AlphaScan 5900 series

Marine Radar Equipment

Instruction Manual

www. alphatronmarine.com

Preface

Thank you for purchasing the Alphatron Marine Multi-Function Display AlphaScan 5900 series.
This equipment meets the performance standards of the IMO (International Maritime Organization) and the IHO (International Hydro graphic Organization), and serves to improve safety, reduce fuel combustion, concentrate voyage information as the main device of the INS (Integrated Navigation System).

- For the best operation, read this manual thoroughly before use.
- Keep this manual in a convenient place for future reference. Make use of this manual when experiencing operation difficulties.
- The LCD of this equipment uses thin film transistors (TFT). If some pixels on the screen are not clear, the color is different, or the screen is brighter than usual, it is not because of defect, instead it is because of inherent characteristic of the TFT display technology.
- The information in this manual is subject to change without notice at any time.

Safety Cautions

Cautions for High Voltage

High voltages, ranging from several hundreds to tens of thousands of volts, are used in electronic apparatus, such as radio and radar instruments. These voltages are totally harmless in most operations. However, touching a component inside the unit is very dangerous. (Any person other than authorized service engineers should not maintain, inspect, or adjust the unit.)

High voltages on the order of tens of thousands of volts are most likely to cause instant deaths from electrical shocks. At times, even voltages on the order of several hundred volts could lead to electrocution. To defend against electrical shock hazards, don't put your hand into the inside of apparatus.

When you put in a hand unavoidably in case of urgent, it is strongly suggested to turn off the power switch and allow the capacitors, etc. to discharge with a wire having its one end positively grounded to remove residual charges. Before you put your hand into the inside of apparatus, make sure that internal parts are no longer charged. Extra protection is ensured by wearing dry cotton gloves at this time. Another important precaution to observe is to keep one hand in your pocket at a time, instead of using both hands at the same time. It is also important to select a secure footing to work on, as the secondary effects of electrical shock hazards can be more serious. In the event of electrical shocks, disinfect the burnt site completely and obtain medical care immediately.

Precautions for Rescue of Victim of Electric Shock

When a victim of electric shock is found, turn off the power source and ground the circuit immediately. If this is impossible, move the victim away from the unit as quick as possible without touching him or her with bare hands. He or she can safely be moved if an insulating material such as dry wood plate or cloth is used.

It is necessary to perform first aid immediately.

Breathing may stop if current flows through the respiration center of brain due to electric shock. If the electric shock is not large, breathing can be restored by artificial respiration. A victim of electric shock looks pale and his or her pulse may become very weak or stop, resulting in unconsciousness and rigidity at worst.

Pictorial Indication

Various pictorial indications are included in this manual and are shown on this equipment so that you can operate them safely and correctly and prevent any danger to you and / or to other persons and any damage to your property during operation. Such indications and their meanings are as follows.
Please understand them before you read this manual:

DANGER	This indication is shown where incorrect equipment operation due to negligence may cause death or serious injuries.
WARNING	This indication is shown where any person is supposed to be in danger of being killed or seriously injured if this indication is neglected and this equipment is not operated correctly.
CAUTION	This indication is shown where any person is supposed to be injured or any property damage is supposed to occur if this indication is neglected and this equipment is not operated correctly.

Examples of Pictorial Indication

Electric Shock

The △ mark represents CAUTION (including DANGER and WARNING).
Detailed contents of CAUTION ("Electric Shock" in the example on the left) is shown in the mark.

Disassembling Prohibited

The ⃠ mark represents prohibition.
Detailed contents of the prohibited action ("Disassembling Prohibited" in the example on the left) is shown in the mark.

Disconnect the power plug

The ● mark represents instruction.
Detailed contents of the instruction ("Disconnect the power plug" in the example on the left) is shown in the mark.

Warning Label

There is a warning label on the top cover of the equipment.
Do not try to remove, break or modify the label.

Precautions upon Equipment Operation

⚠ DANGER	
	Never attempt to check or repair the inside of the equipment. Checking or repair by an unqualified person may cause a fire or an electric shock. Contact our head office, or a nearby branch or local office to request servicing.
	Never remove the cover of this equipment. Touching the high-voltage section inside will cause an electric shock.
	Do not attempt to disassemble or tamper with this equipment. Otherwise, a fire, an electric shock, or a malfunction may occur.
	When conducting maintenance, make sure to turn the main power off. Failure may result in electric shock.
	Turn off all the main powers before cleaning the equipment. Make sure to turn it off since voltage is still outputted from the rectifier even after the indicator and the radar are turned off. Failure may result in equipment failure, or death or serious injury due to electric shock.
	When conducting maintenance work on the radar antenna, make sure to turn all the main powers off. Failure may result in electric shock or injuries.
	Make sure to turn off the radar antenna safety switch. Failure may result in injuries caused by physical contact with the rotating radar antenna.

⚠WARNING

When turning off the power supply, do not hold down the power button of the operation unit.
Otherwise, a trouble may occur due to termination failure.

Never directly touch the internal components of the radar antenna or indicator. Direct contact with these high-voltage components may cause electric shock. For maintenance, inspection, or adjustment of equipment components, consult with our branch office, branch shop, sales office, or our distributor in your district.

Do not get close to the radiant section of the radar antenna. It is a rotating part, and it may cause injuries if it suddenly starts rotating and consequently hits the body. It is recommended that the radiant section be installed at a high place such as on the roof of the wheelhouse, on the flying bride, on the trestle, or on the radar mast so that no one can get close to it.

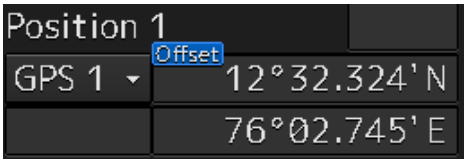
Microwave radiation level of the radar antenna:
Keep away from the radar antenna during transmission.
Microwaves are generated from the front center of the radiant section of the radar antenna at the levels indicated in the table below. Exposure to microwaves at close range can result in injury (especially damage to eyes).

Microwave radiation level of the radar antenna

System	50 W/m2	20 W/m2	2.5 W/m2
NKE-2103	n/a	26 cm	123 cm
NKE-125/2254	5 cm	81 cm	162 cm
NKE-1130	11 cm	76 cm	181 cm
NKE-2632	1.4 cm	3.1 cm	209.8 cm
NKE-1632	1.5 cm	3.3 cm	128.4 cm

Make sure to install the radar antenna at a place higher than human height.
Direct exposure to electromagnetic wave at close range will have adverse effects on the human body.

⚠WARNING	
	When it is necessary to get close to the radar antenna for maintenance or inspection purposes, make sure to turn the power switch of the display unit to "OFF" or "STBY". Direct exposure to electromagnetic waves at close range will have adverse effects on the human body.
	When conducting maintenance work, make sure to turn off the power so that the power supply to the equipment is completely cut off. Some equipment components can carry electrical current even after the power switch is turned off, and conducting maintenance work may result in electric shock, equipment failure, or accidents.
	When cleaning the display screen, do not wipe it too strongly with a dry cloth. Also, do not use gasoline or thinner to clean the screen. Failure will result in damage to the screen surface.
	Do not change Initial Level/Area Offset unless absolutely necessary. Incorrect adjustment will result in deletion of nearby target images and thus collisions may occur resulting in death or serious injuries.
	Confirm computer virus does not exist in USB flash memory beforehand when reading and writing of the file by using USB flash memory. Influences other equipment when the display unit is infected with the virus, and it may cause a breakdown.
	Do not remove USB flash memory while the access lamp (in USB flash drive) is flashing. Data may be damaged when the USB flash memory is inserted or removed while accessing it, and it may cause a breakdown.
	Do not place a glass or cup containing water, etc., or a small metal object on this equipment. If water or such object gets inside, a fire, an electric shock, or a malfunction may occur.

⚠WARNING	
❗	In case water or a metal object gets inside the equipment, turn off the power immediately, unplug the power supply cable from an electric outlet, and contact our head office, or a nearby branch or local office to request servicing. Keeping the equipment in operation under such condition may cause a fire, an electric shock or a malfunction.
❗	In case you find smoke, unusual odor or extreme high heat coming from the equipment, turn off the power immediately, unplug the power supply cable from an electric outlet, and contact our head office, or a nearby branch or local office to request servicing. Keeping the equipment in operation under such condition may cause a fire or an electric shock.
🚫	Do not use the offset function during navigation. If the equipment is used with the offset value entered as the own ship position (deviated from the actual position), accidents may result. When the offset values are entered, the [Offset] badge is displayed at the position display on the Own Ship Information. Check the indication, and cancel the offset function if necessary. Also, the message "Position Shift" is displayed in the message display area. 
❗	Before starting automatic sailing, be sure to check the safety of the route and the safety when crossing safety contour. Otherwise, accidents may result.
❗	If the own ship has arrived at the boundary of a WPT during automatic sailing, be sure to check the safety and perform turning manually by the operator him/herself. Otherwise, the ship keeps the course with the leg bearing, and accidents may result.
❗	Input the ship's parameter accurately according to the specification of the ship. Otherwise, accidents may result.

⚠WARNING	
	Change of the color of the Day/Night button, particularly the use of the [Night] color, may interfere with the recognition of display information.
	When moving the dialog box, move to the position that does not cover the operation area. If the dialog box covers the operation area, it may interfere the recognition of the display information.
	Do not apply strong shock to the coaxial cable by striking it with a tool or hammering it. Otherwise, an open circuit failure may result.
	Do not place anything heavy on the coaxial cable. Otherwise, an open circuit failure may result.
	Do not twist or pull the coaxial cable. Otherwise, an open circuit failure may result.

⚠CAUTION	
	Use the radar only as a navigation aid. The final navigation decision must always be made by the operator him/herself. Making the final navigation decision based only on the radar display information may cause accidents such as collisions or running aground.
	A malfunction as the screen is disordered or unshown may occur if the power in the ship is instantaneously interrupted during operation of the radar. In this case, the power should be turned on again.
	Use Target Tracking (TT) function only as a navigation aid. The final navigation decision must always be made by the operator him/herself. Making the final navigation decision based only on tracking target information may cause accidents. Tracking target information such as vector, target numerical data, and alarms may contain some errors. Also, targets that are not detected by the radar cannot be acquired or tracked. Making the final navigation decision based only on the radar display may cause accidents such as collisions or running aground.
	In the short distance range, do not set the sea clutter suppression function so that all reflections from the sea are suppressed. This suppresses not only the echo from waves, etc., but also the echo from floating objects such as ships or dangerous objects, etc., and obstructs their detection. When using the sea clutter suppression function, always make the best suppression setting.
	Do not set the rain/snow clutter suppression setting to an excessive level, because not only the echo from rain or snow but also the echo from floating objects such as ships or dangerous objects, etc., and obstructs their detection. When using the rain/snow clutter suppression function, always make the best suppression setting.
	When setting a guard zone, make sure to properly adjust gain, sea-surface reflection suppression level, and rain/snow reflection suppression level so that the optimal target images are always on the radar screen. The guard zone alarm will not be activated for targets undetected by the radar, and it may result in accidents such as collisions.

⚠CAUTION	
	The simulation function is used exclusively for deciding whether or not target tracking is properly operating. Therefore, never use this function unless you wish to check target tracking operations. Note especially that, if this function is used during actual navigation, simulated targets are displayed and may become confused with other actual targets. Therefore, never use this function during actual navigation.
	Since these alarms may include some errors depending on the target tracking conditions, the navigation officer himself should make the final decision for ship operations such as collision avoidance. Making the final navigation decision based only on the alarm may cause accidents such as collisions.
	Optimal values have been set for VD Level and Constant; therefore, never change their values unless absolutely necessary. Failure may result in accidents that would lower target tracking performance.
	When replacing magnetrons, make sure to shut off the main power and let the equipment stand for more than 5 minutes to discharge the high-voltage circuit. Failure may result in electric shock.
	Make sure to take off your watch when your hand must get close to the magnetron. Failure may result in damage to the watch since the magnetron is a strong magnet.
	Make sure that two or more staff member work together when replacing the LCD. If only one person attempts to replace the LCD, he/she may drop it and become injured.
	Any adjustments must be made by specialized service personnel. Incorrect settings may result in unstable operation, and this may lead to accidents or equipment failure.

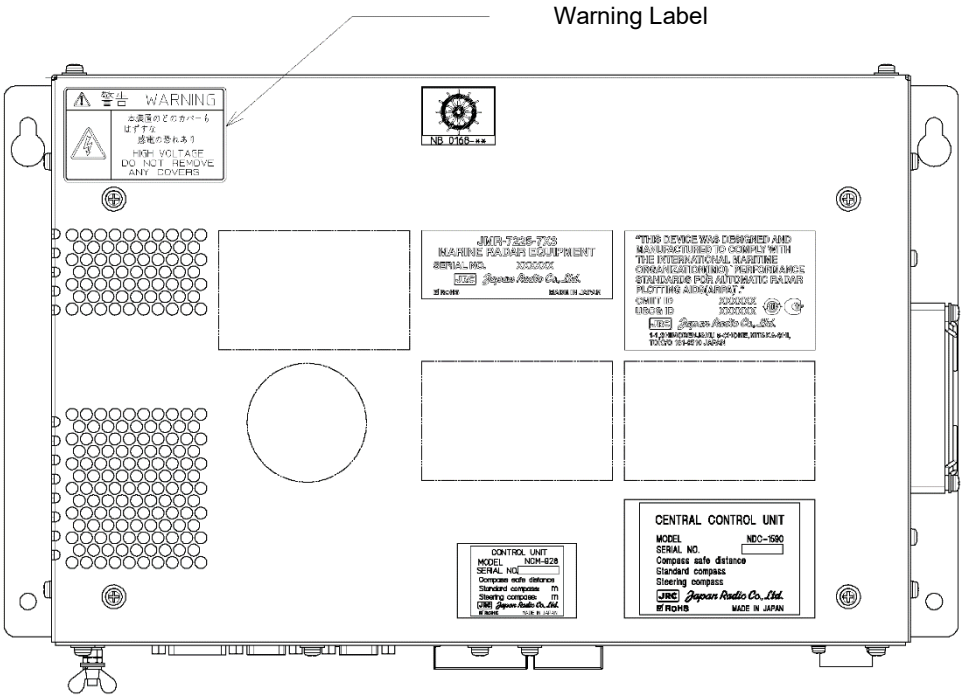
⚠CAUTION

	Do not make any adjustments during navigation. Failure may result in adverse effects on the radar function which may lead to accidents or equipment failure.
	Do not change the quantization level settings unless absolutely necessary. If set at an inappropriate value, the acquisition of target tracking function and the tracking function deteriorate, and this may lead to accidents.
	Do not use or leave the equipment under direct sunlight for a long time or in the temperatures above 55°C. Otherwise, a fire or a malfunction may occur.
	Do not block the ventilation opening of the equipment. Otherwise, heat may accumulate inside to cause a fire or a malfunction.
	This equipment is intended for use as an aid to navigation only. • This equipment is not designed to assess the positional information automatically. The positional information should always be checked by the operator. Otherwise, accidents may result.
	Do not touch the equipment with hands or gloves wet with water. Otherwise, an electric shock or a malfunction may occur.
	Do not leave the disc in the DVD drive. Malfunctions of the drives may result.

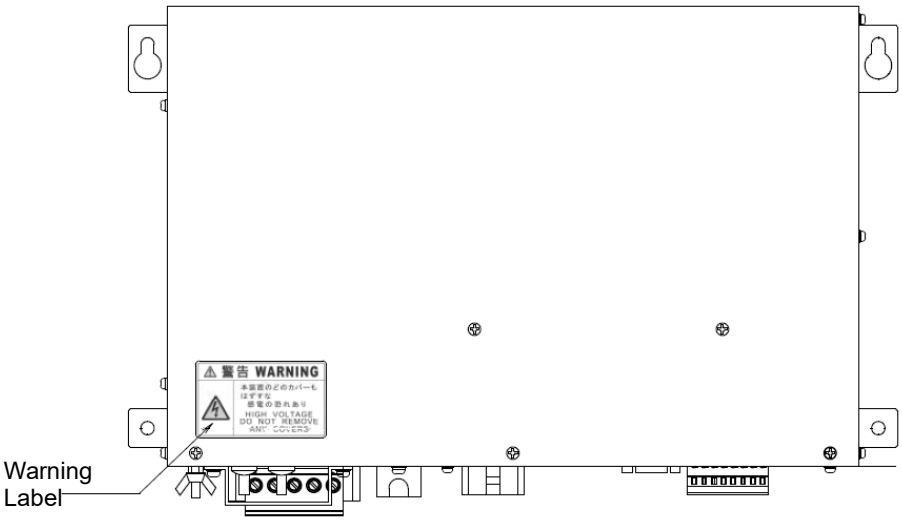
⚠CAUTION	
	• Do not place any object on the operation panel. In particular, if a hot object is placed on the operation panel, it can cause deformation of the surface of the operation panel. • Do not apply any undue shock on the operation panel, trackball and dials. Otherwise, a malfunction may result.
	Make sure that the main power is turned off before inspection or replacement of parts. Otherwise, an electric shock, a fire, or a malfunction may occur.
	• If a fan alarm or CPU temperature rise alarm has occurred, immediately turn off the power. Keeping the equipment in operation under such condition may cause a fire or a malfunction. After turning off the power, contact our head office, or a nearby branch or local office to request servicing.
	Edit routes in accordance with the world geodetic system (WGS-84). Use of routes edited with any other geodetic systems may cause accidents.
	During sailing, be sure to check the own ship's position and bearing as often as necessary, regardless of whether the automatic sailing is in operation or not. Otherwise, accidents may result.
	Do not turn off the power during Backup/Restore. Otherwise, a function may fail, and an accident may occur.
	Do not do the backup operation of data while sailing. The radar application should be ended to begin the data backup. It becomes impossible to observe using radar and this may lead to accidents.

⚠CAUTION	
	The backup power supply (DC power supply, etc.) of the equipment must be connected when recovery of the C drive image is performed. If the power supply stops during recovery, an equipment activation fault occurs, causing an accident.
	Do not turn off the power supply during recovery of C drive image. Otherwise, a function fault occurs, causing an accident.
	Since the image within the previous observation range is displayed by expanding/contracting for the period from immediately after switching of the observation range from the next image updating, do not use this image for navigation. If this image is used for navigation, an accident may occur.
	In the case of turning on the power under the condition of low temperature, do pre-heat more than 30 minutes. Otherwise, an operation failure may occur and an accident may occur.
	Normally, use the automatic tuning mode. If you use the manual tuning mode, an accident may be caused by a transmission/reception problem. Use the manual tuning mode only when you cannot bet the best tuning conditions in the automatic tuning mode.
	Always keep the sensitivity adjusted to the best condition. If you raise the sensitivity excessively, the visibility of the target will be reduced by unwanted signals including receiver noise and pseudo image. This may cause an accident. If the sensitivity is reduced excessively, detection of a target such as a ship or hazardous material will be interrupted.
	Adjust the preset of the observation scene according to the oceanographic condition, with the thorough understanding of the features of the radar signal processing setting. The optimum radar performance may not be able to be demonstrated due to the contents of the changed setting or the oceanographic condition at that time.

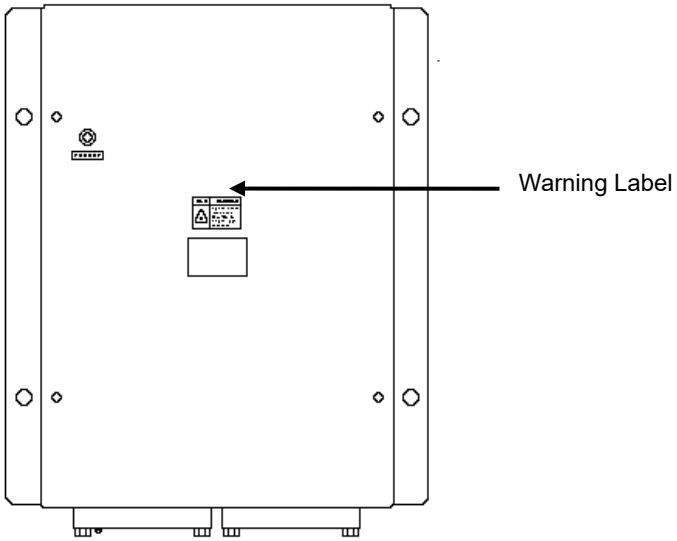
The Mounting Point of the Warning Label



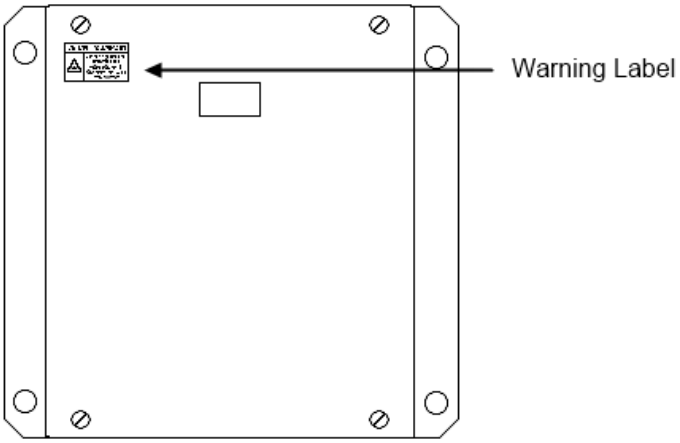
NDC-1590 Central Control Unit(CCU)



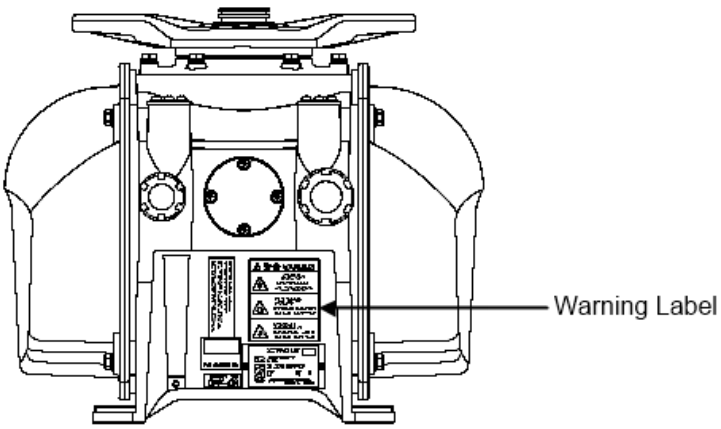
NBD-913 Power Supply Unit(PSU)



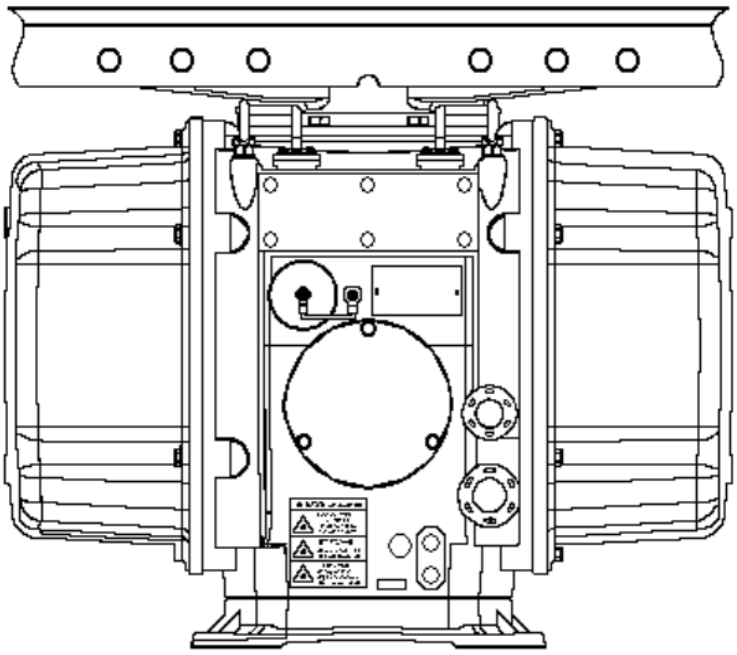
NQE-3141-4A/8A Interswitch Unit (ISW)



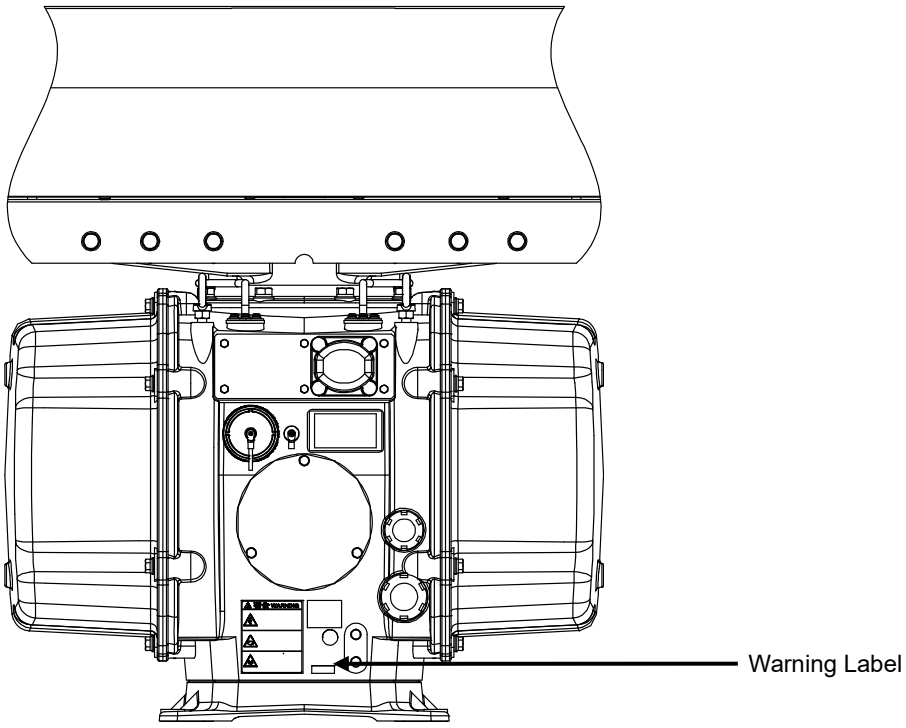
NQE-3167 Power Control Unit



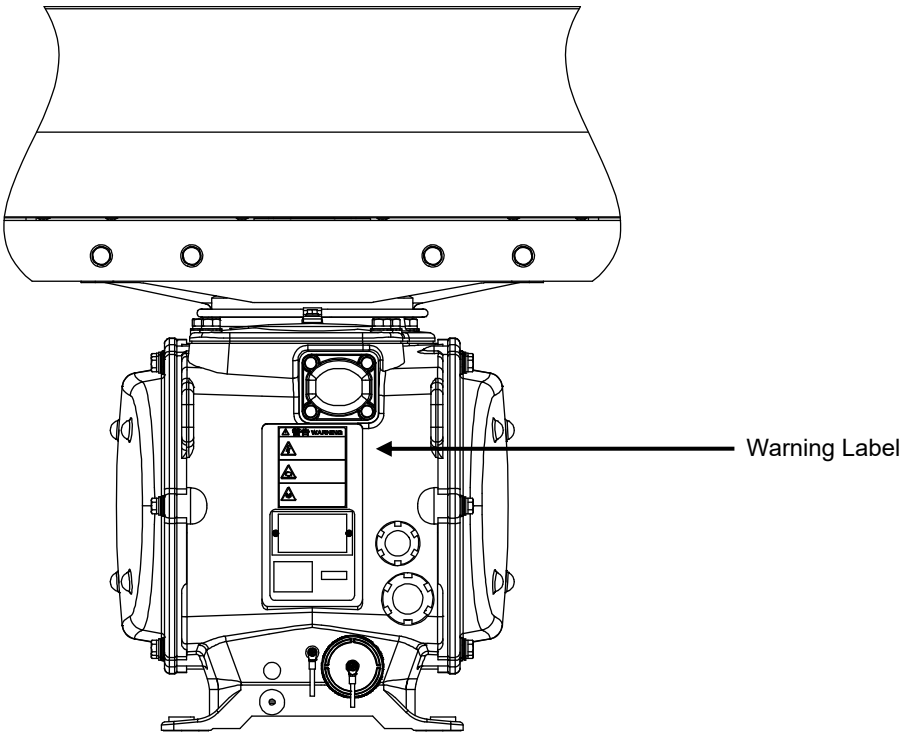
NKE-1125-6/9 Radar Antenna



NKE-1130 Radar Antenna



NKE-1632 Radar Antenna

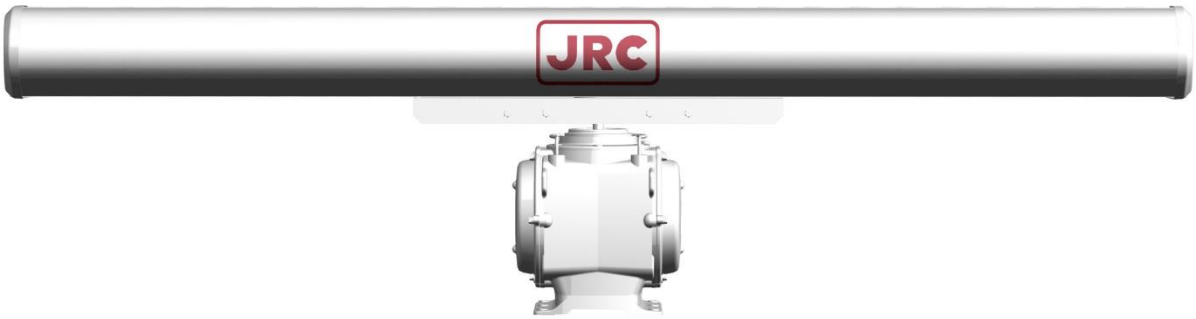


NKE-2632/2632-H Radar Antenna

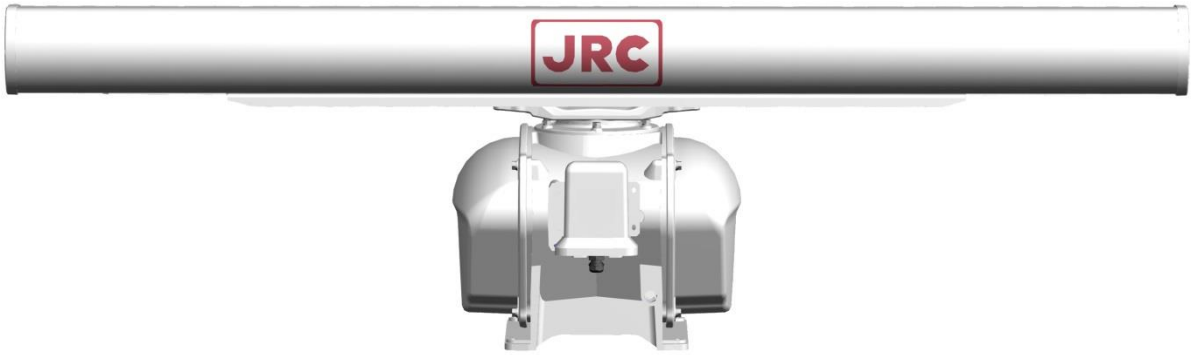
Equipment Appearance

NKE-1130 Radar Antenna (12 feet)

NKE-1632 Radar Antenna (12 feet)

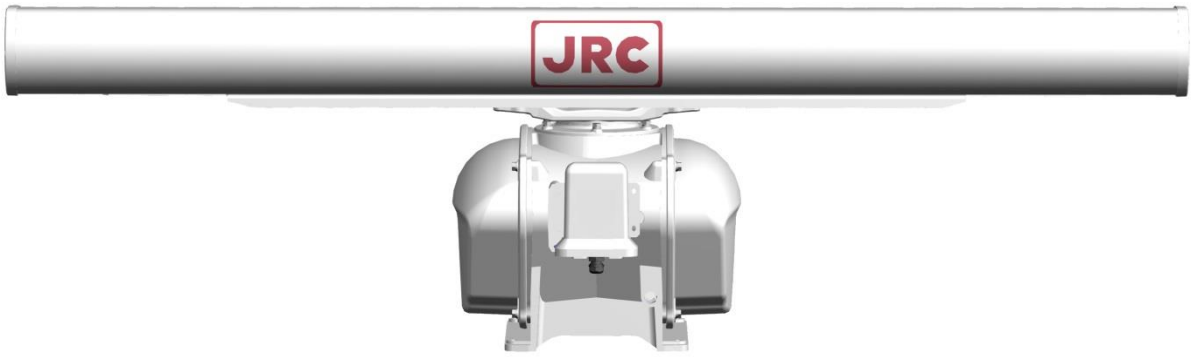


NKE-2632/2632-H Radar Antenna (8 feet)



NKE-1125-6 Radar Antenna (6 feet)

NKE-1125-9 Radar Antenna (9 feet)



NKE-2254-6HS Radar Antenna (6 feet)

NKE-2103/2103-6HS Radar Antenna (6 feet)

NCE-5605 Trackball Operation Unit - TOPU

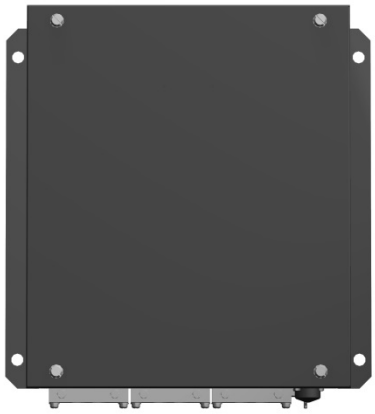
NCE-5625 Keyboard Operation Unit - KOPU

NDC-1590 Central Control Unit - CCU

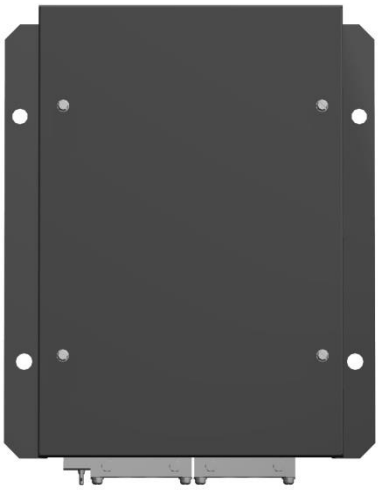
NBD-913 Power Supply Unit - PSU

AlphaScreen 19-inch

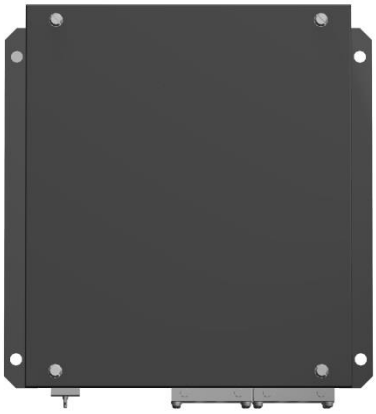
AlphaScreen 26-inch



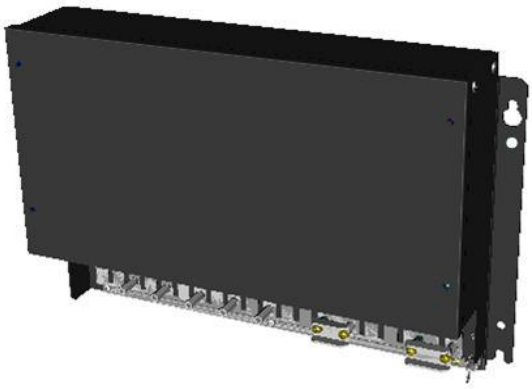
NQE-3167 Power Control Unit (Option)



NQE-3141-4A Interswitch Unit - ISW (4-channel, option)



NQE-3141-8A Interswitch Unit - ISW (8-channel, option)



NQE-1143 Junction Box - JB(Option)

How to Use This Manual

Structure of this manual

This manual is structured as shown below. Read the necessary section according to the purpose.

Item	Contents
Preface	Describes the purposes of using this equipment.
Safety Cautions Emergency Measures	Describes the cautions for a high voltage, precautions for rescue of victims of an electric shock.
Pictorial Indication Precautions Upon Equipment Operation	Describes the safety precautions and warning on this equipment.
The Mounting Point of the Warning Label	Describes the warning label attachment position on this equipment.
Equipment Appearance	Describes the appearance of this equipment.
Glossary	Describes the special terminologies and equipment-specific terminologies that are used in this manual.
How to use this manual	This page

<Basic Operation >

Section 1 Overview	Describes the overview of this equipment.
Section 2 Name and Function of Each Unit	Describes the name and function of each unit of this equipment.
Section 3 Common Basic Operations	Describes the common basic operations of radar.
Section 4 Range and Bearing Measurement Methods	Describes the measuring methods of range and bearing using the measuring tools.

<Function>

Section 5 Basic Operation of the Radar	Describes the basic radar operations.
Section 6 Target Tracking and AIS	Describes the methods of using target tracking and AIS.
Section 7 True and False Echoes on Display	Describes how to check the radar screen.

<Function>

Section 8 Logbook	Describes the logbook.
Section 9 Setting Up Screen View	Describes the detail setting of screen display.

<Reference>

Section 10 Setting Up Alerts	Describes the alert detail setting for avoiding dangers.
Section 11 Setting Up the Operation Mode	Describes the detail setting of the operation modes of this equipment.
Section 12 Adjusting and Setting Up Equipment (for Services)	Describes the equipment adjustments and setting that are performed by the maintenance engineers.
Section 13 Maintenance & Inspection	Describes the maintenance and inspection of this equipment.
Section 14 Failures and After-Sale Services	Describes the failure handling measures and aftercare services of this equipment.
Section 15 About Disposal	Describes the cautions on disposing of this equipment.
Section 16 Specifications	Describes the specification of this equipment.
Appendix A Radar Antenna Block Diagrams	Describes various block diagrams, connection diagrams, schematic diagrams, and setting tables.
Appendix B Alert List	Describes the alert list.
Appendix C Setting the Interswitch	Describes the interswitch setting.
Appendix D Menu List and Materials	Describes the materials such as the menu list.

Notations

Operation notations

Trackball operations on the operation panel are expressed as follows.

Operation	Notation
Click the left button.	Click Example: Click on the object.
Double-click the left button.	Double-click Example: Determine the drawing by double-click.
Click the right button	Click the right mouse button Example: Display the context menu by clicking the right mouse button.

The buttons and dialog boxes on the screen are expressed as follows.

Button type	Notation
Button with button name indicated	Example: AUTO → [AUTO] (automatic) button
Button with an indication other than the button name such as an icon	Shown as follows. Example:  → Day/Night button

A series menu selection operations is expressed as follows.

Click on [User Map] - [Information Mark Property] - [Position] on the menu.

Contents

1 Overview

⚠WARNING	
	Do not put any container with water or small metallic object on this equipment. Water may spill or metal may enter the equipment, causing fire, electric shock or other troubles.
	Should water or metal have entered the equipment, turn off the circuit breaker and contact our sales division, branch office, service center or representative located nearest to you. If you continue to use the equipment without taking required action, fire, electric shock or other troubles may occur.
	Should you find out smoke, offensive smell or extreme heat on the equipment, turn off the switch and circuit breaker immediately. Then contact our sales division, branch office, service center or representative located nearest to you. If you continue to use the equipment without taking required action, fire or electric shock may occur.

⚠CAUTION	
	Do not use or leave the equipment where there is a direct sunshine and high humidity or the temperature exceeds 55°C. Otherwise, fire or other troubles may occur.
	Do not block the ventilation port of the equipment. Otherwise, fire or other troubles may be caused by heat accumulation.
	Use this equipment as your navigation aid. This equipment does not provide automatic decision on the positional information. Decision on the positional information must be made by the ship operator himself. A trouble will occur if checkup is neglected.

⚠CAUTION	
	Do not touch the equipment when your hands or gloves are wet with fresh water or seawater. Otherwise, electric shock or other troubles may occur.
	When there is an alarm of fan failure or CPU temperature rise, turn off the power immediately. If you continue to use the equipment without taking required action, fire or other troubles may occur. Contact our sales division, branch office, service center or representative located nearest to you.

1.1 Functions

Marine radar equipment (referred to as "this equipment" in this manual) is navigation equipment that satisfies the following IMO performance standards.

- IMO Resolution MSC192(79): Performance standards for radar equipment
- IMO Resolution MSC191(79): Performance standards for the presentation of navigation related information on shipborne navigational displays
- IMO Resolution MSC74(69): Annex 2: TCS*11 performance standards
- IMO Resolution A.694(17): General requirements for shipborne radio equipment
- IMO Resolution MSC302(87): Bridge Alert Management

*1: Case where the TCS function is added as the option

Main functions of the RADAR mode

Sensitivity adjustment, sea clutter and rain/snow clutter suppression

- Interference rejection
- Bearing and range measurement using a cursor, fixed/variable range markers, and electronic bearing line
- Colored own track display
- User map creation and display
- TM (True Motion) presentation
- Self-diagnostic facilities
- Radar performance monitoring (Performance Monitor)
- Target tracking functions (manual/automatic target acquisition and tracking, vector and trail displays and alarm displays)
- 8-unit switchover (Interswitch) function (Option)

1.2 Features

This MFD has the following features:

Common functions:

Utilization of an icon menu

Intuitive operation system based on the workflow

High-resolution large screen

Message reception notification function

Notifies arrival of a new AIS message and so on with a badge.

Utilization of a common information window

Enables display of target information and simple conning information (wind direction/wind speed information, etc.) with a simple switching operation.

Display of the cause of alert as well as the action guideline

Equipped with the Help function

The built-in HTML Help enables the search of operation methods in this equipment instead of the hardcopy manual whenever required.

Visual highlight of target symbols

Enables identification of the target that matches the condition such as the sailing direction, ship's length, and ship's type by highlighted display.

Equipped with the white list type virus protection function of Trend Micro Incorporated

RADAR function:

Realized a clear large screen with its high resolution.

By using the high definition 26inch color LCD of 1920×1200 pixels, radar image display of diameter 320mm or more is secured. Image presentation of high resolution is also possible in near ranges.

Equipped with high performance radar signal processing ASIC BLZZARD™ of new design

By eliminating unnecessary signals (clutters) from the radar video signals obtained from a wide dynamic range receiver, target detection is enhanced.

Target tracking (TT) function by utilizing the latest technology

By using the latest high-speed DSP and tracking algorithm, the target acquisition/tracking performance is improved, achieving stable operation for target tracking inside of clutters also.

Acquisition and tracking of up to 100 targets as standard
Expressing danger status with a sound and shape and color of a symbol
Equipped with a trial maneuvering function
Capable of 10-color coded display by storing target trails.

Background tracking function (Full-screen acquisition function)

Since detectable radar echoes are acquired and tracked automatically in background, the vector can be displayed immediately after initial acquisition.

Top screen with strictly selected information

Information that is constantly displayed on the Top screen of the radar is strictly selected to enable users to find the required information effortlessly.

Sortable TT/AIS list

Provides a sortable TT/AIS list (for instance in the TCPA descending order) to enable users to check the ship in the highest danger.

Dual PPI display

Capable of monitoring of near-range images and far-range images concurrently with one radar (AlphaScan 5900 series only).

Superimposed display of radar image, chart, and own ship's trail

Capable of superimposed display of a user-created map, an imported chart of a coastline and buoys, own ship's trail, and other ship's trails, radar images, and radar trails in all the display modes including Head Up display.

Improved Day/Night function

The Day/Night function supports up to 5 types of display screen color combinations and enables users to reproduce screen colors suitable for the user utilization environment with simple key operations. The function provides easy-to-understand screens through color coded radar images and a variety of graphics.

Built-in self-diagnosis program

By constantly monitoring all the system functions, this program displays a warning message on the screen at detection of function deterioration and issues a warning sound. The system function test can be performed easily during normal operation (excluding some tests).

Performance monitor function

This function monitors radar performance (transmission output and reception sensitivity) on the screen.

Interswitch function (Option)

By connecting to the interswitch unit (optional), up to 8 radars can be inter-switched with simple operations.

Up to 4 units: An interswitch unit separate type from the indicator and cable for connecting each indicator are necessary.

Up to 8 units: An interswitch unit separate type from the indicator and cable for connecting each indicator are necessary.

1.3 Components

A list of components and optional accessories is shown below.

Components of the Display Unit

Name			Model	Q'ty	Remarks
Display unit					Main unit
	Display		AlphaScreen 19-inch	1	Option
			AlphaScreen 26-inch		
	Trackball operation unit		NCE-5605	1	
	Keyboard operation unit		NCE-5625	1	Option
	Central control unit		NDC-1590	1	
	Power supply unit		NBD-913	1	
	Junction box		NQE-1143	1	
		Serial LAN I/F Interface circuit	CMH-2370	1	Option
		Analog Option circuit	CMJ-560	1	Option
		Gyro Interface circuit	CMJ-554	1	Option
		RADAR Interface circuit	CQD-2273	1	
	Sensor LAN switch unit		NQA-2443	1	Option
Operation unit desktop frame			CWB-1596	1	Option
Interswitch unit (4ch)			NQE-3141-4A	1	Option
Interswitch unit (8ch)			NQE-3141-8A	1	Option
Power control unit			NQE-3167	1	Option
Instruction Manual (English)				1	
Installation Manual (English)				1	
Accessory		CD cleaner		1	Packing in 1 box
Spare parts for the main unit				1	Packing in 1 box
Spare parts for the junction box				1	Option

List of Radar Antenna Types and Specifications

Radar antenna type	Radio wave type	ft	Transmitter-receiver unit	Transmitting power	Band	Power supply	Rate of revolution
NKE-1130	P0N	12	-	30kW	S	AC	24rpm
NKE-1632	P0N,Q0N	12	-	250W	S	AC	24rpm
NKE-2632	P0N,Q0N	8	-	250W	S	AC	24rpm
NKE-2632-H	P0N,Q0N	8	-	250W	S	AC	48rpm
NKE-1125-6	P0N	6	-	25kW	X	AC	24rpm
NKE-1125-9	P0N	9	-	25kW	X	AC	24rpm
NKE-2254-6HS	P0N	6	-	25kW	X	DC	48rpm
NKE-2103-6	P0N	6	-	10kW	X	DC	27rpm
NKE-2103-6HS	P0N	6	-	10kW	X	DC	48rpm

List of General Type Names

General type name	Model	Radar antenna	Transmitter-receiver unit	Display	Ship's mains
AlphaScan 5930-S	RADAR	NKE-1130	-	19 or 26 inch	100-115VAC 50/60Hz 1ϕ 220-240VAC 50/60Hz 1ϕ *Specify between the two when ordering. 24VDC (For backup)
AlphaScan 5972-S		NKE-1632	-		
AlphaScan 5982-S		NKE-2632	-		
AlphaScan 5982-SH		NKE-2632-H	-		
AlphaScan 5925-6X		NKE-1125-6	-		
AlphaScan 5925-9X		NKE-1125-9	-		
AlphaScan 5925-6XH		NKE-2254-6HS	-		Wide range AC input 24VDC (For backup)
AlphaScan 5910-6X		NKE-2103-6	-		
AlphaScan 5910-6XH		NKE-2103-6HS	-		

* AlphaScan 5972-S and AlphaScan 5982-S/SH are Solid State Radars.

Option list of radar antenna

Name	Model name	Remarks
Performance monitor	NJU-84	For S-band radars excluding NKE-1632, 2632 and 2632-H
	NJU-85	For X-band radars
4 unit switching Interswitch Unit	NQE-3141-4A	Separate unit
8 unit switching Interswitch Unit	NQE-3141-8A	Separate unit (special order)
Power control unit	NQE-3167	Separate unit

Note:

1. The drive motor for the radar antenna is available in 100-115VAC 50/60 Hz 1ϕ or 220-240VAC 50/60 Hz 1ϕ type for NKE-1632/2632/1130/1125 series. Please specify the power source type when ordering.
2. The radar antenna can be equipped with anti-icing system (neck heater) as an option (NKE-2103 is not supported), and '-D' shall be suffixed to the type name ('-D' or '-E' shall be suffixed to NKE-1632, NKE-2632, and NKE-2632-H.)

   '-D' --- 100V AC (50/60Hz)
   '-E' --- 200V AC (50/60Hz)

Reference:

The suffix(s) in the type name is/are changed by applying motor voltage, anti-icing system, etc.

(Example) NKE-1130-1D

D: Attached anti-icing system

1: Motor voltage 100-115 V AC (50/60Hz)

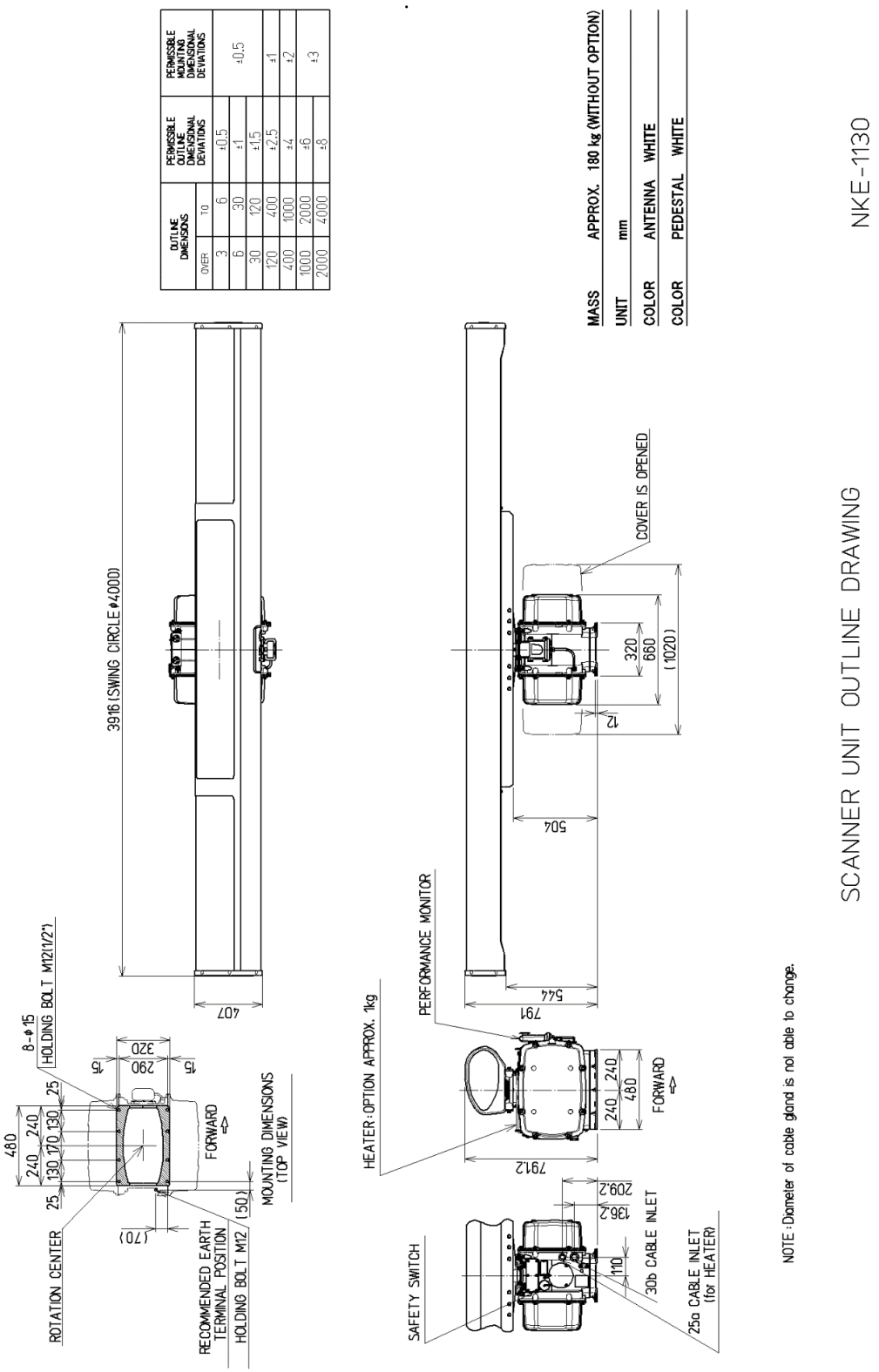
2: Motor voltage 220-240 V AC (50/60Hz)

3. When using the ship's mains of 440VAC as the radar power source, a step-down transformer shall be used.
4. The following are the each unit name on the one's plate:

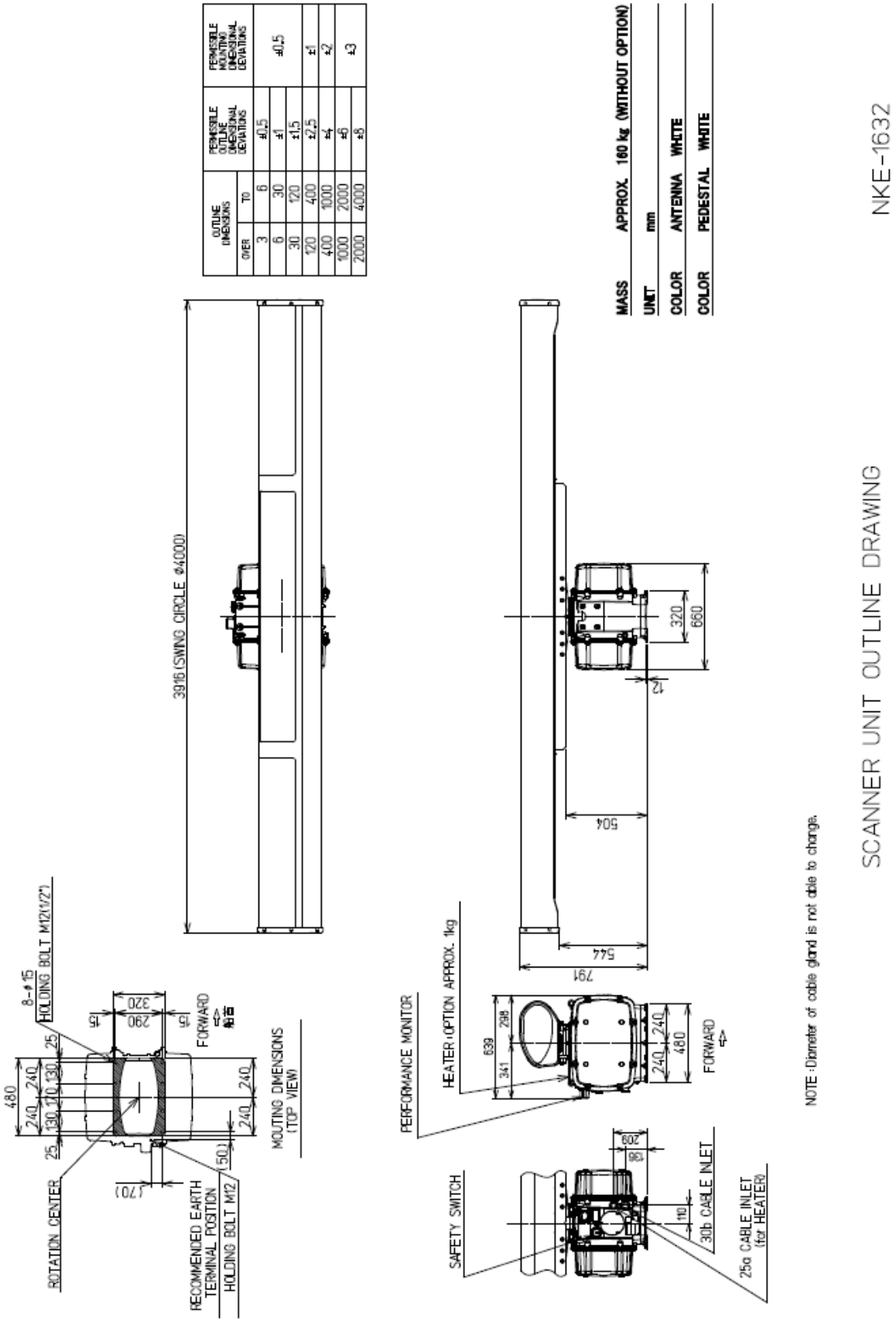
Rader antenna	SCANNER UNIT
Transmitter-receiver unit	TRANSMITTER-RECEIVER UNIT
Display section	MONITOR UNIT
Trackball operation unit	TRACKBALL OPERATION UNIT
Keyboard operation unit	KEYBOARD OPERATION UNIT
Central processing unit	CENTRAL CONTROL UNIT
Power supply unit	POWER SUPPLY UNIT
Junction box	JUNCTION BOX
Sensor LAN switch unit	SENSOR LAN SWITCH UNIT
Cradle frame	CRADLE FRAME

1.4 Structure

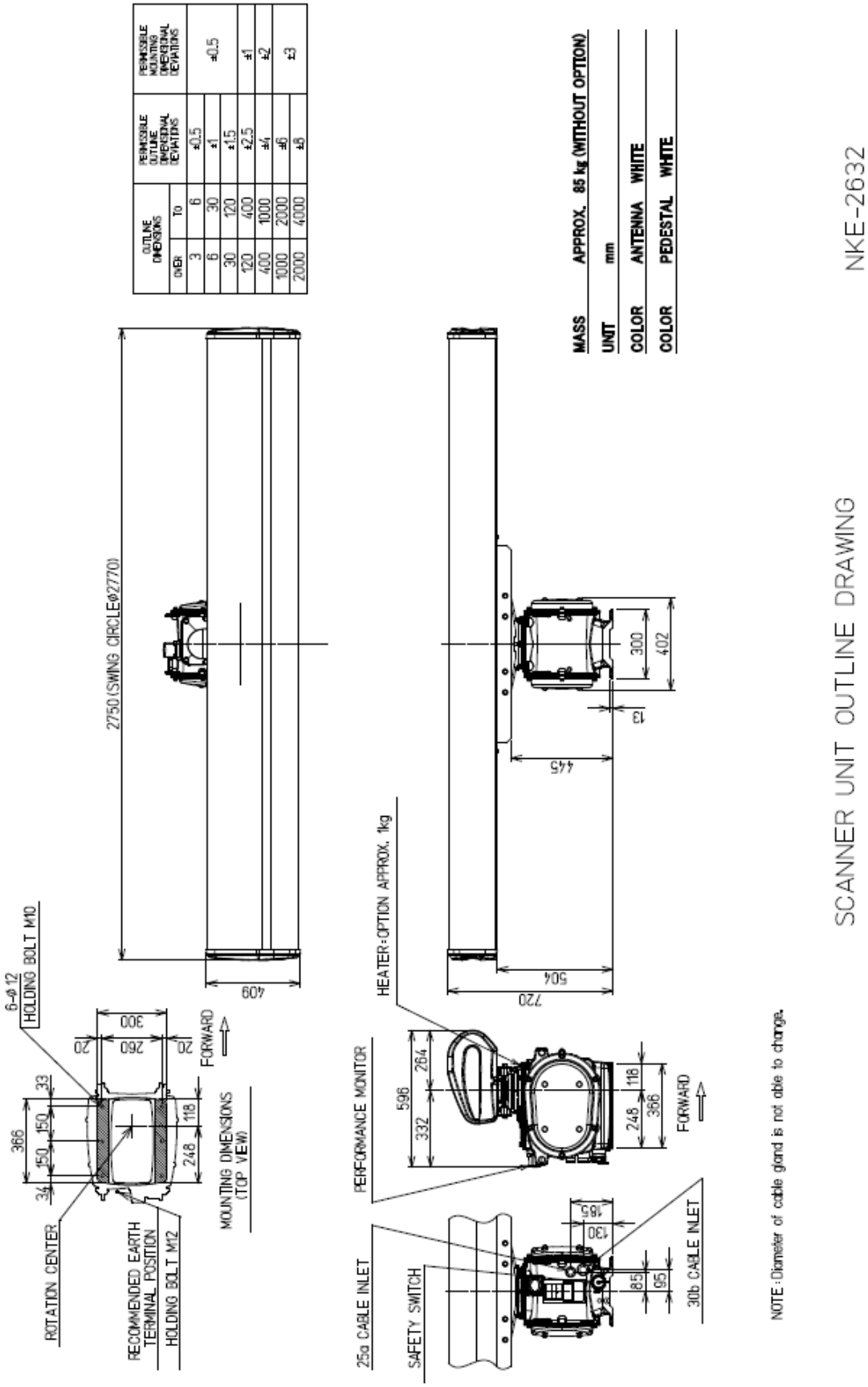
The dimensional outline drawing of this equipment is shown below.



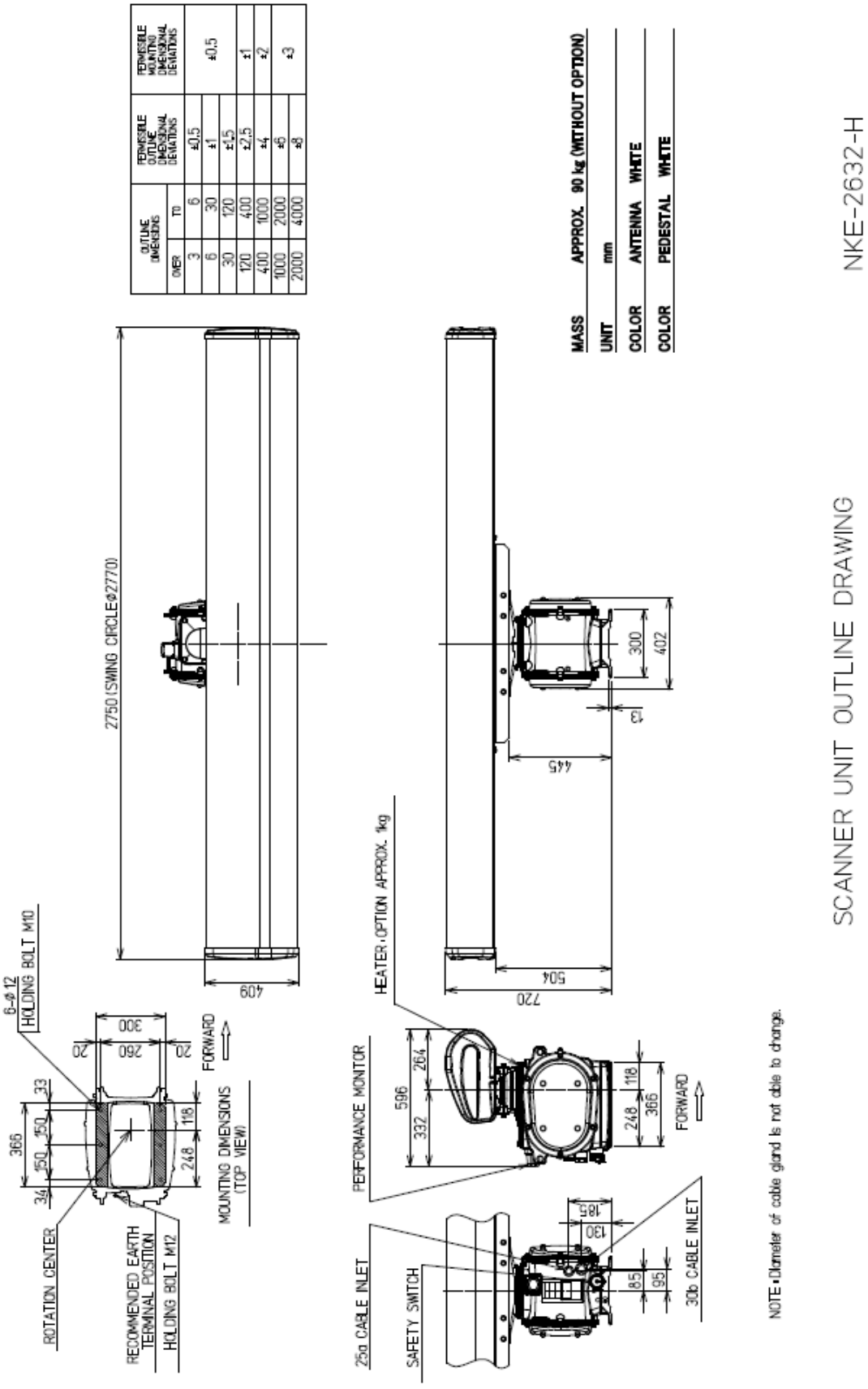
Outline Drawing of Radar Antenna (NKE-1130)



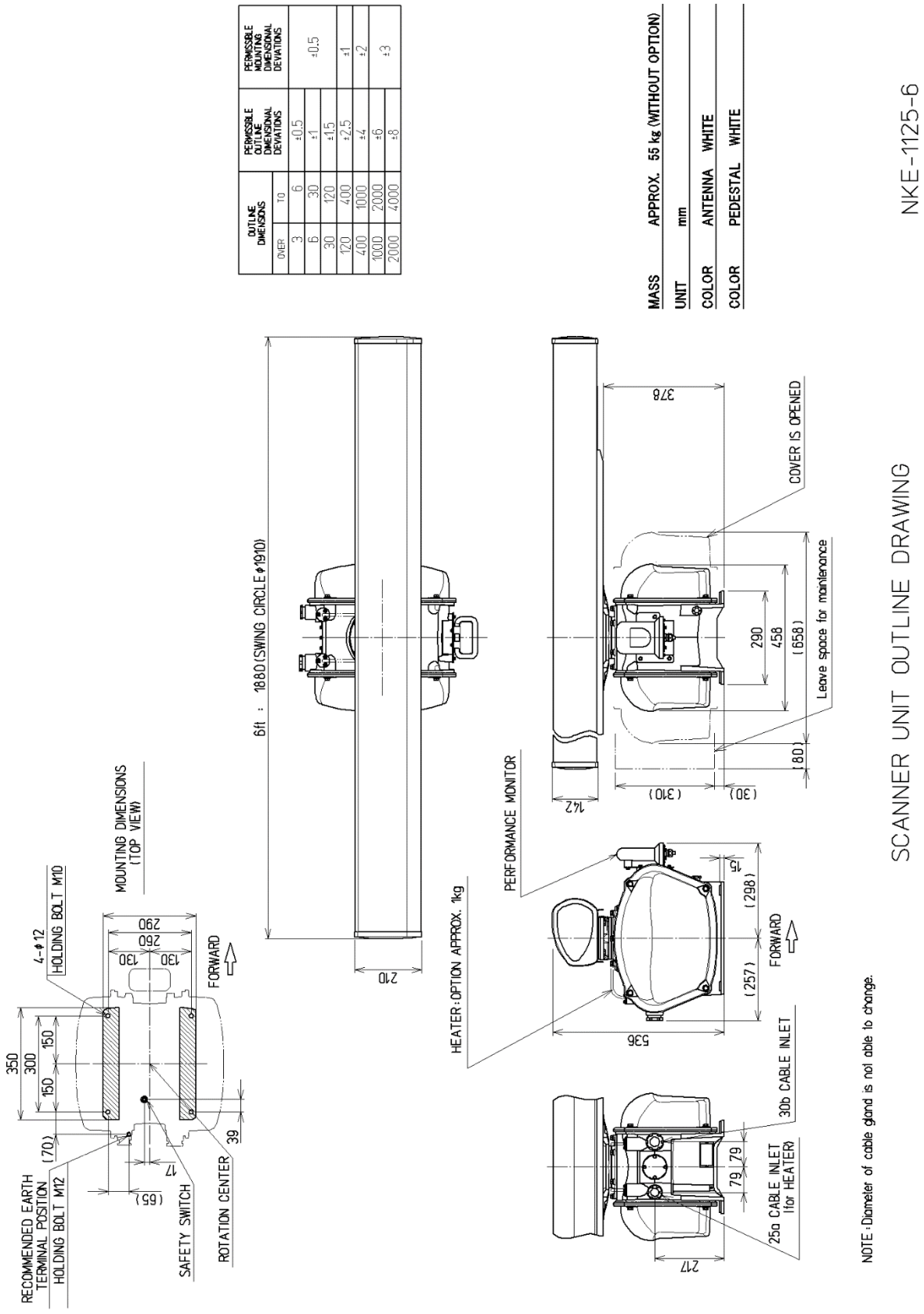
Outline Drawing of Radar Antenna (NKE-1632)



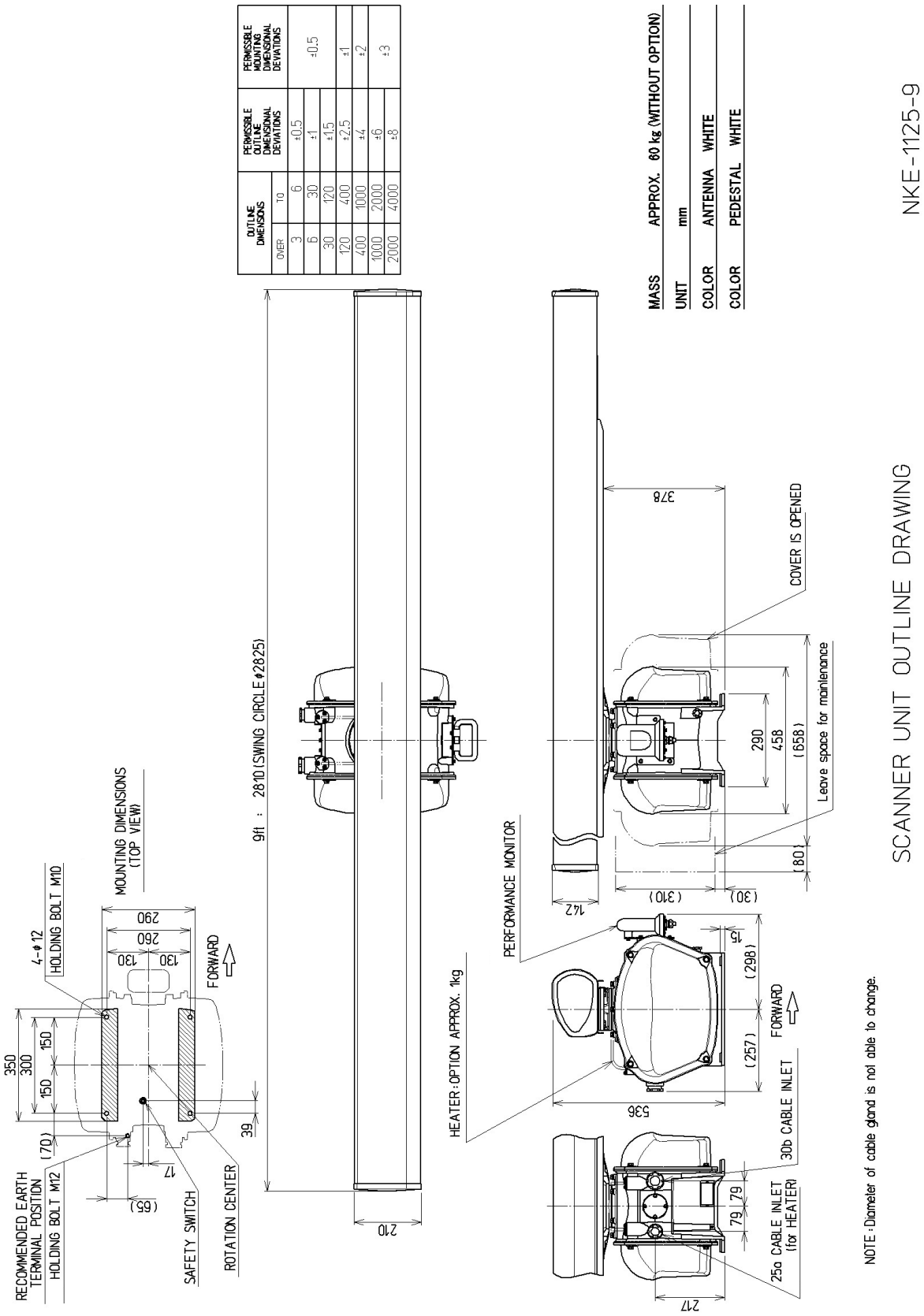
Outline Drawing of Radar Antenna (NKE-2632)



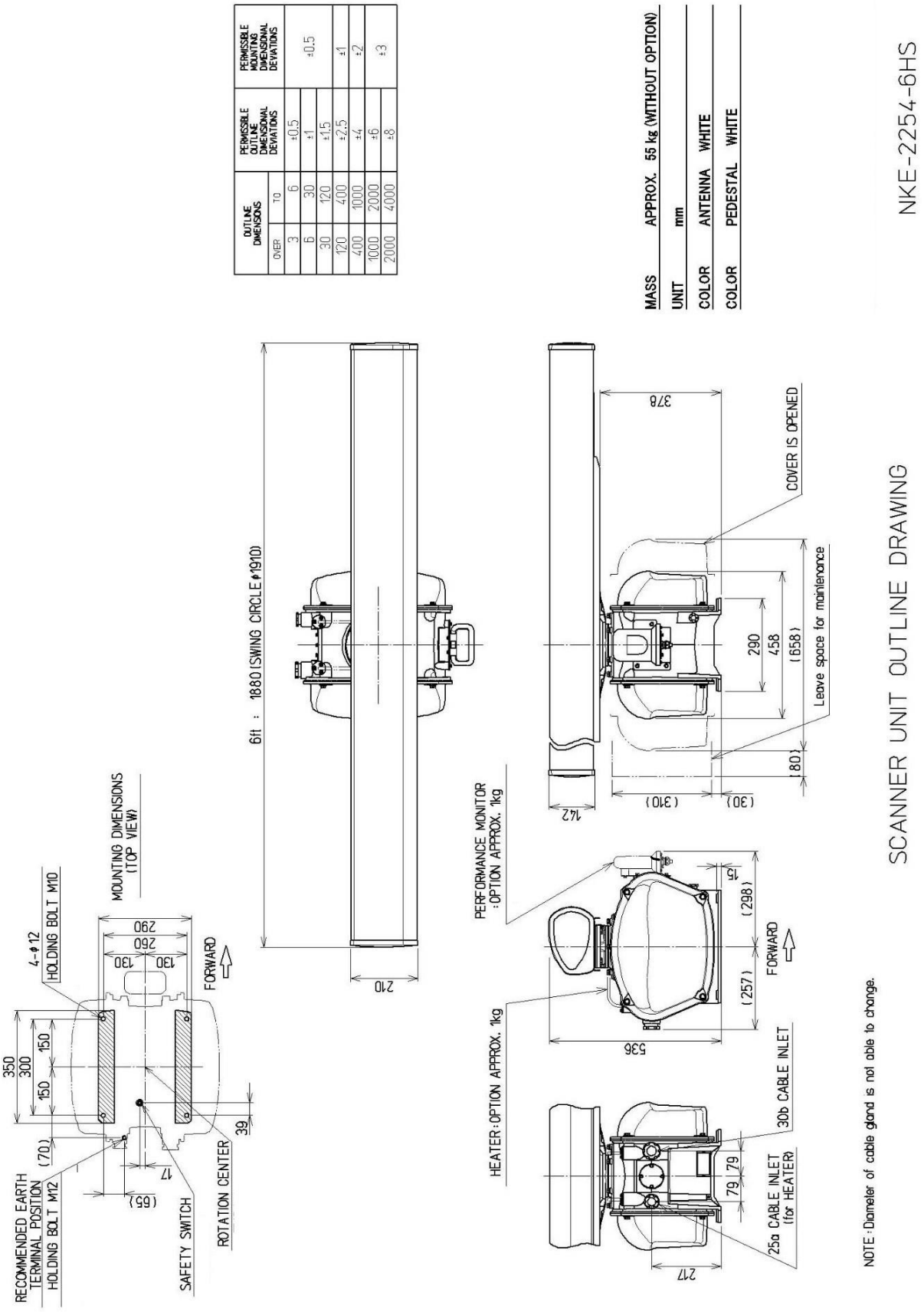
Outline Drawing of Radar Antenna (NKE-2632-H



