FURUNO

OPERATOR'S MANUAL

MARINE RADAR

MODEL 1815

FURUNO ELECTRIC CO., LTD.

www.furuno.com

IMPORTANT NOTICES

General

- This manual has been authored with simplified grammar, to meet the needs of international users.
- The operator of this equipment must read and follow the descriptions in this manual. Wrong operation or maintenance can cancel the warranty or cause injury.
- Do not copy any part of this manual without written permission from FURUNO.
- If this manual is lost or worn, contact your dealer about replacement.
- The contents of this manual and equipment specifications can change without notice.
- The example screens (or illustrations) shown in this manual can be different from the screens you see on your display. The screens you see depend on your system configuration and equipment settings.
- Save this manual for future reference.
- Any modification of the equipment (including software) by persons not authorized by FURUNO will cancel the warranty.
- The following concern acts as our importer in Europe, as defined in DECISION No 768/2008/EC.
  - Name: FURUNO EUROPE B.V.
  - Address: Ridderhaven 19B, 2984 BT Ridderkerk, The Netherlands
- All brand and product names are trademarks, registered trademarks or service marks of their respective holders.

How to discard this product

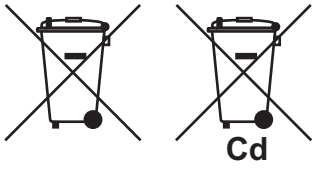
Discard this product according to local regulations for the disposal of industrial waste. For disposal in the USA, see the homepage of the Electronics Industries Alliance (http://www.eiae.org/) for the correct method of disposal.

How to discard a used battery

Some FURUNO products have a battery(ies). To see if your product has a battery, see the chapter on Maintenance. Follow the instructions below if a battery is used. Tape the + and - terminals of battery before disposal to prevent fire, heat generation caused by short circuit.

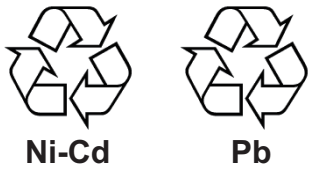
In the European Union

The crossed-out trash can symbol indicates that all types of batteries must not be discarded in standard trash, or at a trash site. Take the used batteries to a battery collection site according to your national legislation and the Batteries Directive 2006/66/EU.



In the USA

The Mobius loop symbol (three chasing arrows) indicates that Ni-Cd and lead-acid rechargeable batteries must be recycled. Take the used batteries to a battery collection site according to local laws.



In the other countries

There are no international standards for the battery recycle symbol. The number of symbols can increase when the other countries make their own recycle symbols in the future.

SAFETY INSTRUCTIONS

Read these safety instructions before you operate or install the equipment.

WARNING	Indicates a condition that can cause death or serious injury if not avoided.
CAUTION	Indicates a condition that can cause minor or moderate injury if not avoided.

Warning, Caution Prohibitive Action Mandatory Action

WARNING

Radio Frequency Radiation Hazard

The radar antenna sends the electromagnetic radio frequency (RF) energy. This energy can be dangerous to you, especially your eyes. Do not look at the radiator or near the antenna when the antenna is rotating.

The distances at which RF radiation levels of 100 W/m^2, 50 W/m^2 and 10 W/m^2 exist are shown in the table.

Note: If the antenna unit is installed at a close distance in front of the wheel house, prevent the transmission in that area to protect passengers and crew from microwave radiation. Set the [Sector Blanks] in the [System] menu.

Distance to 100 W/m^2 point	Distance to 50 W/m^2 point	Distance to 10 W/m^2 point
————	————	Worst case 1.1 m

CAUTION

Observe the following compass safe distances to prevent deviation of a magnetic compass.

Unit	Standard	Steering
Display unit	0.45 m	0.30 m
M1815 Antenna unit	1.70 m	1.05 m

WARNING

Do not open the equipment.

The equipment uses high voltage that can cause electrical shock. Refer any repair work to a qualified technician.

Before turning on the radar, be sure no one is near the antenna.

Prevent the potential risk of being struck by the rotating antenna, which can result in serious injury or death.

If water leaks into the equipment or something is dropped into the equipment, immediately turn off the power at the switchboard.

Fire or electrical shock can result.

If the equipment is giving off smoke or fire, immediately turn off the power at the switchboard.

Fire or electrical shock can result.

Do not disassemble or modify the equipment.

Fire, electrical shock or serious injury can result.

Do not place operate the equipment with wet hands.

Electrical shock can result.

⚠ WARNING

Usethe correct fuse.

Use of a wrong fuse can result in fire or damage to the equipment.

D**o not place liquid-filled containers on the equipment.**

Fire or electrical shock can result if a liquid spills into the equipment.

⚠ CAUTION

The guard zone alarm is an effective aid to anti-collison.

Its use does not relieve the operator of the responsibility to keep a vigilant watch on his or her surroundings.

The data presented by this equipment is intended as a source of navigation information.

The prudent navigator never relies exclusively on any one source of navigation information, for safety of vessel and crew.

TT safety information

⚠ WARNING

The TT function is a valuable aid to navigation. However, the navigator must check all aids available to avoid collision.

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

- A target is not always a landmass, reef, ship, but can also be returns from the sea surface and from clutter. As the level of clutter changes with the environment, the operator must correctly adjust the sea and rain clutter controls and the gain control so that the target echoes do not dis-appear from the radar screen.

⚠ CAUTION

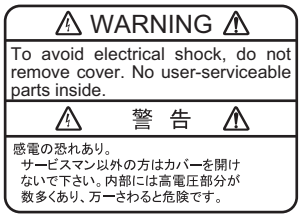
The plotting accuracy and response of this TT meets IMO standards. Tracking accuracy is affected by the following:

- Tracking accuracy is affected by course change. One to two minutes is required to restore vectors to full accuracy after an abrupt course change. (The actual amount depends on gyrocompass specifications.)

- The amount of tracking delay is inversely proportional to the relative speed of the target. Delay is approx. 15-30 seconds for the higher relative speed; approx. 30-60 seconds for the lower relative speed. The following factors can affect accuracy:
  - Echo intensity
  - Radar transmission pulse length
  - Radar bearing error
  - Gyrocompass error
  - Course change (own ship and targets)

Warning Label(s)

Warning label(s) is(are) attached to the equipment. Do not remove the label(s). If a label is missing or damaged, contact a FURUNO agent or dealer about replacement.



Name: Warning Label 1
Type: 86-003-1011-1
Code No.: 100-236-233-10

Name: Warning Sticker
Type: 03-142-3201-0
Code No.: 100-266-890-10

TFT display

The high quality TFT (Thin Film Transistor) LCD displays 99.99% of its picture elements. The remaining 0.01% may drop out or light,. However, this is an inherent property of the TFT; it is not a sign of malfunction.

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FOREWORD

A Word to the Owner of the MODEL1815 Marine Radar

Congratulations on your choice of the FURUNO MODEL1815 Marine Radar. We are confident you will see why the FURUNO name has become synonymous with quality and reliability.

Since 1948, FURUNO Electric Company has enjoyed an enviable reputation for innovative and dependable marine electronics equipment. This dedication to excellence is furthered by our extensive global network of agents and dealers.

Your equipment is designed and constructed to meet the rigorous demands of the marine environment. However, no machine can perform its intended function unless properly installed and maintained. Please carefully read and follow the operation and maintenance procedures set forth in this manual.

We would appreciate feedback from you, the end-user, about whether we are achieving our purposes.

Thank you for considering and purchasing FURUNO equipment.

Features

The main features are as shown below.

- The main specifications of the MODEL 1815 are outlined in the table below.

Model	Output	Range	Antenna unit size and type	Antenna RPM
Model 1815	4 kW	36 nm	48 cm, Radome	24 RPM

- The radar is operated with keys, knobs and a Cursorpad.
- Easy-to-view 8.4 inch LCD.
- Echo area display with full screen provides observation of a wider range around the vessel.
- User-programmable function key
- AIS data available with connection of FURUNO AIS Transponder/Receiver.

Program No.

0359375-01.**
**=Minor modification

Radar function availability

The Model 1815 is available in two types, [River] (river use) and [Sea] (sea use). Some functions may not available depending on the type selected See the table below for item and availability.

