ PRECAUTIONS

◇ For Display unit:

⚠ **WARNING! NEVER** let metal, wire or other objects contact the inside of the display unit, or make incorrect contact with connectors on the rear panel.

This could cause an electric shock or damage the display unit.

⚠ **WARNING! NEVER** apply AC voltage to the DC connector of the display unit. This could cause a fire or damage the display unit.

⚠ **WARNING! NEVER** apply more than 42 V DC to the DC connector of the display unit. This could cause a fire or damage the display unit.

⚠ **WARNING! NEVER** touch or operate the display unit with wet hands. This could cause an electric shock or damage the display unit.

⚠ **WARNING! NEVER** open the display unit. There are no user adjustment points. This could cause an electric shock and incorrect reassembly may cause a fire hazard.

⚠ **WARNING! NEVER** operate the radar during a lightning storm. It may result in an electric shock, cause a fire or damage the display unit. Always disconnect the power source and scanner unit before a storm.

⚠ **WARNING! NEVER** reverse the DC power cable polarity. This could cause a fire or damage the display unit.

⚠ **WARNING! NEVER** remove the fuse holder on the DC power cable. Excessive current caused by a short could cause a fire or damage the display unit.

CAUTION: DO NOT use or place the display unit in areas with temperature below -15°C ($+5^{\circ}\text{F}$) or above $+55^{\circ}\text{C}$ ($+131^{\circ}\text{F}$).

CAUTION: DO NOT use harsh solvents such as Benzine or alcohol when cleaning, the display unit, as they will damage the display unit surfaces.

CAUTION: DO NOT place the display unit in excessively dusty environments.

DO NOT place the display unit near heating equipment or in direct sunlight or where hot or cold air blows directly onto it.

DO NOT place the display unit in areas that could block air passage or put anything around the display unit. This will obstruct heat dissipation.

KEEP the display unit out of the reach of unauthorized persons.

KEEP the display unit away from heavy rain, and never immerse it in the water.

The display unit meets IPX4 requirements for splash resistance when the supplied connection cable, scanner unit are connected.

However, if it is dropped, splash resistance cannot be guaranteed because of possible damage to the case or the waterproof seals.

The LCD display may have cosmetic imperfections that is displayed as small dark or light spots. This is not a malfunction or defect, but a normal characteristic of LCD display.

◇ For Scanner unit:

⚠ **DANGER: HIGH VOLTAGE! NEVER** open the scanner unit. The scanner unit contains high voltage that could be fatal. And there are no user adjustment points. All repairs and adjustments **MUST** be made by a qualified electronics technician at your Marine Navigation Dealer.

◇ For qualified electronics technician only:

⚠ **DANGER: HIGH VOLTAGE!** High voltages of up to 3,500 volts are used in the scanner unit. Although prudent measures for safety have been adopted, sufficient care must be taken in the operation, maintenance and adjustment of the scanner unit. Electric shock of 1,000 volts or more may cause electrocution and death, even an electric shock of only 100 volts may be fatal.

⚠ **DANGER: HIGH VOLTAGE! DO NOT** turn OFF the radar's power and do not reach inside the scanner unit before you have:

- discharged the capacitors by disconnecting the system cable from the radar unit for 5 minutes.
- checked that no electric charges remain inside the device.

Also, it is recommended to wear dry insulated rubber gloves. **NEVER** use both hands simultaneously, keep one hand in your pocket.

⚠ **WARNING: RADIATION HAZARD!**

Radiation emitted from the scanner unit can be harmful, particularly to your eyes. To avoid harmful radiation, turn OFF the radar's power before working on the scanner unit.

DO NOT use or place the scanner unit in areas with temperature below -25°C (-13°F) or above $+70^{\circ}\text{C}$ ($+158^{\circ}\text{F}$).

NEVER immerse the scanner unit in the water. The scanner unit meets IPX6* requirements for high-pressure water jet resistance.

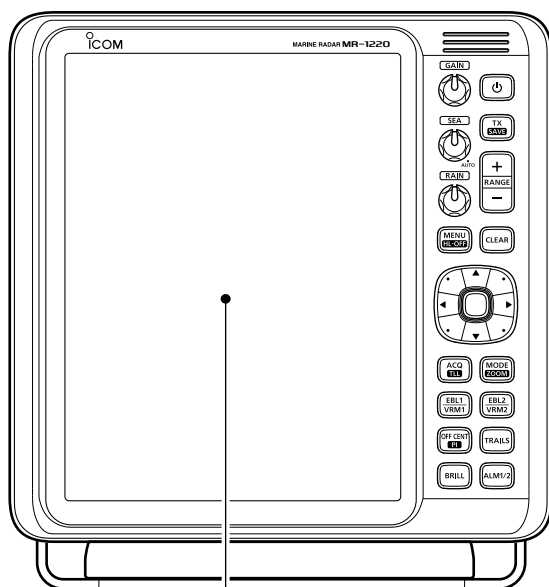
However, if the scanner unit is dropped, high-pressure water jet resistance cannot be guaranteed because of possible damage to the cases or the waterproof seals.

* Except for the cable connectors. They meet IPX4 requirements while connecting to the scanner unit.

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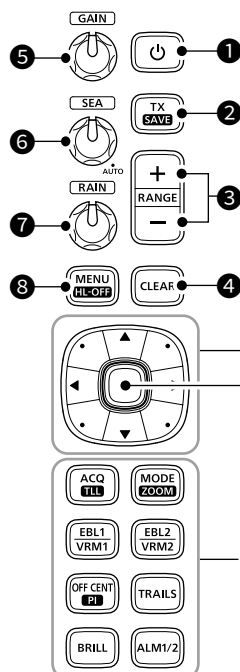
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Front panel

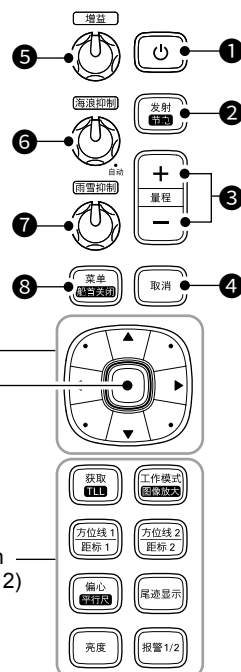


Function display (p. 3)

English keys



Chinese keys

Function
keys (p. 2)**1 [POWER KEY] (p. 6)**

Push to turn the radar power ON or OFF.

2 [TX (SAVE)] / [发射(节电)] KEY (pp. 6, 13)

- Push to change the operating mode between the TX mode and the Standby mode.
- Hold down for 1 second to turn ON the Power Save function.

3 RANGE (量程) UP [+]/DOWN [-] KEYS (p. 6)

- Push [+] to increase the screen range.
- Push [-] to decrease the screen range.

4 [CLEAR] / [取消] KEY

- Push to cancel the previous operation.
- Push to cancel an alarm.
- Hold down for 1 second to turn the active AIS target into a sleeping target.
- Hold down for 1 second to release a ARPA target, or delete a TLL symbol.

5 GAIN CONTROL (GAIN)/增益 (p. 8)

Adjusts the receiver amplifier gain.

- Rotate clockwise to increase the gain.

6 SEA CLUTTER CONTROL (SEA)/海浪抑制 (p. 8)

Eliminates echoes from waves in close range. Reduces the receiver gain for close objects within a radius of approximately 8 nautical miles to eliminate sea clutter.

- Rotate the control fully clockwise to activate the automatic SEA control function.

7 RAIN CONTROL (RAIN)/雨雪抑制 (p. 8)

Eliminates echoes from rain, snow, fog, and so on.

- Rotate the control fully counter clockwise to deactivate the RAIN function.

8 [MENU (HL-OFF)]/[菜单 (船首关闭)] KEY (pp. 5, 12)

- Push to enter or exit the Menu screen.
- While holding down this key, the heading line temporarily disappears.

9 CURSOR PAD

- Push to move the cross-line cursor in 16 directions in the normal operating mode.
- Sets the EBLs, VRMs, alarm area, ARPA target, AIS target, and so on.
- Push [◀] or [▶] to select a Menu group, or push [▲] or [▼] to select an item or an option in the Menu screen.

10 ENTER KEY

Described as [ENTER]/[确认] in this manual.

- Push to select the item or target that the cross-line cursor points to, and display the details on the target in the information box.
- In the Menu screen, push to apply the selection.
- Hold down for 1 second to display the Context menu.

Front panel

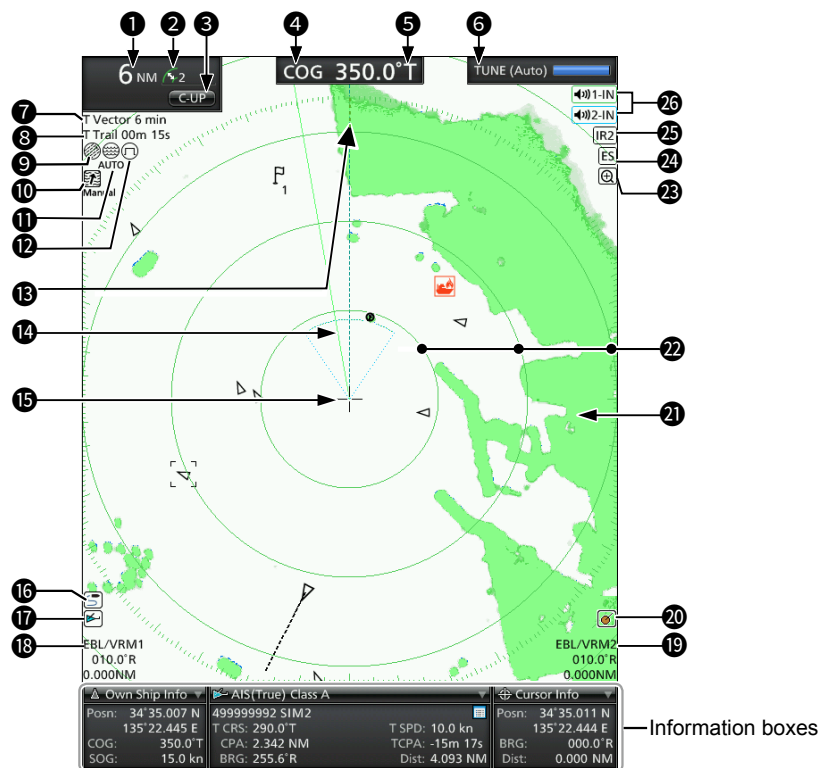
◇ Function Keys

KEY	PUSH	PAGE	HOLD DOWN FOR 1 SECOND	PAGE
[ACQ (TLL)] [获取 (TLL)]	ACQUIRE TARGET Acquires an ARPA target under the cursor.	p. 29	TLL • Makes a TLL maker under the cursor. • Outputs the position data under the cursor to the NMEA output port.	p. 34
[MODE (ZOOM)] [工作模式 (图像放大)]	MODE Selects the Screen mode.	p. 9	ZOOM • In the 2D mode, opens or closes the Zoom view window. • In the 3D mode, opens or closes the 2D view window.	p. 12
[EBL 1 (VRM 1)] [方位线 1 (距标 1)]*	ELECTRONIC BEARING LINE 1/ VARIABLE RANGE MARKER 1 Displays or clears the EBL 1 and VRM 1 lines.	p. 19	While setting the EBL 1 and VRM 1, moves the EBL 1 and VRM 1 line to the cursor.	p. 19
[EBL 2 (VRM 2)] [方位线 2 (距标 2)]*	ELECTRONIC BEARING LINE 2/ VARIABLE RANGE MARKER 2 Displays or clears the EBL 2 and VRM 2 lines.	p. 20	While setting the EBL 2 and VRM 2, moves the EBL 2 and VRM 2 line to the cursor.	p. 20
[OFF CENT (PI)] [偏心 (平行尺)]	OFF CENTER Shifts the center (your own vessel's position) on the screen downward to increase the forward view area.	p. 12	PARALLEL INDEX LINES Displays or hides the Parallel Index lines for measuring the distance between targets.	p. 18
[TRAILS] [尾迹显示]	TRAILS Plots or cancels trails of the movement.	p. 14	Resets the trail interval counter and the plotted trail echoes.	p. 14
[BRILL] [亮度]	BRILLIANCE Displays or hides the Brilliance/Color adjustment window.	p. 7	Maximizes the display brilliance.	p. 7
[ALM 1/2] [报警 1/2]	ALARM 1/ALARM 2 Turns the Alarms ON or OFF. →Alarm 1 → Alarm 2 → Alarm 1 and 2 → OFF→	p. 21	Enters the Alarm Zone Setting mode.*	p.21

* Settable only in the 2D view mode.

Function display

① The screen below is only an example.



① SCREEN RANGE READOUT (p. 6)

Displays the range of the current screen.

NM: Nautical miles
km: Kilometers
SM: Miles

② FIXED RING RANGE READOUT (p. 17)

Displays the interval range of the fixed ring.

③ MODE INDICATOR (pp. 9, 11)

Indicates the Screen mode. “(3D)” is displayed while in the 3D view mode.

- Push [MODE (ZOOM)]/
[工作模式 (图像放大)] to select.

H-UP / H-UP (3D): Head-up
SH-UP / SH-UP (3D): Stabilized Head-up
N-UP / N-UP (3D): North-up
C-UP / C-UP (3D): Course-up
TM / TM (3D): True Motion

④ HEADING INDICATOR (p. 10)

Displays the heading readout.

HDG: Heading

Indicates the heading of the vessel's bow in a clockwise direction from north.

- ① Displayed when “Bearing Input” in the Initial menu is set to “NMEA,” “AUX” or “N+1.”

COG: Course Over the Ground

- ① Displayed when “Bearing Input” in the Initial menu is set to “GPS” or “GPS-L.”

⑤ BEARING REFERENCE (p. 10)

Displays the bearing reference.

T: True bearing
M: Magnetic bearing

⑥ TUNING MODE INDICATOR

Displays the Tuning mode and the Tuning level. “Standby” is displayed while in the Standby mode.

TUNE (Auto): Auto tuning
TUNE (Manual): Manual tuning

⑦ VECTOR INDICATOR

Displays the basis of vector reference and the vector time.

T Vector: True vector
R Vector: Relative vector








⑧ TRAILS INDICATOR (p. 14)







Displays the Trail Reference and the Trail Time.

- ① Echoes remain, with gradation, during the period of trail time on the screen. (Except for the trail time: ∞)
- ① Progressing time counter starts counting until the timer reaches the trail time.

T Trail: True trail
R Trail: Relative trail

Function display

- ⑨ **RAIN CONTROL ICON**  (p. 8)
Displayed when the RAIN Control function is active.
- ⑩ **REFERENCE INDICATOR**  (p. 41)
Displayed when the Input Speed Selection is set to "Manual".
- ⑪ **SEA ICON**  (p. 8)
Displayed when the SEA Control function is active. "AUTO" (automatic) is displayed below the icon when the Automatic SEA control is active.
- ⑫ **LONG PULSE ICON**  (p. 13)
Displayed when the Long pulse is used.
- ⑬ **NORTH MARK** (p. 9)
Indicates the true north direction.
- ⑭ **HEADING LINE** (p. 12)
Indicates the ships bow direction.
- ⑮ **CROSS-LINE CURSOR (THE CURSOR)**
Used to measure the bearing and distance, setting the alarm zone, selecting the ARPA/AIS targets, and so on.
The cross-line cursor can be moved in 16 directions by pushing or holding the cursor pad.
- ⑯ **OWN TRACK ICON**  (p. 35)
Displayed when the Own track is turned ON.
- ⑰ **AIS ICON**  (p. 23)
Displayed when a valid AIS signal is received from the NMEA1 (AIS) port.
The icon disappears if the AIS signal is not received for a certain period of time.
① "FULL" is displayed below the AIS icon when the AIS information of 100 targets is received.
- ⑱ **EBL/VRM 1 READOUTS** (p. 19)
Displays the bearing of the Electronic Bearing Line (EBL) 1 and the distance of the Variable Range Marker (VRM) 1, when EBL 1 and the VRM 1 are used.
- ⑲ **EBL/VRM 2 READOUTS** (p. 20)
Displays the bearing of the Electronic Bearing Line (EBL) 2 and the distance of the Variable Range Marker (VRM) 2 when EBL 2 and the VRM 2 are set.
- ⑳ **ARPA ICON**  (p. 30)
Displayed when one or more targets are automatically acquired by the Auto Acquire function.
① "FULL" is displayed below the ARPA icon when 20 targets are automatically acquired.
- ㉑ **PLAIN POSITION INDICATOR SCOPE AREA (PPI)**
Displays the radar picture and plots the data such as vessels, bases, and so on.
① The screen shows when the PPI Area is set to "Wide."

- ㉒ **FIXED RANGE RINGS** (p. 17)
Displays the distance at fixed intervals from the vessel's own position. The interval distance is indicated by the ring range readout (㉒).
① These rings are displayed when the "Brilliance of Rings" item in the Brilliance & Color menu is set to ON (1 to 3).
- ㉓ **ZOOM ICON**  (p. 12)
Displayed when the Zoom view is active.
- ㉔ **ECHO STRETCH ICON**  (p. 13)
Displayed when the Echo Stretch function is active.
- ㉕ **IR 1 / IR 2 ICONS**  /  (p. 8)
Displayed when the Interference Reduction (IR) function 1 or 2 is active.
- ㉖ **ALARM 1 / ALARM 2 ICONS**  /  (p. 21)
Displayed when the alarm 1 or 2 is set.

◇ Information boxes

① Own Ship Info	② AIS(True) Class A	③ Cursor Info
Posn: 34°34.368 N 135°22.581 E COG: 350.0°T SOG: 15.0 kn	499999992 SIM2 T CRS: 330.0°T CPA: 0.092 NM BRG: 282.4°R	T SPD: 17.0 kn TCPA: -18m 42s Dist: 1.839 NM
		Posn: 34°34.707 N 135°20.550 E BRG: 291.3°R Dist: 1.707 NM

- ① **OWN SHIP INFORMATION BOX**
Displays the current location of your vessel.
① To display the position, NMEA 0183 data is required.
- ② **TARGET INFORMATION BOX**
Displays information about the selected target, such as where it is a vessel, base, aircraft, waypoint mark, and so on.
The items displayed in the box vary, depending on the selected target. See the later sections for details on the target type and contents in the information box.
- ③ **CURSOR INFORMATION BOX**
Displays the location of the cross-line cursor and bearing and distance from your own position.
Bearing R: Relative bearing
T: True bearing
M: Magnetic bearing
① Latitude and longitude (Lat/Lon) or Time to go (TTG) can be selected as the position format.

NOTE: You can minimize or restore the information boxes. Move the cursor onto a box (the box frame is highlighted orange), and press [ENTER]/[确认] to minimize or restore the information box.

1 PANEL DESCRIPTION

Menu screen operation

You can customize the infrequently changed values or function settings in the Menu screen.

Routes in the Menu screen, setting screen and the setting items are described in the following manner:

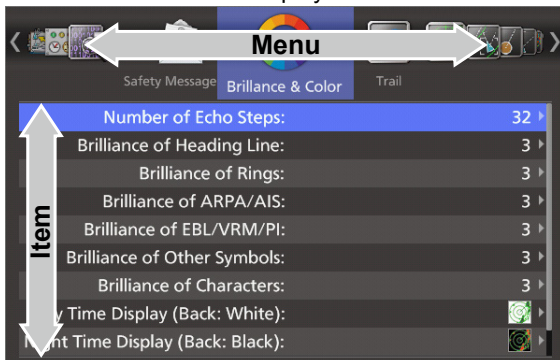
[MENU]/[菜单] > System > **Key Beep**

This shows the “Key Beep” item in the “System” menu.

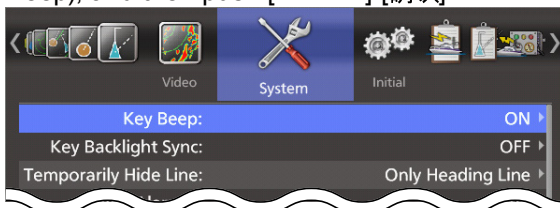
The typical operation in the menu screen is as follows:

(Example: Turning OFF the Key Beep)

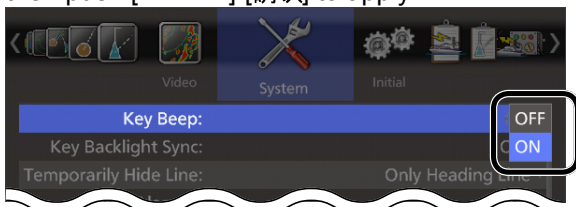
1. Push [MENU]/[菜单].
 - The menu screen is displayed.



2. Push [◀] or [▶] to select a menu.
(Example: System)
3. Push [▲] or [▼] to select an item (Example: Key Beep), and then push [ENTER]/[确认].



4. Push [▲] or [▼] to select an option (Example: OFF), or increasing or decreasing the value, and then push [ENTER]/[确认] to apply.



5. Push [MENU]/[菜单] to exit the menu screen.

NOTE: The Menu screen disappears 10 seconds after the last operation.

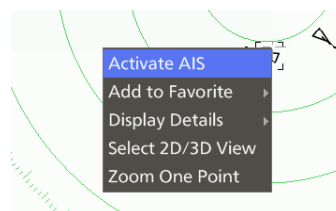
See the Menu screen section for details on each menu or setting item in the Menu screen. (p. 37)

Using the context menu

The radar can display a context menu to shortcut to frequently used functions, by holding [ENTER]/[确认] for 1 second.

① The items in the context menu vary, depending on your operating situation, for example, selected target, display mode, and so on.

1. Move the cursor to a target.
 - The target icon is highlighted in orange.
2. Hold down [ENTER]/[确认] for 1 second.
 - The context menu is displayed.
(Example: An AIS target)

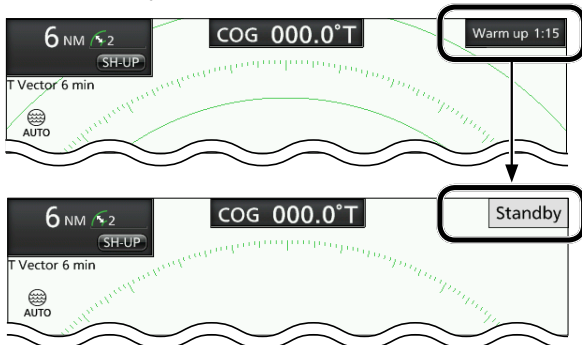


3. Select an item, and then push [ENTER]/[确认].
 - ① Push [CLEAR]/[取消] to return to the PPI screen.
4. Do the operation in the selected function.

Turning the power ON or OFF

◇ Turning ON the radar

1. Push [⏻] to turn ON the radar.
 - The magnetron inside the scanner unit warms up for 90 seconds, and the warm-up time is counted down on the screen.
 - After the countdown is completed, the radar enters the Standby mode.



2. Push [TX (SAVE)]/[发射(节电)] to start scanning.
 - Target and heading markers are displayed.
 - When the TUNE setting in the Video menu is set to "Auto," the screen is displayed approximately 2 seconds after turning on the radar.



NOTE: At the first turning on the radar or after resetting it to the factory default, the Initial Setting screen is displayed. Push [▲] or [▼] to select a language, and then push [ENTER].

◇ Turning OFF the radar

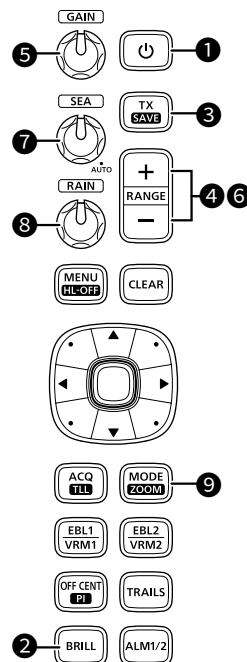
- Push [⏻] to turn OFF the radar.

The typical boot up operation

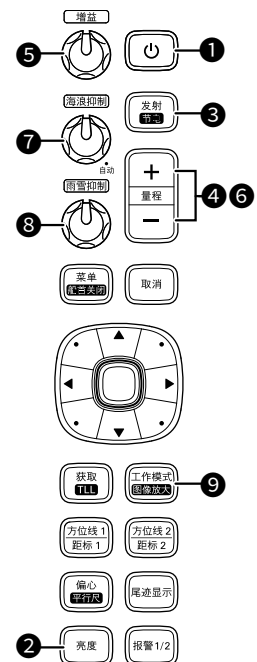
The image of the radar changes with the influence of such as weather waves or rain, surrounding terrain, bridges and radar interference from other vessels. Every time turning on the radar, do the following steps so that you can get a clearer view on the screen.

- 1 Turn ON the radar.
- 2 Adjust the screen brilliance and color. (p. 7)
- 3 After the radar enters standby, push [TX (SAVE)]/[发射(节电)] to start transmitting.
- 4 Push [+] several times to maximize the screen range. (p. 17)
- 5 Rotate **GAIN** / **增益** to adjust the gain (sensitivity). (p. 8)
- 6 Push [-] to set the screen range as you prefer.
- 7 Rotate **SEA** / **海浪抑制** to adjust the sea clutter control. (p. 8)
- 8 Rotate **RAIN** / **雨雪抑制** to adjust the rain clutter control. (p. 8)
- 9 Push [MODE]/[工作模式] to select the display mode. (p. 9)

English keyboard



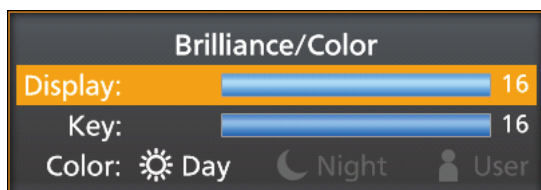
Chinese keyboard



Adjusting the screen brilliance and color

You can adjust the screen and key backlight according to the weather or brightness of surroundings to get better viewing.