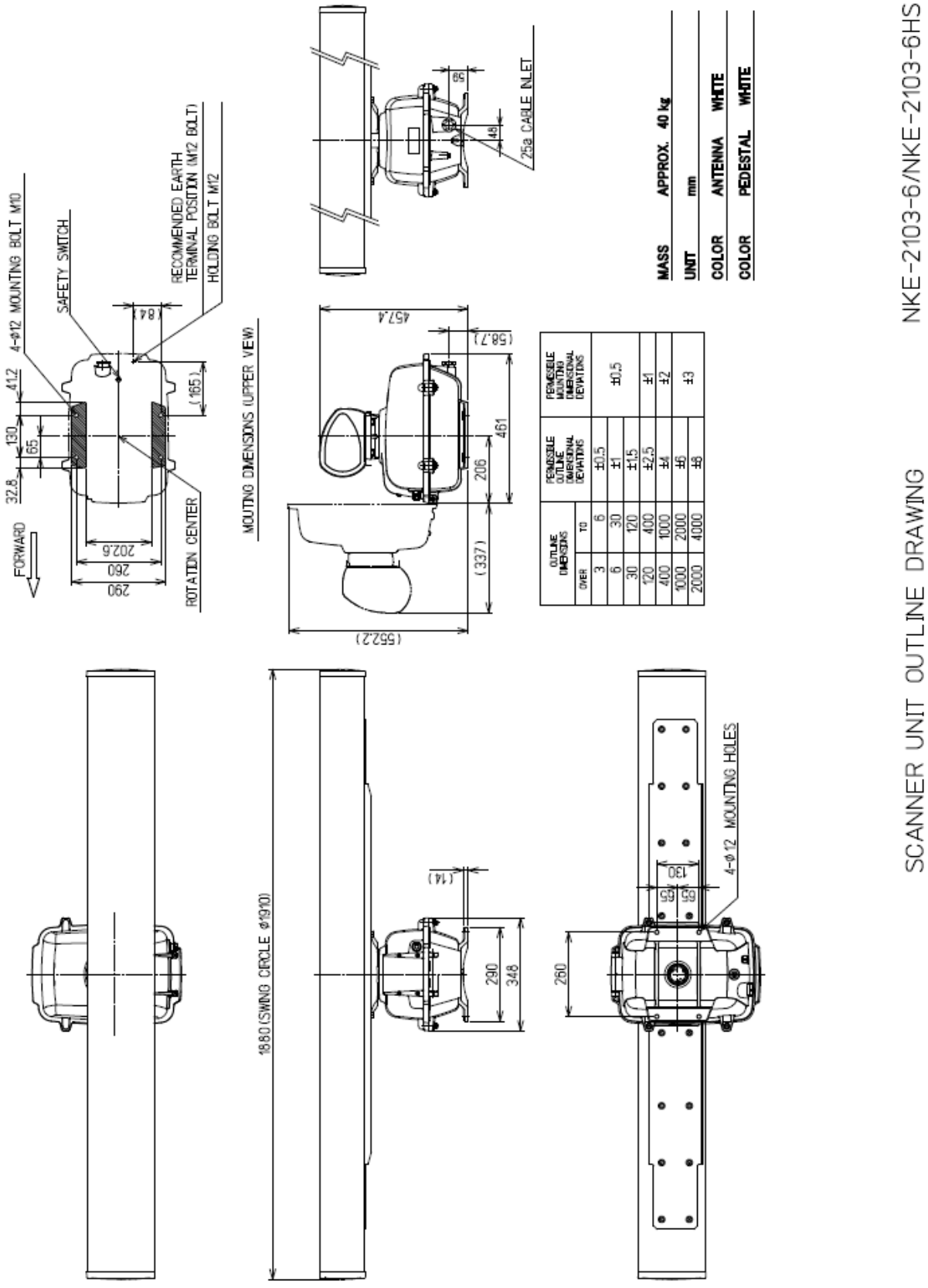
Outline Drawing of Radar Antenna (NKE-1125-6)



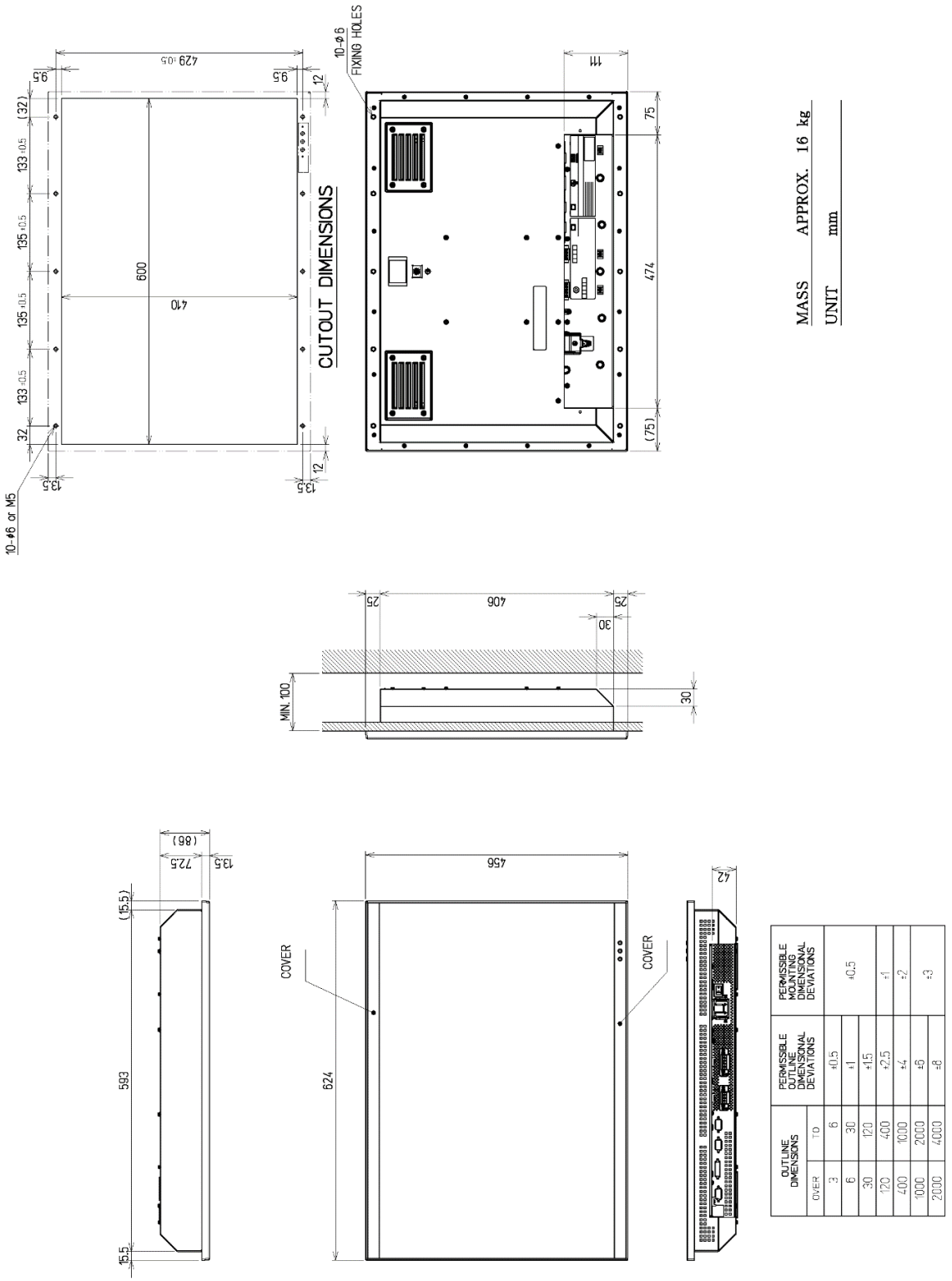
Outline Drawing of Radar Antenna (NKE-1125-9)



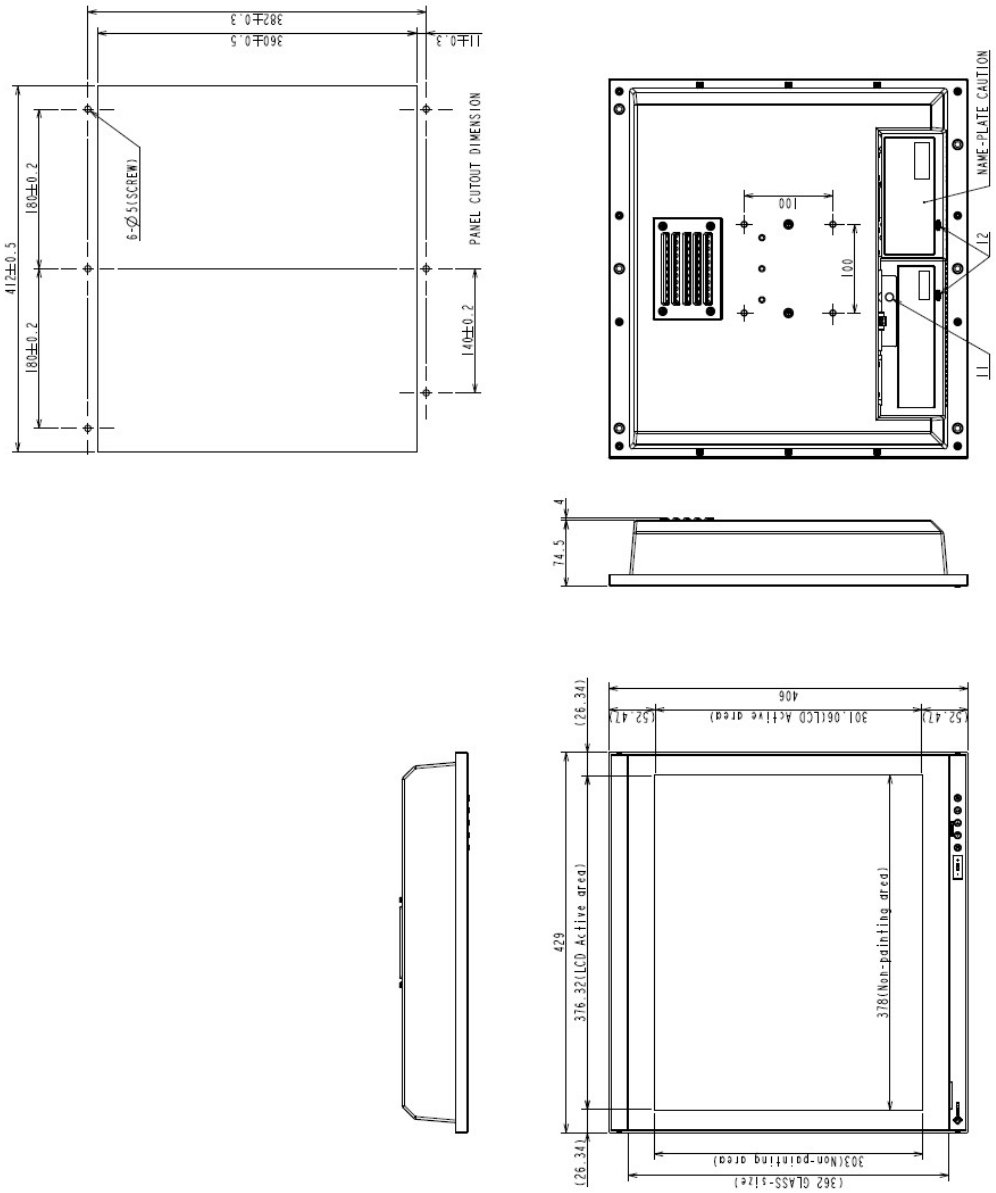
Outline Drawing of Radar Antenna (NKE-2254-6HS)



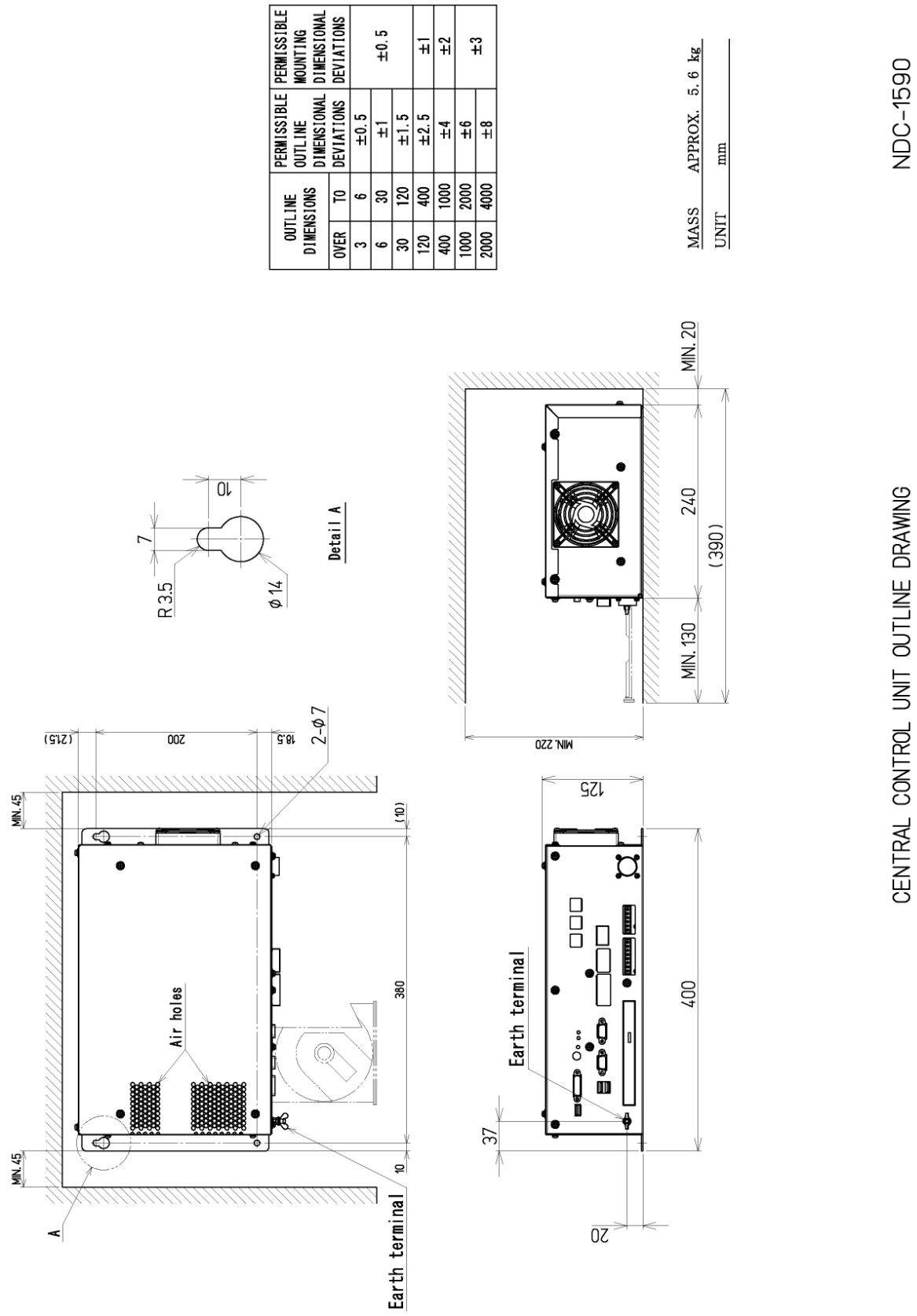
Outline Drawing of Radar Antenna (NKE-2103-6/6HS)



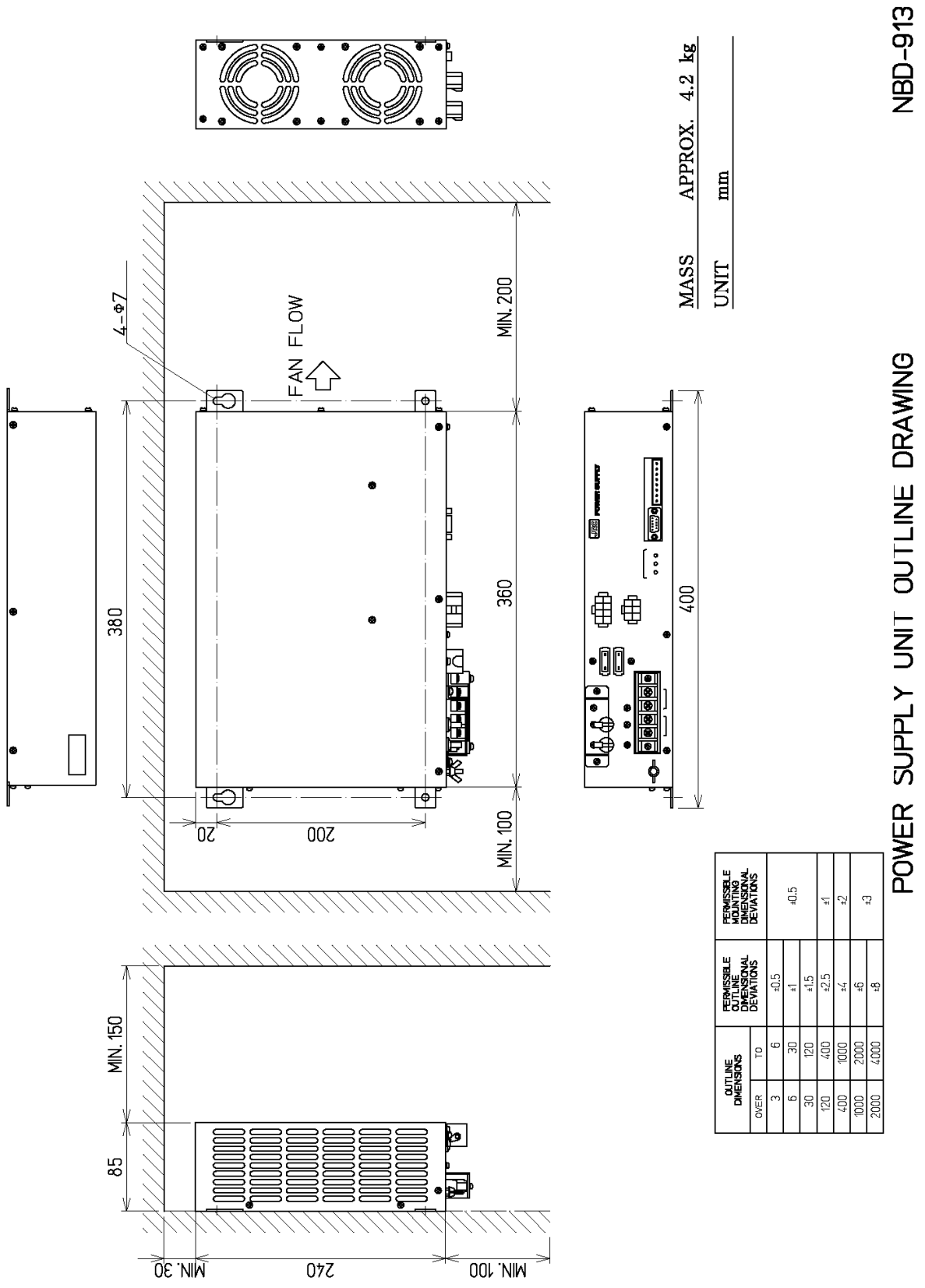
Outline drawing of AlphaScreen 26-inch



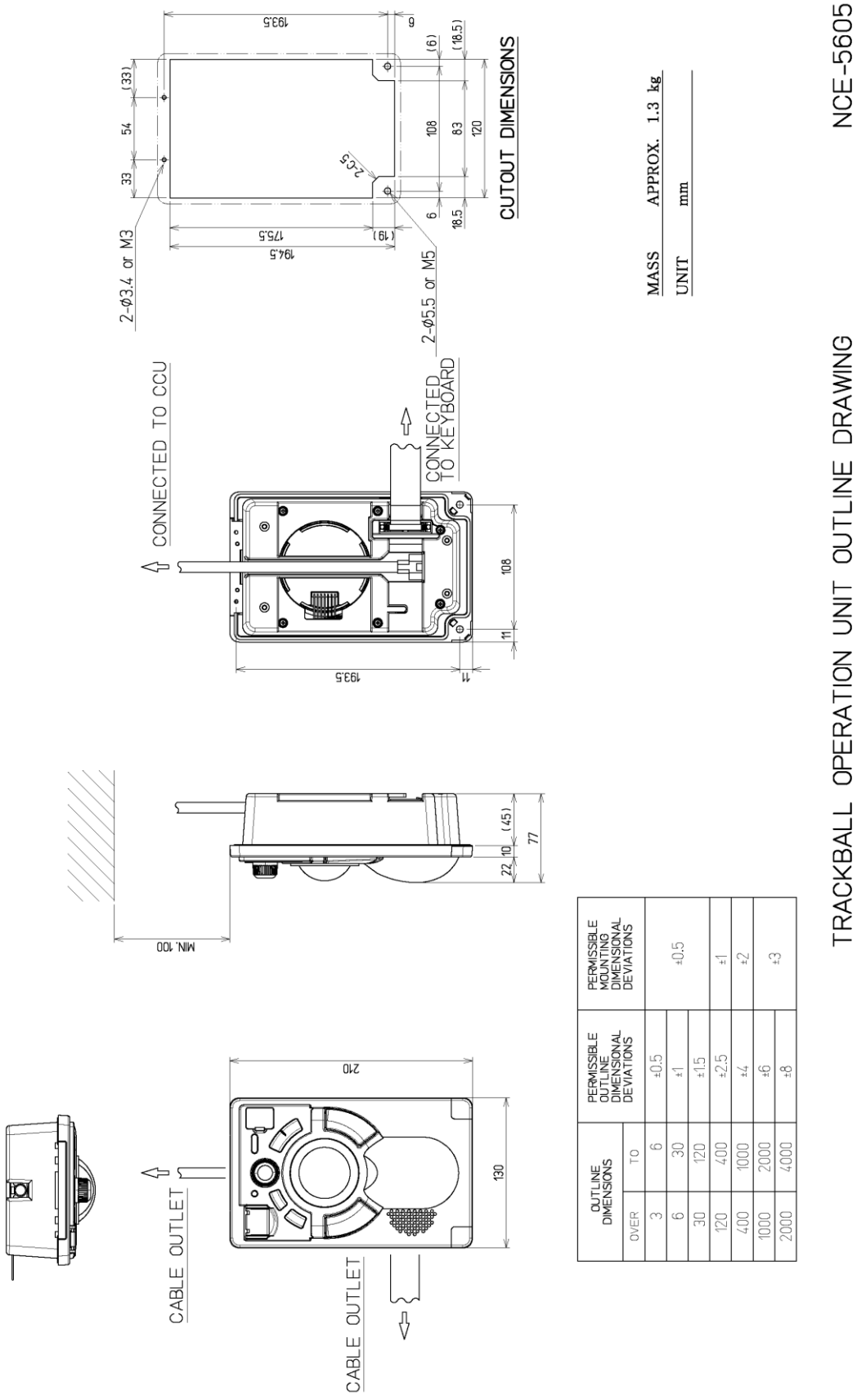
Outline drawing of AlphaScreen 19-inch



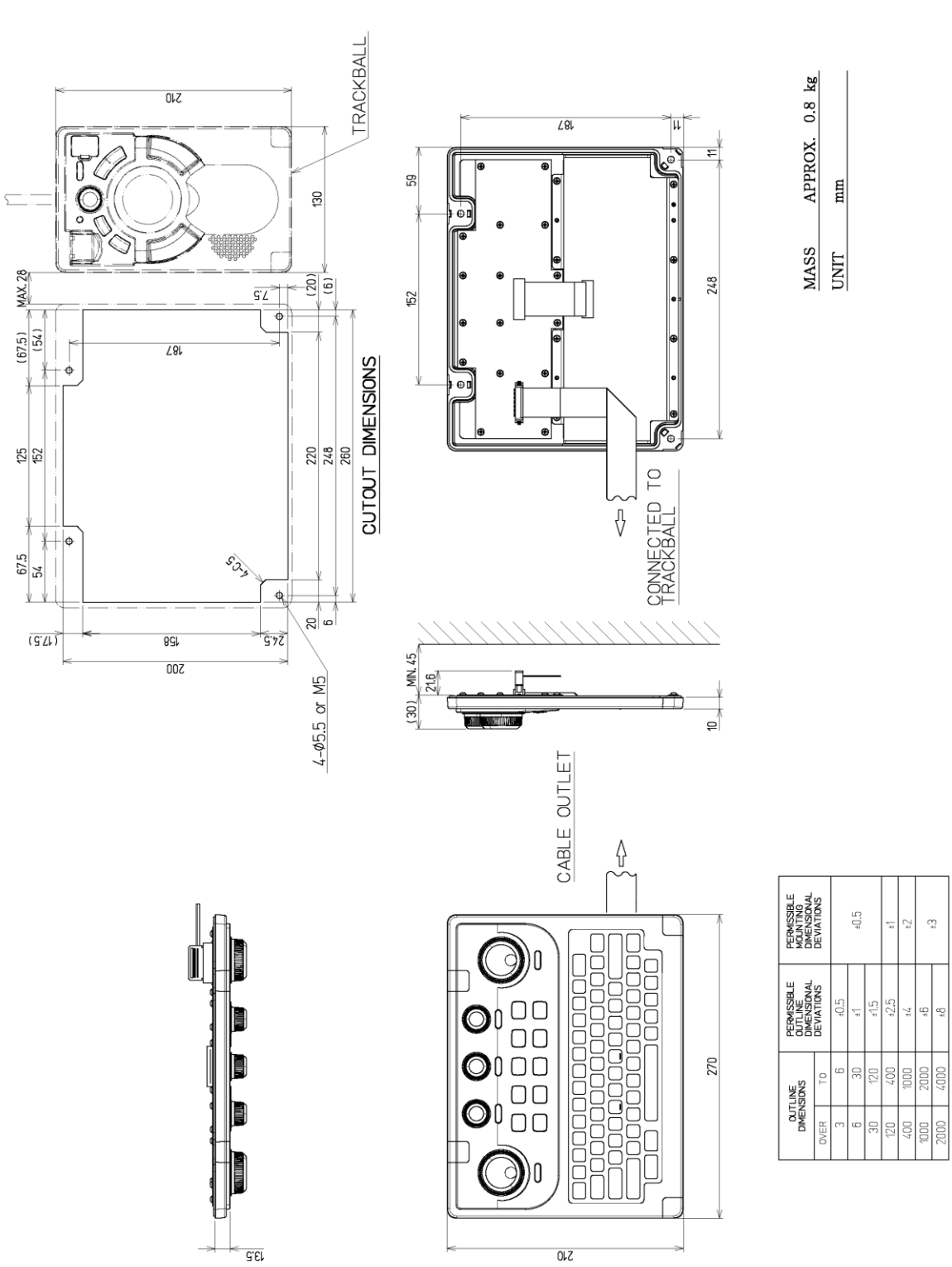
Outline Drawing of Central Control Unit (NDC-1590)



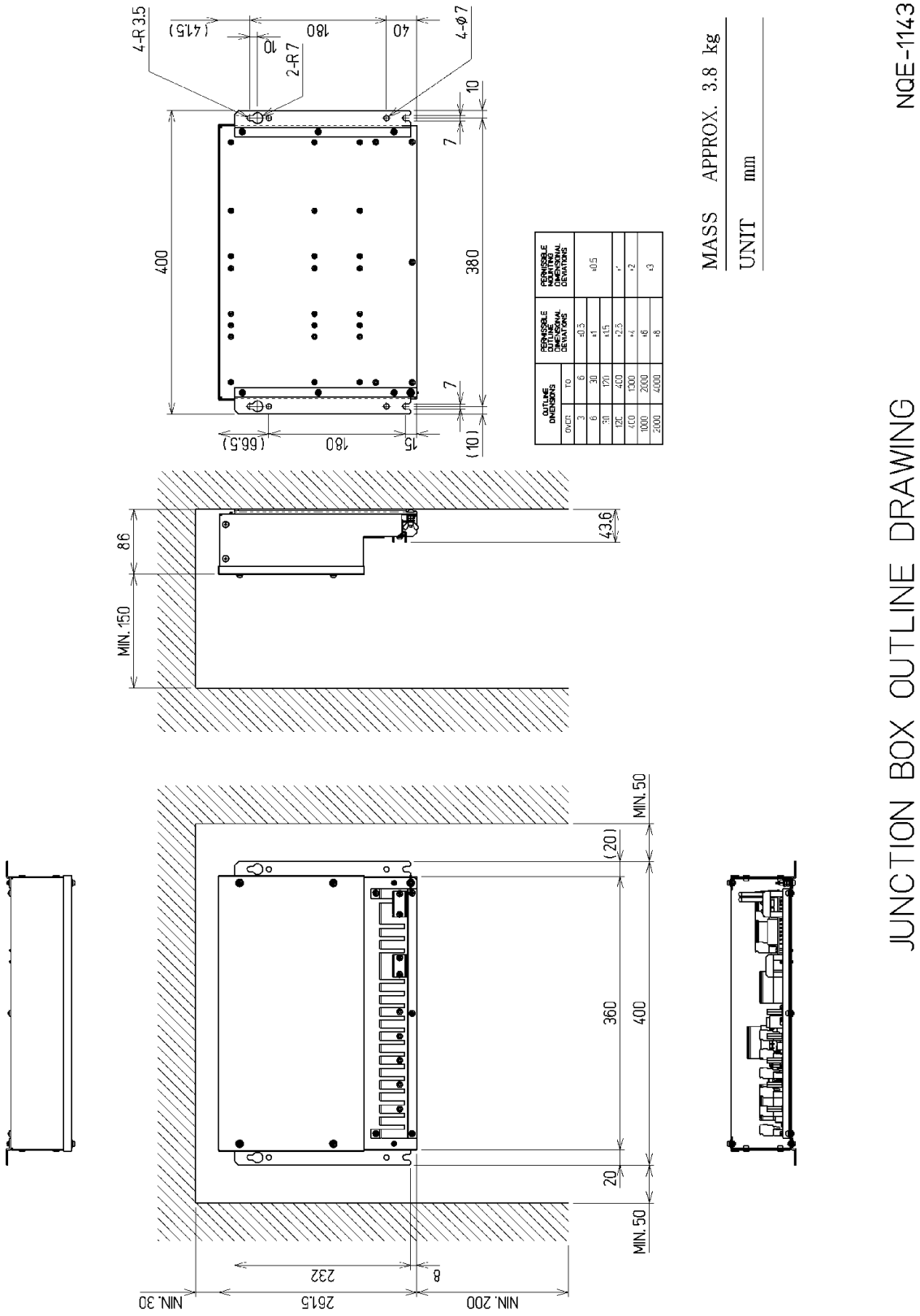
Outline Drawing of Power Supply Unit (NBD-913)



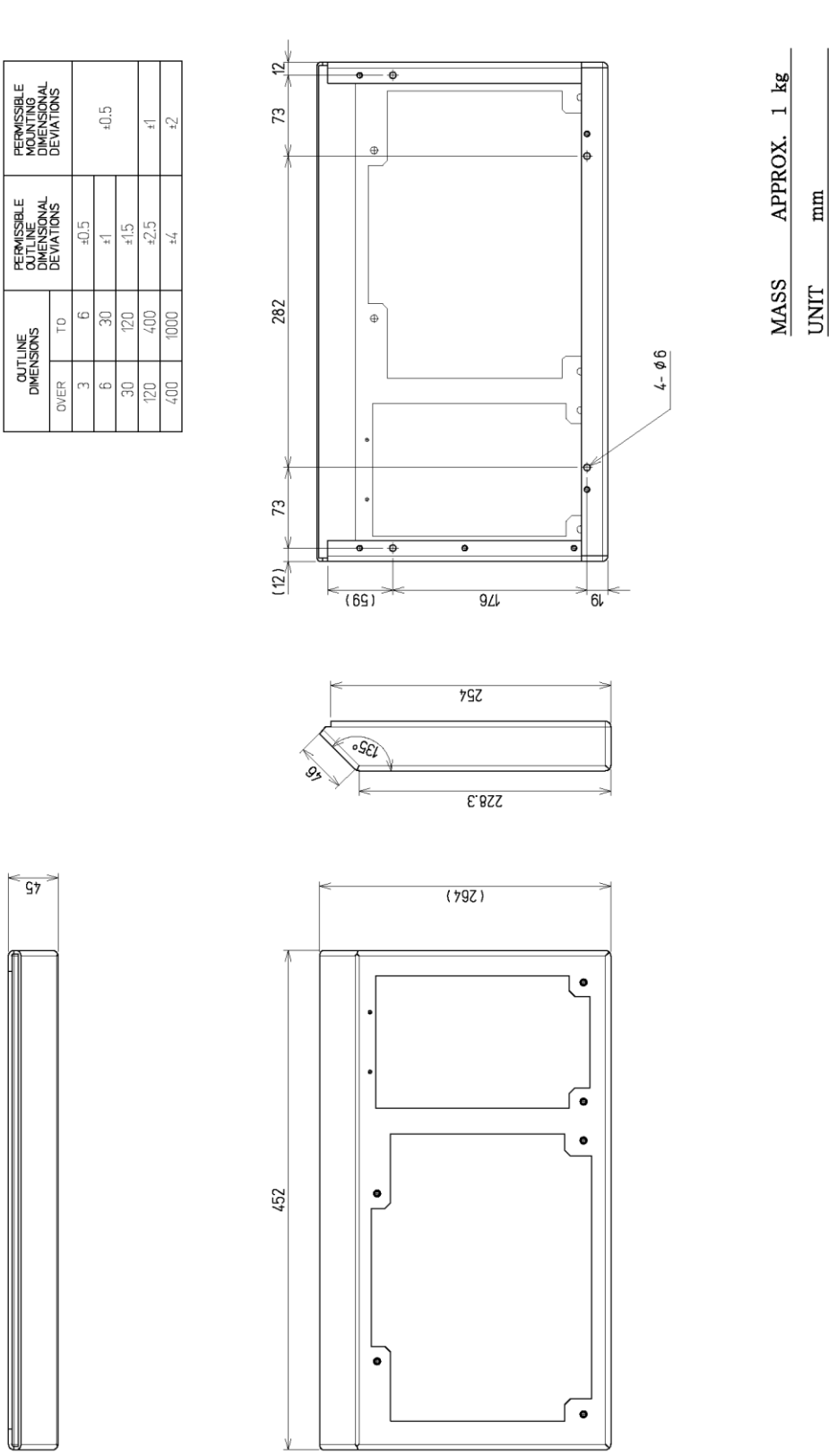
Outline Drawing of Trackball Operation Unit (NCE-5605)



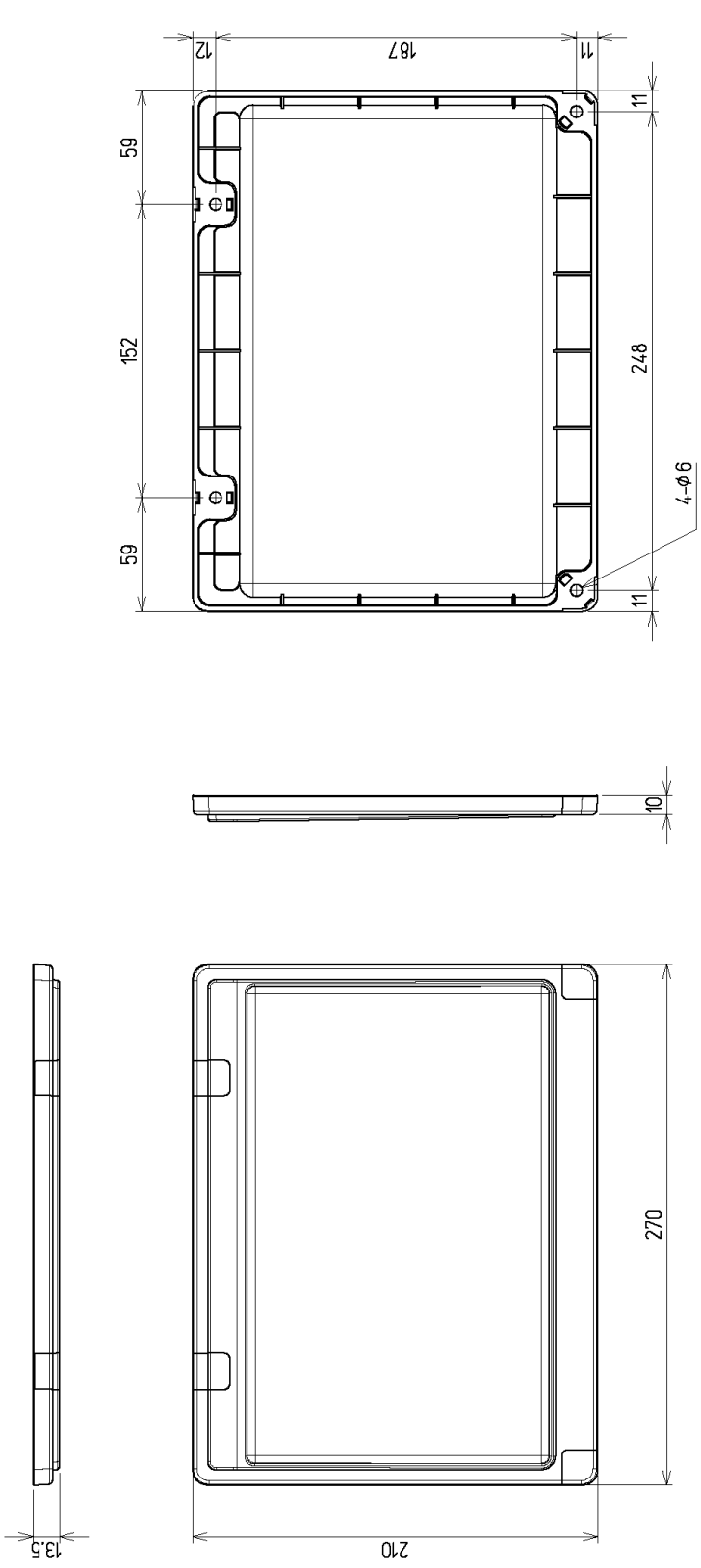
Outline Drawing of Keyboard Operation Unit (NCE-5625)



Outline Drawing of Junction Box (NQE-1143)



Outline Drawing of Operation Unit Desktop Frame (CWB-1596)



MASS 0.3 kg

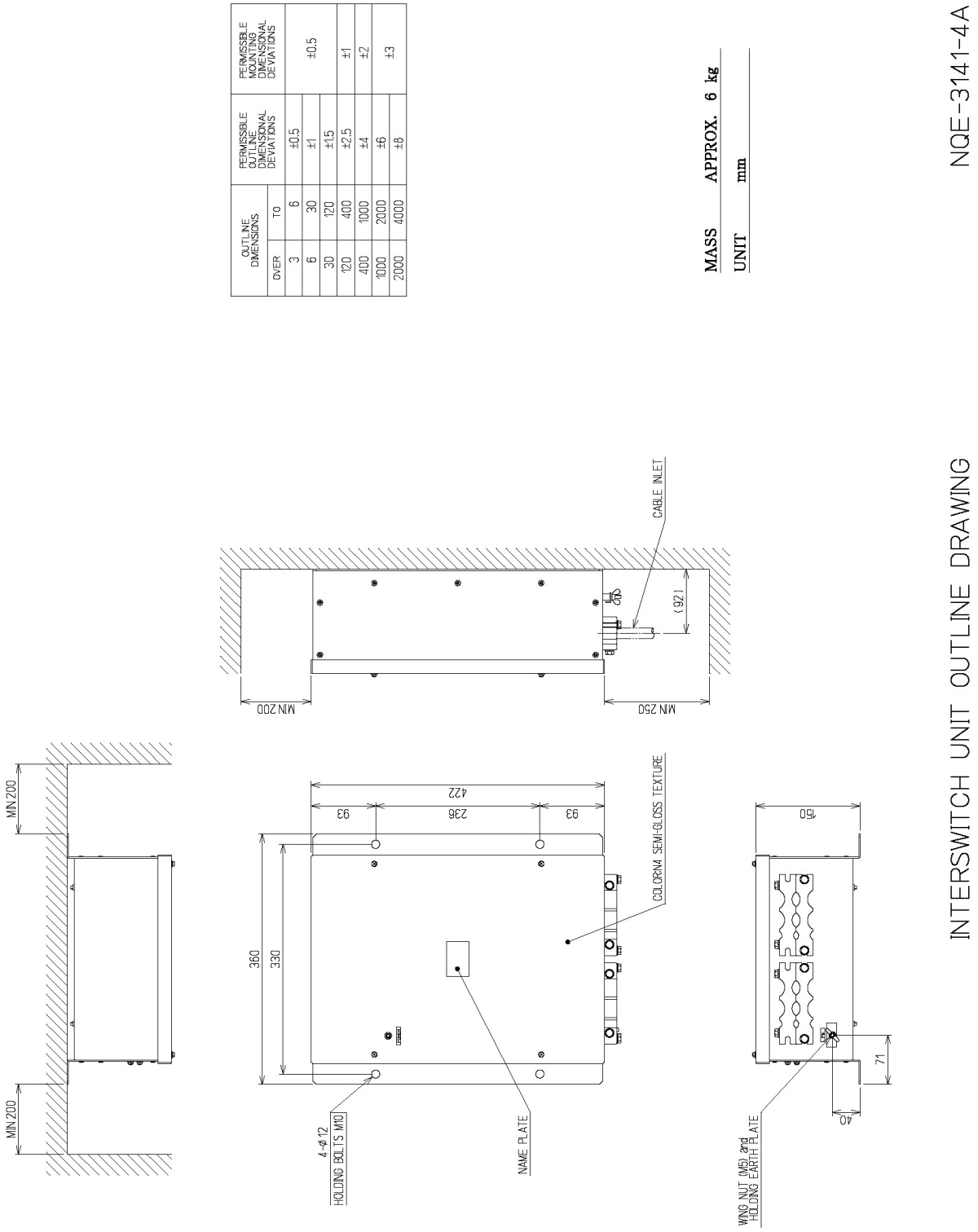
UNIT mm

OUTLINE DIMENSIONS		PERMISSIBLE OUTLINE DIMENSIONAL DEVIATIONS	PERMISSIBLE MOUNTING DIMENSIONAL DEVIATIONS
OVER	TO		
3	6	±0.5	±0.5
6	30	±1	±0.5
30	120	±1.5	±0.5
120	400	±2.5	±1
400	1000	±4	±2
1000	2000	±6	±3
2000	4000	±8	±3

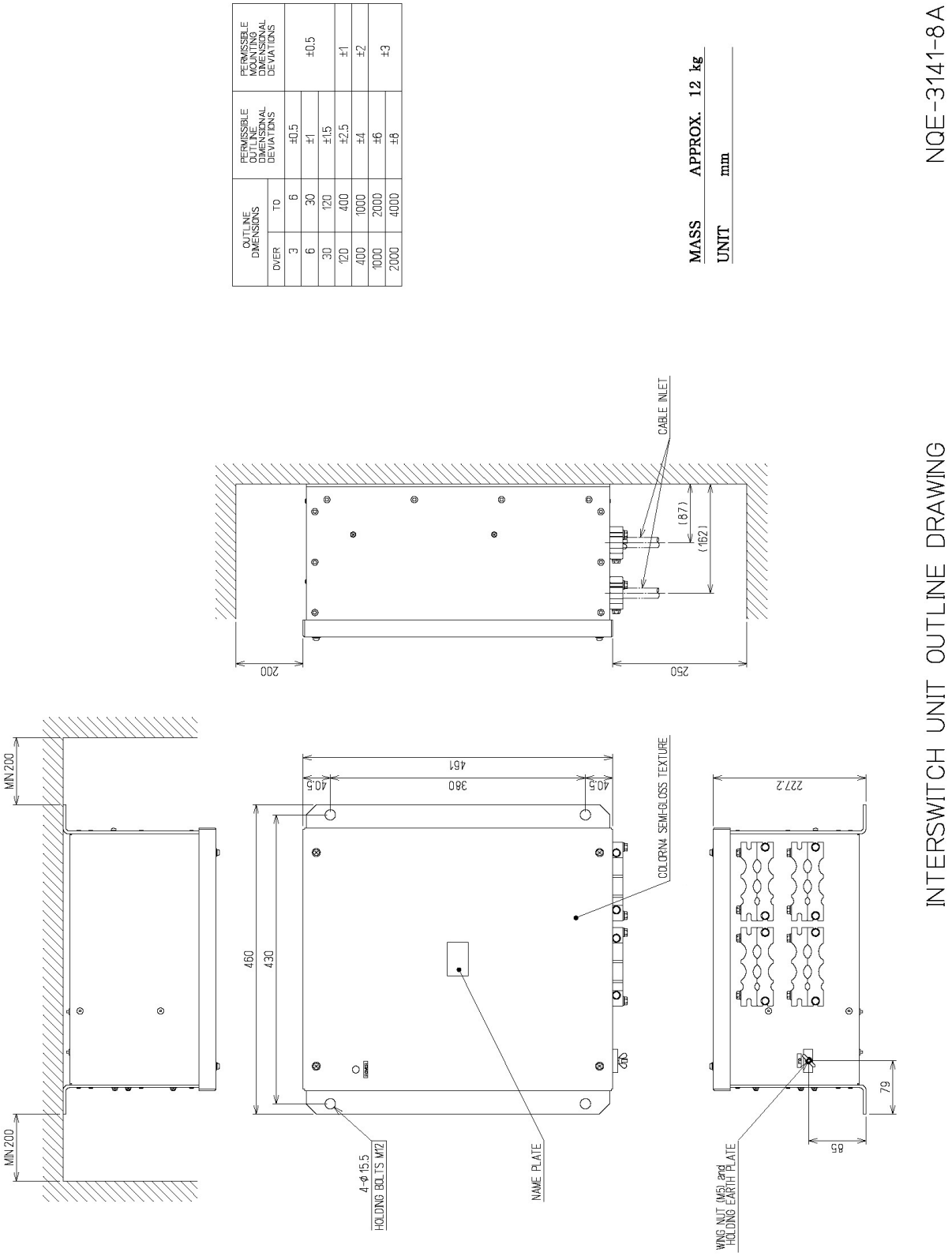
CWB-1593

LARGE TRAY OUTLINE DRAWING

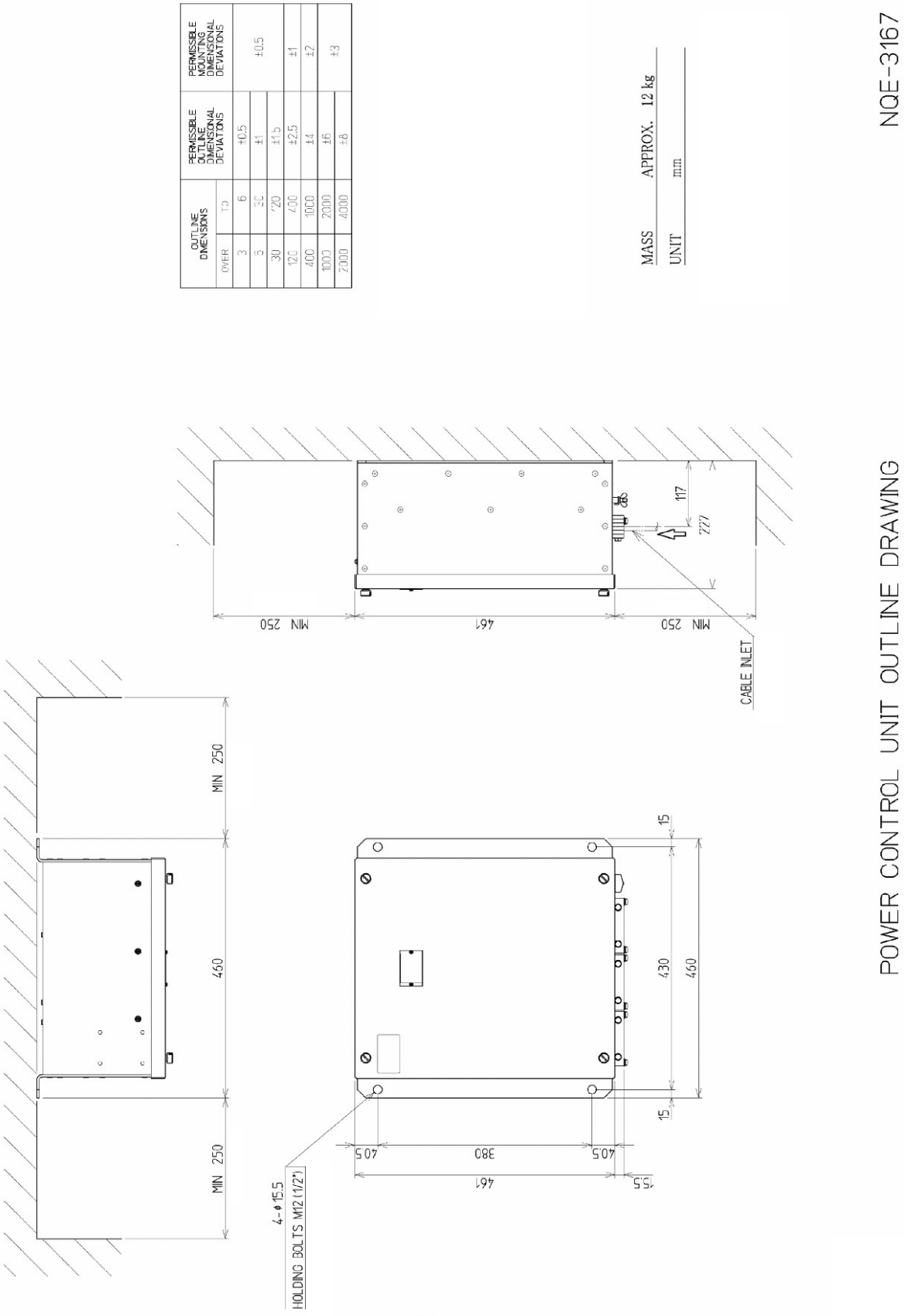
Outline Drawing of Large Tray (CWB-1593)



Outline Drawing of Interswitch Unit (NQE-3141-4A) (Option)



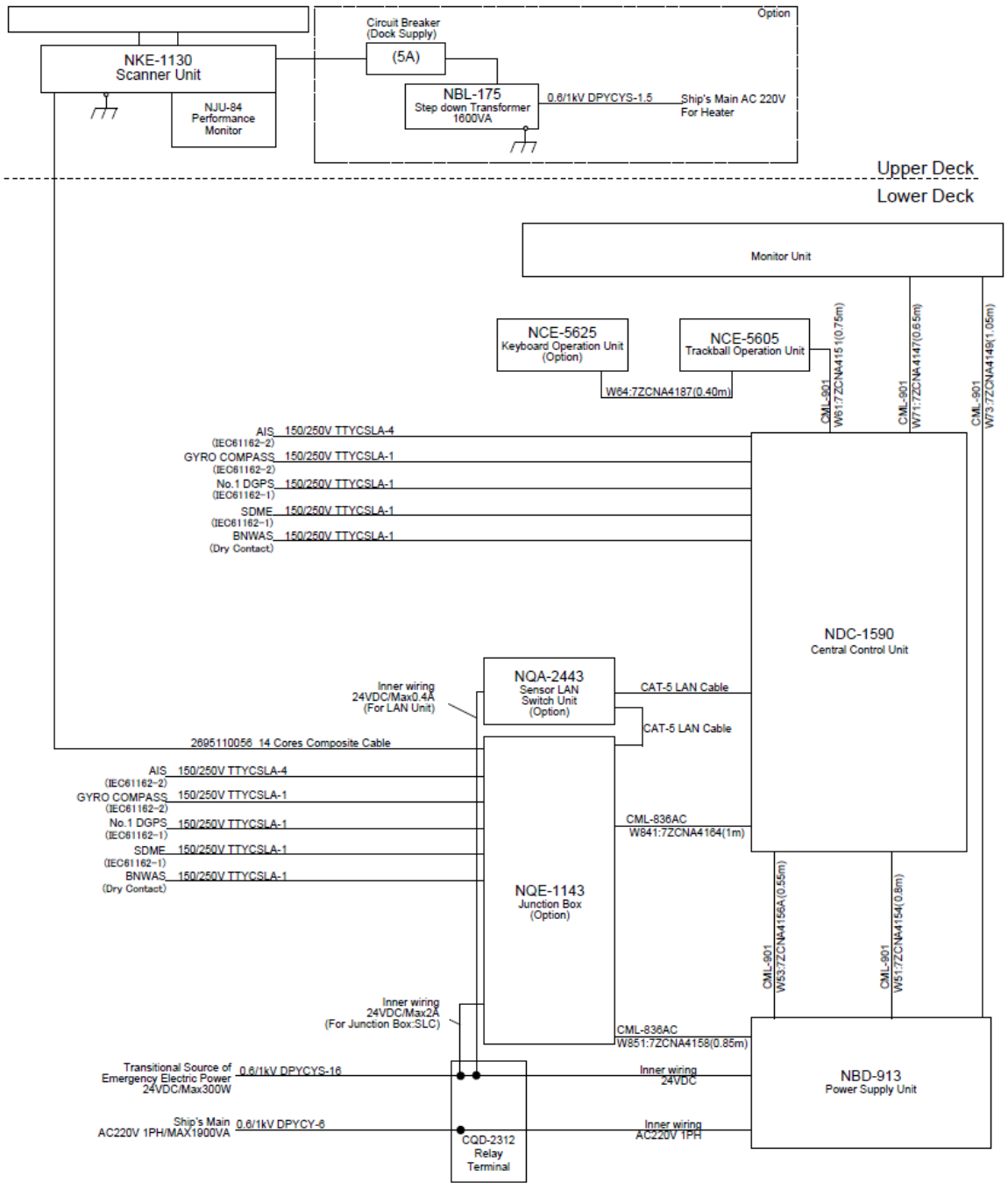
Outline Drawing of Interswitch Unit (NQE-3141-8A) (Option)



Outline Drawing of Power Control Unit (NQE-3167) (Option)

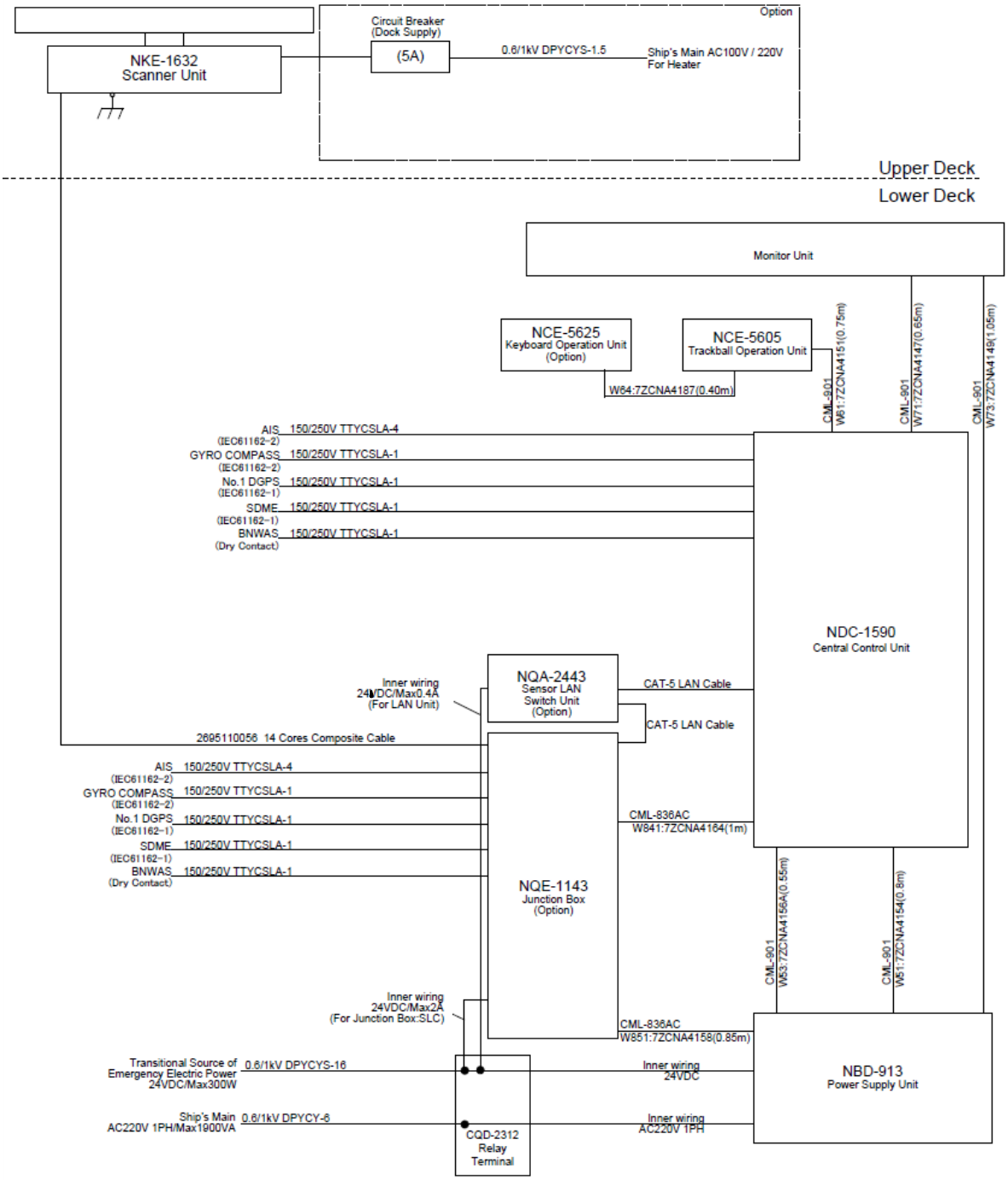
1.5 General System Diagrams

Connection examples of this equipment are shown below.



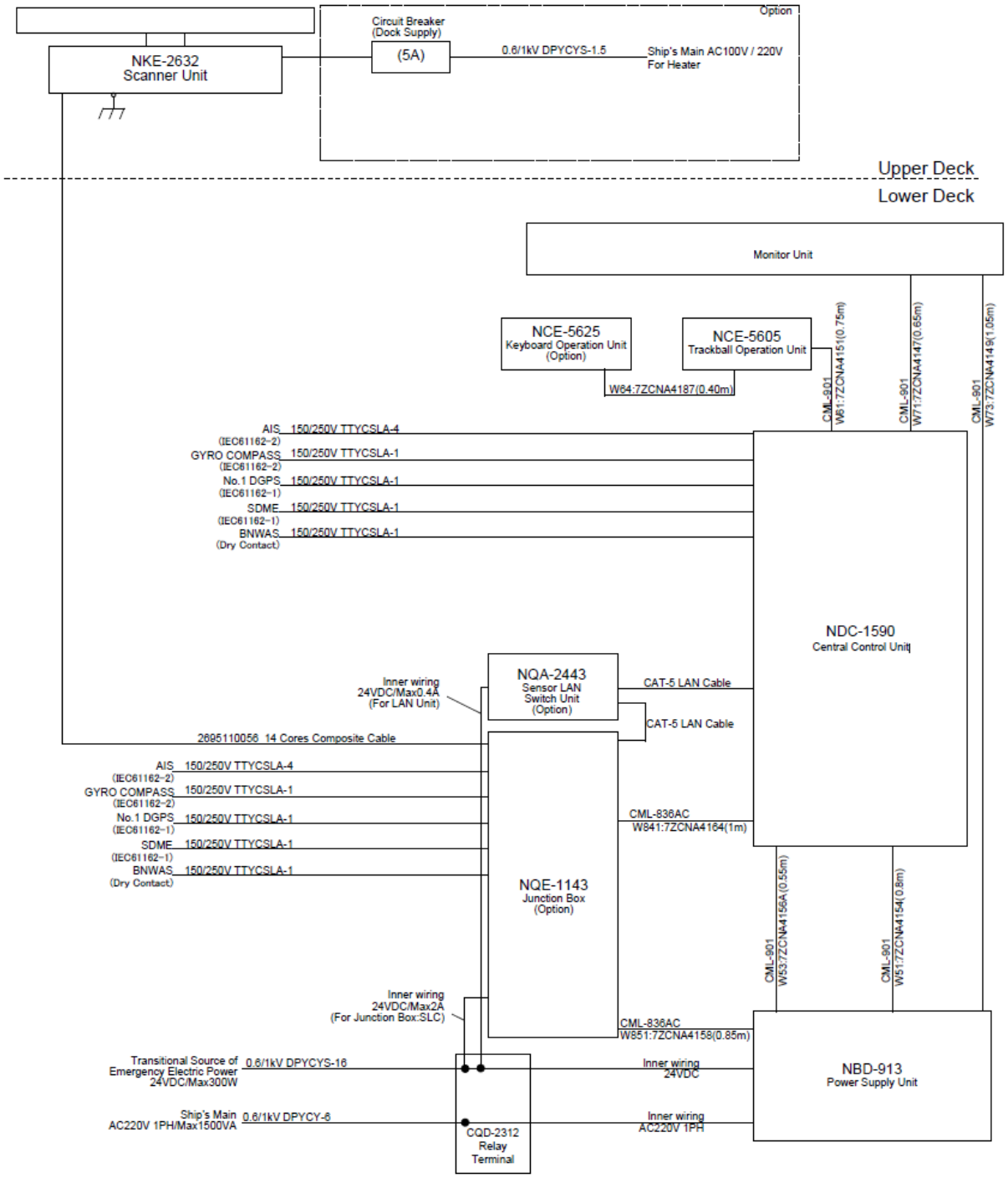
NOTE: ELIMINATING THE INTERFERENCE ON FREQUENCIES USED FOR MARINE COMMUNICATIONS AND NAVIGATION DUE TO OPERATION OF THE RADAR, ALL CABLES OF THE RADAR ARE TO BE RUN AWAY FROM THE CABLES OF RADIO EQUIPMENT. (ex. RADIOTELEPHONE, COMMUNICATIONS RECEIVER and DIRECTION FINDER. etc..) ESPECIALLY INTER-WIRING CABLES BETWEEN SCANNER UNIT AND DISPLAY UNIT OF THE RADAR SHOULD NOT BE RUN PARALLEL WITH THE CABLES OF RADIO EQUIPMENT.

General System Diagram of AlphaScan 5930-S



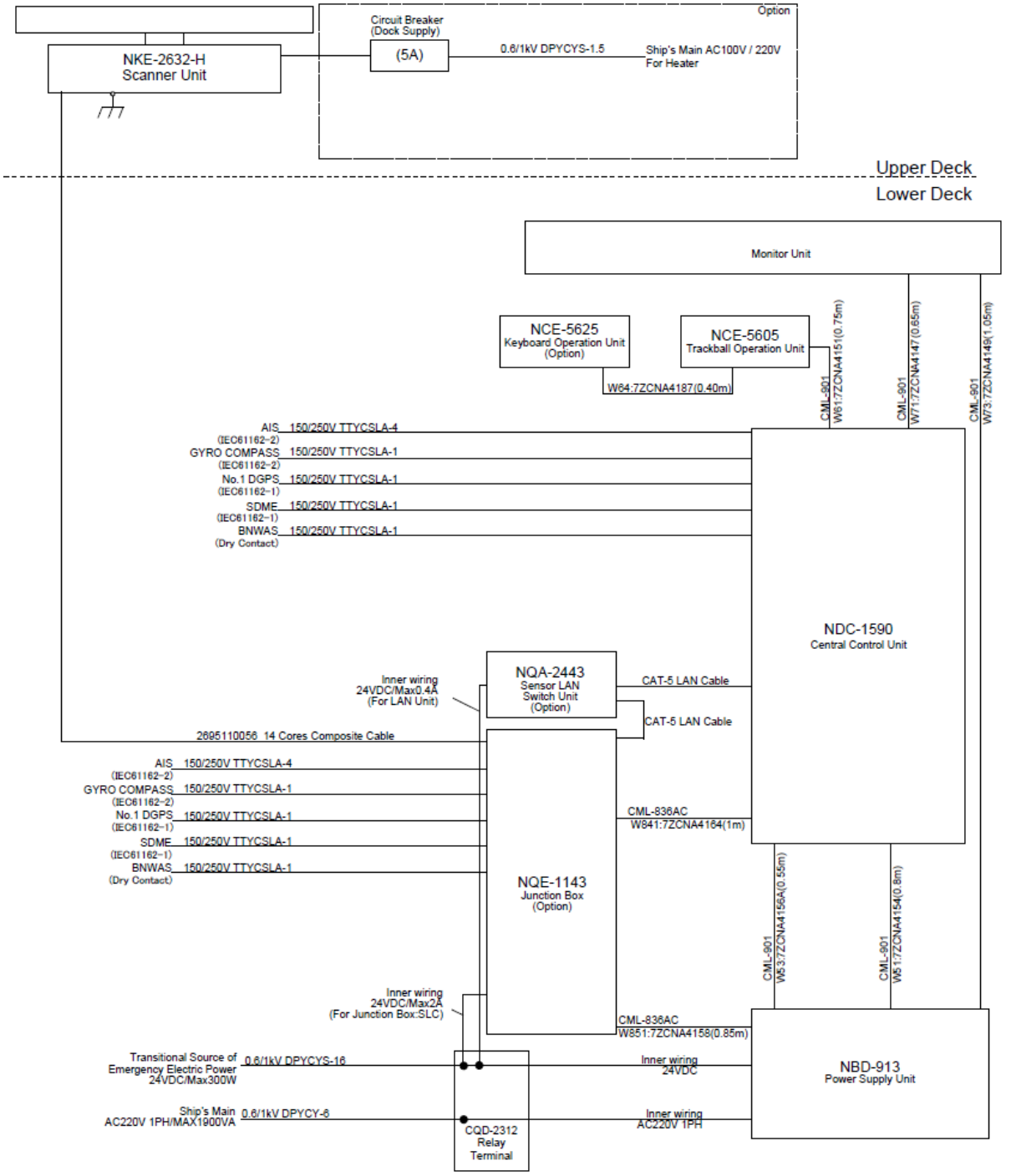
NOTE: ELIMINATING THE INTERFERENCE ON FREQUENCIES USED FOR MARINE COMMUNICATIONS AND NAVIGATION DUE TO OPERATION OF THE RADAR, ALL CABLES OF THE RADAR ARE TO BE RUN AWAY FROM THE CABLES OF RADIO EQUIPMENT. (ex. RADIOTELEPHONE, COMMUNICATIONS RECEIVER and DIRECTION FINDER. etc..) ESPECIALLY INTER-WIRING CABLES BETWEEN SCANNER UNIT AND DISPLAY UNIT OF THE RADAR SHOULD NOT BE RUN PARALLEL WITH THE CABLES OF RADIO EQUIPMENT.

General System Diagram of AlphaScan 5972-S



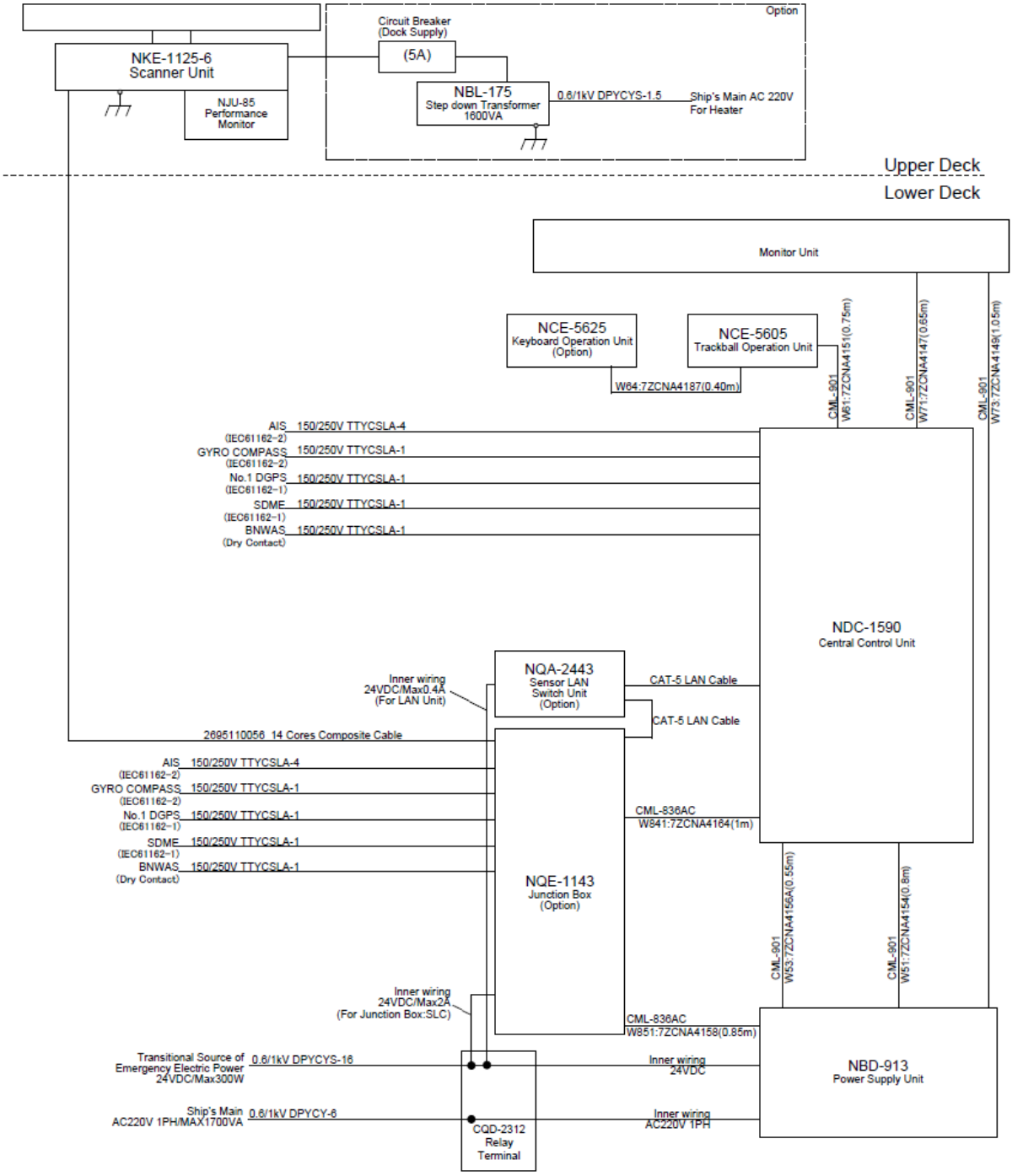
NOTE: ELIMINATING THE INTERFERENCE ON FREQUENCIES USED FOR MARINE COMMUNICATIONS AND NAVIGATION DUE TO OPERATION OF THE RADAR, ALL CABLES OF THE RADAR ARE TO BE RUN AWAY FROM THE CABLES OF RADIO EQUIPMENT. (ex. RADIOTELEPHONE, COMMUNICATIONS RECEIVER and DIRECTION FINDER. etc..) ESPECIALLY INTER-WIRING CABLES BETWEEN SCANNER UNIT AND DISPLAY UNIT OF THE RADAR SHOULD NOT BE RUN PARALLEL WITH THE CABLES OF RADIO EQUIPMENT.

General System Diagram of AlphaScan 5982-S



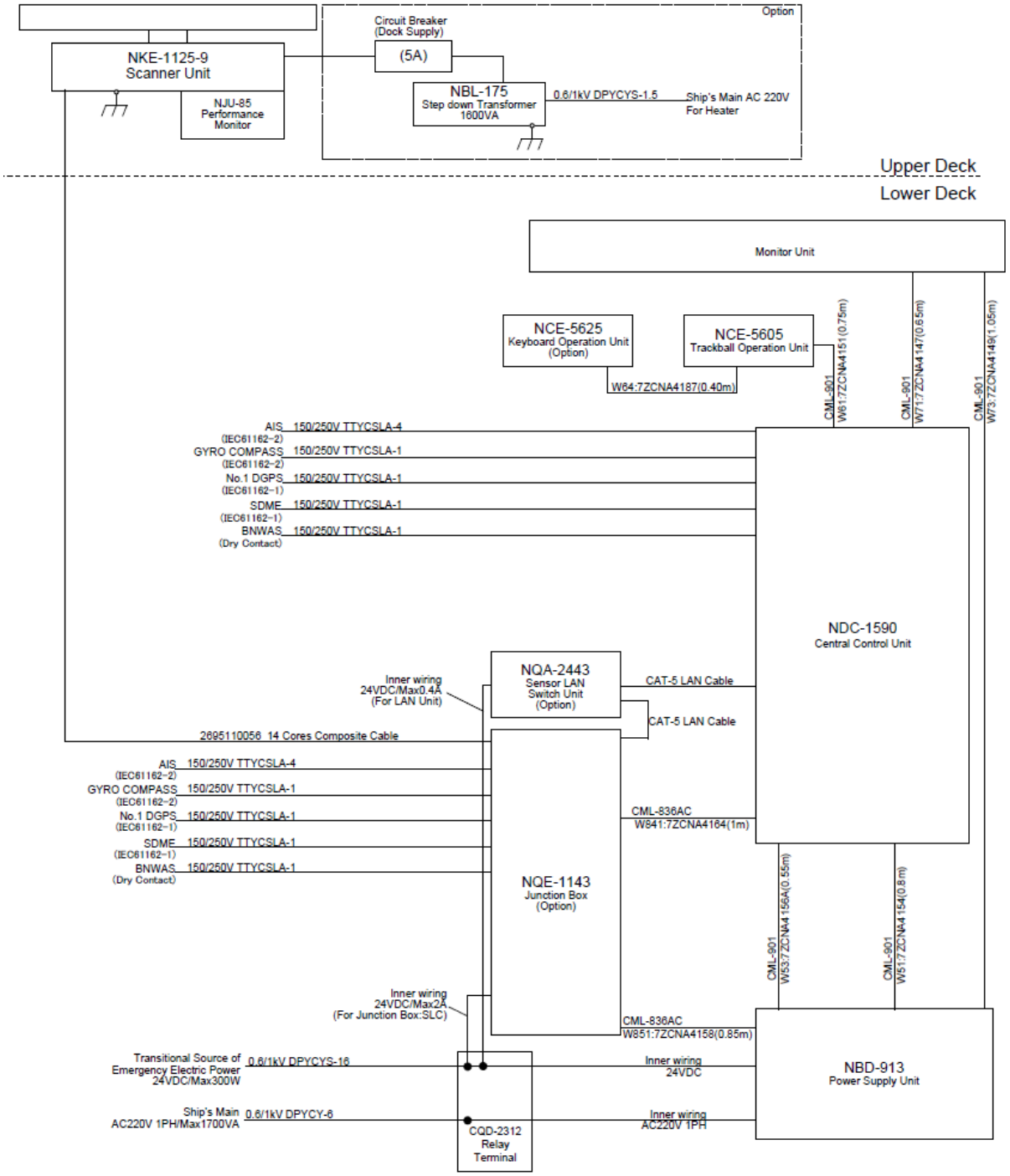
NOTE: ELIMINATING THE INTERFERENCE ON FREQUENCIES USED FOR MARINE COMMUNICATIONS AND NAVIGATION DUE TO OPERATION OF THE RADAR, ALL CABLES OF THE RADAR ARE TO BE RUN AWAY FROM THE CABLES OF RADIO EQUIPMENT. (ex. RADIOTELEPHONE, COMMUNICATIONS RECEIVER and DIRECTION FINDER. etc..) ESPECIALLY INTER-WIRING CABLES BETWEEN SCANNER UNIT AND DISPLAY UNIT OF THE RADAR SHOULD NOT BE RUN PARALLEL WITH THE CABLES OF RADIO EQUIPMENT.

General System Diagram of AlphaScan 5982-SH



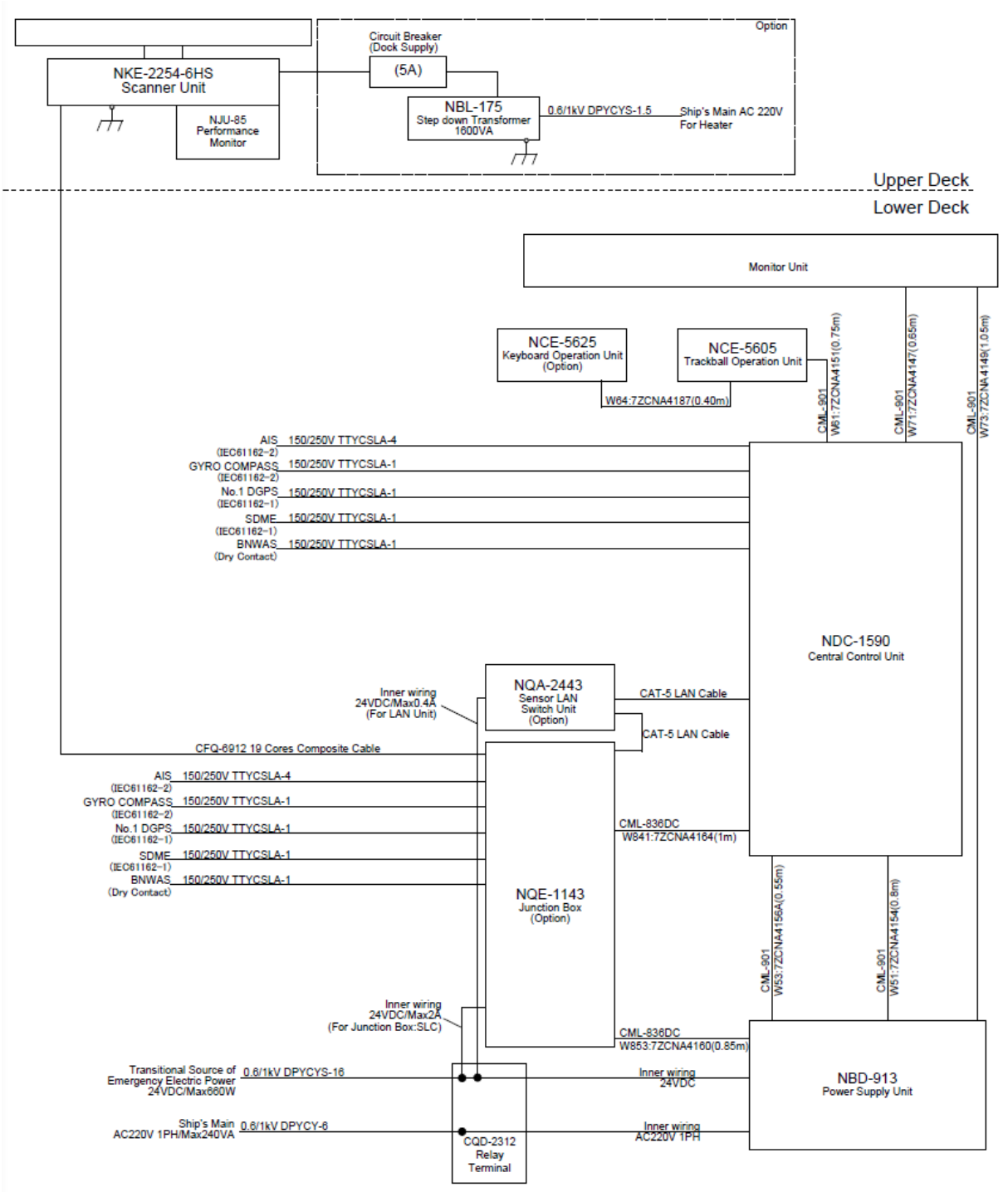
NOTE: ELIMINATING THE INTERFERENCE ON FREQUENCIES USED FOR MARINE COMMUNICATIONS AND NAVIGATION DUE TO OPERATION OF THE RADAR, ALL CABLES OF THE RADAR ARE TO BE RUN AWAY FROM THE CABLES OF RADIO EQUIPMENT. (ex. RADIOTELEPHONE, COMMUNICATIONS RECEIVER and DIRECTION FINDER. etc..) ESPECIALLY INTER-WIRING CABLES BETWEEN SCANNER UNIT AND DISPLAY UNIT OF THE RADAR SHOULD NOT BE RUN PARALLEL WITH THE CABLES OF RADIO EQUIPMENT.