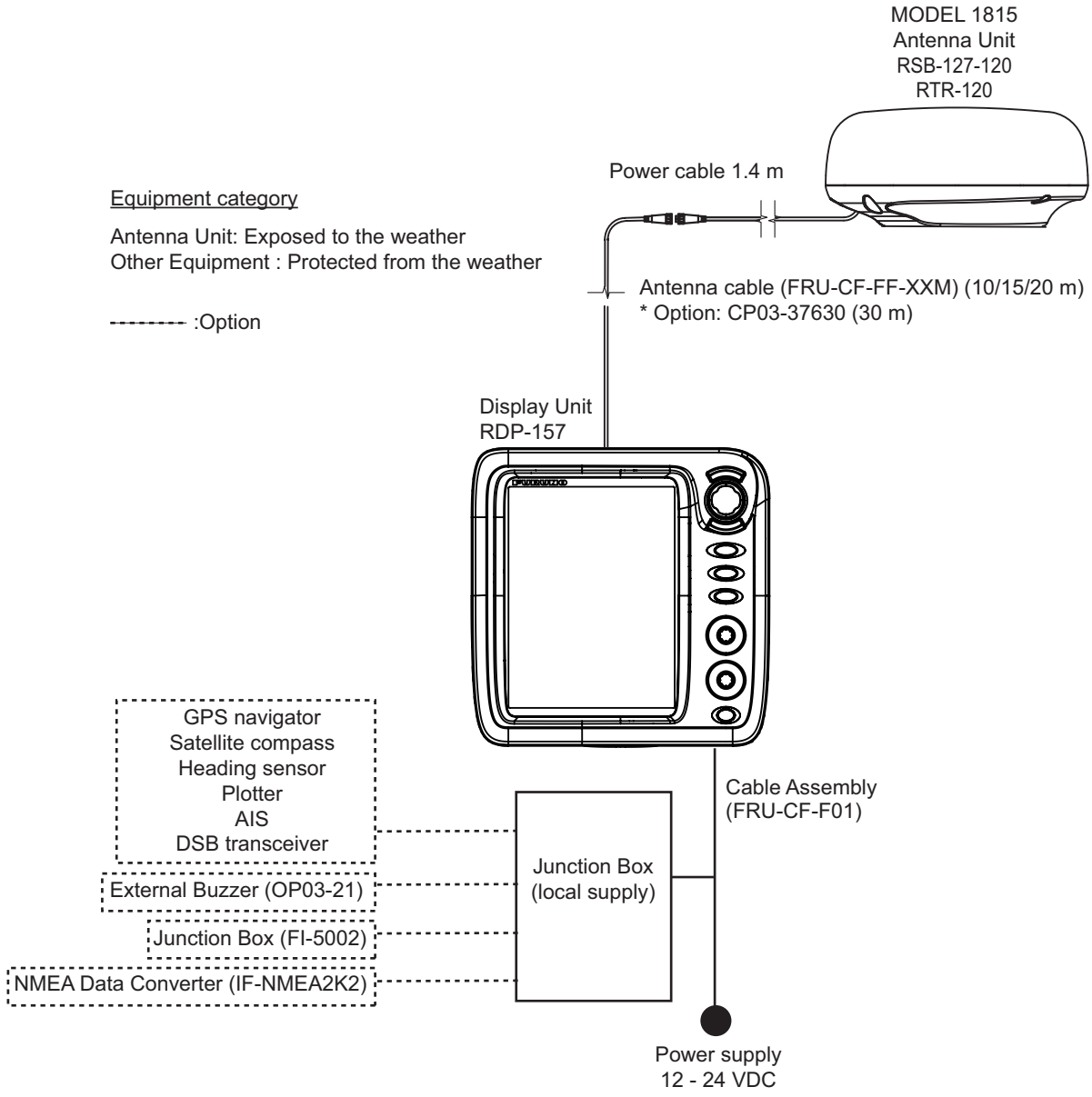
Type and function availability

Item	Type		Page reference
	River	Sea	
Automatic menu closure	Menu closes automatically.		
Effective radius dot count	240 dots		
Echo color	Select the echo display color		
Echo color customizing	Can customize the echo display color.		
Echo area	Select the display area from [Normal] or [Full Screen].		
Base text display	Can show or hide the base text indications.		
Range preset	Select the radar ranges to use.		
Unit defaults 1) range 2) speed	1) KM 2) km/h, m/s	1) NM 2) kn	
Bearing scale	Graduation every 1°, 5°, 10°, 30°, no numeric indication, displayed in the effective radius		
VRM unit	Can set the VRM unit independently from the range unit.		
Range unit	Can change the range unit when transmitting.		
AIS symbol color	Select the AIS symbol color from [Green], [Red], [Blue], [White] or [Black].		
Vector reference	Select the display mode for the vector from [Relative] or [True].		
TT number	Empty numbers numbered in ascending order		
Heading line erasure	Heading line, EBL, VRM, guard zone, etc. temporarily erased.		

Note on Chinese font: The Chinese font used in this equipment is Ricoh Company Ltd.'s Ricoh bitmap font.

SYSTEM CONFIGURATION

Basic configuration is shown below with solid line.



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1. INSTALLATION

1.1 Equipment List

Name	Type	Code No.	Qty	Remarks
Display Unit	RDP-157	—	1	
Antenna Unit	RTR-120	—	1	
Mounting Base	RTR-120	—	1	
Installation Materials	CP03-37600	000-033-122	Select one	
	CP03-37610	000-033-123		
	CP03-37620	000-033-124		
Radome Mounting Bracket	OP03-209	001-078-350	1	Option
External Buzzer	OP03-21	000-030-097	1	Option
NMEA Data Converter	IF-NMEA2K2	000-020-510	1	
Junction Box	FI-5002	000-010-765	1	
Cable Assy.	FRU-CF-FF-30M	001-464-290	1	
Flush Mount Kit	OP03-242	0001-464-280	1	Option

1.2 How to Install the Display Unit

⚠ CAUTION

Do not use paint, anti-corrosion products, contact spray or other items containing organic solvents on the equipment.

Organic solvents can harm paint and plastic, particularly the connectors.

The display unit can be installed on a desktop or flush mounted in a console. Do not install the unit on the overhead or a bulkhead. Select a suitable location for the unit considering the following points:

- Select a location where the controls can be easily operated.
- Locate the unit away from the direct wind from air conditioners.
- The temperature range in the mounting location should be -15°C(5°F to 55°C(131°F).
- Locate the unit away from devices that emit active gas.
- The mounting location must be well ventilated.
- Select a location where vibration and shock are minimal.
- A magnetic compass will be affected if the display unit is placed too close to the compass. Observe the compass safe distances in the safety instructions to prevent interference to the compass.
- Locate the unit away from direct sunlight to prevent heat build up inside the cabinet and condensation in the display.
- Keep the unit away from water and water splash. (The unit complies with waterproofing specification IP5.)

Desktop mount

Fasten the unit to the mounting location as shown below. For mounting dimensions, see the outline drawing at the back of this manual.

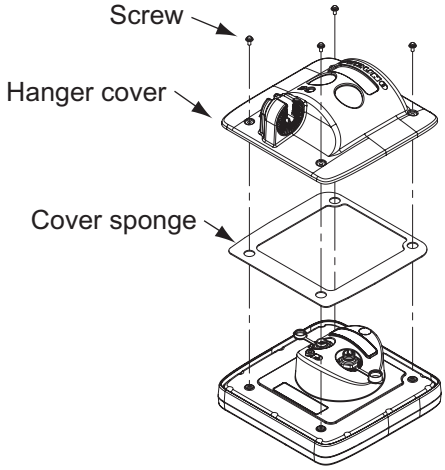
1. Fix the bracket assembly to a desktop with four self-tapping screws (5×25, supplied). Be sure to follow the recommended maintenance space show in the outline drawing. Insufficient space may damage to the connectors when disconnecting and reconnecting them.
2. Loosely screw knob into the bracket assembly.
3. Set the display unit to the bracket assembly.
4. Tighten the knob to fix the display unit.
5. Adjust the angle of the display unit for comfortable viewing angle.
   Note: Do not tilt the unit 90-degree backward or forward. The cable connector may be damaged if it contacts the bracket.
6. Attach the hard cover to the display unit to protect the unit when it is not in use.

Flush mount (in a console)

Select a flat mounting location and install the unit as shown below.

It is recommended to set up a dedicated breaker when flush mounting the unit, since it will be difficult to disconnect cables.

1. Using the paper template (supplied), make a cutout in the mounting location.
2. Unfasten four washer head screws on the rear of the display unit to remove the bracket cover and the cover sponge.

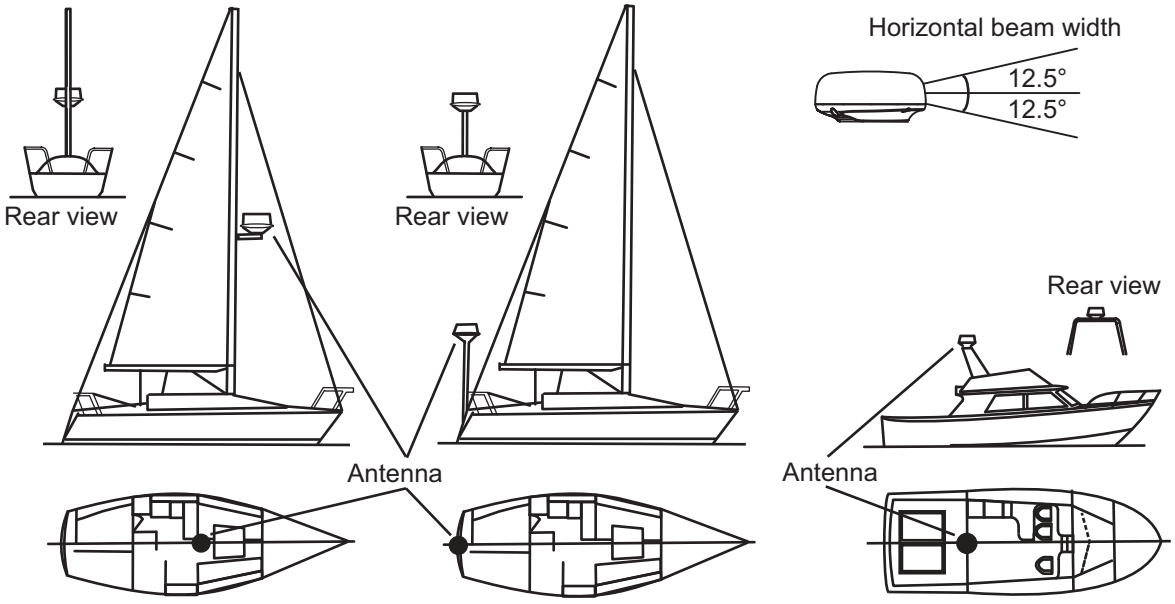


3. Set the flush mounting sponge (supplied) to the display unit.
4. Screw four threaded rods (supplied) to the display unit.
5. Set the display unit to the cutout.
6. Fasten the display unit from behind with four sets of flat washers, spring washers and wing nuts (supplied).