- Push [BRILL]/[亮度] to open the “Brilliance/Color” window.



◇ Adjusting the display brilliance

1. Push [▲] or [▼] to Select “Display” in the Brilliance/Color window.
2. Push [◀] or [▶] to adjust the display brilliance.
3. Push [CLEAR]/[取消] to close the window.
 - ① The window automatically closes if you do not push any keys for 5 seconds.

You can increase or decrease the brilliance by pushing [BRILL]/[亮度] repeatedly.
Hold down [BRILL]/[亮度] for 1 second to maximize the brilliance.

NOTE: When you require continuous operation, but not constant viewing, a lower setting can increase the life of the display backlight.

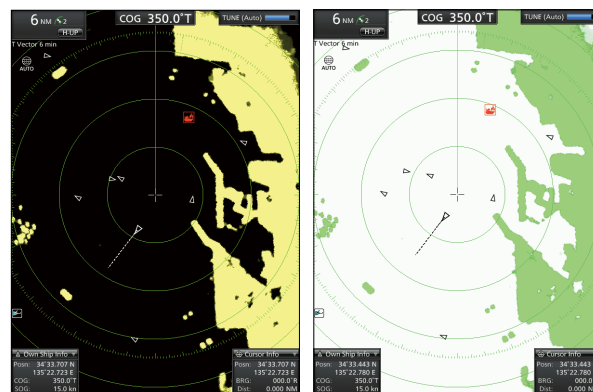
TIP: Customizing the brilliance of the items on the screen

You can individually adjust the brilliance of the displayed items such as fixed range rings, target icons, characters, and so on.
See the “Menu screen” section for details.

[MENU]/[菜单] > **Brilliance & Color**

◇ Selecting the display color

You can select the display color from Day (white background), Night (black background), and User setting.



1. Push [▼] or [▲] to select “Color” in the Brilliance/Color window.
2. Push [◀] or [▶] to select a display color.
3. Push [CLEAR]/[取消] to close the window.
 - ① The window automatically closes if you do not push any key for 5 seconds.

TIP: Customizing the Display color

You can customize the foreground and background color of each color setting, in the Brilliance & Color menu.

See the “Menu screen” section for details.

[MENU]/[菜单] > **Brilliance & Color**

◇ Adjusting the key backlight

The brilliance of the key backlight can be adjusted for your convenient operation.

1. Push [▼] or [▲] to Select “Key” in the Brilliance/Color window.
2. Push [◀] or [▶] to increase or decrease the key backlight brightness.
3. Push [CLEAR]/[取消] to close the window.
 - ① The window automatically closes if you do not push any keys for 5 seconds.

Adjusting the radar reception

The following is typical operation examples that may hinder radar reception (sea clutter, precipitation interference and echoes from other radar).


◇ Adjusting the gain

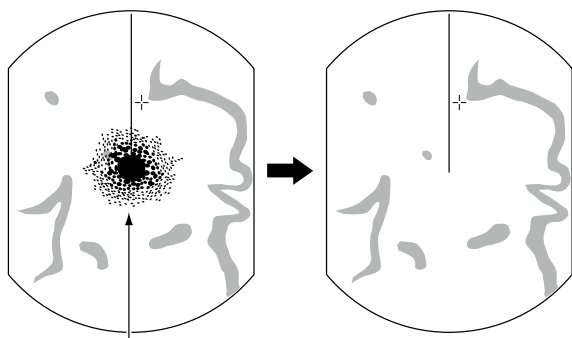
The control adjusts the sensitivity of the receiving signal. The increased gain may increase screen noise.

- Rotate the **GAIN** / **增益** control until the noise disappears.


◇ Reducing the sea clutter

You can eliminate echoes from waves at close range. Reduce the receiver gain for close objects within a radius of approximately 8 NM to eliminate sea clutter.

- Rotate the **SEA** / **海浪抑制** control until the echoes from sea waves disappear.
 - The SEA icon  is displayed in the upper left corner of the screen when the SEA function is active.



Echoes from the sea waves


- Rotate the **SEA** / **海浪抑制** control fully clockwise to activate the automatic control.
 - "AUTO" is displayed below the SEA icon  when the automatic control is active.

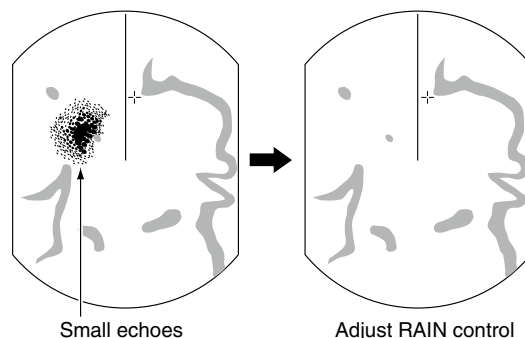
NOTE:

- The **SEA** / **海浪抑制** control reduces the receiver sensitivity of objects within approximately 8 NM. Therefore close targets are blanked if the SEA setting is set to too high.
- While the automatic SEA function is activated, small objects may not be displayed on the screen due to strong echoes from rain or islands within 1 NM.

◇ Reducing the rain clutter

The rain clutter control eliminates echoes from rain, snow, fog, and so on.

- Rotate the **RAIN** / **雨雪抑制** control fully counterclockwise to deactivate the control function.
 - ① The RAIN icon  disappears.

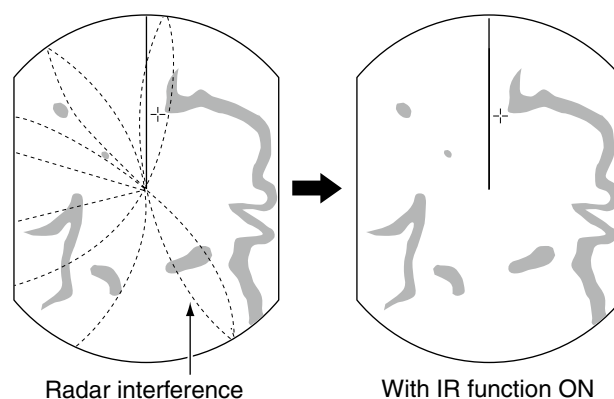


◇ Interference Reduction function

Radar interference may be displayed when another vessel's radar is operating on the same frequency band in close proximity. The Interference Reduction (IR) function can eliminate this type of interference.

[MENU]/[菜单] > Video > **Interference Reduction (IR) Function**

Select 1, 2, or OFF that you can get the clearest view. "IR1" or "IR2" indicator is displayed in the upper right of the screen, when the function is activated.

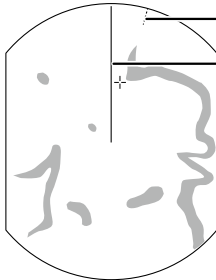
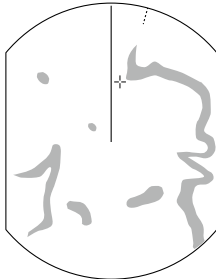
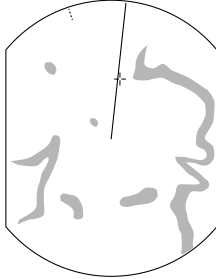
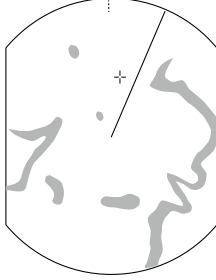
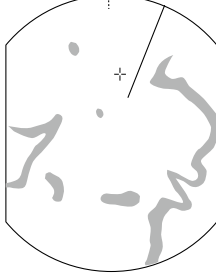


Selecting a screen mode

The radar has 5 display modes.

① “(3D)” is displayed while in the 3D view mode.

- Push [MODE]/[工作模式] to select a display mode.

Mode	Description	Display
Head-up <ul style="list-style-type: none"> • H-UP • H-UP (3D) 	<p>The top of the display indicates your heading.</p> <p>Targets are shown at relative distances and directions to your heading.</p> <p>The headline always indicates the top.</p>	 <p>North marker</p> <p>Headline</p>
Stabilized Head-up <ul style="list-style-type: none"> • SH-UP • SH-UP (3D) 	<p>The top of the display indicates your heading.</p> <p>Targets are shown at relative distances and directions to your heading.</p> <p>The headline always indicates the top.</p> <p>① Requires Bearing data input.</p>	
Course-up <ul style="list-style-type: none"> • C-UP • C-UP (3D) 	<p>The top of the display indicates the heading when the mode has started or when started transmitting.</p> <p>① Requires Bearing data input.</p>	
North-up <ul style="list-style-type: none"> • N-UP • N-UP (3D) 	<p>The top of the display is fixed to the Magnetic north.</p> <p>The targets are shown at their true directions and relative distances to your vessel.</p> <p>① Requires Bearing data input.</p>	
True Motion <ul style="list-style-type: none"> • TM • TM (3D) 	<p>The top of the display is fixed to Magnetic north. The north marker is fixed to the top.</p> <p>All the targets move with their true courses and speed. The fixed target such as islands are displayed as fixed.</p> <p>① Requires Bearing and Position data inputs.</p>	

Reference settings

The radar can accept the bearing input data from NMEA, N+1, AUX, or COG data format. According to the bearing source, you can set the bearing type in the Initial menu screen.

◇ Setting the Bearing input

1. Select "Bearing Type" in the Initial menu screen, and then push [ENTER]/[确认].

[MENU]/[菜单] > Initial > **Bearing Input**

2. Select the Bearing data source, and then push [ENTER]/[确认].
 - NMEA: NMEA0183 bearing data format.
 - N+1: N+1 data format.
 - AUX: Other format.
 - GPS: Reads NMEA0183 COG format data as HDG format. (The course may not match with other HDG format and include errors.)
 - ① When a vessel's speed is less than 2 knots, the direction information is not displayed until the speed increases to more than 3 knots.
 - GPS-L: Reads NMEA0183 COG format data as HDG format. (The course may not match with other HDG format and include errors.)
 - ① When a vessel's speed is less than 2 knots, the direction information is fixed. The display changes only when the vessel's speed increases to more than 3 knots.
 - ① This is in addition to the GPS option to display the cursor latitude and longitude when the vessel's speed is less than 3 knots.

NOTE: If this item is set to "GPS" or "GPS-L," COG (Course Over the Ground) data is used as the bearing.

However, If the vessel's speed is less than 3 knots, direction accuracy falls. Moreover, the position accuracy or the current actual course may vary, and therefore display an incorrect direction.

3. Push [MENU]/[菜单] to exit the Menu screen.

◇ Setting the Bearing type

1. Select "Bearing Type" in the System menu screen, and then push [ENTER]/[确认].

[MENU]/[菜单] > System > **Bearing Type**

2. Select "True" or "Magnetic" then push [ENTER]/[确认].
3. Push [MENU]/[菜单] to exit the Menu screen.

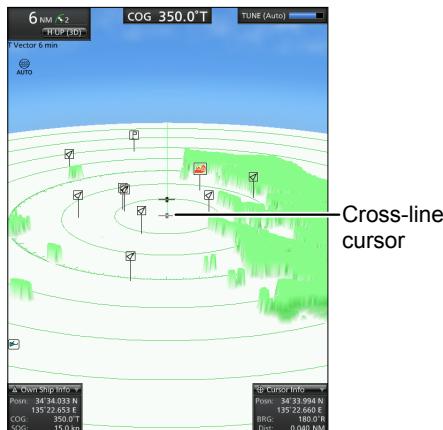
The bearing type is displayed at the top center of the screen.

Changing the screen view

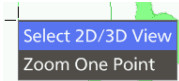
You can change the screen view, according to the situation.

◇ 3D view mode

You can change to the 2D or 3D view in the TX mode. When you set the “Standby mode” in the System menu to “AIS,” you can also use the 3D view in the Standby mode.



1. Move the cursor to a place where there is no target.
2. Hold down [ENTER]/[确认] for 1 second.
 - The context menu is displayed.



3. Select “Select 2D/3D view”, and then push [ENTER]/[确认].
 - The screen changes to the 3D view.
- ① Do the same way to return to the 2D view.

Customizing the 3D view settings

You can customize the 3D height and the angle settings in the 3D view mode.

1. Hold down [ENTER]/[确认] for 1 second.
 - The context menu is displayed.
2. Select “3D Height Setting” or “3D Angle Setting,” and then push [ENTER]/[确认].
3. Push [▲] or [▼] to select an option, and then push [ENTER]/[确认].

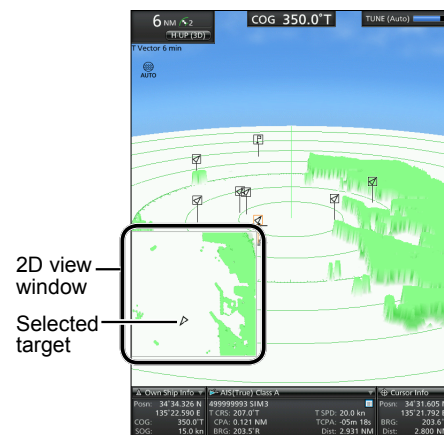
Menu	Options
3D Height Setting	OFF, Low, Middle, or High
3D Angle Setting	20° to 60° in 10° steps

Selecting a target in the 3D view

You can focus a target by moving the cross-line cursor (the gray cross-line at the surface of the PPI area) onto a bottom of the vertical line of a target.

The Dual view of the 3D and 2D

In the 3D view mode, you can 2D view in the sub window.



- Hold down [MODE]/[工作模式] for 1 second ([ZOOM]/[图像放大]).
 - The 2D view is displayed in the sub window. The selected target icon is displayed in the window.
 - ① You can not operate in the sub window.
 - ① Hold down [MODE]/[工作模式] for 1 second again to close the 2D view.

The NOTIFICATION about the 3D view mode

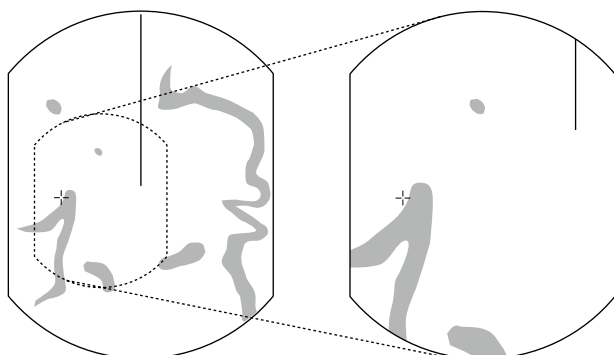
- The EBL/VRM 1 and 2, and Parallel Index Lines are not usable in 3D view mode.
- When the View mode is changed from the 2D to 3D while the Zoom view window is active, the display changes to the 2D/3D Dual view mode.
- Alarm Zone 1 and 2 cannot be edited in the 3D view mode.

Changing the screen view

◇ Temporarily zooming the view

You can temporarily zoom the view to the cursor position.

1. Move the cursor to where you want to zoom, and then hold down [ENTER]/[确认] for 1 second.
 - The context menu is displayed.
2. Select “Zoom One Point,” and then push [ENTER]/[确认].
 - The screen zooms to the cursor position.
3. Push any key to return to the previous view.

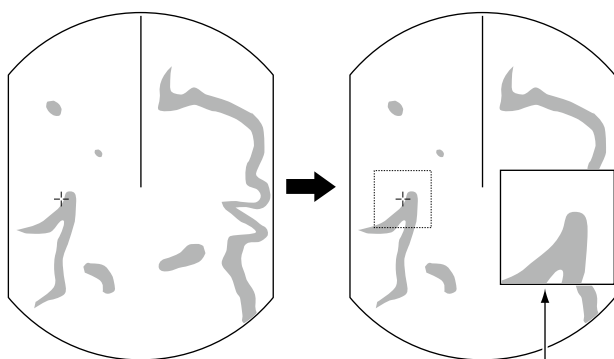


Normal view

Zoomed view


◇ Zoom function

In the 2D view mode, The Zoom function expands the target to two times normal view into the sub window.



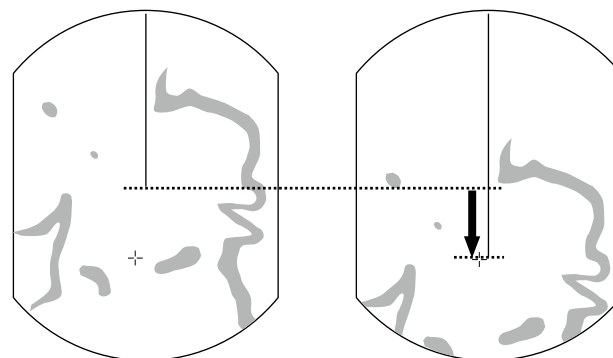
Normal screen

With Zoom function ON

1. Move the cross-line cursor to a target.
2. Hold down [MODE]/[工作模式] for 1 second to change between the zoomed view and the normal view.
 - The ZOOM icon  is displayed in the upper right of the screen.

◇ Off Center function

The Off Center function is used to enlarge the upward view, typically the bow direction display in the Head-up screen mode, by shifting downward the center of the screen.



Normal view

OFF center view

The Off Center function is usable in 24 NM or shorter ranges, excepting for the TM screen mode.

- Push [OFF CENT]/[偏心] to shift the screen.
- Push [OFF CENT]/[偏心] again to return to the normal screen.

TIP: The OFF center rate is settable in the “OFF Center Mode” setting in the System menu.

[MENU]/[菜单] > System > **OFF Center Mode**

Options: 25%, 50%, 75%, or Cursor

◇ Hiding the heading marker (Head-line OFF)

The heading marker is a line that indicates your vessel's bow direction. This marker will be displayed on the center of the screen when the Head-up screen: H-UP or H-UP (3D) is selected.

You can temporarily hide the heading marker while holding down the [MENU (HL-OFF)]/[菜单 (船首关闭)] key in such case that a target is under the heading marker.

Magnifying small targets

To display small targets clearer, the extending Pulse Width and Echo Stretch functions are effective.

◇ Pulse Width Setting

The Long pulse function releases a longer pulse to detect a small target in distant, although it decreases the target distance resolution.

[MENU]/[菜单] > Video > **Pulse Width Setting**

Select "Long" for long distance detection, or "Short" for a proper distance resolution.

When "Long" is set, "Ⓛ" is displayed in the upper left of the screen.

In the 1.5 to 3 NM range, this function magnifies echoes behind the target.

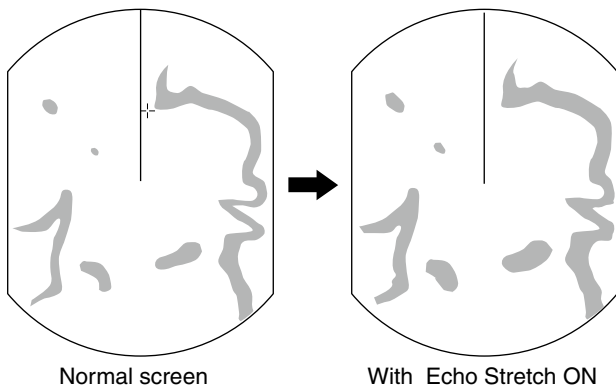
◇ Echo Stretch function

The Echo Stretch function electronically magnifies the blips for more clear viewing of small targets.

[MENU]/[菜单] > Video > **Echo Stretch Function**

When this function is ON, "ES" is displayed in the upper right of the screen.

Turn OFF this function in normal operation.



Normal screen

With Echo Stretch ON

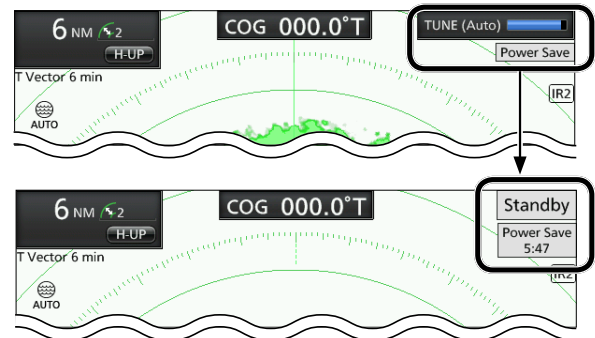
Power Save mode

The radar conserves the vessel's battery power by entering the Power Save mode.

In the Power Save mode, the radar pauses transmitting for the set period of time (6 minutes at default.) After the timer expires, the radar resumes transmitting during ten revolutions and then pauses again for the set period of time.

◇ Entering the Power Save mode

- Hold down [TX (SAVE)]/[发射(节电)] for 1 second to enter the Power Save mode.
 - "Power Save" is indicated in the upper right corner of the screen, and the timer starts counting down.



◇ Canceling the Power Save mode

- Push [TX (SAVE)]/[发射(节电)] to cancel the Power Save mode.
 - The Power Save indicator disappears.

◇ Setting the Standby Time

You can set the Standby Time in the System menu.

1. Select "Save Time" in the System menu, and then push [ENTER]/[确认]

[MENU]/[菜单] > System > **Save Time**

2. Push [▲] or [▼] to select the Save Time.
 - Options: 1, 6, 15, and 30 minutes
3. Push [ENTER]/[确认] to apply the setting.
4. Push [MENU]/[菜单] to exit the Menu screen.

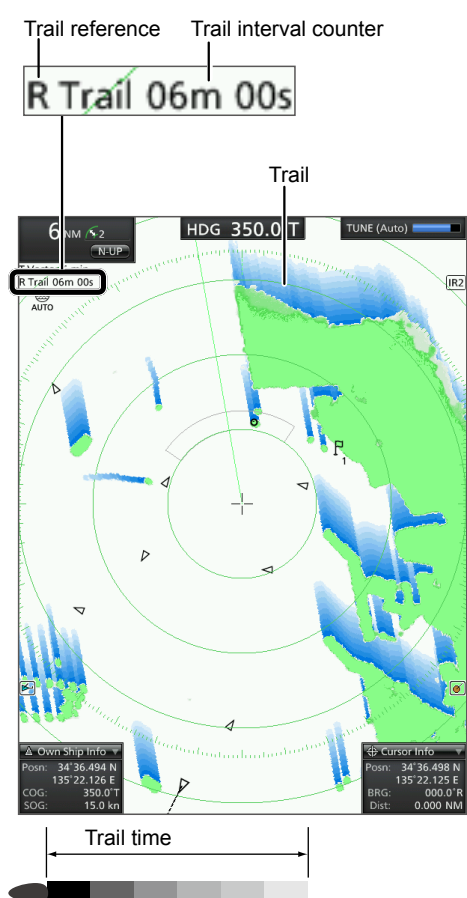
NOTE: The Power Save mode is automatically canceled when any collision alert or signal is received from the NMEA input ports.

Trail function

The trail function memorizes echoes continuously at constant intervals. This function is useful for watching other vessels' tracks, approximate relative speed, and so on.

◇ Displaying the Trail

1. Push [TRAILS]/[尾迹显示] to turn ON the Trail function.
 - The trail indicator and trail interval are displayed in the upper left of the screen.
 - Trail interval counter starts to count up to the trail time.



All echoes higher than the specified level at the plotted time are memorized and displayed with a graduated intensity together with the current echoes.

- Echoes are displayed with minimum intensity when "Continuous" is selected.
- ① Hold down [TRAILS]/[尾迹显示] for 1 second to reset the plotted echoes.
 2. Push [TRAILS]/[尾迹显示] to cancel the Trail function and erase the plotted echoes.
 - The trail indicator and the trail interval disappear.

◇ Customizing the trail settings

You can customize the trail settings in the Trail menu.

[MENU]/[菜单] > Trail

Clear Trails

① Settable only when the Trail function is ON.

- Resets the current trails.

Push [◀] to select <OK>, and then push [ENTER]/[确认] to reset the trails.

Reference Settings

Selects the reference of the trails.

- **True:** The trails of other vessels show the real speeds and courses over the ground, regardless of your vessel movement. The Heading signal (HDG) and the position (GPS) data of your vessel are required.
- **Relative:** The trails of other vessels show relative movement to your vessel. This setting is useful to avoid a collision. However, it is not recommended to use it near islands because a stopped target (for example, an island) is also displayed with a trail.

① Regardless of this setting, the True trail is displayed when the True motion (TM) mode is selected.

Time

Selects the trail time from 30 sec, 1 min, 3 min, 6 min, 15 min, 30 min, or Continuous.

Level

Selects the trail strength from Low, Middle, or High.

Fine Trail

The Fine Trail function makes the trails thin to show the movement of the target clearer. Select the trail type from OFF (normal), 1 (fine), or 2 (extra fine).

Color

Selects the trail color from Blue, Yellow, Green, Red, Orange, or White.

Basic radar theory

Radar finds targets by receiving electromagnetic radiation reflected from large vessels, bridges, or other nearby metal objects. Receiving unwanted reflections from some objects may cause false echoes on screens where the target does not exist.

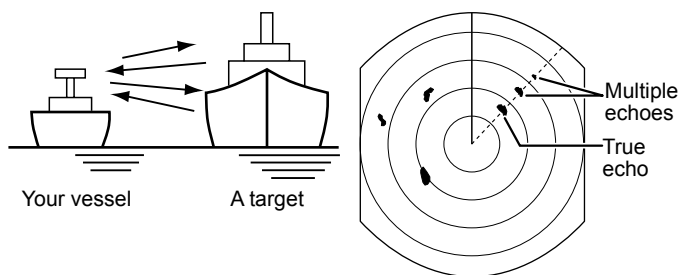
By understanding these phenomena logically and adjusting the radar function appropriately, some of these false echoes can be reduced.