General System Diagram of AlphaScan 5925-6X



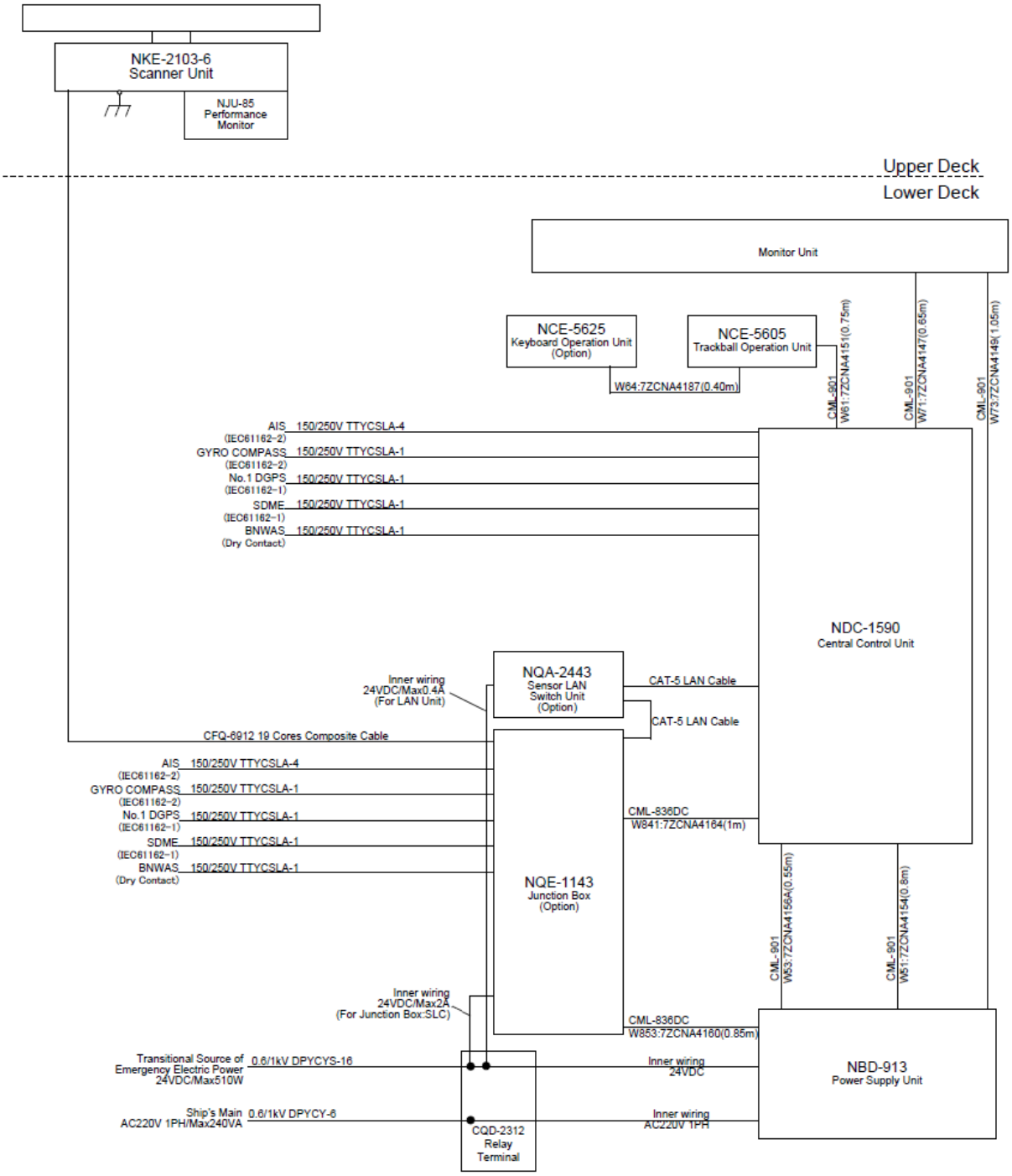
NOTE: ELIMINATING THE INTERFERENCE ON FREQUENCIES USED FOR MARINE COMMUNICATIONS AND NAVIGATION DUE TO OPERATION OF THE RADAR, ALL CABLES OF THE RADAR ARE TO BE RUN AWAY FROM THE CABLES OF RADIO EQUIPMENT. (ex. RADIOTELEPHONE, COMMUNICATIONS RECEIVER and DIRECTION FINDER. etc..) ESPECIALLY INTER-WIRING CABLES BETWEEN SCANNER UNIT AND DISPLAY UNIT OF THE RADAR SHOULD NOT BE RUN PARALLEL WITH THE CABLES OF RADIO EQUIPMENT.

General System Diagram of AlphaScan 5925-9X



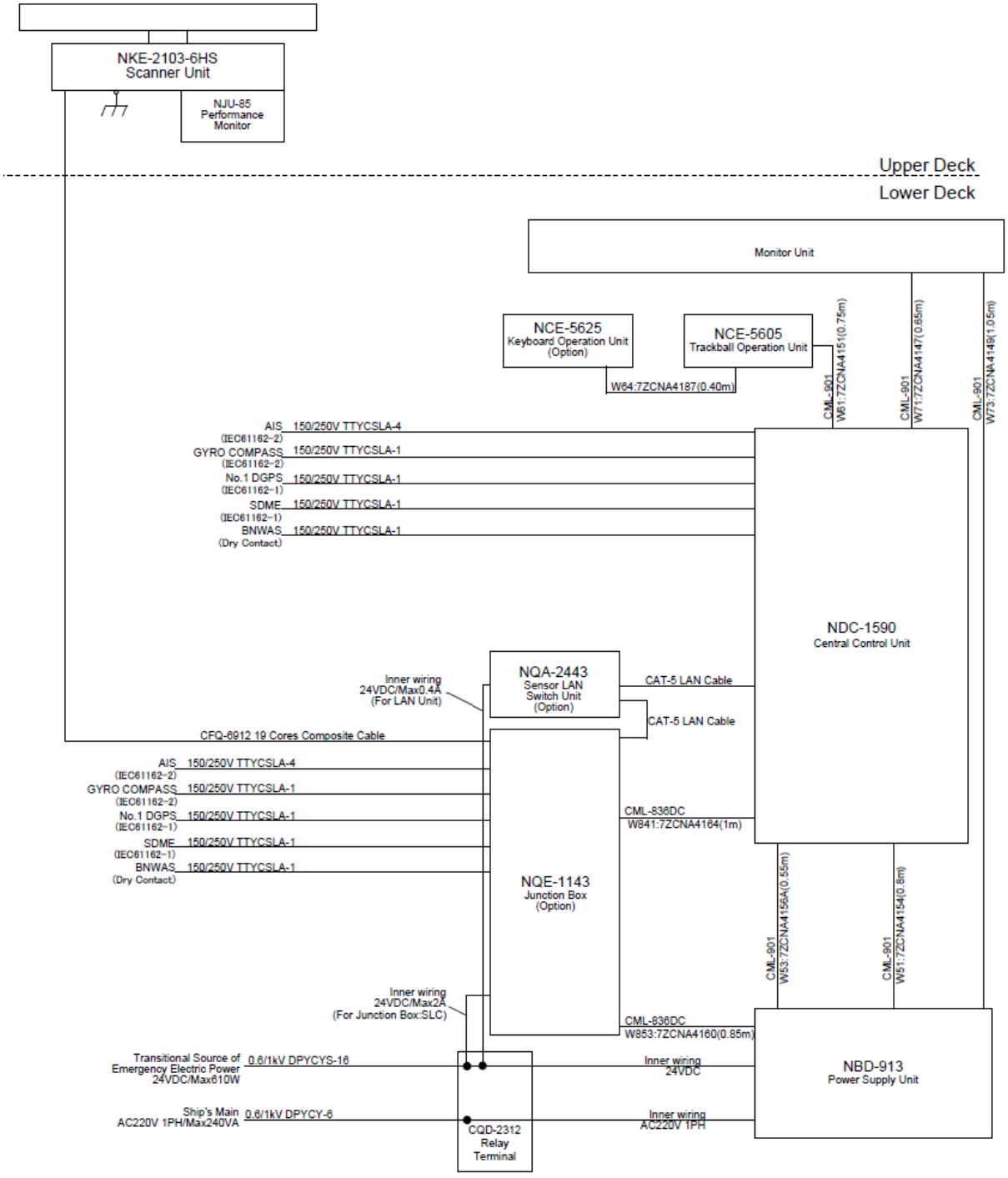
NOTE: ELIMINATING THE INTERFERENCE ON FREQUENCIES USED FOR MARINE COMMUNICATIONS AND NAVIGATION DUE TO OPERATION OF THE RADAR, ALL CABLES OF THE RADAR ARE TO BE RUN AWAY FROM THE CABLES OF RADIO EQUIPMENT. (ex. RADIOTELEPHONE, COMMUNICATIONS RECEIVER and DIRECTION FINDER. etc..) ESPECIALLY INTER-WIRING CABLES BETWEEN SCANNER UNIT AND DISPLAY UNIT OF THE RADAR SHOULD NOT BE RUN PARALLEL WITH THE CABLES OF RADIO EQUIPMENT.

General System Diagram of AlphaScan 5925-6XH



NOTE: ELIMINATING THE INTERFERENCE ON FREQUENCIES USED FOR MARINE COMMUNICATIONS AND NAVIGATION DUE TO OPERATION OF THE RADAR, ALL CABLES OF THE RADAR ARE TO BE RUN AWAY FROM THE CABLES OF RADIO EQUIPMENT. (ex. RADIOTELEPHONE, COMMUNICATIONS RECEIVER and DIRECTION FINDER. etc..) ESPECIALLY INTER-WIRING CABLES BETWEEN SCANNER UNIT AND DISPLAY UNIT OF THE RADAR SHOULD NOT BE RUN PARALLEL WITH THE CABLES OF RADIO EQUIPMENT.

General System Diagram of AlphaScan 5910-6X



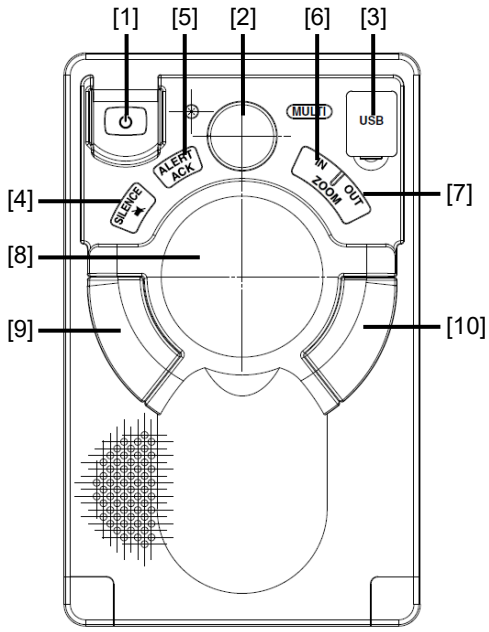
NOTE: ELIMINATING THE INTERFERENCE ON FREQUENCIES USED FOR MARINE COMMUNICATIONS AND NAVIGATION DUE TO OPERATION OF THE RADAR, ALL CABLES OF THE RADAR ARE TO BE RUN AWAY FROM THE CABLES OF RADIO EQUIPMENT. (ex. RADIOTELEPHONE, COMMUNICATIONS RECEIVER and DIRECTION FINDER. etc..) ESPECIALLY INTER-WIRING CABLES BETWEEN SCANNER UNIT AND DISPLAY UNIT OF THE RADAR SHOULD NOT BE RUN PARALLEL WITH THE CABLES OF RADIO EQUIPMENT.

General System Diagram of AlphaScan 5910-6XH

2 Name and Function of Each Unit

2.1 Name and Main Function of the Operation Unit

2.1.1 Trackball operation unit



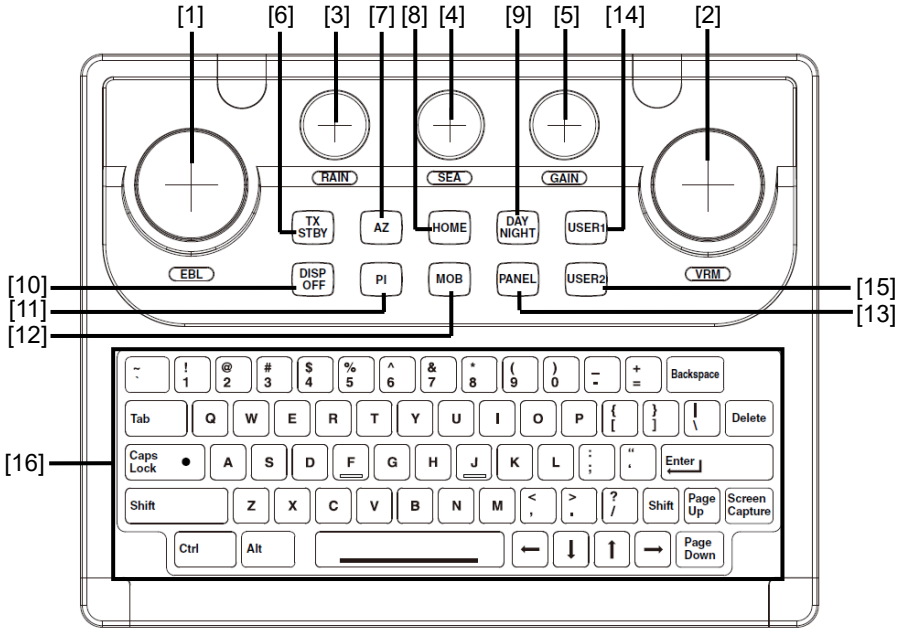
⚠WARNING

When turning off the power supply, do not hold down the power button of the operation unit.
Otherwise, a trouble may occur due to termination failure.

No.	Name	Function outline
1	Power supply button	Use this button to turn on and off this equipment.
2	[MULTI] dial	• Turn this dial to operate the function that is assigned to the [MULTI] dial such as the Display Brightness function. • If the [MULTI] dial is held down, the Display Brightness function is assigned to the [MULTI] dial forcibly.
3	USB terminal	Connects a USB flash memory.
4	[SILENCE] key	Stops the alert buzzer.
5	[ALERT ACK] key	Acknowledging the alert.
6	[ZOOM IN] key	• "Observation range" Setting will increment one step smaller in the case of RADAR. • When this key is held pressed, setting will step continuously until released.

No.	Name	Function outline
7	[ZOOM OUT] key	• "Observation range" Setting will increment one step larger in the case of RADAR. • When this key is held pressed, setting will step continuously until released.
8	Track ball	Moves the cursor on the screen. Use the track ball to specify a position or to perform various settings.
9	Left button	• Use this button to select a function or determine the operation that is set. • The clicking of the left button once is referred to as "click" in this manual. • The clicking of the left button twice consecutively is referred to as "double click" in this manual.
10	Right button	• Use this button to select a function or perform setting operation. • The clicking of the right button is referred to as "right click" in this manual.

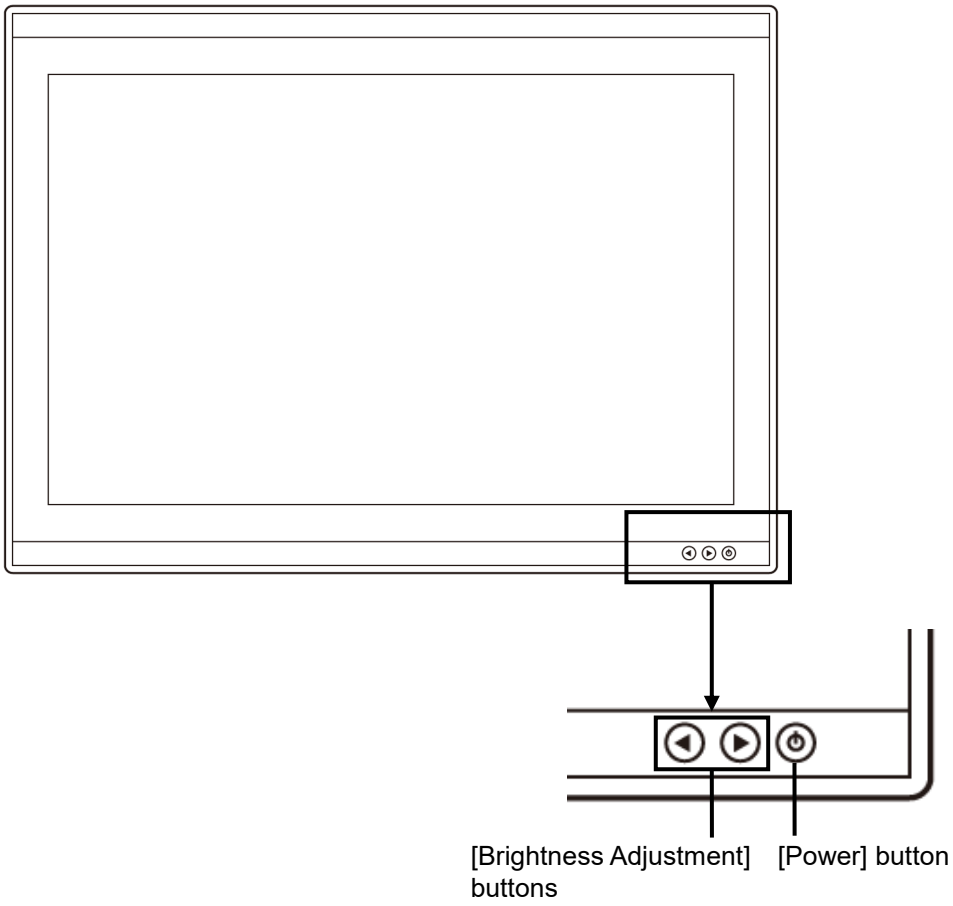
2.1.2 Keyboard operation unit (Option)



No.	Name	Function outline
1	[EBL] dial	When this dial is turned, control moves in the EBL (PI) direction with control right. This dial also moves the cursor horizontally (in cursor move mode).
2	[VRM] dial	When this dial is turned, control moves in the VRM (PI) direction with control right. This dial also moves the cursor vertically (in cursor move mode).
3	[RAIN] dial	• When this dial is turned, the level of rain/snow clutters on the radar image is adjusted. • When this dial is pressed, the function mode is switched to manual/automatic.
4	[SEA] dial	• When this dial is turned, the level of sea clutters on the radar image is adjusted. • When this dial is pressed, the function mode is switched to manual/automatic.
5	[GAIN] dial	• When this dial is turned, the gain of the radar image is adjusted. • When this dial is pressed, the transmission pulse width is switched.

6	[TX STBY] key	• When this dial is pressed, the radar transmission status is switched to Standby or Transmit.
7	[AZ] key	• This key switches AZ to On/Off. • When this key is held down, the “[AZ] Key Assignment” dialog box appears.
8	[HOME] key	• Returns own ship to the home position within the display screen. - TM: Moves the own ship to the TM RESET position. - RM: Moves the own ship to the on-center position (when it is at off-center only).
9	[DAY NIGHT] key	Switches the display color on the screen over 5 levels according to the brightness on the bridge.
10	[DISP OFF] key	The assigned function is executed while the key is pressed. The function that can be assigned is Data Off or HL Off for RADAR
11	[PI] key	• Switches the PI operation/display to On/Off. For PI operation, refer to "4.6 Using Parallel Index Lines (PI)". • When this key is held down, the cursor mode is changed to the floating PI mode.
12	[MOB] key	• Displays the MOB symbol and the setting dialog box in the own ship’s position latitude/longitude. • When this key is held down, the MOB symbol and the setting dialog box are cleared.
13	[PANEL] key	Whenever this key is pressed, the brightness of the panel on the operation unit is switched.
14	[USER1] key	• Executes the function that is assigned to the key. • When this key is held down, the setting dialog box of the function that is assigned to the [USER1] key appears.
15	[USER2] key	• Executes the function that is assigned to the key. • When this key is held down, the setting dialog box of the function that is assigned to the [USER2] key appears.
16	Keyboard	The keyboard is used for input of numeric values and characters at operation of this equipment.

2.1.3 Display unit



[Power] button

When the Power button is pressed while the power of the display unit is turned off, the power is turned on.

To turn off the power of the display unit, press the Power button for 5 seconds or longer.

[Brightness Adjustment] buttons

These buttons are used to adjust the brightness of the screen.

The screen increases brightness by pressing the ⊙ button.

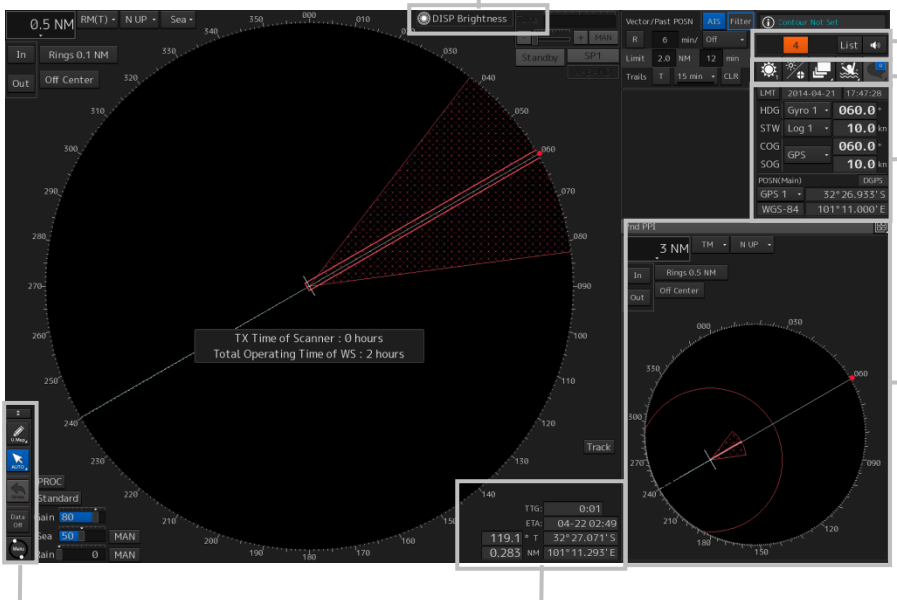
The screen decreases brightness by pressing the ⊙ button.

Memo

Adjust the brightness of the screen to the extent it is not dazzling, taking into account the brightness of the surroundings and to the brightness which you can be easily observe the RADAR screen.

2.2 Names and Main Functions of the Task Screen Common Sections

This section describes the names of task screen common sections and outlines the main functions.



Display Example

2.2.1 Right Toolbar

The functions of the buttons of the right toolbar are as follows.

Day/Night button
The display color on the screen can be switched to 5 levels according to the brightness on the bridge.

For the details, refer to "3.8 Switching the Day/Night Mode ".

Message notification button
When this button is clicked on, the dialog box relating to the latest message among the information received in AIS MSG Tray.

For the message dialog box of each of the information received, refer to "2.3.2 Information reference windows".

The total number of unread messages is displayed on the badge.

Display and Panel Brightness button
The brightness of the screen and operation unit can be switched within the range from 0 to100.

For the details, refer to "3.9 Adjusting the Brightness of the Screen and Operation Unit".

MOB (Man Over Board) button
When a person falls overboard, use this button to mark the own ship's position when the button is clicked on, so as not to lose the sight of the position.

For the details, refer to "3.11 MOB (Man Over Board)".

Panel Brightness button
Switch the brightness of the operation unit to any of the 5 levels, 0 to 4.

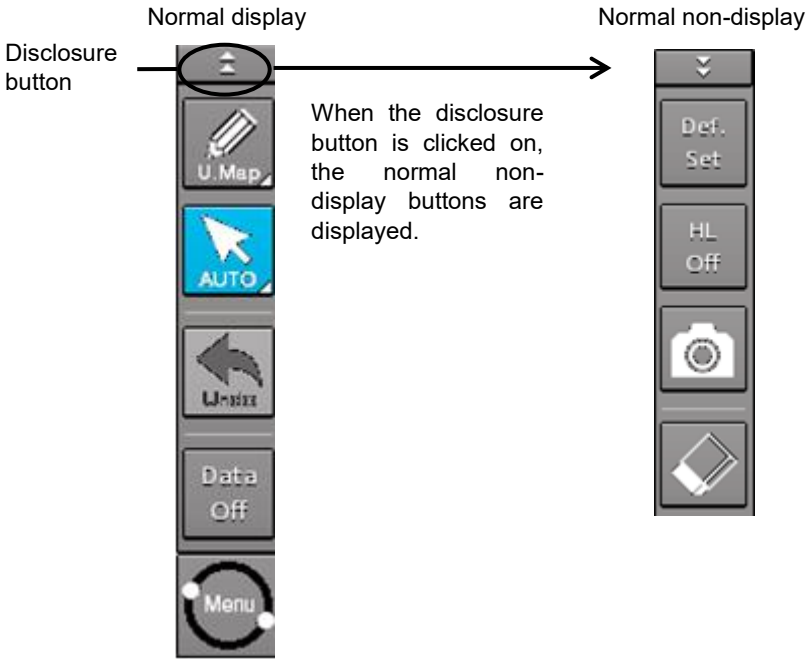
For the details, refer to "3.9.2 Adjusting the Brightness of the Operation Unit".

2.2.2 Left Toolbar

The functions of the buttons of the Left Toolbar are as follows.

Some buttons on the Left Toolbar are normally displayed and others are not.

Click on the Disclosure button to switch the display.



Refer to the next page for the name and function of each button.

2.1.1.1 Buttons that are normally displayed

PEN (Write tool) button

Clicking on this button during user map creation, manual chart update or route planning brings up the corresponding operation mode.
The mode name will be indicated on the button.

Example: [U.Map] (User Map) mode

[U. Map] (User Map) mode

Clicking on the button when it indicates [U. Map] displays the drawing toolbar for user maps.
*When this mode is used, the azimuth mode will be fixed to N UP (North UP).

[Update] (Manual Update) mode

Clicking on the button when it indicates [Update] displays the [Select Chart] dialog box if a chart to be manually updated has not been selected. If a chart to be manually updated is selected, the drawing toolbar for manual update will be displayed.
*When this mode is used, the azimuth mode will be fixed to N UP (North UP).

[Auto] (Cursor mode selection) button

When this button is clicked on, the cursor mode is switched to the AUTO mode.
For the details of the cursor mode, refer to "3.13 Cursor AUTO Mode".

[Undo] button

Clicking on this button cancels the previous operation performed.

- In user map creation mode
- In manual update creation mode

[Data OFF] button

When this button is clicked on, only the main information is displayed from the screen display and other information is hidden.
The following information items are displayed:

RADAR

- Echo/trail
- Cursor

Memo

This equipment is operating normally when the [Menu] button is moving in animation mode. When this equipment is set to a freeze state, the Menu button stops and does not move. In this case, turn off the power once and turn it on again.

2.1.1.2 *Buttons that are normally hidden*

[Def. Set] (Settings at shipment) button
When this button is clicked on, the screen display return from the personal setting information to the settings at shipment.
The function is the same as that of the [Default display configurations] button in [Preference] on the [Settings] dialog box.

[HL Off] button
When this button is clicked on, the Heading Line becomes hidden.

For the details of the Heading Line, refer to “9.2.1 Setting up the Display of Own Ship Symbol".

[Screen Capture] button
When this button is clicked on, the screen that is currently displayed is captured.

For the details, refer to "3.14 Saving the Screen that is Currently Displayed".

[Eraser tool] button
When this button is clicked on, the User Map Erase mode is set, enabling continuous erasing.

2.2.3 Alert notification area

When an alert occurs, the alert status, the contents of the alert and the occurrence count are displayed in the alert notification area.

For the details, refer to "3.7 Confirming and Acknowledging an Alert".

2.2.4 Key assignment indication area

When the [MULTI] dial is turned, the assigned functions are operated.

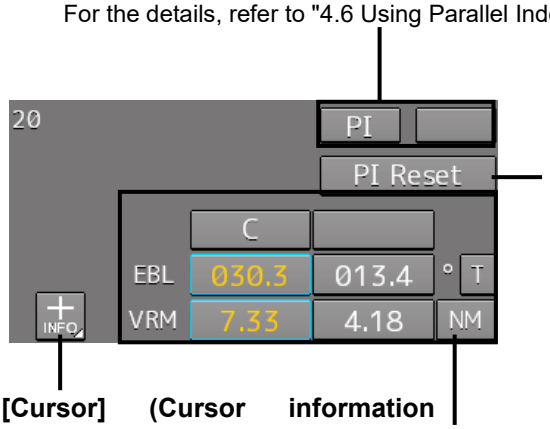
For the function assignment, refer to "3.15 [MULTI] Dial".

2.2.5 Navigation tools

The tools that are used for measurement are displayed.

[PI] button
Use this button to operate the parallel index line cursor.

For the details, refer to "4.6 Using Parallel Index Lines (PI)".



[Cursor] (Cursor information display) button
When this button is clicked on, the [Cursor Readout] dialog box appears.

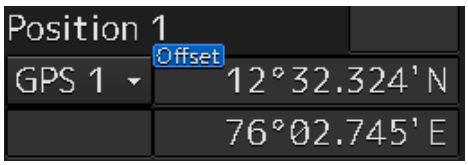
For the details, refer to "4.3 Using the Cross-hair Cursor".

EBL/VRM operation button area
Use this button to operate EBL/VRM.

For the details, refer to "4.5.1 Measuring a range and a bearing with EBL and VRM"

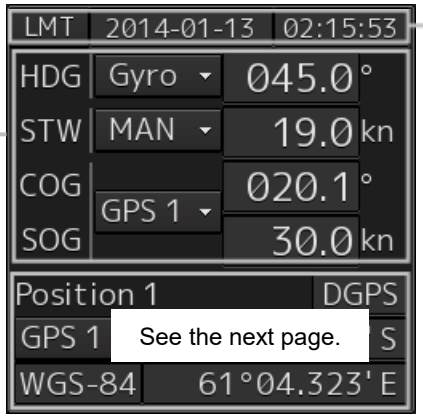
2.2.6 Own Ship Information

Do not use the offset function during navigation.
If the equipment is used with the offset value entered as the own ship position (deviated from the actual position), accidents may result.
When the offset values are entered, the [Offset] badge is displayed at the position display on the Own Ship Information. Check the indication, and cancel the offset function if necessary. Also, the message "Position Shift" is displayed in the message display area.



This window displays the own ship's information.

- When using 1-axis log, heading speed component can be detected, but transverse speed component cannot be detected. Then leeway effect (component drifted by wind) cannot be detected.
- When using 2-axes log, its accuracy in shallow waters may be deteriorated, and its speed in deep sea areas may be unable to be detected.
- When using a GPS, COG accuracy is less than ±3° at speed: from 1kn to 17kn, and is less than ±1° at speed: more than 17kn.



UTC/Local date and time
This button displays the current date and time.
- When the button is clicked on, the time can be switched to the UTC time display or Local time display.
- Set the time format by selecting [Maintenance] - [Date/Time/Time Zone]-[Display Style] on the menu.
  For the details, refer to "13.1.2 Setting Date/Time/Time Zone".

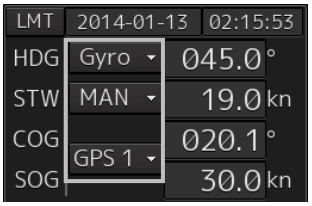
Sensor information
Various sensor information items are displayed.

[Sensor types]

Sensor name	Contents
HDG	Displays the value indicated by the ship's heading sensor.
STW	Displays the value indicated by the speed through water sensor.
COG/SOG	Displays the value indicated by the speed over the ground sensor.

[Sensor value background colors]
Each background color represents the following meaning.
Normal color: Normal sensor value
Yellow: The reliability of the sensor value is deteriorating.
Yellowish orange: The sensor value is abnormal.

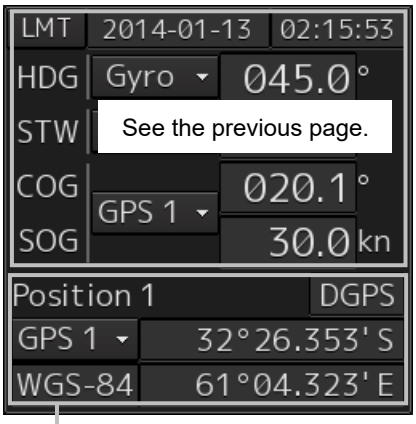
[Switching the sensor source]



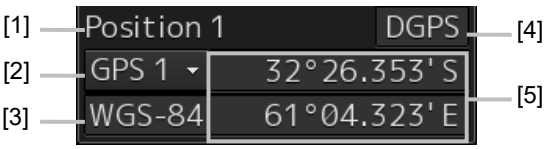
Select the sensor source in the [Source] combo box. The following sensor sources can be selected.
When [Menu] is selected, the [Sensor Selection/Status] dialog is displayed.

Sensor name	Sensor source
HDG	MAN (Manual), Gyro, Gyro 1[*1*4], Gyro 2[*1*4], MAG (MAG Compass)[*4], G/C (GPS Compass)
STW	MAN (Manual), Log,[*5] Log 1[*2*5], Log 2[*2*5]
COG	Log[*5], Log 1[*2*5], Log 2[*2*5], GPSx[*3]
SOG	

*1: Only when there are two Gyros.
*2: Only when there are two Logs.
*3: When two or more GPS units are present, “x” indicates the unit number.
*4: When the Gyro Compass system that is used has the automatic switching function, the display of the sensor source changes automatically according to the switching condition.
*5: When 1AX is installed in Log, Log cannot be selected from the sensor source.



Position
Displays Position information.



[1] The data name of the Position is displayed.

[2] The sensor source of the Position is displayed.
Select a sensor source in the [Source] combo box. Any of the following sensor sources can be selected.
When [Menu] is selected, the [Sensor Selection/Status] dialog dialog is displayed.

Data name	Sensor source
Position	GPSx*, DR

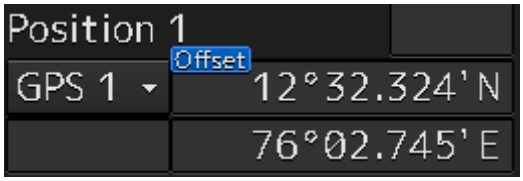
*: When two or more GPS units are present, “x” indicates the unit number.

[3] A geodetic positioning system is displayed. It is fixed to "WGS-84".

[4] Positioning precision display
When the positioning precision is differential positioning, "DGPS" is displayed. No information is displayed in the case of GPS single positioning.

[5] Position (CCRP)
The CCRP position indicated by the primary positioning sensor is displayed.

Own ship’s position offset display
When offset is set for the own ship’s position, the icon that indicates the offset status is displayed for the Position.



2.3 Common Information Window

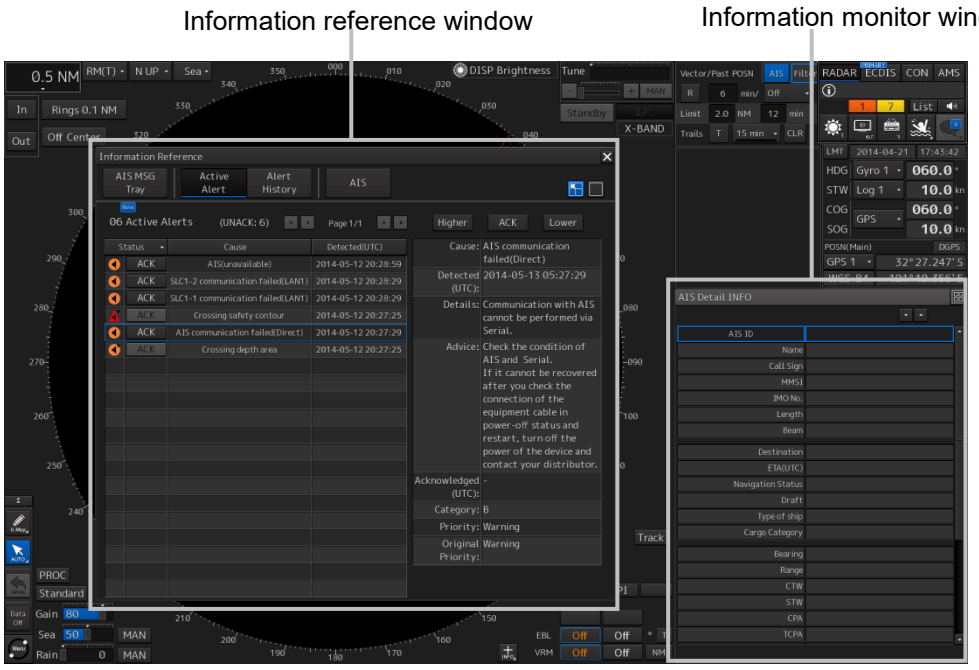
The information that is displayed on the Common Information Window can be classified into information monitoring and information referencing.

An **information monitoring** window is used together with radar PPI and a chart, and the information includes TT/AIS value information, conning blocks, etc.

- Information monitoring windows are displayed at the bottom right corner of the screen.

The **information reference** is the window that is temporarily referenced according to the user request and the information includes AIS messages, alert information, and own ship AIS information.

- The information reference window can be switched to either the standard window display or the extended window display. For the details of the switching between the standard window and the extended window, refer to "2.3.2.1 Switching between a standard window and an extended window".



Display example

Memo

This section provides the overview of each common information window.

For the operations and settings of the common information windows, refer to "3.6 Operation of the Information Monitor Window".

2.3.1 Information monitor windows

Information monitoring related windows is as follows.

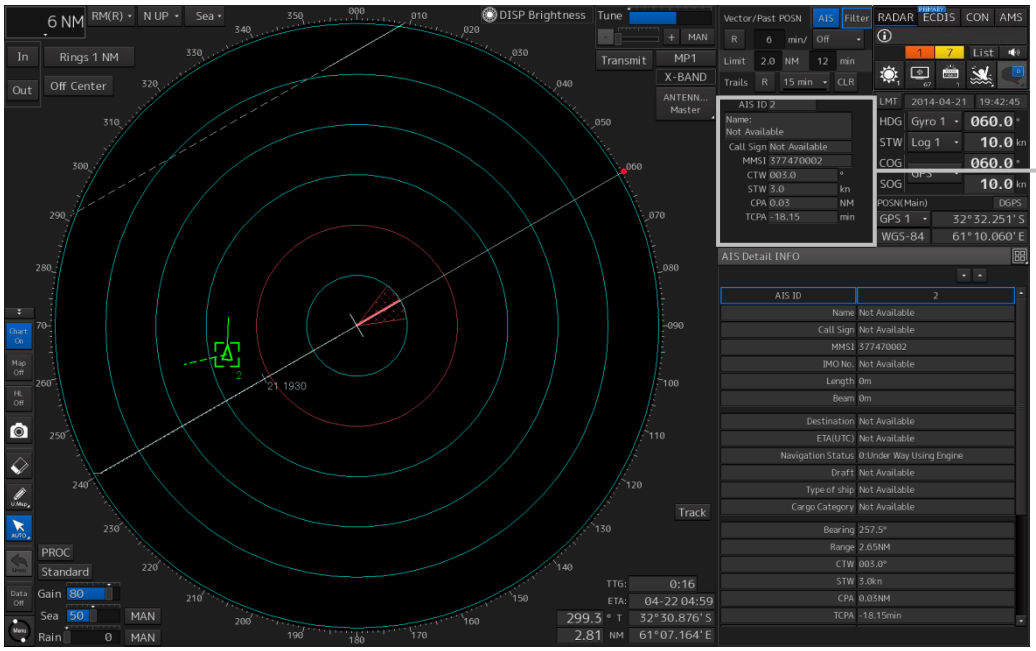
Item	Contents	Related section
Target INFO	TT/AIS movement information	2.3.1.1 Target INFO
TT List	TT target risk sequence list	2.3.1.2 TT List
AIS List	AIS target risk sequence list	2.3.1.3 AIS List
AIS Detail INFO	Detail information relating one AIS target	2.3.1.4 AIS Detail INFO
2nd PPI	Radar 2nd PPI	2.3.1.5 2nd PPI
Current/Wind	Wind speed and current information	2.3.1.6 Wind/Current Block

2.3.1.1 Target INFO

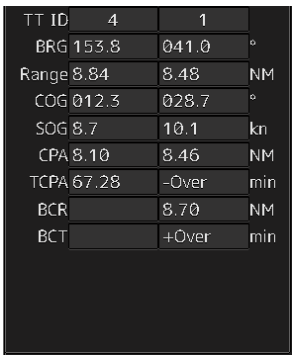
Target INFO is the display monitor window that displays movement information of TT/AIS.
In Target INFO, TT information, AIS information, and AIS extended information are displayed.

Memo

When the screen is a 26inch screen, Target Info is also displayed in the Extra Target INFO Area.



2.3.1.1.1 TT information display

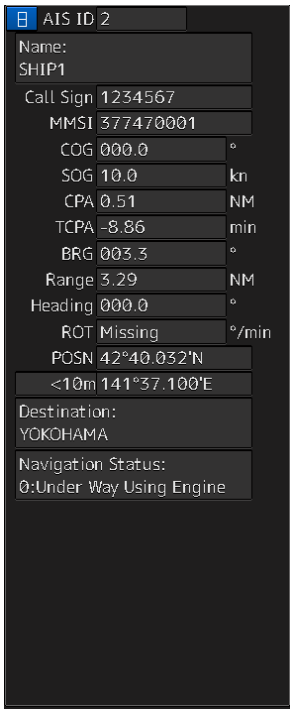


The following information items are displayed.

Displayed information	Explanation
TT ID	Displays the identification number (1 to 100) of a TT target.
BRG	Displays the bearing of a TT target.
Range	Displays the distance to a TT target.
COG or CTW	Displays the course of a TT target. Displayed as "COG" in the course over the ground mode and "CTW" in the course through the water mode.
SOG or STW	Displays the ship speed of a TT target. Displayed as "SOG" in the speed over the ground mode and "STW" in the speed through the water mode.
CPA	Displays the distance of the closest point of approach to the TT target.
TCPA	Displays the arrival time of the closest point of approach to the TT target.
BCR	Displays the bow crossing range of a TT target.
BCT	Displays the bow crossing time of a TT target.

2.3.1.1.2 AIS information

Standard display



Extended display

- AIS information of the target is displayed.
- When the  (AIS standard/extension switching) button is clicked on, the display is switched between the standard display and the extended display.
- The following information items are displayed.

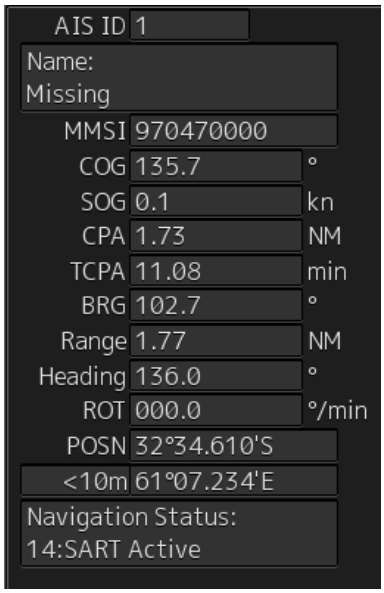
Displayed information	Explanation
AIS ID	Displays the identification number (1 to 1000) of an AIS target. *The maximum display number is 1000 as the option.
Name	Displays the ship name of an AIS target.
Call Sign	Displays a call sign.
MMSI	Displays a nine-digit identification number for a ship/ground station equipped with a DSC communication device.
COG or Course	Displays the course of an AIS target. Displayed as "COG" in the course over the ground mode and "Course" in the course through the water mode.
SOG or STW	Displays the ship speed of an AIS target. Displayed as "SOG" in the speed over the ground mode and "STW" in the speed through the water mode.
CPA	Displays the closest approach distance to an AIS target.

TCPA	Displays the time to reach the closest approach point to an AIS target.
BRG*	Displays the bearing of an AIS target.
Range*	Displays the distance to an AIS target.
Heading*	Displays the heading of an AIS target.
ROT*	Displays the turning speed of an AIS target.
POSN and Position Accuracy*	Displays the position of an AIS target and position-fix accuracy. When the position-fix accuracy is low, [>10m] is displayed. When the position-fix accuracy is high, [<10m] is displayed.
Destination*	Displays the destination of an AIS target.
Navigation Status*	Displays the navigation conditions of an AIS target. For detailed explanation, refer to "Navigation Status" in the table provided in "2.3.1.4 AIS Detail INFO".

*: Extended display only

2.3.1.1.3 AIS SART information

AIS SART information is displayed by using an extended display.



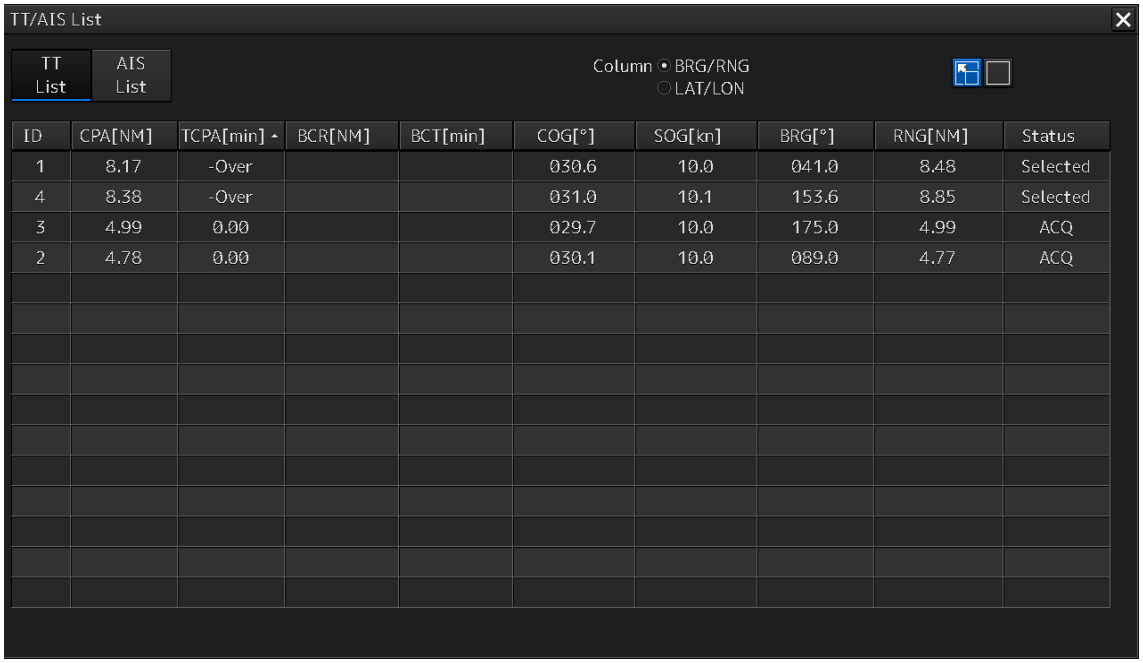
Unlike the AIS information extended display, the following items are not displayed.

- Call Sign
- Destination
-  (AIS standard/extension switching) button

2.3.1.2 TT List

A TT List lists the degrees of risks of TT targets.

For the details, refer to "6.14.2 Displaying the TT/AIS Target List".

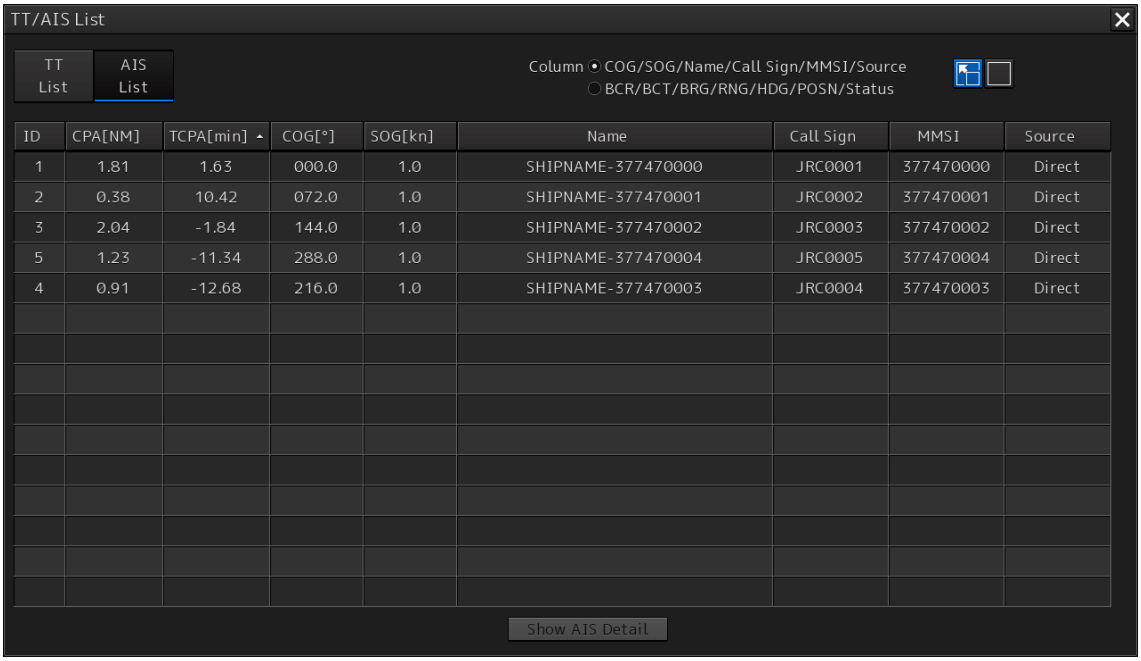


ID	CPA[NM]	TCPA[min]	BCR[NM]	BCT[min]	COG[°]	SOG[kn]	BRG[°]	RNG[NM]	Status
1	8.17	-Over			030.6	10.0	041.0	8.48	Selected
4	8.38	-Over			031.0	10.1	153.6	8.85	Selected
3	4.99	0.00			029.7	10.0	175.0	4.99	ACQ
2	4.78	0.00			030.1	10.0	089.0	4.77	ACQ

2.3.1.3 AIS List

The AIS List lists the degrees of risks of AIS targets.

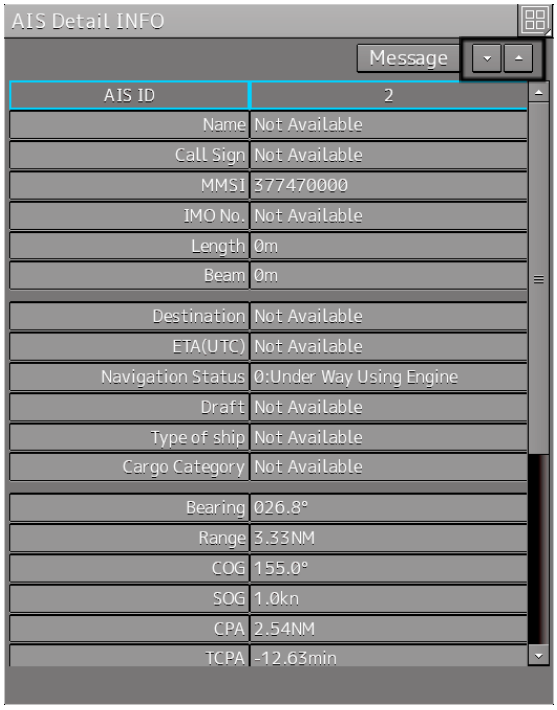
For the details, refer to "6.14.3 AIS List".

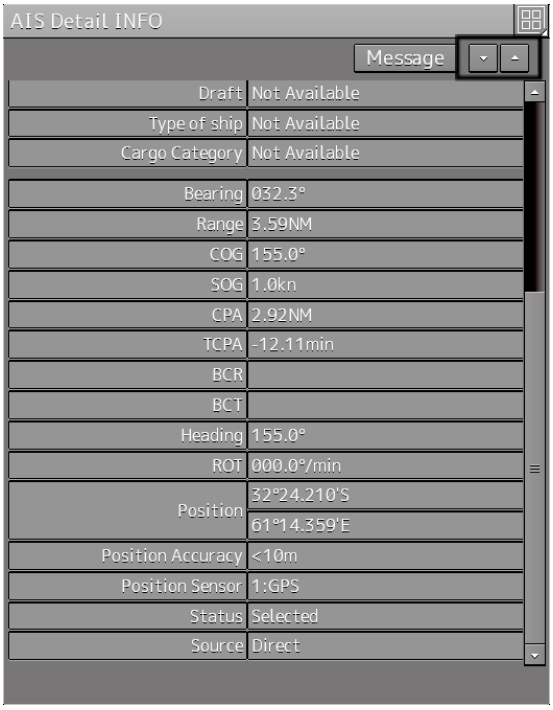


ID	CPA[NM]	TCPA[min]	COG[°]	SOG[kn]	Name	Call Sign	MMSI	Source
1	1.81	1.63	000.0	1.0	SHIPNAME-377470000	JRC0001	377470000	Direct
2	0.38	10.42	072.0	1.0	SHIPNAME-377470001	JRC0002	377470001	Direct
3	2.04	-1.84	144.0	1.0	SHIPNAME-377470002	JRC0003	377470002	Direct
5	1.23	-11.34	288.0	1.0	SHIPNAME-377470004	JRC0005	377470004	Direct
4	0.91	-12.68	216.0	1.0	SHIPNAME-377470003	JRC0004	377470003	Direct

2.3.1.4 AIS Detail INFO

This window displays detail information on one AIS target.





AIS information of the target is displayed.

When either one of   is clicked on, AIS information before or after the information currently displayed is displayed.

When a safety message is received,  is set to valid display. When  is clicked on, the AIS message tray is displayed.

For the AIS message tray, refer to "2.3.2.2 AIS MSG Tray".

The following information items are displayed.

Displayed information	Explanation
AIS ID	Displays the identification number (1 to 1000) of an AIS target. *The maximum display number is 1000 as the option.
Name	Displays the ship name of an AIS target.
Call Sign	Displays a call sign.
MMSI	Displays a nine-digit identification number for a ship/ground station equipped with a DSC communication device.
IMO No.	Displays the 9-digit IMO number.
Length	Displays the length of an AIS target.
Beam	Displays the beam of an AIS target.
Destination	Displays the destination of an AIS target.
ETA or UTC	Displays the expected arrival time of an AIS target.

Navigation Status	Displays the navigation conditions of an AIS target. 0: Under Way Using Engine 1: At Anchor 2: Not Under Command 3: Restricted Maneuverability 4: Constrained by Her Draught 5: Moored 6: Aground 7: Engaged in Fishing 8: Under Way Sailing 9: Reserved for HSC 10: Reserved for WIG 11: Reserved 15: Not Defined
Draft	Displays the draft of an AIS target.
Type of Ship	Displays the ship type of an AIS target. 30: Fishing Vessel 31: Towing Vessel 32: Towing Vessel L>200M B>25M (Towing and length of the tow exceeds 200m or breadth exceeds 25m) 33: Dredge or Underwater OPE (Engaged in dredging or underwater operation) 34: Vessel-Diving OPE (Engaged in diving operation) 35: Vessel-Military OPE (Engaged in military operation) 36: Sailing Vessel 37: Pleasure Craft 50: Pilot Vessel 51: Search and Rescue Vessels 52: Tugs 53: Port Tenders 54: With Anti-Pollution Equip(Vessels with anti-pollution facilities or equipment) 55: Law Enforcement Vessels 58: Medical Transports 59: Resolution No18:MOB-83(Ships according to Resolution No18(Mob-83)) 2X: WIG(Wing-in-Ground Effect Craft) 4X: High Speed Craft 6X: Passenger Ships 7X: Cargo Ships 8X: Tanker 9X: Other Type of Ship

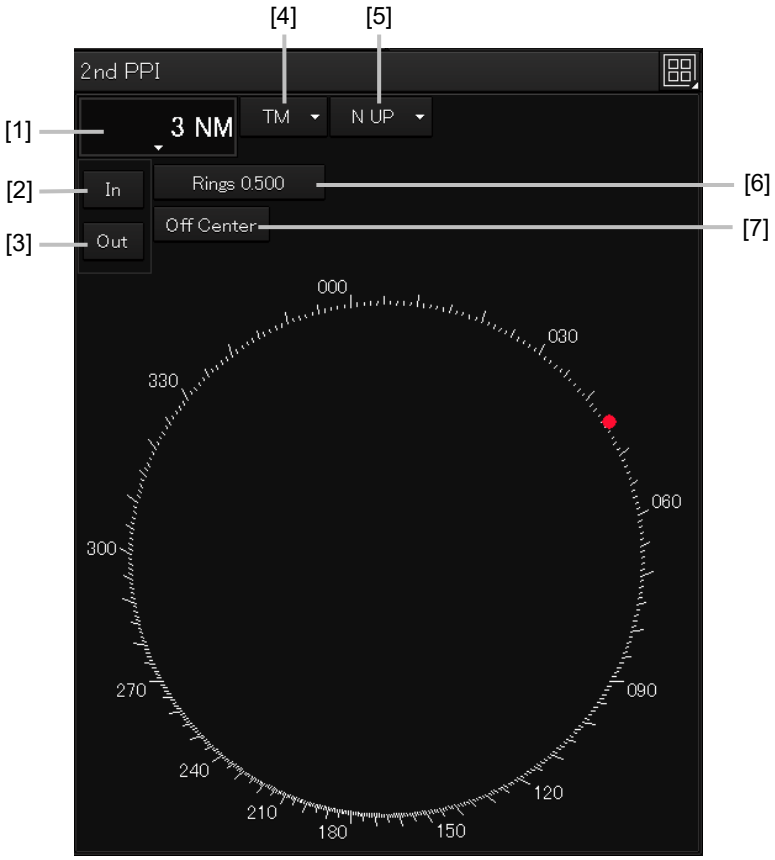
Displayed information	Explanation
Cargo Category	When the setting of the type of a ship is 2X, 4X, 6X, 7X, 8X or 9X, the digit shown at the end of the code represents the cargo/condition. X1 Category X(DG/HP/MP) X2 Category Y(DG/HP/MP) X3 Category Z(DG/HP/MP) X4 Category OS(DG/HP/MP) X9 No Additional Information X0 All Ships of This Type
Bearing	Displays the bearing of an AIS target.
Range	Displays the distance to an AIS target.
COG or CSE	Displays the course of an AIS target. Displayed as "COG" in the course over the ground mode and "CSE" in the course through the water mode.
SOG or STW	Displays the ship speed of an AIS target. Displayed as "SOG" in the speed over the ground mode and "STW" in the speed through the water mode.
CPA	Displays the closest approach distance to an AIS target.
TCPA	Displays the time to reach the closest approach point to an AIS target.
BCR	Displays the bow crossing range of an AIS target.
BCT	Displays the bow crossing time of an AIS target.
Heading	Displays the heading of an AIS target.
ROT	Displays the turning speed of an AIS target.
Position	Displays the position of an AIS target.
Position Accuracy	When the position-fix accuracy of an AIS target is low, [>10m] is displayed. When the position-fix accuracy of an AIS target is high, [<10m] is displayed.
Position Sensor	Displays the type of the position sensor used by an AIS target. 0: Not Defined 1: GPS 2: GLONASS 3: Combined GPS/GLONASS 4: Loran-C 5: Chayka 6: Integrated Navigation System 7: Surveyed 8: Galileo 15: Internal GNSS

Status	Status of an AIS target • Sleeping • Activated • Lost • Danger • Selected
Source	AIS information source - Direct - Repeated - VTS

2.3.1.5 2nd PPI

The setting items are the same as those of the main PPI setting except for the setting items that can be specifically set under 2nd PPI.

For the details, refer to "2.4.1 Presentation and mode information".



Note

In “screen fixed display” (C mode), EBL/VRM is not displayed in the 2nd PPI.

Memo

When the numbers of the direction graduations become overlapped and cannot be distinguished, the numbers will be thinned out and displayed.

[1] Range scale combo box

Select a range scale from the combo box and set up the range scale.

[2] [In] (Zoom In) button

When this button is clicked on, the display is zoomed in by one level from the range scale. When the button is held down, the display is zoomed in continuously.

[3] [Out] (Zoom Out) button

When this button is clicked on, the display is zoomed out by one level from the range scale. When the button is held down, the display is zoomed out continuously.

[4] Motion mode combo box

Select a motion mode from the combo box and set up the motion mode. The mode operates by linking with the setting of the main PPI.

[5] Bearing mode combo box

Select a bearing mode from the combo box and set up the bearing mode The mode operates by linking with the setting of the main PPI.

[6] Range rings display button

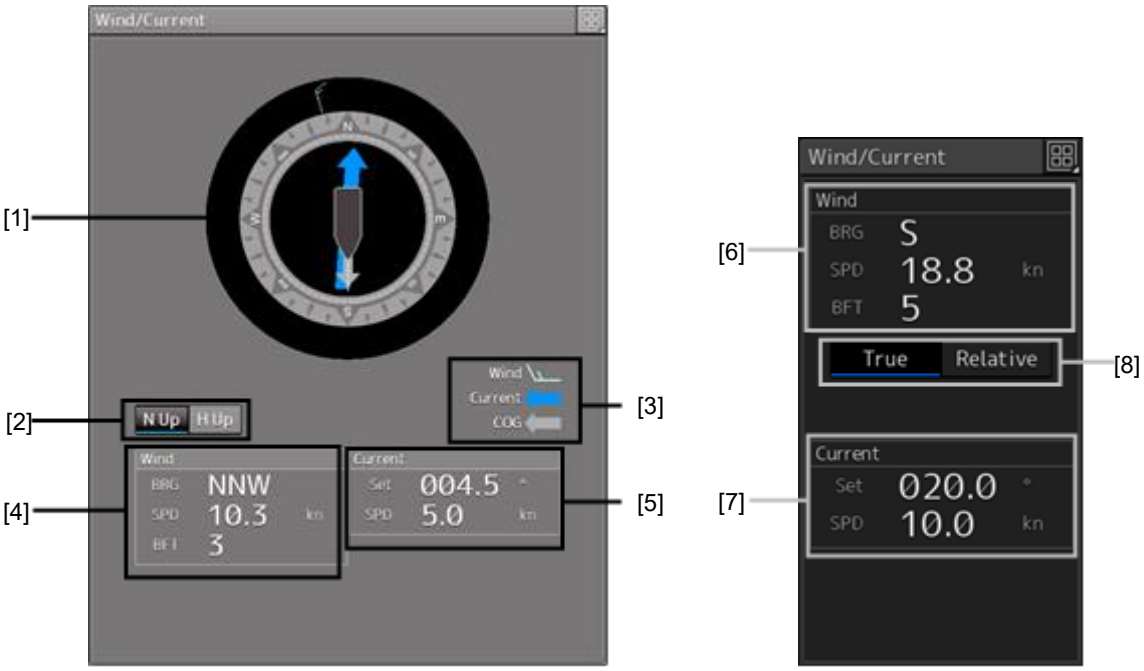
When this button is clicked on, the range rings display surrounding the own ship is set to On/Off.

[7] [Off Center] button

When this button is clicked on, the off-center of the own ship’s position (CCRP) is set to On/Off.

2.3.1.6 Wind/Current Block

The Wind/Current Block shows the wind speed and current information.

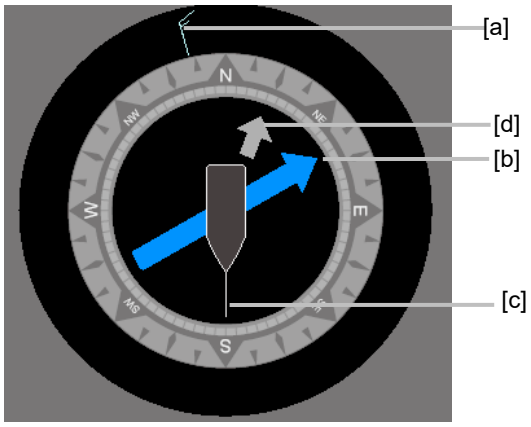


19inch screen

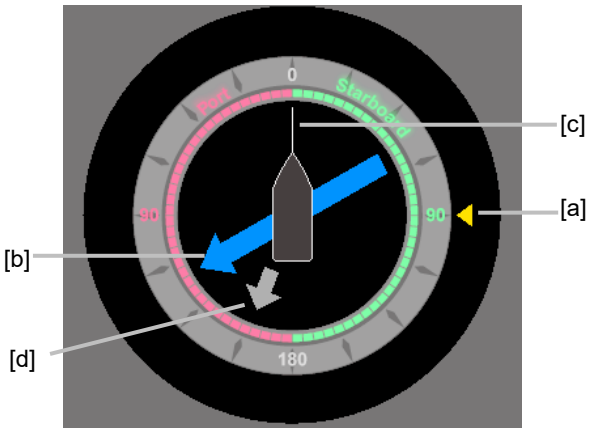
[1] Wind/Current meter

Displays the wind speed and current.

The display varies depending on the setting of the [N-UP]/[H-UP] (N-UP/H-UP switching) button.



N-UP display26inch screen



H-UP display

[a] Wind bearing/speed

Indicates the wind bearing/wind speed.

Arrow feathers are shown when N-UP is selected.

The arrowhead indicates a leeward direction. The number of feathers indicates the wind speed.

Memo

The number of feathers is based on the Beaufort scale.

A triangle arrow is shown when N-UP is selected.

The arrowhead indicates a leeward direction.

[b] Flow direction/speed

Indicates the flow direction.

The arrow indicates the direction of the current.

[c] Ship's heading

Indicates the ship's heading.

When N-UP is selected, the north of the direction ring of the meter is fixed on top, and the own ship symbol rotates to indicate the heading.

When H-UP is selected, the ship's heading is fixed on top to show the direction.

[d] Ground direction

Indicates the ground direction.

[2] [N-UP]/[H-UP] button (Displayed only for 26inch display)

Used to change the display method for the ship's heading.

When the [N-UP] button is clicked, the north of the direction ring of the meter is fixed on top, and the own ship symbol rotates to indicate the heading.

When the [H-UP] button is clicked, the ship's heading is fixed on top to show the direction.

[3] Legends

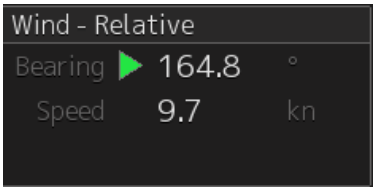
Legends of the Wind/Current meter

[4] Wind bearing/speed information

Shows the wind bearing/speed information.

Display varies depending on the ship's heading display method.

Ship's heading display is N-UP



Ship's heading display is H-UP

For N-UP, [Bearing] (wind bearing), [Speed] (wind speed), and [BFT] (Beaufort scale) are shown as numerical values.

When H-UP is selected, [Bearing] (wind direction) and [Speed] (wind velocity) are displayed in numerical values. For a 26-inch screen, either of the following symbol is also displayed.

: Indicates the windward is on S (starboard) side.

: Indicates the windward is on P (port) side.

Memo

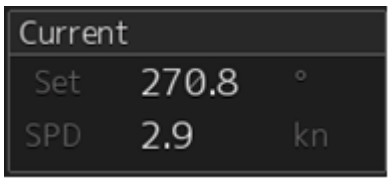
No symbol is displayed with the wind bearing 0°or 180°.

[Speed] (wind speed) is shown as a numerical value.

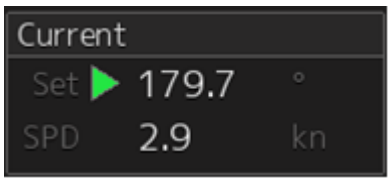
[5] Tidal current information

Shows the tidal current information.

Display varies depending on the ship's heading display method.



Ship's heading display is N-UP



Ship's heading display is H-UP

[Set] (tidal current direction) and [SPD] (flow speed) are displayed in numerical values.

For 26-inch screen, either of the following symbols is also displayed.

: The downstream is on the S (starboard) side.

: The downstream is on the P (port) side.

Memo

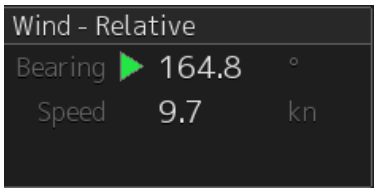
When the tidal current bearing is 0° or 180°, no symbol is displayed.

[6] Wind bearing/speed information

Shows the wind bearing/speed information.

Display varies depending on the wind bearing true/relative display method.

True wind bearing



Relative wind bearing

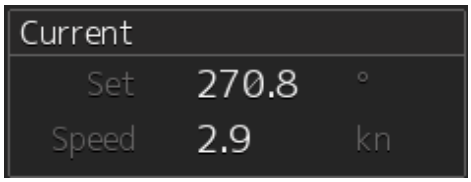
For True wind bearing, [Bearing] (wind bearing), [Speed] (wind speed), and [BFT] (Beaufort scale) are shown as numerical values.

For display of a relative bearing, [Bearing] (wind direction) and [Speed] (wind velocity) are displayed in numerical values.

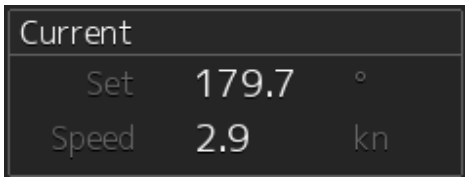
[7] Tidal current information

Shows the tidal current information.

Tidal current information is displayed as follows according to the tidal current true/relative direction.



True current direction



Relative current direction

[Set] (current direction) and [Speed] (flow speed) are shown as numerical values.

[8] [True]/[Relative] (True/Relative wind switching) button (Displayed only for 19inch display)

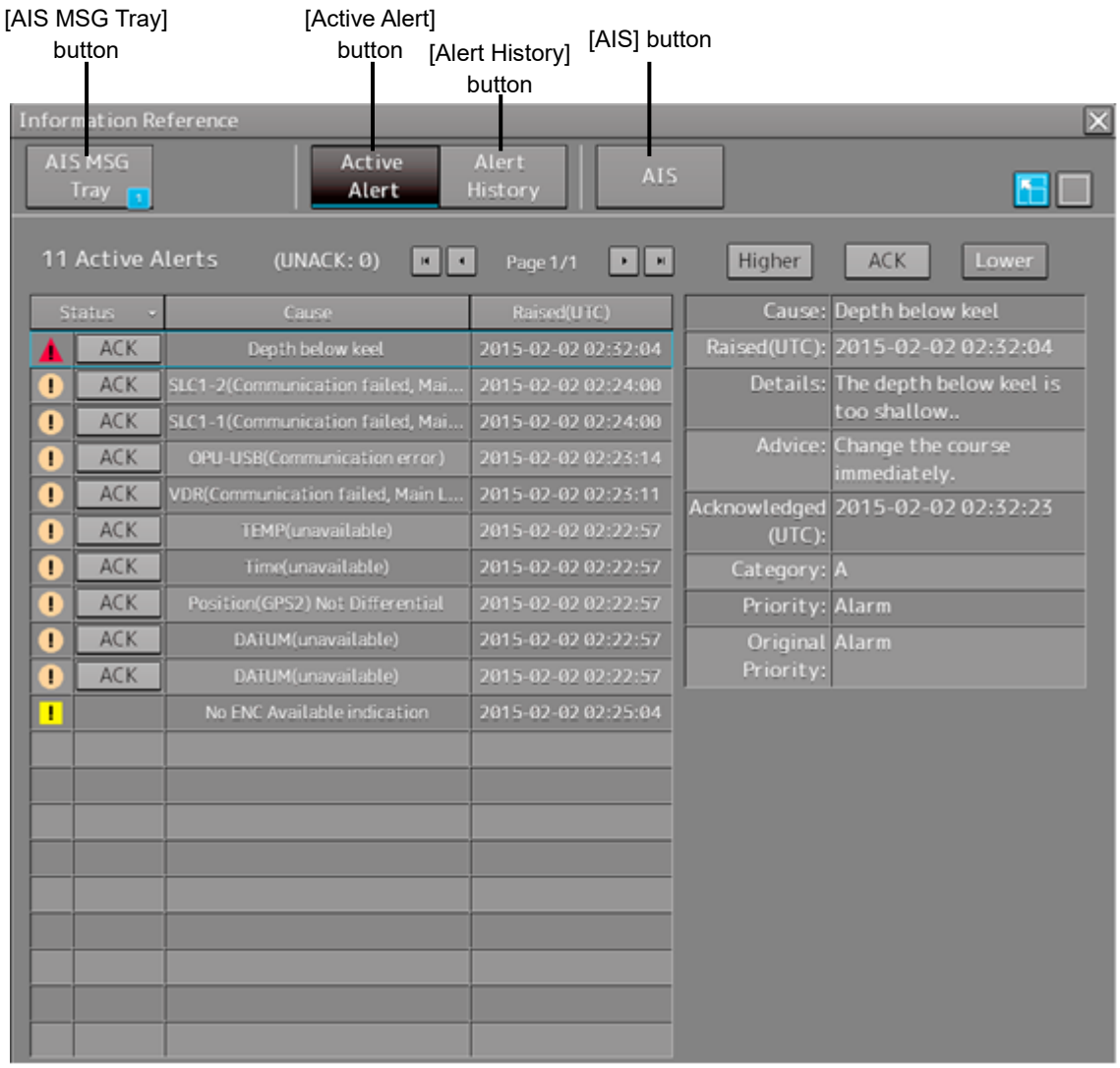
Switches between True and Relative display for wind bearing and tidal current.

Click the [True] (true wind bearing) button to show wind bearing and tidal current in the true direction.

Click the [Relative] (relative wind bearing) button to show wind bearing and tidal current in the relative direction.

2.3.2 Information reference windows

By clicking on the buttons in the window, the contents that are displayed in the window can be switched.

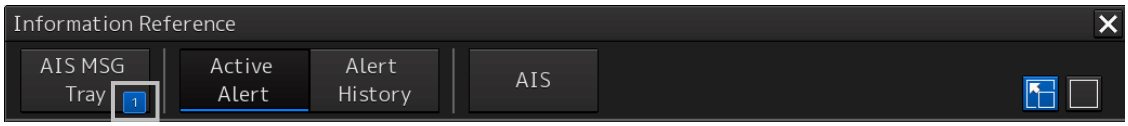


Information reference related windows are listed below.

Button	Displayed content	Related section
[AIS MSG Tray]	AIS message tray	2.3.2.2 AIS MSG Tray
[Active Alert]	Active alert that occurred in the equipment	2.3.2.3 Active Alert
[Alert History]	Alert history that occurred in the equipment	2.3.2.4 Alert History
[AIS]	Own ship's AIS information	2.3.2.5 AIS

When unread messages exist

The number of unread messages is displayed on the [AIS MSG Tray] button as a badge.

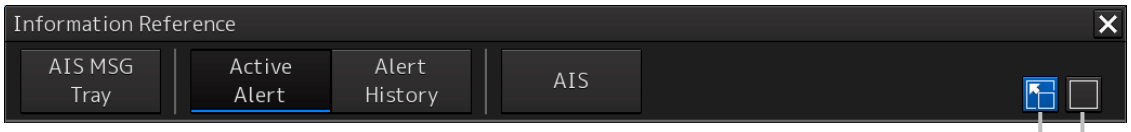


2.3.2.1 *Switching between a standard window and an extended window*

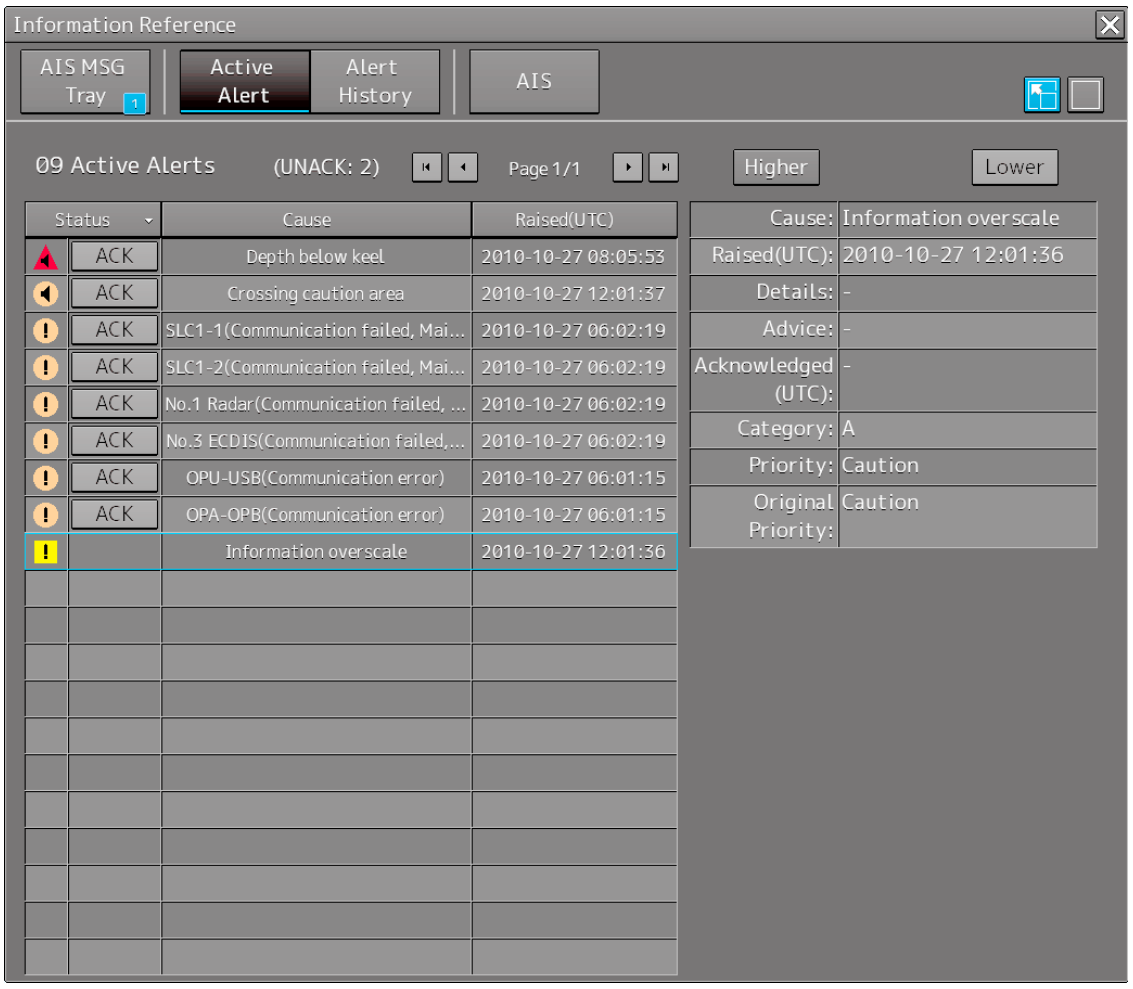
The information reference window can be switched to a standard window or an extended window.