1.3 How to Install the Antenna Unit

Select a mounting location for the antenna unit considering the following points.

- Install the unit on a common mast, radar mast. etc.
- Install the antenna unit on a solid location, for example radar arch or on a mast on a platform. (For sailboats, a mounting bracket is optionally available.) You must put the antenna unit where there is a good complete view. Make sure that no part of the superstructure is within the scanning beam. Any obstruction causes shadow sectors. For example, a mast with a diameter smaller than the horizontal beam width causes only a small blind sector. A horizontal spreader or crosstrees in the same horizontal plane creates a large obstruction. Install the antenna unit above a horizontal spreader or crosstrees.



Mounting on a sailboat　　Mounting on a power boat

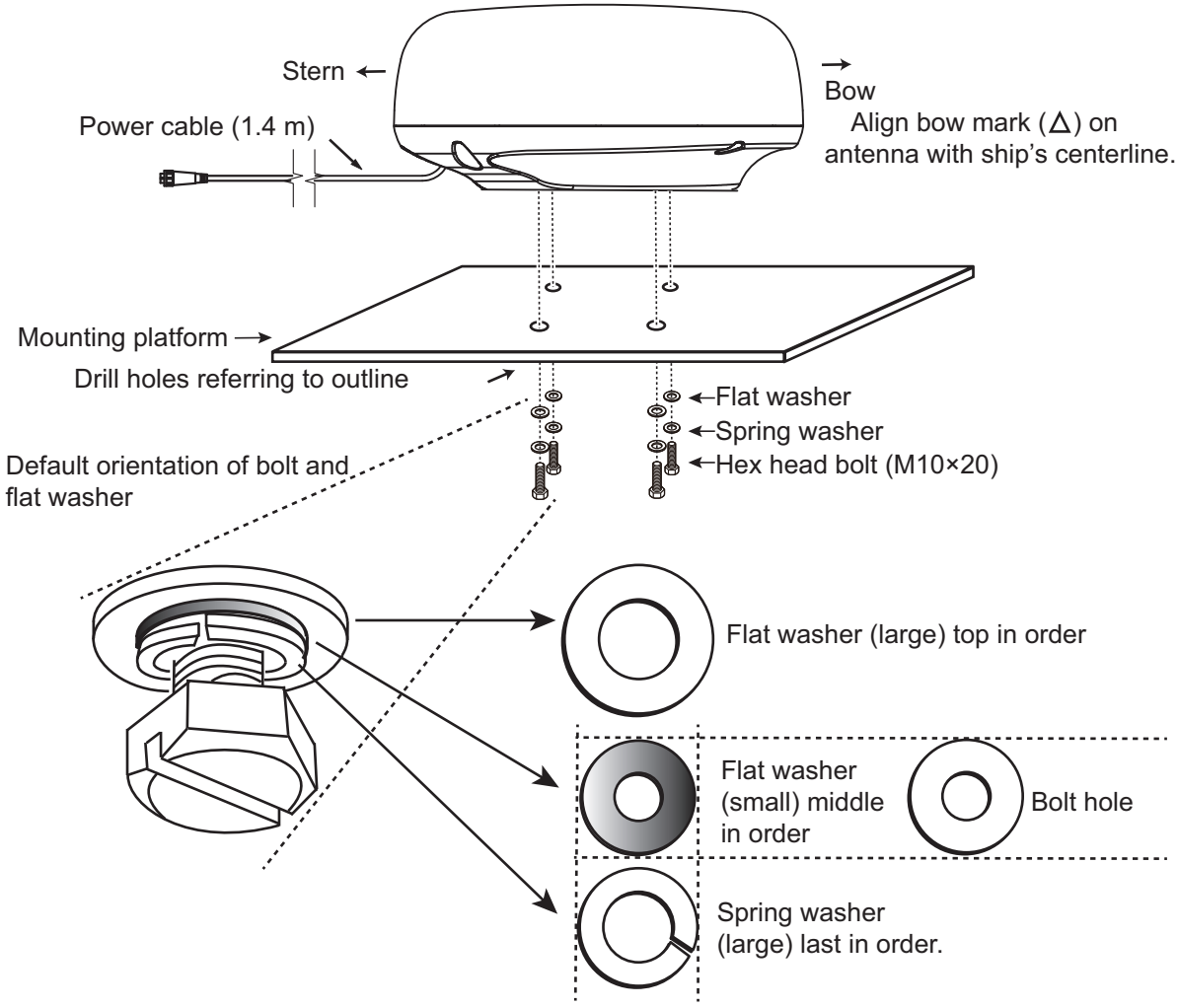
- To avoid electrical interference, do not run the antenna cable near other electrical equipment. Also do not run the cable in parallel to power cables.
- Do not install the unit where its motor noise may affect crew or passengers.
- As much as possible install the unit on the ship's centerline, to prevent misplacement of echoes (wrong bearing) on the display.
- Make sure the mounting location does not allow water to accumulate at the mounting platform.
- A magnetic compass will be affected if the display unit is placed too close to the compass. Observe the compass safe distances in the safety instructions to prevent interference to the compass.
- Do not paint the radome.
- Be sure to follow the recommended maintenance space shown in the outline drawing at the back of this manual.
- If the unit is installed on a large vessel observe the following points.
  - The antenna cable comes in lengths of 10, 15 and 20 m. Consider the length of the cable when selecting a mounting location.

- Keep the unit away from smoke and exhaust stacks. Hot air affects antenna performance. Hot air can also damage the unit. The temperature at the mounting location should not exceed 55°C(131°F)

Tools and materials for mounting

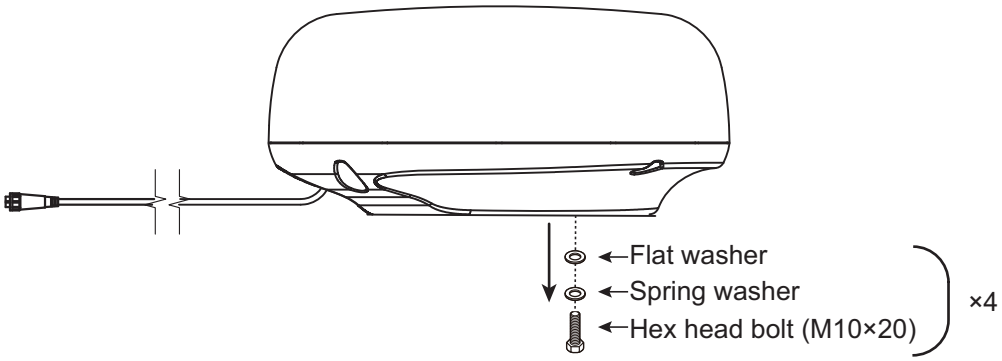
Name	Usage
Electric drill	Drill holes for mounting. Drill bit: ϕ11 mm
Hexagonal wrench	Fastening bolts: Diagonal: 6 mm

How to mount the antenna unit

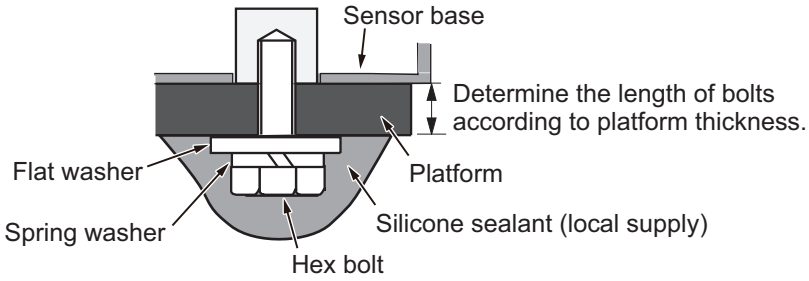


Note: The outer diameter of the small flat washer is the same size as the bolt hole. If the radome is put upside down with only the small flat washer and hex bolt in place, the hex bolt and flat washer may protrude into the radome and damage the RT unit. For this reason, DO NOT put the radome upside down when carrying the radome.

1. From the bottom of the radome, remove spring washers (M10), flat washers (M10) and hex head bolts (M10×25).

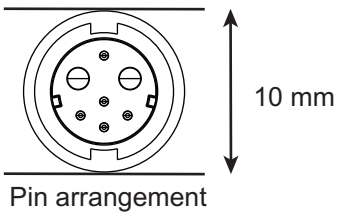


2. Use the mounting template (supplied) to mark the location of fixing holes in the mounting platform. Be sure to drill the holes parallel with the bow.
3. Lay the antenna unit on the mounting platform with the bow mark(△) on the antenna unit facing the bow.
4. Use hex bolts*, flat washers and spring washers (removed at step 1) to fasten the radar sensor to the platform. The torque for the bolts must be 19.6 to 24.5 N.m. Apply silicone sealant (local supply) to hex bolt, flat washer and spring washer as shown below.
   *See the figure below to determine the bolt length to use.