◇ Multiple echoes

Multiple echoes may be displayed when a short-range and strong echo is received from a vessel, a bridge, or a breakwater.

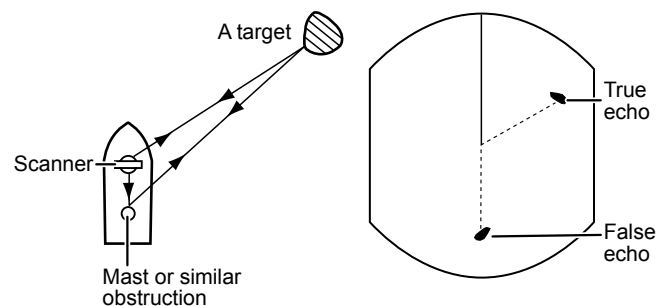
Multiple echoes will be displayed beyond the target's true echo point on the same bearing of a large target. You can reduce them by properly adjusting **SEA** / **海浪抑制** control.

See page 8 for more information on **SEA** / **海浪抑制** control.

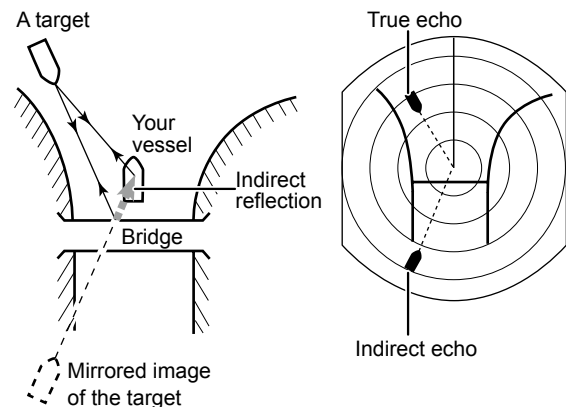


◇ Indirect echoes

Indirect echoes may be returned from a passing vessel or from a reflective surface such as the mast of your vessel.



Indirect echoes from the reflective surface appear in different orientations than direct (true) echoes, but the distance is approximately the same for both.

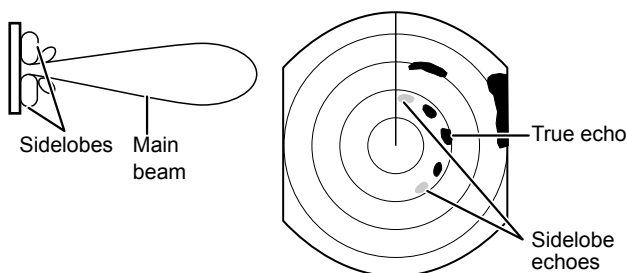


◇ Sidelobe echoes

Radiation escapes on both sides of the beam in the sidelobe. If a target reflects this radiation, it will be displayed on the screen as an echo.

Sidelobe echoes usually occur as a result of large (strongly reflecting) targets at a short distance. You can reduce them by properly adjusting **SEA** / **海浪抑制** control.

See page 8 for more information on **SEA** / **海浪抑制** control.

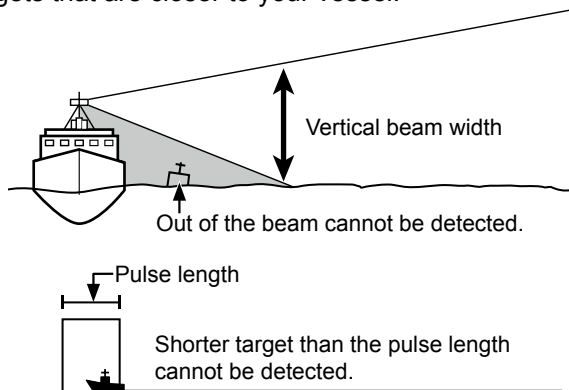


Basic radar theory

◇ Minimum range

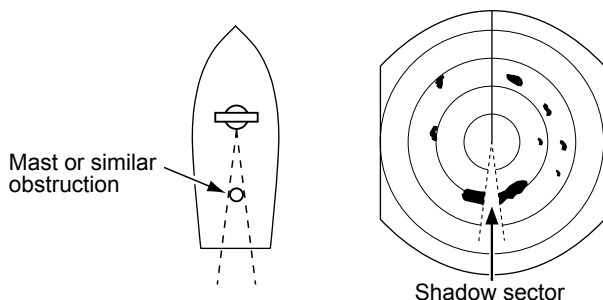
The minimum range of the radar is primarily determined by transmitter pulse length, vertical beam width, and the scanner unit height. The quicker transmission, the faster the echo returns so that the distance can be measured faster.

If the scanner is placed too high from the surface of the water, the scanner's vertical beam overshoots the targets that are closer to your vessel.

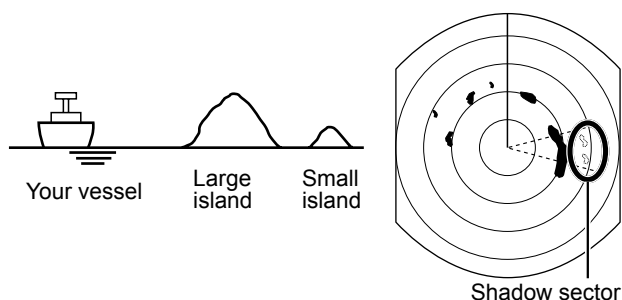


◇ Blind and shadow sectors

A blind or shadow sector may appear because of obstructions such as masts or other metal objects. An obstruction may throw either a complete or partial shadow as shown below. If a target is in a shadow sector, target echoes may not appear on the screen.



When tall and massive targets such as a large island are located at close range also shadowed without producing any echoes. This phenomenon is called blind sector. It is very important to know the bearings and widths of all shadow sectors caused by your own vessel's obstructions.

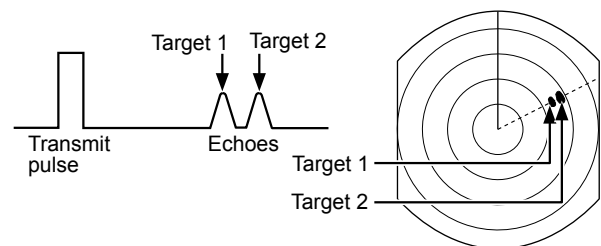


◇ Target resolution

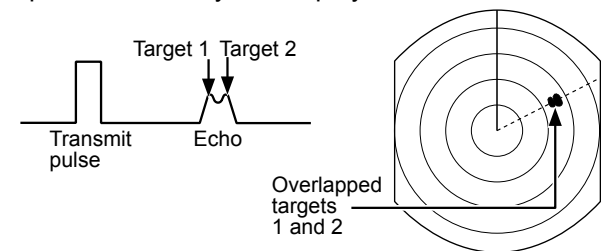
Target resolution is determined, by the horizontal beam width and transmit pulse width. It can be difficult to detect two targets that are separated by a short distance or in the same direction.

Distance resolution

When the distance between two targets is more than the pulse width, they are displayed as two echoes.

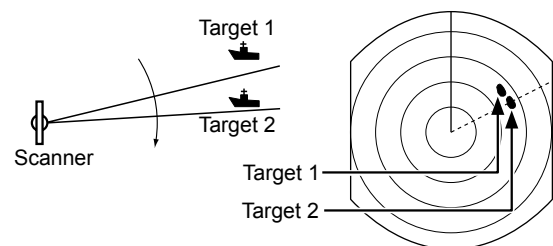


However, if the distance between them is less than the pulse width, they are displayed as one echo.

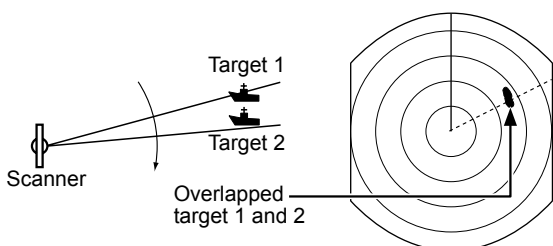


Direction resolution

When two targets are separated by more than the horizontal beam width, they are displayed as two echoes.



However, if they are closer by less than the horizontal beam width, they are displayed as one echo.



Distance measurement

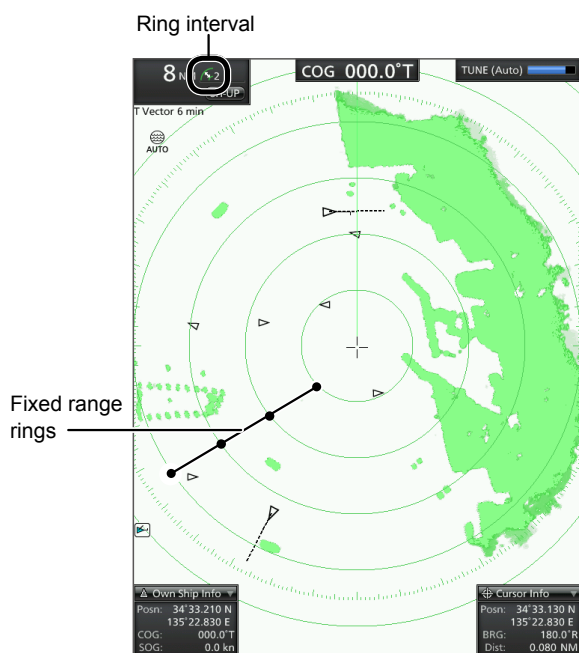
Various way to measure the distance are provided with this radar.

① You can set the distance unit to nautical miles (NM), kilometers (km), or statute miles (SM) in the Initial Menu screen (p. 42).

TYPE DESCRIPTION	Description	Reference
Fixed range rings (RING)	Displays concentric fixed circles around your vessel. Suitable for rough estimations from your own vessel to any target. You can select from two types of range rings.	See below
Parallel index lines (PI)	Displays six parallel index lines. Suitable for rough estimations from your own vessel to any target.	p. 18
Variable range marker 1 (VRM 1)	Displays a variable range marker and activated by [▲] or [▼] for the range marker selector. Suitable for accurate measurements from your own vessel to a target.	p. 19
Variable range marker 2 (VRM 2)	Normally functions the same as VRM 1. When the VRM 1 and EBL 1 selects a target, the center of VRM 2 is displayed at the intersection point. Suitable for accurate measurements from target to target.	p. 20

◇ Using the Fixed range rings

The interval of the fixed range rings is displayed in the upper left corner of the screen. The ring interval in each screen range is listed to the right.



TIP: You can adjust the brilliance of the range rings in the “Ring” setting of the Brilliance & Color menu.

[MENU]/[菜单] > Brilliance & Color > **Brilliance of Rings**

Set the “Brilliance of Rings” setting to “OFF” to hide the fixed range rings.

Range rings in each screen range

Range (NM)	Ring interval		Number of rings	
	Type 1	Type 2	Type 1	Type 2
1/8	0.0625		2	
1/4	0.125		2	
1/2	0.125		4	
3/4	0.25		3	
1	0.25		4	
1.5	0.5	0.25	3	6
2	0.5		4	
3	1	0.5	3	6
4	1		4	
6	2	1	3	6
8	2		4	
12	3	2	4	6
16	4		4	
24	6	4	4	6
32	8		4	
36	12		3	
48*1	12		4	
64*1	16		4	
72*2	18		4	

Range (km)	Ring interval		Number of rings	
	Type 1	Type 2	Type 1	Type 2
1/4	0.125		2	
1/2	0.125	0.25	4	2
3/4	0.25		3	
1	0.25		4	
1.5	0.5	0.25	3	6
2	0.5		4	
3	1	0.5	3	6
4	1		4	
6	2	1	3	6
8	2		4	
12	3		4	
16	4		4	
24	6		4	
32	8		4	
36	12		3	
48	12		4	
64*1	16		4	
72*1	18		4	
96*2	24		4	

*1 Only for the MR-1220T6 and MR-1220T6L.

*2 Only for the MR-1220T6L.

① The number of rings may differ, when the screen is shifted by a function such as Off Center.

① in the SM range, the Type 1 and 2 displays the same rings.

Selecting the range ring type

You can select from two types of range rings.

1. Open the “Range Ring Select” setting in the Menu screen.

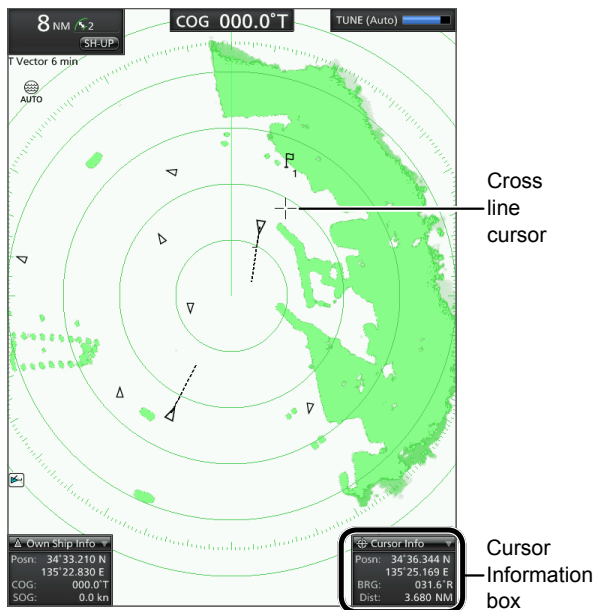
[MENU]/[菜单] > Initial > **Range Ring Select**

2. Select the type of the fixed range rings, Type 1 or Type 2.

Distance measurement

◇ Checking the bearing and distance from your vessel

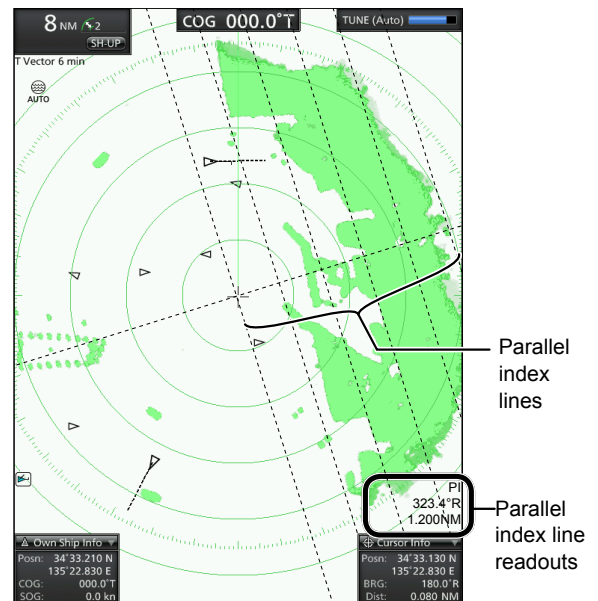
You can check the bearing and distance to a target by moving only the cross-line cursor to a target. The Cursor Information box in the bottom right corner on the screen displays the position details of the cursor, including the distance and variation from your own position.



① Latitude and Longitude (Lat/Lon) or Time To Go (TTG) can be selected as the position format.

◇ Using the Parallel Index lines

1. Hold down [OFF CENT]/[偏心] for 1 second ([PI]/[平行尺]).
 - The crossed lines are displayed.
2. Push [▲] or [▼] to increase or decrease the interval of lines, and [◀] or [▶] to rotate the lines.
 - The direction of the Parallel Index lines and the range of lines are displayed in the lower right area of the screen.
3. Push [ENTER]/[确认] to set lines.



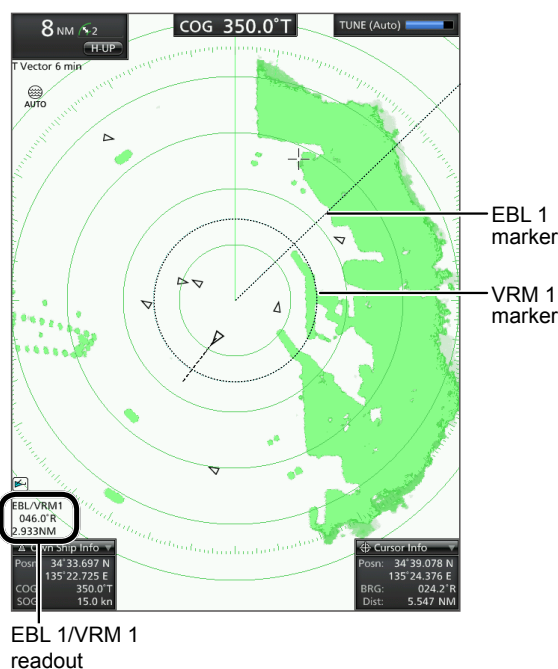
① Hold down [OFF CENT]/[偏心] for 1 second again to clear the Parallel Index lines.

Bearing and distance measurement

This radar has two sets of Electronic Bearing Lines (EBL) and Variable Range Markers (VRM) to indicate the target direction from your vessel to a target.

◇ Using the EBL and VRM

1. Move the cursor onto a target.
2. Push [EBL 1 (VRM 1)]/[方位线 1(距标 1)] to display the EBL 1 and VRM 1 markers.
3. Push [◀] or [▶] to rotate the Electronic Bearing Line (EBL), and push [▲] or [▼] to increase or decrease the Variable Range Marker's (VRM) ring size.
 - The EBL/VRM 1 readout in the lower left corner of the screen indicates the target bearing and distance in orange.
4. Push [ENTER]/[确认] to apply the EBL 1 and VRM 1.
 - The EBL 1/VRM 1 readout changes to black.
5. Move the cursor onto another target.
6. Hold down [EBL 1 (VRM 1)]/[方位线 1(距标 1)] for 1 second to move the EBL 1 and VRM 1 to the cursor.
 - ① Hold down [EBL 1 (VRM 1)]/[方位线 1(距标 1)] for 1 second again to move the EBL 1 and VRM 1 to the original place.
7. Push [EBL 1 (VRM 1)]/[方位线 1(距标 1)] to clear the EBL 1 and VRM 1.



TIP: The indication may differ, depending on the “Bearing Mode” and “Bearing Reference” setting.

[MENU]/[菜单] > System > **Bearing Mode**

[MENU]/[菜单] > System > **Bearing Reference**

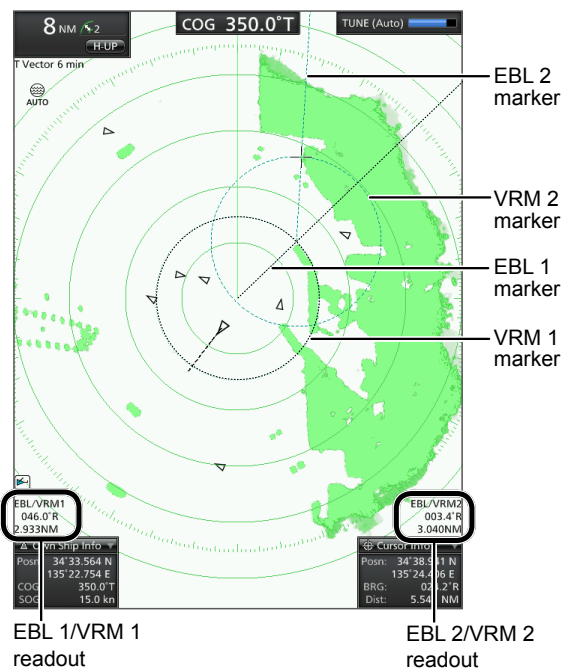
- 0 to 359.9°R: Relative direction, clockwise from the vessel's bow. (when “360°R” is selected)
- P/S 0 to 180°R: Relative direction, left or right from the vessel's bow. (When “PT/SB” is selected)
- 0 to 359.9°T: True bearing. (When “True” is selected in both Bearing Mode and Bearing Reference.)
 - ① Bearing data is required.
- 0 to 359.9°M: Magnetic bearing. (When “Magnetic” is selected in Bearing Mode and “True” is selected in “Bearing Reference.”)

Advanced measurements

◇ Measuring the distance and direction between two targets

Using both Electronic Bearing Lines (EBL) and both Variable Range Markers (VRM), the following advanced measurements can be made.

1. Move the cursor onto a target.
2. Push [EBL 1 (VRM 1)]/[方位线 1(距标 1)] to display the EBL 1 and VRM 1 markers.
3. Push [◀] or [▶] to rotate the Electronic Bearing Line (EBL), and push [▲] or [▼] to increase or decrease the Variable Range Marker's (VRM) ring size.
4. Push [ENTER]/[确认] to apply the EBL/VRM 1 setting.
5. Move the cursor onto another target.
6. Push [EBL 2 (VRM 2)]/[方位线 2(距标 2)] to display EBL 2 and VRM 2.
 - The center of EBL 2/VRM 2 is placed at the intersection of EBL 1 and VRM 1.
7. Push [◀] or [▶] to rotate the Electronic Bearing Line (EBL), and push [▲] or [▼] to increase or decrease the Variable Range Marker's (VRM) ring size.
8. The EBL/VRM 2 readout displays the distance between two targets and the direction from the first target to the other.



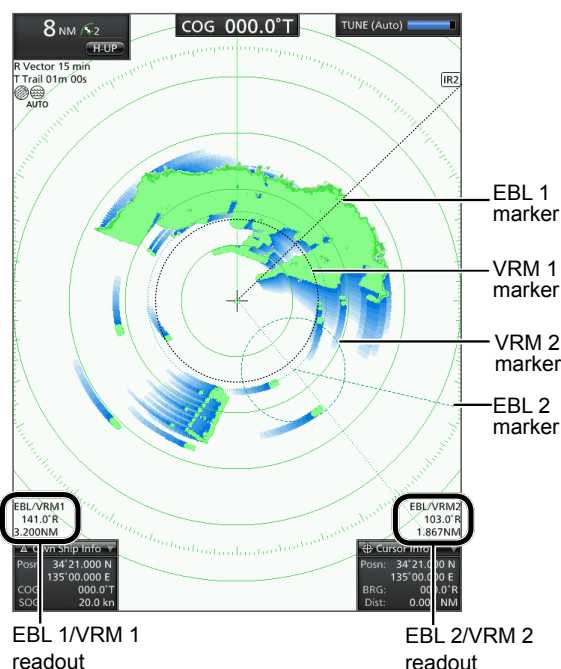
◇ Measuring the relative speed and course of a target

1. Push [TRAIL]/[尾迹显示] to turn ON the Trail function, and wait until the set trail time expires.
 - ① The Trail Time is displayed in the upper left of the screen.
2. Move the cursor onto the end of the trail of a target.
3. Push [EBL 1 (VRM 1)]/[方位线 1(距标 1)] to display the EBL 1 and VRM 1 markers.
4. Push [◀] or [▶] to rotate the Electronic Bearing Line (EBL), and push [▲] or [▼] to increase or decrease the Variable Range Marker's (VRM) ring size.
5. Push [ENTER]/[确认] to apply the VRM 1/EBL 1 setting.
6. Push [EBL 2 (VRM 2)]/[方位线 2(距标 2)] to display EBL 2 and VRM 2, and then place them on the current position of the same target.
 - The center of EBL 2/VRM 2 is placed at the intersection of EBL 1 and VRM 1.

VRM 2 shows the target movement that can be converted into the relative target speed.

For example, when the Trail Time is 6 minute, multiplying the distance by ten gives the relative average speed of the target, and the EBL 2 displays the course direction of the target.

① If your vessel is stationary during the plot time, converted value shows the absolute speed and direction of the target.




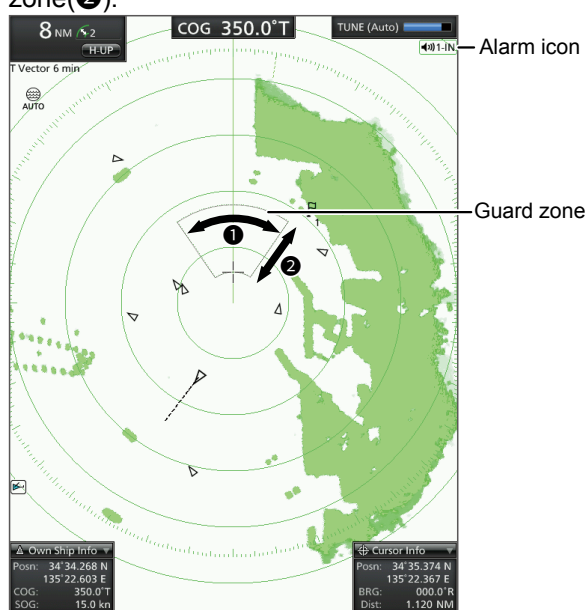
Using an Alarm function

The radar has an alarm function to protect your vessel from collisions. The Alarm function alerts you with an alarm sound and message on the screen if a vessel, island, or other obstruction enters (or goes out of) the preset Guard zone(s). You can set the up to two Guard zones by setting ranges and angles.

◆ Setting a Guard zone

(Example: Setting the Alarm 1)

1. Select the desired screen range.
2. Move the cross-line cursor to the starting point of the alarm zone.
3. Push [ALM 1/2]/[报警1/2] to turn ON the Alarm 1.
 - “ 1-IN” and the preset Guard zone is displayed.
4. Hold down [ALM 1/2]/[报警1/2] for 1 second to enter the Guard zone setting mode.
 - The inner center of the Guard zone moves to the cursor, and the cross-line cursor disappears.
5. Push [◀] or [▶] to adjust the angle (①), and push [▲] or [▼] to adjust the distance of the alarm zone (②).