To switch to an extended window, click on the List extension button.

To switch to a standard window, click on the List Standard button.



[Example of extended window]

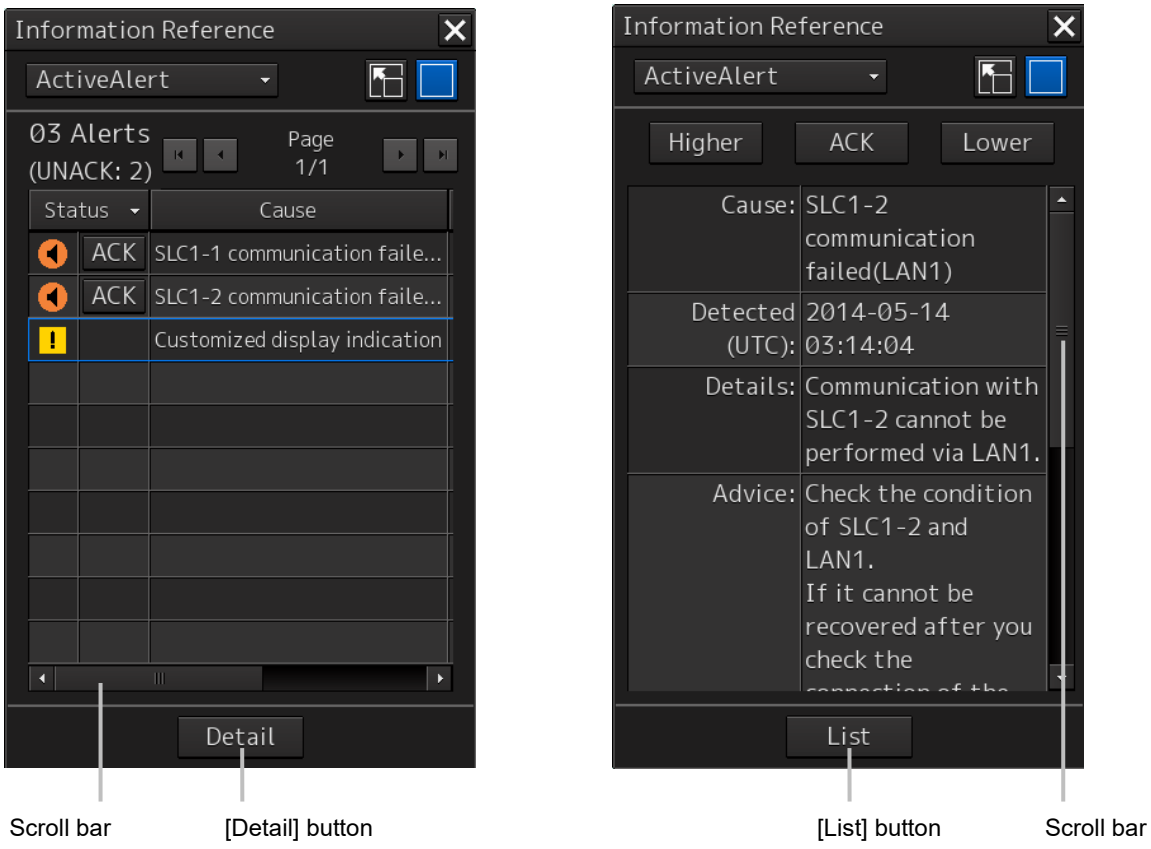


[Example of standard window]

A list screen and a detail screen are available for the standard window.

To switch to the detail screen: Click on the [Detail] button.

To switch to the list screen: Click on the [List] button.



When the display contents overlap the top, bottom, left, or right side of the screen, a scroll bar is displayed.

By dragging the scroll bar, the overlapped section can be displayed.

Memo

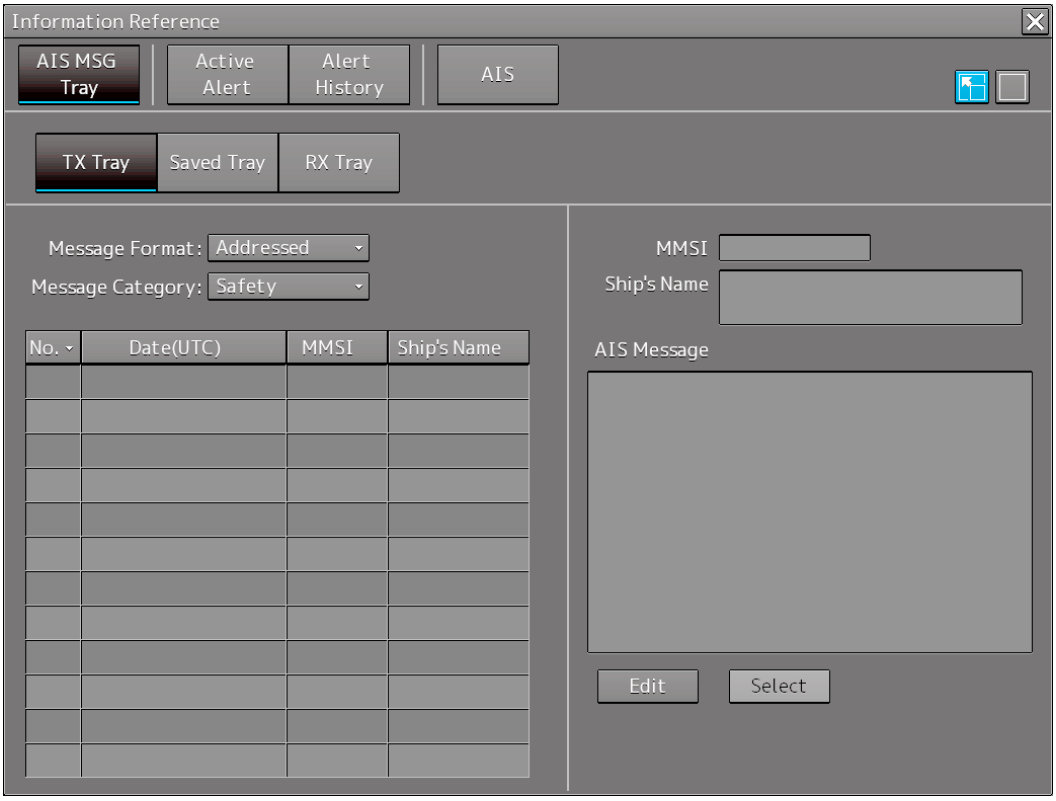
A standard window is displayed at the initial display.

When the RADAR transmission status is Transmit in RADAR mode, the extended window cannot be displayed.

2.3.2.2 AIS MSG Tray

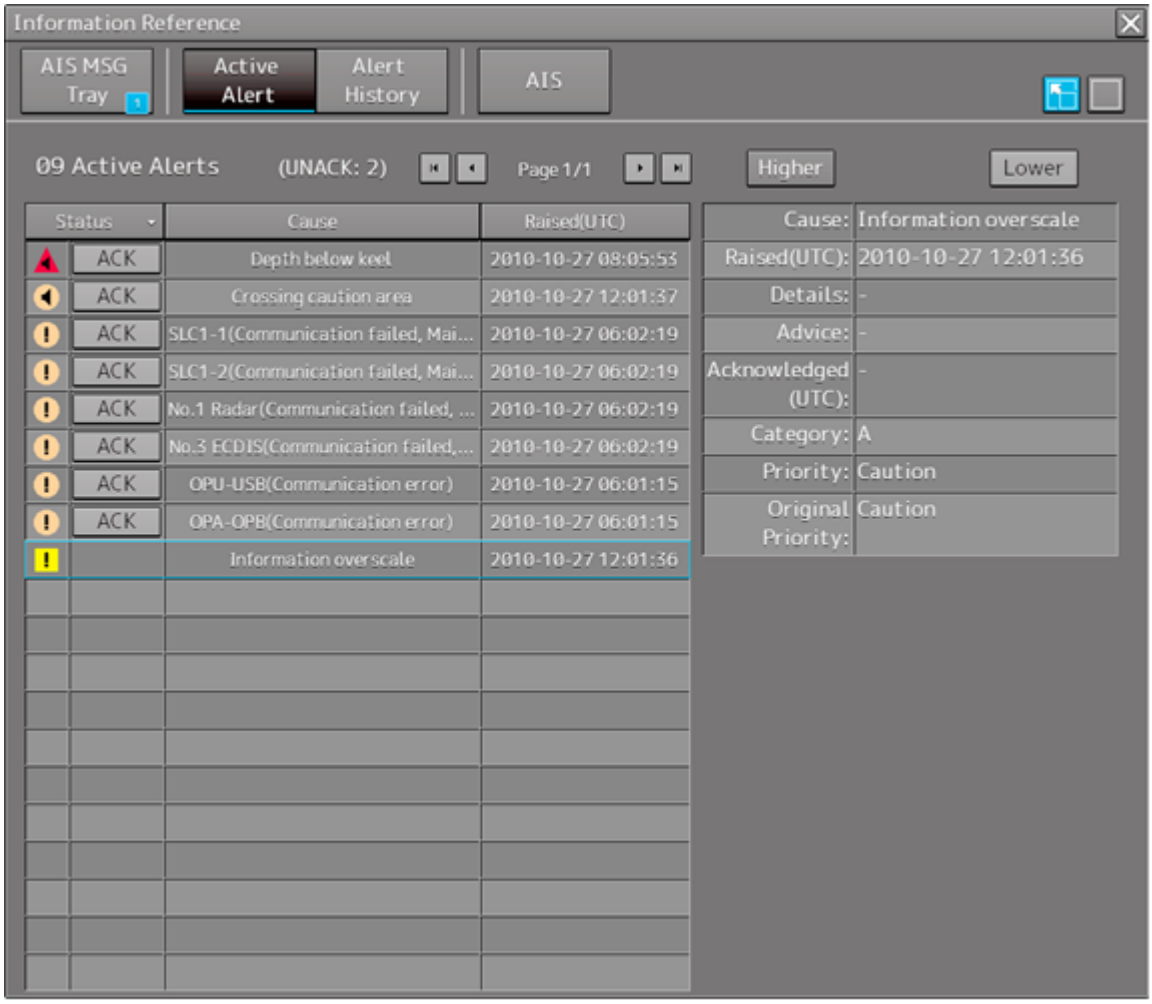
AIS messages are displayed.

For the details of the AIS message tray, refer to "6.11 AIS Message Tray".



2.3.2.3 *Active Alert*

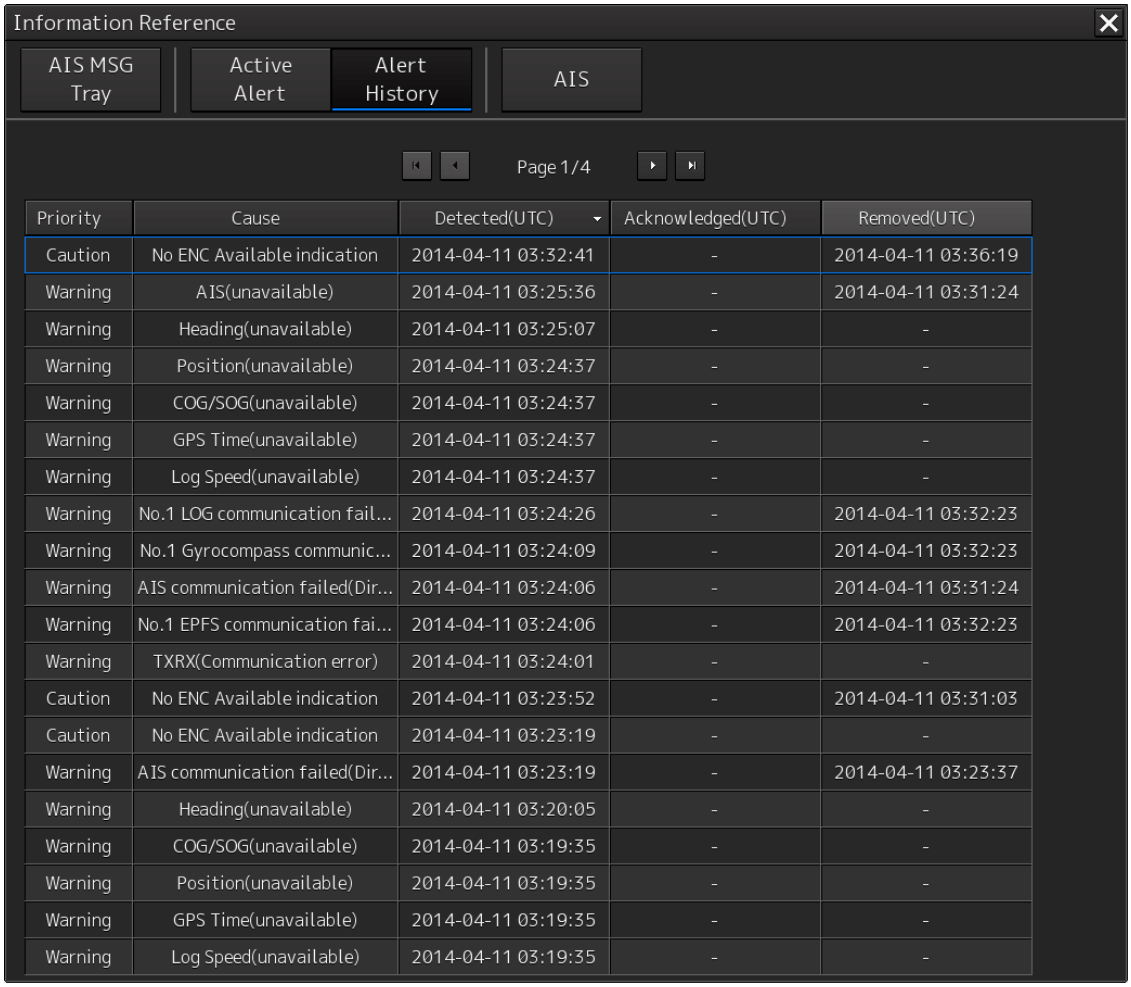
This window displays active alerts that occurred in this equipment.



For the details, refer to "3.7.4 Displaying alert list and alert history".

2.3.2.4 Alert History

This window displays the history of alerts that occurred in this equipment.



Priority	Cause	Detected(UTC)	Acknowledged(UTC)	Removed(UTC)
Caution	No ENC Available indication	2014-04-11 03:32:41	-	2014-04-11 03:36:19
Warning	AIS(unavailable)	2014-04-11 03:25:36	-	2014-04-11 03:31:24
Warning	Heading(unavailable)	2014-04-11 03:25:07	-	-
Warning	Position(unavailable)	2014-04-11 03:24:37	-	-
Warning	COG/SOG(unavailable)	2014-04-11 03:24:37	-	-
Warning	GPS Time(unavailable)	2014-04-11 03:24:37	-	-
Warning	Log Speed(unavailable)	2014-04-11 03:24:37	-	-
Warning	No.1 LOG communication fail...	2014-04-11 03:24:26	-	2014-04-11 03:32:23
Warning	No.1 Gyrocompass communic...	2014-04-11 03:24:09	-	2014-04-11 03:32:23
Warning	AIS communication failed(Dir...	2014-04-11 03:24:06	-	2014-04-11 03:31:24
Warning	No.1 EPFS communication fai...	2014-04-11 03:24:06	-	2014-04-11 03:32:23
Warning	TXRX(Communication error)	2014-04-11 03:24:01	-	-
Caution	No ENC Available indication	2014-04-11 03:23:52	-	2014-04-11 03:31:03
Caution	No ENC Available indication	2014-04-11 03:23:19	-	-
Warning	AIS communication failed(Dir...	2014-04-11 03:23:19	-	2014-04-11 03:23:37
Warning	Heading(unavailable)	2014-04-11 03:20:05	-	-
Warning	COG/SOG(unavailable)	2014-04-11 03:19:35	-	-
Warning	Position(unavailable)	2014-04-11 03:19:35	-	-
Warning	GPS Time(unavailable)	2014-04-11 03:19:35	-	-
Warning	Log Speed(unavailable)	2014-04-11 03:19:35	-	-

For the details, refer to "3.7.4 Displaying alert list and alert history".

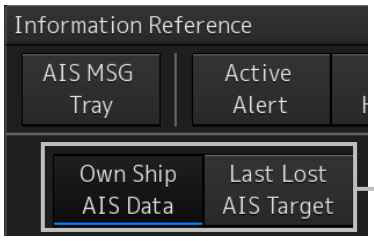
Memo

The Alert History screen is displayed under the extended window only. A standard window is not available.

2.3.2.5 AIS

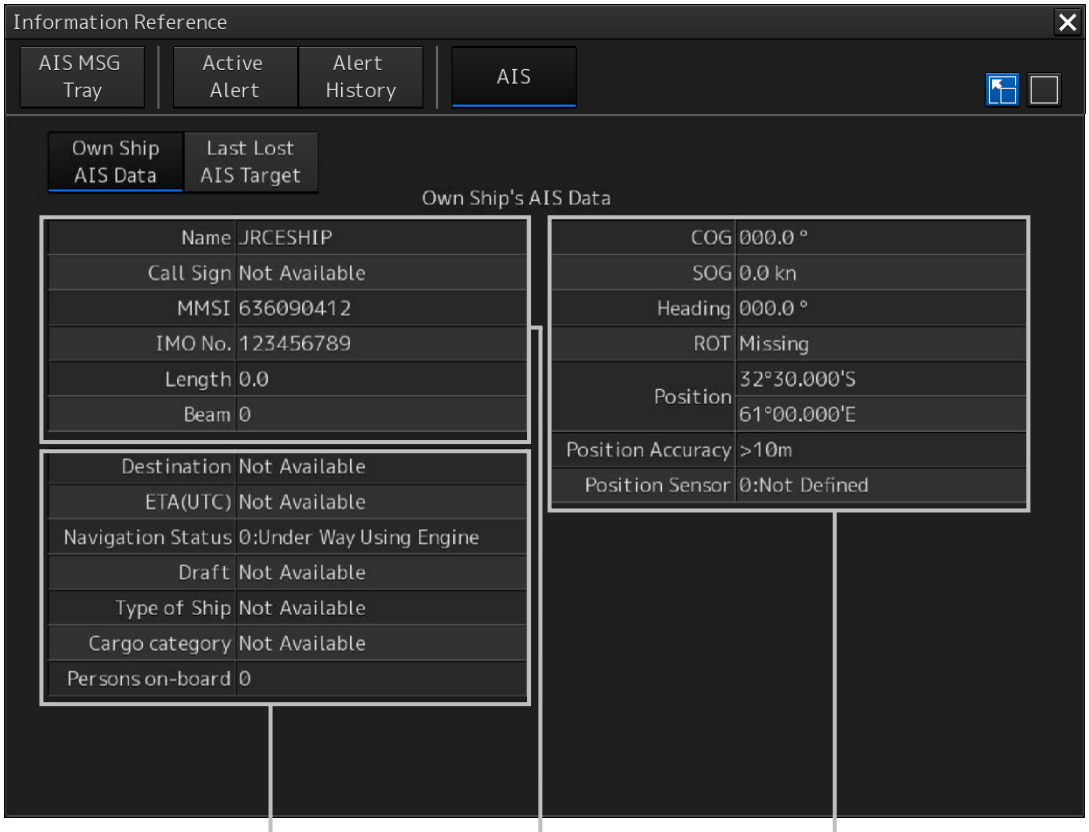
This window displays AIS information.

The AIS window includes the "Own Ship AIS Data" window that displays the AIS information of the own ship and "Last Lost AIS Target" window that displays the information of the last AIS target that is lost.



When the [Own Ship AIS Data] button is clicked on, the Own Ship AIS Data window is displayed.
When the [Last Lost AIS Target] button is clicked on, the information window of the last lost AIS target is displayed.

Own Ship AIS Data window



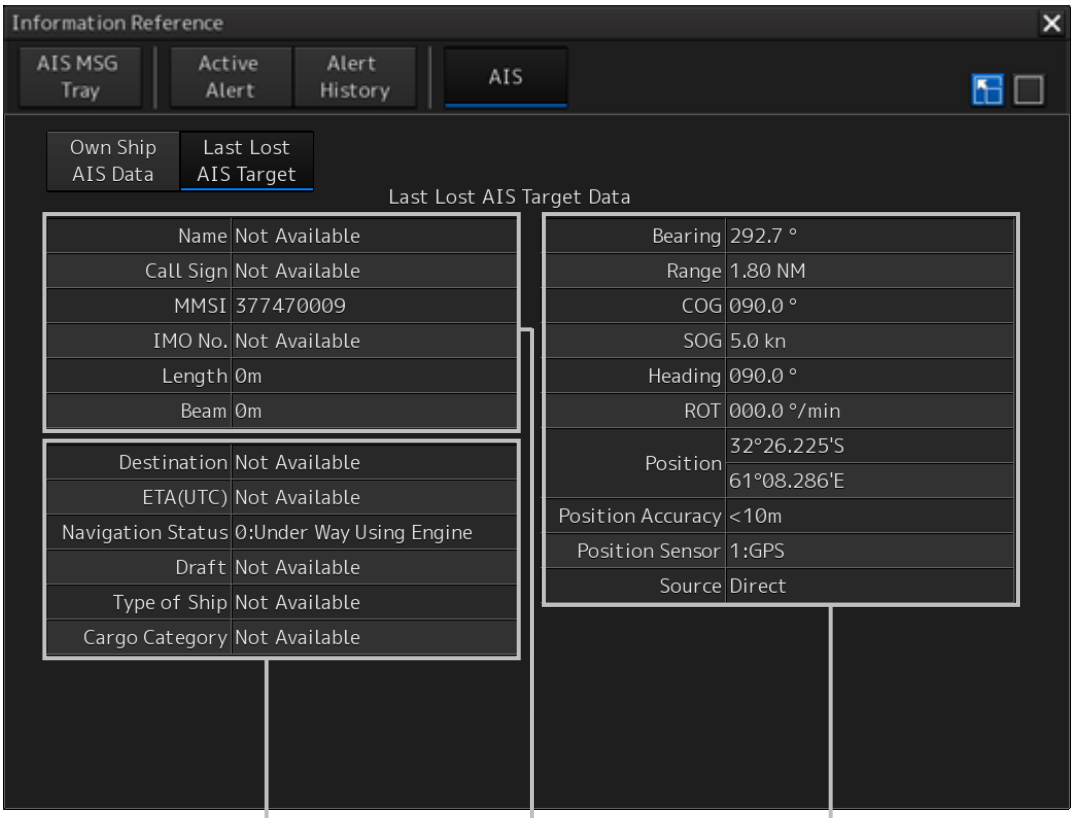
Static information that may be changed at navigation

Ship's specific static information

Dynamic information

For the details, refer to "6.15 Confirming Own Ship's AIS Information".

Window of the information of the last lost AIS target



Static information that may be changed at navigation

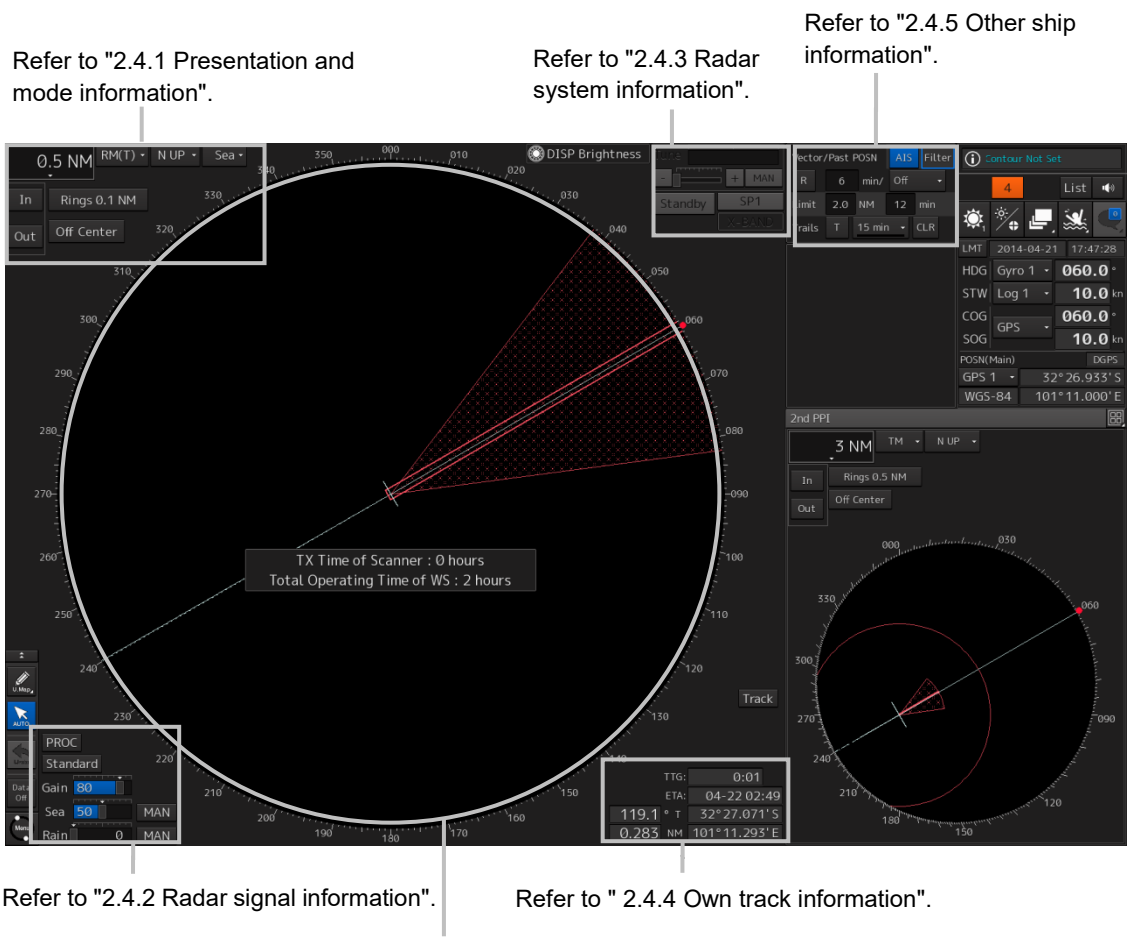
Ship's specific static information

Dynamic information

For the details, refer to "6.16 Displaying the Last Lost AIS Target".

2.4 Names and Main Functions of Each Section of the RADAR Screen

This section describes the names and the main functions of each section of the RADAR screen.



2.4.1 Presentation and mode information

Range scale combo box
Set the observation range.

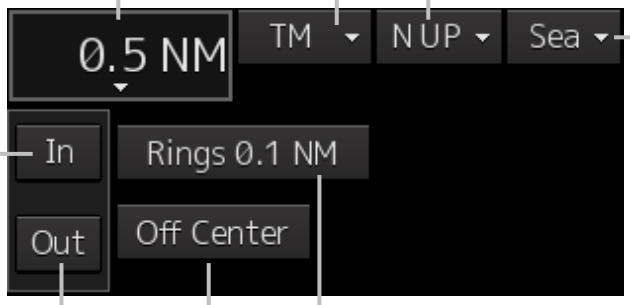
For the details, refer to "5.3.2 Changing the observation range".

Motion mode combo box
Set the motion mode.

For the details, refer to "5.4.6 Setting a motion mode".

Bearing mode combo box
Set the bearing mode.

For the details, refer to "5.4.5 Setting the azimuth mode".



Stabilization mode combo box
Set the stabilization mode.

For the details, refer to "5.4.7 Setting the Stabilization Mode".

Range rings display button
Use this button to switch range rings to On/Off.

For the details, refer to "4.4 Using the Range Rings".

[In] (Zoom In) button
Whenever this button is clicked on, the screen image is zoomed in by one level from the current range scale. When this button is held down, the image is zoomed in continuously.

[Out] (Zoom Out) button
Whenever this button is clicked on, the screen image is zoomed out by one level from the current range scale. When this button is held down, the image is zoomed out continuously.

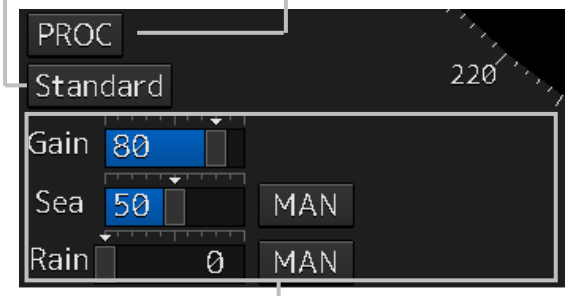
[Off Center] button
Use this button to set Off Center to On/Off for the display position of the own ship's position (CCRP).

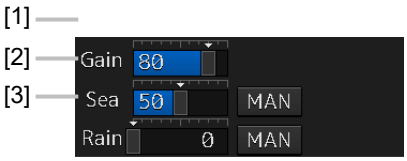
For the details, refer to "5.4.8 Moving own ship's display position (Off Center)".

2.4.2 Radar signal information

Observation Scene Selection button
This button sets an observation scene

For the details, refer to "5.3.7 Adjusting to optimal images (Selection of observation scenes)".



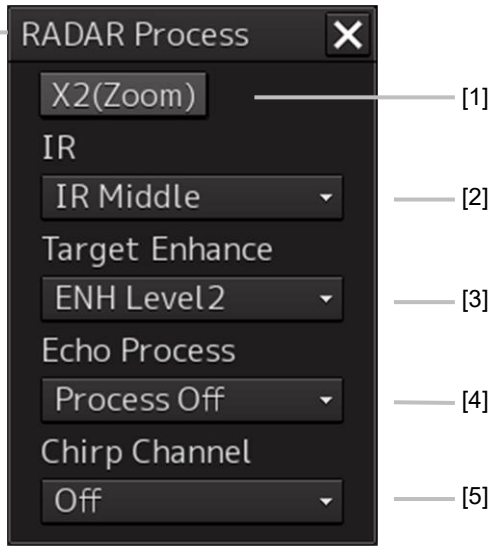


[1] Reception sensitivity adjustment
The reception sensitivity can be adjusted.
For the details, refer to "5.3.4 Adjusting gain".

[2] Sea clutter adjustment
The sea clutter rejection level can be adjusted.
For the details, refer to "5.3.5 Rejecting sea clutter (Sea)".

[3] Rain and snow clutter adjustment
The rain and snow clutter rejection level can be adjusted.
For the details, refer to "5.3.6 Rejecting rain/snow clutter".

RADAR signal processing setting button
This button sets RADAR signal processing. When this button is clicked on, a setting dialog box appears.



[1] [X2 (Zoom)] button
When this button is clicked on, the double scale zoom function is switched to On/Off.
For the details, refer to "5.4.10 Doubling the size of radar image".

[2] [IR] combo box
This setting is enabled to set a radar interference rejection function from the list
For the details, refer to "5.4.1 Interference Rejection (IR Function)".

[3] [Target Enhance] combo box
This setting is enabled to set a target enhancement function from the list
For the details, refer to "5.4.3 Enhancing targets".

[4] [Echo Process] combo box
This setting is enabled to set a video processing function from the list
For the details, refer to "5.4.4 Using video processing (Echo Process)".

[5] [Chirp Channel] combo box
This setting is enabled to set the Chirp Channel function by selecting On or Off from the combo box.
*The Chirp Channel function can be set only when a small solid -state radar antenna is connected. By changing the transmission central frequency (channel) of Q0N (Chirp wave: Frequency modulation pulse) that is used for pulse compression, interferences can be controlled.

2.4.3 Radar system information

On this window, verify, adjust, and set a signal tuning status. The display varies according to the radar antenna type.

Standby/transmission switching button
Whenever this button is clicked on, the mode is switched to "Standby" or "Transmit". When the power for this equipment is turned on, "Preheat" is displayed on this button.
For the display change at power ON, refer to Step 3 in the section "5.2.1 Powering on and starting"

Magnetron radar is connected as the radar antenna

Confirmation and adjustment of tuning
This button checks the tuning status and slightly adjusts.
For the details, refer to "5.3.3 Adjusting tune".

Transmission pulse length switching button
This button switches a transmission pulse length.
For the details, refer to "5.4.2 Changing the transmitter pulse length".

Transmission band display
This button displays the transmission band that is currently used (X-Band or S-Band).

Control status and control antenna display at inter-switch connection
When this button is clicked on, the interswitch switching window is displayed.
For the details of the inter-switch, refer to "Appendix C Setting the Interswitch".

Transmission pulse length switching button
This button switches a transmission pulse length.
For the details, refer to "5.4.2 Changing the transmitter pulse length".

Tuning status display
When the standby/transmission switching button is set to "Preheat" or "Standby", no information is displayed.
When the standby/transmission switching button is set to "Transmit", "Tuning OK" is displayed.

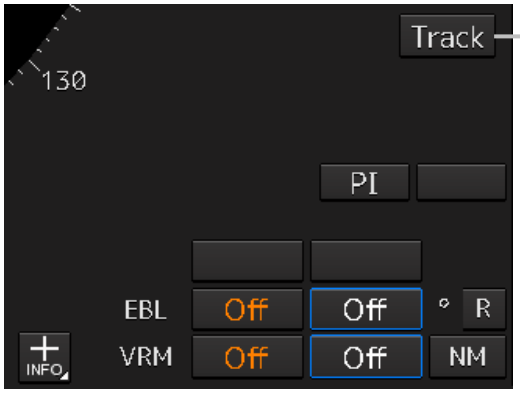
Solid state radar is connected as the radar antenna.

Transmission pulse length switching button
This button switches a transmission pulse length.
For the details, refer to "5.4.2 Changing the transmitter pulse length".

Transmission band display
This button displays the transmission band that is currently used (S-Band).

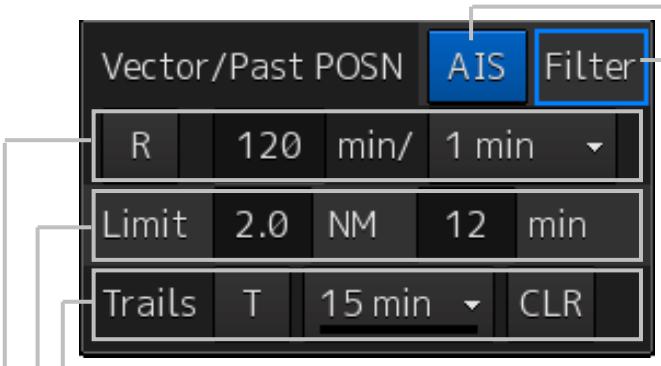
Control status and control antenna display at inter-switch connection
When this button is clicked on, the inter-switch switching window is displayed. For the details of the inter-switch, refer to "Appendix C Setting the Interswitch".

2.4.4 Own track information



Own ship's track color setting button
When this button is clicked on, a [Plot Color] dialog box appears. Click on the color to be used from the list.

2.4.5 Other ship information

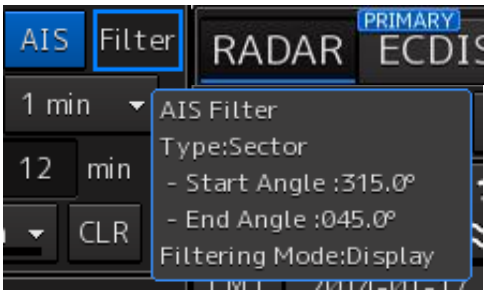


[AIS] button
This button sets the AIS function to On/Off.

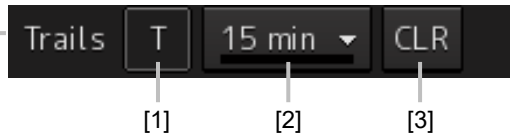
On: AIS Off: AIS

Note
When AIS is set to Off, alerts relating to AIS are also no longer displayed.

[Filter] button
When the cursor is placed on this button while AIS is On, the AIS Filter status is displayed.



The following status is displayed.
Filter type
- Filter shape: For Sector, the status is displayed with Start Angle and End Angle, and for Ring, the status is displayed with Distance.
- Filtering mode: Priority or Display



[1] Trail True/Relative switching button
This button switches the trail mode to True or Relative.
When True is set, "T" is displayed on the button and when Relative is set, "R" is displayed on the button.

[2] Trail length switching combo box
This button switches the trail length.
For the details, refer to "5.4.9 Displaying radar trails (Trails)".

[3] [CLR] (Trail Clear) button
When this button is clicked on, the trail is cleared.
For the details, refer to "5.4.9 Displaying radar trails (Trails)".

[1] CPA limit value input box
Input a CPA limit value. For the details, refer to "6.4.3 Setting collision decision criteria".

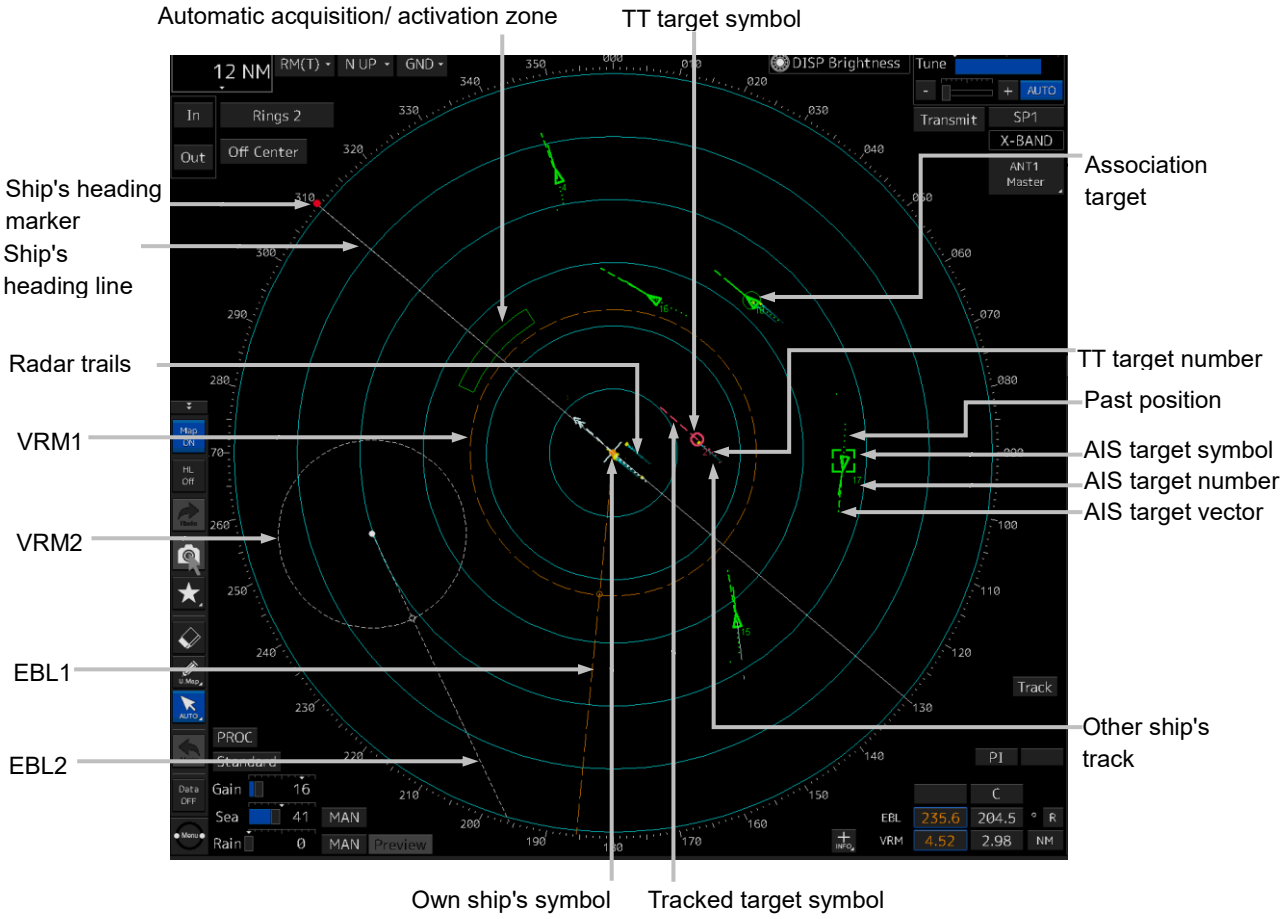
[2] TCPA limit value input box
Input a TCPA limit value. For the details, refer to "6.4.3 Setting collision decision criteria".

[1] Vector past position True/Relative switching button
This button switches the vector past position to True or Relative.
For the details, refer to "6.4.2.4 Setting the vector length".

[2] Vector length input box
Enter a vector length.
For the details, refer to "6.4.2.4 Setting the vector length".

[3] Past position interval switching combo box
For the details, refer to "6.8.1 Setting the Past position".

2.4.6 Display inside the PPI



3 Common Basic Operations

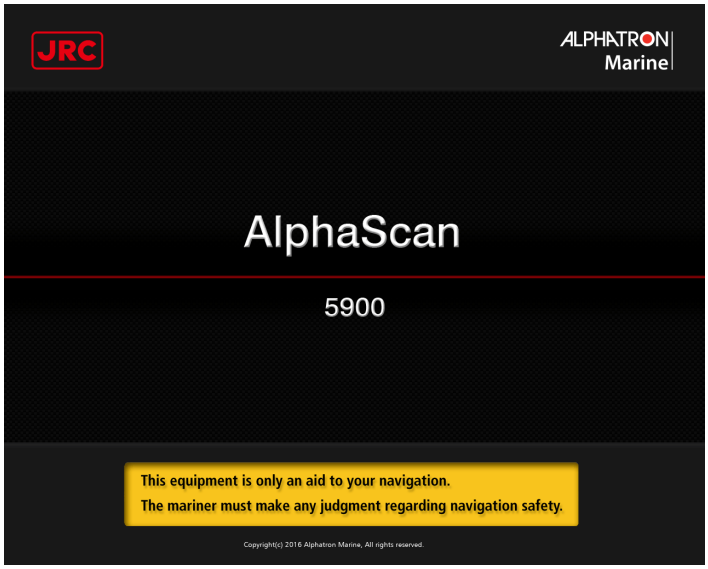
3.1 Powering On and Starting

Turn on the power supply according to the following procedure.

⚠CAUTION	
	Do not leave the disc in the DVD drive. Malfunctions of the drives may result.
	For low-temperature start-up, perform pre-heat for more than 30 minutes. Otherwise, an operation failure may occur and an accident may occur.

1 Press the Power button on the operation unit.

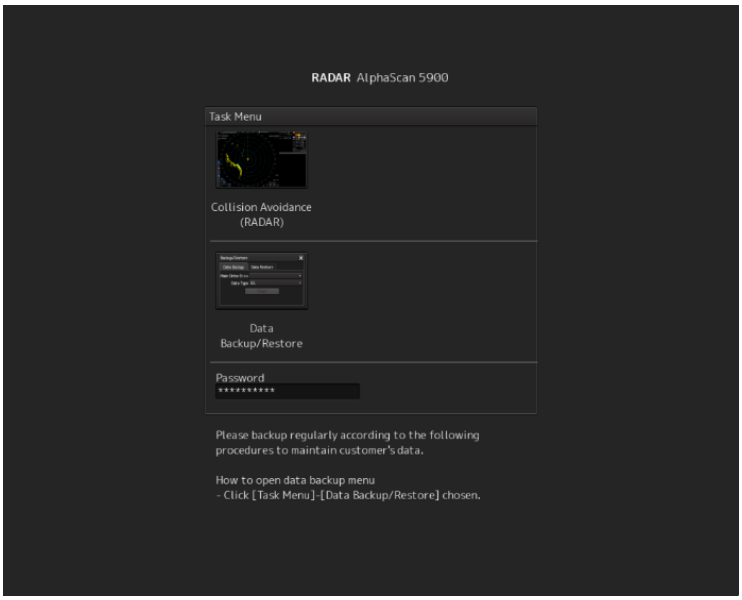
The Power button is lit and the start-up screen is displayed.



Memo

When the power is supplied while all the power supplies are disconnected, the indicator can be started automatically without pressing the Power button.

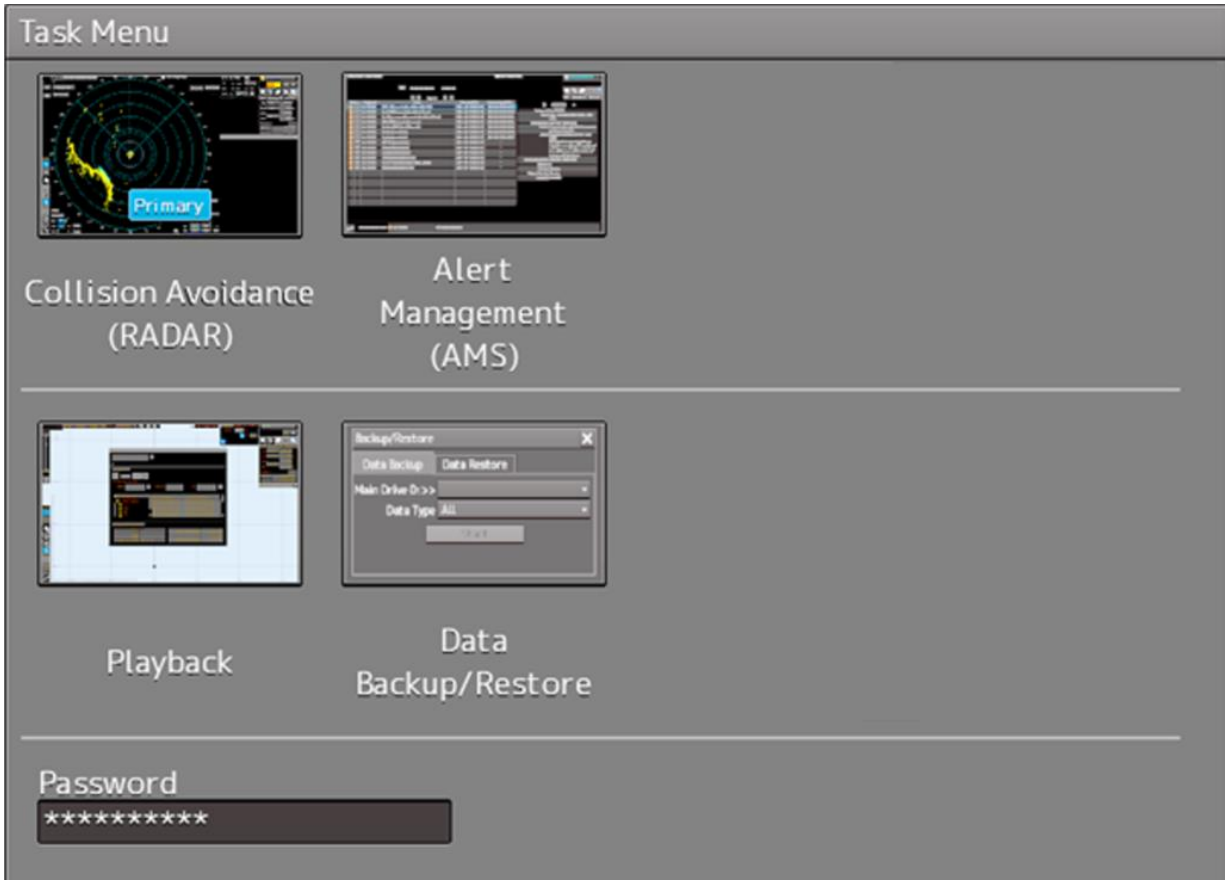
After the start-up screen is displayed, the task menu is displayed after a brief interval.



3.2 Starting Each Mode

When this equipment starts up, a task menu is displayed on the screen.

On the Task menu, you can select and start the desired mode from the operation modes available for this equipment.



Task Menu Display Example

When the button of the mode to be executed is clicked on, the screen of the mode is displayed.

Note

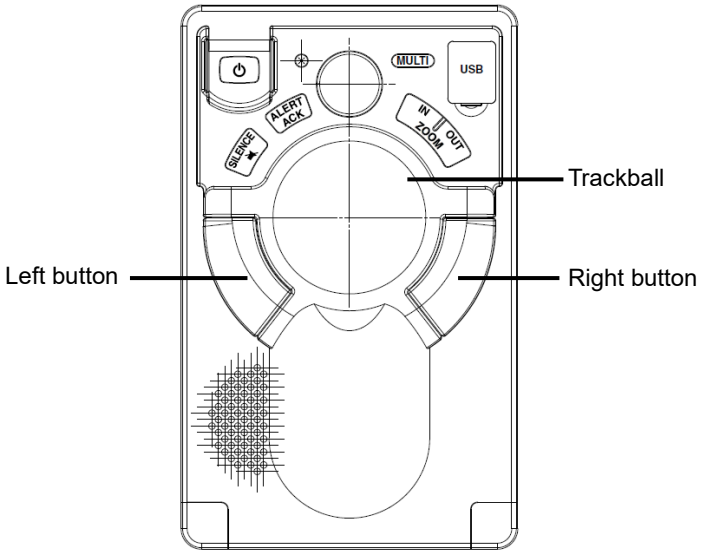
When this equipment is started for the first time, if no operation is performed within 10 seconds after the task menu is displayed, the mode screen that has been set up at the time of shipment will appear.

3.3 Basic Operations when using a Trackball

A trackball in the trackball operation unit is mainly used for the operations of this equipment.
This section describes the basic operations performed using the trackball.

3.3.1 Basic trackball operations

As the basic trackball operations, move the cursor that is displayed on the screen and perform various operations using the left and right mouse buttons.



3.3.2 Basic click operations

3.3.2.1 Selecting a button

When the cursor is set to a button and the button is clicked on, the function of the selected button is executed.
When a function On/Off button is clicked on, the setting is switched to On/Off each time.
When a function selection button is clicked on, the function selection menu is displayed.

3.3.2.2 Selecting a single object

When the cursor is set to an object and the button is clicked on, the primary action (primary operation) related to the target object is performed.
For example, when the cursor is set to the sleeping AIS target and the button is clicked on, "Activate" which is the primary action of the sleeping AIS target is performed.

3.3.2.3 Selecting multiple objects

When the cursor is set to multiple objects and the button is clicked, a list menu of the target objects is displayed.
When an object is selected from the menu, the AUTO mode operation of the selected object is executed.

When the cursor is set to multiple objects and the right button is clicked, a target object list menu is displayed.
When an object is selected from the menu, the context menu of the selected object is displayed.

3.3.3 Basic operations of double-clicking

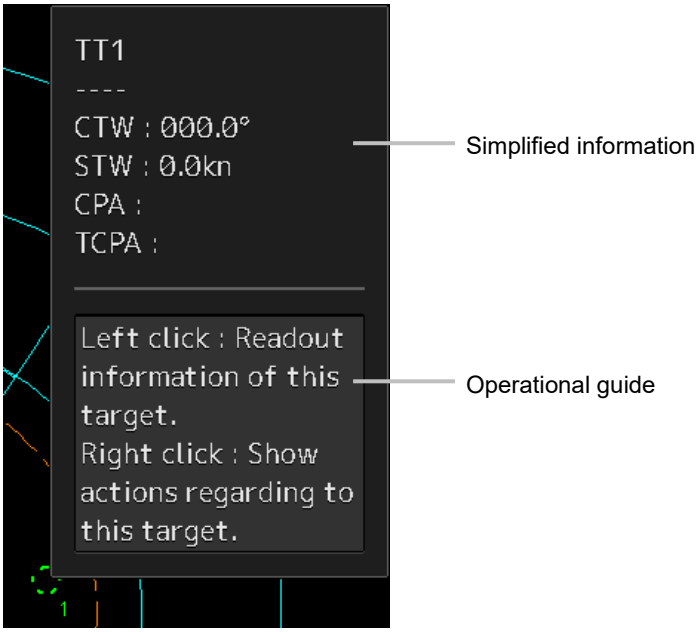
Double-click the button to end the creation mode in line creation mode or creation of a graphical route.

3.3.4 Basic operations of clicking the right button

When the cursor is positioned on the target object and the right mouse button is clicked, the context menu of the target object appears.

3.3.5 Displaying simplified information and operational guide of objects

When the cursor is set to a specific object, the "simplified information" and "operational guide" are displayed.



When the cursor is moved, the display is cleared.

3.3.6 Cursor types

The following cursors are displayed by this equipment.

Cursor	Cursor Name	Description
	Pointer cursor	Indicates a position on the display panel, menu bar, dialog box, or context menu.
	Cross-hair cursor	Indicates a position on the chart or PPI.
	Hand cursor	Appears when the cursor is moved while pressing the left button on a chart. This function enables moving the position freely by dragging the chart.
	Zoom cursor	Appears when a zoom function is selected.
	Edit cursor	Moves an object in user map/manual update/mariner's mark, or route graphic mode.
	Offset cursor	Appears when the offset of the ship's own position is set in adjustment cursor mode.
	Select cursor	Displays the position on the chart during the editing of the user map/manual update/mariner's mark and route graphics.
	Mark cursor	Displayed at execution of User Map/Manual Update/Mariner's Mark, route plan (addition of WPT), or Manual Position Fix.
	Arrow cursors	Appear when any of the following operations is performed. EBL/VRM, AIS filter, AZ, PI User map/manual update Moving the multi-view bar Operation of EBL, VRM
	Rotation cursor	Appears at PI operation
	Eraser cursor	Appears in eraser tool mode.
	Target activation cursor	Appears when the cursor is moved over a sleeping AIS target.
	Numeric displayed AIS target cursor	Appears when the cursor is moved over an activated AIS target or TT.

	Numeric displayed AIS target cancellation cursor	Appears when the cursor is moved over an AIS digital information target or a TT digital information target.
	Pointer cursor	Appears when the cursor is moved over a hyperlink.
	Off-center cursor	Appears when the RADAR off-centering mode is used.
	Move cursor	• Appears during the dialog box move mode. • Appears when moving an intersection point of EBL/VRM. • Appears when moving Node Fixed EBL/VRM.
	EBL cursor	Appears at EBL maneuver is created.

3.4 Basic Menu Operations

Various functions can be executed or set from the menu that is displayed by clicking on the [Menu] button.

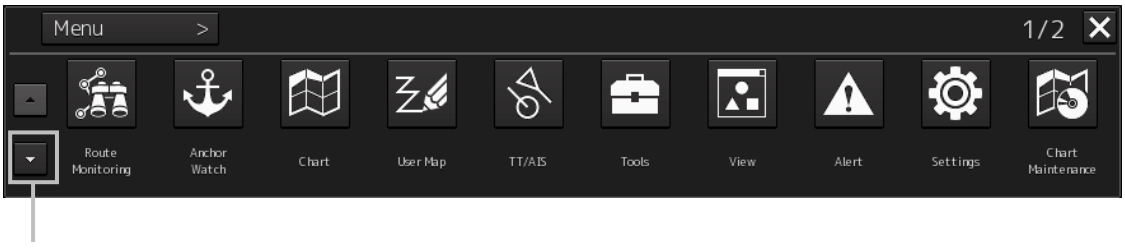
This section describes the basic menu operations.

3.4.1 Opening the menu

1 Click on the [Menu] button on the left toolbar.

The menu is displayed.

The menu screen comprises two pages.

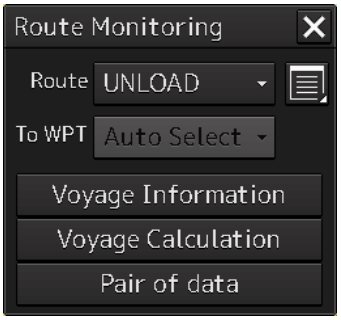


Page switching button:

Switch the menu screen by clicking on the button.

2 **Click on one of the buttons that are displayed on the menu.**

A dialog box for executing or setting the applicable function appears.

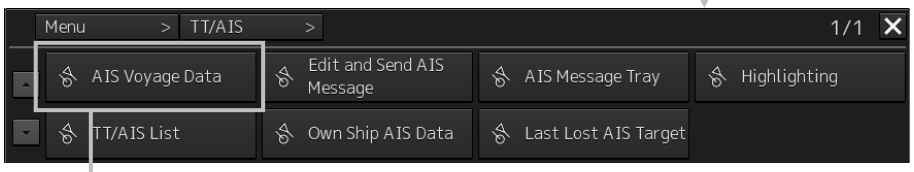


Display Example

3 **A submenu is displayed depending on the function. In this case, display a dialog box of the function by clicking on the button on the submenu.**

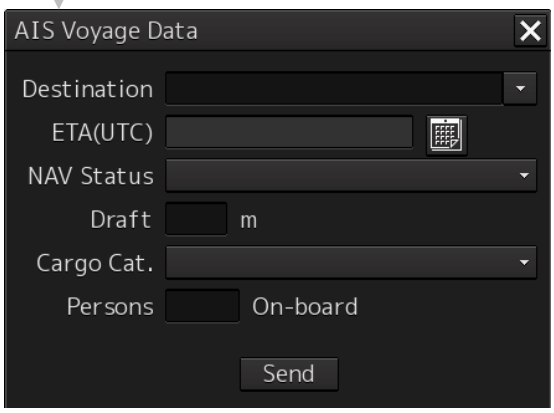
Example: TT/AIS

Top menu of TT/AIS



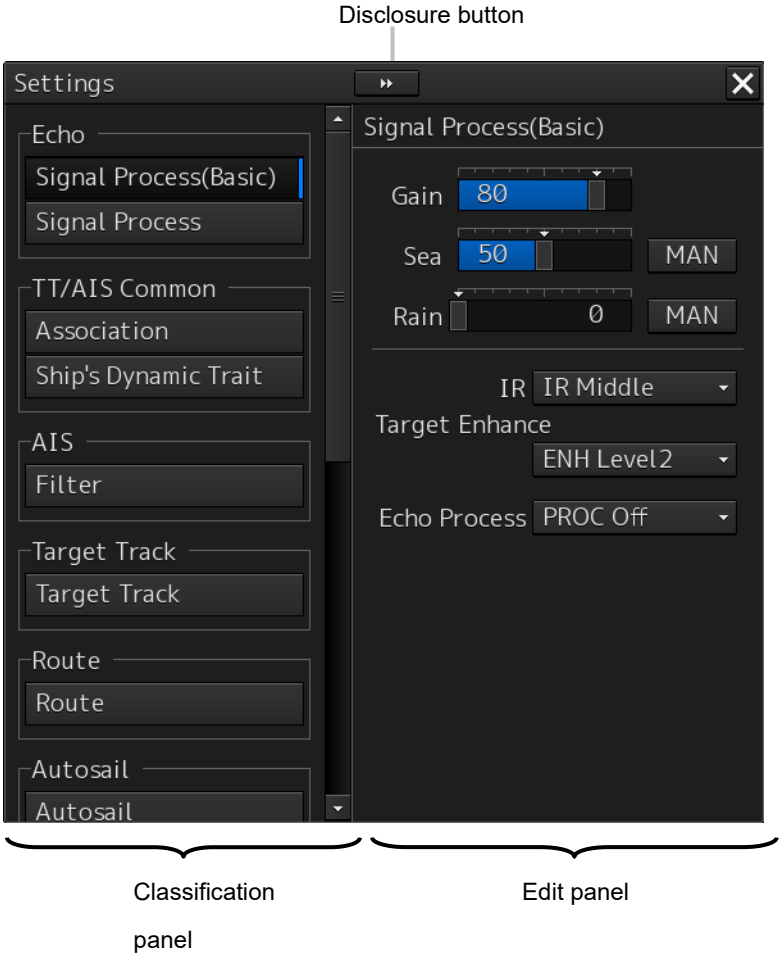
Submenu of TT/AIS

When the submenu screen extends over two pages, similar to the menu screen, it is possible to switch between the pages using the page change buttons.



4 Some functions comprise a classification panel and an edit panel and a dialog is available to hide the classification panel by using the Disclosure button.

Example: "Settings" is clicked on the menu.



Hiding the classification panel

Memo

When the RADAR transmission status is Transmit in RADAR mode and Classification is selected, the classification panel is hidden automatically.

3.4.2 Menu list

The menus that are displayed vary according to the task that is currently being executed.

Menu	Task that is currently executed (○: Display -: Hide)		Related section
	RADAR	Playback	
Logbook	-	-	Section 8 Logbook
TT/AIS	○	○	Section 6 Target Tracking and AIS
Tools	○	○	-
View	○	○	Section 9 Setting Up Screen View
Alert	○	-	Section 10 Setting Up Alerts
Settings	○	○	Section 11 Setting Up the Operation Mode
Maintenance	○	○	14.1 Maintenance Functions Executed from Menu
Help	○	○	3.18 Help
Code Input	○	○	3.19 Password Input
Service	○	-	Section 12 Adjusting and Setting Up Equipment (for Services)

3.4.3 Closing the menu

Click on the [X] button on the menu (submenu).

3.5 Basic Dialog Box Operations

When a dialog box is opened, the dialog box is in the factory setting state or state at termination of the previous operation.

The setting can be changed by the following operation.

Enter a character or a value in the input box.

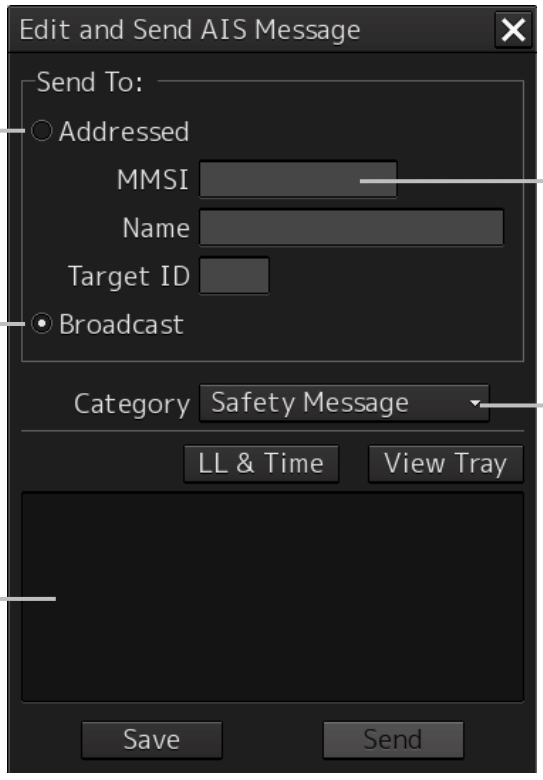
Select a setting from the list.

Select a setting by clicking on the button.

Select a setting by checking or unchecking the check box.

3.5.1 Changing dialog box settings

This section describes the basic setting change procedure by using the [Edit and Send AIS Message] (AIS message editing/transmission) dialog box as the example.



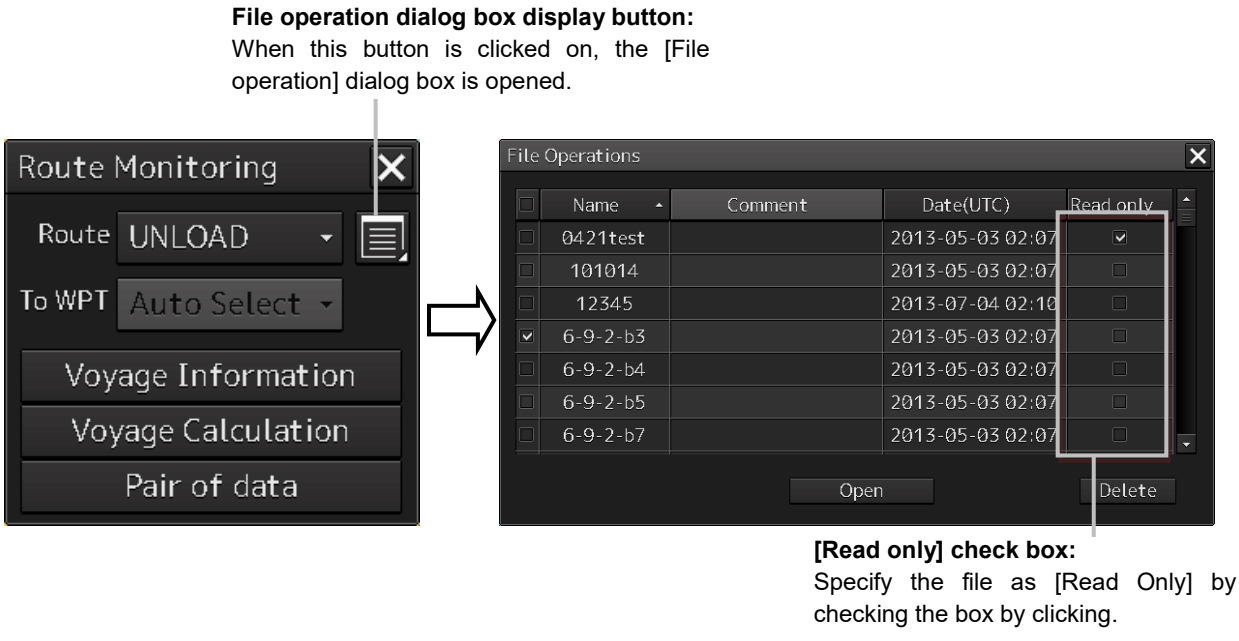
[Addressed]/ [Broadcast] radio button: Select whether a MMSI message is to be sent or a broadcast message is

Message input area: Enter a message

[MMSI] box: Enter a MMSI code (value).

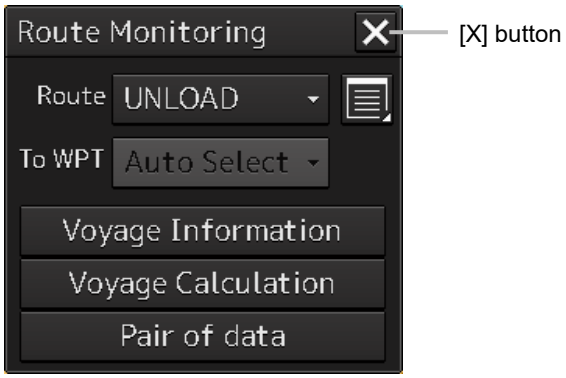
[Message Category] list: Select [Safety Message] or [Routine Message] from the list.

A function may also be set by opening another dialog box from the dialog box.



3.5.2 Closing a dialog box

Close the dialog box by clicking on the [X] (Close) button on the dialog box.



Memo

When no operation is performed for one minute after a dialog*1 is displayed, the dialog is closed automatically. When a different dialog is displayed in any of the following cases, the dialog that is currently displayed is closed automatically.

- **The RADAR transmission status is Transmit in RADAR mode.**

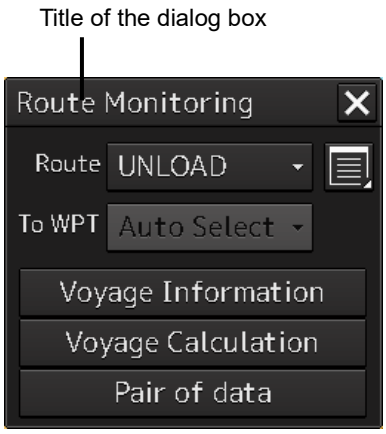
1. **If setting/editing operation has not been completed when the dialog is closed automatically, the editing contents are discarded.**
2.

*1: The following dialogs are excluded from the targets.

Information monitoring window, information reference window, route monitoring (including Voyage Information, Voyage Calculation, and Pair of data), MOB

3.5.3 Title Bar

The name (title) of the dialog box is displayed on the title bar of the dialog box.



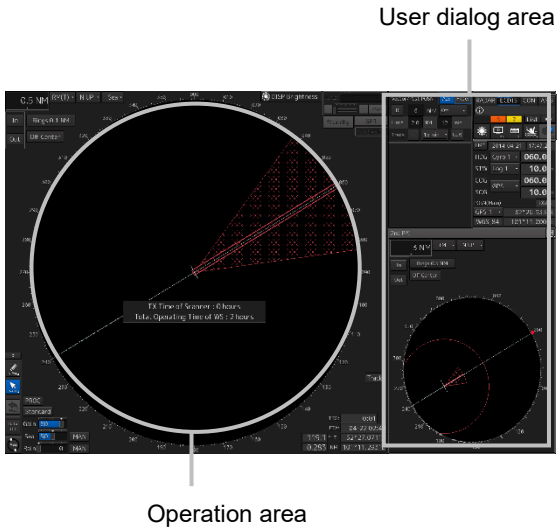
The dialog can be moved by dragging the title bar.

⚠WARNING

When moving the dialog, move to the position that does not cover the operation area. If the dialog covers the operation area, it may interrupt the recognition of the display information.

Memo

Operation area and user dialog area



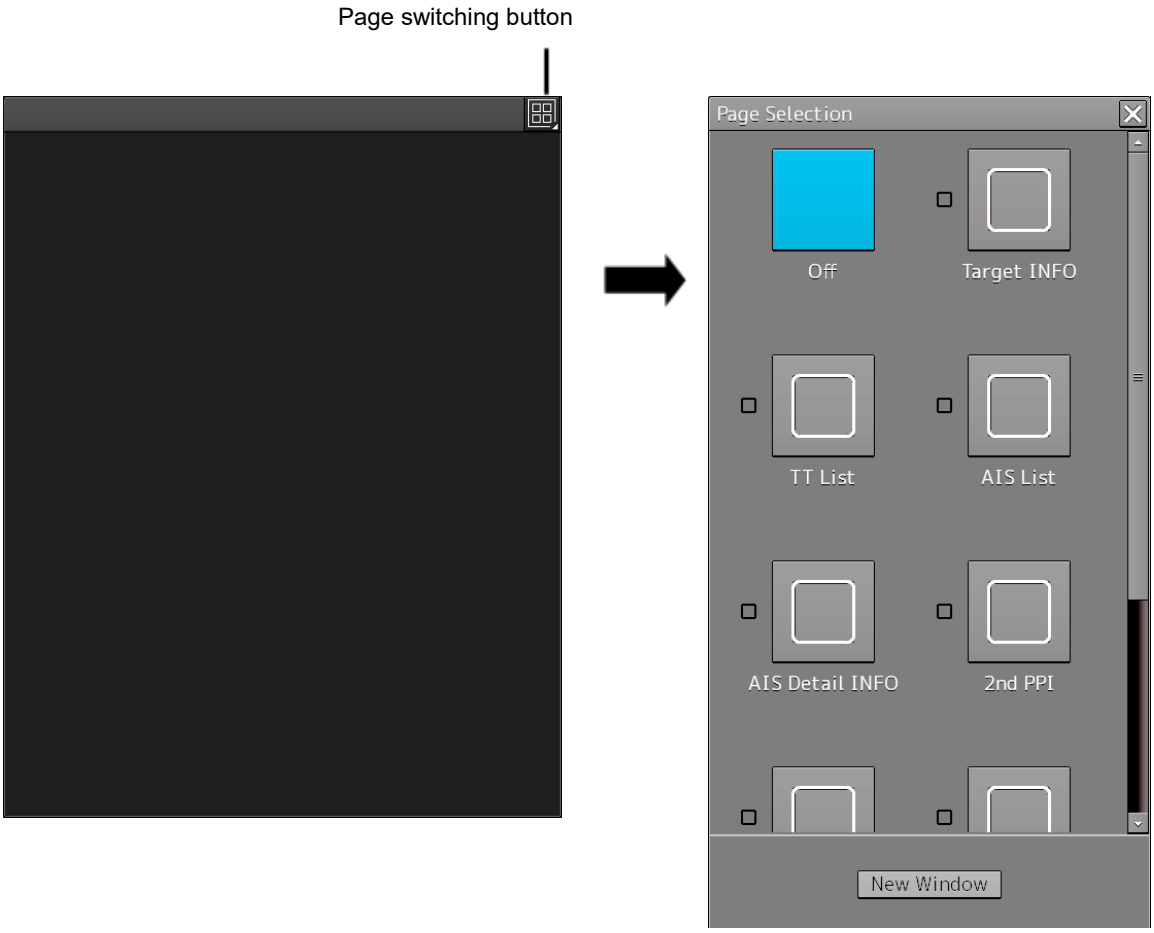
3.6 Operation of the Information Monitor Window

This section describes the operation and editing of the information monitor window.
For the details of the information monitor window, refer to "2.3 Common Information Window".

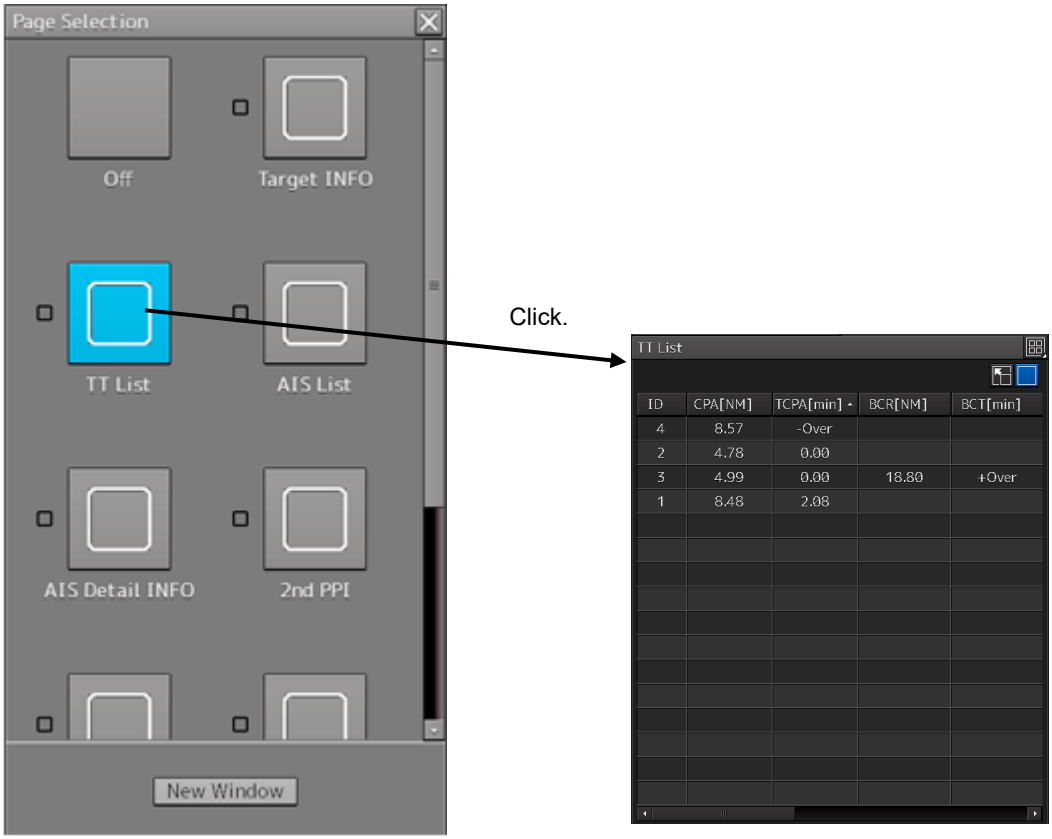
3.6.1 Opening the information monitor window

1 **Click on the page switching button on the initial display window.**
In the initial display, a blank window appears.

The [Page Selection] dialog box appears by clicking on the page switching button.