Platform thickness	Bolt size to use
5 mm or less	M10×20m
6 to 10 mm	M10×25
More than 10 mm	Local supply

5. Connect the power cable to the antenna unit. The pin arrangement is as shown below.

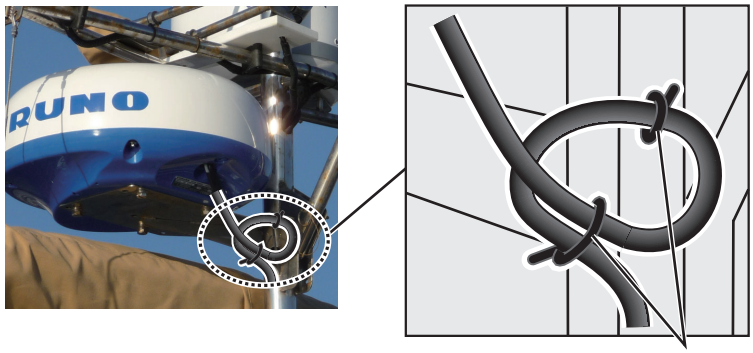


How to connect the power cable

Observe the following guidelines for connecting the power cable.

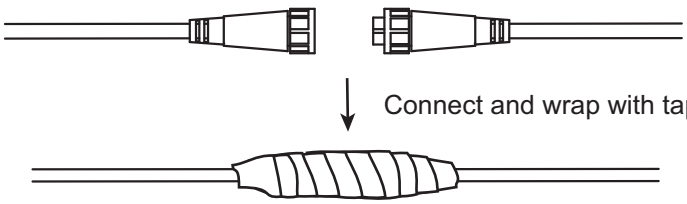
- The connectors must not strike any part of the vessel by wind, etc.
- The load applied to the connectors must not be more than their own weight.
- If the cable is passed through a mast on a sailboat, be sure the cable does not touch ropes (sheet, halyard, etc.).
- Do not fasten the cable to the hull.

1. The cable must be fixed so no tension is applied to the connectors. To prevent tension, make a loop in the cable close to the sensor and tie the loop with cable ties, as in the figure below.



Loop cable and tie the loop with cable ties. (Min. bending radius: 80 mm)

2. Wrap the junction of the connectors with self vulcanizing tape for waterproofing.



3. Fasten the cable to the mast, etc. at the neck of each connector with a cable tie.

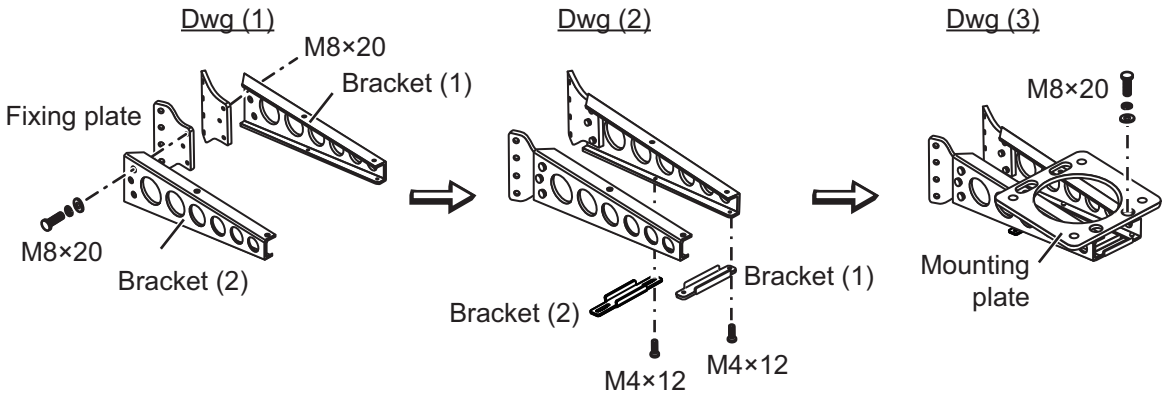
How to use the radome mounting bracket (option)

The optional radome mount lets you fasten the radar sensor to a mast on a sailboat.
Name, Type: Radome Mount, OP03-209
Code No.: 001-078-350

Name	Type	Code No.	Qty
Mounting plate	03-018-9001-0	100-206-740-10	1
Support plate (1)	03-018-9005-0	100-206-780-10	1
Support plate (2)	03-018-9006-0	100-206-790-10	1
Bracket (1)	03-028-9101-1	100-206-811-10	1
Bracket (2)	03-028-9101-2	100-206-812-10	1
Fixing plate	03-028-9103-1	100-206-831-10	2
Hex bolt w/washer	M8×20 SUS304	000-162-955-10	8
Hex bolt w/washer	M4×12 SUS304	000-162-956-10	4

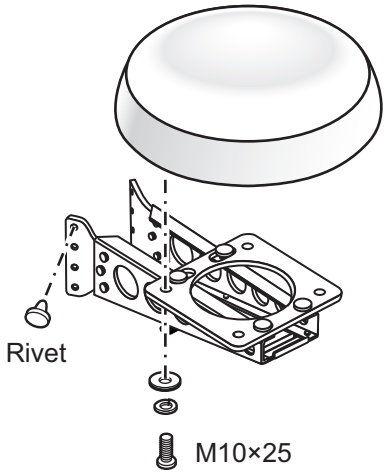
How to assemble the bracket:

1. Fasten the fixing plates to brackets (1) and (2) with four M8×20 hex bolts.
2. Fit brackets (1) and (2) loosely with support plates (1) and (2) using four M4×12 hex bolts, so that the gap between the brackets can be adjusted.
3. Place the mounting plate on the bracket and fix it loosely with four M8×20 hex bolts.



How to fasten the bracket to the mast:

1. Drill eight holes of 6.5 mm into the mast. Fasten the bracket to the mast with eight stainless steel rivets whose diameter is 6.4 mm.
2. Tighten the bolts on the bracket.
3. Fasten the antenna unit to the bracket.



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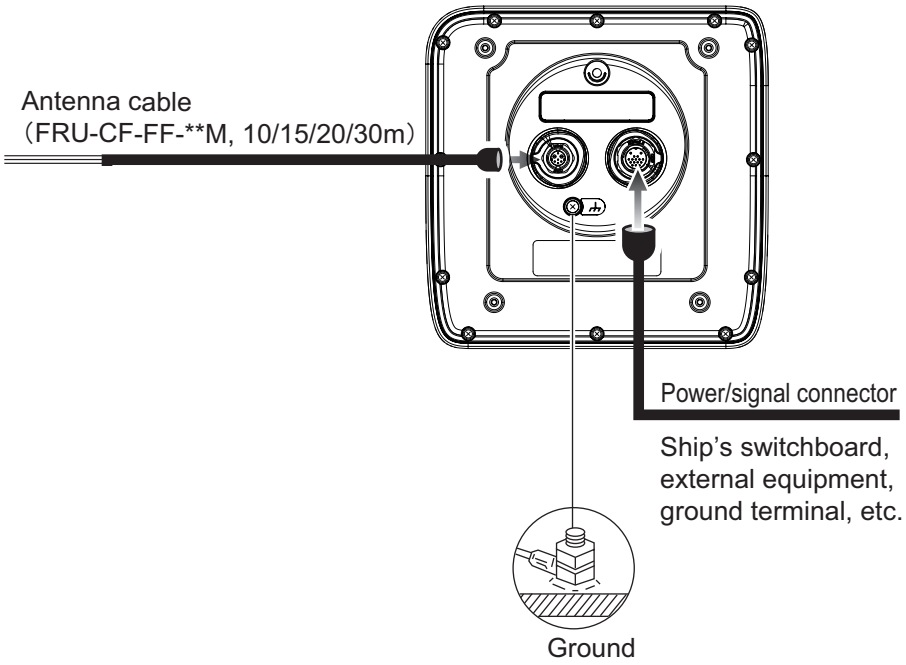
2. WIRING

2.1 Wiring

Use the supplied cable FRU-CF-F01 to connect a satellite compass, heading sensor, GPS navigator, external buzzer, and power supply to the 12-24 VDC/NMEA connector.

Connect the antenna cable (FU-CF-xxM (10m/15m/20m/30m) to the antenna port. See the interconnection diagram at the back of this manual for details. Leave slack in the cable to ease maintenance.



Display unit, rear view

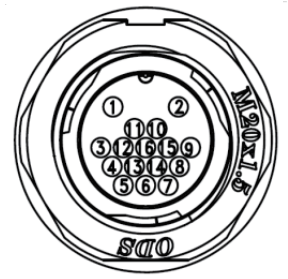
Note 1: The display unit comes with connector caps. Use the caps to cover the connectors whenever the display unit is removed from the boat.

Note 2: Cut unused wires and wrap them with vinyl tape to keep them from touching one another.

Note 3: Use care when disconnecting cables to prevent damage to their connectors.

Note 4: If an NMEA device is to use +12 V power from this radar, do not connect the device’s circuit GND or chassis GND. (Do not connect chassis GND to 12V_M.)