6. Push [ALM 1/2]/[报警1/2] to apply the Guard zone.
 - The cross-line cursor is displayed.
 - The selected Guard zone remains.

① You can set the Alarm 2 in the same way.

① Push [ALM 1/2]/[报警1/2] several times to turn ON the Alarm 2.

When a target comes into (or goes out of) the Guard zone:

- An alarm sounds.
 - The alert message is displayed.
 - The Guard zone is highlighted.
1. Push [CLEAR]/[取消] to stop the alarm.
 2. Push [ALM 1/2]/[报警1/2] to cancel the alarm signal and function.
 3. To deactivate the alarm function, push [ALM 1/2]/[报警1/2] several times.
 - “ 1-IN” and the Guard zone disappear.
 4. To turn ON the alarm function again with the same Guard zone, push [ALM 1/2]/[报警1/2].
 - “ 1-IN” and the preset alarm zone is displayed.

Using an Alarm function



◇ Entering the Power Save mode

While the Alarm function is active, you can turn OFF the display while waiting for an alarm, to conserve the battery power.

- Hold down [TX (SAVE)]/[发射(节电)] for 1 second while the Alarm 1 and/or 2 function is ON.
 - The radar enters Power Save mode, and the display turns OFF.

When a target comes into the Guard zone, an alarm sounds, and the display turns ON, and the Power Save mode is canceled.

Push [TX (SAVE)]/[发射(节电)] to manually cancel the Power Save mode.

NOTE: If the alarm icon is “”, the alarm function is invalid because the invalid screen range is selected. In that case, push [+] / [–] until the alarm icon returns to “.”

◇ Setting the Zone alarm type

You can select the alarm type in the Menu screen. Select “Zone Alarm 1” or “Zone Alarm 2” in the System menu.

Zone Alarm 1 / 2

[MENU]/[菜单] > System > **Zone Alarm 1**

[MENU]/[菜单] > System > **Zone Alarm 2**

Selects the Alarm type.

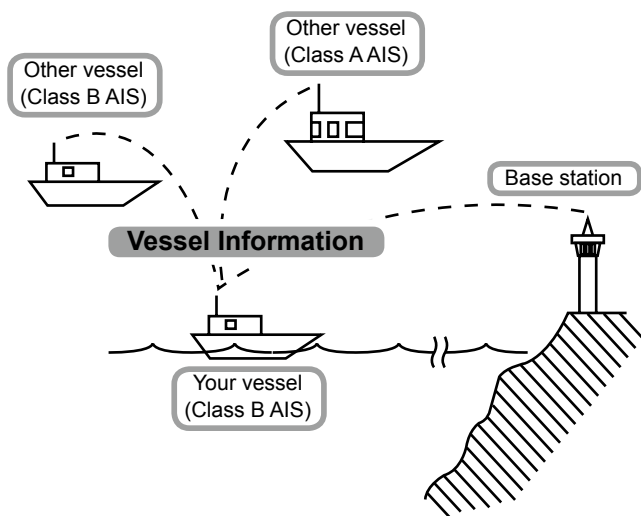
- Enter: An alarm sounds when a target comes into the zone.
- Exit: An alarm sounds when the target goes out of the zone.

About AIS

The Automatic Identification System (AIS) is primarily used for collision-risk management and navigation safety. It automatically transmits and receives vessel information, such as the vessel name, MMSI code, vessel type, position data, speed, course, destination and more. Information is exchanged among the vessels and/or base stations on the VHF maritime mobile band. The information helps to identify other nearby vessels or stations by displaying the received data on the radar screen.

◇ AIS Classes

There are seven types of AIS stations, vessels, base stations, Search and Rescue (SAR), Aids to Navigation (AtoN), Search and Rescue Transmitter (SART), Man OverBoard (MOB), and Emergency Position Indicating Radio Beacon (EPIRB). AIS units for vessels are classified into Class A and Class B. Under the Safety Of Life At Sea (SOLAS) convention, all SOLAS vessels are required to install a Class A AIS transponder: Many other commercial vessels and some leisure craft that are not required Class A units install Class B unit to avoid accidents at sea.



The radar can receive and display up to 100 (depends on the Menu screen setting) of AIS Class A and Class B targets on the screen, if the required data is input to the display unit. See the External data list (p. 61) for the details on the data requirements.

AIS description

◇ Turning the AIS display ON or OFF

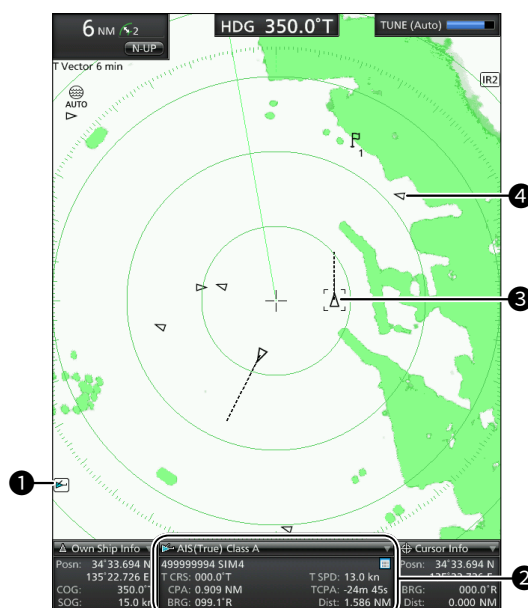
You can turn the AIS display ON or OFF in the AIS menu.

[MENU]/[菜单] > AIS > **Display AIS Targets**

◇ Description of the AIS display

If the radar has received AIS information of other vessels or other targets, the icons are displayed as shown below.

① See "AIS settings" later in this section for customizing the AIS setting options.



① AIS Icon

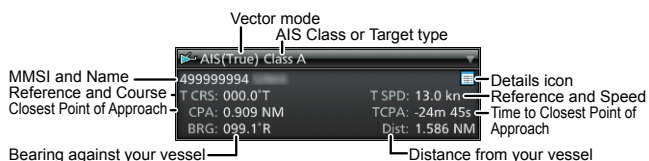
Displayed when a valid AIS signal is input to the NMEA 1 port. The icon disappears if the AIS signal is not received for 6 minutes.

① "FULL" is displayed below the AIS icon when the AIS information of 100 targets is received.

AIS description

② AIS information box

Displays the selected AIS target (③) details.



③ Selected AIS target

You can select an AIS target by moving the cursor and pushing [ENTER]/[確認] on it. Four corners of a square are displayed when a target is selected. The AIS information of the selected AIS target is displayed in the AIS information box (②).

④ AIS target

Targets whose AIS signal are received are displayed with icons. The icon vary, depending on the target type or its status.

Icon	Description
	Vessel ① The triangle tip shows its heading.
	Vessel (CPA and TCPA are unknown)
	Base Station
	Search and Rescue (SAR) vessel
	Search and Rescue (SAR) aircraft
	Aids to Navigation (AtoN)
	Virtual Aids to Navigation (Virtual AtoN)
	Search and Rescue Transponder (SART), Man OverBoard (MOB), or Emergency Position Indicating Radio Beacon (EPIRB)

◇ Status of the vessel icon

Vessels are displayed with triangle icons. The icon vary, depending on the target status.

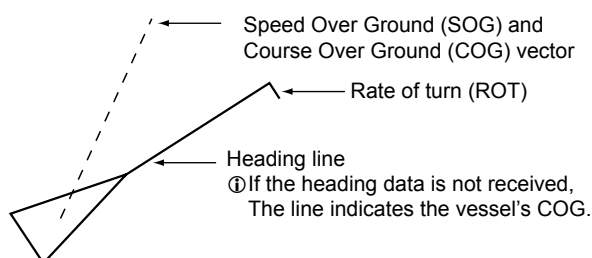
Icon	Status
	Sleeping target: A target in the following status is displayed as a triangle without a heading or vector line. <ul style="list-style-type: none"> Target whose AIS signal has been updated (received), however the distance from your vessel is far. Target that you manually changed to Sleeping target. Target that you entered the Blocking AIS list.
	Activated target: The target is displayed with the heading line, Speed Over Ground (SOG), Course Over Ground (COG) vector, and Rate Of Turn (ROT). Refer to the next page for details on the lines.
	Selected target: The target's information is displayed in the data area.
	Dangerous target: Even if the target's status is sleeping or activated, when it enters your CPA and TCPA limit settings, the target is displayed with a thick line and changes its color to red.
	Lost target: When the AIS signal has not been updated (received) for a specific period of time, the target triangle is marked with a red cross. If the AIS signal has still not been updated (received) for 6 minutes and 40 seconds, the target icon disappears. ① A vessel is regarded as a "Lost target" after a specified period of time has passed since the vessel last transmitted data. (p.27)

AIS description

◇ Course and speed vectors

The vector indicates the target's predicted, true or relative course and speed.

- The vector time may change, depending on the setting in the "Vector Time" item of the Target menu (p. 39).
- The tip of the vector shows the target's predicted position after the time selected in the "Vector Time" item of the Target menu (p.39).



◇ Plots (AIS)

The plot displays the activated target, SAR, SART, MOB, or EPIRB's past positions as 5 dots, during each specified tracking interval.

- ① The target track interval may change, depending on the setting in the "Track Interval" item of the Target menu. (p. 39)

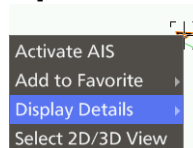
Plots	Status
	Going straight
	Turning right
	Decelerating (dots are closer together behind the target)
	Accelerating (dots are father apart behind the target)

AIS operation

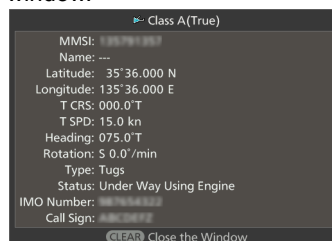
◇ Displaying AIS target details

You can also display the more details on an AIS target from a context menu.

1. Move the cursor onto an AIS target.
 - The target is highlighted.
2. Hold down [ENTER]/[确认] for 1 second.
 - The context menu is displayed.
3. Select "Display Details," and then push [ENTER]/[确认].



- The detailed AIS information is displayed in the window.



- ① Push [CLEAR]/[取消] to close the window.

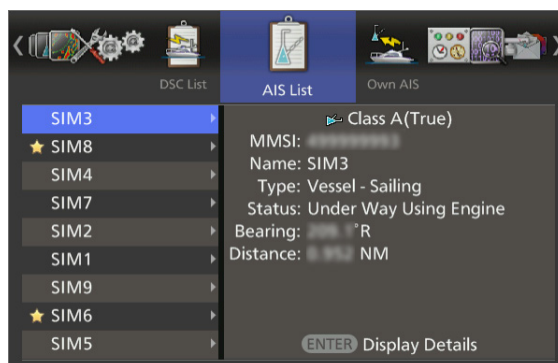
TIP: You can display the AIS details by moving the cursor to in the Information box and pushing [ENTER]/[确认].

◇ Received AIS list

The list of received AIS is in the AIS List menu.

The targets are displayed with their MMSI numbers, or names of the ships, if entered.

[MENU]/[菜单] > AIS List

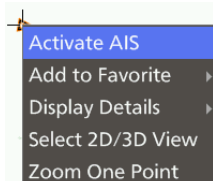


TIP: You can enter the selected target in the list by holding down [ENTER]/[确认] for 1 second and select "Add to Favorite".

AIS operation

◇ Activating a Sleeping target

1. Move the cross-line cursor to a sleeping target, and then hold down [ENTER]/[确认] for 1 second.
 - The context menu is displayed.
2. Select “Activate AIS” and push [ENTER]/[确认] to activate the selected target.



- The target is activated and its vector line is displayed.

◇ Changing a Active target to sleeping

- Move the cross-line cursor to an activated target, then hold down [CLEAR]/[取消] for 1 second to change the selected target to sleeping.
 - The target is slept and its vector line disappears.

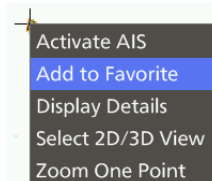
◇ Warning message by AIS receiver

When a target advances within the CPA and TCPA limits, mark changes its color to red and blinks. The message “AIS Collision Warning!” is displayed, and an alarm sounds. Push [CLEAR]/[取消] to cancel the alarm.

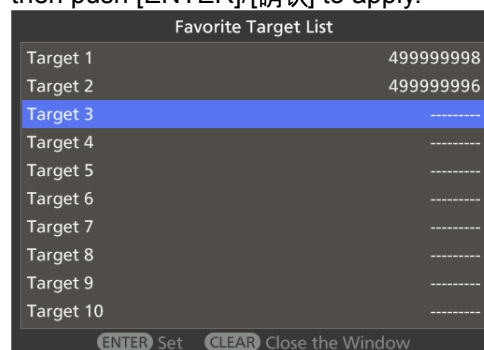
◇ Adding to the Favorite AIS list

You can enter up to 10 frequently referred targets to your Favorite AIS list.

1. Move the cross-line cursor to a target, and then hold down [ENTER]/[确认] for 1 second.
 - The context menu is displayed.
2. Select “Add to Favorite” and push [ENTER]/[确认]

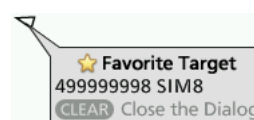


- Favorite Target List window is displayed.
3. Select a target number that you want to enter, and then push [ENTER]/[确认] to apply.



- The target is entered a Favorite Target.

When a favorite target enters in the preset range, the pop-up dialog shows the target information as follows:



Push [CLEAR]/[取消] to clear the dialog and return to the operation.

- ① You can set the range in the “Range (Favorite Target)” of the Target menu.

[MENU]/[菜单] > Target > **Range (Favorite Target)**

- ① You can check the Favorite target list from the Target menu.

[MENU]/[菜单] > Target > **Favorite Target List**

AIS operation

◇ About Lost targets

After a specified period of time (see the table below) has elapsed since the last AIS was received from a vessel, it is considered a Lost Target.

The “Lost target” icon automatically disappears from the screen 6 minutes and 40 seconds after the vessel becomes “Lost target.”

Reference time to become a Lost target

• Class A/B

Vessel type			Nominal reporting interval Class A	Lost target maximum interval Class A	Nominal reporting interval Class B *1		Lost target maximum interval Class B *1	
					CS *2	SO *3	CS *2	SO *3
1	Class A	Vessel is at anchor or moored and not moving faster than 3 knots	3 min.	18 min.	—	—	—	—
	Class B	Vessel is not moving faster than 2 knots	—	—	3 min.	3 min.	18 min.	18 min.
2	Vessel is at anchor or moored and moving faster than 3 knot		10 sec.	60 sec.	N/A		N/A	
3	Class A	Vessel is moving between 0 and 14 knots	10 sec.	60 sec.	—	—	—	—
	Class B	Vessel is moving between 2 and 14 knots	—	—	30 sec.	30 sec.	180 sec.	180 sec.
4	Class A	Vessel is moving between 0 and 14 knots while changing course	3 1/3 sec.	60 sec.	—	—	—	—
	Class B	Vessel is moving between 2 and 14 knots while changing course	—	—	30 sec.	30 sec.	180 sec.	180 sec.
5	Vessel is moving between 14 and 23 knots		6 sec.	36 sec.	30 sec.	15 sec.	180 sec.	90 sec.
6	Vessel is moving between 14 and 23 knots while changing course		2 sec.	36 sec.	30 sec.	15 sec.	180 sec.	90 sec.
7	Vessel is moving faster than 23 knots		2 sec.	30 sec.	30 sec.	5 sec.	180 sec.	30 sec.
8	Vessel is moving faster than 23 knots while changing course		2 sec.	30 sec.	30 sec.	5 sec.	180 sec.	30 sec.

*1 AIS Class B does not provide information about the navigation status, anchored or moored.

*2 CS: Carrier-sense, *3 SO: Self organized

• Others

Category	Nominal reporting interval	Lost target maximum interval
SAR aircraft	10 sec.	60 sec.
Base station	10 sec.	60 sec.
AtoN	3 min.	18 min.

AIS settings

■ AIS menu

You can customize the settings in the AIS menu.

[MENU]/[菜单] > AIS

Display AIS Targets

Sets whether or not to display AIS symbols when the radar is in transmitting (TX) mode.

① Regardless of this setting, AIS information is displayed when an AIS target reaches the CPA and TCPA limits.

Display Tracks

Sets whether or not to display the tracks of up to 5 dots for each AIS symbol. You can set the interval of the track in "Track interval" in the Target menu.

[MENU]/[菜单] > Target > Track interval

Display Target's Name

Sets whether or not to display the names of targets.

OFF: Does not display the Target name.

Selected: Displays only the name of the selected target.

Active Targets: Displays all the name of active targets.

Auto Activate Function

Sets whether or not to automatically activate a sleeping AIS target when the target comes into the specified area. You can specify the area in the "Distance (Auto Activate)" and "Angle (Auto Activate)" settings.

Distance (Auto Activate)

Sets the maximum range for the Auto Active function by distance.

Range: 0.1 ~ 10.0 (NM), 0.2 ~ 18.5 (km), or 0.1 ~ 11.5 (SM).

① The distance unit varies, depending on the "Unit (Distance)" setting in the Initial menu.

Angle (Auto Activate)

Sets the maximum range for the Auto active function by angle.

Range: 5° ~ 180° in 5° steps

New Target Warn (Auto Activate)

Sets whether or not to alert you when an AIS target has automatically been activated.

Display Range

Sets the range for displaying the AIS targets.

- ∞: All range from your vessel.
- 0.1 ~ 36.0 (NM), 0.2 ~ 66.7 (km), or 0.1 ~ 41.4 (SM): Sets the distance from your vessel by 0.1 steps.

Maximum Targets

Sets the maximum number of AIS targets that radar displays to between 10 and 100.

Slow Warn Function

Selects whether or not to use the Slow Warn function.

Since AIS units cannot rely on COG (Course Over Ground) data for vessels that are anchored or drifting, CPA (Closest Point) and TCPA (Time to CPA) may not be calculated correctly. If a vessel stays in your alarm zone, the collision warning may sound multiple times with unreliable data, even if there is no actual danger. To prevent this, if the SOG (ground speed) of the vessel is lower than this setting, the Slow Warn function considers as the vessel's COG is fixed toward your vessel.

Speed (Slow Warn)

Sets the range of the target vessel's speed in 0.1 steps to activate the Slow Warn function.

Range: 0.1 ~ 5.0 (kn), 0.2 ~ 9.3 (km/h), or 0.1 ~ 5.8 (mph).

Clear Lost Targets

Clears all of the Lost Targets.

Select <OK> and Push [ENTER]/[确认] to clear the Lost targets.

Display Safety Message

Sets whether or not to display a message when it is received.

■ Related settings

◇ Target menu

You can change the target settings for AIS operation. The settings of the Target menu are commonly used for the ARPA and AIS operations. See page 39 for the

Target menu details.

These are the Target menu items and their default settings.

- Vector Mode: True
- Vector Time: 6 min
- Track Interval: 1 min
- CPA Limit: 1.0 NM
- TCPA Limit: 1 min
- CPA/TCPA Alarm: ON

① CPA (Closest Point of Approach) and TCPA (Time to Closest Point of Approach) limits are set to give a warning when a target or targets enter those limits around your own vessel.

The Simplified ARPA function

The simplified Automatic Radar Plotting Aids (ARPA) function is designed to help prevent a collision with other vessels or landmasses.

The radar automatically acquires and plots other vessels and landmasses that are in the set watch area. It automatically calculates the closest point of approach (CPA), and the time to closest point of approach (TCPA) limit of your vessel and the targets, and alerts you if there is a danger of colliding with them.

ARPA Features

- Only targets in the 0.25 to 16 NM range that are displayed with a high luminosity (strong return signal) can be selected as ARPA targets.
- Up to 30 targets can be acquired and plotted on the screen, including up to 20 automatically acquired targets (when the Auto Acquire Function is turned ON in the Menu screen).
- Plot positions are identified by an approved symbol mark (p. 31) and associated plot number.
- The target and vector line will move across the screen at the rate and direction defined by the calculated true or relative course and speed.
- The vector line is displayed on the target.

ARPA operation

◇ Turning the simplified ARPA function ON or OFF

You can set about the simplified ARPA function ON or OFF in the ARPA menu.

[MENU]/[菜单] > ARPA > **ARPA Function**

◇ Acquiring a target

1. Move the cross-line cursor onto a target.
2. Push [ACQ]/[获取] to set the target for tracking.
 - A dotted circle symbol is displayed on the cursor.
 - After 20 seconds progressing time has passed, a dotted vector line, the target number is displayed beside the icon, depending on the "Display Target Number" setting (p. 32). Then more 40 seconds has passed, the circle changes to a solid circle and tracking starts.
 - When the target disappears, a cross mark blinks on the target, and then the mark disappears after 1 minute.
 - When a target advances within the CPA and TCPA limits, the mark changes its color to red, blinks, and sounds an alarm. Push [CLEAR]/[取消] to cancel the alarm.

◇ Releasing the acquired target

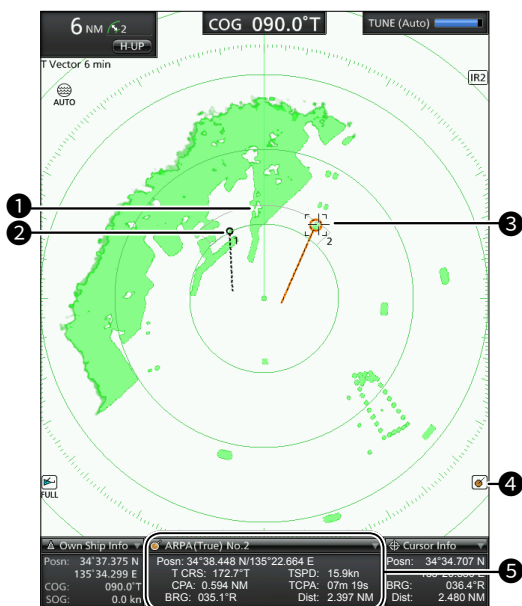
To release the target, move the cursor onto the target, then hold down [CLEAR]/[取消] for 1 second.

ARPA operation

◇ Description of the ARPA display

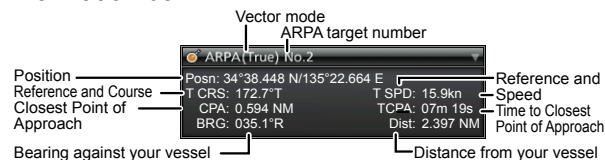
If the radar has received ARPA information of other vessels or other targets, the icons are displayed as shown below.

① See “ARPA settings” later in this section for customizing the ARPA setting options.



⑤ ARPA information box

Displays the selected ARPA target details in the information box.



① Auto Acquiring zone

Displayed when the Auto Acquire Function is turned ON in the Menu screen.

The zone is fixed to the $\pm 45^\circ$ and 2 ~ 2.5 NM against your vessel's heading.

② ARPA Target

Displayed when any ARPA target is began to acquire or acquired.

③ Selected ARPA target

You can select an ARPA target by moving the cursor and pushing [ENTER]/[确认] on it. Four corners of a square are displayed when a target is selected.

The selected ARPA target detail is displayed in the ARPA information box (⑤).

④ ARPA icon

Displayed when Simplified ARPA function started to acquire or acquired a target.

① If the Maximum number of ARPA Targets are acquired, "FULL" is displayed below the icon.

ARPA operation

◇ ARPA target status

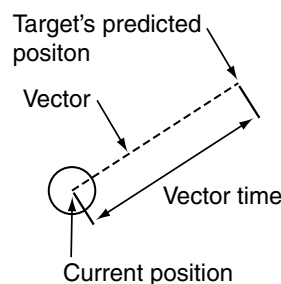
ARPA targets are displayed with icons. The icon vary, depending on the target type or its status.

Icon	Status
○	Focused target Displayed with the orange colored circle
□	Selected target Displayed with corners of the square
□	Selected, started to acquire automatically or manually.
○	Acquired target Approximately 1 minute after the acquirement is started, the dotted circle icon changes to a circle, and the vector of the vessel is displayed.
○ ₅	Target with a number Displayed when the "Display Target Number" setting in the ARPA menu is set to "Selected Targets" or "All".
☀	CPA/TCPA alarm mark. The target is close to within a minimum range and time. <ul style="list-style-type: none"> An alarm sounds and red colored mark blinks until acquiring the target. Push [CLEAR]/[取消] to cancel the alarm. Push [ACQ]/[获取] to acquire the target.
✖	Lost target Indicates the tracking of a target is lost. <ul style="list-style-type: none"> An alarm sounds, red cross blinks, and "Lost an ARPA target" is displayed. Push [CLEAR]/[取消] to cancel the alarm.

◇ Course and speed vector

The vector indicates the target's predicted, true or relative course and speed.

- The vector time may change, depending on the setting in the "Vector Time" item of the Target menu (p. 39).
- The tip of the vector shows the target's predicted position after the time selected in the "Vector Time" item of the Target menu (p. 39).



◇ Plots (ARPA)

The plot displays the target's past positions as 5 dots, during each specified tracking interval.

- ① The target track interval may change, depending on the setting in the "Track Interval" item of the Target menu. (p. 39)

Plots	Status
	Going straight
	Turning right
	Decelerating (dots are closer together behind the target)
	Accelerating (dots are father apart behind the target)

ARPA settings

■ ARPA menu

You can customize the settings in the ARPA menu.

[MENU]/[菜单] > **ARPA**

ARPA Function

Sets whether or not to use the Automatic Radar Plotting Aid (ARPA) function.