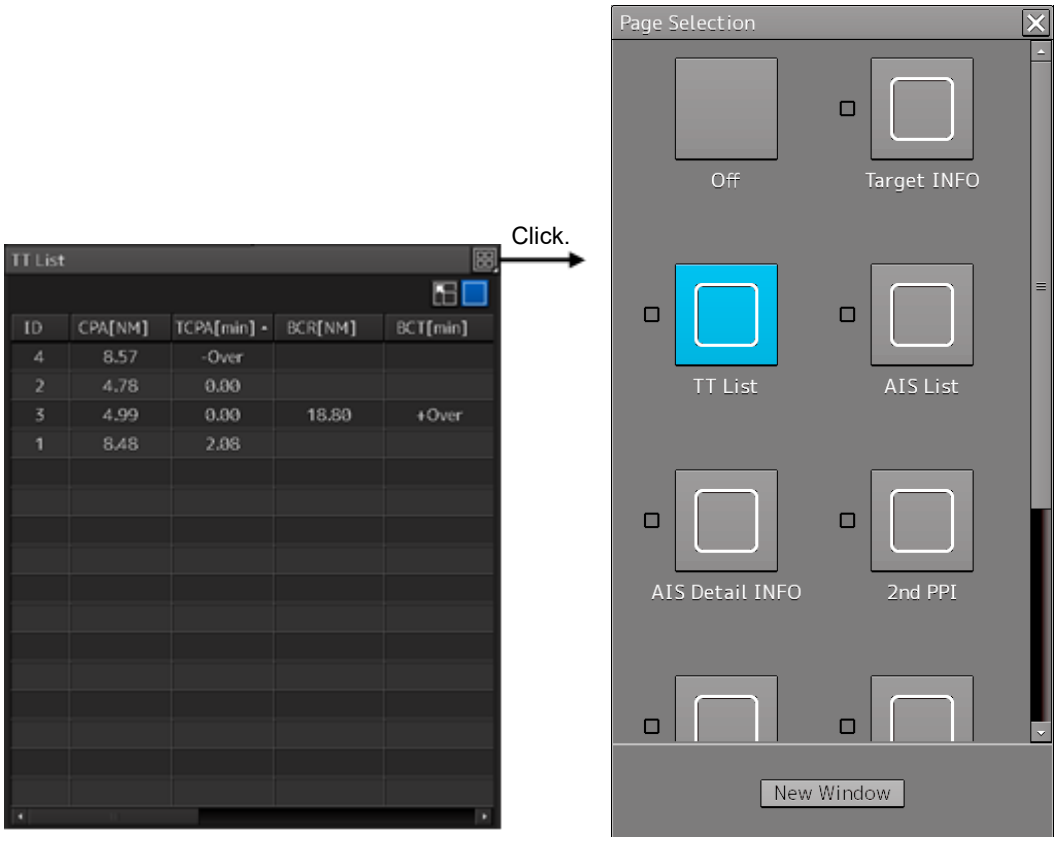
2 Click on the monitor information to be displayed. The applicable window is opened.



Example: When selecting the TT List in the RADAR

3 Returning to the [Page Selection] dialog box from each window

When the page switching button on each window is clicked on, control returns to the [Page Selection] dialog box.



Example: Returning control from Target INFO in the RADAR

3.6.2 Displaying an information monitor window from other than the [Page Selection] dialog box

Use the following procedures to display an information monitor window from a display other than the [Page Selection] dialog box.

Information monitor window	Display method
Target INFO	1) Click on the TT symbol. (Cursor AUTO mode) 2) Click the right button on the TT/AIS symbol and select Readout information from the context menu. 3) Click on the AIS Activated target. (Cursor AUTO mode)
TT List (RADAR) TT1 List, TT2 List	1) Select TT/AIS List from [TT/AIS] on the menu.
AIS List	1) Select TT/AIS List from [TT/AIS] on the menu.
AIS Detail INFO	1) Select one AIS target from the AIS List and click on the Details button. 2) Click the right button on the AIS symbol, and select Readout detail information from the context menu.

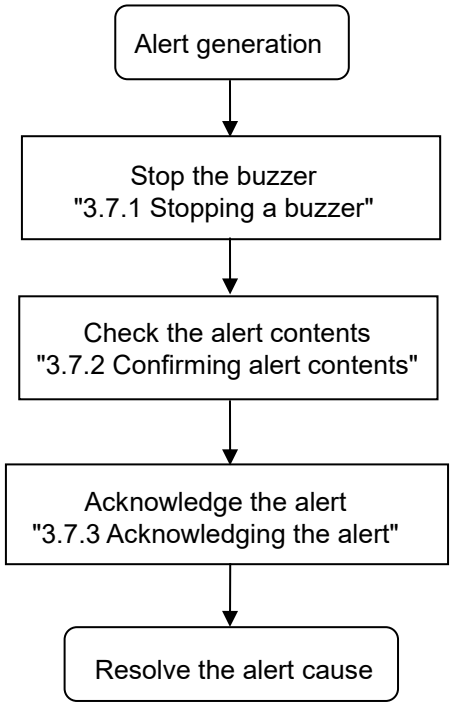
3.7 Confirming and Acknowledging an Alert

When an alert occurs, a buzzer sound is emitted and an alert balloon is displayed in the alert notification area.

Example of alert balloon

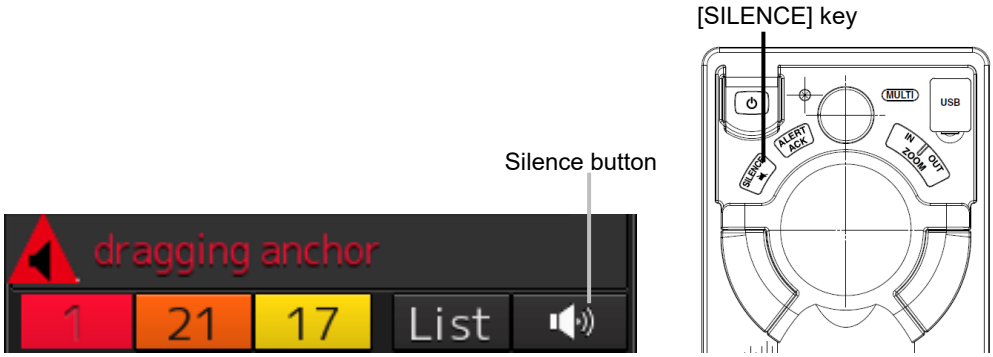
To acknowledge the alert detailed information, click on the Disclosure button.
For the details of the subsequent operations, refer to "3.7.2 Confirming alert contents".

The general procedure for handling an alert is shown below.

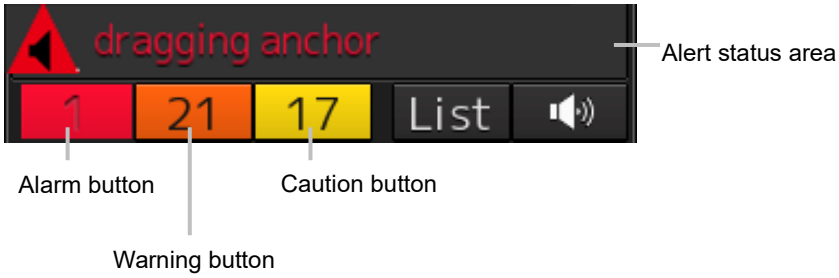


3.7.1 Stopping a buzzer

To stop a buzzer (silencing), click the silence button in the alert notification area or press the [SILENCE] key in the trackball operation unit.



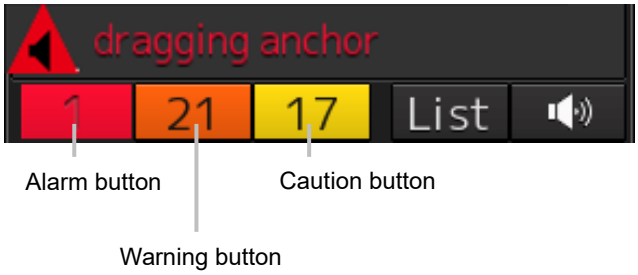
3.7.2 Confirming alert contents



Display Example when an Alert is generated

Display Example when No Alert is generated

When an alert is generated, the alert message is displayed in the "Alert status area".
The alert type and the number of alerts are displayed by the button.



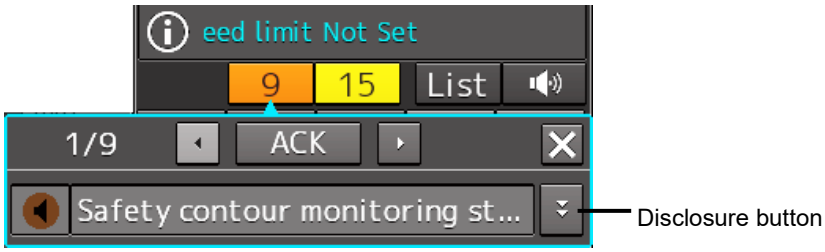
Alarm button: Displayed when an alarm is generated. The button is displayed in red. The number of alarms is indicated on the button

Warning button: Displayed when a warning is generated. The button is displayed in orange. The number of warnings is indicated on the button.

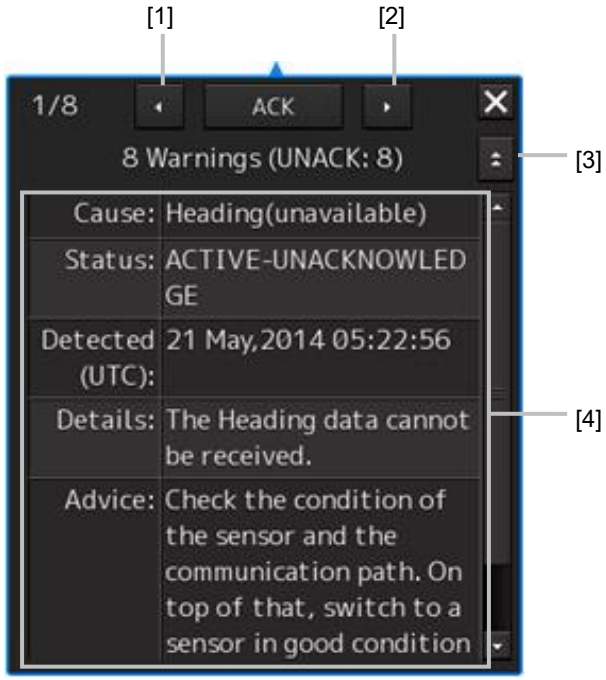
Caution button: Displayed when a caution is generated. The button is displayed in yellow. The number of cautions is indicated on the button.

1 Click on the button

An alert balloon is displayed.



2 Display the alert detail dialog by clicking on the Disclosure button.



[1] [Higher] button

When the Higher button is clicked on, details of the alerts of the higher priority than the alert currently displayed appear.

[2] [Lower] button

When the Lower button is clicked on, details of the alerts of the lower priority than the alert currently displayed appear.

[3] Disclosure button

When the Disclosure button is clicked on, the original alert balloon is displayed.
As a result, the Own Ship Information that was hidden can be re-acknowledged.

[4] Detail information

Cause, Status, Date and time (Raised), Details and action (Advice) to be taken are displayed.

Memo

About Information:

Information is displayed in addition to a warning or a caution in the alert status area.

Information is used to report operation errors and so on to the users.

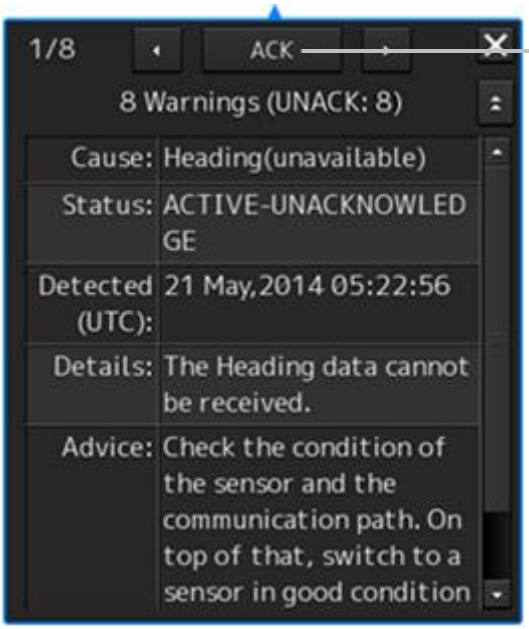
Unlike other alerts, no detail display is provided for Information.

3.7.3 Acknowledging the alert

After the [ACK] (acknowledgement) button of the alert detail display dialog box is clicked on or the [ALERT ACK] (alert acknowledgement) button of the trackball operation section is pressed after verification of the alert contents, the alert that is currently displayed is acknowledged.

When there are multiple alerts, perform the same operation by displaying the details dialog box of another alert.

When all the alerts are acknowledged, the alert detail display dialog is closed automatically.



Memo

An alert can also be acknowledged by clicking on the [Active Alert] tab - [ACK] button of the [Alert List] dialog box.

For the details, refer to "3.7.4 Displaying alert list and alert history".

3.7.4 Displaying alert list and alert history

When an alert list button is clicked on, the "Alert List" dialog box of the common information window is displayed.

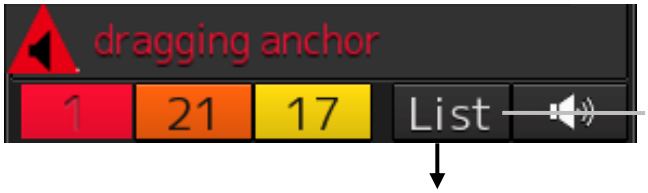
Memo

The common information window can be switched to either the standard window display or the enlarged window display.

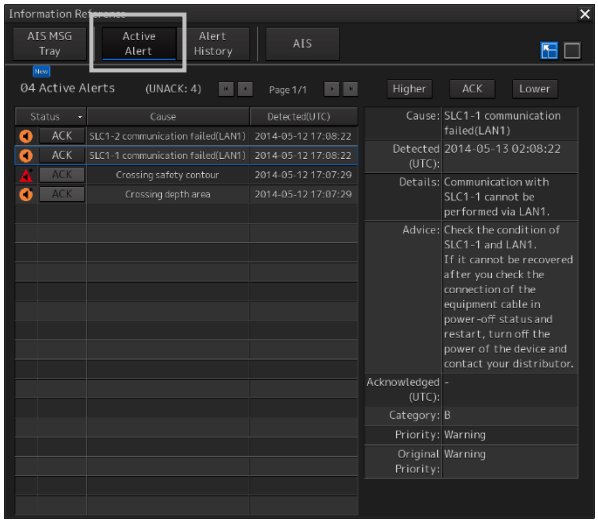
This section uses the enlarged window in the example.

Fort the details of switching between the standard window and the enlarged window, refer to "2.3.2.1 Switching between a standard window and an extended window".

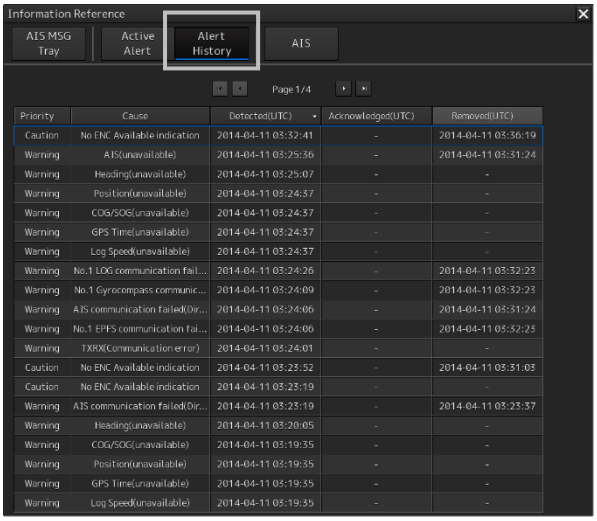
In the [Active Alert] tab, a list of the current alerts is displayed. In the [Alert History] tab, a list of past alerts that have been resolved is displayed.



Alert list button

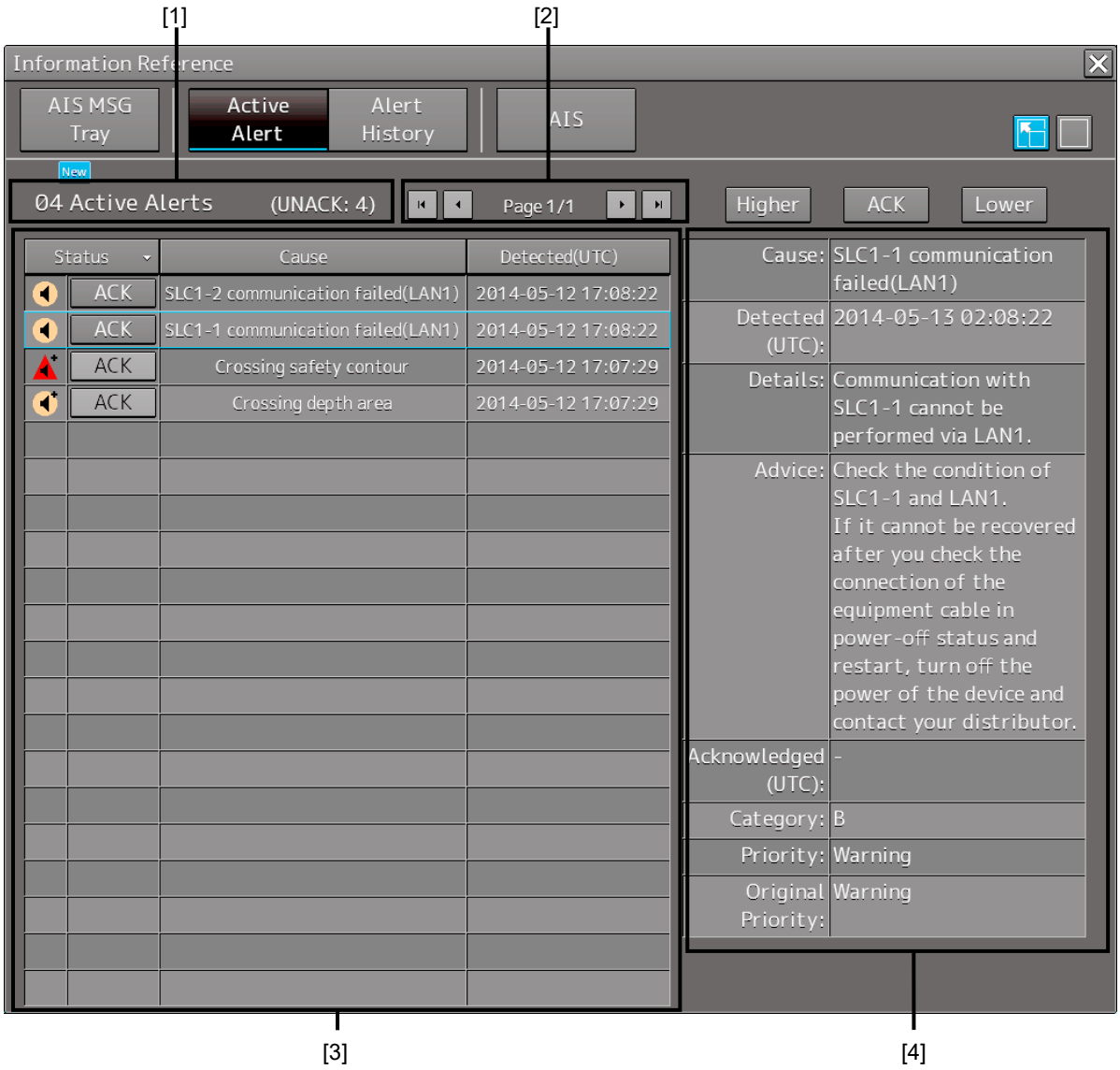


[Active Alert] Tab of the [Alert List] Dialog Box



[Alert History] Tab of the [Alert List] Dialog Box

["Active Alert" tab]



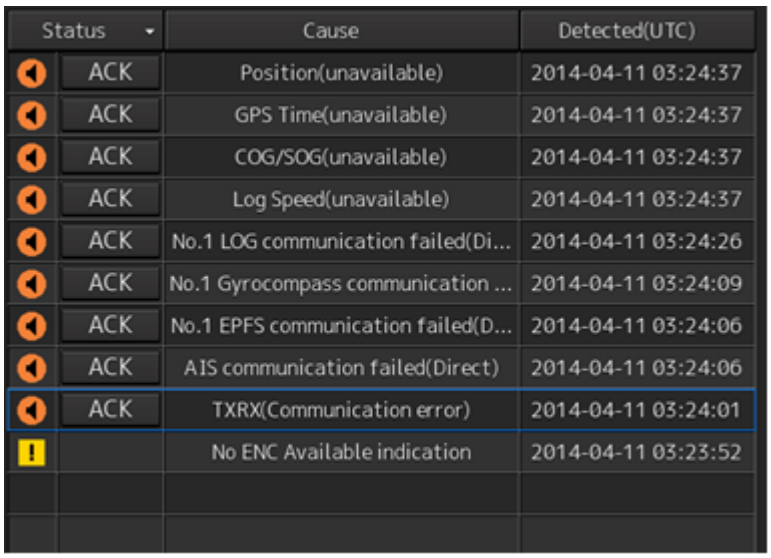
[1] Active alert information

The number of current alerts is displayed.

[2] Active page information

Up to 20 alert information items can be displayed in one page. Use this function to switch pages when the number of alert information items exceeds 20, requiring multiple pages.

[3] Active alert list

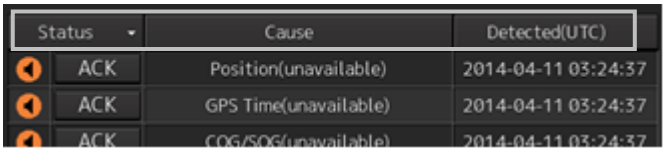


The alert of the highest priority is automatically selected. When an alert in the active alert list is clicked on, the alert is selected.

The details of the selected alert are displayed in "[4] Active alert details".

When a new alert is generated during the screen display, the alert is added at the top of the list.

By clicking on any of the items in the title line, active alerts can be sorted based on the item.

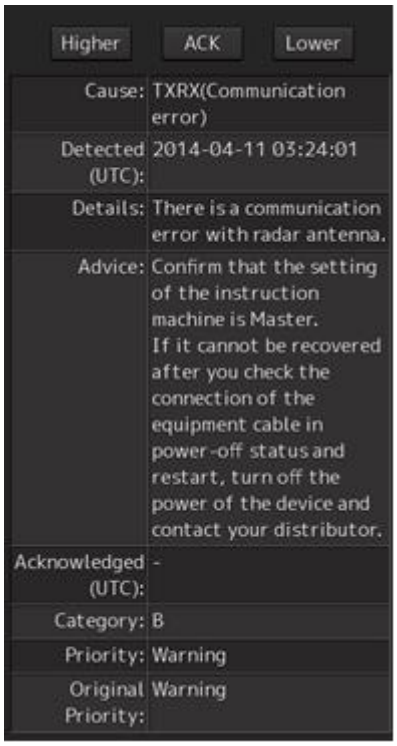


When the [ACK] button is clicked on, the alert is acknowledged.

Memo
The [ACK] button is not displayed for the [Caution] alert since acknowledgement is not required.

[4] Details of active alert

Details of the alert that is currently selected are displayed.



Alert	Detailed information
Cause:	Displays the cause of the alert.
Raised:	Displays the alert generation time.
Details:	Displays the details of the cause of the alert.
Advice:	Displays advice on the alert (action to be taken by the user).
Acknowledged:	Displays the time when the alert was acknowledged.
Category:	Displays the alert category.
Priority:	Displays the current alert priority (identification of Alarm/Warning/Caution).
Original Priority:	Displays the priority (identification of Alarm/Warning/Caution) at the generation of the alert.

[Higher] button

When this button is clicked on, the details of the alert of the higher priority than the alert that is currently displayed appear.

[Lower] button

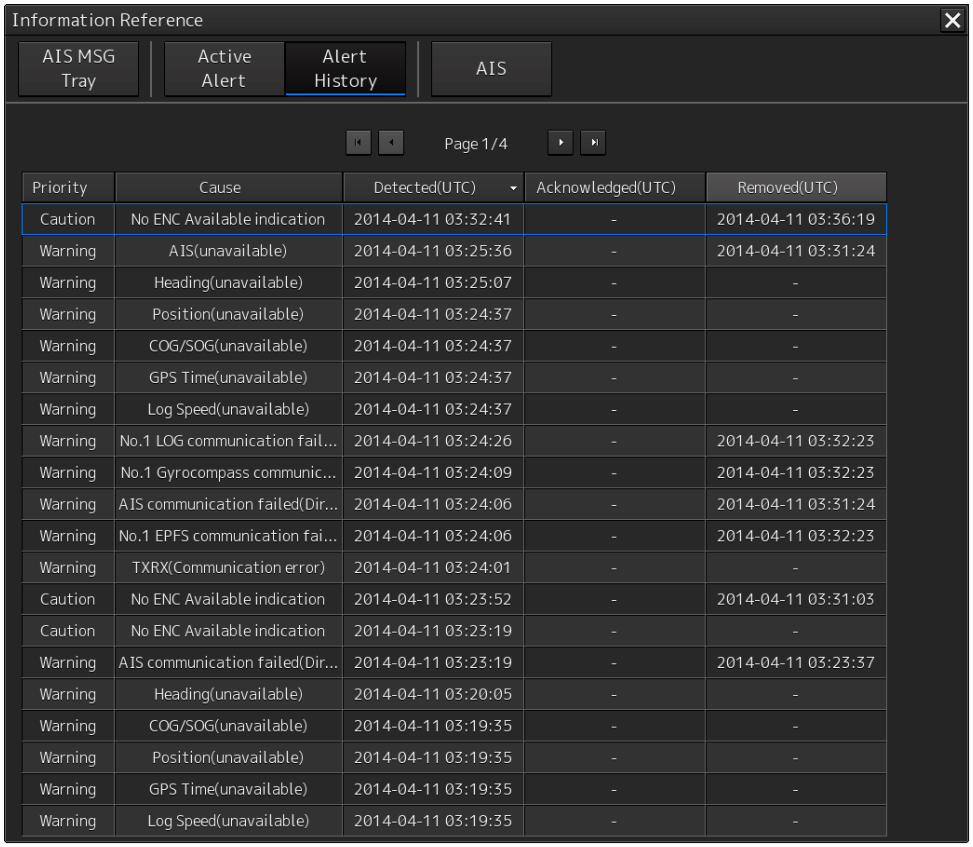
When this button is clicked on, the details of the alert of the lower priority than the alert that is currently displayed appear.

[ACK] button

When this button is clicked on, the alert that is currently selected is acknowledged.

["Alert History" tab]

Alerts that have been generated in the past are displayed.



Priority	Cause	Detected(UTC)	Acknowledged(UTC)	Removed(UTC)
Caution	No ENC Available indication	2014-04-11 03:32:41	-	2014-04-11 03:36:19
Warning	AIS(unavailable)	2014-04-11 03:25:36	-	2014-04-11 03:31:24
Warning	Heading(unavailable)	2014-04-11 03:25:07	-	-
Warning	Position(unavailable)	2014-04-11 03:24:37	-	-
Warning	COG/SOG(unavailable)	2014-04-11 03:24:37	-	-
Warning	GPS Time(unavailable)	2014-04-11 03:24:37	-	-
Warning	Log Speed(unavailable)	2014-04-11 03:24:37	-	-
Warning	No.1 LOG communication fail...	2014-04-11 03:24:26	-	2014-04-11 03:32:23
Warning	No.1 Gyrocompass communic...	2014-04-11 03:24:09	-	2014-04-11 03:32:23
Warning	AIS communication failed(Dir...	2014-04-11 03:24:06	-	2014-04-11 03:31:24
Warning	No.1 EPFS communication fai...	2014-04-11 03:24:06	-	2014-04-11 03:32:23
Warning	TXRX(Communication error)	2014-04-11 03:24:01	-	-
Caution	No ENC Available indication	2014-04-11 03:23:52	-	2014-04-11 03:31:03
Caution	No ENC Available indication	2014-04-11 03:23:19	-	-
Warning	AIS communication failed(Dir...	2014-04-11 03:23:19	-	2014-04-11 03:23:37
Warning	Heading(unavailable)	2014-04-11 03:20:05	-	-
Warning	COG/SOG(unavailable)	2014-04-11 03:19:35	-	-
Warning	Position(unavailable)	2014-04-11 03:19:35	-	-
Warning	GPS Time(unavailable)	2014-04-11 03:19:35	-	-
Warning	Log Speed(unavailable)	2014-04-11 03:19:35	-	-

Up to 20 alerts are displayed per page.

When a newly acknowledged alert is generated during the screen display, the acknowledged alert is added to the top of the list.

By clicking on any of the items in the title line, active alerts can be sorted based on the item.

Memo

The Alert History screen is displayed under the extended window only. A standard window is not available.

3.8 Switching the Day/Night Mode

The screen display color can be switched to any of five levels according to the brightness within the bridge.

Use the following procedure for switching.

1 Click on the Day/Night button on the right toolbar.

Adjustment buttons are displayed based on the brightness that is currently set.

Example: Day2 is set.

2 Adjust the brightness by using the [Light] button and the [Dark] button.

Whenever the [Light] button is clicked on, the brightness increases by one level from the current level.

When the [Dark] button is clicked on, the brightness decreases by one level from the current level.

: Day 1

: Day 2

: Day 3

: Dusk

: Night

⚠WARNING

Change of the color of the Day/Night button, particularly the use of the [Night] color, may interfere with the recognition of display information.

Memo

The colors and brightness of the buttons can be changed by setting [Settings] - [Color and Brightness] in the menu. For the details, refer to “11.19 Setting Color and Brilliance".

Relationship between the day/night mode and the screen/operation section brightness setting value

When the day/night mode is changed, the screen/operation section brightness is set to the following values.

	26-inch monitor	19-inch monitor
Screen brightness	Day1, Day2, Day3: 67/100 Dusk: 60/100 Night: 11/100	Day1, Day2, Day3: 42/100 Dusk: 20/100 Night: 4/100
Operation unit brightness	Day1: Level4 Day2: Level3 Day3: Level2 Dusk, Night: Level1	

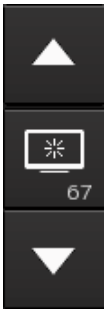
3.9 Adjusting the Brightness of the Screen and Operation Unit

3.9.1 Adjusting the Brightness of the Screen

The screen brightness can be adjusted within the range from 0 to 100.

1 Click on the [Display Brightness] button on the right toolbar.

The following screen brightness buttons are displayed.



2 Adjust the brightness by using the [Light] button and [Dark] button.

Whenever the [Light] button/[Dark] button is clicked on, the brightness changes by one level.

3.9.2 Adjusting the Brightness of the Operation Unit

The brightness of the operation section can be adjusted in 5 levels (0 to 4).

1 Click on the [Panel Brightness] (Brightness of the operation unit) on the Right Tool Bar.

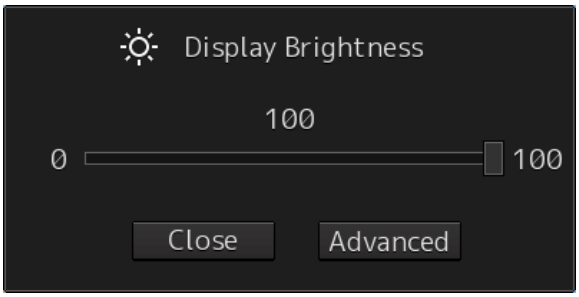
The following operation unit brightness buttons are displayed.

2 Adjust the brightness by using the [Light] button and [Dark] button.

Whenever the [Light] button/[Dark] button is clicked on, the brightness changes by one level.

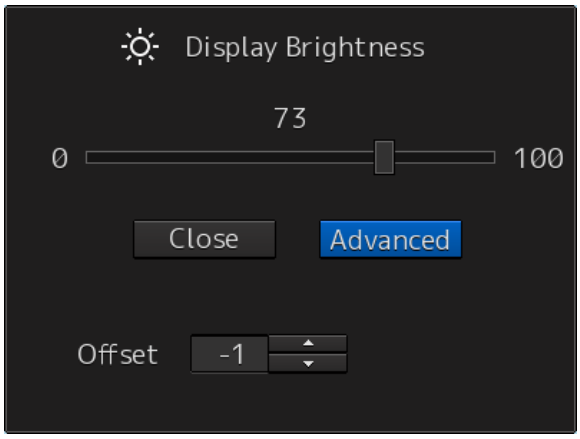
3.9.3 [Display Brightness] dialog

If the [MULTI] dial is operated while [Display Brightness] function is selected as the [MULTI] dial assignment function, the [Display Brightness] dialog is displayed.



It is possible to adjust the brightness of the display section by rotating the [MULTI] dial.

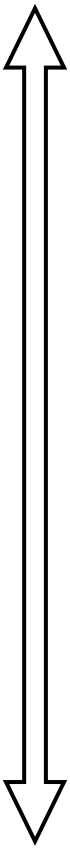
In order to set an offset value so that when set to the same value as the screen brightness of other equipment, the light emitted becomes the same as in other equipment, click the [Advanced] button and adjust the offset using the  buttons displayed for setting the [Offset].



3.10 Mouseover Display

When the mouse cursor is hovered over an object on the screen, the information on the object is displayed on a popup window near the cursor.
When objects overlap, the following priority is applied and information on the object of the higher priority is displayed.

Object	Priority
• AIS target	High
• Tracking target	
• Event mark	
• Information mark	
• Tidal stream mark	
• User map (symbol)	
• Buoy object	
• Light object	
• Clearing Line	
• User map (line)	
• EBL1, EBL2	
• VRM1, VRM2	
• Parallel index lines 1 to 8	
• Intersecting point fixed EBL/VRM	
• AZ1, AZ2	
• AIS filter	
• Dragging anchor monitoring	
• WPT	
• Highlight (Highlighted display)	
• User map (area)	Low



Memo

Refer to the following section for each object.

- AIS target/tracking target
  "6.3 Displaying Symbols"
- Event mark
  "8.12 Marking the Position of Own Ship with an Event Mark"
- User map (symbol)
  "14.5.1 Creating a symbol object (Symbol) "
- EBL1/EBL2/VRM1/VRM2
  "4.5 Using the Electronic Bearing Line (EBL) and Variable Range Marker (VRM)
- Parallel index lines 1 to 8
  "4.6 Using Parallel Index Lines (PI) "
- AZ1 and AZ2
  "17.3 New Target Alarm Generation Conditions"
- AIS filter
  "3.13.5 AIS filter"
- Dragging anchor monitoring
  "11.2 Starting and Ending Dragging Anchor Monitoring"

3.10.1 Condition and timing of mouseover display

3.10.1.1 Starting mouseover display

Mouseover display is performed under the following condition and timing.

Condition	The cursor in AUTO mode.
Timing	The cursor stops for 500ms.

When the motion mode of the radar screen or chart is a relative motion display (RM) mode, the fixed object such as land moves.
In this case, mouseover display is not performed simply by hovering the cursor over the object.
By moving the cursor once and hovering the cursor over the object again, mouseover display can be performed.
For the details of the motion mode of the radar screen, refer to "5.4.6 Setting a motion mode".

3.10.1.2 Terminating mouseover display

Mouseover display terminates when the cursor is moved based on a certain distance or the mouse button is clicked.

3.10.2 How to read mouseover display

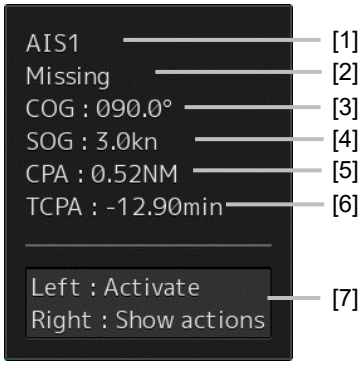
3.10.2.1 Example of mouseover display

When mouseover is performed on a user map (symbol), the following popup window is displayed.

The width and height of the popup window changes according to the number of characters that are displayed.

3.10.2.2 Mouseover display of an AIS target/tracking target

The following information is displayed through mouseover display of an AIS target/tracking target.



[1] Target ID

A target ID is displayed in the following notation.

AIS:

AIS + target ID

Tracking target:

TT + target ID

[2] Ship's name

Displays the name of the target ship.

[3] COG or CTW

Displays the course over the ground (COG) or the course through the water (CTW).

[4] SOG or STW

Displays the speed over the ground (SOG) or the speed through the water (STW).

[5] CPA (Closest Point of Approach)

Displays the distance between the target and the closest point of approach.

[6] TCPA (Time to Closest Point of Approach)

Displays the time required to reach the closest point of approach with the target.

[7] Operation guide display area

The operations that can be performed for this object are displayed.

In this example, [Left : Activate] indicates that if it is clicked on, the AIS target can be activated. [Right : Show actions] (right: displays the possible operations) indicates that if it is clicked on, a context menu is displayed.

3.11 MOB (Man Over Board)

When a person falls overboard, this monitoring function prevents loss of sight of the position of the person overboard.

The MOB use procedure is as follows.

1 Click on the MOB button on the right toolbar.

The [Marker] dialog box appears and the MOB marker is displayed on the own ship's position when the button is clicked on.

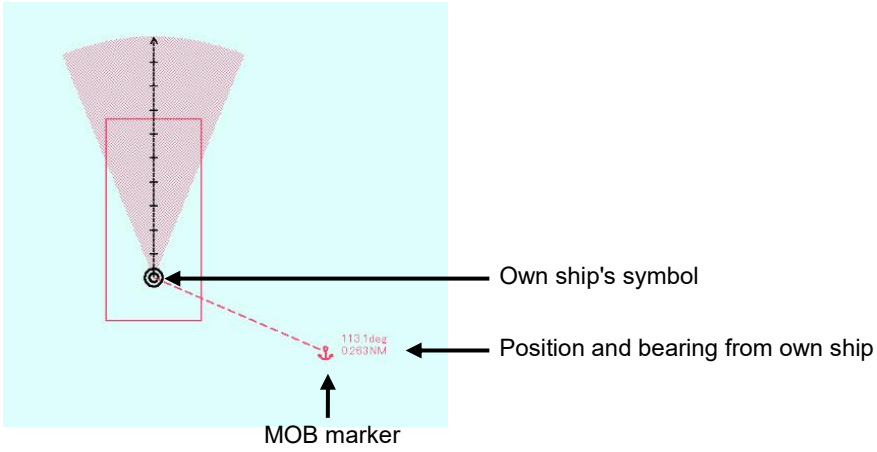
[Marker] Dialog Box

Memo

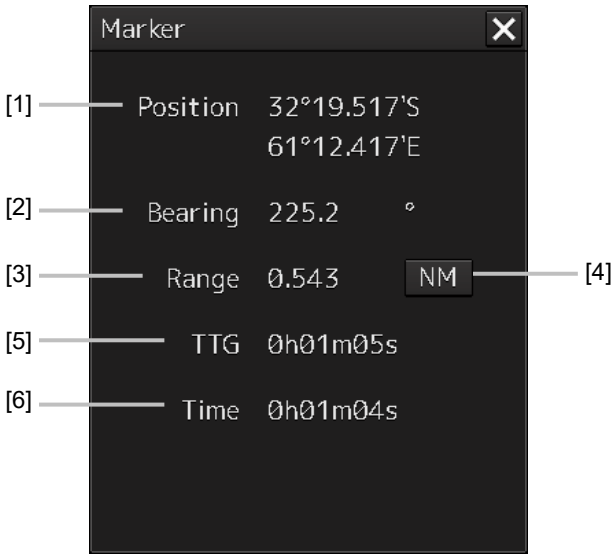
The [Marker] dialog box appears by clicking [Tools] - [MOB] on the menu

2 Monitor with the screen and the [Marker] dialog box.

The position relationship between the own ship that is moving and the MOB marker is displayed as follows.



See below for how to reference the [Marker] dialog box.



[1] [Position]

Displays the coordinate of the MOB marker.

[2] [Bearing]

Displays the bearing from the own ship to the MOB marker.

[3] [Range]

Displays the range from the own ship to the MOB marker.

[4] NM/Km/sm switching button

Whenever this button is clicked on, the unit of [Range] is switched to NM, km or sm.

Memo

NM denotes nautical mile, sm denotes statute mile, and km denotes kilometer.

[5] [TTG]

Displays the time to reach the MOB marker from the ship speed.

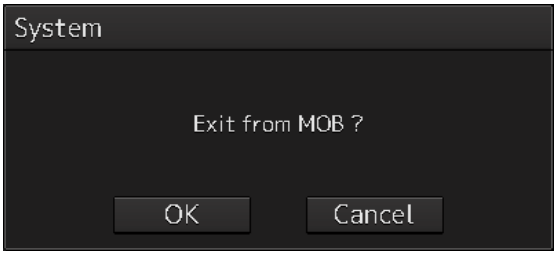
[6] [Time]
Displays the time elapsed after clicking on the [MOB] button.

To exit from MOB

1 Click the [X] button in the [Marker] dialog box.

A confirmation dialog box appears.

2 Click on the [OK] button.
The [Marker] dialog is closed.
The MOB marker is cleared



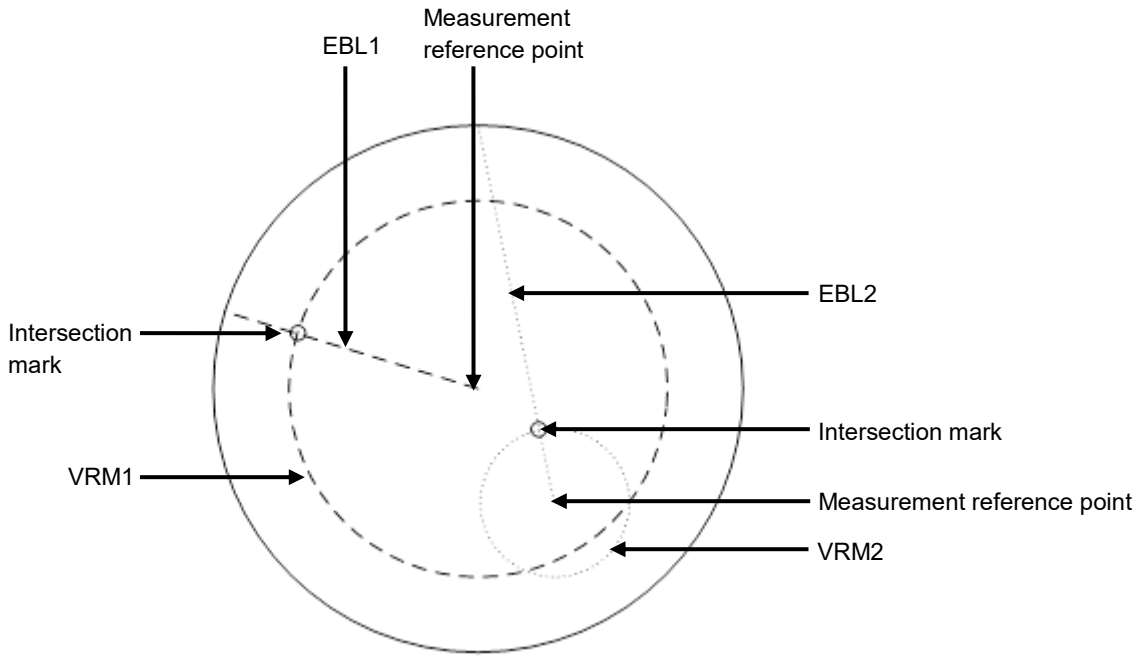
3.12 Electronic Bearing Line (EBL) and Variable Range Marker (VRM)

3.12.1 Electronic Bearing Line (EBL) and Variable range marker (VRM)

The electronic bearing line (EBL) and the variable range marker (VRM) are the essential tools for measuring bearings and ranges.
This equipment is equipped with two sets each for EBL (EBL1/EBL2) and VRM (VRM1/VRM2).

An intersecting point mark is displayed at the intersecting point between EBL and VRM.
By setting an intersecting point at any location, the bearing and range from the own ship's position to the location can be measured.

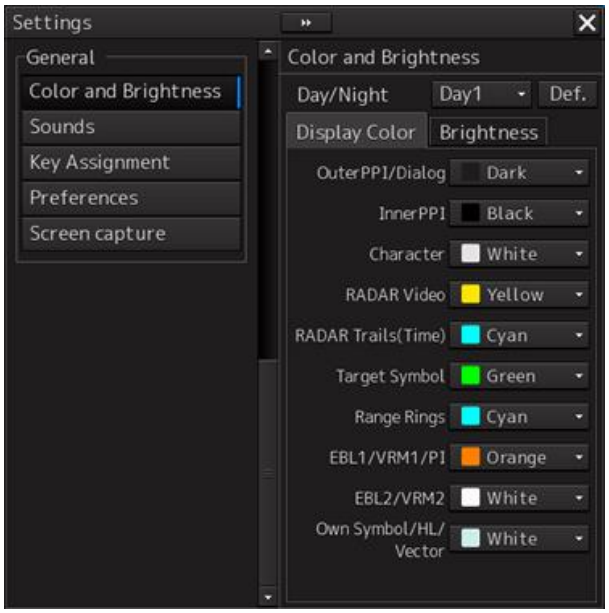
Two sets of EBL and VRM can be operated independently.



The first EBL and VRM are displayed in Long dashed line and the second EBL and VRM are displayed in Short dashed line.

Memo

The line colors can be set on the dialog that is displayed by selecting [Settings] - [Color and Brightness] on the menu.



3.12.2 Displaying the EBL and VRM buttons

Use the EBL/VRM button for creation and setting of EBL/VRM and bearing/range of EBL/VRM.

The information is displayed on Navigation Tools (measuring tools) at the bottom right corner of the screen.

EBL button (Left: EBL1, Right: EBL2)

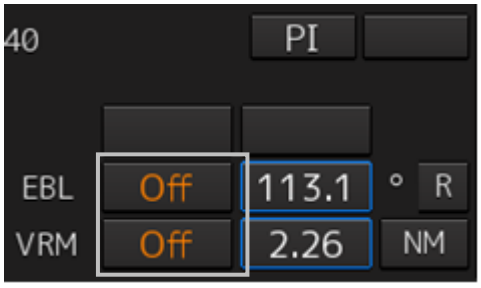
VRM button (Left: VRM1, Right: VRM2)

3.12.3 Basic manipulation of EBL/VRM

3.12.3.1 Switching the control right of EBL/VRM

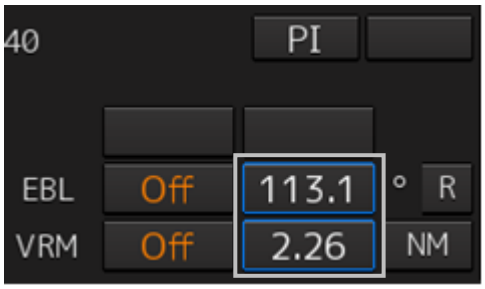
This equipment is equipped with two sets of EBL (EBL1/EBL2) and VRM (VRM1/VRM2).
To use EBL/VRM, the EBL/VRM to be used must be enabled.
To enable EBL/VRM, click on the EBL/VRM button.
The status of EBL/VRM can be checked by using the EBL/VRM button.

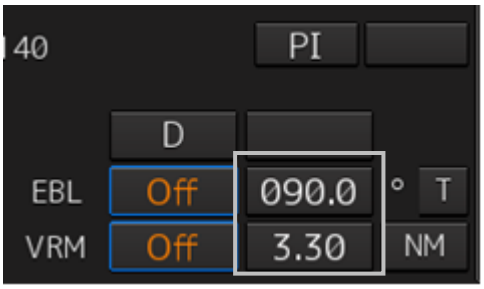
[Button in [OFF] state]



EBL/VRM is disabled and is not displayed on the screen.
When the button is clicked on, EBL/VRM is displayed and the manipulation is enabled.

[Numeric value displayed on the button]





When the button is enclosed by a blue frame, EBL/VRM is displayed and the manipulation is enabled (with control right).
When this button is clicked on, the blue frame is cleared and the manipulation is disabled (without control right).

When the button is not enclosed by a blue frame, although EBL/VRM is displayed on the screen, the manipulation is disabled (without control right).
When the button is clicked on, the display is changed to [OFF].
When the button is double-clicked, the button is enclosed by a blue frame and the manipulation is enabled (with control right).

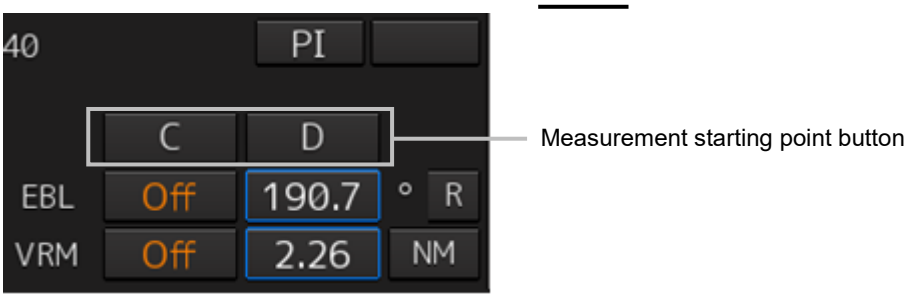
3.12.3.2 Setting up the measurement starting points

The measurement starting points of the EBL/VRM in operation can be changed. Set up the measurement starting points as usage.

1 Enable the manipulation of EBL/VRM by clicking on the EBL/VRM button.

- The display of the clicked button changes from [OFF] to the bearing presentation of the measurement starting point.

2 Click on the Measurement Starting Point button of the EBL/VRM in the operational state.



- Each time this button is clicked on, the measurement starting point switches in the order of blank field → [C] → [D] → blank field and so on.
- Blank field (CCRP): Sets the measurement starting point to the own ship position (CCRP).
- C (Carried): Fixes the measurement starting point on the screen.
- D (Dropped): Fixes the measurement starting point at longitude and latitude point.

Memo
In the case of [D], it is necessary to connect a navigation unit.

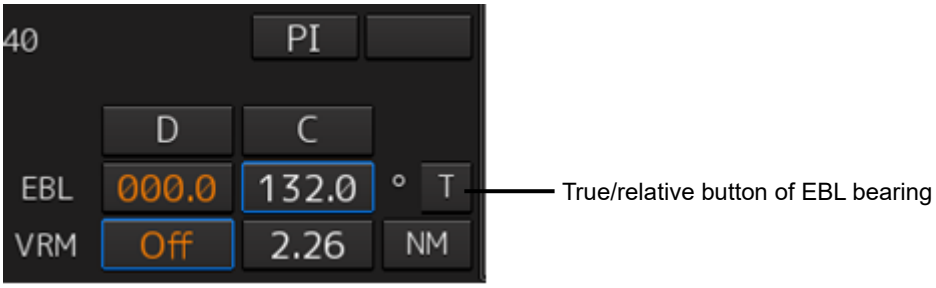
3.12.3.3 Setting the EBL bearing to True/Relative display

The EBL bearing True/Relative display can be changed by using the True/Relative button of EBL of the Navigation Tools (measuring tools).

Setting the EBL numeric value display mode

1 Click on the true/relative button of EBL bearing.

- Each time the button is clicked on, display switches between [T] → [R] → [T] in this order.
- [T]: Displays EBL bearing in true bearing.
- [R]: Displays EBL bearing in relative bearing.

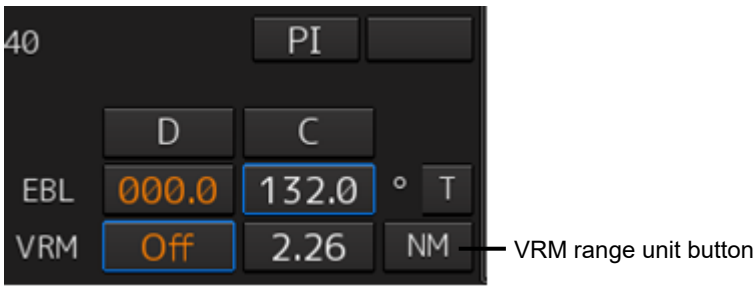


Memo
The true/relative presentation of EBL bearing is common between EBL1 and EBL2.

3.12.3.4 Setting up the range unit of VRM

1 Click on the VRM Range Unit button.

- Each time the button is clicked on, display switches in the order of [NM] → [sm] → [km] → [NM]
- [NM]: Displays the range in the unit of NM.
- [sm]: Displays the range in the unit of sm.
- [km]: Displays the range in the unit of km.

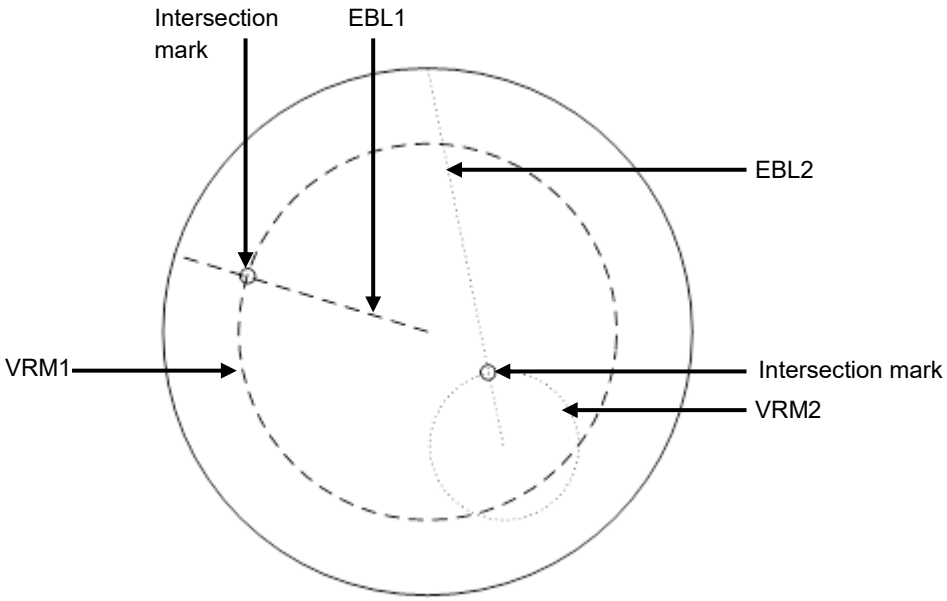


Memo
The VRM range unit is common between VRM1 and VRM2. NM denotes nautical mile, sm denotes statute mile, and km denotes kilometer.

3.12.3.5 Operating the intersecting point between EBL and VRM

1 **Place the cursor on the intersection mark (○) and click the mouse button.**

- EBL and VRM are set to a movable state.



2 **Move the cursor to the required target or the coordinate.**

- EBL and VRM move together with the cursor.

3 **Click on the mouse button.**

- The EBL and VRM are fixed.

3.13 Cursor AUTO Mode

The cursor AUTO mode (referred to as AUTO mode henceforth) is a function that automatically executes the function (operation) that is assigned to the object when the object under the cursor is clicked on.

The AUTO mode is effective for the following objects.

Object	Section that describes the function (operation) to be executed
No object (when the button is clicked on the position without a valid object under the AUTO mode on a chart/PPI)	3.13.1 No object
AIS	3.13.2 AIS
TT	3.13.3 TT
(AZ) Acquisition/Activation Zone	3.13.4 (AZ) Acquisition/Activation Zone
AIS filter	3.13.5 AIS filter
User map	3.13.6 User map
Mariner's Mark/Line	3.13.7 Mariner's Mark/Line
Manual update	3.13.8 Manual updating
EBL	3.13.9 EBL
VRM	3.13.10 VRM
EBL/VRM intersecting point	3.13.11 EBL/VRM intersecting point
Node Fixed EBL/VRM	3.13.12 Node Fixed EBL/VRM
PI	3.13.13 PI

3.13.1 No object

When the button is clicked on the position without a valid object under the AUTO mode on a chart/PPI, the following operation is performed.

Acquires the TT target manually when the button is clicked on inside of the PPI.

Note

Manual acquisition is not allowed in any of the following cases:

- Radar antenna standby state
- Occurrence of PROC (Interrupt 1) / PROC (Interrupt 2) alert
- Occurrence of target tracking function alert.
- Occurrence of ship's heading alert.
- Using at the position further than 32 NM from the own ship’s position
- Using at the position closer than 0.1 NM from the own ship’s position

3.13.2 AIS

[Sleeping AIS target target]

When a sleeping AIS target is clicked on, the AIS target is activated.

[Activated AIS target]

When an Activated AIS target is clicked on, the AIS target value is displayed.

[Numeric displayed AIS target]

When the numeric displayed AIS target is clicked on, the AIS target value display is cancelled.

[AIS-SAR aircraft normal target]

When an AIS-SAR aircraft in the normal state is clicked on, the AIS-SAR aircraft is selected and the AIS-SAR aircraft value is displayed.

[Numeric displayed AIS-SAR aircraft]

When a numeric displayed AIS-SAR aircraft is clicked on, the sleeping target of the AIS-SAR aircraft is displayed and the AIS-SAR aircraft value display is cancelled.

[Sleeping AIS-SAR vessel target]

The same operation as the normal sleeping AIS target is performed.

[Activated AIS-SAR vessel target]
The same operation as the normal activated AIS target is performed.

[Numeric displayed AIS-SAR vessel target]
The same operation as the normal numeric displayed AIS target is performed.

[Sleeping AIS-SART]
The same operation as the normal sleeping AIS target is performed.

[Activated AIS-SART]
The same operation as the normal activated AIS target is performed.

[Numeric displayed AIS-SART target]
The same operation as the normal numeric displayed AIS target is performed.

[AtoN normal target]
When AtoN target in a normal state is clicked on, the AtoN normal target is selected and the numeric value of AtoN is displayed.

[Numeric displayed AtoN target]
When a numeric displayed AtoN target is clicked on, the AtoN normal target is deselected and the numeric value of AtoN normal target is cancelled.

[AIS-shore base station normal target]
When an AIS-shore base station target in a normal state is clicked on, the AIS-shore base station is selected and the numeric value of AIS-shore base station is displayed.

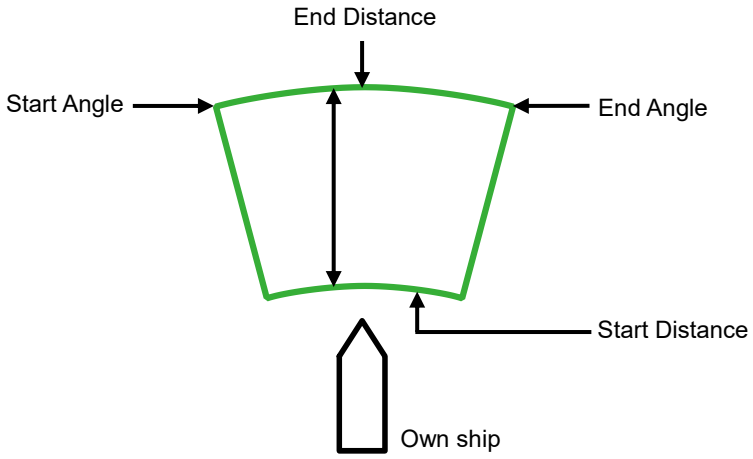
[Numeric displayed AIS-shore base station normal target]
When an AIS-shore base station in a normal state is clicked on, the AIS-shore base station is deselected and the numeric value of AIS-shore base station is cancelled.

3.13.3 TT

[TT target]
When TT target is clicked on, a numeric value is displayed.

[Numeric displayed TT target]
When a numeric displayed TT target is clicked on, the numeric value display of TT is cancelled.

3.13.4 (AZ) Acquisition/Activation Zone



[Start Angle]

When Start Angle is clicked on, the cursor is set to the Start Angle/End Angle change mode.

[End Angle]

When End Angle is clicked on, the cursor is set to the End Angle change mode.

[Start Distance]

When Start Distance is clicked on, the cursor is set to the Start Distance/End Distance change mode.

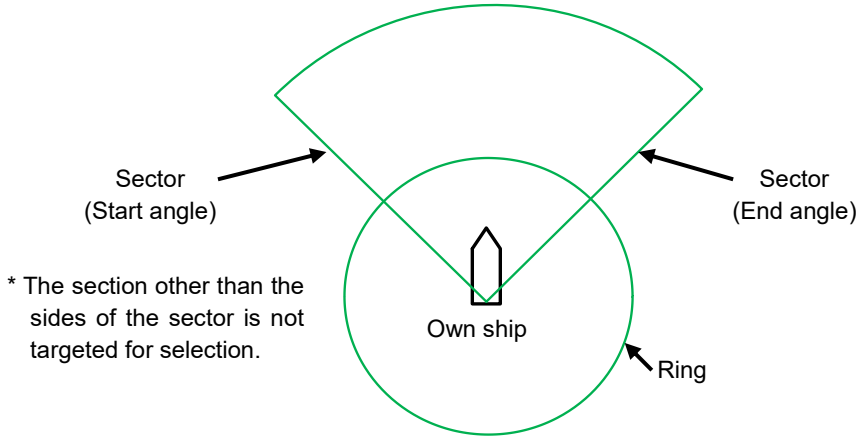
[End Distance]

When End Distance is clicked on, the cursor is set to the End Distance change mode.

Memo

When Acquisition/Activation Zone is not displayed on the radar screen, AIS automatic activation is disabled. If automatic AIS sleeping targets activation is necessary, please set up the acquisition/activation zone.

3.13.5 AIS filter



[Sector (start angle)]

When Sector (start angle) is clicked on, the cursor is set to the Sector (start/end angle) change mode.

[Sector (end angle)]

When Sector (end angle) is clicked on, the cursor is set to the Sector (end angle) change mode.

[Ring]

When Ring is clicked on, the cursor is set to the Ring change mode.

Memo

1 The values of Sector (start angle) and Sector (end angle) indicate relative bearings based on the ship's heading as the standard.

3.13.6 User map

The operation of an object in the unselected state is different from that of an object in the selected state.

3.13.6.1 Non-selected object

When an object created on the user map is clicked on, the object is selected and the property screen of the object is displayed.

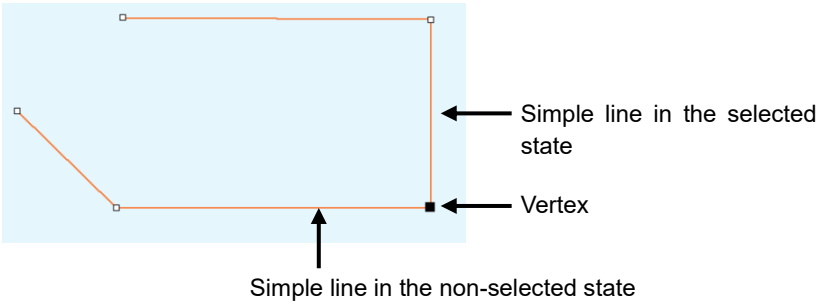
3.13.6.2 Selected object

The operation varies according to the object.

(1) Symbol

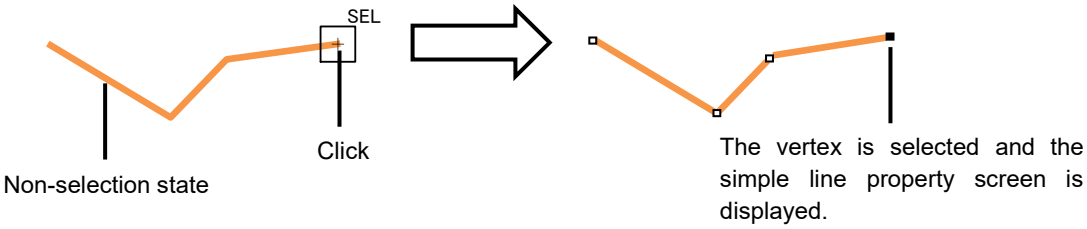
When the selected symbol is clicked on, a symbol move mode is set.
When the right button is clicked, the symbol move mode is cancelled.

(2) Simple line

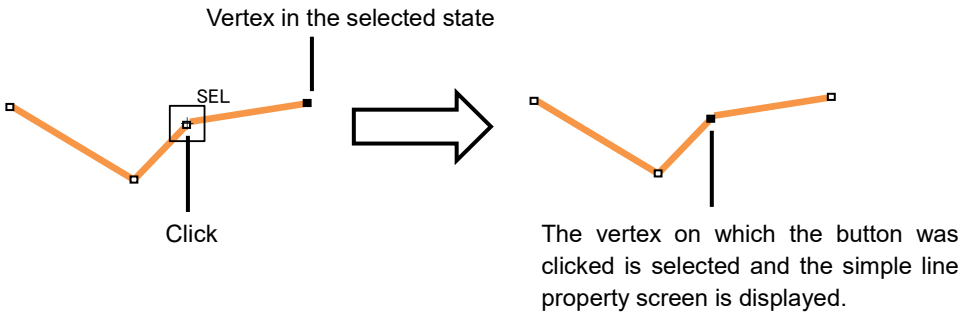


[Selecting vertex]

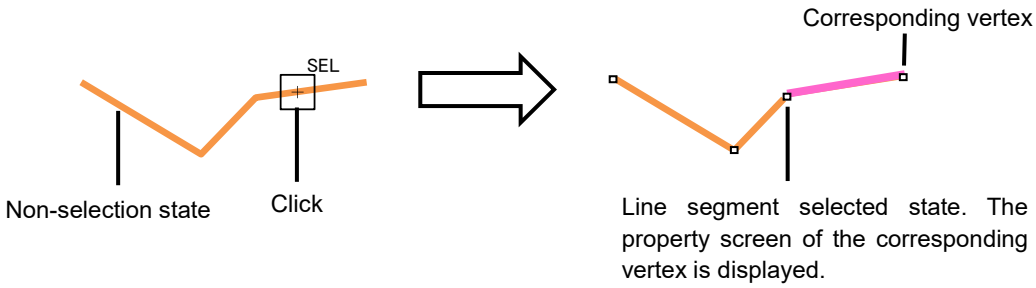
<Non-selected state>



<Selected state>



[Selecting a line segment]



[Moving a vertex]

When the middle point of simple line in the selected state is clicked on, vertex move mode of simple line is set.

[Inserting a vertex]

When a line segment of simple line in the selected state is clicked on, vertex insertion mode of simple line is set.

Memo

A vertex can also be inserted by using [Insert Vertex] on the context menu that is displayed by clicking the right button on the simple line in the selected state.

When the insertion point is the starting point or the ending point, a vertex can be inserted with [Add Vertex].

[Cancelling operation]

By clicking the right button, the vertex addition, move, or insertion mode can be cancelled.

(3) Line-Circle

[Moving Line-Circle]

When the circumference of the line-circle in the selected state is clicked on, move mode of line-circle is set.

[Chainging a radius]

When a square of four corners of the line-circle in the selected state is clicked on, radius set mode of line-circle is set.

[Cancelling operation]

By clicking the right button, the line-circle move or radius change mode can be cancelled.

(4) Line-Ellipse

[Moving line-ellipse]

When the circumference of the line-ellipse in the selected state is clicked on, move mode of line-ellipse is set.

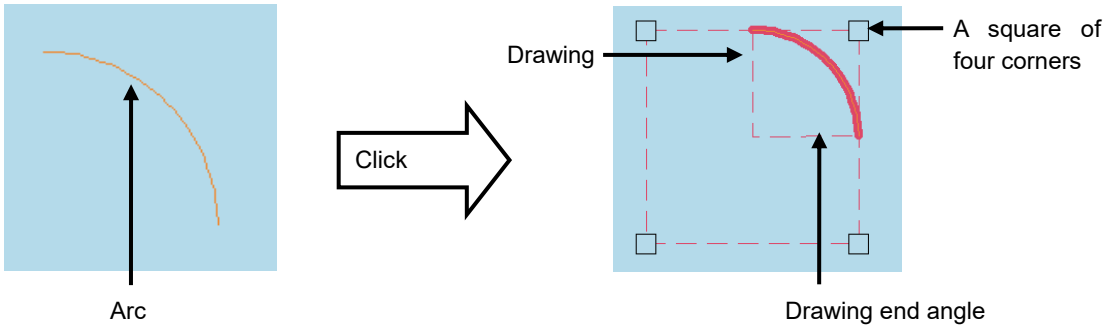
[Changing vertical/horizontal width]

When a square of four corners of the line-ellipse in the selected state is clicked on, a vertical/horizontal width change of line-ellipse mode is set.

[Cancelling operation]

By clicking the right button, the line-ellipse move or vertical/horizontal width change mode can be cancelled.

(5) Arc



[Moving an arc]

When the arc in the selected state is clicked on, move mode of arc is set.

[Changing a radius]

When a square of four corners of the arc in the selected state is clicked on, radius set mode of arc is set.

[Drawing start angle]

When a drawing start angle of the arc in the selected state is clicked on, drawing start angle set mode of arc is set.

[Drawing end angle]

When a drawing end angle of the arc in the selected state is clicked on, drawing end angle set mode of arc is set.

[Cancelling operation]

By clicking the right button, the arc move, radius change, drawing start angle change, or drawing end angle change mode can be cancelled.

(6) Polygon

[Moving a vertex]

When a vertex of the polygon in the selected state is clicked on, vertex move mode of polygon is set.

[Inserting a vertex]

When a line segment of the polygon in the selected state is clicked on, vertex insertion mode of polygon is set.

> **Memo**
>
> A vertex can also be inserted by using [Insert vertex] on the context menu that is displayed by clicking the right button on the selected polygon.

[Moving a polygon]

When the inside of the polygon in the selected state is clicked on, move mode of polygon is set.

[Cancelling operation]

By clicking the right button, the vertex move, insertion, or polygon move mode can be cancelled.

(7) Area-Circle

[Moving Area-Circle]

When the radius of the area-circle in the selected state is clicked on, an area-circle move mode is set.

[Changing a radius]

When a square formed by four corners of area-circle in the selected state is clicked on, an area-circle radius setting mode is set.

[Cancelling operation]

By clicking the right button, the area-circle move or radius change mode can be cancelled.

(8) Area-Ellipse

[Moving area-ellipse]

When the radius or inside of the area-ellipse in the selected state is clicked on, an area-ellipse move mode is set.

[Changing a radius]

When a square formed by four corners of area-ellipse in the selected state is clicked on, an area-ellipse radius setting mode is set.

[Cancelling operation]

By clicking the right button, the area-ellipse move or radius change mode can be cancelled.

(9) Sector

[Moving a sector]

When a circumference or inside of the sector in the selected state is clicked on, a fan move mode is set.

[Changing a radius]

When a square formed by four corners of the sector in the selected state is clicked on, a sector radius setting mode is set.

[Drawing start angle]

When a drawing start angle of the sector in the selected state is clicked on, a sector drawing start angle setting mode is set.

[Drawing end angle]

When a sector drawing end angle in the selected state is clicked on, a sector drawing end angle setting mode is set.

[Cancelling operation]

By clicking on the right button, the sector move, radius change, drawing start angle change or drawing end angle change mode can be cancelled.

(10) Text

[Moving text]

When the text object in the selected state is clicked on, move mode of the text object is set.

[Cancelling operation]

By clicking the right button, the text move mode can be cancelled.

(11) Arrow

[Moving an arrow]

When a line segment of the arrow in the selected state is clicked on, move mode of the arrow is set.

[Moving a start point]

When a start point of the arrow in the selected state is clicked on, start point move mode of the arrow is set.

[Moving an end point]

When an end point of the arrow in the selected state is clicked on, end point move mode of the arrow is set.

[Cancelling operation]

By clicking the right button, the arrow move or start point/end point move mode can be cancelled.

3.13.7 Mariner's Mark/Line

3.13.7.1 Object in the non-selected state

When the object that is created by using Mariner's Mark/Line is clicked on, the object is selected and the property screen of the object is displayed.

3.13.7.2 Object in selected state

The operation varies according to the object.

(1) Event mark in the selected state

When an event mark is clicked on, the selected state of the event mark is cleared.

(2) Information Mark

When Information Mark in the selected state is clicked on, move mode of Information Mark is set.
By clicking the right button, the Information Mark move mode can be cancelled.

(3) Tidal Stream

When Tidal Stream in the selected state is clicked on, move mode of Tidal Stream is set.
By clicking the right button, the Tidal Stream move mode can be cancelled.

(4) Clearing Line

[Moving Clearing Line]

When a line segment of Clearing Line in the selected state is clicked on, move mode of Clearing Line is set.

[Moving a start point]

When a start point of Clearing Line in the selected state is clicked on, start point move mode of Clearing Line is set.

[Moving an end point]

When an end point of Clearing Line in the selected state is clicked on, end point move mode of Clearing Line is set.

[Cancelling operation]

By clicking the right button, the Clearing Line move or start point/end point move mode can be cancelled.

(5) Highlight

[Moving a vertex]

When a vertex of a highlight in the selected state is clicked on, vertex move mode of highlight is set.

[Inserting a vertex]

When a line segment of a highlight in the selected state is clicked on, vertex insertion mode of highlight is set.

> **Memo**
>
> A vertex can also be inserted by using [Insert vertex] on the context menu that is displayed by clicking the right button on a highlight in the selected state.

[Moving a highlight]

When an inside of a highlight in the selected state is clicked on, entire shift mode of highlight is set.

[Cancelling operation]

By clicking the right button, the vertex move, insertion, or highlight move mode can be cancelled.

(6) Plotted Position

[Moving a Plotted position]

When Plotted position in the selected state is clicked on, a Plotted position mode move is set.

[Cancelling operation]

By clicking the right button, the Plotted position move mode can be cancelled.

3.13.8 Manual updating

3.13.8.1 Unsaved object

The operation of AUTO mode of unsaved objects is the same as for the user map.

3.13.8.2 Saved object

When setting an edit mode by clicking on the saved object, the property screen of the saved object is displayed.

3.13.9 EBL

When EBL is clicked, the mode becomes one in which EBL is operated alone.

3.13.10 VRM

When VRM is clicked, the mode becomes one in which VRM is operated alone.

3.13.11 EBL/VRM intersecting point

When the EBL/VRM intersection point is clicked, the mode becomes one in which EBL and VRM are operated simultaneously.

3.13.12 Node Fixed EBL/VRM

When Node Fixed EBL/VRM is clicked on, the clicked point becomes the EBL/VRM intersecting point, and an EBL/VRM (1step) drawing mode is set. (The start point follows the own ship’s position.)

3.13.13 PI

Four PI setting modes are available and the operation of the cursor AUTO mode varies depending on the setting.
For the details, refer to "4.6 Using Parallel Index Line (PI)".

3.14 Saving the screen that is currently displayed

The image that is displayed on the screen can be saved as a PNG file.
Use the following procedure to save screen images.

1 Click on the Disclosure button on the left toolbar.

Buttons normally hidden are displayed.

2 Click on the screen capture button.

The screen that is currently displayed is saved and the next confirmation dialog box is displayed.

When the screen contents cannot be saved:

When the screen contents cannot be saved due to insufficient disk free space, an error dialog is displayed.
In this case, secure sufficient disk free space and save the contents again.

3.15 [MULTI] Dial

3.15.1 Functions of [MULTI] dial

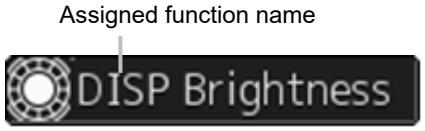
By turning the [MULTI] dial, the functions that are assigned to the [MULTI] dial can be operated.

Assignment to the [MULTI] dial can be changed.

3.15.2 Functions assigned to [MULTI] dial

3.15.2.1 Displaying a screen for setting the function that is assigned

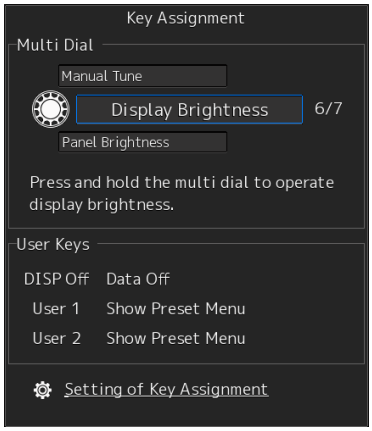
By pressing the [MULTI] dial, the setting screen for the function that is currently assigned can be displayed.



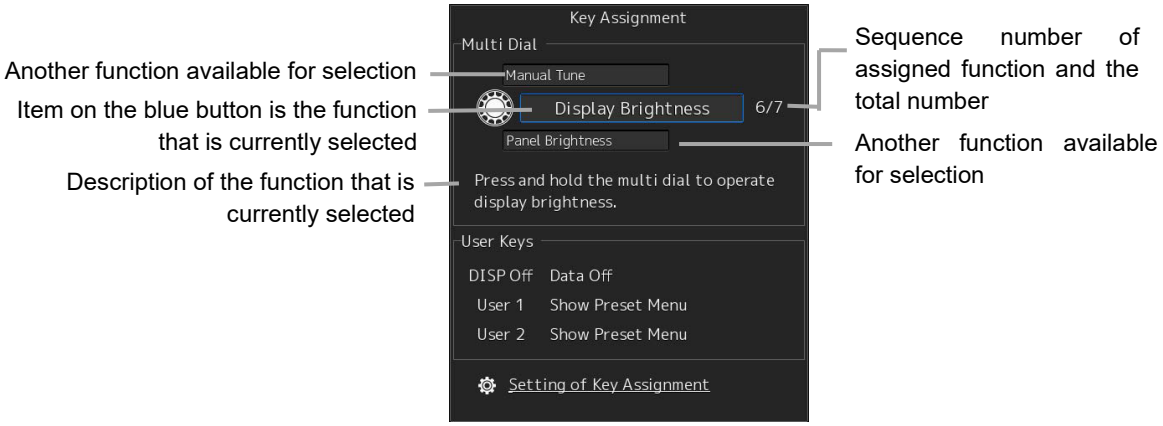
3.15.2.2 Changing the function that is assigned

1 **Press the [MULTI] dial.**

The [Key Assignment] dialog box of the assigned function is displayed.



2 Select a function to be assigned from [Multi Dial] by turning the [MULTI] dial.



The table below lists the functions that can be assigned.