Connector		Color	Remarks
1	DC-P-IN(+)	RED	Power input, 12-24 VDC
2	DC-M-IN(-)	BLK	
3	TD1-A	GRN/BLK(1)	IEC61162-2/NMEA1
4	TD1-B	GRN/RED(1)	
5	RD1-H	GRY/BLK(1)	
6	RD1-C	GRY/RED(1)	
7	TD2-A	GRN/BLK(2)	IEC61162-2/NMEA2
8	TD2-B	GRN/RED(2)	
9	RD2-H	GRY/BLK(2)	
10	RD2-C	GRY/RED(2)	
11	RD3-H	GRY/BLK(3)	IEC61162-2/NMEA3
12	RD3-C	GRY/RED(3)	
13	12V-P(+)	BRN	Power output, 12-24 VDC
14	12V-M(-)	ORG	
15	EXT-BUZZ-EN	WHT	External buzzer
16	SHIELD	BLK	Drain wire, to ship's switchboard's ground terminal



Ground

⚠ CAUTION

Do not fail to ground the display unit.

If the ground is poor or there is no ground, interference to the radar and other equipment can result.

Grounding guidelines:

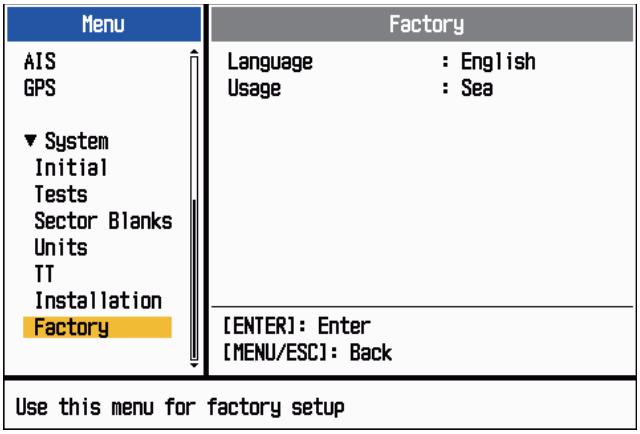
- The ground wire (local supply) should be 2sq or higher.
- The length of the ground wire should be as short as possible.
- For an FRP vessel, fasten a 20 cm×30 cm earthing plate to the outside of the ship's hull and attach the ground wire to a bolt on the plate.
- Attach a closed-end lug ( ) to the ground wire. Do not use an open-end lug ( ).
- External equipment whose signal line is connected to ground cannot be directly connected to this equipment if the positive polarity of the vessel's DC power is connected to ground.

3. INITIAL SETTINGS

3.1 How to Select Language

Do the following to select the language to use.

1. Press the (⏻ TX) key on the display unit to turn on the power.
2. Press the **MENU/ESC** key to show the menu.

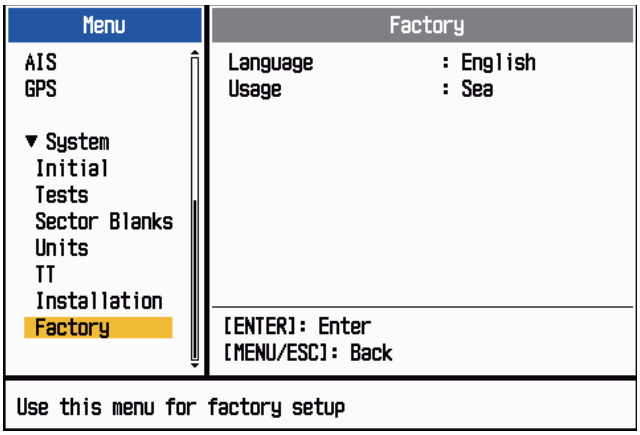


3. Press ▲, ▼ on the Cursorpad to select [Factory], then press the **ENTER** key.The cursor moves to the menu item section and [Language] is selected. Press the **ENTER** key again to show the language options.

4. Press ▲, ▼ on the Cursorpad to select a language, then press the **ENTER** key.
5. Press the **MENU/ESC** key to close the menu.

3.2 How to Select Radar Purpose

1. Press the **MENU/ESC** key to show the menu.
2. Press ▲, ▼ on the Cursorpad to select [Factory], then press the **ENTER** key.

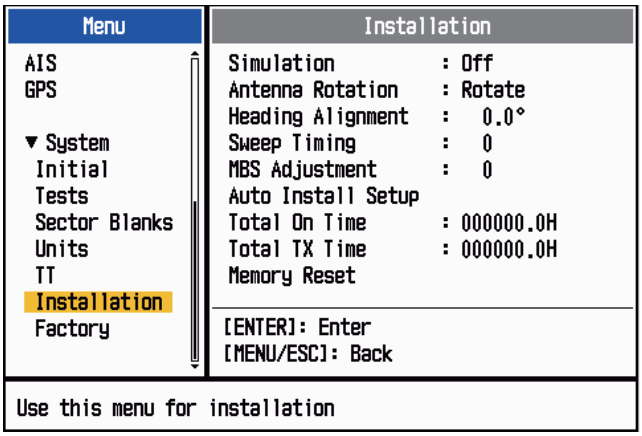


3. Press ▲, ▼ on the Cursorpad to select [Usage], then press the **ENTER** key.

4. Press ▲, ▼ on the Cursorpad to select a [River] or [Sea], then press the **ENTER** key.
5. Press the **MENU/ESC** key to close the menu.

3.3 Initial Settings

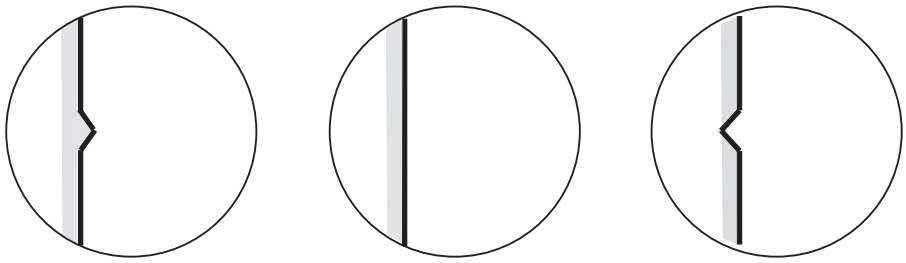
1. Press the **MENU/ESC** key to show the menu.
2. Press ▲, ▼ on the Cursorpad to select [Installation], then press the **ENTER** key.



3. While holding down and pressing the **ENTER** key, press the **ALARM** key five times to unlock the [Installation] menu.
4. Press ▲, ▼ on the Cursorpad to select the item to set, then press the **ENTER** key.
5. Press ▲, ▼ on the Cursorpad to select the option required, then press the **ENTER** key
6. After setting all items, press the **MENU/ESC** key to close the menu.

Item description

- [**Simulation**]: Normally, set to [Off.] To view the demonstration picture, select [On].
- [**Antenna Rotation**]: Select [Rotate] to rotate the antenna and transmit radar pulses. The [Stop] setting, which transmits radar pulses without rotating the antenna, is for use by the service technician.
- [**Heading Alignment**]: You have installed the antenna unit so that the unit faces toward the bow. A target at the front of the boat and aligned with the bow must appear on the heading line (zero degrees). If the target does not appear on the heading line, do the procedure shown below to adjust the heading.
  1. Set ship heading toward an acceptable target (for example, ship at anchor or buoy) at a range between 0.125 and 0.25 nautical mile.
  2. Transmit the radar at the range of 0.25 nautical mile and measure the bearing of that target relative to ship heading with an EBL.
  3. Open the [Installation] menu and select [Heading Adjust].
  4. Press the **ENTER** key to show the heading adjustment window.
  5. Press ▲ or ▼ to set the value measured at the above step 2. Check that the target appears on the heading line.
  6. Press the **ENTER** key to finish.
- [**Sweep Timing**]: This adjustment gives correct radar performance on short ranges. The radar measures the time required for a transmitted echo to go to the target and return to the source. The received echo appears on the display according to the measured time. The sweep must start from the center of the display.A trigger pulse created in the display unit goes to the antenna unit through the signal cable to activate the transmitter (magnetron). The time taken by the signal to move to the antenna unit changes, according to the length of the signal cable. During this period, the display unit must wait before the radar starts the sweep. When the display unit is not adjusted correctly, the echoes from a straight object will not appear as a straight line. The target appears "pushed" or "pulled" near the picture center. The range to objects are shown at wrong distances.



(1) Target pulled (2) Correct (3) Target pushed outward

  1. Transmit on the shortest range, then adjust the gain and the A/C SEA.
  2. Visibly select a target that creates a straight line (harbor wall, straight piers).
  3. Open the [Installation] menu and select [Timing Adjust].
  4. Press the **ENTER** key to show the timing adjustment window.
  5. Press ▲ or ▼ to make straight the target selected at step 2, then press the **ENTER** key to finish.