Auto Acquire Function

Sets whether or not to automatically acquire a target that comes into the Auto acquiring zone. You can automatically acquire up to 20 targets.

Display Tracks

Sets whether or not to display the tracks of up to 5 dots for each ARPA symbol. You can set the interval of the track in "Track interval" in the Target menu.

[MENU]/[菜单] > Target > **Track interval**

Display Target Number

Sets whether or not to display the Target number beside the ARPA icon on the screen.

OFF: Does not display the Target number.
 Selected Targets: Displays only the selected target number.
 All: Displays all the ARPA targets number.

Clear All Targets

Releases all of the acquired ARPA targets.
 Select <OK> and Push [ENTER]/[确认] to release.

■ Related settings

◇ Target menu

[MENU]/[菜单] > **Target**

You can change the target settings for ARPA operation. The settings of the Target menu are commonly used for the ARPA and AIS operations. See page 39 for the Target menu details.

These are the Target menu items and their default settings.

- Vector Mode: True
- Vector Time: 6 min
- Track Interval: 1 min
- CPA Limit: 1.0 NM
- TCPA Limit: 1 min
- CPA/TCPA Alarm: ON

① CPA/TCPA: Closest Point of Approach and Time to Closest Point of Approach limits are set to give a warning when a target or targets enter those limits around your own vessel.

Receiving DSC information

If an external DSC data is received through the NMEA 2 connector, the radar can display the DSC information of a target on the screen.

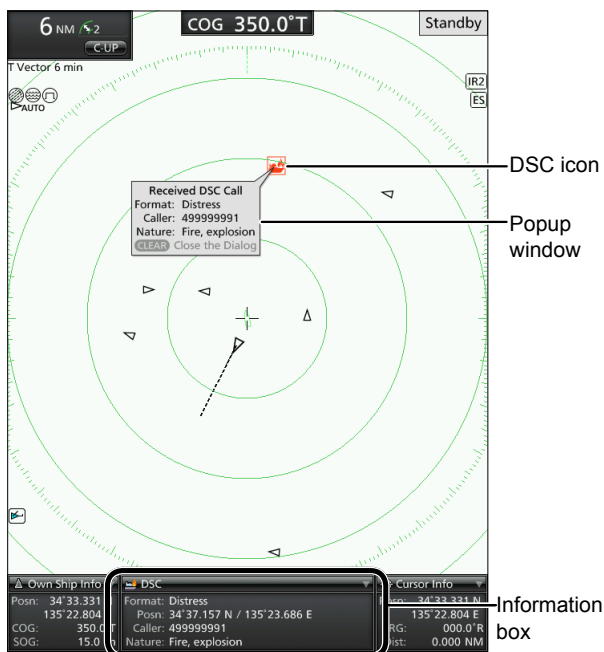
The displayable DSC formats are:

- Distress
- Distress ACK
- Distress Relay
(All Ships, Geographic, Individual, Group)
- Distress Relay ACK (All Ships, Individual, Group)
- Position ACK
- Position Report

◇ Receiving DSC

When DSC information is received:

- The emergency alarm sounds.
- An icon that displays the type of DSC call is plotted on the screen.
- The readout pops up that includes the “Received DSC,” format of the DSC, sender’s MMSI, and the nature of distress are displayed.



- Push [CLEAR]/[取消] to cancel the alarm.
 - The DSC popup window closes.
- Move the cursor to the target icon, and push Enter to display the Information into the Information box at the bottom of the screen.
- Move the cursor to the target icon, and then hold down [ENTER]/[确认] for 1 second, and then select “Display Details” from the context menu to display the detailed information in the DSC details window.
 - ① push [CLEAR]/[取消] to close the window.

◇ Customizing the DSC setting

You can customize the DSC display setting in the Menu screen.

[MENU]/[菜单] > Display > **Display DSC Info**

Display DSC Info

Selects the DSC information display type.

- OFF: Does not display DSC information.
- Symbol: Displays only DSC icons.
- Pop-up: Displays only a DSC pop-up window.
- Symbol & Pop-up: Displays both the Symbols and the pop-up window.

◇ Checking the DSC log

Up to 20 of the recently received DSC log can be checked in the DSC List menu.

[MENU]/[菜单] > **DSC List**

- Push [▼] or [▲] to select a caller ID (or name.)
 - The DSC details is displayed.



① Push [MENU]/[菜单] to close the Menu screen.

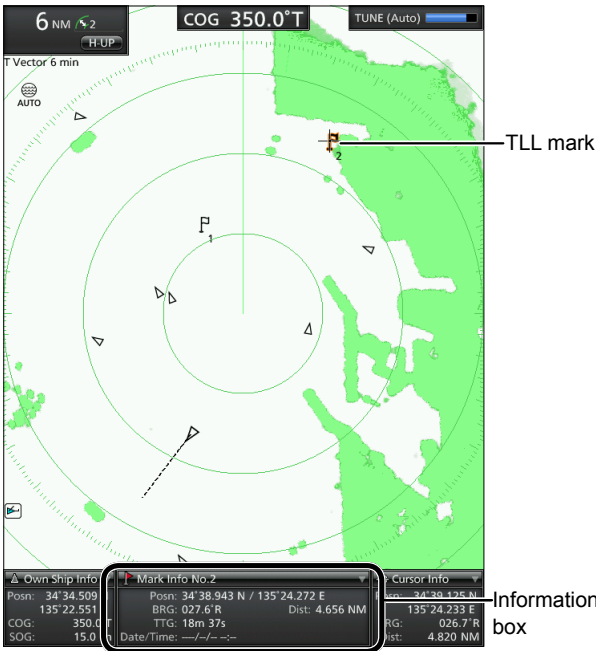
TLL function

Using the TLL (Target Latitude and Longitude) function, you can mark up a place on the screen. You can also output the TLL information to an external device through the NMEA 2 connector.

◇ Marking up a place

You can make up to 20 TLL marks.

1. Move the cross-line cursor onto a place where you want to mark up.
2. Hold down [ACQ]/[获取] for 1 second ([TLL]).
 - The TLL icon and a number is displayed.



- ① Details on the TLL mark can be displayed in the Information box by moving the cursor to the TLL mark and pushing [ENTER]/[确认] to select the target.

◇ Clearing a TLL mark

1. Move the cross-line cursor onto a TLL mark you want to clear.
2. Hold down [CLEAR]/[取消] for 1 second to clear the TLL mark.
 - The TLL mark and the number disappears.

◇ Customizing the TLL settings

You can customize the TLL mark settings in the Menu screen.

Display Marks

[MENU]/[菜单] > Display > Display Marks

Selects the TLL mark display type.

- OFF: Does not display TLL marks.
- Symbol: Displays only TLL marks.
- Symbol & Number: Displays both the Symbols and the Number.

TLL Mode

[MENU]/[菜单] > System > TLL Mode

Selects the action when the [ACQ (TLL)]/[获取 (TLL)] key is held down for 1 second, in the Menu screen.

- Output: Outputs the position information where the cursor is positioned, to the NMEA output terminals.
- Symbol: Marks with an icon and number on the screen where the cursor is positioned.
- Output & Symbol: Outputs the position information and marks on the screen where the cursor is positioned.

Displaying your tracks

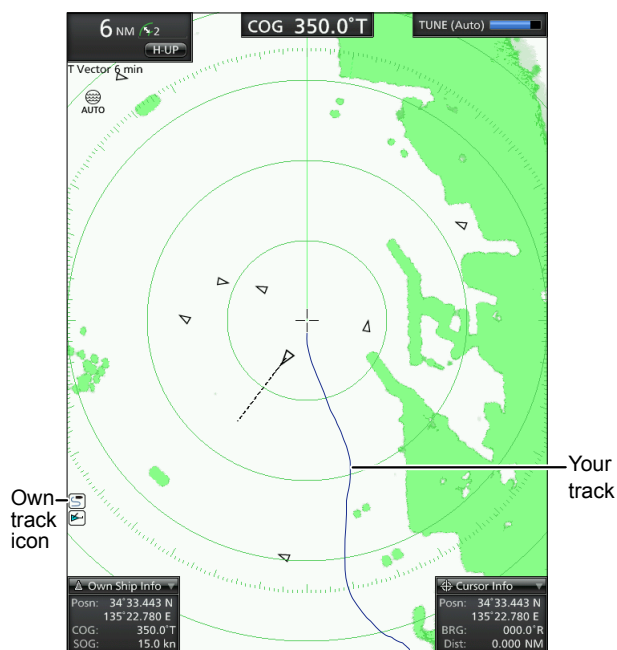
The Plot function tracks your route on the screen.

◇ Displaying your track

To display your vessel's track, turn ON the "Display Own Track" setting in the Display menu.

[MENU]/[菜单] > Display > **Display Own Track**

- When this function is on, the Own track icon is displayed.



TIP: You can customize your own track settings, such as track interval or track color in the Display menu.

[MENU]/[菜单] > Display > **Interval (Own Track)**

[MENU]/[菜单] > Display > **Color (Own Track)**

Refer to the Menu screen section for the details.

◇ Resetting your track

1. Select the "Clear Own Track" setting in the Display menu, and push [ENTER]/[确认].
2. Push [◀] to select <OK>, and then push [ENTER]/[确认] to apply.
 - Your track is cleared.
3. Push [MENU]/[菜单] to exit the Menu screen.

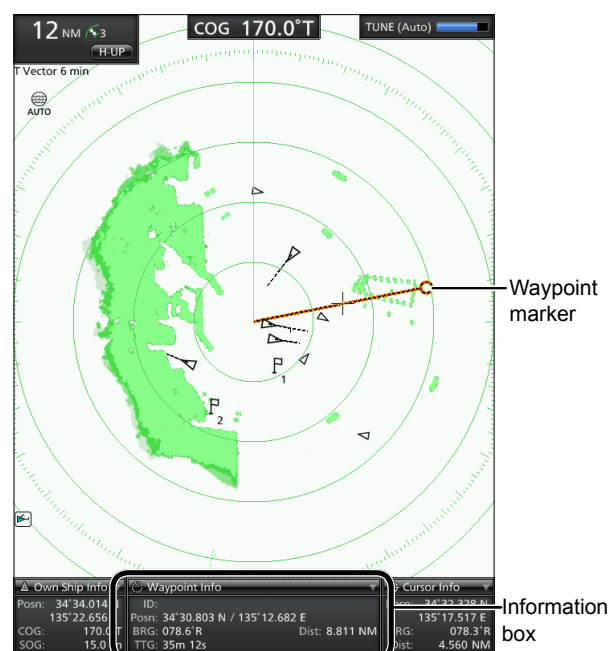
Waypoint indication

If the received NMEA 0183 data through the NMEA 2 connector includes the Waypoint data, the radar can plot the Waypoint marker on the screen.

◇ Displaying the Waypoints

To display the Waypoint marker, turn ON the "Display Waypoints" setting in the Display menu.

[MENU]/[菜单] > Display > **Display Waypoints**



- ① The details on the Waypoint can be displayed in the Information box. Move the cross-line cursor onto the line of the Waypoint marker, and then push [ENTER]/[确认] to select the Waypoint marker.

Manual tuning

The radar automatically tunes the receiver by default. You can also manually tune the receiver after the radar has started to transmit.

[MENU]/[菜单] > Video > **TUNE**

1. Open the "Video" menu in the Menu screen.
2. Select "TUNE," and then push [ENTER]/[确认].
3. Select "Manual," then push [ENTER]/[确认].
 - "TUNE (Manual)" is displayed at the upper right of the screen.
4. Select "Manual TUNE," and then push [ENTER]/[确认].
 - Enters the manual tuning mode.
5. Push [◀] or [▶] to adjust the tuning level, and then push [ENTER]/[确认] to apply the setting.
6. Push [MENU]/[菜单] to exit the Menu screen.

Using the Menu screen

You can customize the radar settings infrequently changed values or function settings.

Example: Turning the Key Beep ON or OFF

[MENU]/[菜单] > System > **Key Beep**

1. Push [MENU]/[菜单].
① The menu screen is displayed.
The Menu screen disappears 10 seconds after the last operation.
2. Push [◀] or [▶] to select the "System" menu.
3. Push [▲] or [▼] to select the "Key Beep" item, and then push [ENTER]/[确认].
4. Push [▲] or [▼] to select "ON" or "OFF," to turn the key beeps ON or OFF, and then push [ENTER]/[确认] to apply.
5. Push [MENU]/[菜单] to exit the menu screen.



Menu	Description	Reference
Brilliance & Color	Customizes the display color and brilliance such as the background, range rings, displayed symbols.	p. 38
Trail	The detailed settings on trails or resets the trail.	p. 14
Display	Selects the displayed information in the PPI area, such as waypoint, marks, DSC information, or customizes your own track.	p. 38
Target	Settings for the AIS or ARPA targets such as CPA/TCPA alarm, entering favorite or blocking targets.	p. 39
ARPA	Sets details on the simplified ARPA (Automatic Radar Plotting Aids) or resets the acquired targets.	p. 32
AIS	Customizes the AIS (Automatic Identification System) information display.	p. 28
Video	Scanning and Video tuning settings to get a clear PPI.	p. 40
System	Settings for the radar operation basics, such as the Key Beep, Zone Alarms, Bearing type, Manual Variation, display in the Standby mode.	p. 40
Initial	The initial settings of the radar, such as the distance and speed units, date format, language, bearing input source, heading adjustment, and so on. You can also back up or restore the settings, or reset to the factory default in this menu.	p. 42
DSC List	Displays the received DSC (Digital Selective Calling) list and each details.	p. 43
AIS List	Displays the received AIS information.	p. 43
Own AIS	Displays AIS information of your vessel.	p. 43
Status	Displays the status of the GPS, Heading and AIS inputs, alarm settings, and CPA/TCPA alarm settings.	p. 43
Port Monitor	Displays status of the input/output ports.	p. 43
Scanner Monitor	Displays the scanner status.	p. 43
Safety Message	Lists the received AIS messages.	p. 43

Menu items

■ Brilliance & Color

Number of Echo Steps

Sets the number of echo gradation steps to 8 or 32.

Brilliance of Heading Line

Sets the brilliance of the heading line to 1 (weak), 2, or 3 (strong).

Brilliance of Rings

Sets the brilliance of the fixed range rings to 1 (weak), 2, 3 (strong), or OFF (hidden).

Brilliance of ARPA/AIS

Sets the brilliance of the ARPA and AIS symbols to 1 (weak), 2, or 3 (strong).

Brilliance of EBL/VRM/PI

Sets the brilliance of the EBL, VRM, PI lines to 1 (weak), 2, or 3 (strong).

Brilliance of Other Symbols

Sets the brilliance of other symbols inside the bearing scale to 1 (weak), 2, or 3 (strong).

Brilliance of Characters

Sets the brilliance of the items outside the bearing scale to 1 (weak), 2, or 3 (strong).

Day Time Display (Back: White)

Night Time Display (Back: Black)

Selects the Day Time or Night Time display color from 4 patterns.

User Custom Display

Selects the User color setting from 12 patterns.

TIP: You can change the Display color between Day, Night, and User color in the "Brilliance/Color" window. See the Basic operation section for details.

[BRILL]/[亮度] > Color

■ Trail

See the Basic operation section (p.14).

■ Display

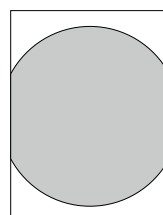
Display Own Vector

Displays or hides your own ship's vector.

① Requires the Bearing and Ship Speed data input.

PPI Area Setting

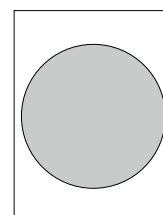
Sets the size of the Plain Position Indicator (PPI) area.



Normal



Wide



Circle

Auto Hide Information

① For only when the PPI Area Setting is "Wide."

Sets whether or not to hide the information outside the scale ring 10 seconds after the last operation. Information is resumed by any operation.

Display Waypoints

Sets whether or not to display Waypoints.

Display Marks

Selects the TLL mark display type from OFF, Symbol, or Symbol & Number. Set also "TLL Mode" in the System menu to display TLL marks. (p. 42)

Display DSC Info

Selects the DSC information display type.

- OFF: Hides DSC information.
- Symbol: Displays only DSC icons.
- Pop-up: Displays only a DSC pop-up window.
- Symbol & Pop-up: Displays both the Symbols and the pop-up window.

Cursor Information

Selects the location format in the Cursor Information box.

- Lat/Lon: Latitude and Longitude
- TTG: Time to Go

Display Own Track

Sets whether or not to display your vessel's track.

Clear Own Track

Clears the your vessel's track. Select <OK> and push [ENTER]/[确认] to clear the track.

Interval (Own Track)

Selects the interval of your vessel's track from 30 seconds, or between 1 ~ 15 minutes.

Color (Own Track)

Selects the color of your vessel's track from Blue, Yellow, Green, Red, Orange, or White.

Menu items

■ Target

Vector Mode Setting

Selects the vector (speed and bearing) reference of the target.

- True: Displays the vector of your vessel and the AIS/ARPA targets in true motion.
- Relative: Displays the vector of the AIS/ARPA targets in relative motion. Your own vessel is not displayed.

Vector Time

Sets the vector time of your vessel and AIS/ARPA targets to 30 seconds, 1 minute, 3 minutes, 6 minutes, 15 minutes, or 30 minutes.

Track Interval

Sets the interval for reloading the track of your own vessel and AIS/ARPA targets to 15 sec, 30 sec, or 1 ~15 minutes in 1 minute steps.

CPA Limit

Sets the Closest Point of Approach (CPA) limit by distance.

Range: 0.1 ~ 12.0 (NM), 0.2 ~ 22.2 (km), or 0.1 ~ 13.8 (SM).

- ① The distance unit varies, depending on the “Unit (Distance)” setting in the Initial menu.
- ① The settable range differs, depending on the scanner unit type.

TCPA Limit

Sets the Time to Closest Point of Approach (CPA) limit to 30 seconds, 1, 2, 3, 4, 5, 6, or 12 minutes.

TIP: CPA and TCPA are set to give a warning when a target or targets enter those limits around your own vessel.

CPA/TCPA Alarm Function

Sets whether or not to sound an alarm when a target enters CPA and TCPA limits.

Display Favorite Target

Sets whether or not to alert when a target enters the set range in the “Range (Favorite Target)” below.

Range (Favorite Target)

Sets the range of the distance at which notice when a vessel listed in your Favorite Target List enters.

- ∞: Displays all range from your vessel.
- 0.1 ~ 36.0 (NM), 0.2 ~ 66.7 (km), or 0.1 ~ 41.4 (SM):
Sets the distance from your vessel by 0.1 steps.
- ① The distance unit varies, depending on the “Unit (Distance)” setting in the Initial menu.
- ① The settable range differs, depending on the scanner unit type.

Favorite Target List

You can enter up to 10 of Favorite targets.

ID Blocking Function

Set whether or not to individually exclude the targets that are set in the “Blocking Target List” below from sounding an AIS or CPA/TCPA collision alarm.

Blocking Target List

You can enter up to 10 of Blocking targets.

■ ARPA

See the Simplified ARPA operation section (pp. 29 ~ 32).

■ AIS

See the AIS operation section (pp.23 ~ 28).

Menu items

■ Video

TUNE

Sets the tuning method to Auto or Manual.
“TUNE (Auto)” or “TUNE (Man)” is displayed in the upper right corner of the screen.

Manual TUNE

Sets the tuning value when the “Tune” is set to “Manual.”

Dynamic Range

Sets the dynamic range of the Plain Position Indicator (PPI).

- Narrow: Even weak reflections are displayed as strong reflections.
- Middle: Middle dynamic range.
- Wide: You can easily distinguish between weak reflections and strong reflections.

Interference Reduction (IR) Function

Sets the interference reduction type to OFF (Disabled), 1 (Low), or 2 (High).

① When this function is enabled, **IR1** or **IR2** is displayed in the upper right of the screen.

Echo Stretch Function

Selects whether or not to use the Echo Stretch function.

① When this function is enabled, “ES” is displayed in the upper left of the screen.

Pulse Width Setting

Sets the transmitting pulse width to Short (narrow) or Long (wide).

① ① is displayed in the upper left of the screen when using the Long pulse.

SEA Curve Level

The SEA knob can be used to fine tune the sea clutter of the display after one of 4 main levels (1 ~ 4) is selected, based on the sea conditions.

Antenna Height

Sets the antenna height from the surface of the sea, according to your antenna installation.
Options: 5, 10, 15, 20, 30, 40, or 50 (m)

3D - Transparent

Sets whether or not to transparent the PPI in the 3D view.

■ System

Key Beep

Sets whether or not to sound a beep when a key is pushed.

Key Backlight Sync

Sets whether or not to synchronize the brilliance of the display and the key backlights.

Temporarily Hide Line

Selects the action during [MENU (HL-OFF)]/[菜单 (船首关闭)] is held down.

- Only Heading Line: Hides only heading line.
- All: Hides the heading line, range rings, and other objects.

Zone Alarm 1, Zone Alarm 2

Sets the type of the zone alarms.

- Enter: An alarm sounds when the target comes into the zone.
- Exit: An alarm sounds when the target goes out of the zone.

Zone Alarm Level

Selects the target detection parameter of zone alarms from Low, Middle, or High.

OFF Center Function

Sets the setback ratio when the OFF Center function is ON.

- 25 %, 50 %, 75 %:
Your own ship position in the screen moves backward at the set ratio, and the bow view increases.
- Cursor: Your own ship position in the screen moves to the cursor, and the opposite view increases.

Save Time

Selects the standby time during the save mode from 1, 6, 15 or 30 minutes.

① The radar for a TX interval scan is fixed at 10 revolutions.

Bearing Type

Selects the displayed bearing type, regardless of the bearing data format (NMEA, N+1, AUX, GPS, or GPS-L).

- True: True North bearing.
- Magnetic: Magnetic North bearing.

Menu items

■ System (Continued)

Variation

Selects the difference setting between True North and Magnetic North.

- Auto: Automatically revises the magnetic variations. Until an effective variation is received, 0° is used for difference between true North and Magnetic North. When an effective variation has been received, the received data is used. The MR-1220 memorize the data until you turn OFF the power.
- Manual: Manually revises the magnetic variation. Set the value in "Manual Variation" below for the difference between True North and Magnetic North.

Manual Variation

Sets the difference value for the Manual Variation to between 180.0°W (West) and 180°E (East).

Bearing Reference

Sets the direction basis for the EBL (Electronic Bearing Line) or the cursor.

- True: True or Magnetic North
- 360°R: The vessel's bow. Described by the clockwise direction.
- PT/SB: The vessel's bow. Described between P180°R and S180°R.

Input Speed Selection

Selects the speed input of the vessel from "SOG" or "Manual." If you select "Manual," enter data manually into the items below, "Manual Speed," "Manual SET," and "Manual Drift."

① When this item is set to "Manual," the Reference indicator is displayed (p. 3)

Manual Speed

Sets your vessel's speed to between 0.0 and 40.0 (kn), 0.0 ~ 74.0 (km/h), or 0.0 ~ 46.0 (mph).

Manual SET

Sets the Tidal current direction to between 000.0 and 359.9°T (or M).

Manual Drift

Sets the Tidal current speed to between 0 and 20.0 (kn), 0.0 ~ 37.0 (km/h), or 0.0 ~ 23.0 (mph).

TLL Mode

Selects the action when the [ACQ (TLL)]/[获取 (TLL)] is held down for 1 second.

- Output: Outputs the position information where the cursor is positioned, to the NMEA output terminals.
- Symbol: Marks on the screen where the cursor is positioned.
- Output & Symbol: Outputs the position information and marks on the screen where the cursor is positioned.

① Set also "TLL Mode" in the System menu to display TLL marks. (p. 41)

Transparency Menu

Sets the transparency level of the Menu screen and dialog boxes to between 0% (Nontransparent) and 70% (Transparent).

Transparency Info.

Sets the transparency level of the Information box, Own Ship information box, Cursor information box or Range/COG/Tune tag to between 0% (Nontransparent) and 70% (Transparent).

Standby Mode

Selects the displayed items in the Standby mode.

- Normal: Does not display inside the scale.
- AIS: Displays the AIS information.

Version

Displays the firmware version.

Menu items

■ Initial

Unit (Distance)

① Settable only in the Standby mode.

Selects the distance unit from NM (nautical miles), km (kilometers), or SM (miles).

Unit (Speed)

Selects the speed unit from kn (knots), km/h (kilometers per hour), or mph (miles per hour).

Date Format

Sets the date format.

- YYYY/MM/DD: Year/Month/Day
- MM/DD/YYYY: Month/Day/Year
- DD/MM/YYYY: Day/Month/Year

Language

Selects the displayed language.

① The selectable language differs, depending on the display unit version.

Bearing Input

Sets the input source of the vessel's bow information.

- NMEA: NMEA0183 bearing data format.
- N+1: N+1 data format.
- AUX: Other format.
- GPS: Reads NMEA0183 COG format data as HDG format. (The course may not match with other HDG format and include errors.)
 - ① When a vessel's speed is less than 2 knots, the direction information is not displayed until the speed increases to more than 3 knots.
- GPS-L: Reads NMEA0183 COG format data as HDG format. (The course may not match with other HDG format and include errors.)
 - ① When a vessel's speed is less than 2 knots, the direction information is fixed. The display changes only when the vessel's speed increases to more than 3 knots.
 - ① This is in addition to the GPS option to display the cursor latitude and longitude when the vessel's speed is less than 3 knots.