No.	Function name	Function outline
1	Vector Time	Selection of a vector length
2	Trails Length	Selection of a radar trail length
3	C UP Angle	Change of the course-up angle
4	Own Track Color	Selection of an own track color
5	Manual Tune	Manual tuning
6	Display Brightness	Adjustment of brightness of the display panel
7	Panel Brightness	Adjustment of brightness of the operation panel
8	Gain	Adjustment of sensitivity
9	Sea	Removal of sea clutter
10	Rain	Removal of rain and snow clutter

3 Press the [MULTI] dial.

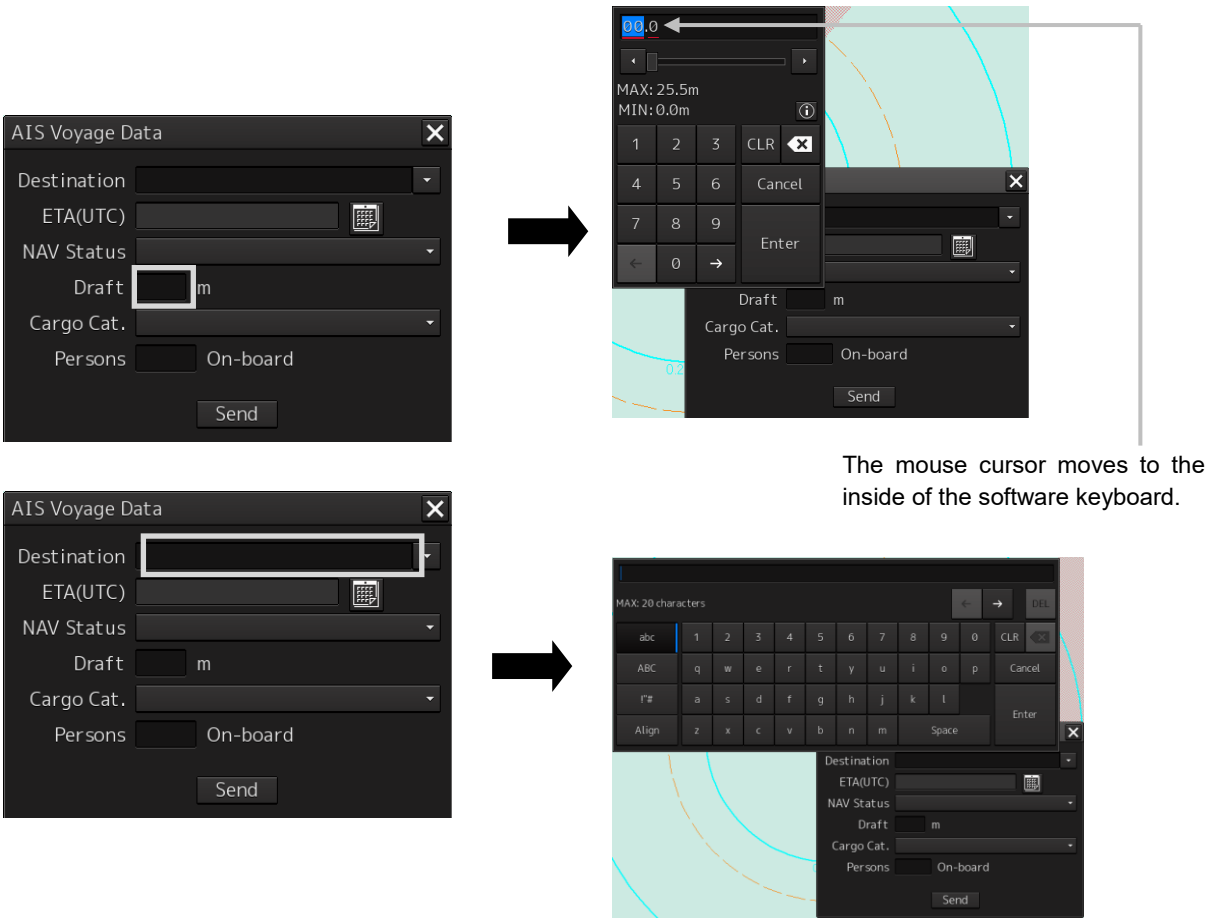
The selected function is set to the assigned function.

3.16 Basic Operations of the Software Keyboard

Use a software keyboard for inputting numeric values and characters in various setting operations. This section describes the basic operations of a software keyboard.

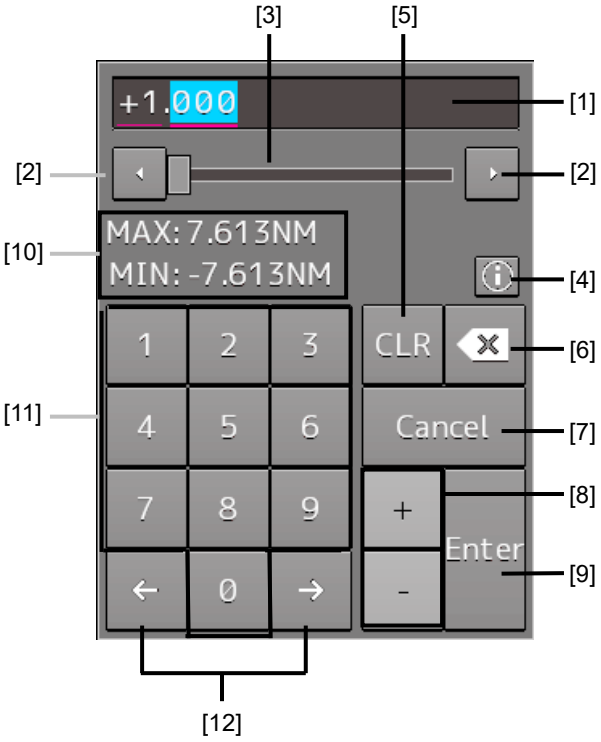
3.16.1 Starting a software keyboard

When the mouse button is clicked on a numeric input text box on such as a dialog box, a numeric input software keyboard is displayed.
When the mouse button is clicked on a character input text box, a character input full keyboard is displayed.



3.16.2 Name and function of each section of the keyboard

Numeric value input software keyboard



Sowtware full keyboard for character input

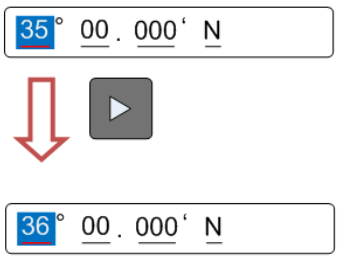
* The description of the functions common to those of a numeric value input software keyboard is omitted.

[1] Input value display section

Displays the value that is input/edited through the software keyboard.

[2] Spin button

When the right spin button is clicked on, the minimum unit value that can be set is added to the value that is displayed. When the left spin button is clicked on, the minimum unit value that can be set is subtracted from the value that is displayed.



Example of addition

When the mouse button is held down on the right spin button, the value is added consecutively. When the mouse button is held down on the left spin button, the value is subtracted consecutively.

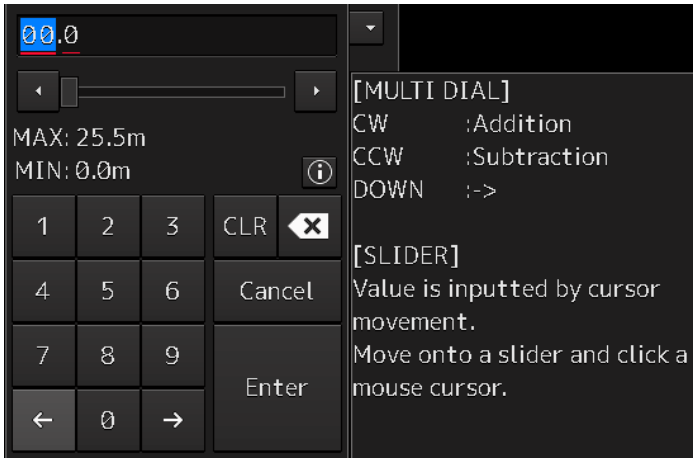
When the value set by the right spin button operation exceeds the maximum value, the minimum value is set subsequently. When the value set by the left spin button operation becomes lower than the minimum value, the maximum value is set subsequently.

[3] Numeric value slider

When the value adjustment button on the value slider is clicked on, the input value increases or decreases.

[4] Operation guide display button

Displays an operation guide.



To close the operation guide, click on the operation guide display button again or click on a location other than the operation guide.

[5] [CLR] key

Clears the input value that is currently selected.

[6] Back Space key

Clears the input value on the left-side of the cursor position.

[7] [Cancel] key

Cancels the input operation and closes the software keyboard.

[8] Option key

Displays the following keys according to the type of the software keyboard.

Signed keyboard: + key and - key

Latitude software keyboard: Direction key [N key and S key)

Longitude software keyboard: Direction key [E key and W key)

[9] [Enter] key

Determines the input operation.

[10] Input range display section [format display section)

Displays the values and character types that can be input.

[11] Numeric keys

Use the keys for input of numeric values.

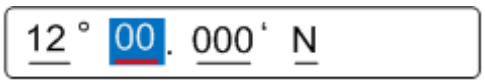
[12] Arrow keys

When there are multiple input parts, the active part can be moved to the left/right by clicking on the arrow key.

Example:

When the (left arrow key) is clicked on, the input section moves to "12".

When the (right arrow key) is clicked on, the input section moves to "000".



[13] Lowercase character switching key

Changes the character input key mode to the lowercase character mode.

[14] Uppercase character switching key

Changes the character input key mode to the uppercase character mode.

[15] Symbol switching key

Changes the character input key mode to the symbol mode.

[16] Key alignment switching key

Switches the character key alignment between QWERTY alignment and alphabetic alignment.

[17] Character input key

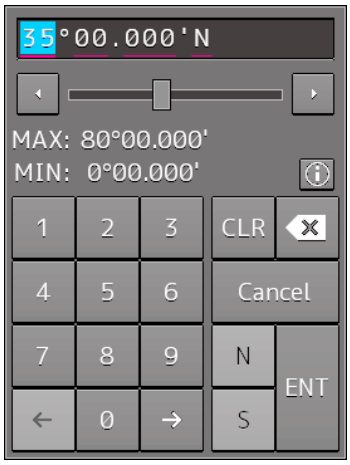
Use this key for character input.

[18] [DEL] key

Deletes the character on the right-side of the cursor.

3.16.3 Numeric value input example

In this example, "12°34.567' S" (south latitude 12°34.567') is input as the latitude.



1 **Start up the latitude software keyboard.**

35 ° 00 . 000 ‘ N

2 **Enter "1".**

1 ° 00 . 000 ‘ N

3 **Enter "2".**

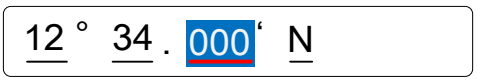
12 ° 00 . 000 ‘ N

The active part moves to the right by one position.

4 **Enter "3".**

12 ° 3 . 000 ‘ N

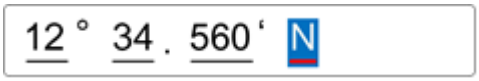
5 **Enter "4".**



The active part moves to the right by one position.

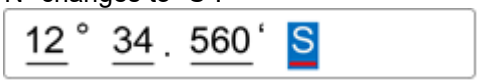
6 **Enter "5" and "6".**

7 **Set the active part by clicking on the input part ("N" in this example) at the right end.**



8 **Click on the [S] key of the option key.**

"N" changes to "S".

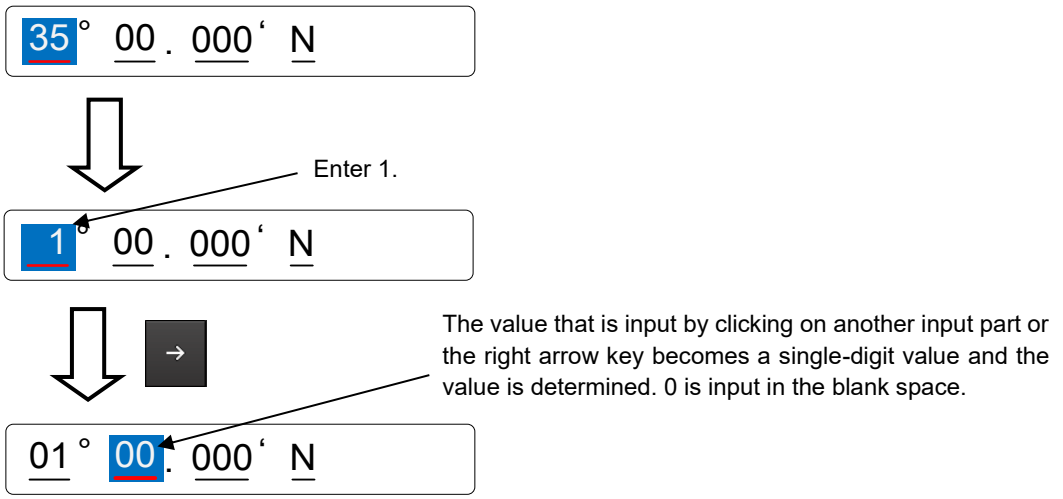


9 **When the right arrow key is clicked, input is determined and the software keyboard is closed.**

3.16.3.1 Inputting a single-digit value

Enter a value and click on another input part or move the active part by using the right arrow key.

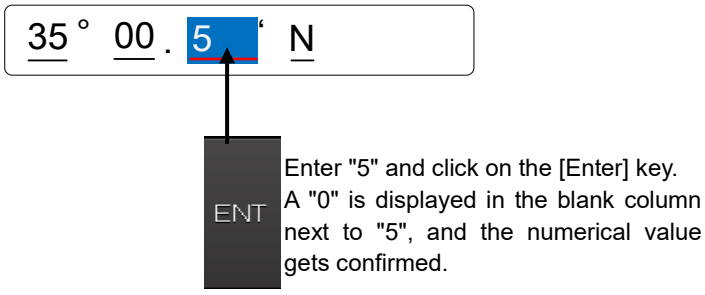
Example:



3.16.3.2 Inputting blank space in the decimal fraction section (3 digits)

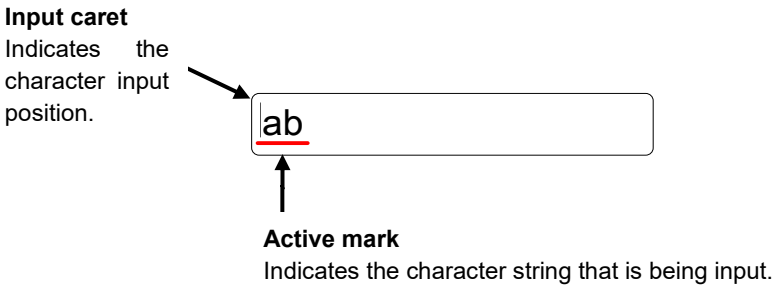
After a value is input and the [Enter] key is clicked on, the input of the decimal fraction section is determined.

Example:



3.16.4 Character input example

This section describes character input by using a full keyboard.



3.16.4.1 Input example

1 **Start up a full keyboard.**

When a value [character) has been input in the text box, the full character string is selected at startup.

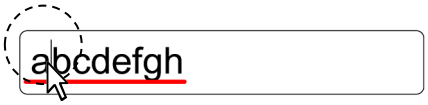
2 **Delete the character string by clicking the Back Space key.**

3 **Input any character string.**

3 **Determine the input by clicking on the [Enter] key.**

3.16.4.2 Character modification example

1 **Move the cursor to the left-end (or right-end) of the character string to be modified and click the mouse button.**



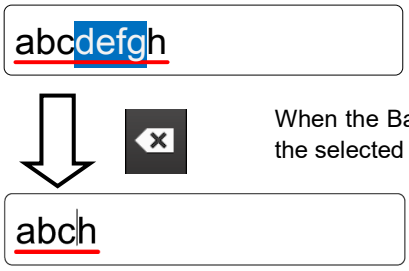
The input caret moves to the clicked position.

2 **Click the mouse button on the input caret position and select the character string to be modified by dragging with the trackball.**

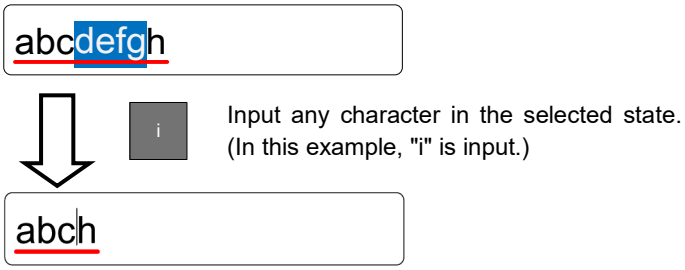
* When the character string is selected, the input caret is cleared.

3 **Perform the following operation in the selected state.**

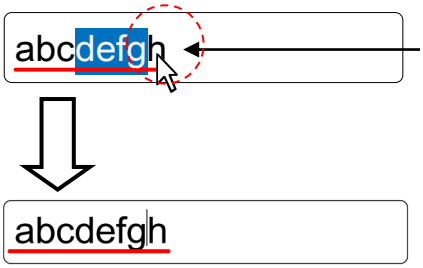
[Deleting a selected section]



[Replacing a selected section]



[Canceling a selected state]



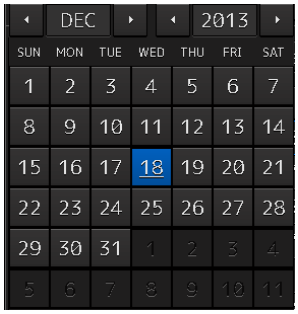
Under a selected state, click on another section inside of the active mark to cancel the selection. The input caret moves to the clicked position.

4 After modification is determined, determine the input by clicking on the [Enter] key.

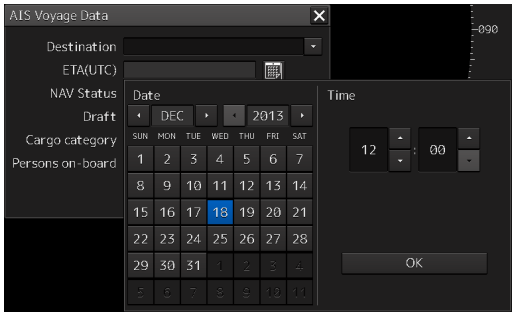
3.17 Setting a Date and a Time (Calendar Operation)

Set a date and a time on the calendar input screen.

The following calendar types are available.



Calendar picker

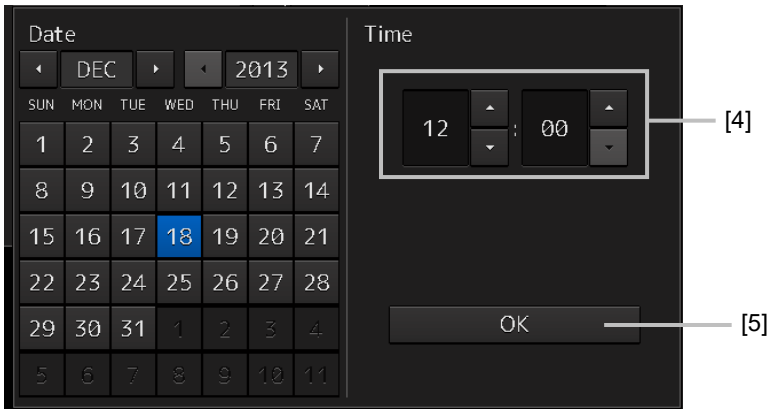


Calendar picker + Time picker

From-To calendar picker
+ Time picker

3.17.1 Details and usage of a calendar picker and a time picker

3.17.1.1 Details of a calendar



[1] Year selection spin button

Selects a year to be displayed in the date selection box.

When the right spin button is clicked on, the year is changed in the ascending order.

When the left spin button is clicked on, the year is changed in the descending order.

[2] Month selection spin button

Selects a month to be displayed in the date selection box.

When the right spin button is clicked on, the month is changed in the ascending order.

When the left spin button is clicked on, the month is changed in the descending order.

[3] Day selection box

Selects a day.

[4] Time selection spin button

Sets an hour, a minute, and a second.

When the upper spin button is clicked on, the hour, minute, and second are changed in the ascending order.

When the lower spin button is clicked on, the hour, minute, and second are changed in the descending order.

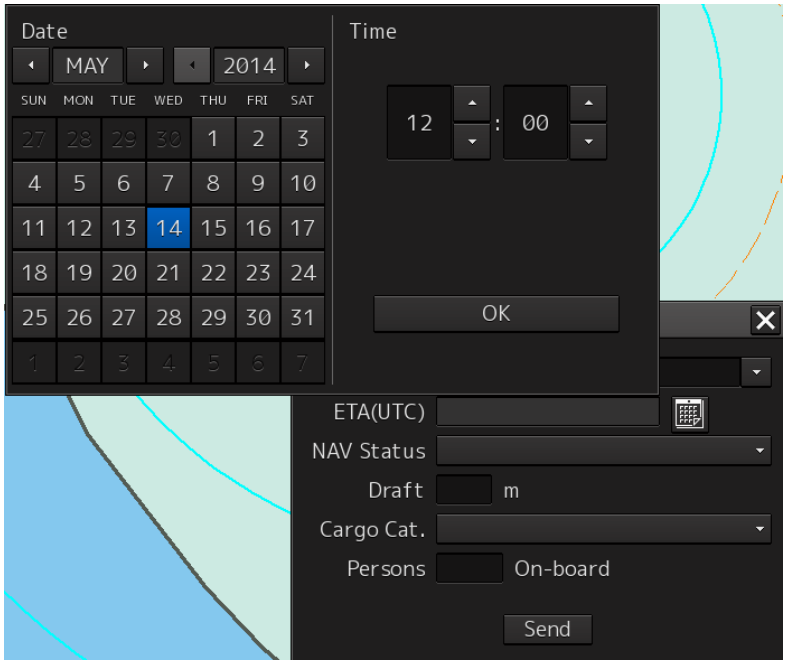
[5] [OK] button

Completes the setting and closes the calendar.

3.17.1.2 How to use a calendar

1 Click on (calendar) button next to the date setting box.

A calendar is displayed.



2 Set a year and a month by using the year selection spin button and the month selection spin button respectively.

3 Click on the day to be set from the day selection box.

* In the case of a calendar picker only, the day is set at this stage and the calendar picker is closed.

4 Set a time by clicking on the time spin button of the time picker.

5 Click on the [OK] button.

The setting is completed and the calendar is closed.

3.18 Help

Help information on the operation of this equipment can be displayed.

For the details of installation of Help, refer to “14.7 Updating Help data”.

> **Memo**
> The Preface, Section 1 and Appendix A are not displayed in the Help.

1 **Click on the [Menu] button on the left toolbar.**

The menu is displayed.

2 **Click on the [Help] button on the menu.**

The [Help] dialog box appears.

[1] Backward button

The display of the content display panel goes backwards by one.

[2] Forward button

The display of the content display panel goes forwards by one.

[3] [Contents] tab

Displays the contents. The contents are displayed in the content panel.

For the procedure, refer to "Searching the required information from the contents"

[4] Content panel

The contents are displayed in tree format. When an item is clicked on, the related contents are displayed in the content display panel.

[5] Home button

Displays the home screen of the [Help] dialog box.

[6] [Search] tab

Searches the character string in Help.

For the procedure, refer to "Searching terminologies ".

[7] Content display panel

Displays the contents of the item that was clicked on.

[8] [×] button.

Closes the [Help] dialog box.

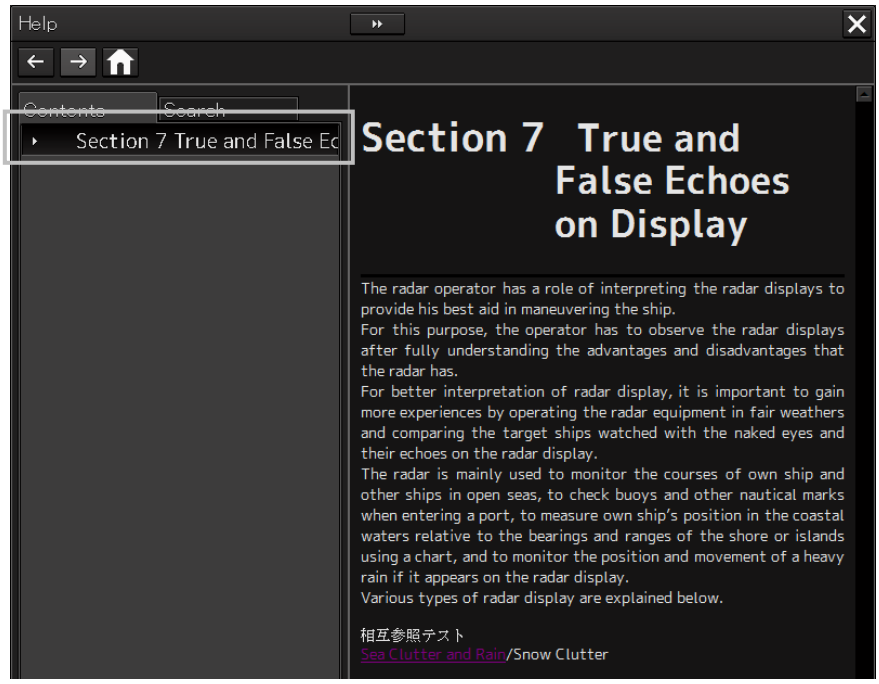
Searching the required information from the contents.

1 **Click on the [Contents] tab.**

The contents are displayed on the contents panel.

2 **Click on the item containing the required information.**

The contents of the item that was clicked on are displayed on the contents display panel.



Searching terminologies

1 **Click on the [Search] tab.**

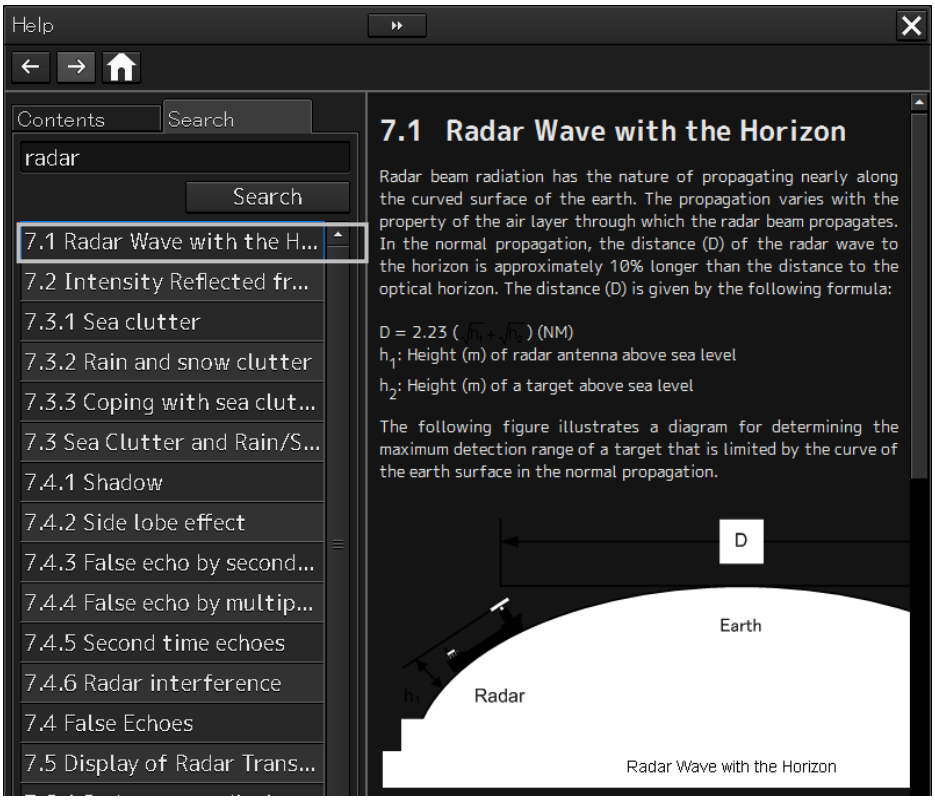
A search character input box is displayed.

2 **Enter a required terminology and click on the [Search] button.**

Search is performed within Help. When the applicable terminology is hit, the item containing the terminology is displayed on the contents panel.

3 **Click on the item containing the required information.**

The contents of the item that is clicked on are displayed on the contents display panel.



3.19 Password Input

Equipment settings are protected by a password. To open the dialog box of the protected setting function, the password input is necessary.

Use the following procedure to enter a password.

1 Click on the [Menu] button on the left toolbar.

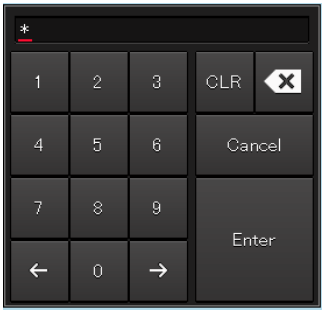
The menu is displayed.

2 Change over to the second page of the menu using the page switching button of the menu.

3 Click on the [Code Input] button on the Menu.

The password input dialog box appears.

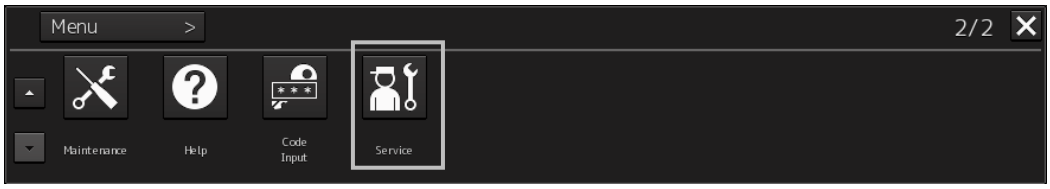
4 Enter "0" (zero) and click on the [Enter] key.



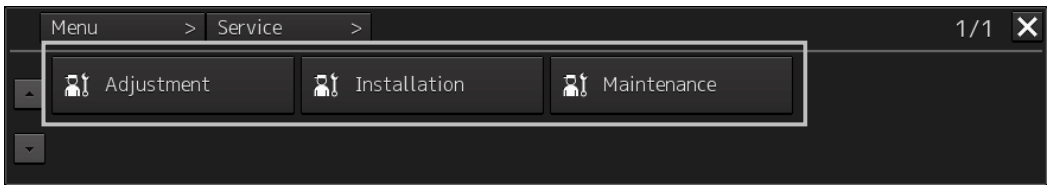
5 **Display the menu by clicking again the [Menu] button on the left toolbar, and change over to the second page using the page switching button.**

The [Service] button is displayed in the menu.

6 **Click on the [Service] button.**



Check that service-related menus are displayed in the sub-menu.



Subsequently, service-related menus can be set.

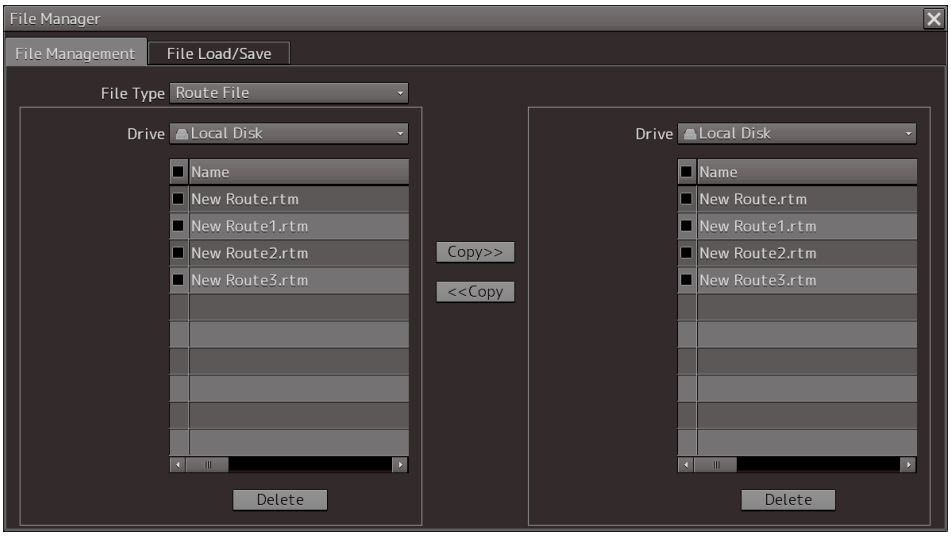
3.20 Managing Files with File Manager

The file manager function enables the copying of route files and user map from the hard disk of this equipment to external storage media such as DVD or from external storage media to the hard disk of this equipment.

3.20.1 Displaying the [File Manager] dialog box

1 **Click on the [Menu] on the left toolbar.**
The menu is displayed.

2 **Click on the [Tools] - [File Manager] button on the menu.**
The [File Manager] dialog box appears.



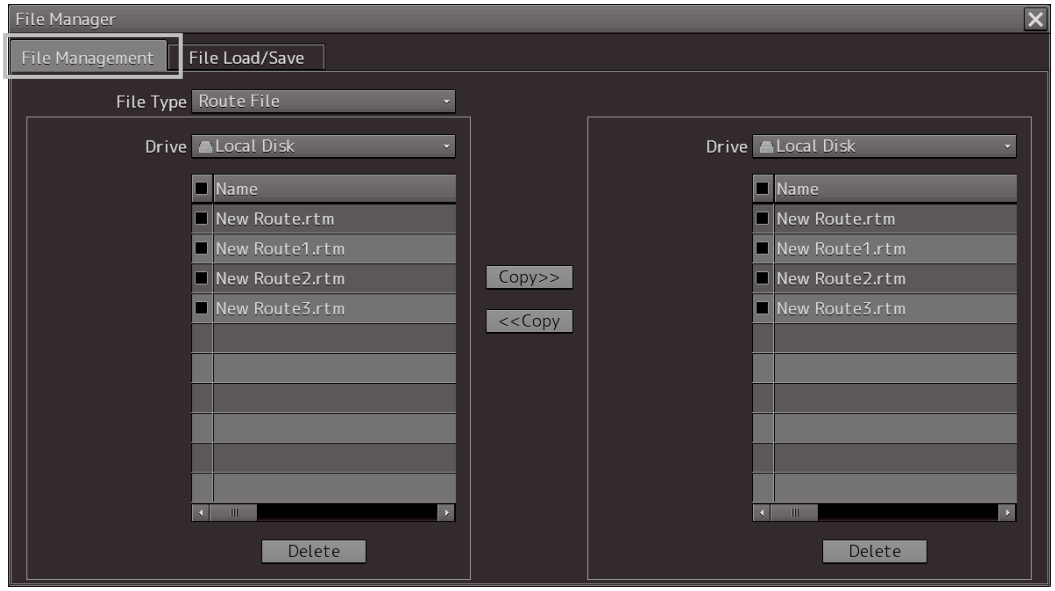
3.20.2 File management

The [File Management] tab enables file management.

File management copies files between SSD of this equipment and external storage media and deletes files.

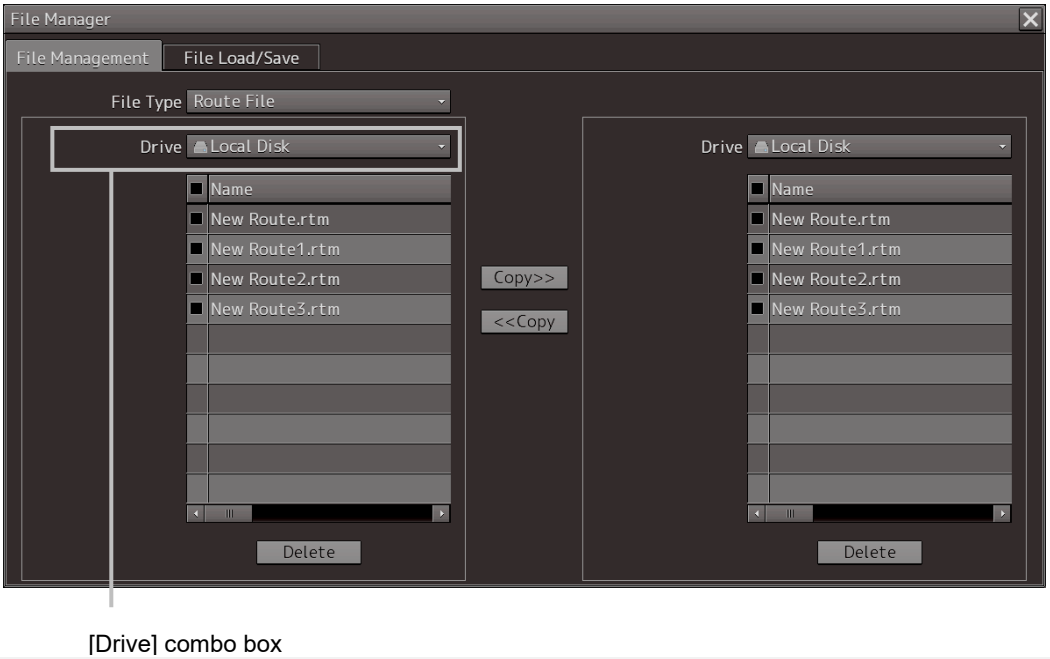
This section describes file management by using the example copying a file in the file list of the drive that is specified in the [Drive] list on the left hand side of the dialog box to the drive that is specified in the [Drive] list on the right hand side.

1 Click on the [File Management] tab.



2 Select the drive that contains the file to be copied from the [Drive] combo box.

Files in the drive are displayed in the list.

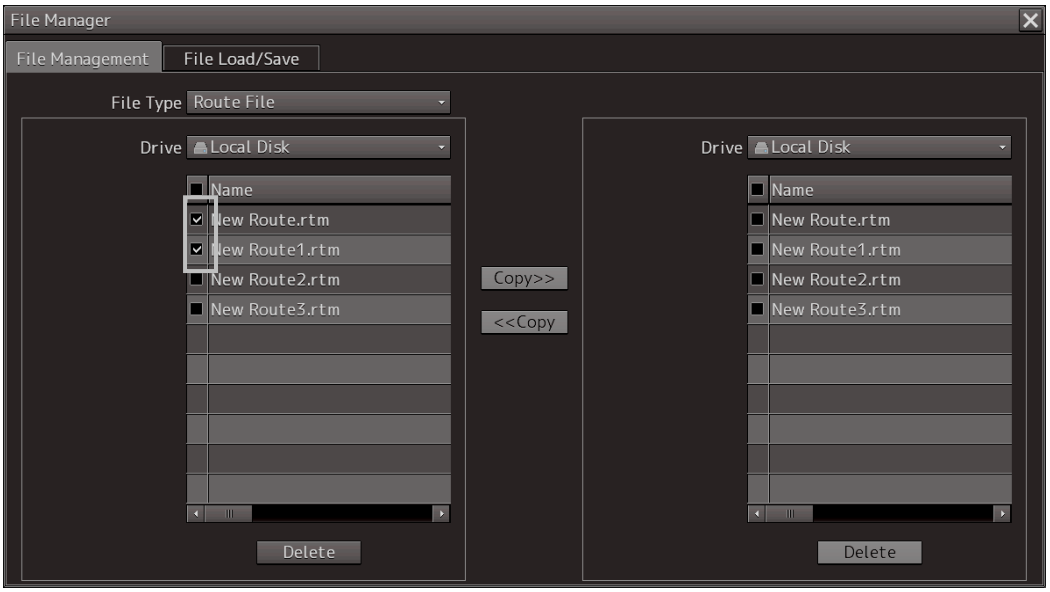


[Drive] combo box

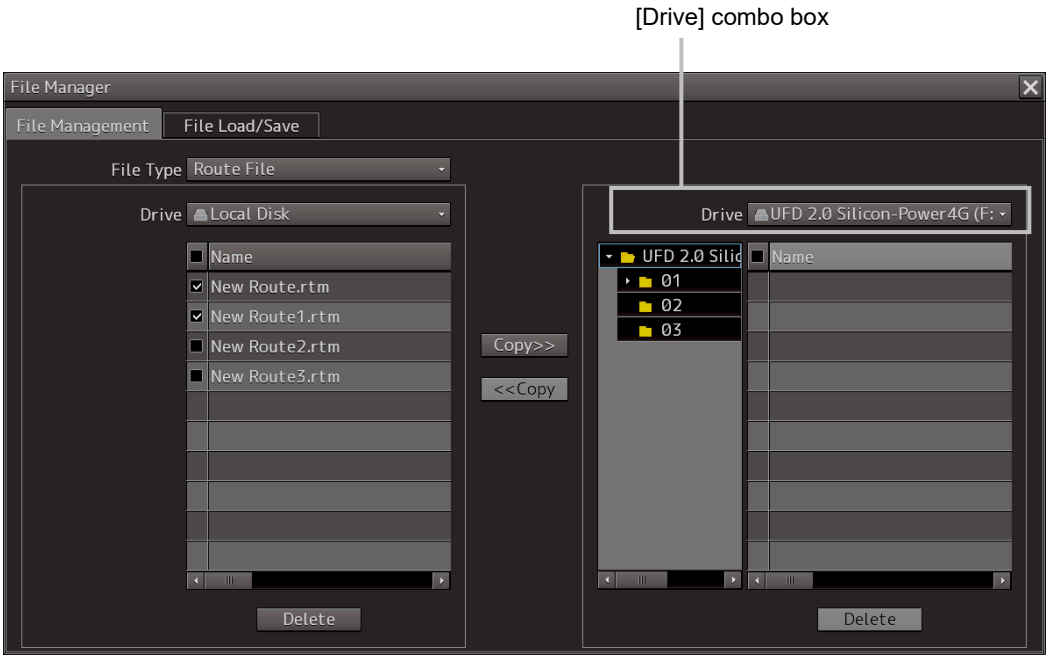
The following file types can be displayed by the file manager.

No.	File type	File extension	Contents
1	Route File	rtm	Route
2	User Map	uchm	User map
3	Target Track	ttr	Track of other ship (including the GPS buoy)
4	Screen Shot (AUTO)	png	Automatically generated screen shot
5	Screen Shot (User)	png	Manually generated screen shot
6	Preferences	ini	Personal setting
7	Playback	pbl, index, pbo, rot, pbt	Playback data
8	Logbook	lgb, lgblst	Logbook (for up to 3 months)

3 Select the files to be copied by checking them.

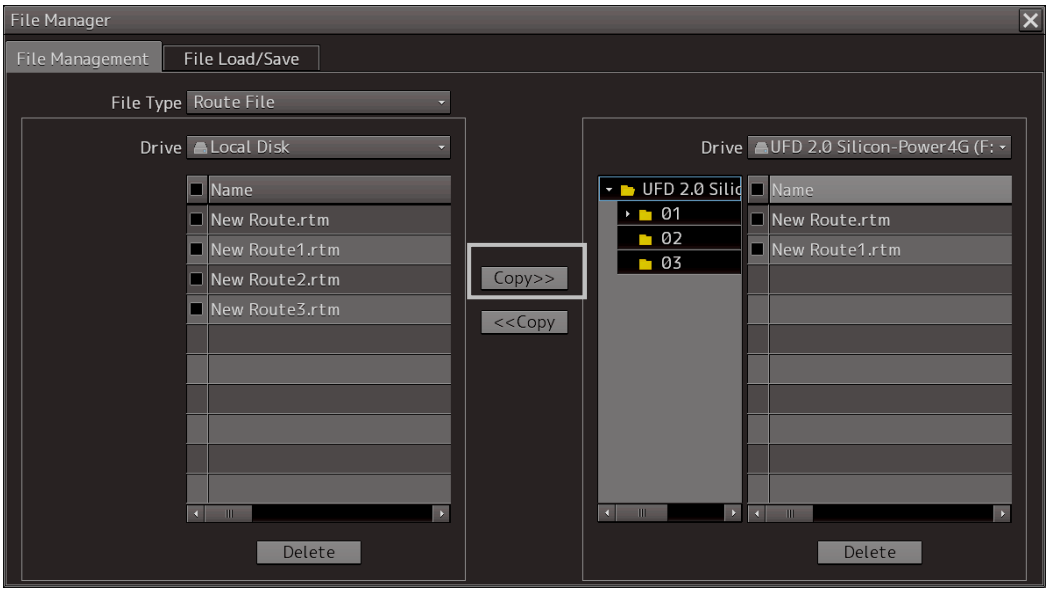


4 **Select a drive of the storage destination from the [Drive] combo box and select a copy location from the folder tree that is displayed.**



5 **Click on the [Copy>>] (copy to the right) button.**

The files are copied.



When the drive of the copy source and the drive of the copy destination are reversed, click on the [<<Copy] (copy to the left) in Step 5.

Deleting a file

1 **Click on the [Delete] button.**
A deletion confirmation dialog is displayed.

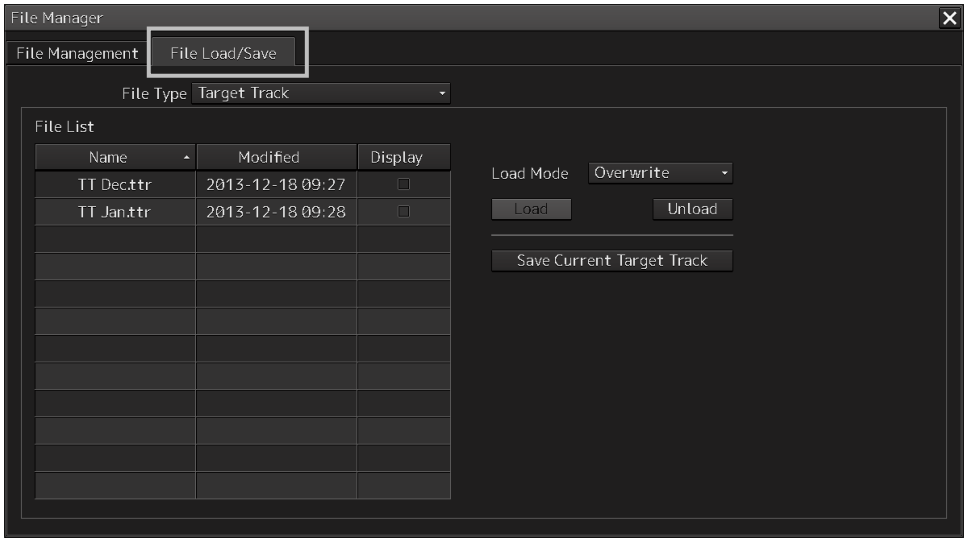
2 **To delete the file, click on the [OK] button.**

3.20.3 Loading and saving files

The [File Load/Save] tab enables loading and saving files.

3.20.3.1 Loading files

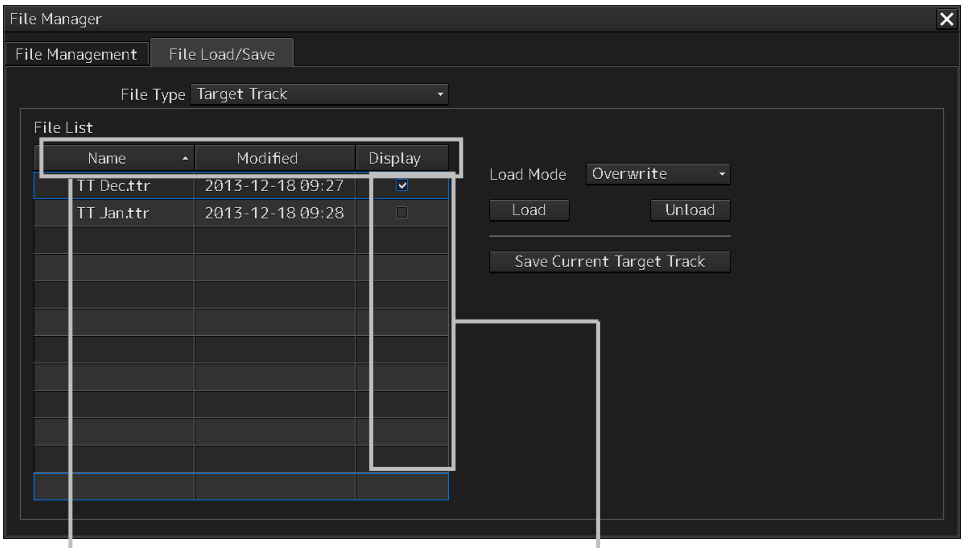
1 **Click on the [File Load/Save] tab.**



2 Check [Display] of the file to be loaded.

Memo

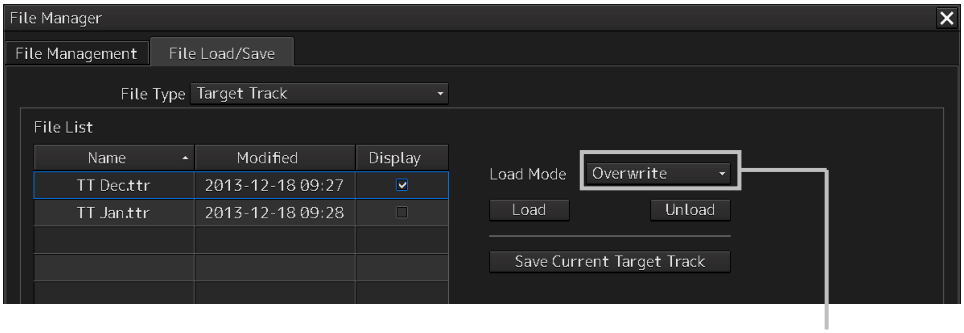
Only one file can be selected each time.



[Name] (file name)
[Modified] (last modified date)
[Display] (column check box)
Each title is sorted in the ascending/descending order whenever the button is clicked on.

Temporarily displays the Track of the line that was checked.
When the line is unchecked, the line is hidden.

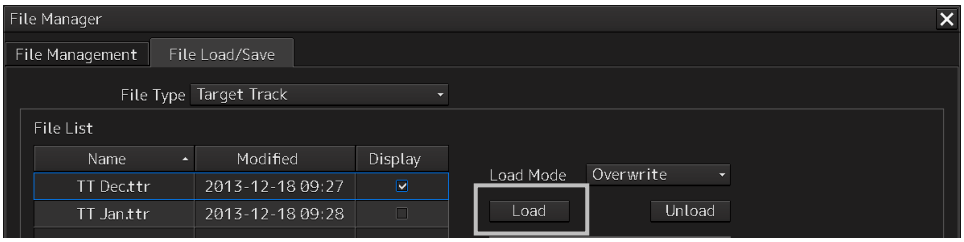
3 Select the file loading mode from the [Load Mode] combo box.



One of the following modes is displayed.

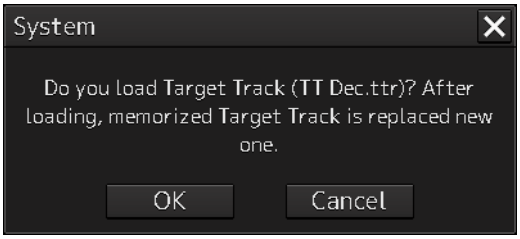
- **[Overwrite]**
- **[Add]**

4 **Click on the [Load] button.**



A confirmation dialog box appears.

5 **Click on the [OK] button.**



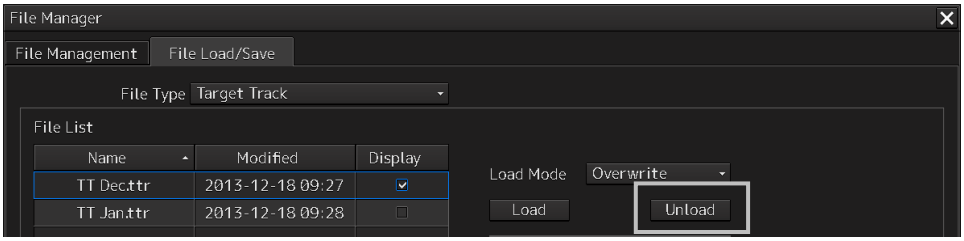
The selected file is loaded.

3.20.3.2 Unloading data (clearing data from the data screen)

1 **Click on the "File Load/Save" tab.**

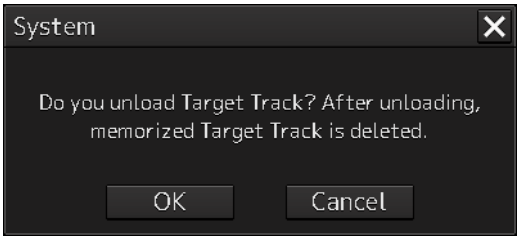
2 **Select a file type from the [File type] combo box.**

3 **Click on the [Unload] button.**



A confirmation dialog box appears.

4 **Click on the [OK] button.**



The Target track data is cleared from the screen.

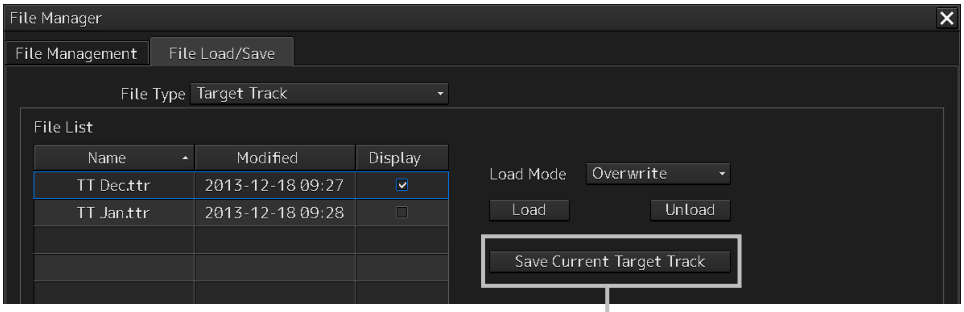
3.20.3.3 Saving files

1 Click on the [File Load/Save] tab.

2 Select a file type from the [File type] combo box.

3 Click on the [Save Current Target Track] button.

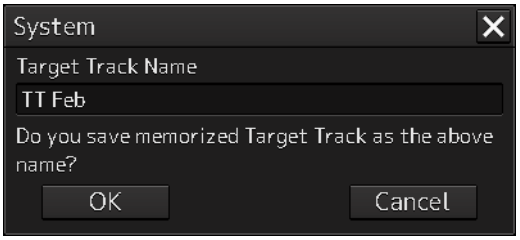
Memo
The name of the Save button varies according to the file type.



[Save Current Target Track] button

A confirmation dialog box appears

4 Enter a name under which the file is saved in the input box and click on the [OK] button.



The Target Track that is stored is saved.

3.21 Returning to a Task Menu by Ending the Operation

1 **Click on the [MENU] on the left toolbar.**

The menu is displayed.

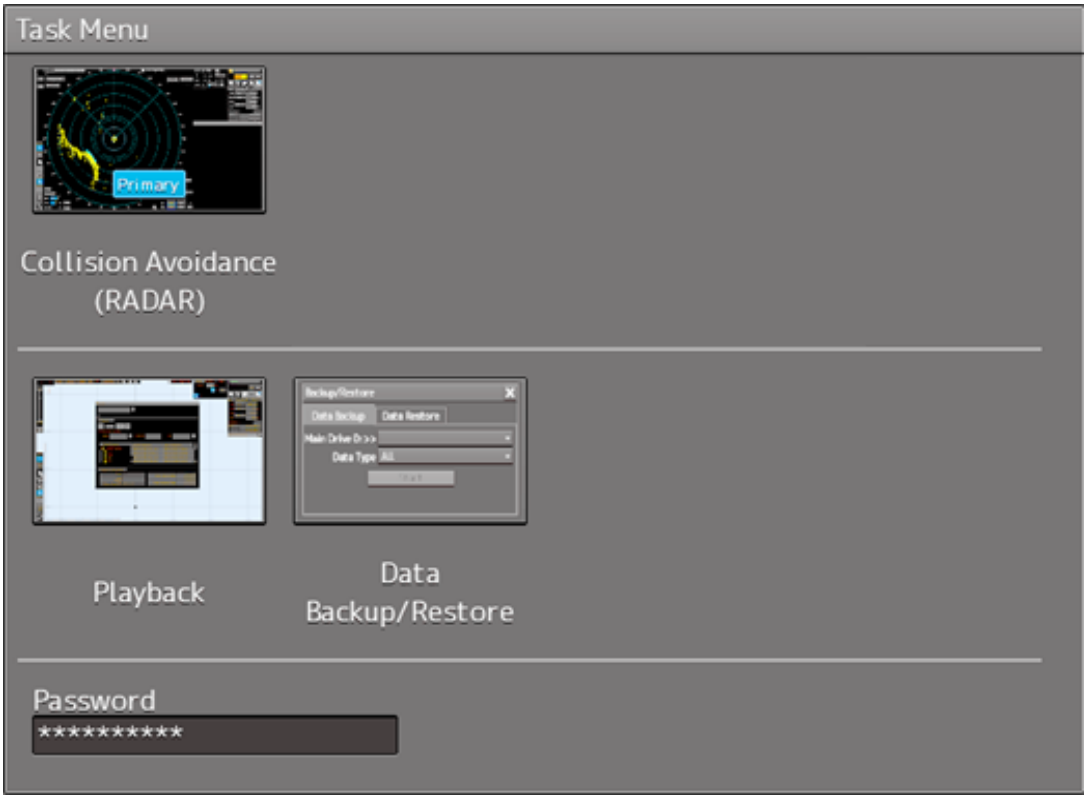
2 **Change over to the second page of the menu using the page switching button of the menu.**

3 **Click on the [Code Input] button on the menu.**

The password input dialog box appears.

4 **Enter 9999 and click on the [Enter] key.**

Returns to the task menu.



3.22 Terminating this equipment

⚠WARNING

When turning off the power supply, do not hold down the power button of the operation unit.
Otherwise, a trouble may occur due to termination failure.

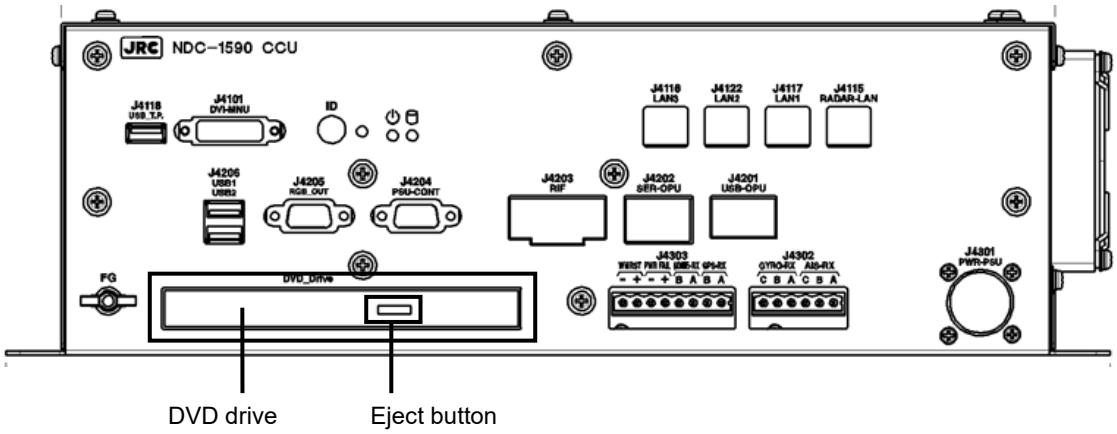
1 **Press the power supply button on the operation unit.**
The power is turned off and the light of power supply button goes off.

3.23 Using a DVD Drive

⚠CAUTION

Do not leave the disc in the DVD drive.
Malfunctions of the drives may result.

A DVD drive is installed in the panel of this equipment. Use the drive by removing the panel.



Note
Do not remove a DVD disk while the access lamp of the DVD drive is lit.

4 Range and Bearing Measurement Methods

4.1 List of Measuring Tools

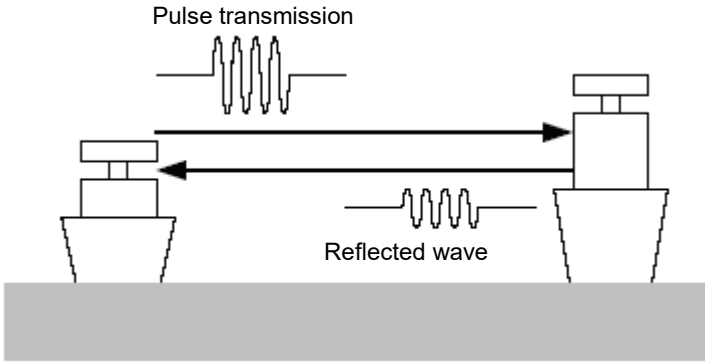
This equipment is equipped with the following measuring tools to measure the range and bearing.

Measuring tool	Function	Related section
Cross-Hair Cursor (Cursor)	Used to measure the range and bearing from the own ship's position.	4.3 Using the Cross-hair Cursor
Range Rings	Displays concentric circles having CCRP (Consistent Common Reference Point) as the center at constant intervals in order to be used as guidance for measuring the range.	4.4 Using the Range Rings
Electronic Bearing Lines (EBL1/EBL2)	Displays a straight line that specifies an arbitrary bearing in order to measure the bearing from own ship. The MFD is equipped with two electronic bearing lines (EBL1 and EBL2).	4.5 Using the Electronic Bearing Line (EBL) and Variable Range Marker (VRM)
Variable Range Markers (VRM1/VRM2)	Displays a circle that specifies an arbitrary range in order to measure the range from own ship. The MFD is equipped with two variable range markers (VRM1 and VRM2).	
Parallel Index Lines (PI)	Displays a group of straight lines at equal intervals in order to be used for complex measurement and guidance for route.	4.6 sing Parallel Index Lines (PI)
EBL Maneuver	Displays a predictable track when own ship is turned in order to be used as guidance for maneuvering.	4.7 Using the EBL Maneuver
Node Fixed EBL/VRM	Connects the own ship's position and the specified fixed position with EBL and VRM markers. Since the connection is maintained even if own ship advances, the bearing and range of own ship against the fixed position is always available.	4.8 Connecting Own Ship and the Specified Fixed Position with EBL and the VRM Marker (Node Fixed EBL/VRM Function)
Manual position fix (LOPs)	Measures the own ship's position with LOP (Line Of Position) and plots it on the chart. The own ship's position can be jumped to the plotted position.	4.9 Measuring the Own Ship's Position Manually (LOPs Fixing Function of Manual position fix)
Manual position fix (Position Offset)	Enables offsetting the own ship's position with manual operation.	4.10 Offsetting the Own Ship's Position Manually (Position Offset Function of Manual position fix)

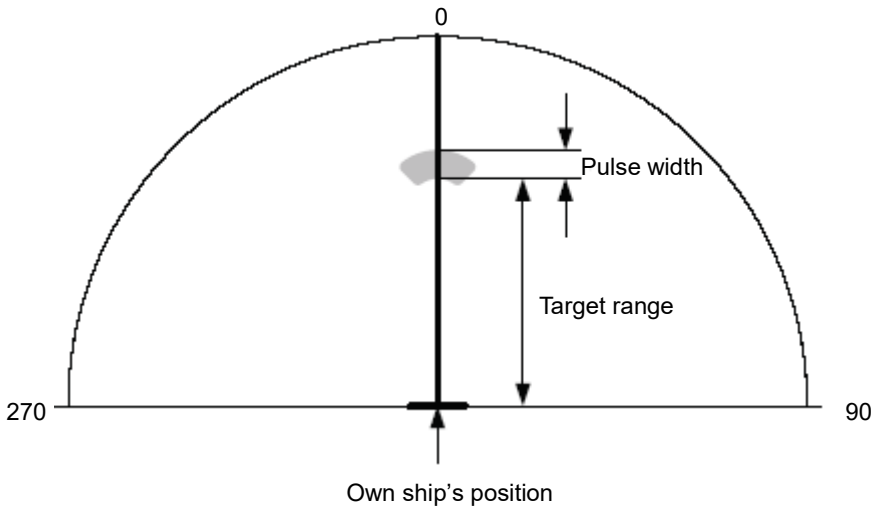
4.2 Target Position

The radar transmits the pulse-modulated radio waves. The transmitted waves are received in the target after being reflected (echoed). On the screen, the waves spread in the pulse width range direction based on the target position as the front edge.

When measuring a target or setting a mark/line on the target, place the cursor on the front edge of the echo.



Radar transmission/reception



Relationship of range between the echo and the target and the pulse width

4.3 Using the Cross-hair Cursor

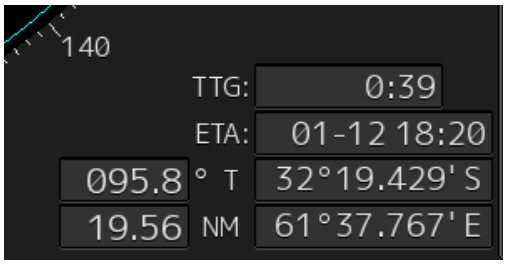
When moving the cursor into a window, it changes to a cross-hair cursor. With the cross-hair cursor, the bearing and position of a target can be measured.
The information that is measured by the cursor is displayed in the cursor readout information area.

4.3.1 Cursor readout information area display position

4.3.1.1 RADAR

The information can be displayed by either of the following methods.

[Placing the cursor inside of PPI]
When the cursor is placed inside of PPI, the cursor information on the position at which the cursor is placed is displayed in the bottom right corner of the screen.

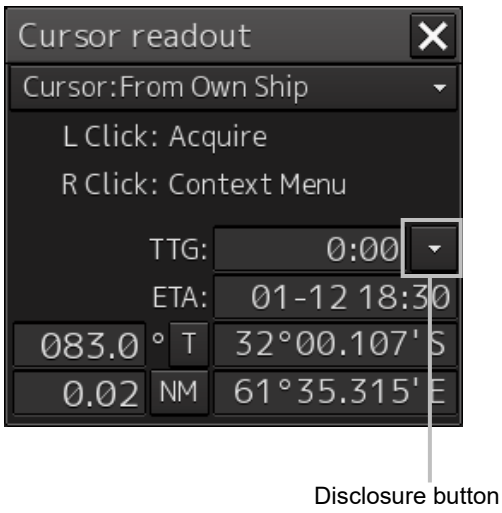


[Clicking on the cursor information display button at the bottom right corner of the screen]
When the cursor information display button on the bottom right corner of the screen is clicked on, the [Cursor readout] dialog is displayed.

Cursor information display button

The display mode of the [Cursor readout] dialog can be switched between standard display and expanded display by clicking on the Disclosure button.

Standard display



Expanded display

To close the [Cursor readout] dialog box

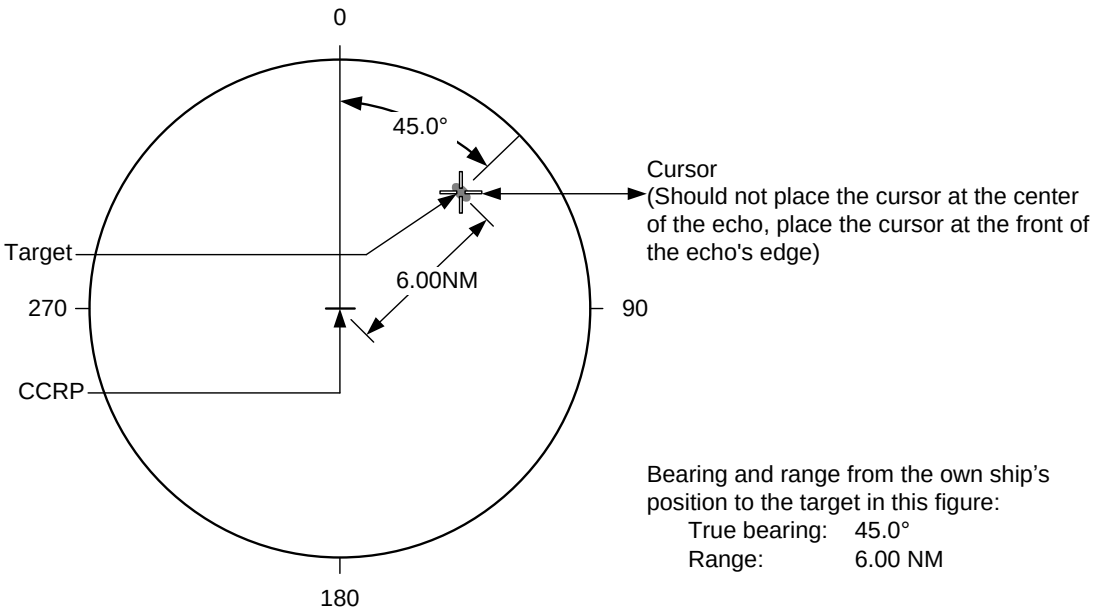
Click the [X] button.

4.3.2 Measuring the bearing and the range from the own ship's position to the target by using the cross-hair cursor

The measurement method is as follows.

Memo

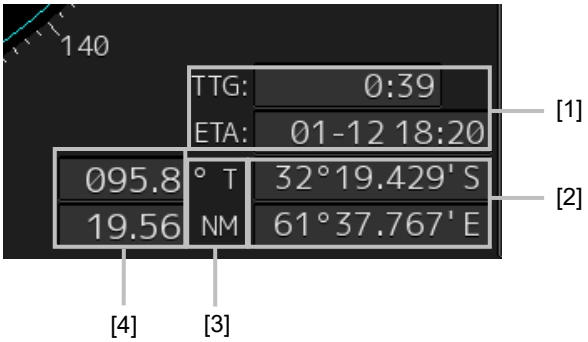
When placing the cursor on the target, place the cursor on the front edge (towards the own ship of the echo) (CCRP side) of the echo.



4.3.2.1 Measuring by using the cursor information that is displayed by placing the cursor inside of PPI

1 Place the cursor on the target.

When the cursor is placed on the target, the following cursor information is displayed.



[1] TTG display and ETA display

Displays TTG and ETA from the own ship's position to the cursor position.

[2] Latitude and longitude of the cursor position

Displays the latitude and the longitude of the cursor position.

[3] Cursor bearing True/Relative display and cursor range unit display

Displays the cursor bearing True/Relative display setting and the cursor range unit that were set in the [Cursor readout] dialog.

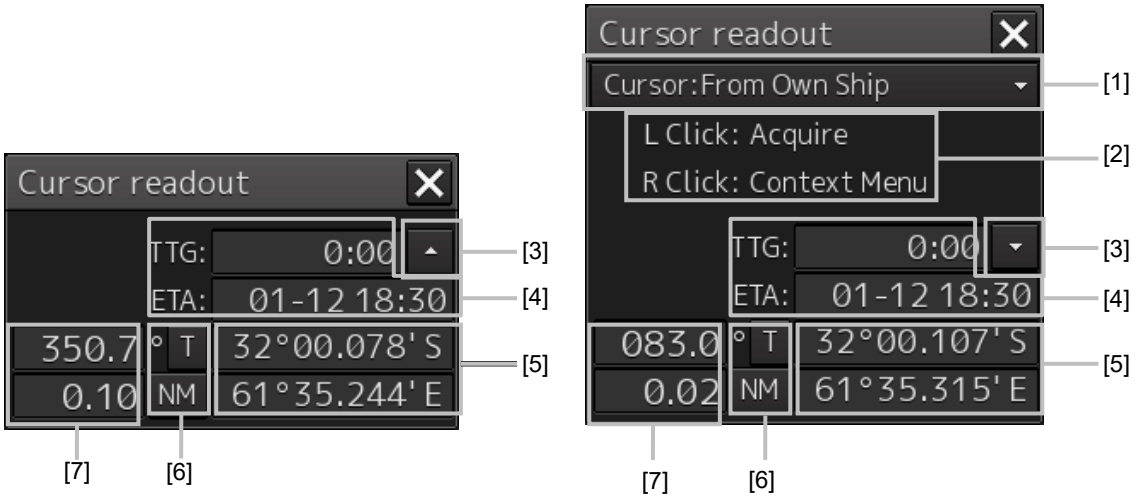
[4] Cursor bearing display and cursor range display

Displays the bearing and range from CCRP to the cursor.

4.3.2.2 Measuring by using the [Cursor readout] dialog

When the cursor is placed on the target, the cursor information is displayed on the [Cursor readout] dialog.

> **Memo**
> The [Cursor readout] dialog can also be displayed by selecting [Tools] - [Cursor Readout] on the menu.



Standard display **Expanded display**

[1] Cursor bearing/range reference point switching combo box

Set a cursor bearing/range reference point.

* Only [Cursor:From Own Ship] which makes own ship's position a bearing/range reference point to the cursor can be selected.

[2] Operation hint

Displays the operation hint of the trackball button.

[3] Disclosure button

By clicking on the button, the display mode of the [Cursor readout] dialog can be switched between standard display and expanded display.

[4] TTG display and ETA display

Displays TTG and ETA from the ship's own position to the cursor position.

[5] Latitude and longitude of the cursor position

Displays the latitude and longitude of the cursor position.

[6] Cursor bearing True/Relative display and cursor range unit display

For the details, refer to "4.3.2.3 Switching the cursor bearing between True/Relative" and "4.3.2.4 Switching the cursor range unit".

[7] Cursor bearing display and cursor range display

Displays the bearing and range from CCRP to the cursor.

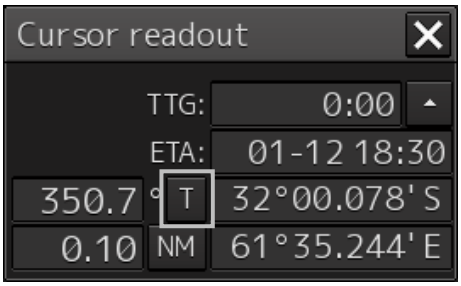
4.3.2.3 Switching the cursor bearing between True/Relative

The cursor bearing mode can be switched between True/Relative in the [Cursor readout] dialog box.

1 Display the [Cursor readout] dialog box.

2 Click on the cursor bearing True/Relative switching button.

Whenever the button is clicked on, the display is switched between [T] and [R].



[T]: Displays the cursor bearing in True mode.

[R]: Displays the cursor bearing in Relative mode.

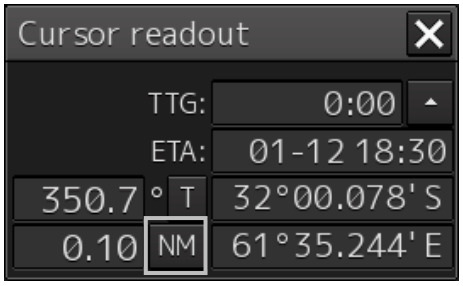
4.3.2.4 Switching the cursor range unit

The cursor range unit can be switched in the [Cursor readout] dialog box.

1 Display the [Cursor readout] dialog box.

2 Click on the cursor range unit switching button.

Whenever the button is clicked on, the display is switched to [NM], [sm], or [km].



[NM]: Displays the range in the unit of NM.

[sm]: Displays the range in the unit of sm.

[km]: Displays the range in the unit of km.

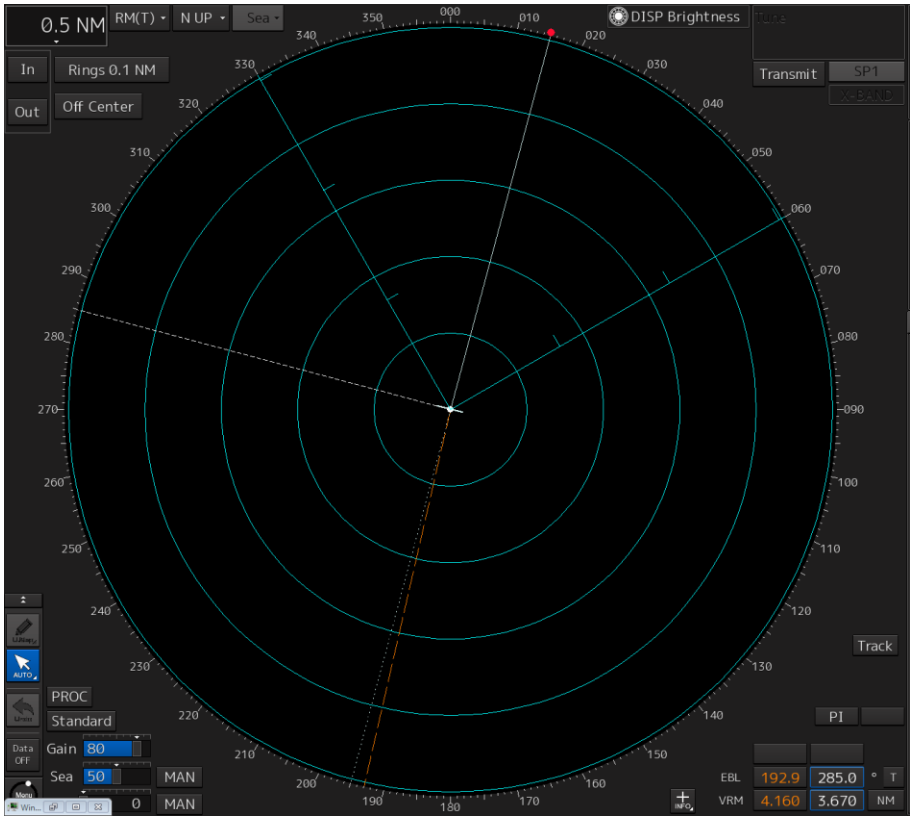
Memo

NM indicates nautical miles, sm indicates surface miles, and km indicates kilometers.

4.4 Using the Range Rings

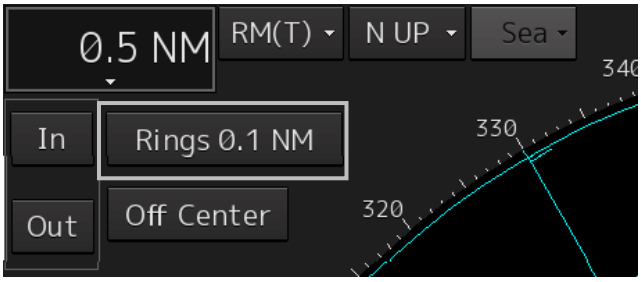
Range rings are multiple concentric circles displayed on the PPI screen.