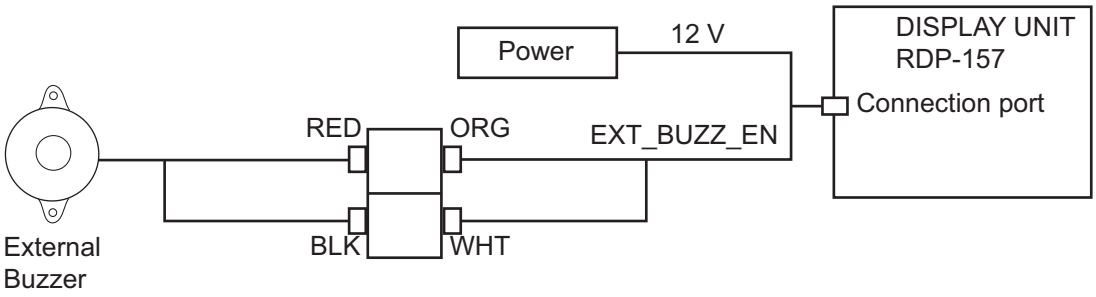
- [**Main Bang Suppression**]: Reduce the main bang (black hole at center of screen), which appears at the display center on short ranges, as follows.
  1. Transmit on the shortest range.
  2. Open the [Installation] menu and select [MBS Adjust].
  3. Press the **ENTER** key to show the MBS adjustment window.
  4. Press ▲ or ▼ on the Cursorpad so that the main bang is reduced.
  5. Press the **ENTER** key to finish.
- **How to automatically set the equipment**: The tuning, timing, and video can be automatically adjusted as follows.
  Note: Before doing this procedure, transmit the radar more than 10 minutes on a long range and check that [Sector Blank] is [Off].
  1. Transmit on the maximum range.
  2. Open the [Installation] menu and select [Auto Initial Setup], then press the **ENTER** key.
  3. Press ▲ on the Cursorpad to select [Yes], then press the **ENTER** key.

  The tuning adjustment begins automatically, and the message "Tuning adjusting" appears during tuning adjustment. After the tuning adjustment is completed, the timing and video are adjusted in that order. The messages "Timing adjusting" and "Video adjusting" appear during those adjustments. After all adjustments are completed, the window disappears. If the result for any item is not best for your conditions, manually adjust the item according to the procedure in this section.
- [**Total On Time**]: You can set the total on time as shown below.
  1. Open the [Installation] menu and select [Total On Time].
  2. Press the **ENTER** key.
  3. Press ▲ or ▼ on the Cursorpad to set value. The range is 000000.H to 999999.9 H.
  4. Press the **ENTER** key to finish.
- [**Total TX Time**]: You can set the total TX time as shown below.
  1. Open the [Installation] menu and select [Total TX Time].
  2. Press the **ENTER** key.
  3. Press ▲ or ▼ on the Cursorpad to set value. The range is 000000.H to 999999.9 H.
  4. Press the **ENTER** key to finish.
- [**Memory Clear**]: The memory clear feature restores all settings to default, including the default settings for the antenna connected to LAN.
  1. Open the [Installation] menu and select [Memory Clear].
  2. Press the **ENTER** key.
  3. Press ▲ or ▼ on the Cursorpad to select [Yes], then press the **ENTER** key.
  4. Press the **ENTER** key to finish.

4. OPTIONAL EQUIPMENT

4.1 External Buzzer

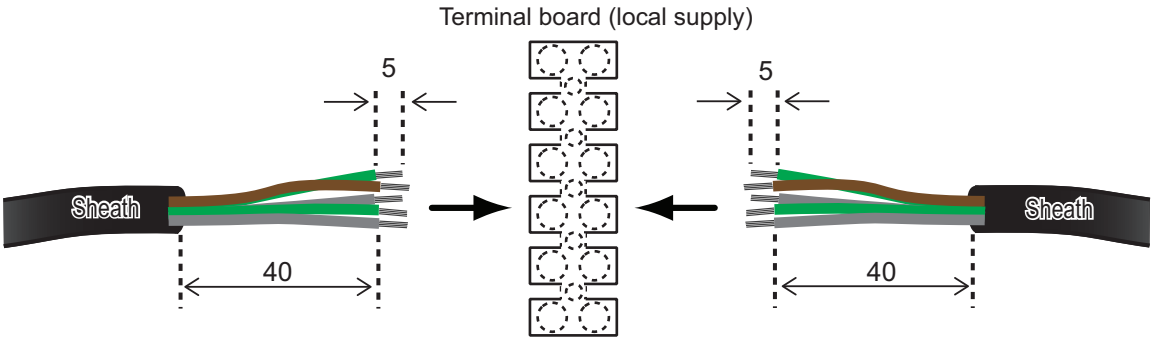
The external buzzer alerts you to violation of the guard zone in a remote location. Connect the buzzer to the display unit as shown below, using the external buzzer installation kit.



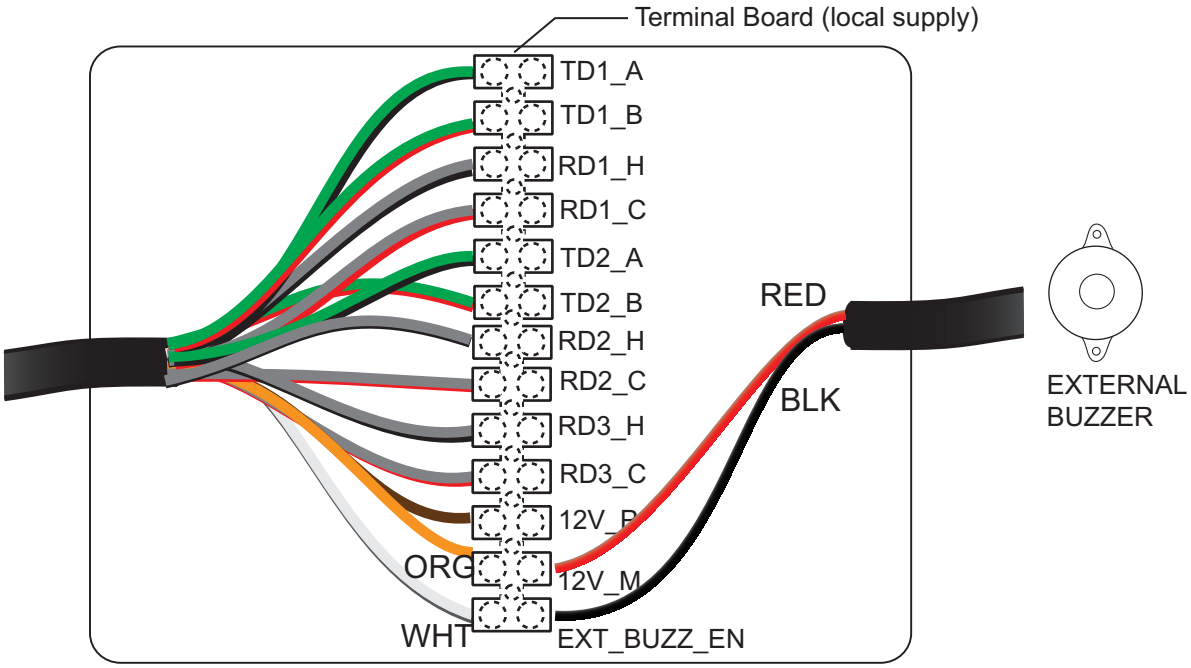
External Buzzer Installation Kit
Type: OP03-31, Code No.: 000-030-097

	Name	Type	Code No.	Qty	Remarks
1	Buzzer	PKB42SWH2940	000-153-221-10	1	Connector at both ends
2	Cable Tie	CV-70N	000-162-185-10	4	
3	Heat Shrink Tube	3×0.25 BLK	000-165-283-10	1	40 mm
4	Double-sided Tape	9760	000-800-851-00	1	25 m×25 mm

As shown in the illustration below, cut the connector from the end of the cables. Fabricate the cables as shown below, then connect the cables to the terminal board in the display unit.



Fabricate the cables as shown.


Terminal Board (local supply)
TD1_A
TD1_B
RD1_H
RD1_C
TD2_A
TD2_B
RD2_H
RD2_C
RD3_H
RD3_C
12V_P
12V_M
EXT_BUZZ_EN
RED
BLK
ORG
WHT
EXTERNAL
BUZZER

5. OPERATION

5.1 Controls

Display unit

The display unit has six keys, two knob controls and a Cursorpad that control the radar. When you correctly do an operation, the unit beeps one time. If the operation is incorrect, the unit beeps three times.

Control	Description
MENU/ESC	• Open/close the menu. • Cancel selection (setting),
Cursorpad	• Select the menu items and options. • Move the cursor.
ENTER	• Save selected menu option. • Acquire target to track its movement. • Select TT or AIS target to display its data.
MODE	Show the mode selection window.
ALARM	Set the target alarm, which checks for targets in the operator-set area.
FUNC	Execute the function assigned to this key.
RANGE (PUSH FOR GAIN)	Select the detection range.
DATA BOX	Select the data box to display on the radar screen.
TX	**Short push**: Turn on the power. **Long push**: Turn off the power. • Adjust the display brilliance. • Switch the radar between standby and TX.

5.2 How to Turn the Radar On/Off and Transmit

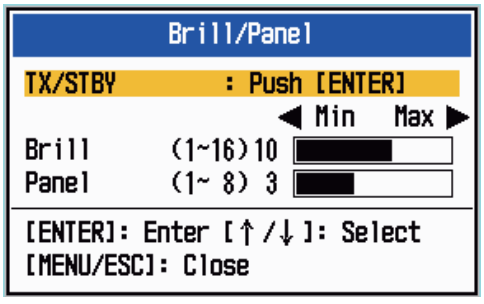
Press the TX key to turn on the radar. To turn off the radar, press and hold down the key until the screen turns off.