NOTE: If this item is set to "GPS" or "GPS-L," COG (Course Over the Ground) data is used as the bearing.

However, If the vessel's speed is less than 3 knots, direction accuracy falls. Moreover, the position accuracy or the current actual course may vary, and therefore display an incorrect direction.

TX Inhibit

Selects whether or not to pause transmission in a specific zone. When turning ON this function, also set the Start Point and Angle settings below.

Start Point (TX Inhibit)

Set the direction from the ship's bow to 0 ~ 359°, where the radar starts to pause transmission.

Angle (TX Inhibit)

Set the angle of the zone where the radar pauses transmission to 1 ~ 90°.

Timing Adjust

Adjusts the sweep timing. (p. 57)

Heading Adjust

Adjusts the bow compensation between -180° and +180°. (p. 56)

Antenna Rotation Speed

Sets the antenna rotation speed at the display range 1/2, 1/4, or 1/8 to Normal or Slow.

Range Ring Select

Selects the type of range rings from Type 1 (normal) or Type 2 (fine). (p. 17)

Effective Range Setting

Turns the individual ranges ON or OFF. (p. 57)

Internal Buzzer

Turns the alarm sound from the internal speaker ON or OFF.

External Buzzer

Turns the alarm sound to the external speaker ON or OFF.

Save Setting 1/2/3

Saves the current settings in the Brilliance & Color, Trail, Display, Target, ARPA, AIS, Video, and System menus to the memory 1, 2, or 3. (p. 57)
The "Load Settings" item for the saved memory number changes to selectable.

Load Setting 1/2/3

Loads the saved settings. (p. 57)

Setting Reset

Resets other than the Initial menu settings to their defaults. (p. 58)

① You can reset the settings only in the Standby mode.

Factory Reset

Resets all the settings to their factory defaults. (p. 58)

① You can reset the settings only in the Standby mode.

Menu items

■ DSC List

Displays the received DSC logs.

- Select an ID from the list to display the details.
You can select the target by holding down [ENTER]/[确认] for 1 second in the list, and then pushing [ENTER]/[确认] again.

■ AIS List

Displays the received AIS information of up to 100 targets. The target that you have added to the Favorite, Selected, Lost, ID Blocking, and Dangerous targets are displayed with each icons.

- Select an ID from the list, hold down [ENTER]/[确认] and select “Select” or “Add to Favorite,” and then push [ENTER]/[确认] apply.

■ Own AIS

Displays the AIS information of your vessel.

■ Status

Displays the current status of the principal settings and input information.

■ Port Monitor

Displays the current status of each Input/Output ports.

- ① The status is continuously updated. Push [ENTER]/[确认] to pause the screen, and push [ENTER]/[确认] again to resume.

■ Scanner Monitor

Displays the scanner status.

If reception fails, the status is displayed in orange text.

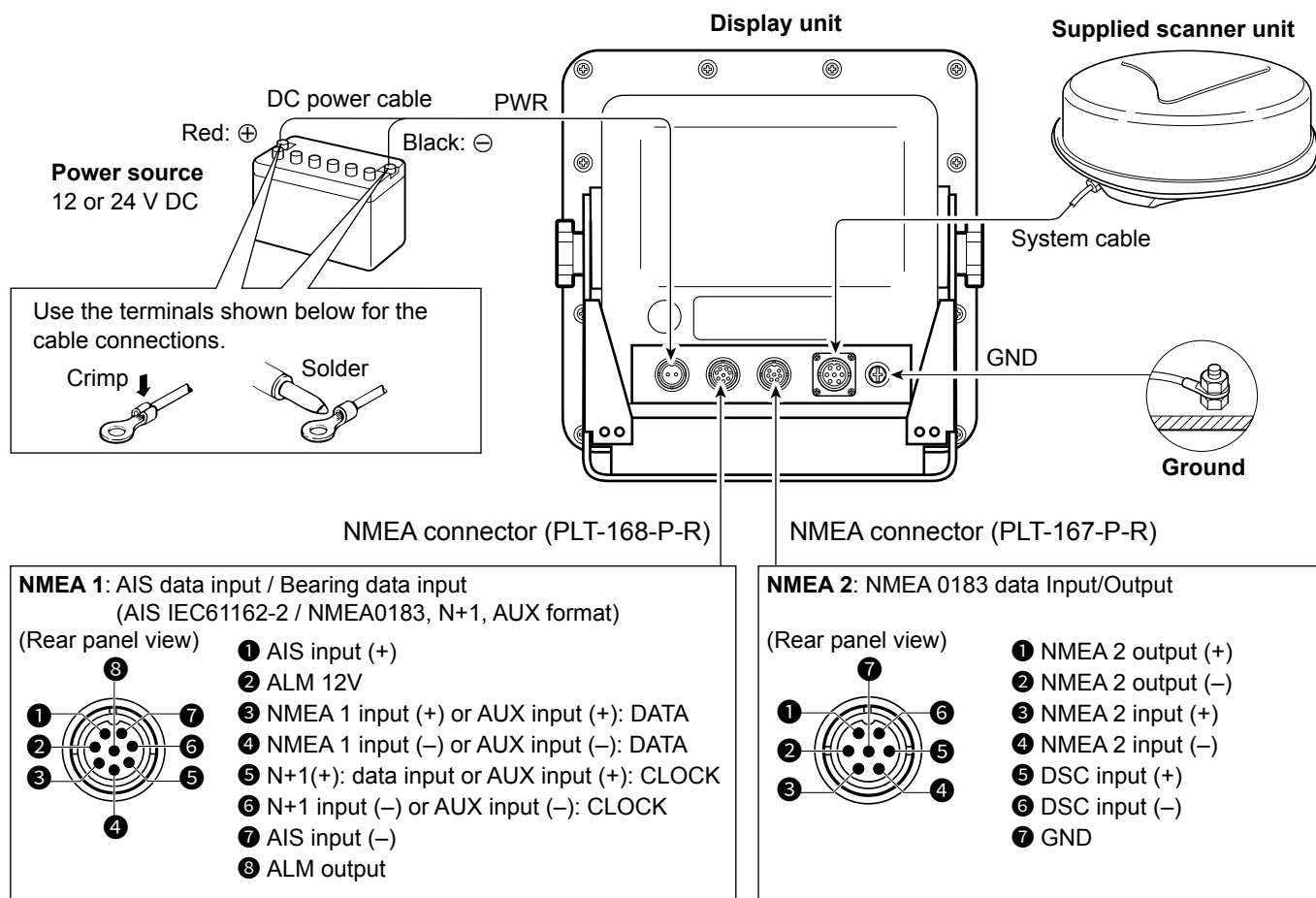
■ Safety Message

Lists the AIS safety messages.

Basic connections

CAUTION:

- **DO NOT** turn ON the display unit until both the display unit and the scanner unit are completely installed and connected.
- **NEVER** connect anything other than the supplied scanner unit.
- An incorrect cable connection may damage the display unit.



- NMEA 1/2 inputs, NMEA 2 output, DSC input: 4800 bps
- AIS input: IEC61162-2 38400 bps

◇ Power source

You can directly connect the display unit to a 12 V or 24 V DC battery without a DC-DC converter or any internal modifications.

(Power source requirement: 10.2 ~ 42 V DC)

Connect the DC power cable as shown above.

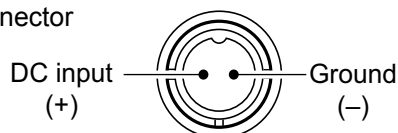
Black: ⊖

Red: ⊕

◇ Grounding

To prevent an electrical shock or other problems, ground the display unit through the [GND] terminal. For the best results, connect a heavy gauge wire or a strap to the nearest grounding point on the vessel. The length of the wire or the strap should be as short as possible.

PWR connector



Selecting a location

◆ Display unit

Install the display unit in a place that meets the following important conditions:

- Near the wheel in the cabin so that you can easily view the radar screen while facing the bow.
- To minimize interference, keep the distance more than "COMPASS SAFE DISTANCE" (stated in the serial number label on the rear panel) away from the compass and your navigation receiver.
- A safe place from salt or fresh water splash or immersion.
- A place where it is easy to operate the usual maintenance or adjustments.
- A place that can support the weight of the display unit.
- Do not locate the display unit subject to extreme heat, cold, vibrations or direct sunlight.

◆ Scanner unit

The scanner unit is designed for high-pressure water jet resistance (except for the cable connectors.)

Install the scanner unit in a place that meets the following essential conditions:

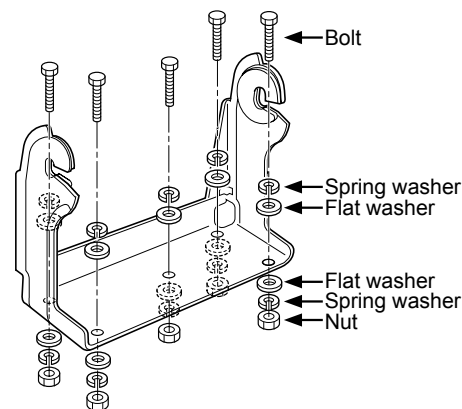
- Place the scanner unit horizontally at the vessel's center so that it can view in all directions. Make sure that no objects interfere with the scanning beam.
- Keep the scanner unit away from any exhaust pipes to avoid damaging the unit with exhaust gas.
- If your vessel is equipped with a Radio Directional Finder (RDF) system, keep the scanner unit at least 2 m (6.6 ft) away from the RDF antenna. Radiation from the scanner unit may affect the measurement data of RDF instruments.
- Locate the scanner unit as high as possible on the vessel for maximum performance in the full range. If the height is insufficient to install the scanner unit, build a frame to mount it.
- When installing two or more radars on a vessel, do not place the scanner units at the same height.

Installing the display unit

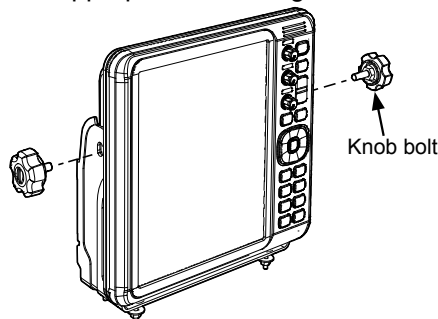
◆ Mounting with the bracket

The mounting bracket supplied with the display unit enables "dashboard" or "overhead" mounting.

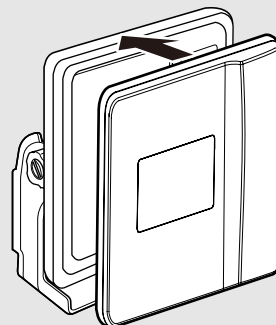
1. Hold the mounting bracket up to the selected location and mark pilot holes for the 5 installation holes using the template. (p. 70)
2. Drill 5 holes of 7 mm (0.28 inch) in diameter.
3. Install the bracket using the bolts, nuts or washers.



4. Attach the display unit to the bracket with the knob bolts at an appropriate view angle.



NOTE: For protecting the display, attach the front cover on the display unit while the radar is not in use.

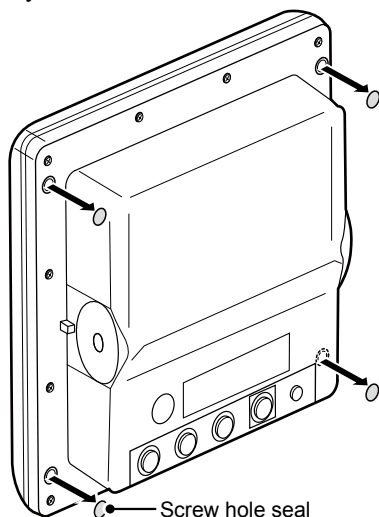


Installing the display unit

◆ Wall mounting

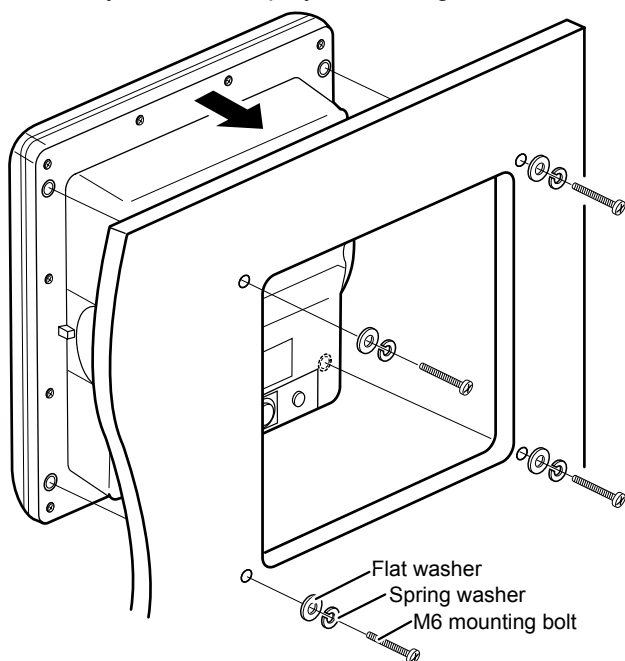
The display unit can be mounted to a flat surface, such as an instrument panel, using the M6 mounting bolts.

1. Remove the 4 screw hole seals from the 4 corners of the display unit.

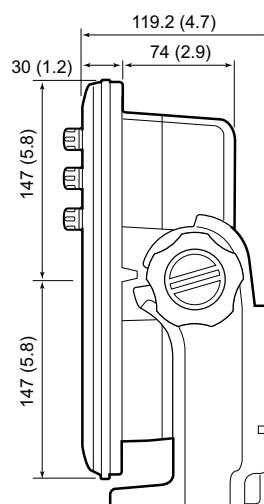
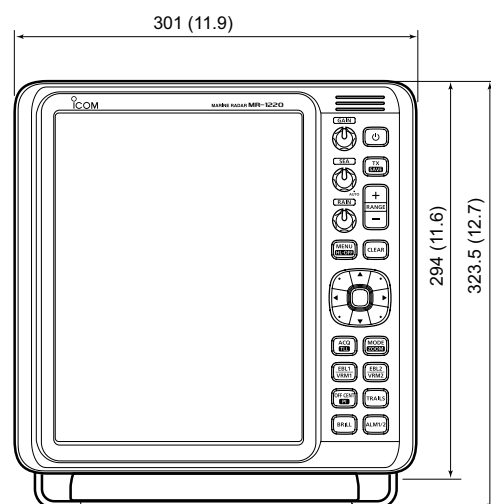
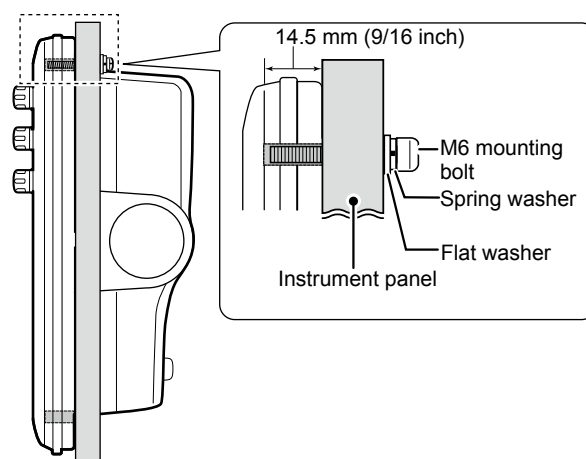


BE CAREFUL! NEVER use your finger nail to remove the seal. Otherwise, you may injure your nail.

2. Using the supplied display unit template, carefully cut a hole in the instrument panel, or wherever you want to mount the display unit.
3. Drill 4 holes for the mounting screw.
4. Firmly slide the display unit through the hole.



5. Fix the four corners of the display unit with the flat washers, spring washers, and M6 mounting bolts.
 - ① The screw hole depth on the display unit is 14.5 mm (9/16 in). Select the mounting bolts of the length that fits the thickness of the instrument panel.



Unit: mm (inch)

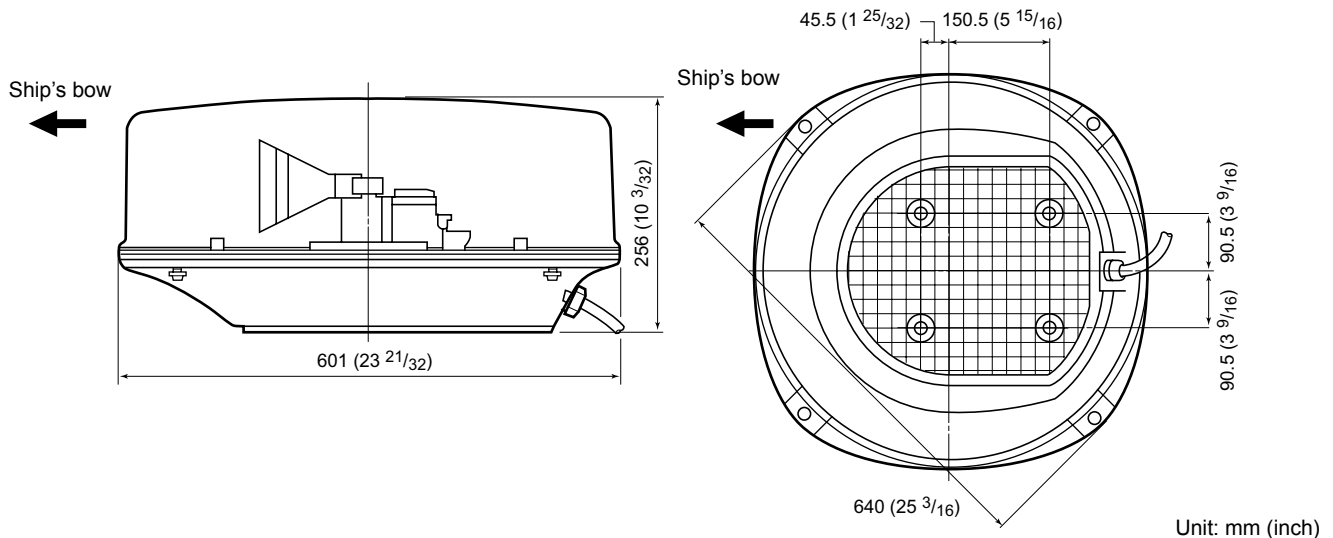
Installing the scanner unit (Radome type)

For the SC-R40 radome type scanner unit.

◆ Mounting the scanner unit

⚠ WARNING! TURN OFF the display unit whenever you are working with the scanner unit.

1. According to the Radome scanner unit template that is supplied with the scanner unit, drill 4 holes of 12 mm (0.47 inch) in diameter to where you want to mount the scanner unit.
2. If the mounting surface or platform is metal, apply a sealing compound around the holes to prevent corrosion and water ingress.
3. Mount the scanner unit in place using the supplied bolts (M10 × 50 mm or M10 × 25 mm, depending on your installation condition), flat washers, and spring washers.
① Secure the bolts firmly.



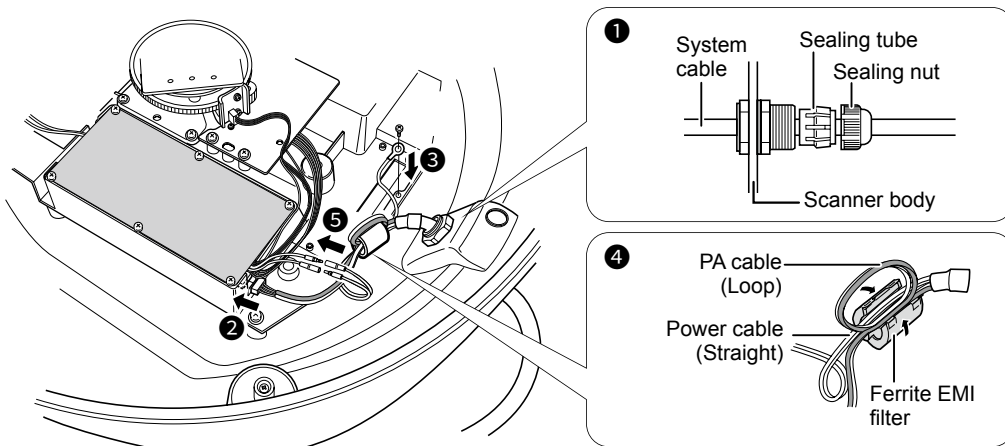
Installing the scanner unit (Radome type)

◇ Connecting the system cable

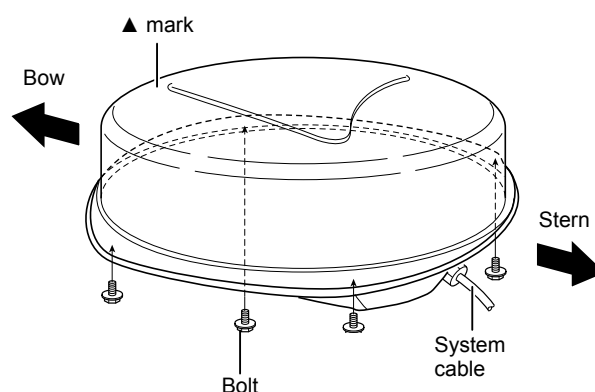
CAUTION: DO NOT cut the supplied system cable.

1. Using a hex head wrench, loosen the 4 bolts on the bottom of the scanner unit, and remove the cover.
① You can use a Phillips head or flat head screwdriver instead of the hex head wrench.
2. Loosen the sealing nut on the scanner unit, and then pass the system cable through the sealing nut and sealing tube, and the scanner body. (①)
3. Insert the black and white PA cable connector into the PA unit connector J1. (②)
4. Connect the shielded cable ground wire to the ground plate with the screw. (③)
5. Clamp the system cable with the ferrite EMI filter attached near the sealing connector.
① Be sure to clamp it tightly. (④)
6. Connect the power cable (black and red) to the power connector. (⑤)

DO NOT install the system cable too tightly.
It may cause contact failure.



7. Tighten the sealing nut.
8. Replace the radome cover over the scanner unit.
Be sure that the “▲” mark on the top of the cover faces the vessel's bow.
9. Tighten the four bolts on the bottom of the scanner unit. (Torque: 5.0 N•m, 3.69 lbf•ft)
① The four protrusions around the radome cover indicate the location of the bolt receptacle.



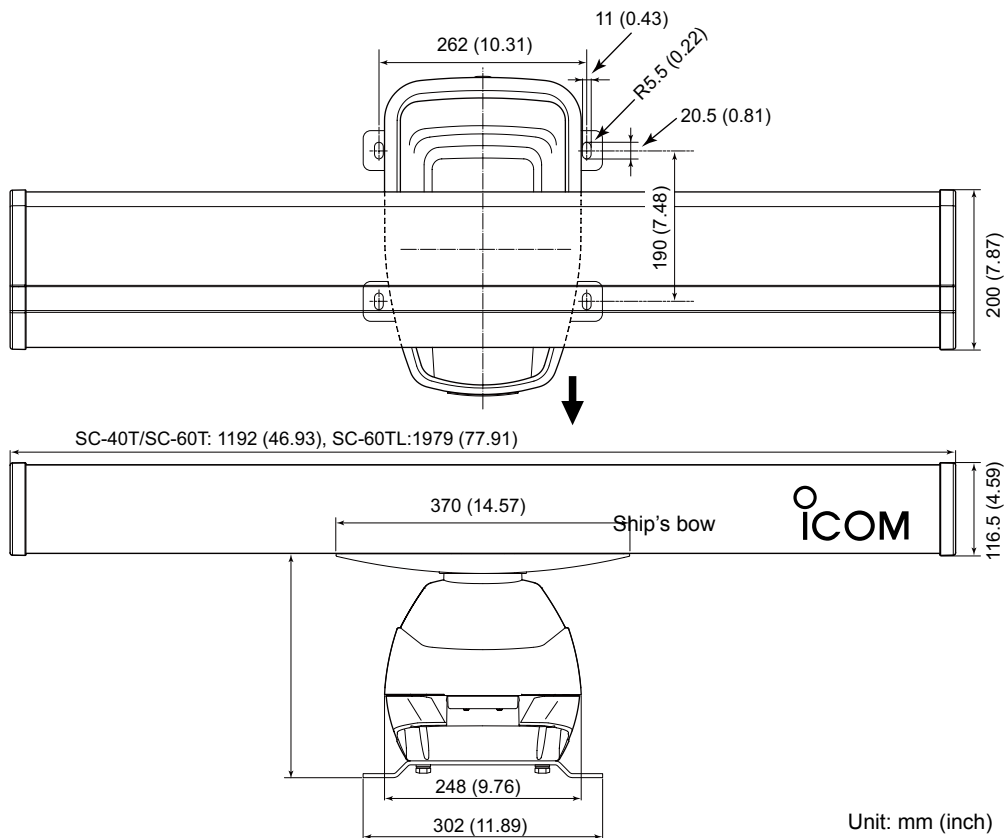
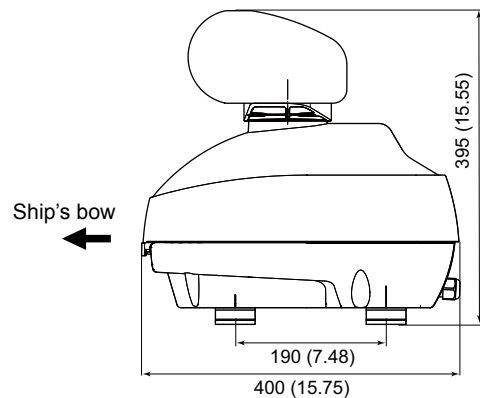
Installing the scanner unit (Open array types)

For the SC-T40, SC-T60, and SC-T60L open array type scanner units.