Using range rings on the PPI screen, the range to a target can be measured by determining at which scale interval the target is positioned.



The display of range rings can be turned on/off according to the following procedure.

1. **Click the Rings button in Presentation and mode information.**



Each time this button is clicked on, display switches between On and Off.

On: 

Off: 

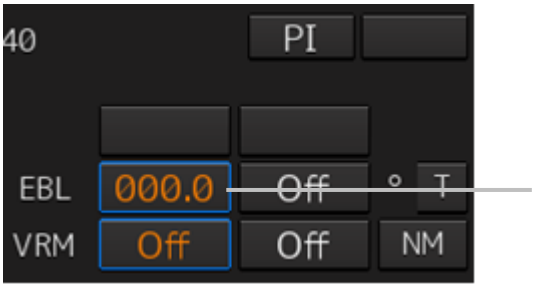
4.5 Using the Electronic Bearing Line (EBL) and Variable Range Marker (VRM)

4.5.1 Measuring a range and a bearing with EBL and VRM

4.5.1.1 Measuring in the trackball operation unit

When the cursor is in AUTO mode, EBL and VRM can be operated on the trackball operation unit. This section describes the manipulation under EBL1 and VRM1; however, the same manipulation can be performed under EBL2 and VRM2 also.

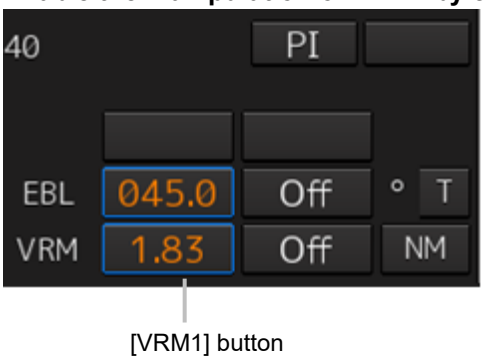
1 Enable the manipulation of EBL1 by clicking on the [EBL1] button.



2 Align the cursor with a target and click on the mouse button.

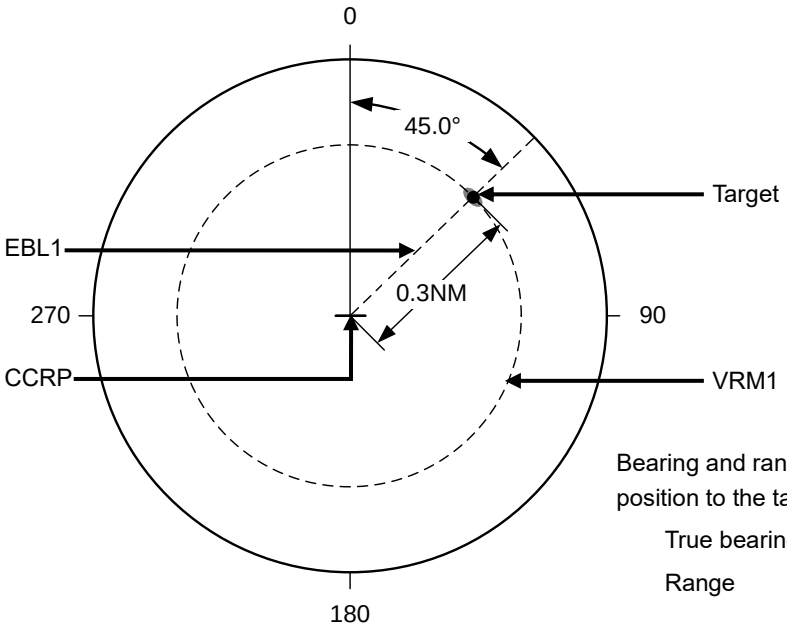
The bearing of the target is displayed on the [EBL1] button.

3 Enable the manipulation of VRM1 by clicking on the [VRM1] button.



4 Align the cursor with a target and click on the mouse button.

The range of the target is displayed on the [VRM1] button.



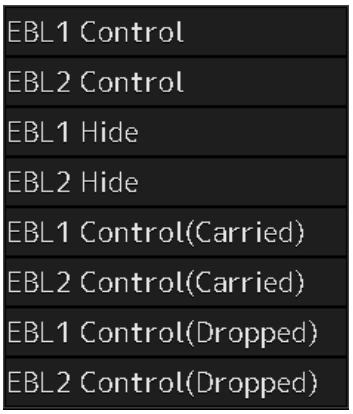
Bearing and range from the own ship's position to the target in this figure:

True bearing	45.0°
Range	0.30 NM

4.5.1.2 Measuring with the [EBL] or [VRM] dial on the keyboard operation unit

1 **Press the [EBL] dial.**

The context menu is displayed.



2 **By turning the dial, select either [EBL1 Control] or [EBL2 Control].**

3 **Press the [EBL] dial.**

If [EBL1 Control] is being selected, manipulation of EBL1 is enabled.

If [EBL2 Control] is being selected, manipulation of EBL 2 is enabled.

4 **By turning the [EBL] dial, align the EBL with a target.**

The bearing of the target is displayed on the [EBL1] button.

5 **Press the [VRM] dial.**

The context menu is displayed.

6 **By turning the dial, select either [VRM1 Control] or [VRM2 Control].**

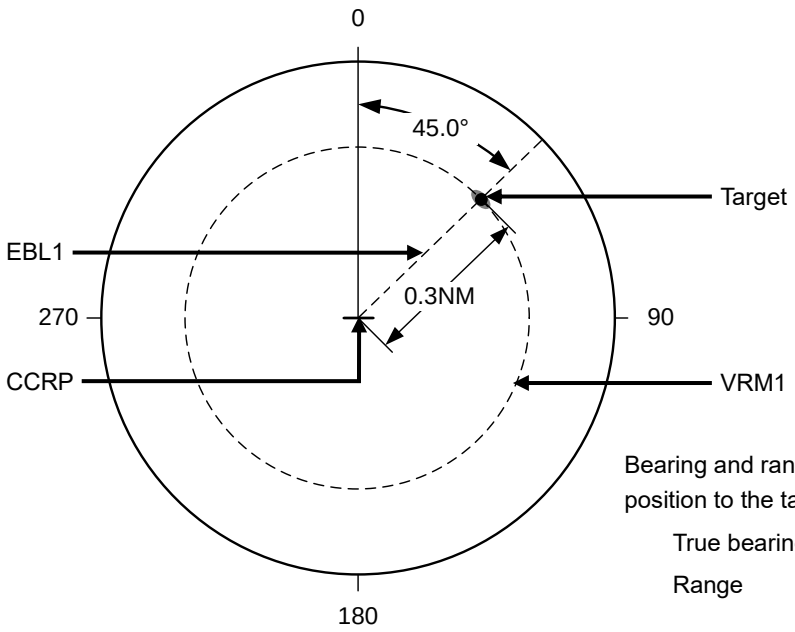
7 **Press the [VRM] dial.**

If [VRM1 Control] is being selected, manipulation of VRM1 is enabled.

If [VRM2 Control] is being selected, manipulation of VRM2 is enabled.

8 **By turning the [VRM] dial, align the VRM with a target.**

The range of the target is displayed on the [VRM1] button.



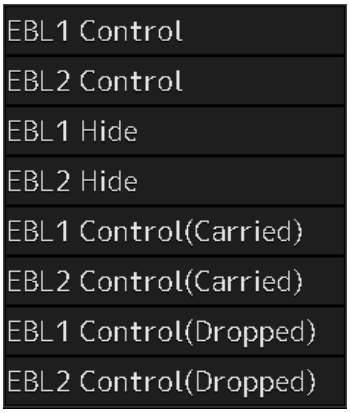
Bearing and range from the own ship's position to the target in this figure:

True bearing	45.0°
Range	0.30 NM

To clear the EBL:

9 **Press the [EBL] dial.**

The context menu is displayed.



10 **By turning the dial, select either [EBL1 Hide] or [EBL2 Hide].**

11 **Press the [EBL] dial.**

If [EBL1 Hide] is being selected, the selection of EBL1 is cleared.

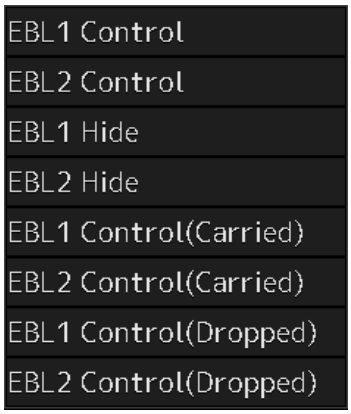
If [EBL2 Hide] is being selected, the selection of EBL2 is cleared.

To change the measurement starting point of the EBL:

The measurement starting point can be changed from the own ship's position to another.

12 **Press the [EBL] dial.**

The context menu is displayed.



13 **By turning the dial, select either [EBL1 Control (Carried)] and [EBL1 Control (Dropped)] or [EBL2 Control (Carried)] and [EBL2 Control (Dropped)].**

14 **Press the [EBL] dial.**

If [EBL1 Control (Carried)] and [EBL1 Control (Dropped)] is being selected, manipulation of EBL1 is enabled.

If [EBL2 Control (Carried)] and [EBL2 Control (Dropped)] is being selected, manipulation of EBL2 is enabled.

15 **Move the cursor to change the measurement starting point.**

16 **The measurement starting point is fixed by clicking on it.**

To clear the VRM:

17 **Press the [VRM] dial.**

The context menu is displayed.

18 **By turning the dial, select either [VRM1 Hide] or [VRM2 Hide].**

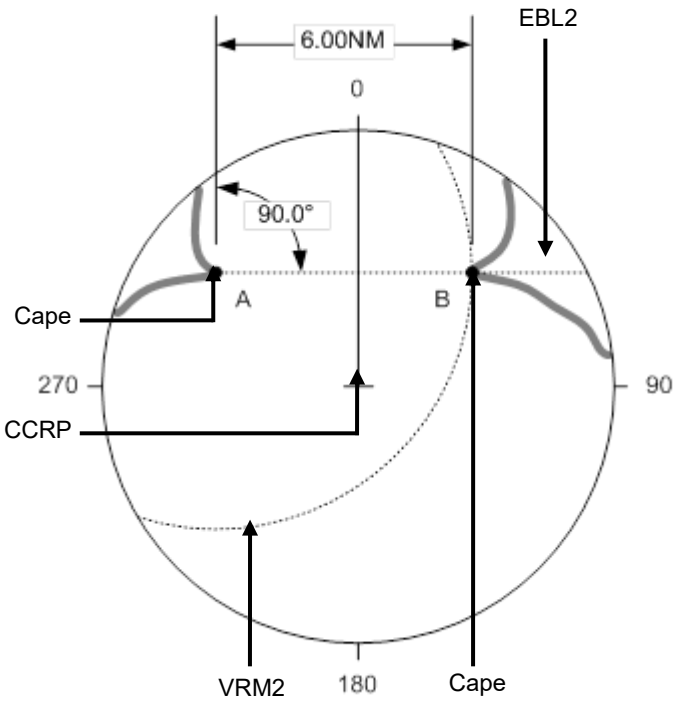
19 **Press the [VRM] dial.**

If [VRM1 Hide] is being selected, the selection of VRM1 is cleared.

If [VRM2 Hide] is being selected, the selection of VRM2 is cleared.

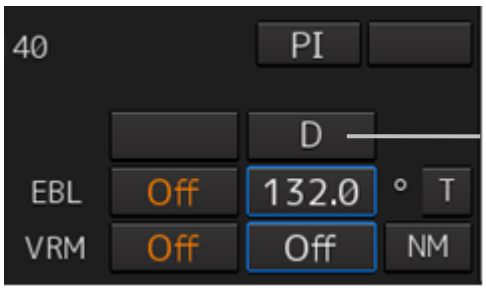
4.5.2 Measuring between arbitrary two points

The range and bearing between arbitrary two points can be measured as follows.

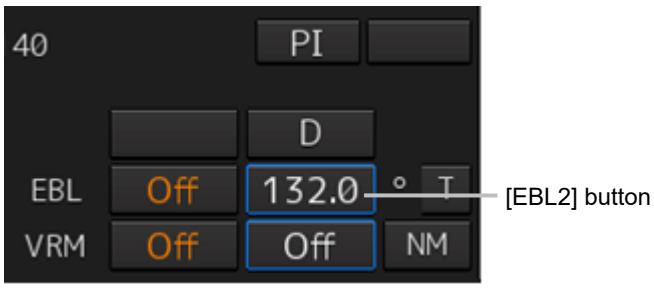


Here, the manipulation with EBL2/VRM2 is explained. The same operation can be performed with EBL1/VRM1.

1 Click on the measurement starting point button of EBL2/VRM2 and select [D].



2 Enable the manipulation of EBL2 by clicking on the [EBL2] button.



3 **Align the cursor with “point A” of the two points to be measured and then click it on.**

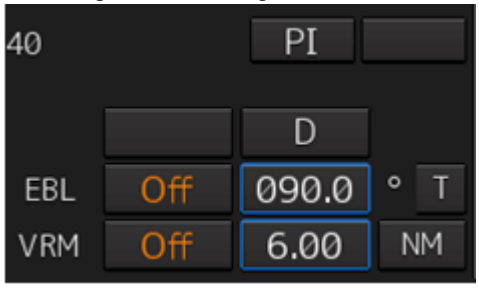
4 **Enable the movement of EBL2 by clicking on the EBL2 line.**

5 **Align the cursor with bearing “point B” of the two points to be measured and then click it on.**

6 **Click the [VRM2] button to make VRM2 operable.**

7 **Move the intersecting point marker on the dotted line of EBL2 by the cursor and align it with point B.**

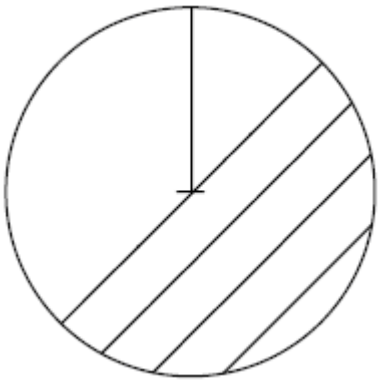
The range and bearing between the two points are displayed.



4.6 Using Parallel Index Lines (PI)

4.6.1 Description of a parallel index line

Parallel index lines (PI) refer to straight lines at equal interval that are displayed on the screen.
By using parallel index lines, complicated measurement is enabled relating to the bearing and the range by using the own ship's position as the reference point.

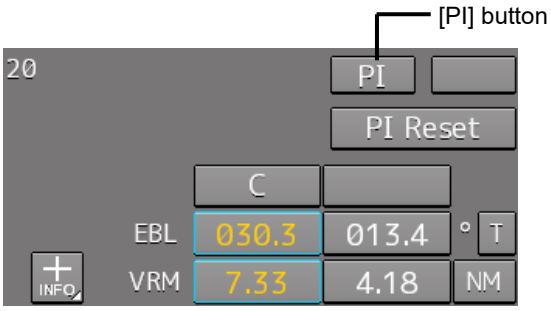


Example of Display

4.6.2 Displaying parallel index lines

4.6.2.1 Displaying parallel index lines in the trackball operation unit

1. **Click on the [PI] button in Navigation Tools (measuring tool).**



Operation when the [PI] button is clicked on:

When the [PI] button is set to Off, PI is set to On and the [PI Menu] dialog is displayed.

When the [PI] button is set to On and the [PI Menu] dialog is displayed, the [PI Menu] dialog is closed. PI remains On.

When the [PI] button is set to On and the [PI Menu] dialog is not displayed, PI is set to Off.

Memo
The [PI Menu] dialog can also be displayed by clicking on [Tool] - [PI] on the menu.

Set PI on the [PI Menu] dialog.

For the details of the [PI Menu] dialog, refer to "4.6.2.3 "Description of the [PI Menu] dialog".
The [PI Menu] dialog setting method varies depending on the PI operation mode.

To clear parallel index lines:

1 Set the [Display for All Lines] button to Off by clicking on it.

The parallel index lines disappear.

4.6.2.2 Displaying parallel index lines in the keyboard operation unit

1 Press the [PI] key.

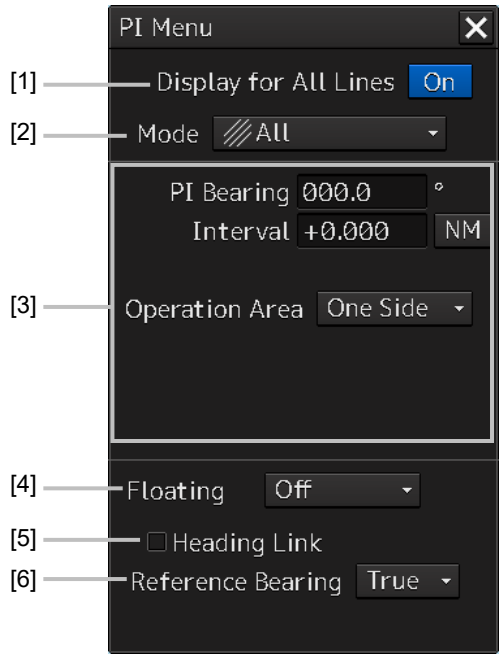
Operation when the [PI] key is pressed:

- When the [Display for All Lines] button is set to Off, PI is set to On and the [PI Menu] dialog box is displayed.
- When the [Display for All Lines] button is set to On and the [PI Menu] dialog is displayed, the [PI Menu] dialog is closed. PI remains On.
- When the [Display for All Lines] button is set to On and the [PI Menu] dialog is not displayed, PI is set to Off.

2 Set PI on the [PI Menu] dialog.

For the [PI Menu] dialog, refer to "4.6.2.3 Description of the [PI Menu] dialog".
The [PI Menu] dialog setting method varies according to the PI operation mode.

4.6.2.3 Description of the [PI Menu] dialog



Note

Parallel index lines can be operated by using the EBL/VRM dial of the keyboard operation unit only while the [PI Menu] dialog is displayed. Even if the dialog is closed, the parallel index lines remain displayed, however, the bearing and interval cannot be operated.

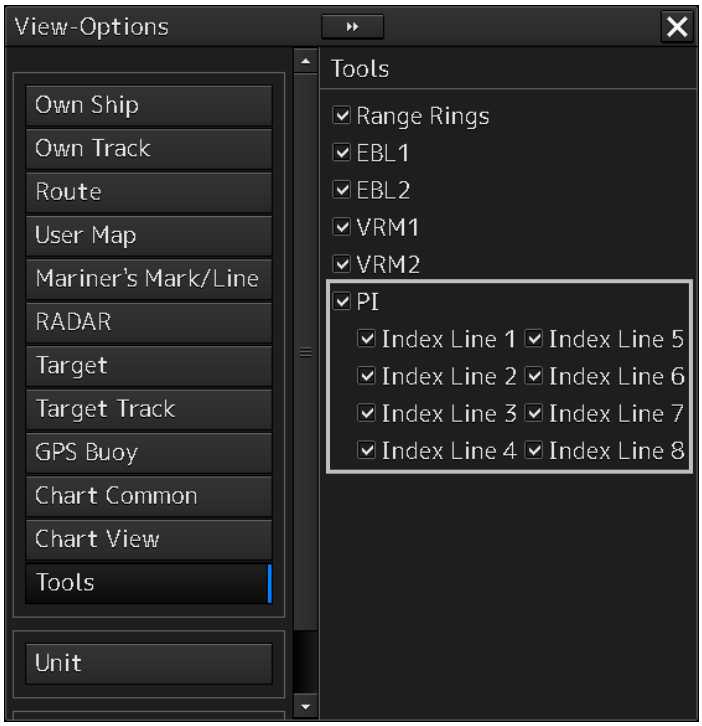
To reset the bearing and the interval, set by redisplaying the [PI Menu] dialog.

[1] [Display for All Lines] (Display for all PI lines) button

Use this button to switch display for all PI lines to ON/OFF.

The button ON/OFF state is maintained even if the dialog box is closed.

The parallel index lines that are displayed by setting the [Display for All Lines] button to On are those that are selected on the [View-Options] dialog that is displayed by selecting [View] - [Options] - [Tools] on the menu.



When the operation mode is Individual and the [Display for All Lines] button is set to On, the parallel index lines that were selected in the [View-Options] dialog (Index Line 1 to Index Line 8) are displayed on the screen.

When the operation mode is Track or Equiangular and the [Display for All Lines] button is set to On, the parallel index lines that were selected in the [View-Option dialog] (Index Lines 1, 3, 5, and 7 correspond to groups 1, 2, 3, and 4 respectively) are displayed.

When the operation mode is All, the line at the center of the screen becomes Index Line1 and the parallel lines from the center to the outer section correspond to Index Line2, 3.... When [Operation Area] is set to [Both Side], the parallel index lines forming pairs on opposite sides with each other based on Index Line1 correspond to Index Line2, 3... towards the outer section.

[2] [Mode] (operation mode switching) combo box

Select an operation mode.

When the operation mode is selected, the dialog box of the selected operation mode is displayed.

[3] Parameter setting area by operation mode

Set parameters in each operation mode.

[4] [Floating] combo box

Move the center of the parallel index line.

Select the Floating mode from the list.

[Off]: Sets the starting point of the parallel index line to the CCRP position.

[Screen Fix]: Moves the center of the parallel index line and fixes it on the screen.

[L/L Fix]: Moves the center of the parallel index line and fixes it based on the latitude and longitude.

(Connection of a navigation unit is required.)

[5] [Heading Link] (Heading link setting)

Set whether the parallel index line is linked to the ship's heading.

When this item is checked, the parallel index line is linked to the ship's heading.

When this item is unchecked, the parallel index line is not linked to the ship's heading.

Different values can be set for the angle of the parallel index lines when this item is checked and the angle of the parallel index lines when the item is unchecked.

[6] [Reference Bearing] (Reference bearing selection) combo box

Set a reference bearing of the bearing value display of the parallel index line.

[True]: Displays in true bearing (based on the North).

[HL]: Displays in the heading line reference.

Index Line 1 to Index Line 8: Displays by using the Index Line as the reference. (Only when the operation mode is [Individual])

Group 1 to Group 4: Displays by using the Group as the reference. (Only when the operation mode is [Track])

Memo

[Reference Bearing] (reference bearing selection) is not displayed in [Equiangular] mode as the operation mode.

Switching the Floating mode

When [Screen Fix] or [L/L Fix] is selected in switching the Floating mode, the cursor mode changes.

Note

When the operation mode is [All] and the reference point that is set in [L/L Fix] moves to the position outside of the PPI circle, the floating mode is set to Off and the own ship's position becomes the reference point.

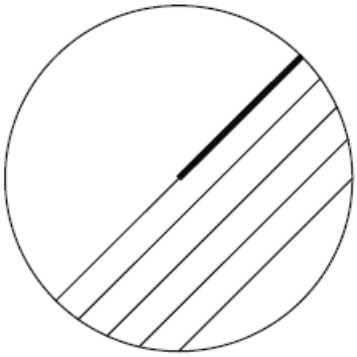
When the screen is clicked on, the fixed position or the coordinates on the screen are determined, and the cursor is changed to the normal cursor.

When [Screen Fix] or [L/L Fix] is re-selected after the determination, the cursor changes to the center selection cursor for parallel index lines.

When PI is created with View2 of multi-view after selecting [Screen Fix], PI terminates after termination of the multi-view function.

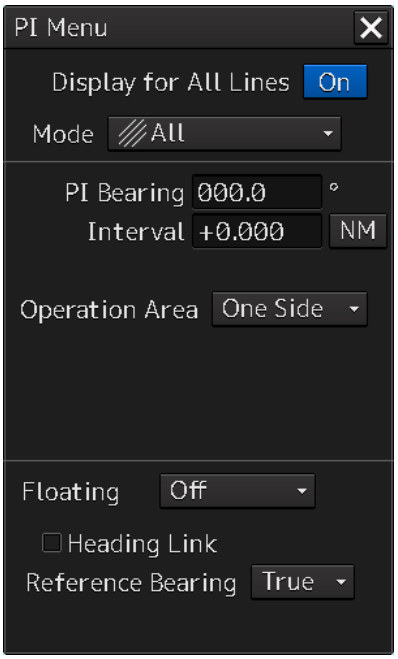
4.6.3 Setting all the parallel index lines concurrently (All mode)

When the operation mode is set to [All], all the parallel index lines are operated concurrently. All the lines are in parallel.



Display Example

1 Select [All] from the [Mode] (operation mode) combo box.



2 Enter a direction of the parallel index lines in [PI Bearing] (parallel index line bearing adjustment).

The setting is applied to the bearings of all the parallel index lines.

Memo

The bearing can also be adjusted by turning the [EBL] dial clockwise/counterclockwise. When the dial is turned clockwise, the bearing is adjusted in the plus direction, and when the dial is turned counterclockwise, the bearing is adjusted in the minus direction.
The set value is displayed in the input box.

3 Enter a display interval of the parallel index lines in [Interval] (parallel index line interval adjustment).

The setting is applied to all the lines.
The input range is the PPI radius when PPI is used as the center for the lines and double the PPI radius when the PPI is not used as the center.

Memo

The bearing can also be adjusted by turning the [VRM] dial clockwise/counterclockwise. When the dial is turned clockwise, the bearing is adjusted in the plus direction and when the dial is turned counterclockwise, the bearing is adjusted in the minus direction.
The set value is displayed in the input box.

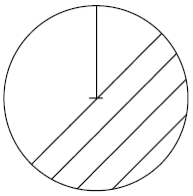
Whenever the unit display switching button on the right side of [Interval] is clicked on, the unit (NM/km/sm) of the value displayed is switched.

Memo

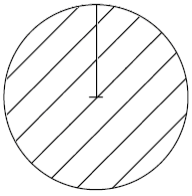
NM denotes nautical mile, sm denotes statute mile, and km denotes kilometer.

4 Select the area for displaying the parallel index line from the [Operation Area] (operation area selection) combo box.

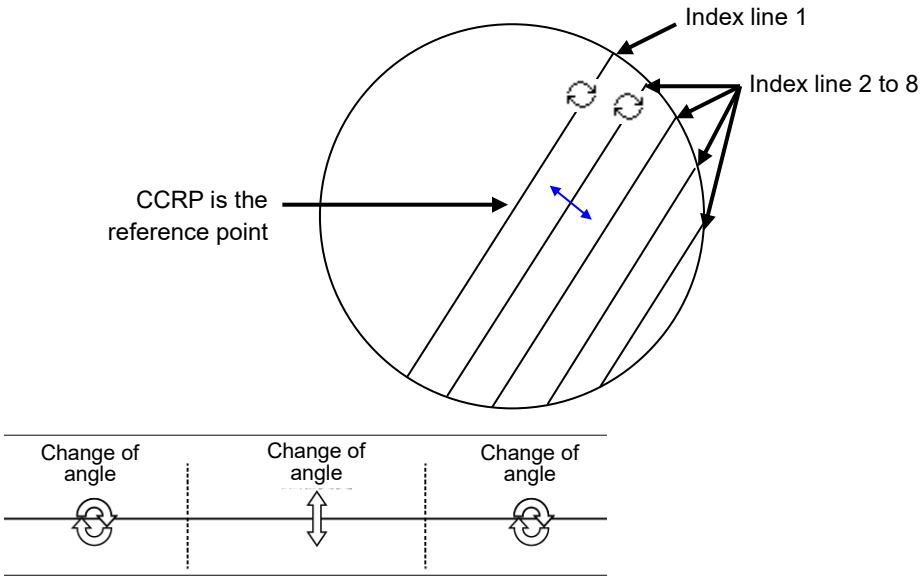
When [One Side] is selected, 8 parallel index lines are displayed on one side of the reference point of own ship or the point set arbitrarily.



When [Both Side] is selected, 15 parallel index lines are displayed on both sides of the reference point of own ship or the point set arbitrarily.



4.6.3.1 *Changing the bearing/interval of parallel index lines in the trackball operation unit (All mode)*



Dividing the line segment that can be clicked into 3 equal sections

[Changing the bearing with index line 1]

When index line 1 is clicked on, the shape of the cursor changes to .

All the index lines rotate centering on the index line reference position (starting point).

[Changing the bearing at a clickable trisectional end segment position of index lines 2 to 8]

When one of the index lines 2 to 8 is divided into three equal segments and the mouse button is clicked on both ends of the line segments, the cursor shape changes to .

Index lines 2 to 8 move, forming a circle centering on the reference position while the index line reference position (starting point) is fixed.

[Changing the interval at a clickable trisectional center segment position of index lines 2 to 8]

When one of the index lines 2 to 8 is divided into three equal segments and the mouse button is clicked on the middle line segments, the cursor shape changes to .

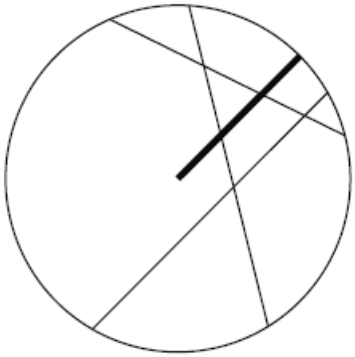
Index lines 2 to 8 move in parallel to index line 1.

Memo

If a clickable segment is 2 cm or less, the change of interval mode is always activated.

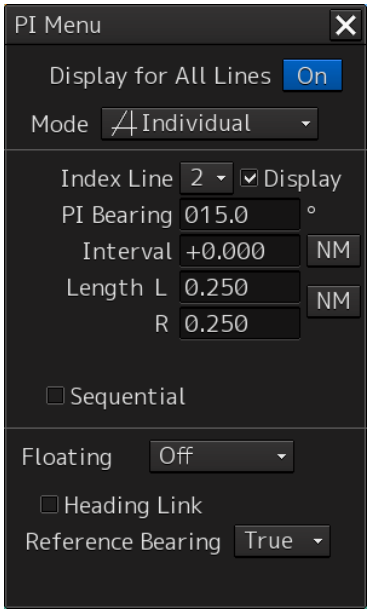
4.6.4 Setting parallel index lines individually (Individual mode)

By setting the operation mode to [Individual], the bearing and the interval of parallel index lines can be set individually.



Display Example

1 Select [Individual] from the [Mode] (operation mode) combo box.



2 Select a parallel index line (1 to 8) to be set from the [Index Line] (parallel index line selection) combo box

3 Select [Display].

The selected parallel index line is displayed.

4 Enter the bearing of the parallel index line in [PI Bearing] (parallel index line bearing adjustment).

Memo

The bearing can also be adjusted by turning the [EBL] dial clockwise/counterclockwise. When the dial is turned clockwise, the bearing is adjusted in the plus direction, and when the dial is turned counterclockwise, the bearing is adjusted in the minus direction.
The set value is displayed in the input box.

5 Enter the interval of the parallel index line in [Intereval] (parallel index line interval adjustment).)

The input range is the PPI radius when PPI is used as the center for the lines and double the PPI radius when the PPI is not used as the center.

Memo

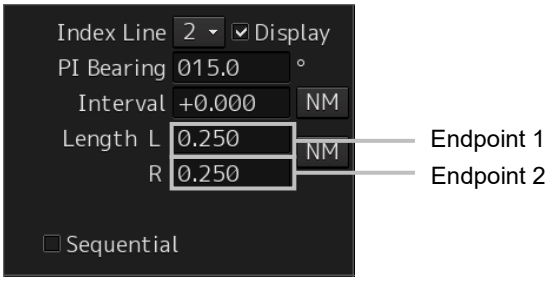
The bearing can also be adjusted by turning the [VRM] dial clockwise/counterclockwise. When the dial is turned clockwise, the bearing is adjusted in the plus direction and when the dial is turned counterclockwise, the bearing is adjusted in the minus direction.
The set value is displayed in the input box.

Whenever the unit display switching button on the right side of [Interval] is clicked on, the unit (NM/km/sm) of the numeric value that is displayed is switched.

Memo

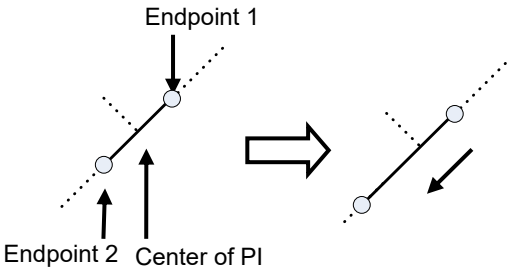
NM denotes nautical mile, sm denotes statute mile, and km denotes kilometer.

6 Set [Length] (adjustment of parallel index line length).



Adjust the length of the parallel index line by changing the positions of endpoint 1 and endpoint 2.

Define endpoint 1 as the point on the left side when PI center is viewed from the own ship and endpoint 2 as the point on the right side.



Change the length of endpoint 2

Set the mode to the endpoint change mode by pressing the [VRM] dial and turn the [VRM] dial to change the position of an endpoint.

1	Clockwise:	+ (Direction from the center of PI to outside)
2	Counterclockwise:	- (Direction towards the center of PI)

The input range is as follows.

The minimum length of a parallel index line from the left end to the right end is 2 cm.

The maximum length is double the PPI radius.

Memo

A negative value can also be set for [Length].

In the case of the left end, the left direction from the center becomes a positive value and the right direction from the center becomes a negative value.

In the case of the right end, the right direction from the center becomes a positive value and the left direction from the center becomes a negative value.

Whenever the unit display switching button on the right side of [length] is clicked on, the unit (NM/km/sm) of the numeric value that is displayed is switched.

Memo

NM denotes nautical mile, sm denotes statute mile, and km denotes kilometer.

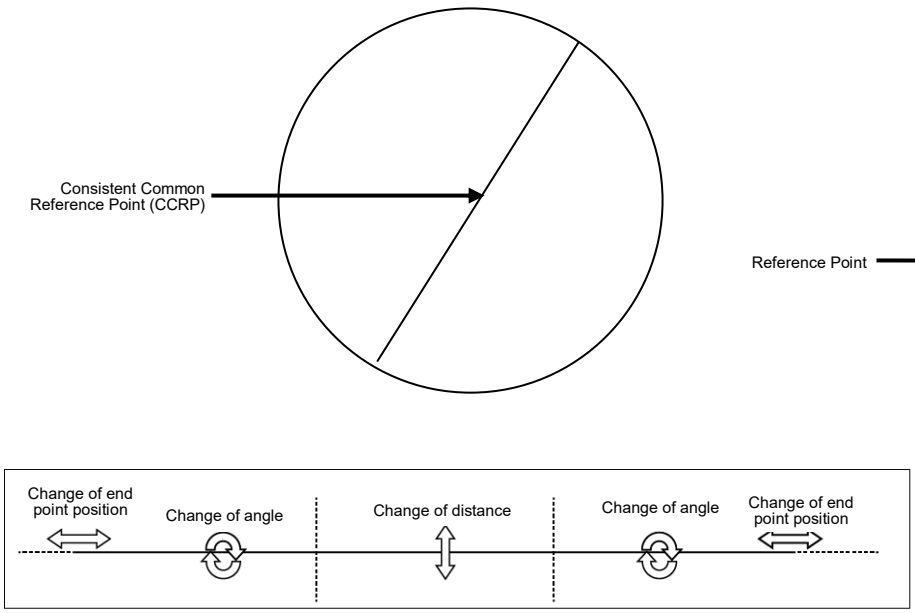
Setting parallel index lines consecutively

When [Sequential] is checked and [Screen Fix] or [L/L Fix] is selected at floating mode switching, the parallel index lines to be set are changed in the sequence of Index Line1→2→•••→8→1••• and setting can be performed consecutively.

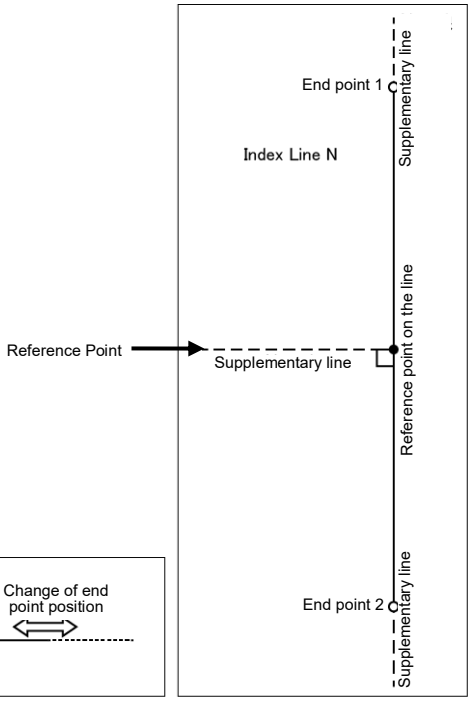
Note

The index lines that are set to be hidden by selecting [View] - [Options] - [Tools] on the menu are skipped during operation.

4.6.4.1 *Changing the bearing/interval/end point of parallel index lines in the trackball operation unit (Individual mode)*



Dividing the line segment that can be clicked into 3 equal sections



End points 1 and 2

[Changing the bearing at a clickable trisectional segment position on both sides]

1 **Place the cursor on the lines on both sides of the lines that were created by dividing one of the index lines 1 to 8, which can be clicked, into 3 equal sections and click the button.**
The shape of the cursor changes to and when the mouse button is clicked, the bearing of the parallel index lines can be changed.

2 **Move the cursor to the bearing to be set.**
The bearing of the parallel index lines changes together with the cursor.

3 **Click the mouse button.**
The parallel index lines are fixed.

[Changing the distance at a clickable trisectional middle position]

1 **Place the cursor on the middle line of the lines that were created by dividing one of the index lines 1 to 8, which can be clicked, into 3 equal sections and click the button.**
The shape of the cursor changes to  and when the mouse button is clicked, the interval of the parallel index lines can be changed.

2 **Move the cursor to the interval to be set.**
The interval of the parallel index lines changes together with the cursor.

3 **Click the mouse button.**
The parallel index lines are fixed.

> **Memo**
> If a clickable segment is 2 cm or less, the change of interval mode is always activated.

[Changing the positons of end points 1 and 2]

1 **Set the cursor on the broken-line display section on the end point side to be moved on one of the index lines 1 to 8.**
The shape of the cursor changes to  and when the mouse button is clicked, the position of end point 1 or end point 2 can be changed.

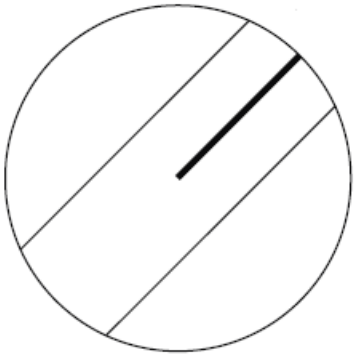
2 **Move the cursor to the bearing to be set.**
The position of end point 1 or 2 changes together with the cursor.

3 **Click the mouse button.**
The position of end point 1 or 2 is fixed.

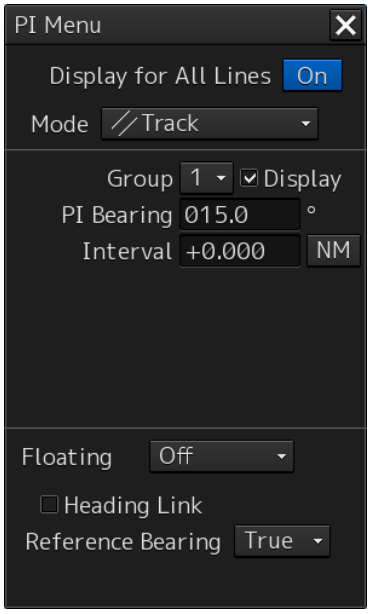
4.6.5 Displaying lines at equal interval on the left and right sides of the own ship's position (Track mode)

When the operation mode is set to [Track], lines are displayed on both the left and right sides at equal intervals.

Display Example



1 Select [Track] from the [Mode] (operation mode) combo box.



2 Select a parallel line cursor group (1 to 4) from the [Group] (parallel line cursor group) combo box.

Since in [Track] mode, parallel index lines always form pairs, set in group units.

3 Select [Display].

The selected parallel line cursor group is displayed.

4 **Enter the bearing of the parallel index line group in [PI Bearing] (parallel index line bearing adjustment).**

> **Memo**
> The bearing can also be adjusted by turning the [EBL] dial clockwise/counterclockwise. When the dial is turned clockwise, the bearing is adjusted in the plus direction, and when the dial is turned counterclockwise, the bearing is adjusted in the minus direction.
> The set value is displayed in the input box.

5 **Enter the interval of the parallel index line group in [Interval] (parallel index line group interval adjustment).**

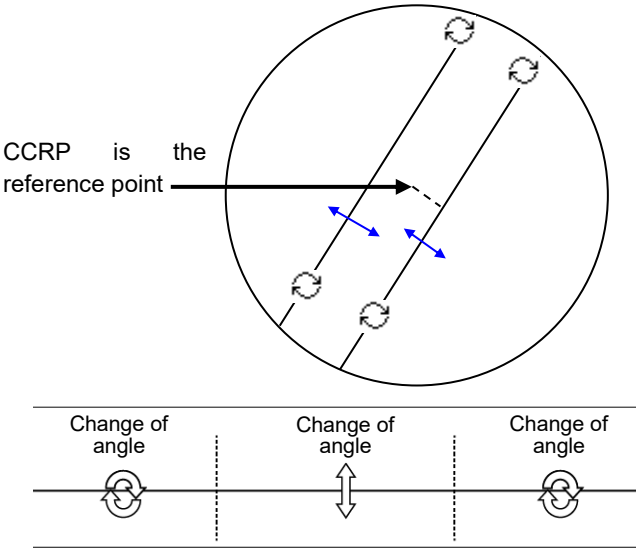
The input range is the PPI radius when PPI is used as the center for the lines and double the PPI radius when the PPI is not used as the center.

> **Memo**
> The bearing can also be adjusted by turning the [VRM] dial clockwise/counterclockwise. When the dial is turned clockwise, the bearing is adjusted in the plus direction and when the dial is turned anti-clockwise, the bearing is adjusted in the minus direction.
> The set value is displayed in the input box.

Whenever the unit display switching button on the right side of [Interval] is clicked on, the unit (NM/km/sm) of the numeric value that is displayed is switched.

> **Memo**
> NM denotes nautical mile, sm denotes statute mile, and km denotes kilometer.

4.6.5.1 Changing the bearing/interval of parallel index lines with the trackball (Track mode)



Dividing the line segment that can be clicked into 3 equal sections

[Changing the bearing at a clickable trisectional end segment position]

1 **Place the cursor on the lines on both sides of the lines that were created by dividing one of the index lines 1 to 8, which can be clicked, into 3 equal sections and click the button.**
The shape of the cursor changes to and when the mouse button is clicked, the bearing of the parallel index lines can be changed.

2 **Move the cursor to the bearing to be set.**
The bearing of the parallel index lines changes together with the cursor.

3 **Click the mouse button.**
The parallel index lines are fixed.

[Changing the distance at a clickable trisectional middle position]

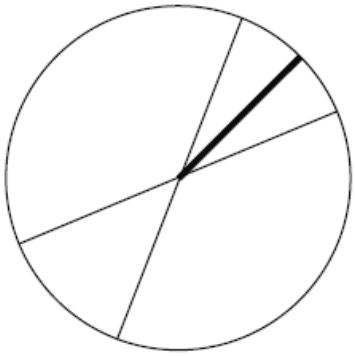
1 **Place the cursor on the middle line of the lines that were created by dividing one of the index lines 1 to 8, which can be clicked, into 3 equal sections and click the button.**
The shape of the cursor changes to and when the mouse button is clicked, the interval of the parallel index lines can be changed.

2 **Move the cursor to the interval to be set.**
The interval of the parallel index lines changes together with the cursor.

3 **Click the mouse button.**
The parallel index lines are fixed.

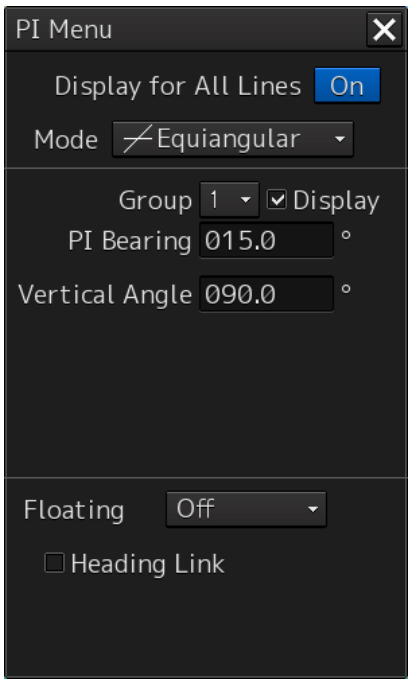
4.6.6 Displaying two intersecting lines (Equiangular mode)

When the operation mode is set to [Equiangular], two intersecting lines are displayed.



Display Example

1 Select [Equiangular] from the [Mode] (operation mode) combo box.



2 Select a parallel index line group (1 to 4) from the [Group] (parallel index line group).

Since parallel index lines form pairs in [Equiangular] mode, set in group units.

3 Select [Display].

The selected parallel line cursor group is displayed.

4 Enter the bearing of the parallel index line group in [PI Bearing] (parallel index line bearing adjustment).

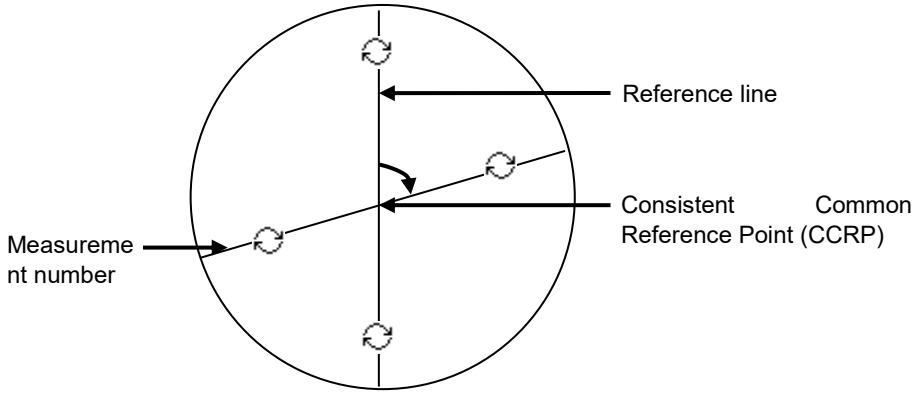
Memo

The bearing can also be adjusted by turning the [EBL] dial clockwise/counterclockwise. When the dial is turned clockwise, the bearing is adjusted in the plus direction, and when the dial is turned counterclockwise, the bearing is adjusted in the minus direction.

The set value is displayed in the input box.

5 Enter the vertical angle of the parallel index line group in [Vertical angle] (parallel index line vertical angle adjustment).

4.6.6.1 Changing the bearing of two intersecting lines in the trackball operation unit (Equiangular mode)



[Changing the bearing of index lines 1 to 8]

1 Place the cursor on index lines 1 to 8 and click the mouse button.

The shape of the cursor changes to and when the mouse button is clicked, the bearing of the two intersecting lines can be changed.

2 Move the cursor to the bearing to be set.

The bearing of the two intersecting lines changes together with the cursor.

3 Click the mouse button.

The two intersecting lines are fixed.

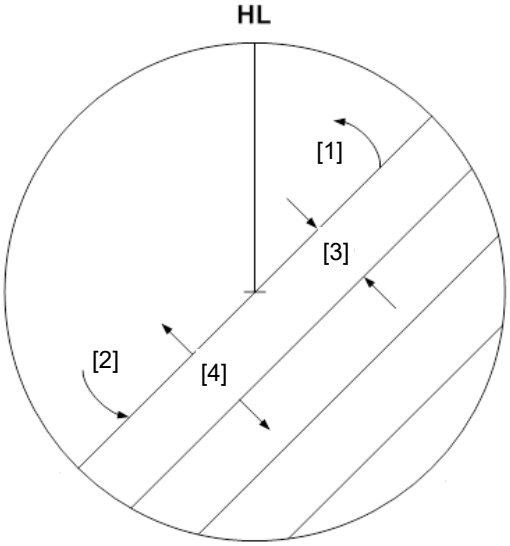
4.6.7 Setting parallel index lines in the keyboard operation unit

The bearing and interval of parallel index lines can be set with the [EBL] and [VRM] dials.

1 **Press the [PI] key to display the [PI Menu] dialog box.**

2 **By turning the [EBL] dial, set up bearing.**
Turning the [EBL] dial to the right changes the bearing of parallel index lines in the right bearing [1] and turning it to the left changes in the left bearing [2].

3 **By turning the [VRM] dial, set up the interval of parallel index lines.**
Turning the [VRM] dial to the left narrows the interval of parallel index lines [3] and turning it to the right widens the interval [4].



4 **Press the [PI] key to close the [PI Menu] dialog box.**
The parallel index lines are fixed.

The operation and motion of the parallel index differ depending on the motion mode in the [PI Menu] dialog.

4.6.7.1 Operation in All mode

[Operating the [EBL] dial]
By using the [EBL] dial, the bearing of the index lines can be changed.

[Operating the [VRM] dial]
By using the [VRM] dial, the interval of the index lines can be changed.

4.6.7.2 Operation in Individual mode

In Individual mode, the index line that is selected in the [Index Line] combo box is operated.

[Using the [EBL] dial]

By using the [EBL] dial, the bearing of the index line can be changed.

Setting parallel index lines consecutively by using the [EBL] dial

When [Sequential] is checked, the floating mode is set. When [Screen Fix] or [L/L Fix] is selected, the parallel index line to be set is switched in the sequence of Index Line1→2→•••→8→1•••, enabling consecutive setting.

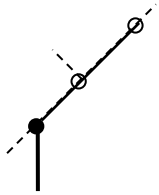
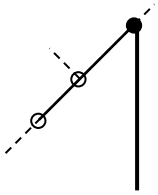
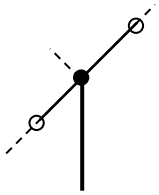
> **Note**
> The index lines that are set to be hidden by selecting [View] - [Options] - [Tools] on the menu are skipped during operation.

[Operating the [VRM] dial]

By using the [VRM] dial, the interval of the index lines can be changed.

The reference point for changing the interval can be an end point 1 or 2 of the index line or the reference point on the line.

Whenever the [VRM] dial is pressed, the reference point is selected in the sequence of "end point 1→end point 2→reference point on the line→•••"

End point 1	End point 2	Reference point on the line
		
As a result of the selection, the distance from the reference point to the end point 1 on the line changes.	As a result of the selection, the distance from the reference point to the end point 2 on the line changes.	As a result of selection, the interval from the reference point to the index line changes.

4.6.7.3 Operation in Track mode

The index lines of the group that is selected in [Group] combo box are operated in Track mode.

[Operating the [EBL] dial]

By using the [EBL] dial, the bearing of the index lines can be changed.

[Operating the [VRM] dial]

By using the [VRM] dial, the interval of the index lines can be changed.

4.6.7.4 Operation in Equiangular mode

The index lines of the group that is selected in [Group] combo box are operated in Equiangular mode.

[Operating the [EBL] dial]

By pressing the [EBL] dial, the "Group reference line (PI Bearing)" and the "Group measurement line" can be set.

Whenever the [EBL] dial is pressed, the "Group reference line (PI Bearing)" and the "Group measurement line" are selected alternately.

Memo

A measurement line can be set across the reference line. (When a measurement line is set across the reference line by rotating the dial in the minus direction, the measured bearing data changes as 0°→359.9°.)

When the reference line is set by using the EBL dial, the value of the measured bearing data is maintained and the measurement line follows concurrently.

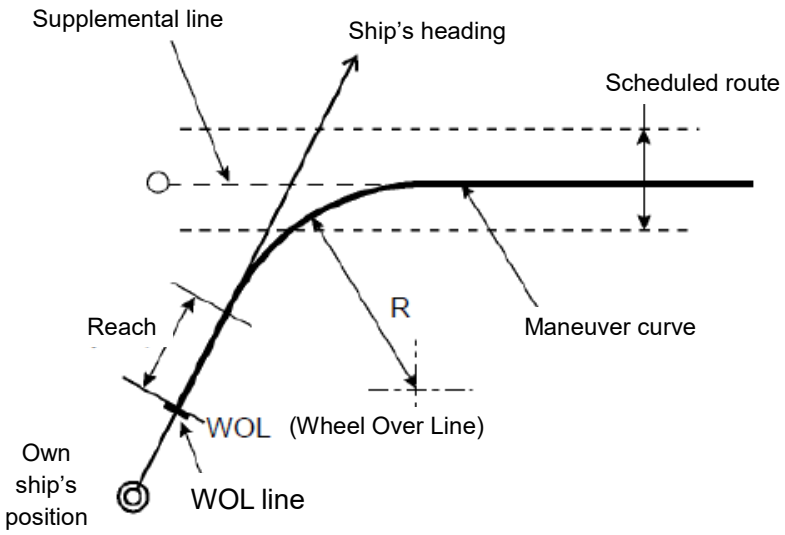
[Operation the [VRM] dial]

In Equiangular mode, the [VRM] dial is disabled.

4.7 Using the EBL Maneuver

The EBL Maneuver is the function that displays a predictable track when own ship is turned under certain conditions.

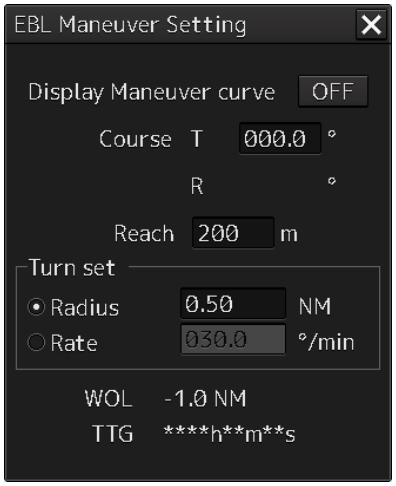
By displaying a maneuver curve that has been drawn by taking safety into consideration, it can be used as the guideline for turning.



4.7.1 Displaying the [EBL Maneuver Setting] dialog box

1 **Click on the [Menu] bar on the left toolbar.**
The menu is displayed.

2 **Click on the [Tools] - [EBL Maneuver] button on the menu.**
The [EBL Maneuver Setting] dialog box appears.

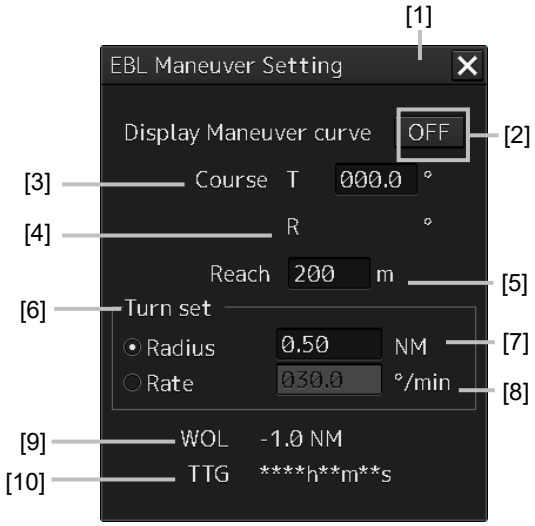


4.7.2 Clearing the display of maneuver curve

1 Click on the [Display Maneuver curve] button.

The [Display Maneuver curve] button display is set to [OFF] and the maneuver curve is cleared from the screen.

4.7.3 Setting the creation conditions of the EBL Maneuver



[1] [X] button

Use this button to close the [EBL Maneuver] dialog box.

[2] [Display Maneuver curve] (Maneuver curve display) button

When this button is set to ON, the cursor mode changes to the maneuver curve creation mode.

[3] [Course T] (Bearing of the acquisition line (true bearing))

The bearing of the acquisition line is displayed in true bearing. The line can also be set.

The input range is from 0.0 to 359.9°.

[4] [Course R] (Bearing of the acquisition line (relative bearing))

The bearing of the acquisition line is displayed in relative bearing.

[5] [Reach] (Distance from steering to turning)

The distance (reach) from steering to turning is displayed. The line can also be set.

The input range is from 0 to 2000 m (integer value).

[6] [Turn set] (Turning mode)

Select a turning mode from either [Radius] (constant turn radius) or [Rate] (constant turn rate).

[7] [Radius] (Constant turn radius)

Set a constant turn radius to be used for the Radius turn mode.

The input range is from 0.10 to 9.99NM.

[8] [Rate] (Constant turn rate)

Set a constant turn speed to be used in Rate turn mode.

The input range is from 20.0 to 720°/min.

[9] [WOL] (Distance to WOL)

The distance up to WOL is displayed.

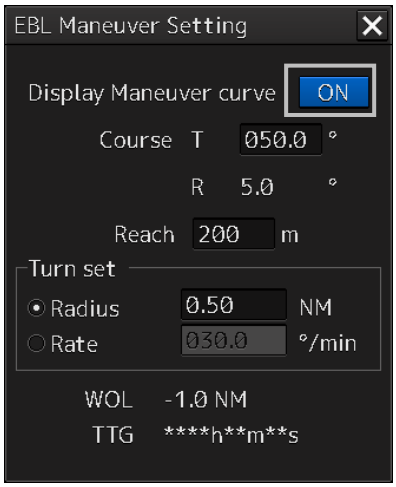
[10] [TTG] (Expected traveling time to reach WOL)

The expected traveling time to reach WOL is displayed.

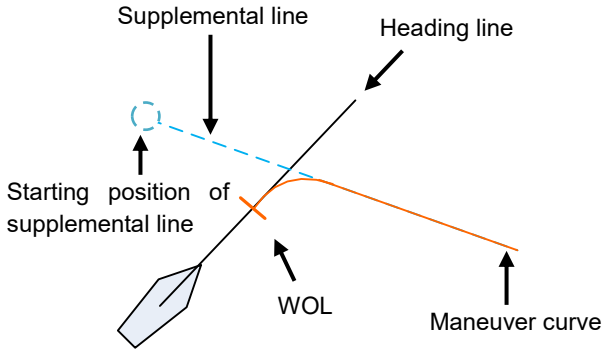
When the ship's speed is 0 or the speed information of the own ship is invalid and the TTG value is invalid, "**h**m**s" is displayed.

4.7.4 Creating an EBL maneuver curve

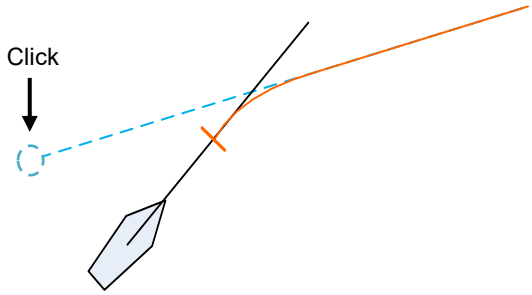
1 Set the function to [ON] by clicking on the [Display Maneuver curve] (EBL maneuver curve) button.



A supplemental line, a maneuver curve, and a WOL for creating a maneuver curve are displayed and the maneuver curve creation mode is set.
The bearing of the supplementary line can be changed by turning the EBL dial during creation of a maneuver curve.

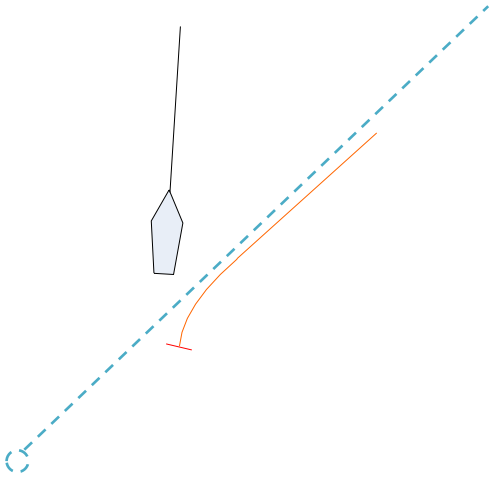


Determine a supplemental line starting position by clicking.



Note

When the WOL position is behind the own ship, the color of WOL changes to red and the supplemental line starting point can no longer be determined by clicking on the point.



Cancelling the creation of maneuver curve

By clicking the right-button in maneuver curve creation mode, the creation can be cancelled.

4.8 Connecting Own Ship and the Specified Fixed Position with EBL and the VRM Marker (Node Fixed EBL/VRM Function)

Node Fixed EBL-VRM is the function that connects the own ship with the specified fixed position with the EBL and VRM markers.

Since this EBL/VRM connection is maintained even if the own ship travels, it is possible to always know the bearing and distance of the own ship against the fixed position.

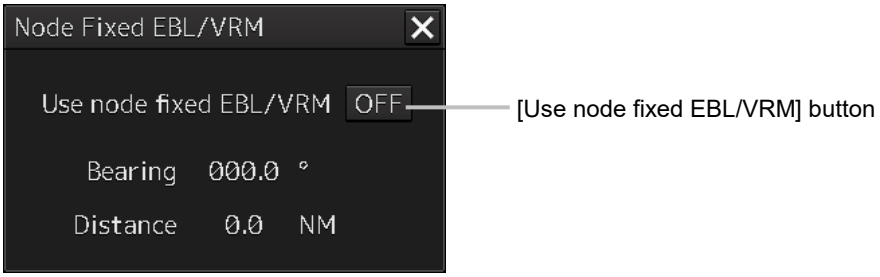
On the selected fixed position, the bearing and distance of the own ship against the fixed position are displayed.

4.8.1 Displaying the [Node Fixed EBL/VRM] dialog box

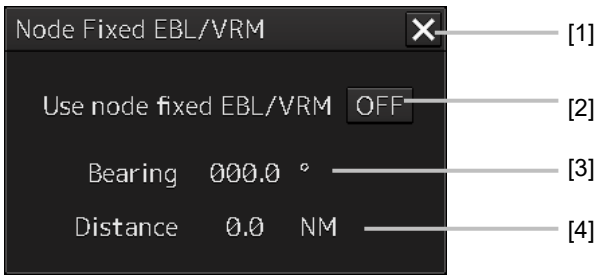
To execute the Node Fixed EBL/VRM function, the [Node Fixed EBL/VRM] dialog box must be displayed.

1 **Click on the [Menu] button on the left toolbar.**
A submenu is displayed.

2 **Click on the [Node Fixed EBL/VRM] button on the menu.**
The [Node Fixed EBL/VRM] dialog box appears.



4.8.2 Description of [Node Fixed EBL/VRM] dialog box



[1] [x] button

When the [x] button is clicked on, the [Node Fixed EBL/VRM] dialog box is closed.

[2] [Use Node Fixed EBL/VRM] button

This button sets the display of fixed position EBL/VRM to ON/OFF.

[ON]: The cursor mode is changed to the EBL/VRM marker intersection move mode.

[OFF]: Cancels the fixed position EBL/VRM display.

[3] Bearing up to the fixed position

Displays the bearing from the own ship to the fixed position.

The bearing is always reflected.

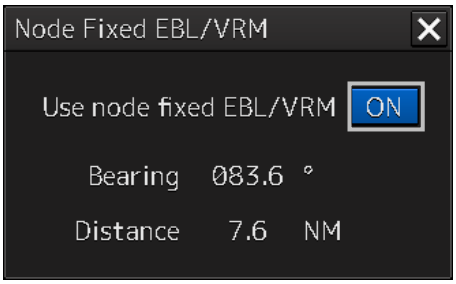
[4] Distance up to the fixed position

Displays the distance from the own ship to the fixed position.

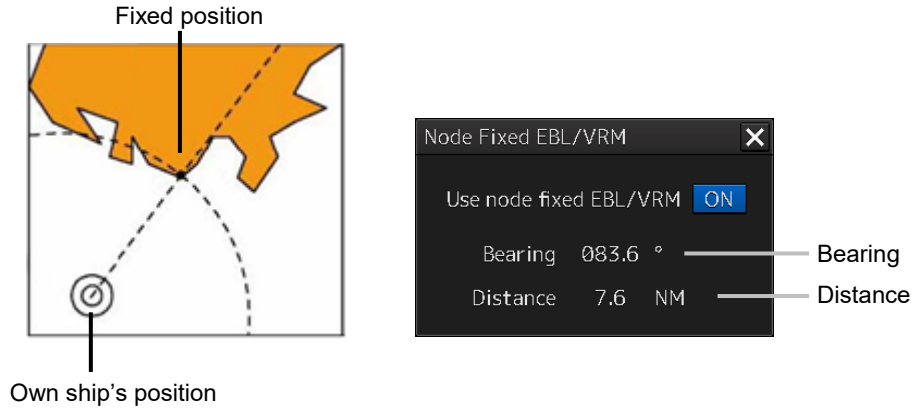
The distance is always reflected.

4.8.3 Creating a new Node Fixed EBL/VRM

1 Set the function to ON by clicking on the [Use Node Fixed EBL/VRM] button.

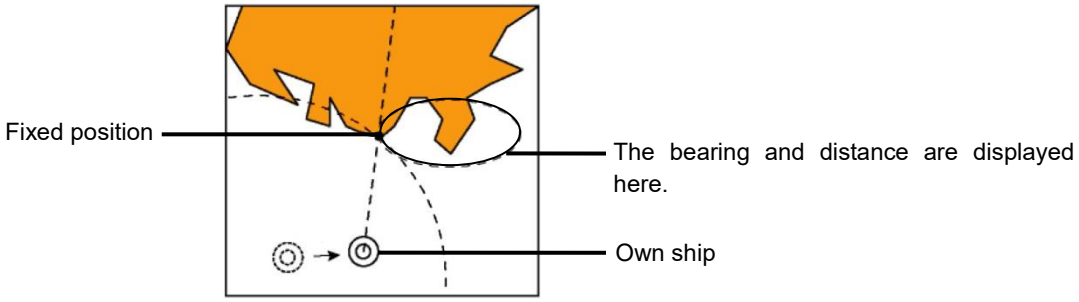


The cursor mode is set to the EBL/VRM marker intersection move mode.



2 Determine the fixed position by clicking the position to be fixed.

The bearing and distance of the own ship against the fixed position are displayed on the selected fixed position and these values change as the own ship advances.



[Relationship between the own ship and the fixed position when the own ship advances]

Even if the [Node Fixed EBL/VRM] dialog box is closed after the fixed position is determined, the display of Node Fixed EBL/VRM remains.

After the fixed position is determined, the cursor mode changes to the AUTO mode.

When the mouse button is clicked on any position in Node Fixed EBL/VRM in AUTO mode, the mode changes to the Node Fixed EBL/VRM intersection shift mode.

4.8.4 Cancelling the Node Fixed EBL/VRM function

1 **Click** the right mouse button in Node Fixed EBL/VRM intersection shift mode.

The mode is cancelled and the [Use Node Fixed EBL/VRM] button is set to OFF.

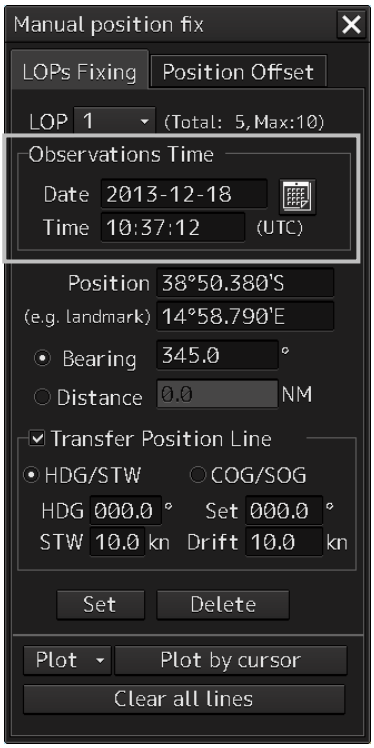
4.9 Measuring the Own Ship's Position Manually (LOPs Fixing Function of Manual position fix)

This function is used for measuring the own ship's position based on the following navigation and plotting on the chart by using LOP (Line Of Position).
The own ship's position can also be jumped to the plotted position.

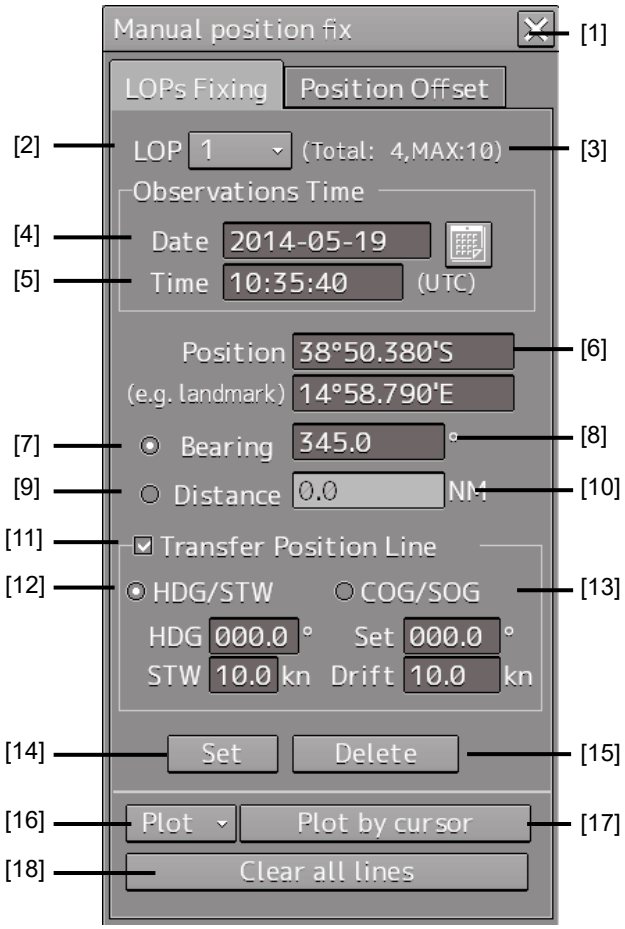
4.9.1 Displaying the [Manual position fix] dialog box

1 **Click on the [Menu] button on the left toolbar.**
The menu is displayed.

2 **Click on the [Tools] - [Manual Position Fix] button on the menu.**
The [Manual Position Fix] dialog box appears.



4.9.2 Description of the [LOPs Fixing] tab of the [Manual position fix] dialog box



[1] [X] button

Use this button to close the [Manual position fix] dialog box.

[2] [LOP] (LOP selection combo box)

When a LOP number (1 to 10) is selected from the list, the LOP is switched to the generated LOP corresponding to the number.

[3] Display of the number of LOPs

The maximum number of LOPs that can be created and the number of LOPs that have been created are displayed.

[4] [Date] (Observation date)

When the text box is clicked on, a calendar picker is displayed, enabling input of an observation date.

[5] [Time] (Observation time)

When the text box is clicked on, a calendar picker is displayed, enabling input of an observation time.

[6] [Position] (LOP reference point)

Set a reference point by entering a LOP reference point through the software keyboard or clicking on any position on the chart.

[7] [Bearing] (Selection of LOP bearing mode)

When this item is selected, LOP is switched to the bearing mode.

[8] LOP bearing input box

Enter a bearing of LOP. The input is enabled when LOP is in bearing mode.

[9] [Distance] (Selection of LOP distance mode)

When this item is selected, LOP is switched to the distance mode.

[10] LOP distance input box

Enter a distance of LOP. The input is enabled when LOP is in distance mode.

[11] [Transfer Position Line] (TPL ON/OFF)

When this item is checked, TPL (Transfer Position Line) is drawn by determining the transfer amount from the observation time differences of all other LOPs, the bearing and speed of the ship and the current direction and the current speed. However, transfer does not occur to the past LOP.

[12] [HDG/STW] (Selection of speed through water)

When this item is selected, TPL is determined from the speed through water, the current direction, and the current speed.
This item can be selected when [Transfer Position Line] is checked.

[13] [COG/SOG] (Selection of speed over the ground)

When this item is selected, TPL is determined from the speed over the ground.
This item can be selected when [Transfer Position Line] is checked.

[14] [Set] button

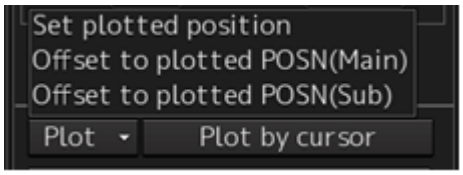
When this item is clicked on, the LOP that was created is determined and control is passed to the next LOP creation mode.

[15] [Delete] button

When this button is clicked on, the LOP that was selected on the LOP selection combo box is deleted.

[16] [Plot] button

When this button is clicked on, the following menu is displayed.



[Set plotted position]: Creates a reference point on the plotted position on the chart.

[Offset to plotted POSN(Main)]: Creates a reference point on the position determined by offsetting from plotted position by POSN.

[Offset to plotted POSN(Sub)]: Creates a reference point on the position determined by offsetting from plotted position by POSN.

[17] [Plot by cursor] button

When the mouse button is clicked on this button, the cursor shape changes to the offset cursor, enabling creation of a Plotted Position on the coordinates on which the button was clicked with the offset cursor.

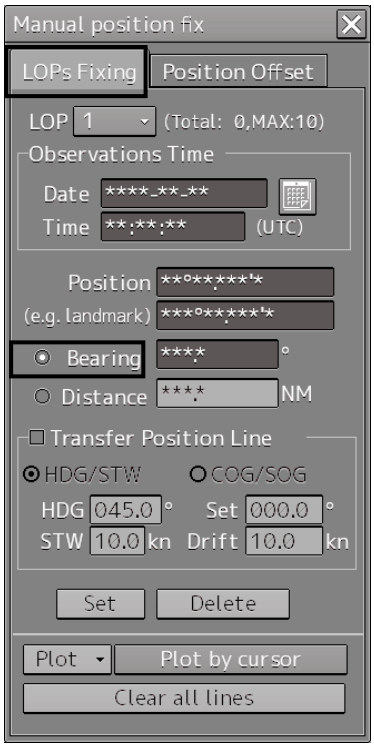
[18] [Clear all lines] button

When this button is clicked, all the LOPs that were created are deleted.

4.9.3 Creating LOP

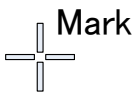
4.9.3.1 Creating bearing LOP

1 After confirming that the "LOPs Fixing" tab is selected, select [Bearing].

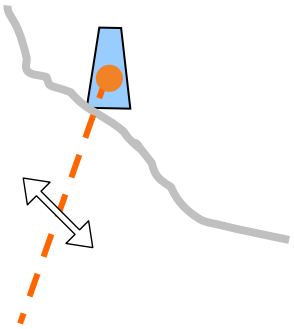


2 Place the cursor on the reference point.

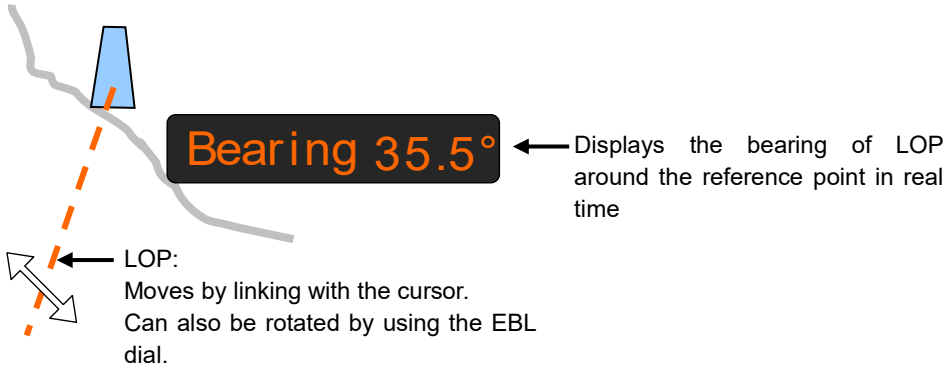
The cursor (mark cursor) of the LOP reference point setting mode for the first LOP is displayed. In this case, the LOP starts from the edge of the screen and the LOP reference point is the cursor position.



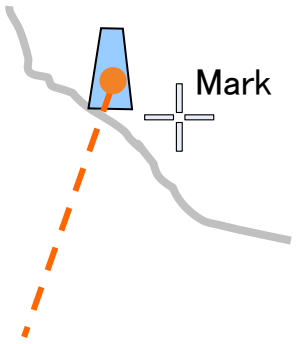
3 **Set the cursor to the target that was used for bearing measurement and click the mouse button. The cursor changes to the bearing setting cursor.**



4 **Move the cursor to set the bearing to the measured bearing and determine the bearing of the LOP by clicking the mouse button.**
The measurement can also be determined by entering a numeric value in the Bearing text box.

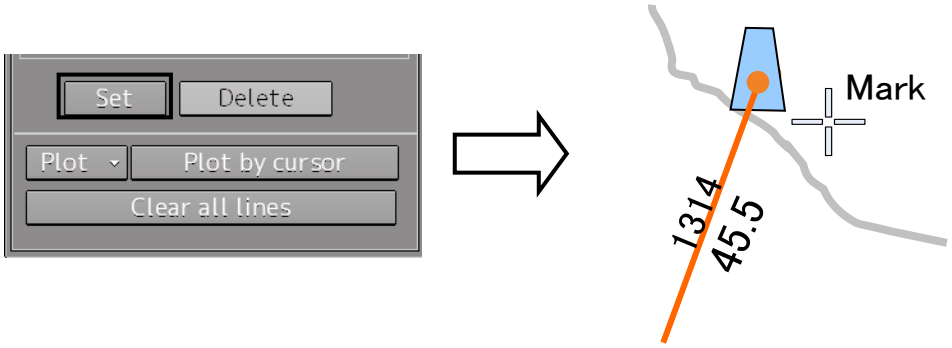


When the bearing of LOP is determined, the mark cursor is displayed and the cursor mode is changed to the reference point setting mode.