Start-up screen

When you turn on the power, the initialization screen appears followed by the start-up screen. The start-up screen shows the model name, program number and the results of the ROM and RAM check, OK or NG (No Good). If the test results are normal, the stand-by screen ([Normal] or [Nav]) appears approx. 5 sec. later, and the time remaining for magnetron warm-up (approx. 90 seconds) is counted down on the screen. **If NG appears, contact your dealer for instruction**.

After the magnetron has warmed, the indication [ST-BY] at the screen center. The radar is now ready to transmit radar pulses.

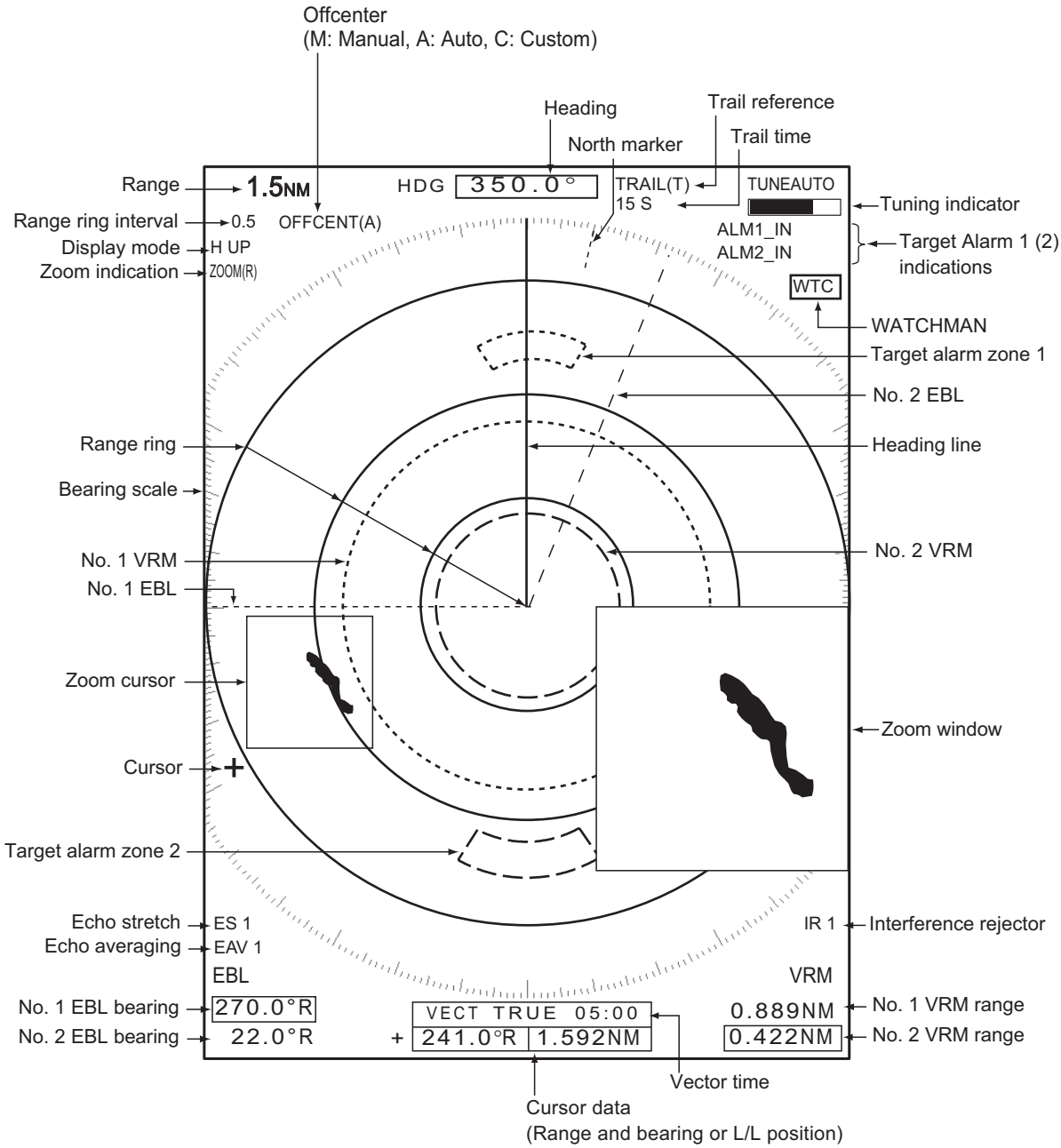
Push the TX key to show the [Brill/Panel] window.



The cursor is selecting [TX/STBY]. Press the **ENTER** key to transmit the radar pulses.

The TX key switches between standby and transmit. The antenna rotates in transmit and is stopped in standby. Because the magnetron ages with use, set the radar in stand-by when you are not using the radar, to extend the life of the magnetron.

5.3 Display Indications



Nav data: Appears at screen bottom when [Data Box] in the [Display] menu is set to [Nav] or [All]. Appropriate sensors required to display nav data.

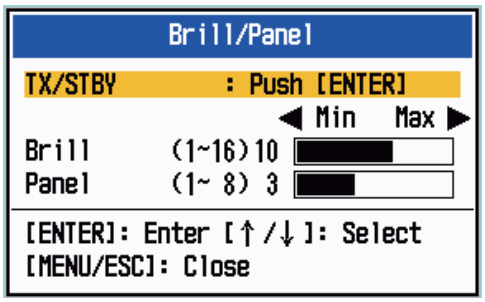
OWN SHIP		+ CURSOR		WAYPOINT	
LAT	34°56.123N	LAT	34°56.123N	BRG	14.8°
LON	135°34.567E	LON	135°34.567E	RNG	0.876NM
SPEED	12.3KN	TTG	01:00	TTG	00:20

Display indications

5.4 How to Adjust Display Brilliance, Panel Dimmer

You can adjust the display brilliance and panel dimmer as follows:

1. Press the TX key to show the [Brill/Panel] window.



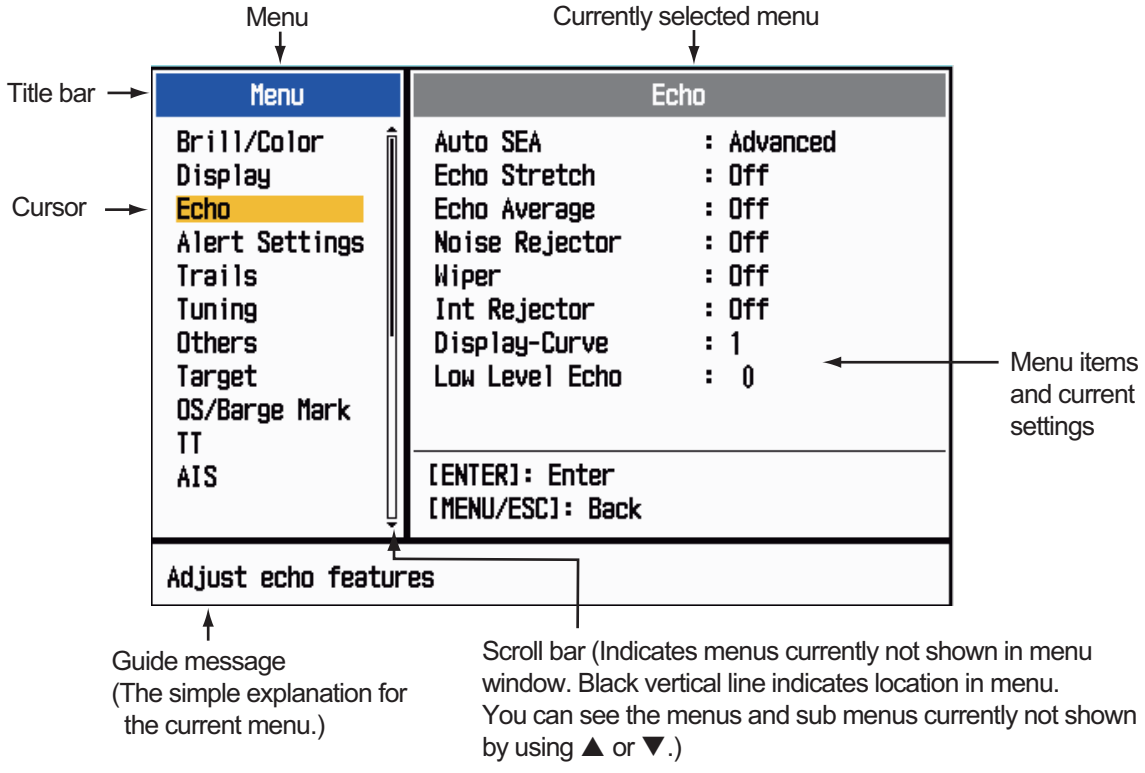
Brill/Panel dialog box

2. Press the **ENTER** key (or ▲, ▼) to select [Brill] or [Panel] as required.
3. Use the Cursorpad (◀ or ▶) to adjust. (For brilliance, you can also use the TX key.)
4. Press the **MENU/ESC** key to close the window.

5.5 Menu Description

This MODEL 1815 series has 14 menus and 7 sub menus. Below is the basic procedure for menu operation.