◆ Mounting the scanner unit

⚠ WARNING! TURN OFF the display unit whenever you are working with the scanner unit.

1. Using the Open array scanner unit template that is supplied with the scanner unit, drill 4 holes 12 mm (0.47 inch) in diameter, where you want to mount the scanner unit.
2. If the mounting surface or platform is metal, apply a sealing compound around the holes to prevent corrosion and water ingress.
3. Mount the scanner unit in place using the supplied bolts (M10 × 40 mm), flat washers, and spring washers.
① Secure the bolts firmly.

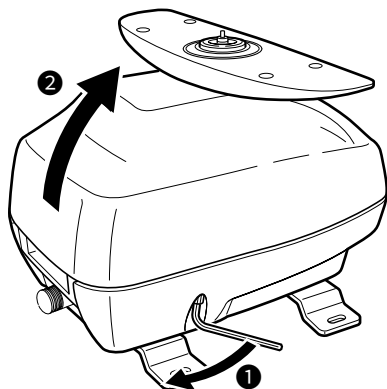


Unit: mm (inch)

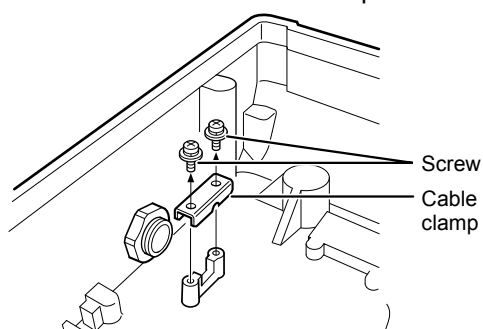
Installing the scanner unit (Open array types)

◇ Wiring the system cable

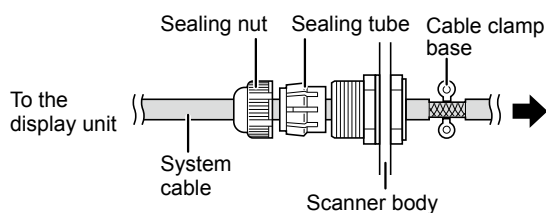
1. Remove the 4 bolts on the bottom of the scanner body using the supplied allen wrench (①), and open the top cover. (②)



2. Remove 2 screws and cable clamp.

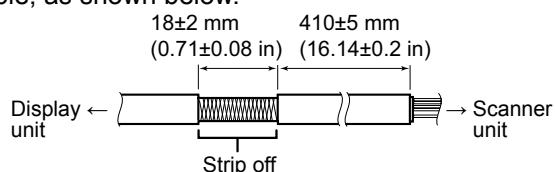


3. Remove the sealing nut outside the scanner unit.
4. Pass the system cable through the sealing nut, sealing tube, scanner body, and the cable clamp base.



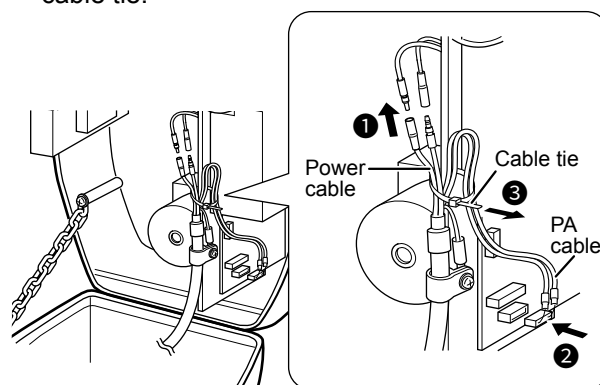
When using an optional OPC-2340 system cable:

Strip off a part of the outer sheath of the system cable, as shown below.

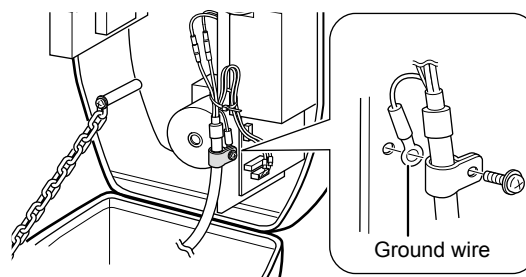


CAUTION: DO NOT cut the inner shield wire when stripping off the outer sheath.

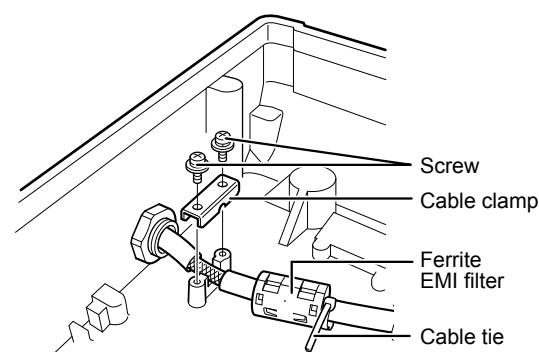
5. Connect the system cable to the scanner unit.
 - ① Pass the power cables (black and red) of the system cable through the looped cable tie, and then connect them to the power unit connectors.
 - ② Carefully insert the PA cable (black and white) connector into the PA unit connector, as shown below.
 - ③ Secure the looped PA cable with the looped cable tie.



6. Ground the system cable to the chassis with the screw, as shown below.



7. Fix the system cable with the cable clamp near the sealing connector and two screws. Attach the ferrite EMI filter close to the sealing connector of the system cable, and then secure the cable tie beside the ferrite EMI filter, as shown below.



Installing the scanner unit (Open array types)

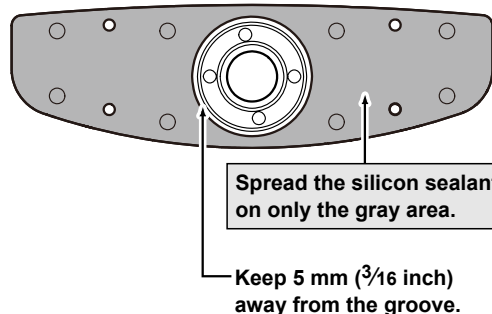
8. Tighten the sealing-nut.

DO NOT install the system cable in tension. It may cause contact failure.

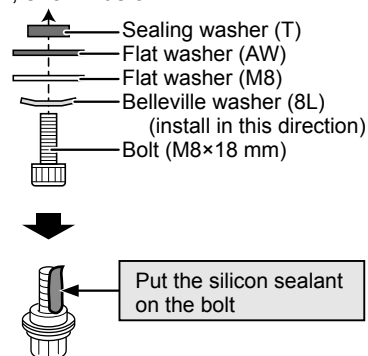
9. Close the scanner cover, and then tighten the four bolts on the bottom of the scanner body to secure the cover. (Torque: 9.8 N•m, 7.23 lbf•ft)

◆ Attaching the antenna unit

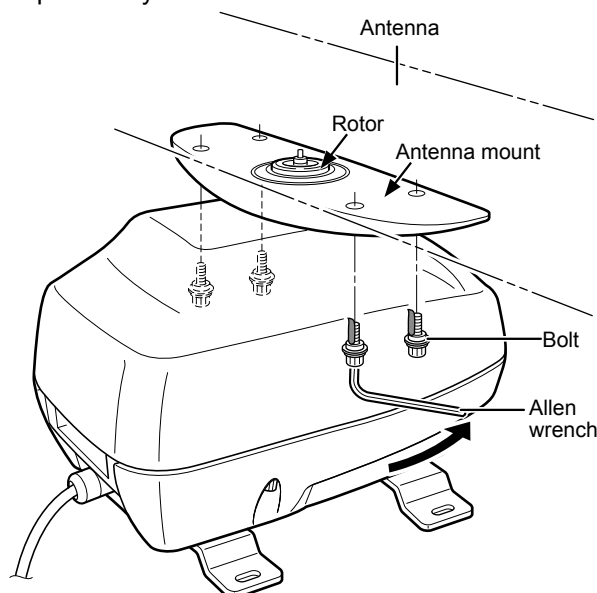
1. Spread the supplied silicon sealant onto the top of the antenna mount.



2. Carefully place the antenna onto the mount so that the rotor ring and pin go into the hole in the antenna. If necessary, move the antenna slightly back and forth on the mount to align the bold holes. The antenna will drop slightly into place.
 3. Slide the flat and Belleville washers and a sealing washer onto the supplied bolt (M8 x 18 mm), and then put the silicon sealant on the bolt. (4 bolts)
- ① Be sure to install the Belleville washer in the direction, shown below.



4. Insert and tighten the 4 bolts using the wrench.
5. Wipe off any excess silicon sealant.



Installing the UX-234 Video output unit

You can connect an external display or a PC monitor with a VGA connector to the display unit by installing an optional UX-234 VIDEO OUTPUT UNIT.

The external monitor requires the resolution of 800 × 600 or higher.

⚠ WARNING! Disconnect the power cable from the display unit, before installing the optional unit.

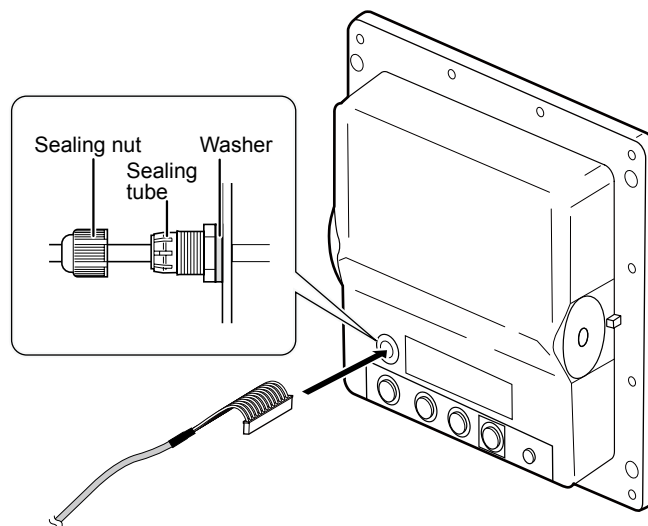
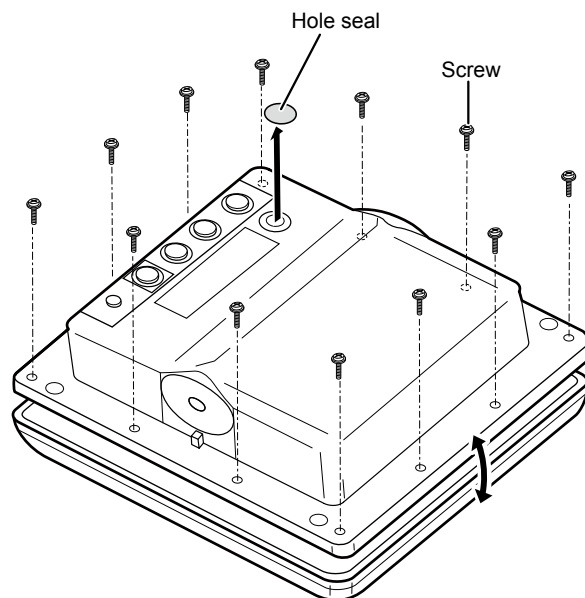
1. Place the display unit facing the front panel down on a flat and horizontal place.
2. Remove the cable hole seal to the left of the serial number label.

CAUTION: DO NOT use your finger nail to remove the seal. Otherwise, you may injure your nail.

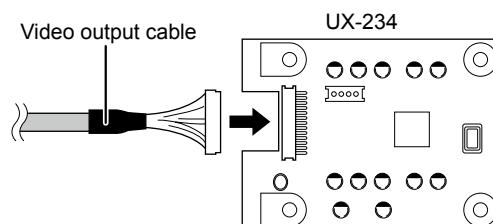
3. Remove the 12 screws from the rear panel of the display unit.
4. Slowly open the rear case and disconnect the 5 connectors from the display unit's main board.
 - ① The one connector is lock-type. Hold the release on connector head to disconnect the connector.

CAUTION: DO NOT pull the cables when opening the rear case. This could damage the cables and/or display unit.

5. Pass the video output cable through the sealing nut, sealing tube, washer, and the hole on the rear panel, and then screw in and tighten the sealing tube.

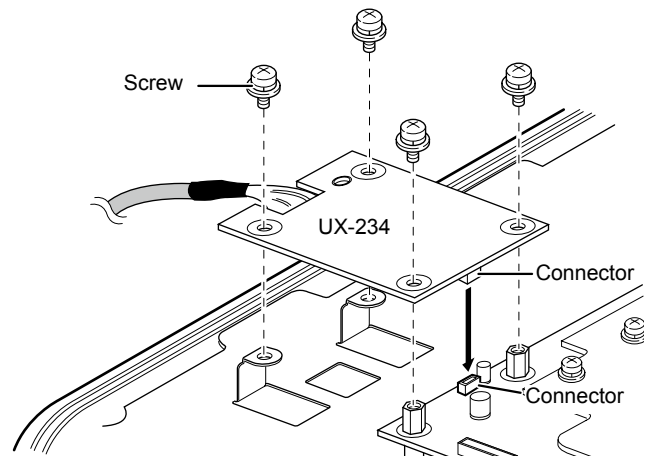


6. Connect the video output cable to the connector on the UX-234.

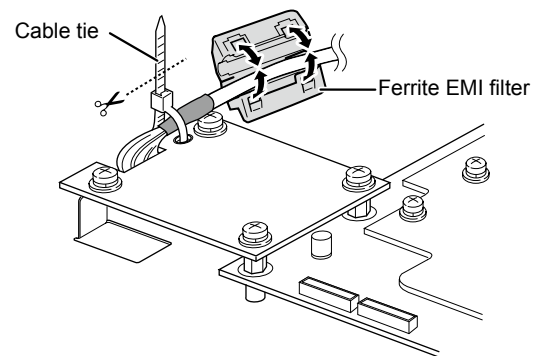


Installing the UX-234 Video output unit

7. Connect the UX-234 to the display unit's connector, then adjust the 4 holes.
8. Fix the UX-234 to the display unit tightening the 4 screws supplied with the UX-234.



9. Secure the video output cable to the UX-234 using a cable tie.
10. Tightly secure the ferrite EMI filter around the video output cable near the UX-234.
11. Reconnect the four connectors to the display unit's main board.

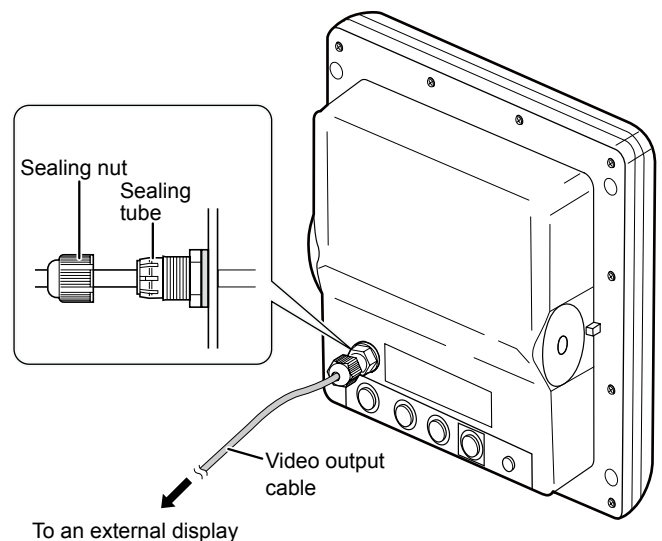


12. Replace the gasket, rear case, and screws to their original position.

① Make sure the gasket is properly seated.

CAUTION: DO NOT pinch the cables when closing the rear case. This could damage the cables.

13. Adjust the video output cable length and then tighten the sealing nut.



Periodic maintenance

Continued, reliable operation of the radar depends on how you care for it. The simple maintenance tips that follow can help you save time and money, and avoid premature equipment failure.

⚠ WARNING! TURN OFF the radar before any maintenance.

- Keep the equipment as clean as possible.
 - ① Use a soft cloth to remove dirt, dust and water.
- Check all hardware for loose screws, bolts, and so on.
- Check cables and terminal connections.

■ Display unit

◇ Cleaning

- Wipe the surface of the display unit with a clean soft cloth. If the LCD is dirty, a film of contaminants may form, and the screen may darken.

CAUTION: DO NOT use harsh solvents such as benzine or alcohol.

■ Scanner unit

◇ Cleaning

- Wipe the surface of the scanner with a clean soft cloth.

CAUTION: DO NOT use harsh solvents such as benzine or alcohol.

- Check that there is no dirt or caked-on salt.

A heavy deposit of dirt or caked-on salt on the painted surface of the upper scanner unit will cause a considerable drop in radar performance.
- Check for cracks or deterioration of the rubber packing and replace it, if necessary.

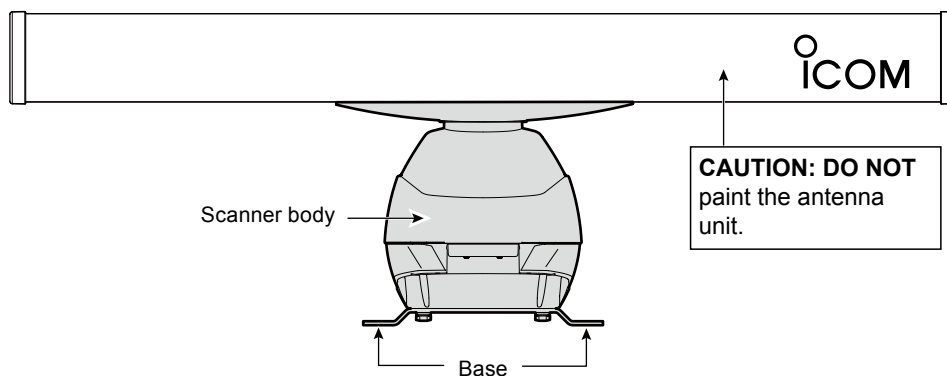
◇ Mounting

- Check the mounting bolts of the scanner unit and tighten if necessary.

◇ Painting (for the Open array types)

- To prevent a corrosion, paint the surface of the scanner body and the base once a year or more.

CAUTION: DO NOT paint the antenna unit. Otherwise, the loss of the antenna sensitivity or a crack will cause.



Error messages

An error message is displayed at the bottom or the center of the display, as shown below.
Check the connection of the cables or the external data source devices.

◇ MR-1220 error messages

Message	Condition
Check Scanner Connection.* ¹	The system cable may not be properly connected.
Communication Error. (Scanner)	The data from the Scanner unit can be received, but it is incorrect data. This is possibly a bad cable or bad connection, or a malfunction from other equipment noise.
Trigger Signal Failure.* ²	If the Trigger signal is interrupted for more than 15 seconds while in the TX mode, an alarm sounds.
SHM Signal Failure.* ³	If the SHM signal is interrupted for more than 15 seconds while in the TX mode, an alarm sounds.
Heading Data Loss.* ²	The Azimuth signal is interrupted. An alarm sounds within 5 seconds and the display reverts to H-UP mode in approximately 1 minute.
Position Data Loss.* ²	If the position signal is interrupted for more than 15 seconds, an alarm sounds.

*1 Turn OFF the radar, then check the system cable connections.

*2 Push [CLEAR]/[取消] to cancel the error message and beep tone. Turn OFF the radar, and then check the external data cable connection.

*3 An electricity failure may have occurred. Turn OFF the radar, and then consult your dealer or service person.

◇ AIS error messages

An error message is displayed when a system error is received from the AIS unit.
See the AIS unit instructions for details.

(Some examples)

Message contents
AIS: TX MALFUNCTION
AIS: ANTENNA VSWR EXCEEDS LIMIT
AIS: RX CHANNEL 1 MALFUNCTION
AIS: RX CHANNEL 2 MALFUNCTION
AIS: RX CHANNEL 70 MALFUNCTION
AIS: GENERAL FAILURE
AIS: MKD CONNECTION LOST
AIS: EXTERNAL EPFS LOST
AIS: NO SENSOR POSITION IN USE
AIS: NO VALID SOG INFORMATION
AIS: NO VALID COG INFORMATION
AIS: HEADING LOST/INVALID
AIS: NO VALID ROT INFORMATION

Settings for a maintenance

◇ Selecting the language

You can change the displayed language such as the items in the main screen, the Menu screen, and warning messages.

① The selectable language differs, depending on the display unit version.

1. Select the Language setting the Initial Menu.

[MENU]/[菜单] > Initial > **Language**

2. Push [▲] or [▼] to select a language, and then push [ENTER]/[确认] to apply.

◇ Simulation mode

You can boot up the radar in the simulation mode, in such a case you demonstrate the radar functions only with the display unit.

1. Confirm the radar is turned OFF.
2. While holding down [BRILL]/[亮度], push [⏻] to turn ON the radar.
 - The radar boots up in the Simulation Mode.
 - After the radar boots up, "Simulation Mode" blinks at the top of the screen.
3. Push [TX (SAVE)]/[发射(节电)] to simulate the PPI screen.

NOTE: To return to the normal operation, turn OFF the radar, and then Turn it ON again.

◇ Adjusting the heading line

If the heading marker line differs from the actual bow direction, in such a case the scanner has not been mounted correctly in the line with the bow, you can adjust the "Heading Adjust" setting in the Initial menu.

1. Line up the bow of the ship with a fixed target.
2. Select the Heading Adjust setting the Initial Menu.

[MENU]/[菜单] > Initial > **Heading Adjust**

3. Push [▲] or [▼] to adjust the heading until the target on the screen meets the heading marker. (The difference can be readout on the screen.)



4. Push [ENTER]/[确认] to apply.

◇ Setting the antenna height

After mounting the scanner unit, properly set the "Antenna Height" in the Video Menu.

1. Select the Antenna Height setting the Video Menu.

[MENU]/[菜单] > Video > **Antenna Height**

2. Push [▲] or [▼] to select the height from the water surface to the antenna, and then push [ENTER]/[确认] to apply.

Settings for a maintenance

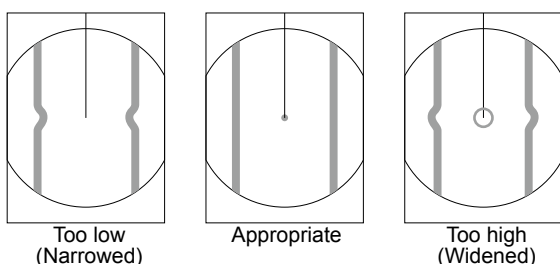
◇ Adjusting the sweep timing

The system cable length affects the sweep timing. If a straight target is displayed as a curved echo, adjust the “Timing Adjust” setting in the Initial menu appropriate for the cable length.

1. Select the Timing Adjust setting the Initial menu.

[MENU]/[菜单] > Initial > **Timing Adjust**

2. Push [◀] or [▶] to adjust the timing until the echo is displayed as straight.



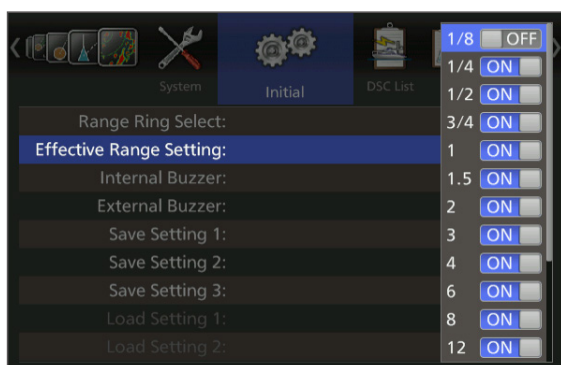
◇ Setting the selectable display ranges

The selectable display ranges can be customized. If you turn OFF a range, it will be skipped and not selectable when pushing the RANGE/ [+] or [-] key.

1. Select the “Effective Range Ring” setting in the Initial Menu.

[MENU]/[菜单] > Initial > **Effective Range Ring**

2. Push [▲] or [▼] to select a range, and then push [◀] or [▶] to turn the range OFF or ON.



3. Push [ENTER]/[确认] to apply the settings.

◇ Saving or loading the settings

The radar can save three different settings for different operators or different situations, and immediately change from one to another.

You can save or load the settings other than the Initial menu.

1. Confirm the radar is in the Standby mode, if necessary, push [TX (SAVE)]/[发射(节电)] to enter the Standby mode.
2. Select either of the “Save setting (1 ~ 3)” that you want to save the setting to in the Initial menu. When you load the saved settings, select from “Load Setting (1 ~ 3).”

[MENU]/[菜单] > Initial > **Save Settings (1 ~ 3)**

[MENU]/[菜单] > Initial > **Load Settings (1 ~ 3)**

① The setting number displayed in bold face has already been saved.

3. Push [ENTER]/[确认].
 - <OK> and <Cancel> are displayed.
4. Push [◀] to select <OK>, and then push [ENTER]/[确认] to save or load the settings.

Settings for a maintenance

◇ Resetting to the defaults

When you reconfigure your settings, you can reset the radar settings to the factory defaults.
There are 2 types of resetting. Select an appropriate way, according to your situation.

- Settings Reset Resets settings other than in the Initial menu.
- Factory Reset Resets all the settings to the factory defaults.

NOTE: You can reset the settings only in the Standby mode.

1. Confirm the radar is in the Standby mode, if necessary, push [TX (SAVE)]/[发射(节电)] to enter the Standby mode.
2. Select “Settings Reset” or “Factory Reset” in the Initial menu.

[MENU]/[菜单] > Initial > **Settings Reset**

[MENU]/[菜单] > Initial > **Factory Reset**

3. Push [ENTER]/[确认].
 - <OK> and <Cancel> are displayed.
 4. Push [◀] to select <OK>, and then push [ENTER]/[确认] to reset the settings.
 - After Factory Reset has been done, the radar automatically restarts and the Initial screen as shown below is displayed.
Select a language, and then push [ENTER]/[确认] to boot up the radar.
- ① The selectable language differs, depending on the display unit version.