1. Press the **MENU/ESC** key to open the menu.



Menu

2. Use the Cursorpad (▲ or ▼) to select a menu or a sub menu. The cursor (yellow) in the Menu column indicates the menu currently selected. The menu items in the right window change according to the menu selected.

   Menu description
   [Brill/Color]: Adjust the brilliance and color.
   [Display]: Set up the display-related features.
   [Echo]: Adjust the echo features.
   [Alert Settings]: Customize the user settings.
   [Alarm]: Set up the alarm items.
   [Trails]: Process trails of the radar targets.
   [Tuning]: Adjust the radar tuning.
   [Others]: Set up other items.
   [Target]: Set up the targets configuration.
   [OS/Barge Mark]: Set up the own ship mark and barge mark.
   [TT]: Set up tracked targets.
   [AIS]: Set up AIS targets.
   [GPS]: Set up GP-320B (Black-Box GPS).
   [System]
   [Initial]: Initial settings.
   [Tests]: System diagnostic and LCD test.
   [Sector Blanks]: Set up the sector blanks to prevent the transmission in a certain area.
   [Units]: Set up units.
   [TT]: Set up TT system.
   [Installation] and [Factory]: For use by the installer. See the Installation Manual.

3. Press the **ENTER** key to switch the control to the menu items column. The cursor in the menu column now turns gray and the cursor in the menu items column is yellow.
   To switch the control from the menu items column to the menu column, use the **MENU/ESC** key. The color of the title bar of the active column is blue and of the inactive column is gray.

4. Use the Cursorpad (▲ or ▼) to select a menu item and press the **ENTER** key. A window with options for the related menu item appears.

Display Color options *Echo Brill setting window*

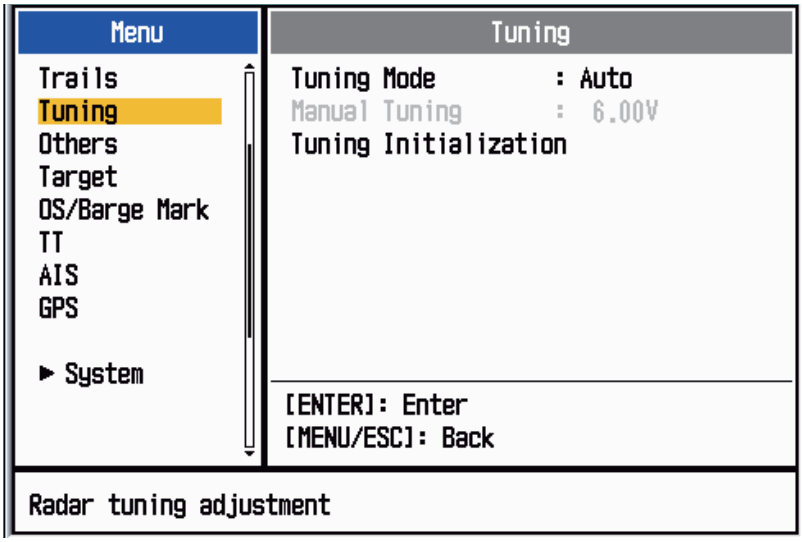
Example windows

5. Use the Cursorpad (▲ or ▼) to select an option or numeric value.
6. Press the **ENTER** key to save your selection. To close the window without saving, press he **MENU/ESC** key (instead of the **ENTER** key).
7. Press the **MENU/ESC** key to close the menu.

5.6 Tuning

In default, the radar receiver can be tuned automatically after turning the radar to TX. If you require fine tuning in manual, do the following:

1. Transmit the radar and select the maximum range with the **RANGE** knob.
2. Press the **MENU/ESC** key to open the menu.
3. Use the Cursorpad (▲ or ▼) to select [Tuning] and press the **ENTER** key.

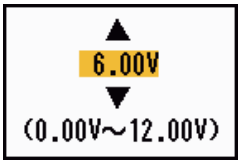


Tuning menu

4. Use the Cursorpad (▲ or ▼) to select [Tuning Mode] and press the **ENTER** key.

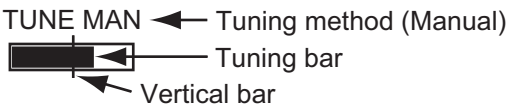
Tuning Mode options

5. Use the Cursorpad (▲ or ▼) to select [Manual] and press the **ENTER** key.
6. Use the Cursorpad (▲ or ▼) to select [Manual Tuning] and press the **ENTER** key to show the manual tuning setting window.



Manual Tuning setting window

7. Use the Cursorpad (▲ or ▼) to adjust the tuning while you look at the tuning bar at the upper-right corner of the display. The best tuning point is where the tuning bar moves to maximum value. The vertical bar on the tuning bar shows the tuning voltage.



8. Press the **ENTER** key.
9. Press the **MENU/ESC** key to close the menu.

Note: If the automatic tuning does not give the correct tuning, run the [Tuning Initialization] again.

5.7 Display Modes

This radar has the display modes shown below. All modes except head-up require a heading signal. The true motion mode additionally requires position data.

Relative Motion (RM)

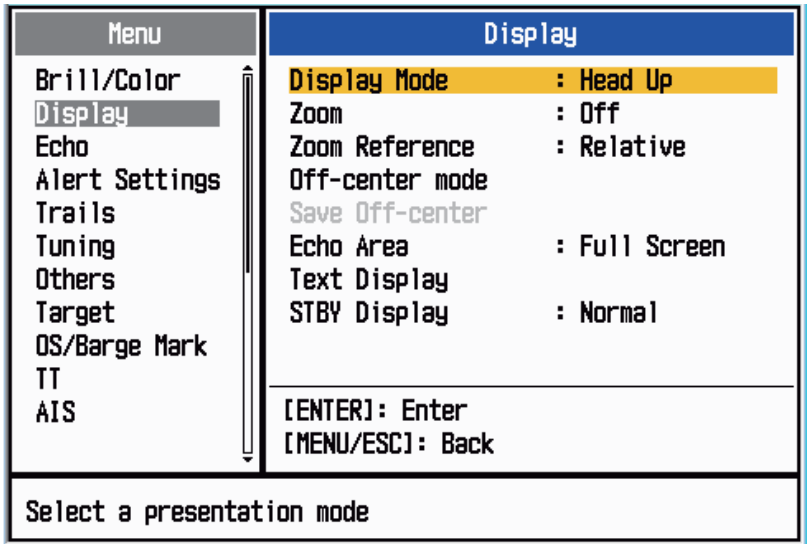
- [Head Up] (H UP)
- [Course Up] (C UP)
- [North Up] (N UP)
- [True View]

True Motion (TM)

- [True Motion] (TM)

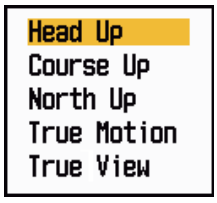
5.7.1 How to select the display mode

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



Display menu

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



Display Mode options

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

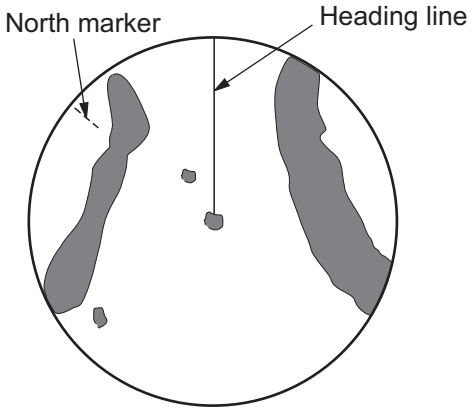
Note 1: The display mode is automatically switch to head up if the heading signal becomes lost.

Note 2: All modes except head-up require a heading signal in AD-10 format or NMEA format. If the heading signal is lost, the mode is changed to head-up and the north marker disappears. The display for heading is XXX.X and the alarm sounds. The message "GYRO" (AD-10 format data) or "NMEA_HDG" (NMEA format data) appears in the alarm message display. To stop the audio alarm, press any key. When the heading signal is restored, check the heading. The numeric value is displayed at the heading indication when the heading signal is restored.

5.7.2 Description of display modes

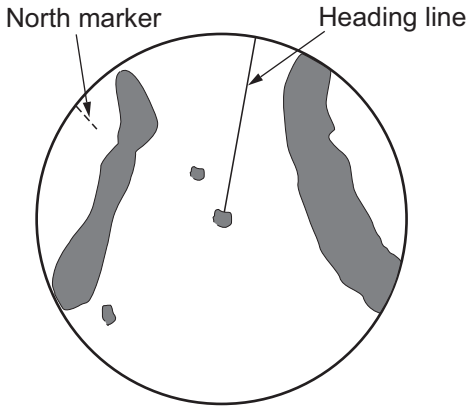
Head-up mode

A display without azimuth stabilization in which the line that connects the center with the top of the display indicates your heading. Targets are shown at their measured distances and their directions relative to your heading. The short dotted line on the bearing scale is the north marker.



Course-up mode

The radar picture is stabilized and displayed with the currently selected course at the top of the screen. When you change the heading, the heading line moves with the course selected. If you select a new course, select the course-up mode again to display the new course at the top of the display.



Targets are shown at their measured distances and their directions relative to the set course, which is at the 0-degree position. The heading line moves according to the yawing and any course change.

North-up mode

Targets are shown at their measured distances and their true (compass) directions from your ship. North is at the top of the screen. The heading line changes its direction according to your heading.