11 SPECIFICATIONS

■ Display unit (MR-1220)

Model	MR-1220R4	MR-1220T4	MR-1220T6	MR-1220T6L
Scanner unit	SC-R40	SC-T40	SC-T60	SC-T60L
Display type	12.1 inch TFT color LCD			
Resolution	800 (H) × 600 (W) dots			
Minimum range	25 m, 82 ft (at 1/8 NM range)			
Maximum range	36 NM	48 NM	72 NM	
Range scales (NM)	1/8, 1/4, 1/2, 3/4, 1, 1.5, 2, 3, 4, 6, 8, 12, 16, 24, 32, 36, 48*1, 64*2, 72*2 *1: For only the MR-1220T4/MR-1220T6/MR-1220T6L *2: For only the MR-1220T6/MR-1220T6L			
Preheat time	90 seconds			
Power supply requirement	12 V or 24 V DC (Power source requirement: 10.2 ~ 42 V DC)			
Approximate power consumption (at zero wind velocity)	60 W	70 W	80 W	90W
Usable temperature range	-15°C ~ +55°C, +5°F ~ +131°F			
Input data format	NMEA 0183, N+1, AUX, IEC61162-2 format (for AIS unit)			
Output data format	NMEA 0183			
Dimensions (Projections not included)	301 (W) × 323.5 (H) × 119.2 (D) mm, 11.8 (W) × 12.7 (D) × 4.7 (H) in ①Including the mounting bracket			
Weight (Approximately)	4.8 kg, 10.6 lb ①Including the mounting bracket			

■ Scanner units

Model		MR-1220R4	MR-1220T4	MR-1220T6	MR-1220T6L
Scanner unit		SC-R40	SC-T40	SC-T60	SC-T60L
Scanner type (Typical)		2 ft (60 cm) Radome	4 ft (120 cm) Open array	4 ft (120 cm) Open array	6.5 ft (200 cm) Open array
Beam width (Typical)	Vertical	4°	2°	2°	1.2°
	Horizontal	22°	23°	23°	23°
Side lobe (Typical)		−22 dB	−24 dB	−24 dB	−27 dB
Polarization		Horizontal			
Transmission frequency		9410 MHz ±30 MHz P0N			
Peak output power		4 kW	4 kW	6 kW	6 kW
Pulse width		80 ns/2160 Hz, 80 ns/1440 Hz, 250 ns/1440 Hz, 350 ns/1440 Hz, 900 ns/720 Hz	80 ns/2160 Hz, 80 ns/1440 Hz, 250 ns/1440 Hz, 350 ns/1440 Hz, 900 ns/720 Hz	80 ns/2160 Hz, 80 ns/1440 Hz, 250 ns/1440 Hz, 350 ns/1440 Hz, 900 ns/720 Hz, ° 900 ns/660 Hz	80 ns/2160 Hz, 80 ns/1440 Hz, 250 ns/1440 Hz, 350 ns/1440 Hz, 900 ns/720 Hz, 900 ns/660 Hz
Mixer and local oscillator		Microwave Integrated Circuit			
Transmitting tube		Magnetron MAF1421B			Magnetron MAF1422B
Modulator		FET switching			
Duplexer		Circulator			
Tuning system		Automatic/manual selectable			
Intermediate frequency		250 MHz	60 MHz		
IF band width		15 MHz, 3 MHz	10 MHz, 3 MHz		
Usable temperature range		−25°C to +70°C, −13°F to 158°F			
Relative humidity		Less than 95% at 40°C (+104°F)			
Dimensions (SC-R40) Diameter of rotation/Height (SC-T40/SC-T60/SC-T60L)		640 (W) × 256 (H) × 640 (D) mm, 25.2 (W) × 10.1 (D) × 25.2 (H) in	1217/395 mm, 48/16 in	1217/395 mm, 48/16 in	1995/395 mm, 79/16 in
Weight (Approximately) (Without cable)		8 kg, 17.5 lb	18 kg, 39.7 lb	18 kg, 39.7 lb	20 kg, 44.1 lb
System cable length	Supplied	15 m, 49.2 ft	20 m, 65.6 ft		
	Maximum	30 m, 98.4 ft	30 m, 98.4 ft		

■ Options

- **OPC-2339** SYSTEM CABLE (for only the SC-R40)
To connect the display unit and the scanner unit.
Length: 20 m (65.6 ft)
- **OPC-2340** SYSTEM CABLE
To connect the display unit and the scanner unit.
Length: 30 m (98.4 ft)
- **UX-234** VIDEO OUTPUT UNIT
To connect an external display or a PC monitor with a VGA connector.

External data list

◇ External data input

The following external data is/are required to use each functions of the MR-1220 series.

Connector		[NMEA 1] *1 connector			[NMEA 2] *2 connector				
Sentence format		THS, HDG, HDM, HDT		VDM, ALR, VDO*2	RMC, GGA, GLL, GNS, VTG, WPL, BWC, BWR				DSC, DSE
		N+1, AUX							
Function	Display	Bearing	Variation	AIS	Speed	Position	Waypoint	Variation	DSC
Head-Up	H-UP	—	—	—	—	—	—	—	—
Stabilized Head-Up	SH-UP	Required	—	—	—	—	—	—	—
Course-Up	C-UP	Required	—	—	—	—	—	—	—
North-Up	N-UP	Required	—	—	—	—	—	—	—
True Motion	TM	Required	—	—	—	RMC, GGA, GLL, or GNS	—	—	—
Speed Display	SOG	—	—	—	RMC or VTG	—	—	—	—
Heading Bearing	HDG	Required	—	—	—	—	—	—	—
Waypoint	Waypoint	Required	—	—	—	RMC, GGA, GLL, or GNS	WPL, BWC, or BWR	—	—
Own Vector	—	Required	—	—	RMC or VTG	—	—	—	—
ARPA	ARPA	Required	—	—	RMC or VTG	—	—	—	—
Cursor/Waypoint Estimated Time of Arrival	—	—	—	—	RMC or VTG	—	—	—	—
Magnetic Variation (Auto)*3	—	Required	HDG	—	—	—	—	RMC	—
TLL	—	Required	—	—	—	RMC, GGA, GLL, or GNS	—	—	—
AIS (Display only)	AIS	Required	—	VDM	—	RMC, GGA, GLL, or GNS	—	—	—
AIS (CPA/TCPA Alarm)	AIS	Required	—	VDM	RMC or VTG	RMC, GGA, GLL, or GNS	—	—	—
AIS (Own)	MENU	—	—	VDO	—	—	—	—	—
Alarm Status*4	—	—	—	ALR	—	—	—	—	—
DSC	DSC	Required	—	—	—	RMC, GGA, GLL, or GNS	—	—	DSC, DSE

◇ External data output

The radar can output the following sentences through the [NMEA 2] *1 connector: RMC, GGA, GLL, VTG, TLL, RSD, and OSD.

*1 [NMEA1] and [NMEA 2] connectors: See the page 44.

*2 AIS input also receives RMC, GGA, GLL, VTG, and GNS sentences.

These are valid only when the NMEA2 input and DSC input do not receive them.

*3 Either an HDG to [NMEA 1] connector or an RMC to [NMEA 2] connector is required.

① THS, HDG, HDM, HDT, RMC, GGA, GLL, GNS, VTG, WPL, BWC, BWR, TTM, TLL, RSD, OSD, DSC, and DSE are the sentence formats of NMEA0183.

② If the "Bearing Input" item in the Initial menu is set to "GPS" or "GPS-L," "RMC" of [NMEA 2] connector or COG (Course Over the Ground) of "VTG" a bow it receives as a direction, even if there is no direction information (compass etc.) in [NMEA 1] connector, the screen display of the North rise etc. is possible.

However, direction accuracy falls when the speed of a vessel is set to 2 knots or less, or when exceeding 3 knots a bow it does not receive as direction data. Moreover, the influence of measurement position accuracy or a current an actual bow it may differ from a direction.

*4 A system error from the AIS unit is displayed.

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URL: <http://www.icom.co.jp/world/support/download/gpl/>

To receive the source code, please send your inquire to the Icom World Support Center.

Icom World Support Center
1-6-19 Kamikuratsukuri, Hirano-ku, Osaka 547-0004, Japan

The user acknowledges and agrees that Icom Inc. shall not be responsible for any support, details, or explanation of the source code.

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@defgroup IPU MXC Image Processing Unit (IPU)

Driver

@file arch-mxc/ipu.h

@brief This file contains the IPU driver API declarations.

@ingroup IPU

■ About "zlib"

ZLIB DATA COMPRESSION LIBRARY

zlib 1.2.7 is a general purpose data compression library. All the code is thread safe. The data format used by the zlib library is described by RFCs (Request for Comments) 1950 to 1952 in the files <http://tools.ietf.org/html/rfc1950> (zlib format), [rfc1951](http://tools.ietf.org/html/rfc1951) (deflate format) and [rfc1952](http://tools.ietf.org/html/rfc1952) (gzip format).

All functions of the compression library are documented in the file [zlib.h](#) (volunteer to write man pages welcome, contact zlib@gzip.org). A usage example of the library is given in the file [test/example.c](#) which also tests that the library is working correctly. Another example is given in the file [test/minizip.c](#). The compression library itself is composed of all source files in the root directory.

To compile all files and run the test program, follow the instructions given at the top of [Makefile.in](#). In short `./configure; make test`, and if that goes well, `make install` should work for most flavors of Unix. For Windows, use one of the special makefiles in `win32/` or `contrib/vstudio/`. For VMS, use `make_vms.com`.

Questions about zlib should be sent to zlib@gzip.org, or to Gilles Vollant info@winimage.com for the

Windows DLL version. The zlib home page is <http://zlib.net/>. Before reporting a problem, please check this site to verify that you have the latest version of zlib; otherwise get the latest version and check whether the problem still exists or not.

PLEASE read the zlib FAQ http://zlib.net/zlib_faq.html before asking for help.

Mark Nelson markn@ieee.org wrote an article about zlib for the Jan. 1997 issue of Dr. Dobbs's Journal; a copy of the article is available at <http://marknelson.us/1997/01/01/zlib-engine/>.

The changes made in version 1.2.7 are documented in the file [ChangeLog](#).

Unsupported third party contributions are provided in directory `contrib/`.

zlib is available in Java using the `java.util.zip` package, documented at <http://java.sun.com/developer/technicalArticles/Programming/compression/>.

A Perl interface to zlib written by Paul Marquess pmqs@cpan.org is available at CPAN (Comprehensive Perl Archive Network) sites, including <http://search.cpan.org/~pmqs/IO-Compress-Zlib/>.

A Python interface to zlib written by A.M. Kuchling amk@amk.ca is available in Python 1.5 and later versions, see

<http://docs.python.org/library/zlib.html>.

zlib is built into tcl: <http://wiki.tcl.tk/4610>.

An experimental package to read and write files in .zip format, written on top of zlib by Gilles Vollant info@winimage.com, is available in the `contrib/minizip` directory of zlib.

Notes for some targets:

- For Windows DLL versions, please see [win32/DLL_FAQ.txt](#)
- For 64-bit Irix, `deflate.c` must be compiled without any optimization. With `-O`, one `lbgp` test fails. The test works in 32 bit mode (with the `-n32` compiler flag). The compiler bug has been reported to SGI.
- zlib doesn't work with gcc 2.6.3 on a DEC 3000/300LX under OSF/1 2.1 it works when compiled with cc.
- On Digital Unix 4.0D (formerly OSF/1) on AlphaServer, the `cc` option `-std1` is necessary to get `gzprintf` working correctly. This is done by `configure`.
- zlib doesn't work on HP-UX 9.05 with some versions of `/bin/cc`. It works with other compilers. Use "make test" to check your compiler.

OPEN SOURCE LICENSES

- gzdopen is not supported on RISCOS or BEOS.
- For PalmOs, see <http://palmzlib.sourceforge.net/>

Acknowledgments:

The deflate format used by zlib was defined by Phil Katz. The deflate and zlib specifications were written by L. Peter Deutsch. Thanks to all the people who reported problems and suggested various improvements in zlib; they are too numerous to cite here.

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Jean-loup Gailly Mark Adler
jloup@gzip.org madler@alummi.caltech.edu

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Written by David Howells (dhowells@redhat.com)

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■ About "libusb1"

libusb

libusb is a library for USB device access from Linux userspace.

It is written in C and licensed under the LGPL-2.1 (see COPYING).

libusb is abstracted internally in such a way that it can hopefully be ported to other operating systems. See the PORTING file for some information, if you fancy a challenge :)

libusb homepage: <http://libusb.sourceforge.net>

Developers will wish to consult the API documentation: <http://libusb.sourceforge.net/api-1.0/>

Use the mailing list for questions, comments, etc: https://sourceforge.net/mailarchive/forum.php?forum_name=libusb-devel

- Daniel Drake <dsd@gentoo.org>

(use the mailing list rather than mailing developers directly)

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CREDITS

The iana-etc maintainer is Seth W. Klein <sk@sethklein.net>.

Thanks go to all the Linux From Scratch users who wrote the scripts that inspired the, now obsolete, LFS HINT and who reported bugs against that HINT.

Thanks also go to the following people who have reported bugs in iana-etc or made feature requests.

Oden Eriksson <eriksson@mandriva.com>

Gave me an idea of what distributions need from the project.

Pascal S. de Kloe <pascal@quies.net>

Reminded me that command options must come first on many non-GNU systems.

Paul Jarc <prj@po.cwru.edu>

Reported that the install target didn't create the installation directory.

Jochen Striepe <jochen@tolot.escape.de>
Reported that GNU Awk 3.1.0 or greater is required.

Steve Westerbeck <stevow@charter.net>
Reported that the website wasn't correctly updated for 1.00.

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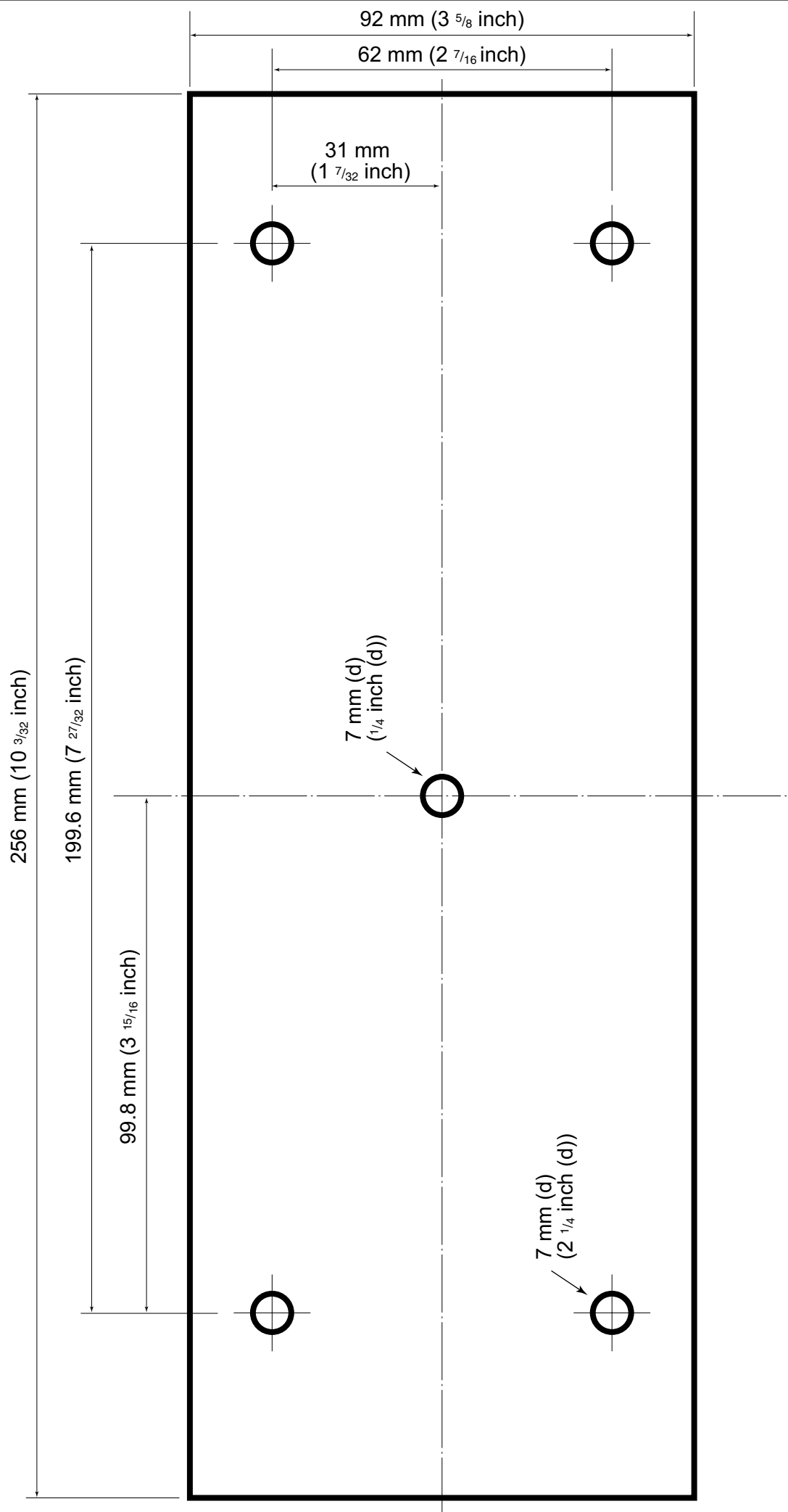
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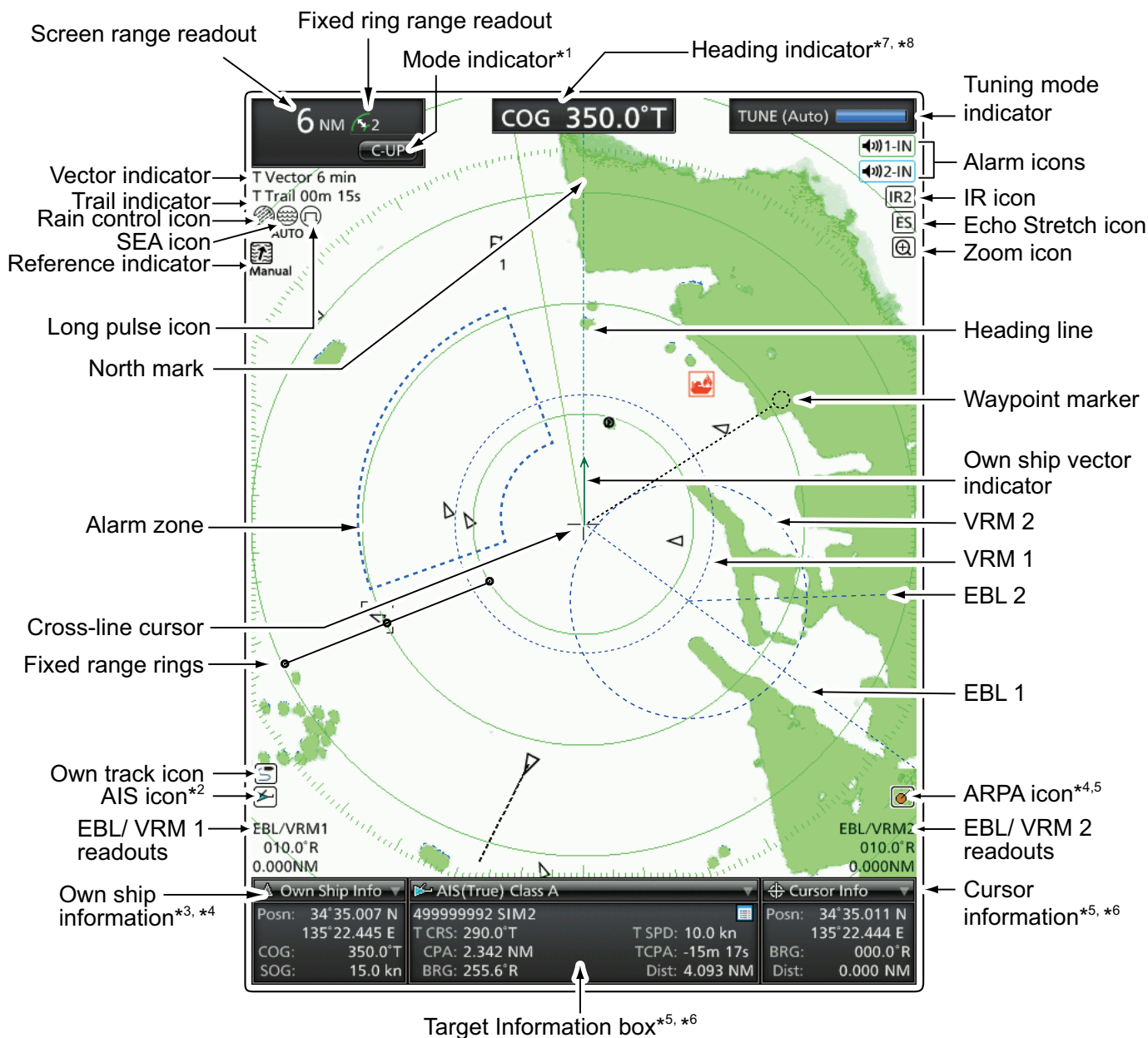
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Display mounting bracket template



Refer to the Instruction Manual for details about the ARPA, the AIS receiver, and DSC functions.

■ Display information



*1 North-up and Course-up screens require a bearing input (NMEA, N+1 or AUX.)

*2 AIS data is required.

*3 Your position data is required.

*4 GPS data is required.

COG (Course Over Ground), SOG (Speed Over Ground)

*5 Bearing data and position data are required.

*6 R: Relative bearing, T: True bearing, M: Magnetic bearing

*7 T: True bearing, M: Magnetic bearing

*8 COG (Course Over Ground) is displayed when the "Bearing Input" item in the Initial menu is set to "GPS" or "GPS-L."


When using COG instead of HDG (HeadInG), the heading indicator may differ from the vessel's actual bow direction.

MR-1220 MENU screen operation

① Push  /  to enter the Menu screen.

② Push  to select a menu.

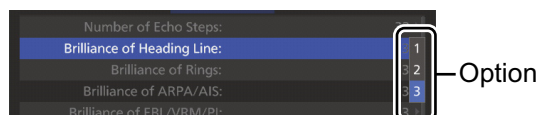
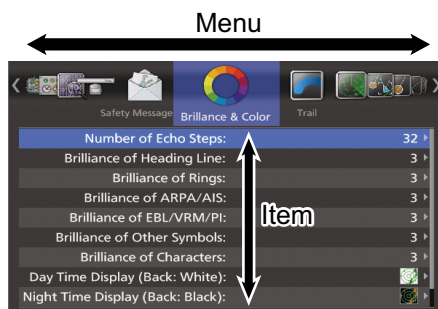
③ Push  to select an item.

④ Push  to enter the option selection mode.

⑤ Push  to select an option.

⑥ Push  to apply the selection.

⑦ Push  /  to exit the Menu screen.



Brilliance & Color	Target	Video	Initial
Number of Echo Steps Brilliance of Heading Line Brilliance of Rings Brilliance of ARPA/AIS Brilliance of EBL/VRM/PI Brilliance of Other Symbols Brilliance of Characters Day Time Display (Back: White) Night Time Display (Back: Black) User Custom Display	Vector Mode Setting Vector Time Track Interval CPA Limit TCPA Limit CPA/TCPA Alarm Function Display Favorite Target Range (Favorite Target) Favorite Target List ID Blocking Function Blocking Target List	TUNE Manual TUNE Dynamic Range Interference Reduction (IR) Function Echo Stretch Function Pulse Width Setting SEA Curve Level Antenna Height 3D - Transparent	Unit (Distance) Unit (Speed) Date Format Language Bearing Input TX Inhibit Start Point (TX Inhibit) Angle (TX Inhibit) Timing Adjust Heading Adjust Antenna Rotation Speed Range Ring Select Effective Range Setting Internal Buzzer External Buzzer Save Setting 1 / 2 / 3 Load Setting 1 / 2 / 3 Settings Reset Factory Reset
Trail	ARPA	System	DSC List
Clear Trails Reference Settings Time Level Fine Trail Color	ARPA Function Auto Acquire Function Display Tracks Display Target Number Clear All Targets	Key Beep Key Backlight Sync Temporarily Hide Line Zone Alarm 1 / 2 Zone Alarm Level OFF Center Function Save Time Bearing Type Variation Manual Variation Bearing Reference Input Speed Selection Manual Speed Manual SET Manual Drift TLL Mode Transparency Menu Transparency Info. Standby Mode Version	AIS List
Display	AIS		Own AIS
Display Own Vector PPI Area Setting Auto Hide Information Display Waypoints Display Marks Display DSC Info Cursor Information Display Own Track Clear Own Track Interval (Own Track) Color (Own Track)	Display AIS Targets Display Tracks Display Target's Name Auto Activate Function Distance (Auto Activate) Angle (Auto Activate) New Target Warn (Auto Activate) Display Range Maximum Targets Slow Warn Function Speed (Slow Warn) Clear Lost Targets Display Safety Message		Status
			Port Monitor
			NMEA1 Input NMEA2 Input NMEA2 Output AIS Input DSC Input
			Scanner Monitor
			Safety Message

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Count on us!