5 **Determine the 1st LOP by clicking on the [Set] button.**

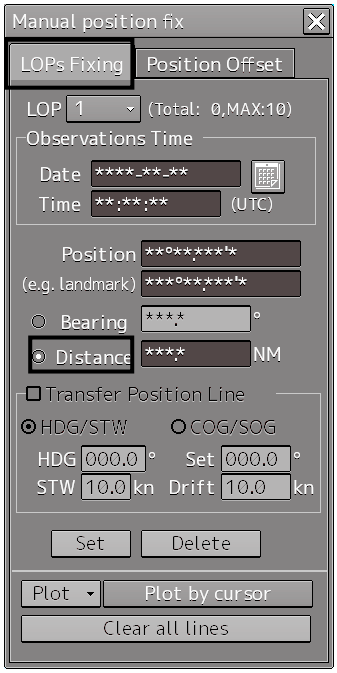
The 2nd LOP is selected in the LOP selection combo box.



When LOP is determined, the broken line is changed to a solid line.

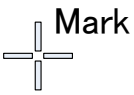
4.9.3.2 Creating distance LOP

1 **Check that the [LOPs Fixing] tab is displayed and select [Distance].**

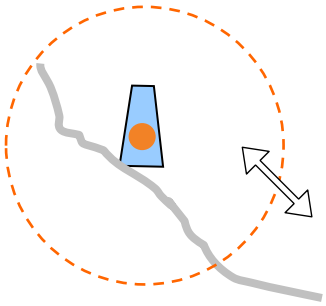


2 **Place the cursor on the reference point.**

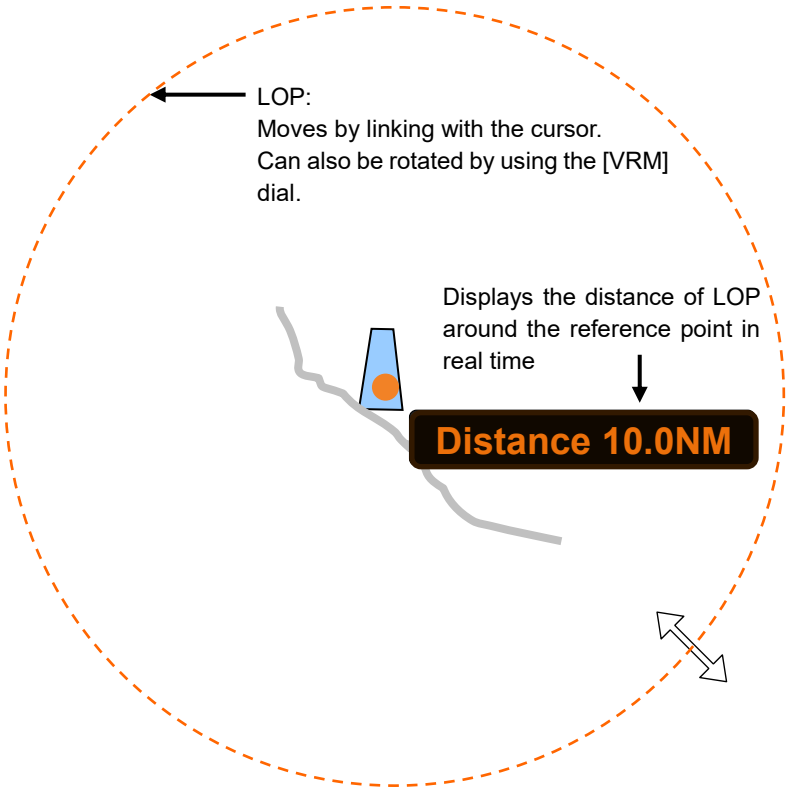
The cursor (mark cursor) is displayed.



3 **When the cursor is moved to the target that is used for distance measurement and the mouse button is clicked on, the cursor changes to the arrow cursor.**



4 **Move the cursor to the measured distance and determine the LOP distance by clicking the button.**



4.9.4 Measuring the own ship's position in cross bearing fix

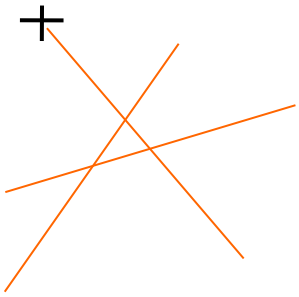
This section describes the own ship position fixing and offset procedures by cross bearing (cross position fixing method).

In cross bearing, creation of a Plotted Position and offset operation can be performed concurrently.

When the own ship's position is unclear due to the occurrence of abnormality in the position sensor such as a navigation unit, the position of own ship can be determined by drawing a line of the bearing of the fixed target visually on the chart by using cross bearing.

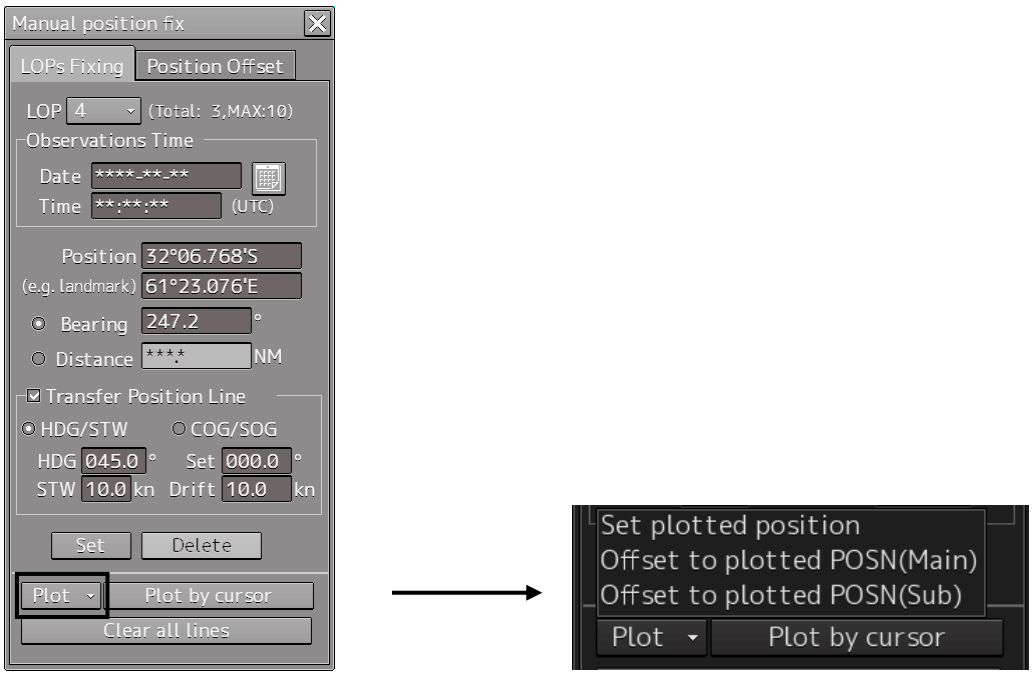
4.9.4.1 Automatic position fixing

1 Create two or more LOPs to create intersecting points.



2 Click the [Plot] combo box.

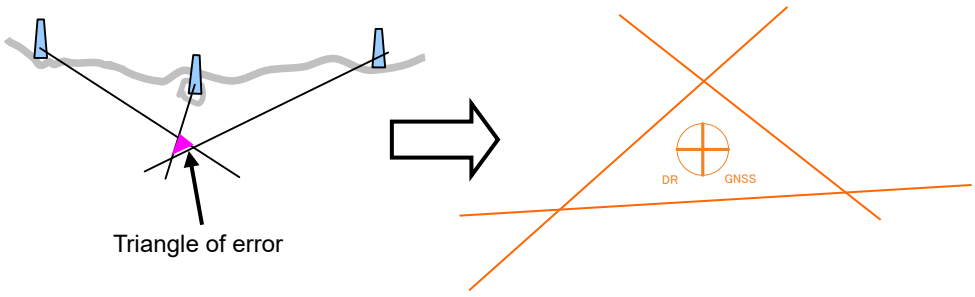
> **Memo**
> The following menu is displayed only when two or more LOPs are determined.
> When there are three or more LOPs or TPLs, refer to "4.9.4.4 When there are three or more LOPs or TPLs".



3 **Select [Set plotted position].**

A Plotted Position is displayed on the appropriate intersecting point.

When there are two LOPs, the intersecting point is used as the position fixing candidate and when there are three LOPs and a differential triangle is generated, the inner center is used as the position fixing candidate.

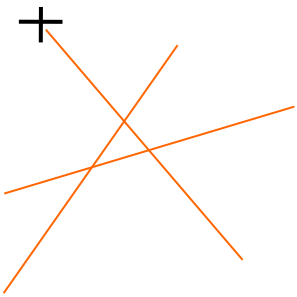


4 **Set a Plotted Position in the [Plotted Position] dialog that is displayed at creation of a Plotted Position.**

For the details of the [Plotted Position] dialog box, refer to "4.9.4.5 Setting a plotted position".

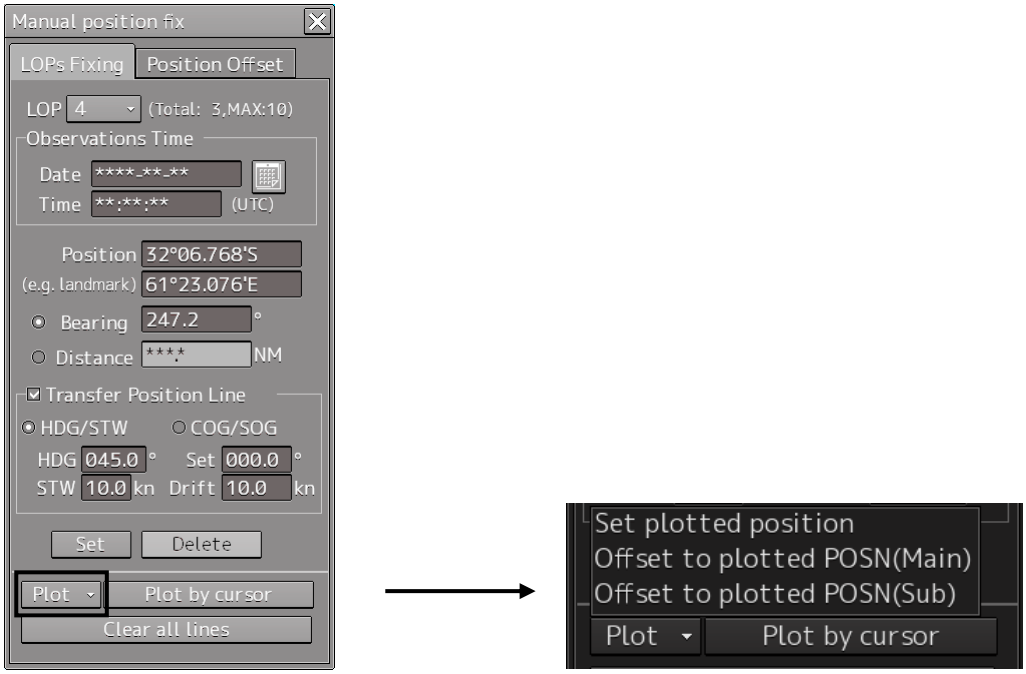
4.9.4.2 Automatic offset

1 **Create two or more LOPs to create intersecting points.**



2 Click the [Plot] combo box.

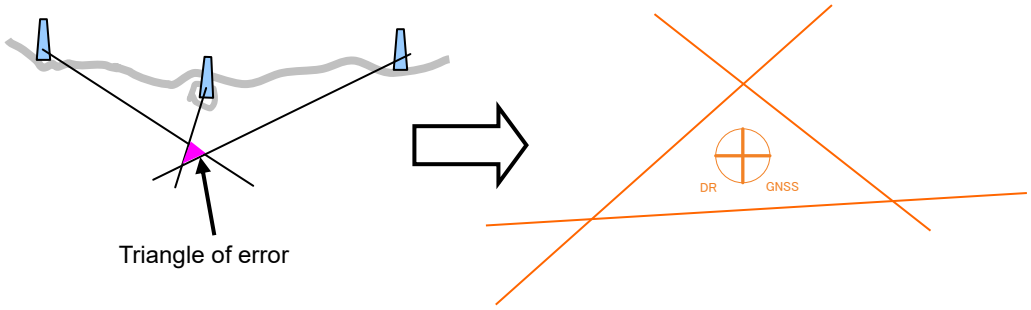
> **Memo**
> The following menu is displayed only when two or more LOPs are determined.
> When there are three or more LOPs or TPLs, refer to "4.9.4.4 When there are three or more LOPs or TPLs".



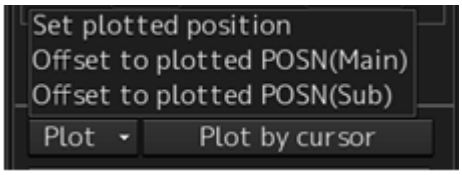
3 **Select [Set plotted position].**

A Plotted Position is displayed on the appropriate intersecting point.

When there are two LOPs, the intersecting point is used as the position fixing candidate and when there are three LOPs and a triangle of error is generated, the inner center is used as the position fixing candidate.



4 **Select [Offset to plotted POSN(Main)] or [Offset to plotted POSN(SUB)] from the [Plot] combo box.**



- When [Offset to plotted POSN(Main)] is selected, a reference point is created by offsetting by POSN1 from the plotted position.
- When [Offset to plotted POSN(Sub)] is selected, a reference point is created by offsetting by POSN2 from the plotted position.

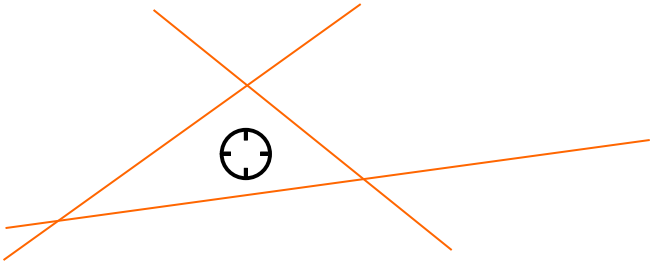
4.9.4.3 Manual position fixing

1 **Click on the [Plot by cursor] button.**

The mode is changed to the manual plot mode and the offset cursor is displayed.

2 **Click inside of the triangle of error with the offset cursor.**

A Plotted Position is displayed on the coordinate that was clicked on and the [Plotted Position] dialog box appears.

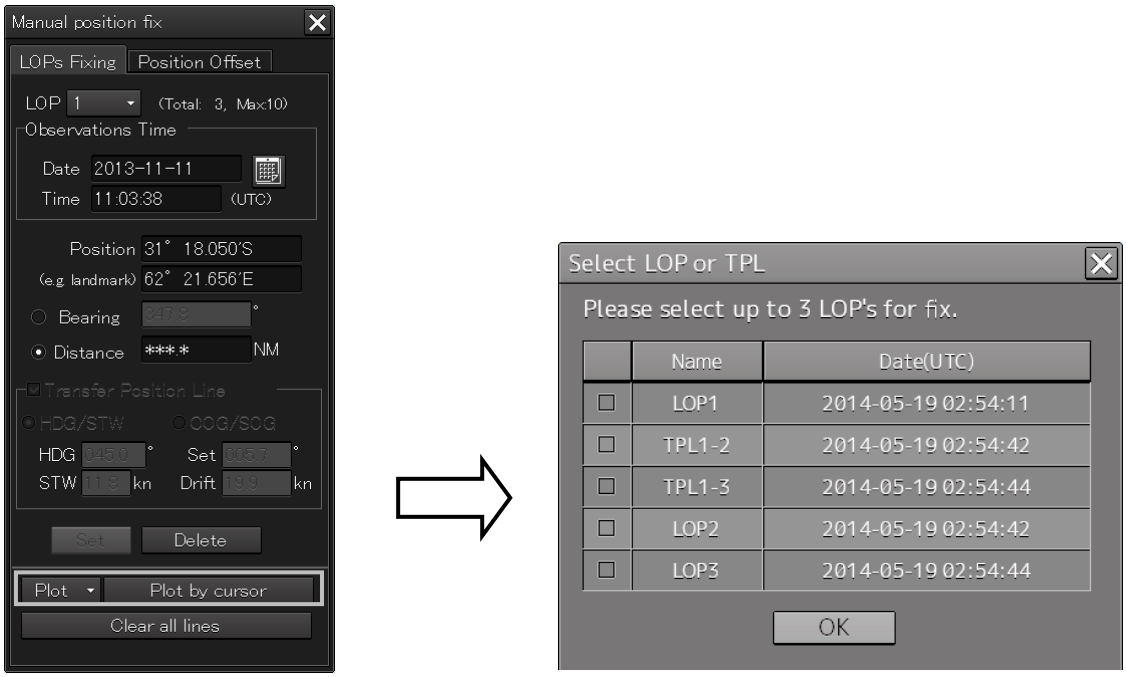


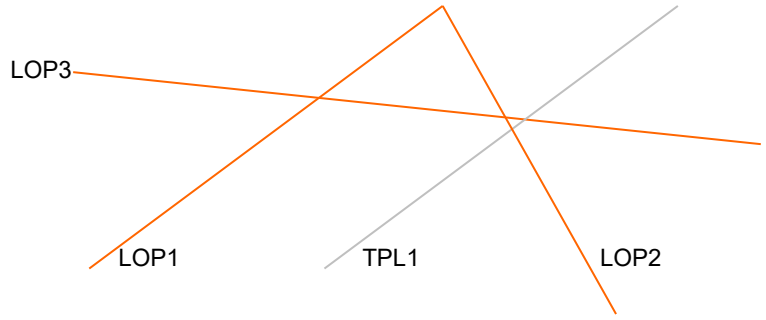
3 **Set a Plotted Position in the [Plotted Position] dialog that is displayed at creation of a Plotted Position.**

For the details of the [Plotted Position] dialog box, refer to the "4.9.4.5 Setting a plotted position".

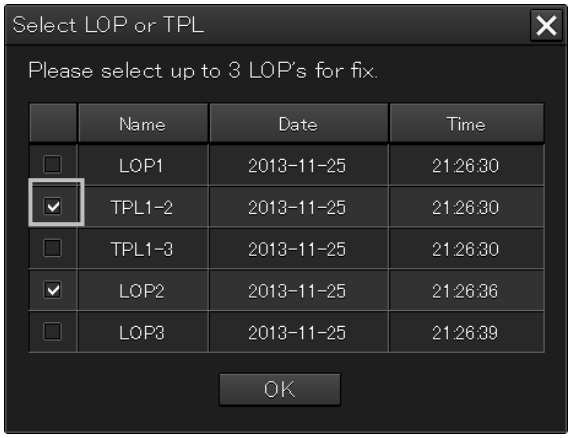
4.9.4.4 When there are three or more LOPs or TPLs

When there are three or more LOPs or TPLs in total and the [Set plotted position] button is clicked on, the [Select LOP or TPL] dialog box appears.
Select LOP or TPL on the chart from this dialog box.





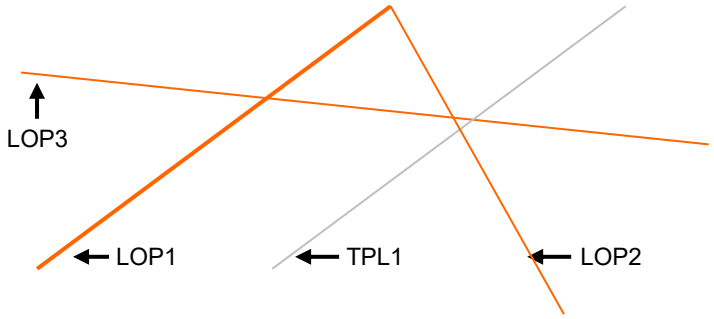
1 **Select a LOP or TPL checkbox.**



TPL display example

For instance, "TPL1-2" is expressed with the "LOP number" that is checked in [Transfer Position Line] and "LOP number of creation destination (transfer destination").

The selected LOP or TPL is highlighted.



2 **Close the dialog box by clicking on the [OK] button.**

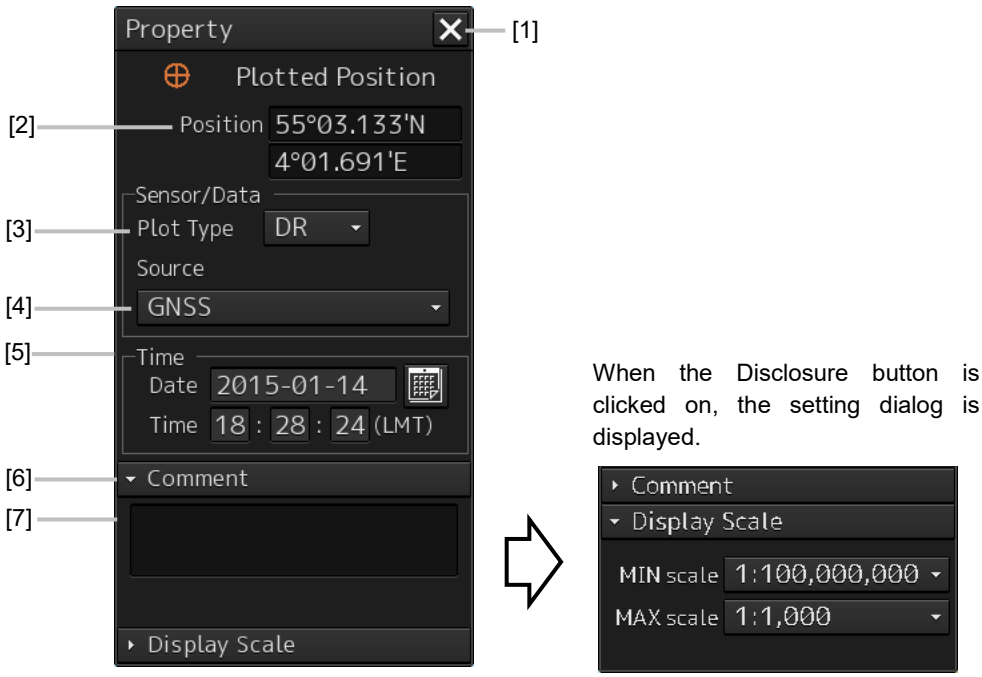
Important

The [OK] button on the dialog box is enabled under the following conditions only.

Position fixing method	Pattern where the [OK] button is enabled	Remarks
Cross Bearing	BRG×2 BRG×3	LOP bearing only is available for Cross Bearing.
Running fix	BRG×1 TPL×1 BRG×1 TPL×2	LOP and TPL bearing only are available for Running fix.
Bearing Distance	BRG×1 DST×1	For Bearing Distance, the position is fixed by one LOP bearing and one LOP distance.
Radar fix	DST×2 DST×3	LOP distance only is available for Radar fix.

* BRG means "bearing LOP" and RNG means "distance LOP".

4.9.4.5 Setting a plotted position



[1] [X] button

Close the [Property] dialog box.

[2] [Position]

Enter the coordinate of the Plotted Position.

[3] [Plot type] combo box

Switched between blank, DR(Dead Reckoning) and EP(Estimated Position).

Position by dead-reckoning (DR: Dead-Reckoning)

Position that is assumed based on the current course and speed

Estimated position (EP)

Position that is assumed by including the influence of wind and current in addition to the current course and speed

[4] [Source] (Data source) combo box

Select a data source from the list containing following 11 types.

Data source	
Blank	GPS
GNSS	DGPS
LORAN	DECCA

RADAR Range	Astronomical
Visual Bearing	MFDF
Visual BRG/RADAR RNG	TRANSIT

[5] [Time]

When the calendar icon  is clicked on, a calendar picker is displayed, enabling input of date and time.

[6] [Comment]

When the disclosure button of the Comment is clicked on, an input column is displayed. Enter a comment (up to 64 characters).

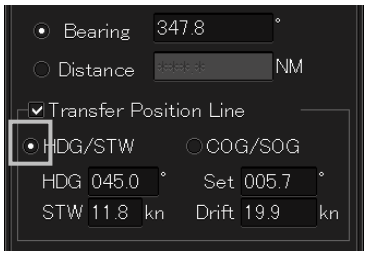
[7] Display Scale

When the disclosure button of Display Scale is clicked on, the scale range (minimum scale to maximum scale) for Plotted Position on the chart is displayed.
Select the minimum scale (MIN scale) and the maximum scale (MAX scale) as required.

4.9.5 Measuring the own ship's position with Running Fix

By using two LOPs and TPLs (Transfer Position Line) that were created at different times, an intersecting point or a triangle of error is created and the position is fixed.
The same procedure as for cross bearing is applied for automatic position fixing and manual position fixing.

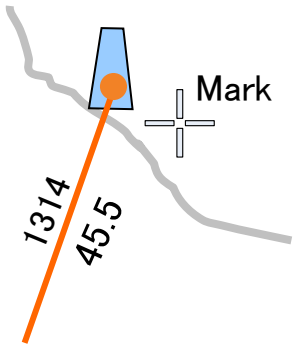
1 Select the [Transfer Position Line] (ON/OFF of TPL) checkbox.



2 Select a TPL calculation method.

When determining TPL from the ship's heading through water, ship's speed, current direction, and current speed, select [HDG/STW].
To change the ship's heading, ship's speed through water, current direction, and current speed subsequently, change the value in each of the [HDG], [STW], [Set], and [Drift] boxes. To determine TPL from the ship's speed, select [COG/SOG].

3 Create the 1st LOP and click on the [Set] button.



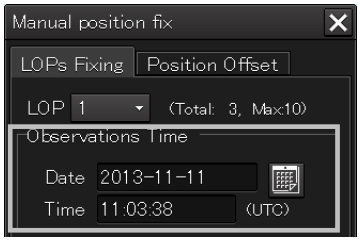
4 **Wait until the ship moves for a while.**

Note

While the ship is moving, do not change the bearing and speed of own ship.

Memo

When the traveling distance is available from the time difference from the 1st LOP to the observation time and the direction and speed of the ship, the 2nd LOP can also be created by entering the Observation Time of the LOP without waiting for the movement of the ship.

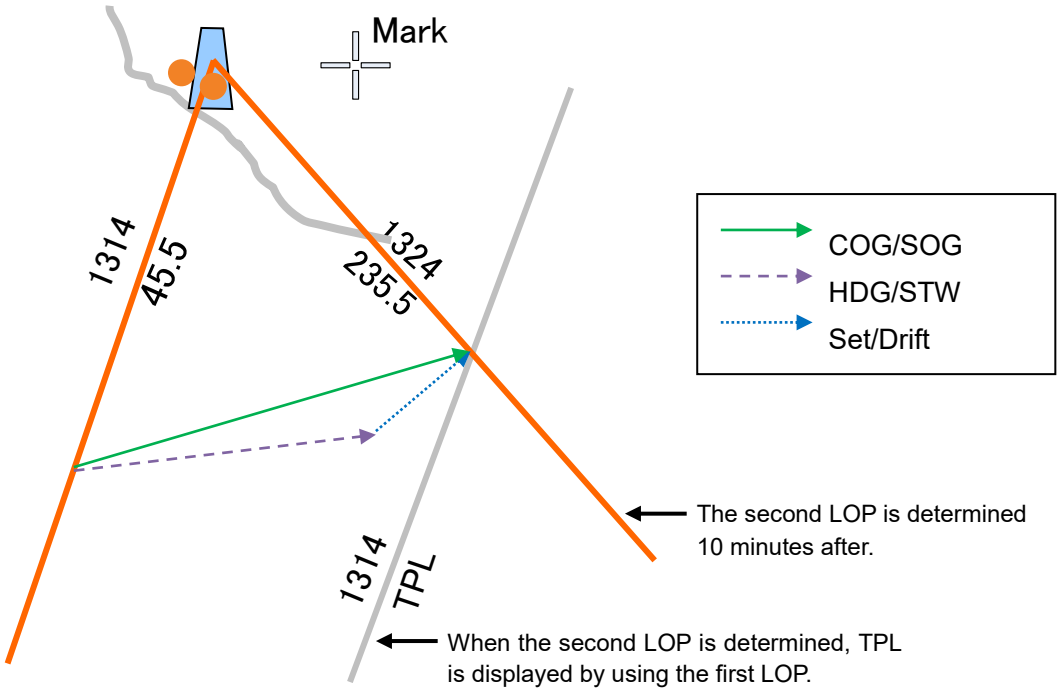


5 **Select the [Transfer Position Line] check box.**

6 Create the second LOP with the same procedure as for cross bearing.

TPL is automatically drawn by determining the traveling distance from the time difference from the 1st LOP to the observation time and the bearing and speed of the ship. The intersection between the 2nd LOP and TPL becomes the own ship's position based on the both-side positioning method.

- When [HDG/STW] is set to ON, TPL of the same angle as that of the 1st LOP and same time as that of 2nd LOP is created based on the position determined by adding the HDG/STW vector and the Set/Drift vector.
- When [COG/SOG] is ON, TPL is created by using COG/SOG.



Note

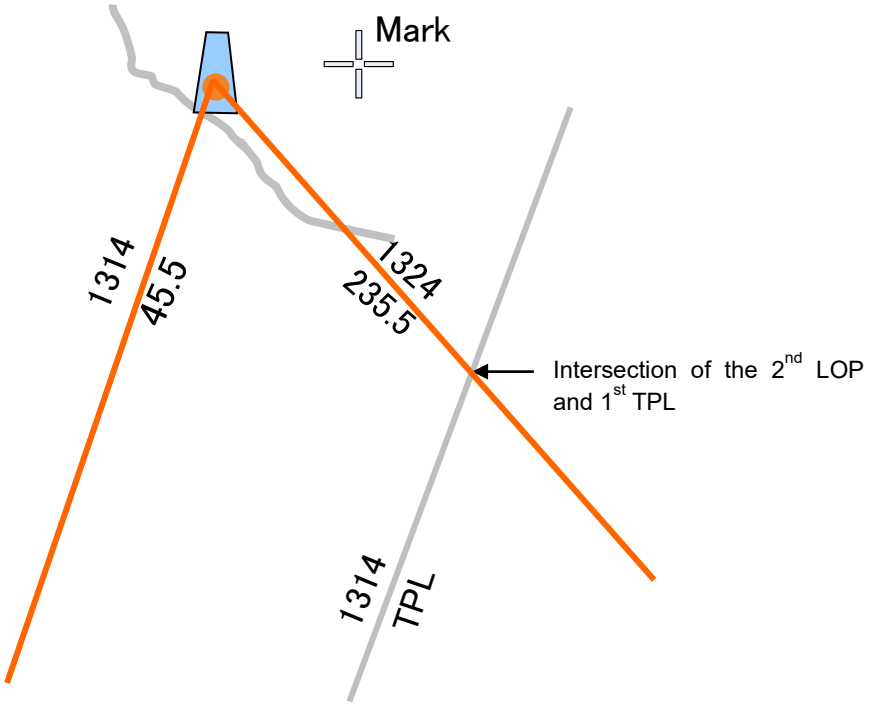
Since transfer to the past LOP is not possible, TPL cannot be created when the time of LOP is prior to the time of LOP1.

7 **When using the intersection between LOP and TPL as the Plotted Position, perform the operation that is described in Memo.**

When using a triangle of error as the Plotted Position, advance to Step 8.

Memo

The intersection between LOP and TPL can also be used as the Plotted Position.



1 Select [Set plotted position] from the [Plot] button while an intersection is created from the 2nd LOP and 1st TPL.
The [Select LOP or TPL] dialog is displayed.

2 Select the 2nd LOP and 1st TPL and click on the [OK] button.
A Plotted Position is set at the intersection of the 2nd LOP and 1st TPL.

8 **Check [Transfer Position Line].**

9 **Click on the [Set] button by creating the 2nd LOP.**

TPL is automatically drawn by determining the traveling distance from the time difference from the 2nd LOP to the observation time and the bearing and speed of the ship.
Two TPLs are created, creating a triangle of error.

10 **Select [Set plotted position] from the [Plot] button.**

The [Select LOP or TPL] dialog is displayed.

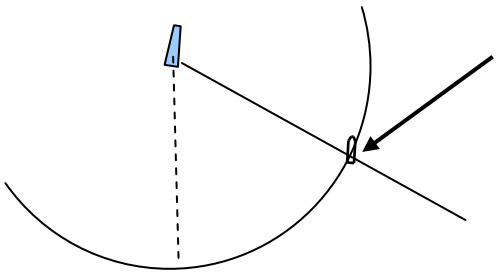
11 Select LOP and TPL that form a triangle of error and click on the [OK] button.

A Plotted Position is set inside of the triangle of error.

4.9.6 Measuring the own ship's position with other methods

■ Bearing and Distance

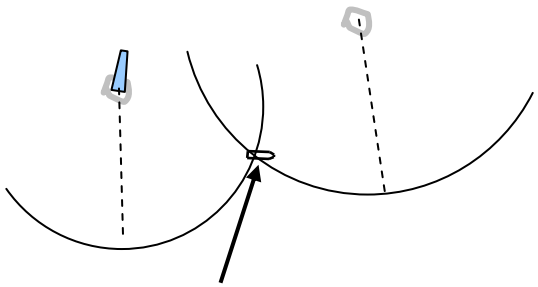
Perform position fixing from one target with one Bearing and one Distance.



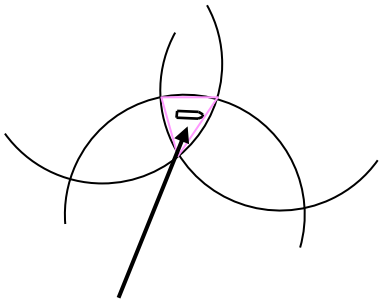
The intersection becomes the own ship's position.
However, when multiple intersections are created, the one closest to the own ship's position among those that are displayed in the own ship information area is used as the own ship's position. In this case, the own ship's position is outside of the sensor detection range, the position closest from the bearing starting point is used as the own ship's position.

■ Distance

Perform position fixing from the distance intersecting point from 2 to 3 targets.



The intersection becomes the own ship's position.
However, when multiple intersections are created, the one closest to the own ship's position among those that are displayed in the own ship information area is used as the own ship's position. In this case, the own ship's position is outside of the sensor detection range, the position closest from the bearing starting point is used as the own ship's position.

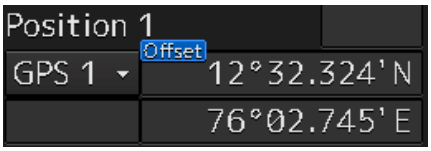


Inner center (position closer to the own ship's position) of the triangle of error created by 3 intersecting points when there are 3 distance LOPs.

4.10 Offsetting the Own Ship's Position Manually (Position Offset Function of Manual position fix)

⚠WARNING

Do not use the offset function during the voyage.
If the function is used while an offset value is input in the own ship's position (different from the actual position), an accident may occur.
When an offset value is input, the [Offset] badge is displayed in the position display section of Own Ship Information. Check if the own ship is off course with this position display section. The "Position Shift" message is also displayed in the message area.

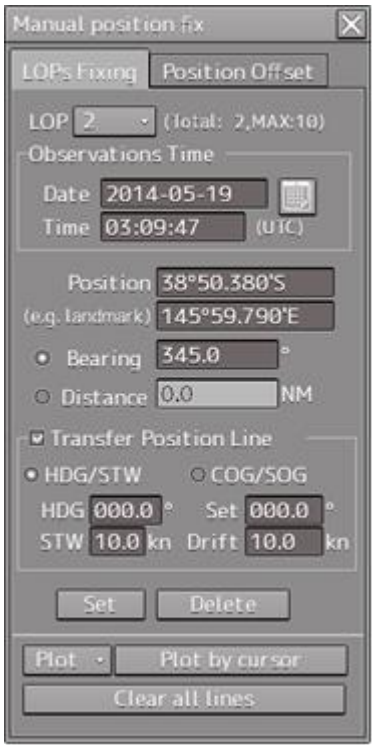


4.10.1 Displaying the [Manual position fix] dialog box

1 Click on the [Menu] button on the left toolbar.
The menu is displayed.

2 **Click on the [Tools] - [Manual Position Fix] button on the menu.**

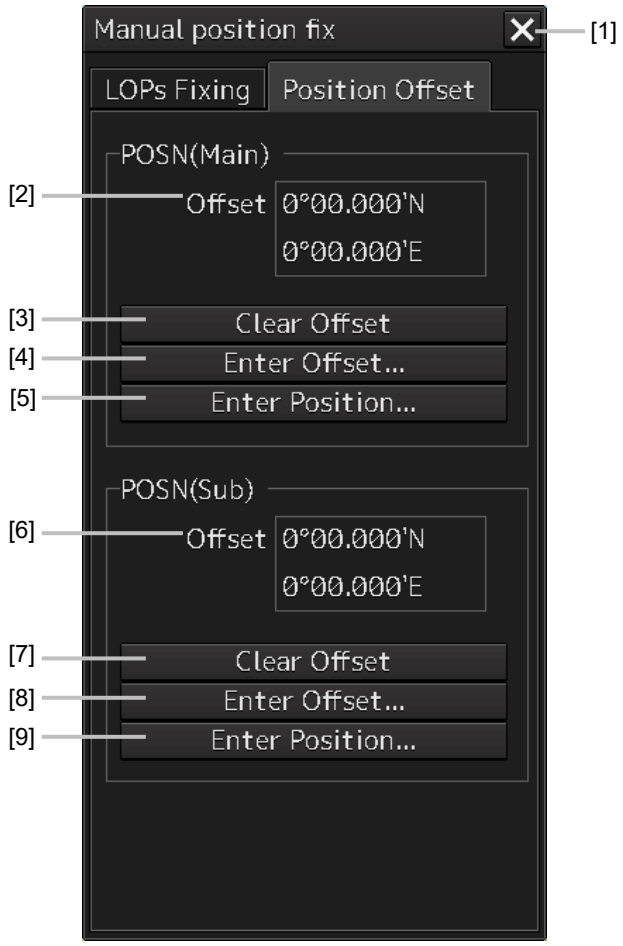
The [Manual position fix] dialog box appears.



3 **Click on the [Position Offset] tab.**

The "Position Offset" dialog box appears.

4.10.2 Description of the [Position Offset] tab of the [Manual position fix] dialog box



[1] [X] button

This button closes the [Manual position fix] dialog box.

[2] [Offset] ([POSN(Main)] coordinate after offset)

The offset amount that was offset by Enter Offset and Enter Position is displayed.

[3] [Clear Offset] (Clearing the offset value of [POSN(Main)]) button

The offset value of [POSN(Main)] is cleared.

[4] [Enter Offset] (Input of the offset value of [POSN(Main)]) button

This button displays the [Enter Offset] dialog box.

For the details, refer to "4.10.3 Setting the offset amount that is input in the [Enter Offset] dialog as the offset position".

[5] [Enter Position] (Coordinate input of [POSN(Main)]) button

This button displays the [Enter Position] dialog box.

For the details, refer to "4.10.4 Setting the position on the chart on which the mouse button was clicked as the offset position".

[6] [Offset] (Post-offset [POSN(Sub)]coordinate]
The offset amount is displayed.

[7] [Clear Offset] (Clearing the [POSN(Sub)] offset value) button
The offset value of [POSN(Sub)] is cleared.

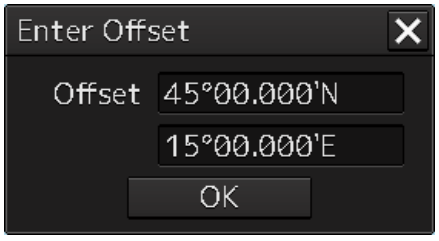
[8] [Enter Offset] (Input of offset value of [POSN(Sub)]) button
This button displays the [Enter Offset] dialog box.
For the details, refer to "4.10.3 Setting the offset amount that is input in the [Enter Offset] dialog as the offset position".

[9] [Enter Position] (Coordinate input of [POSN(Sub)]) button
This button displays the [Enter Position] dialog box.
For the details, refer to "4.10.4 Setting the position on the chart on which the mouse button was clicked as the offset position".

4.10.3 Setting the offset amount that is input in the [Enter Offset] dialog as the offset position

1 **Click on the [Enter Offset] (Setting the offset amount) button of [POSN(Main)] or [POSN(Sub)].**
The [Enter Offset] dialog is displayed.

2 **Enter an offset value through the software keyboard.**



3 **Click on the [OK] button.**
The offset amount that was input is set as the offset position.

4.10.4 Setting the position on the chart on which the mouse button was clicked as the offset position

1 **Click on the [Enter Position] (input of coordinates) button of [POSN(Main)] or [POSN(Sub)].**

The [Enter Position] dialog is displayed.

While the dialog is displayed, the cursor changes to the offset cursor and the mode changes to the position selection mode.

2 **The position is displayed in [Position] in the dialog as the coordinate of the position on the chart on which the mouse button was clicked.**

Memo

Post-offset coordinates can also be input from the software keyboard.

3 **Click on the [OK] button.**

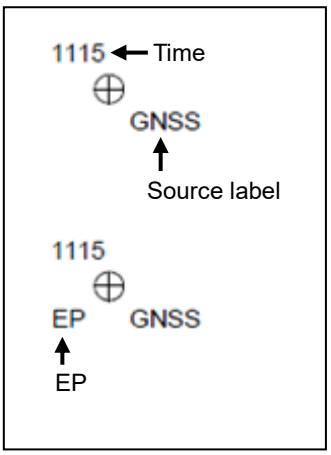
The coordinate is set in the offset position.

Notation of Plotted Position on the chart

When offset is applied to automatic plot, manual plot, or own ship's position, the time and source are displayed near the symbol.

The source is displayed with the following label.

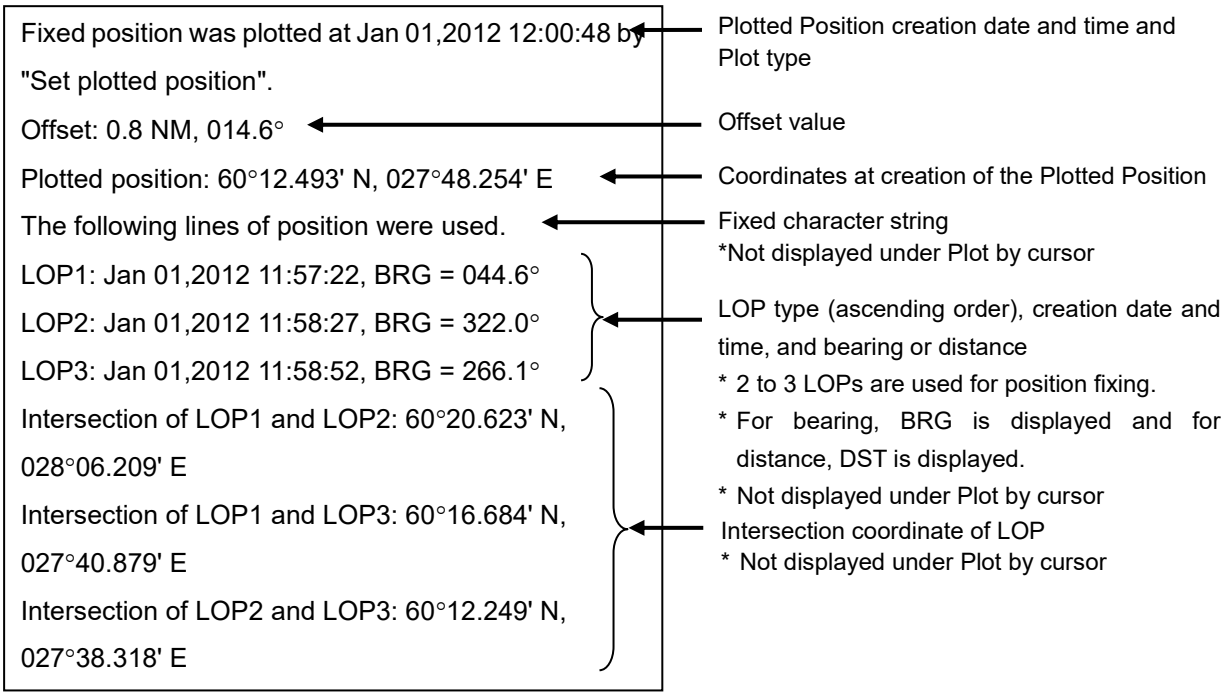
	Label	Details
Estimated position	EP	
Dead reckoned position	DR	
Plotted Position	GNSS	GNSS
	L	Loran
	R	Radar range
	V	Visual bearing
	VR	Visual BRG/Radar RNG
	G	GPS
	dG	DGPS
	D	Decca
	A	Astronomical
	M	MFDF
	T	TRANSIT



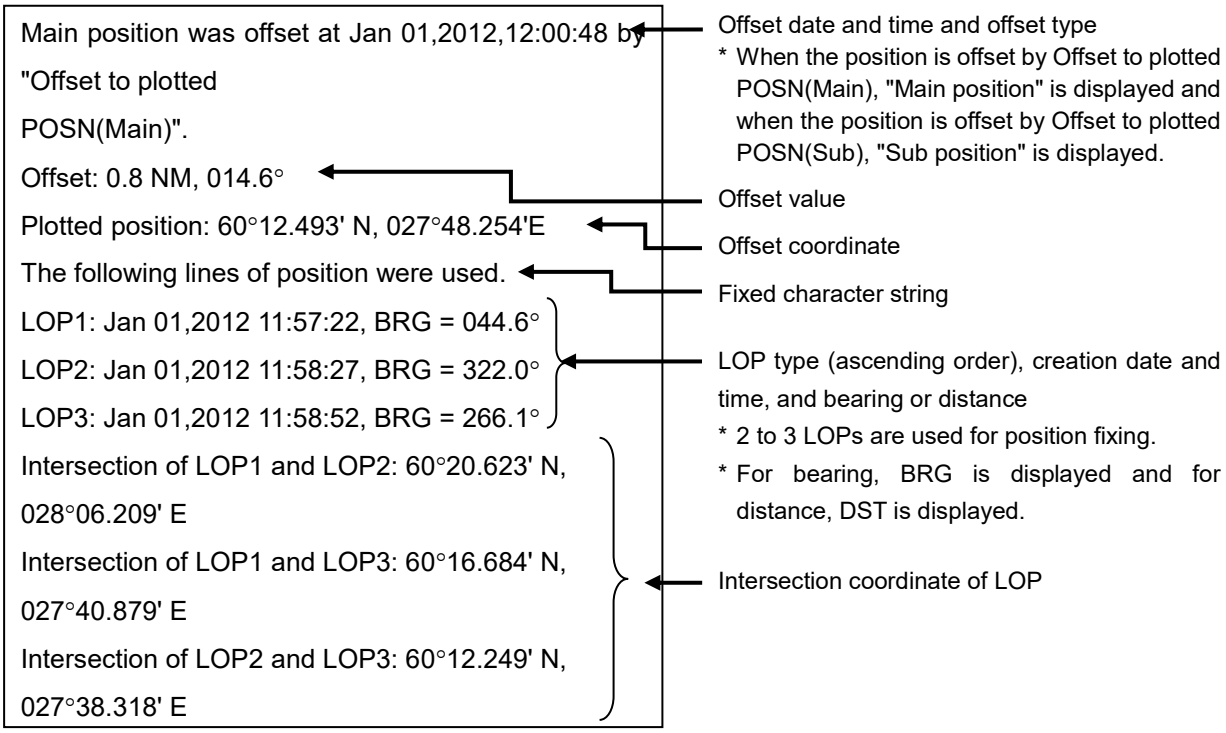
4.10.5 Recording LOPs Fixing operation in the logbook

A comment can be registered in the log book by using the following procedure.

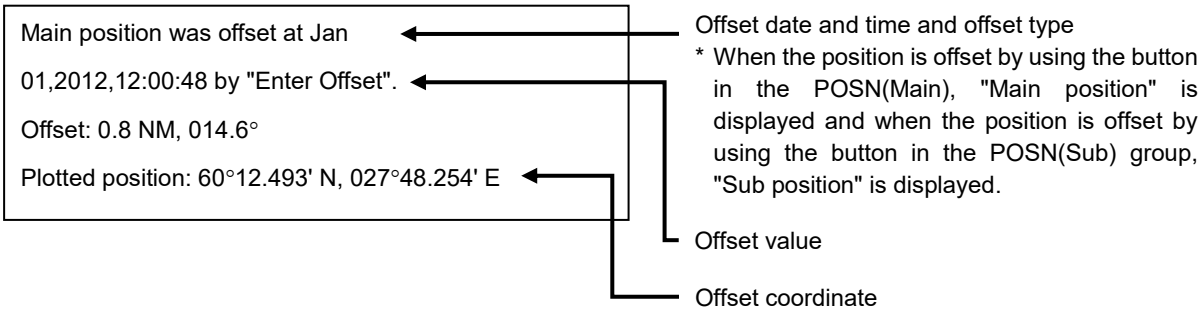
Display example when a Plotted Position is created by using Set plotted position or Plot by cursor.



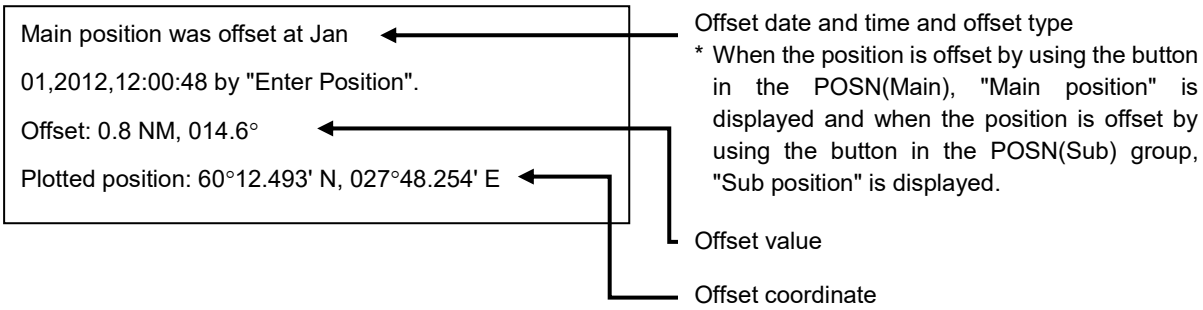
Display example when the own ship position is offset by [Offset to plotted POSN(Main/Sub).


Main position was offset at Jan 01,2012,12:00:48 by "Offset to plotted POSN(Main)".
Offset: 0.8 NM, 014.6°
Plotted position: 60°12.493' N, 027°48.254'E
The following lines of position were used.
LOP1: Jan 01,2012 11:57:22, BRG = 044.6°
LOP2: Jan 01,2012 11:58:27, BRG = 322.0°
LOP3: Jan 01,2012 11:58:52, BRG = 266.1°
Intersection of LOP1 and LOP2: 60°20.623' N, 028°06.209' E
Intersection of LOP1 and LOP3: 60°16.684' N, 027°40.879' E
Intersection of LOP2 and LOP3: 60°12.249' N, 027°38.318' E
Offset date and time and offset type
* When the position is offset by Offset to plotted POSN(Main), "Main position" is displayed and when the position is offset by Offset to plotted POSN(Sub), "Sub position" is displayed.
Offset value
Offset coordinate
Fixed character string
LOP type (ascending order), creation date and time, and bearing or distance
* 2 to 3 LOPs are used for position fixing.
* For bearing, BRG is displayed and for distance, DST is displayed.
Intersection coordinate of LOP

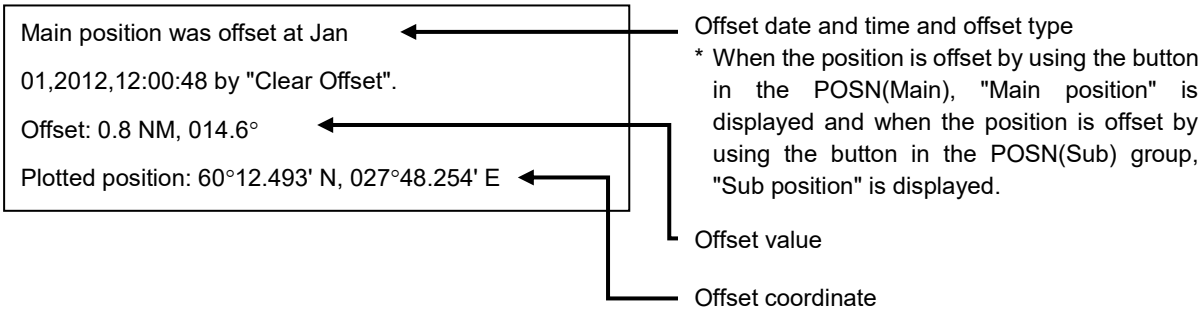
Display example when the own ship position is offset by Enter Offset of the [Position Offset] tab



Display example when the own ship position is offset by Enter Position of the [Position Offset] tab



Display example when the own ship position is offset by Clear Offset of the [Position Offset] tab



4.10.6 Offsetting the own ship position

When the own ship position is offset by Offset to plotted POSN(Main/Sub) and Enter Offset, Enter Position, and Clear Offset in Position Offset, the following character strings are registered in the Logbook.

Item	Statement	Display contents
Offset to plotted POSN(Main/Sub) *For the "Offset to plotted POSN(Main)" section, "Offset to plotted POSN(Main)" or "Offset to plotted POSN(Sub)" is displayed.	Main position was offset at Jan 01,2012,12:00:48 by "Offset to plotted POSN(Main)". Offset: 0.8 NM, 014.6° Plotted position: 60°12.493' N, 027°48.254' E The following lines of position were used. LOP1: Jan 01,2012 11:57:22, BRG = 044.6° LOP2: Jan 01,2012 11:58:27, BRG = 322.0° LOP3: Jan 01,2012 11:58:52, BRG = 266.1° Intersection of LOP1 and LOP2: 60°20.623' N, 028°06.209' E Intersection of LOP1 and LOP3: 60°16.684' N, 027°40.879' E Intersection of LOP2 and LOP3: 60°12.249' N, 027°38.318' E	- First line: Offset date and time, offset type * When the position is offset by Offset to plotted POSN(Main), "Main position" is displayed and when the position is offset by Offset to plotted POSN(Sub), "Sub position" is displayed. - Second line: Offset value - Third line: Offset coordinate - Fourth line: Fixed character string - Fifth to seventh lines: LOP type (ascending order), creation date and time, bearing or distance * 2 to 3 LOPs are used for position fixing * For bearing BRG is displayed and for distance, DST is displayed. - Eighth to tenth lines: Intersection coordinates of LOP
Enter Offset	Main position was offset at Jan 01,2012,12:00:48 by "Enter Offset". Offset: 0.8 NM, 014.6° Plotted position: 60°12.493' N, 027°48.254' E	- First line: Offset date and time * When the position is offset by using the button in the POSN(Main), "Main position" is displayed and when the position is offset by using the button in the POSN(Sub) group, "Sub position" is displayed. - Second line: Offset value - Third line: Offset coordinate
Enter Position	Main position was offset at Jan 01,2012,12:00:48 by "Enter Position". Offset: 0.8 NM, 014.6° Plotted position: 60°12.493' N, 027°48.254' E	- First line: Offset date and time * If offset with a button in the POSN(Main) group, "Main position" is displayed; if offset with a button in the POSN(Sub) group, "Sub position" is displayed. - Second line: Offset value - Third line: Offset coordinates

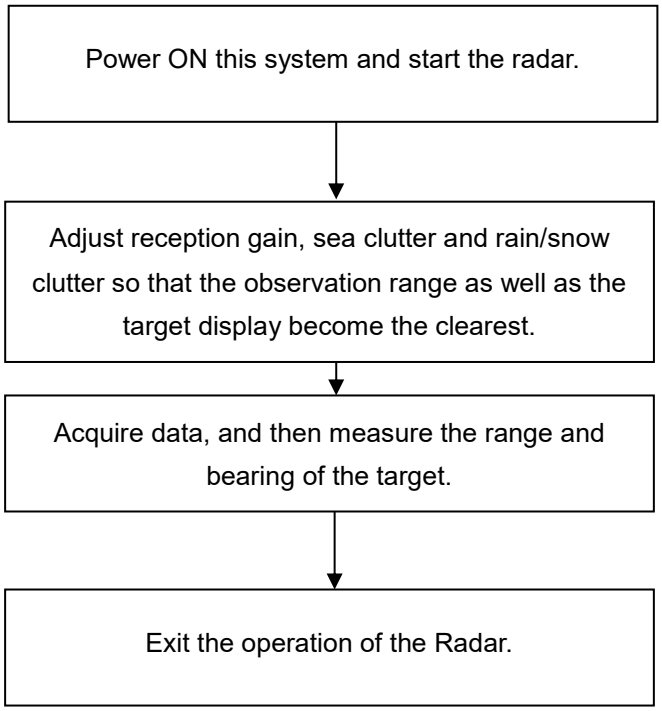
Clear Offset	Main position was offset at Jan 01,2012,12:00:48 by “Clear Offset”. Offset: 0.8 NM, 014.6° Plotted position: 60°12.493’ N, 027°48.254’ E	- First line: Offset date and time * If offset with a button in the POSN(Main) group, "Main position" is displayed; if offset with a button in the POSN(Sub) group, "Sub position" is displayed. - Second line: Offset value - Third line: Offset coordinates

5 Basic Operation of the Radar

⚠CAUTION	
	Use the radar as your navigation aid. Final decision on the ship operation must be made by the ship operator himself. If you depend entirely on the radar information for the final decision on the ship operation, such an accident as collision and stranding may occur.
	If momentary power interruption has occurred on the ship during the radar operation, the image may distort or may not appear. If this occurs, turn on the power again.

5.1 Overview Flowchart

⚠CAUTION	
	Do no put anything on the operation section. In particular, if a hot object is placed on the operation section, deformation is likely to occur. Do not allow a heavy impact to be applied to the operation section, trackball or dial. A trouble may occur.


Power ON this system and start the radar.
Refer to "5.2.1 Powering on and starting".
Adjust reception gain, sea clutter and rain/snow clutter so that the observation range as well as the target display become the clearest.
Refer to "5.3 Observation Environment and Image Adjustment".
Acquire data, and then measure the range and bearing of the target.
Refer to "5.4 General Radar Operation".
Exit the operation of the Radar.
Refer to "5.2.2 Exiting radar operation".

5.2 Starting and Shutting Down the Radar

5.2.1 Powering on and starting

Note

Wait for about 2 seconds before turning on the power again.

Immediately after the radar is installed, at start of the system after it has not been used for a long time, or after the magnetron is replaced, preheat the equipment in the standby state for 20 to 30 minutes before setting it into the transmit state.

If the preheating time is short, the magnetron causes sparks, resulting in its unstable oscillation.

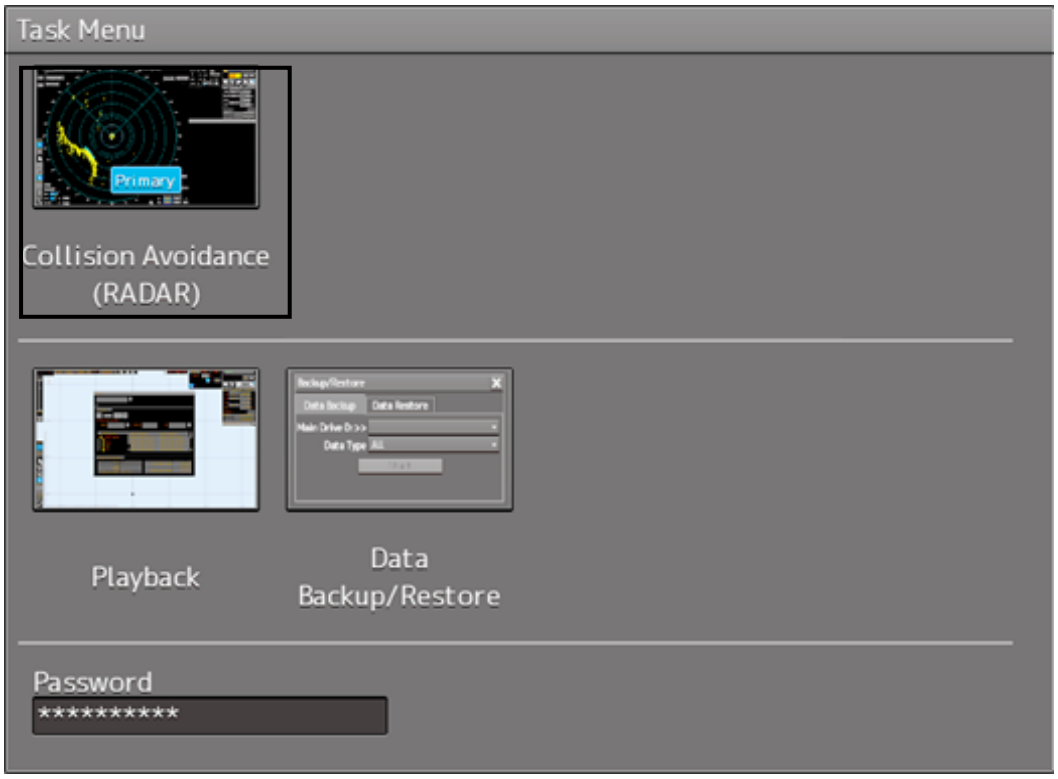
Start transmission on a short pulse range and change the range to the long pulse ranges in turn.

If the transmission is unstable in the meantime, immediately place the system back into the standby state and maintain it in the standby state for 5 to 10 minutes before restarting the operation. Repeat these steps until the operation are stabilized.

1. **Check that the ship's mains are turned on.**

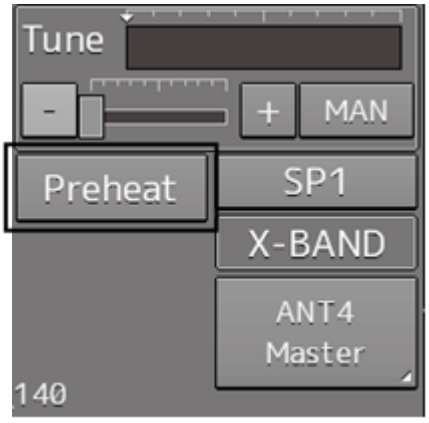
2. **Press the Power button on the operation unit.**
   This equipment starts and Task Menu appears on the screen.

3. **Click on the [Collision Avoidance (RADAR)] button on Task Menu.**



The RADAR screen appears.
The preheating time is displayed at the center of the screen.

When the magnetron radar antenna is connected, “Preheat” is displayed on the Standby/Send switching button.



4. **Wait until preheating is complete.**
   When the preheating time expires, the preheating time display disappears, and the display of the Standby/Transmit switch button changes from "Preheat" to "Standby".
5. **Click on the Standby/Transmit switch button.**
   Radar transmission starts and the radar antenna rotates.
   The display of the Standby/Transmit switch button changes from "Standby" to "Transmit".

Note
Even if the Standby/Transmit switch button is clicked on while "Preheat" is being displayed, radar transmission cannot be performed.

5.2.2 Exiting radar operation

1. **Click on the Standby/Transmit switch button in Radar system information.**

   Radar transmission stops and the rotation of the radar antenna stops.

   The display of the Standby/Transmit switch button changes from "Transmit" to "Standby".

> **Memo**
>
> If observation using the radar is being scheduled within a comparably short period of time, keep this state. Observation can be started immediately by just clicking on the Standby/Transmit switch button.

2. **Press the Power button on the operation unit.**

   The power to this equipment is turned OFF.

⚠WARNING	
	Before starting maintenance, turn off power. Cut off all the power supplies to the equipment. Some equipment components can carry electrical current even after the power switch is turned off, and conducting maintenance work may result in electric shock, equipment failure, or accidents.
	When turning off the power supply, do not hold down the power button of the operation unit. Otherwise, a trouble may occur due to termination failure.

5.3 Observation Environment and Image Adjustment

5.3.1 Adjusting screen brightness

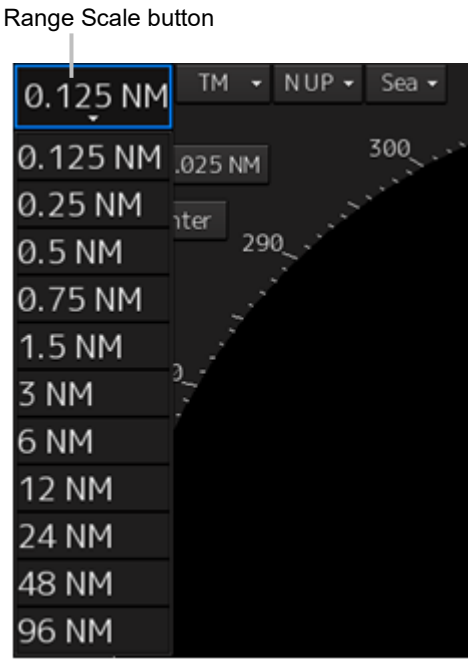
1. **Adjust the screen brightness.**

   For the details of the adjustment, refer to "3.9 Adjusting the Brightness of the Screen and Operation Unit".

   In consideration of the ambient brightness, adjust the brightness of the display that is high enough to easily observe the radar display but does not glare.

5.3.2 Changing the observation range

1. **Click on the Range Scale button in Presentation and mode information, and then select Range from the pop-up menu.**



[Points on adjustments]

Increasing the observation range will enable a wider range to be observed.

However, a video image is small and the ability to detect targets near own ship decreases. Therefore, when observing the vicinity of own ship, use the smaller observation range.

Decreasing the observation range will enable the vicinity of own ship to be enlarged. However, caution must be taken because video images of the area beyond the observation range cannot be displayed.

⚠CAUTION

Since the image within the previous observation range is displayed by expanding/contracting for the period from immediately after switching of the observation range from the next image updating, do not use this image for navigation.
If this image is used for navigation, an accident may occur.

Note
An observation range under which the own ship display positon and the antenna position exceeds the area 66% of the screen radius cannot be selected.

5.3.3 Adjusting tune

⚠CAUTION

3 Normally, use the automatic tune mode.
If you use the manual tuning mode, an accident may be caused by fluctuation of transmission and reception.
Use the manual tune mode only when best tuning is not possible in the automatic tune mode due to deterioration of magnetron.

This equipment has the automatic tuning mode that performs tuning of the transmission frequency and the reception frequency by automatic control, and the manual tuning mode in which the user performs tuning. Normally use the automatic tune mode. Only when the best tuning is not possible by the automatic tune mode due to the deterioration of magnetron, use the manual tune mode.
The tuning mode currently being used is displayed on the Tuning Mode button in Radar system information.

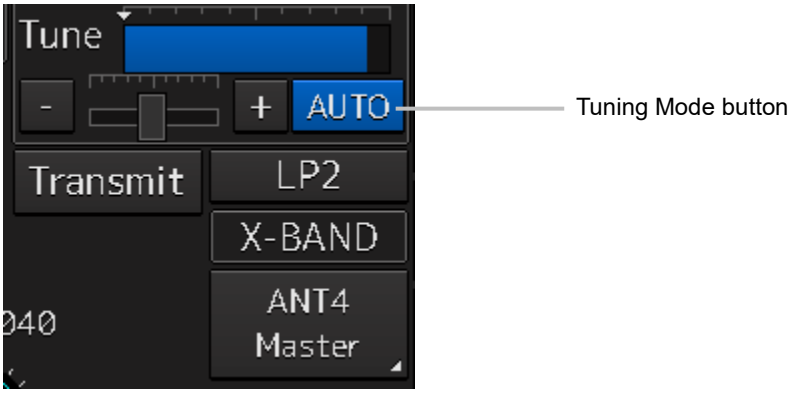
Note
This function is effective when a magnetron radar antenna is connected.

5.3.3.1 When using the automatic tune mode

1. **Click on the tune mode button.**

   [AUTO] (automatic) is displayed on the tune mode button.

   Whenever the button is clicked on, the mode is switched between [AUTO] (automatic) and [MAN] (manual).



5.3.3.2 Using the manual tune mode

1. **Click on the tune mode button.**

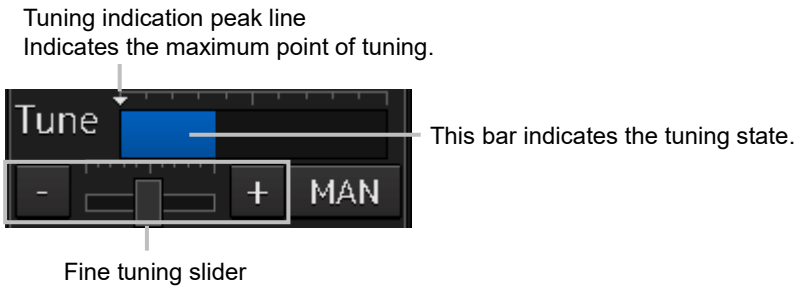
   [MAN] (manual) is displayed on the tune mode button.

   Each time this button is clicked on, the display switches between [AUTO] (automatic) and [MAN] (manual).

2. **Move the fine tuning slider to the left and right sides.**

   The tuning status is displayed on the tuning bar according to the movement of the fine tuning slider.

   Make adjustments so that the display on the tuning bar indicates the maximum (the state in which the tuning bar is positioned at the most right).



5.3.4 Adjusting gain

⚠CAUTION

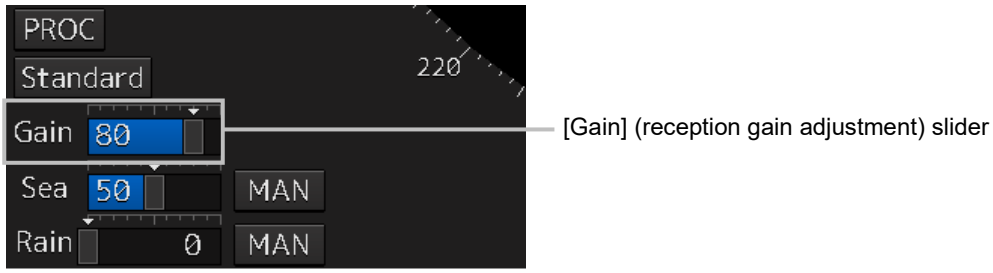
Be sure to always adjust for the best gain.
If the gain is too high, undesired signals including receiver noise and false echoes increase resulting in reduction of visibility of targets. Otherwise, accidents may result.
On the contrary, if the gain is too low, targets including ships and dangerous objects may not be clearly indicated.

Adjust the gain of the radar.

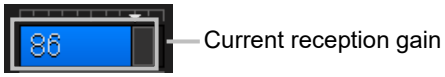
Memo

Set the optimum gain when making adjustments, giving consideration to the setting described in "5.3.7 Adjusting to optimal images (Selection of observation scenes)".

1. **Drag the [Gain] (reception gain adjustment) slider dial in Radar signal information, turn the trackball, and set up reception gain.**



Moving the slider to the right increases gain.
Moving the slider to the left decreases gain.
The current reception gain level is indicated by the bar and a numeric value.

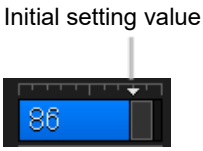


[Points on adjustments]

As reception gain is increased, the range in which radar images can be observed widens; however, if gain is increased too high, receiver noise, false echoes and other undesired signals will increase on the screen, lowering the visibility of targets.
Also, it gets easier to see the screen display if gain is decreased to observe cluttered targets and close range, but be careful not to overlook small targets.

Memo

If the optimal setting value was lost, it is recommended to reset to the initial value and tune up again.
The initial setting value is indicated as shown in the figure at right.



5.3.5 Rejecting sea clutter (Sea)

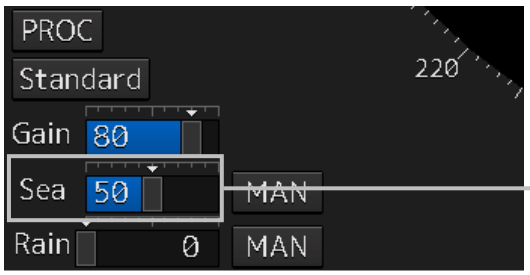
⚠CAUTION

Never set the sea clutter suppression function before rejecting all the sea clutters at close range. Detection of not only echoes from the wave and so on but also targets such as other ships or dangerous objects may be suppressed.
When using the sea clutter suppression function, make sure to choose the most appropriate setting for suppression.

Memo

Remove images by sea clutter by using the sea clutter suppression function.
When using the sea clutter suppression function, make the optimum setting, giving considerating to the setting described in "5.3.7 Adjusting to optimal images (Selection of observation scenes)".

1. **Drag the [Sea] (sea clutter adjustment) slider dial in Radar signal information, turn the trackball, and adjust the amount of images by sea clutter displayed on the screen so as to make display easy to observe.**



[Sea] (sea clutter adjustment) slider

Moving the slider to the right decreases the amount of images by sea clutter.
Moving the slider to the left increases the amount of images by sea clutter.
The current level of sea clutter suppression is indicated by the bar and a numeric value.

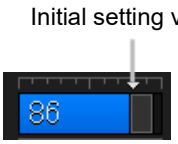
Current level of sea clutter suppression

[Points on adjustments]

The sea clutter suppression function decreases the amount of images by sea clutter by lowering reception gain at close range. When reception gain is lowered, the effectiveness of sea clutter suppression increases; however, if excessive effect is applied, please note that targets having weak signal strength such as buoys and small ships will disappear.

Memo

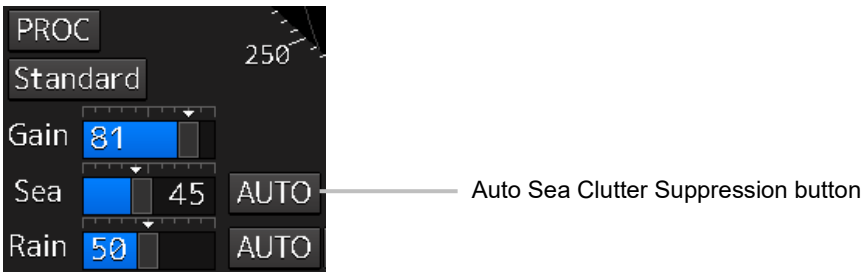
If the optimal setting value was lost, it is recommended to reset to the initial value and tune up again.
The initial setting value is indicated as shown in the figure at right.



5.3.5.1 Using the function of automatic sea clutter suppression mode

The sea clutter suppression in accordance with the intensity of sea clutter is possible. Use this mode when the sea clutter's intensity differs according to directional orientation.

1. **Click on the Automatic Sea Clutter Suppression button.**
   [AUTO] (automatic) is displayed on the automatic sea clutter suppression button.
   Each time this button is clicked on, the display switches between [AUTO] (automatic) and [MAN] (manual).



2. **Drag the sea clutter adjustment slider dial, turn the trackball, and adjust the amount of images by sea clutter displayed on the screen.**
   Even while automatic sea clutter is being suppressed, the amount of images can be fine-adjusted manually.

5.3.5.2 Canceling automatic sea clutter suppression

1. **Click on the Automatic Sea Clutter Suppression button.**
   [MAN] (manual) is displayed on the automatic sea clutter suppression button.
   Each time this button is clicked on, the display switches between [AUTO] (automatic) and [MAN] (manual).

5.3.6 Rejecting rain/snow clutter

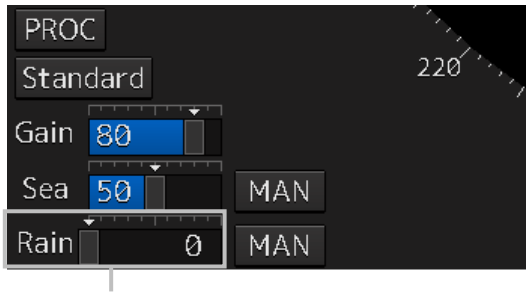
⚠CAUTION

Never set the rain/snow clutter suppression function too high.
Detection of not only echoes from the rain or snow but also images targets such as other ships or dangerous objects may be suppressed.
When using the rain/snow clutter suppression function, make sure to choose the most appropriate setting for suppression.

Memo

Remove images by rain/snow clutter by using the sea clutter suppression function.
When using the rain/snow clutter suppression function, make the optimum setting giving considerating to the setting described in "5.3.7 Adjusting to optimal images (Selection of observation scenes)".

1. **Drag the [Rain] rain/snow clutter adjustment slider dial in Radar signal information, turn the trackball, and adjust the amount of images by rain/snow clutter displayed on the screen so as to make display easy to observe.**



[Rain] (rain/snow clutter adjustment) slider

Moving the slider to the right decreases the amount of images by rain/snow clutter.
Moving the slider to the left increases the amount of images by rain/snow clutter.
The current level of rain/snow clutter suppression is indicated by the bar and a numeric value.

Current level of rain/snow clutter suppression

[Points on adjustments]

When the amount of images by rain/snow clutter is decreased, the outlines of targets hidden by images of rain/snow will appear, but please note that small targets may be missed. Since this can also reduce sea clutter, it is effective to use it together with the sea clutter rejection function.
Normally, set the level of rain/snow clutter suppression to 0.

Memo

If the optimal setting value was lost, it is recommended to reset to the initial value and tune up again.
The initial setting value is indicated as shown in the figure at right.

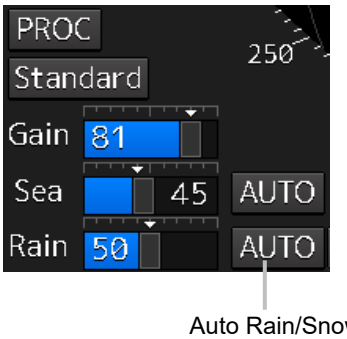
Initial setting value

5.3.6.1 Using the automatic rain/snow clutter suppression mode

The rain/snow clutter suppression in accordance with the intensity of rain/snow clutter is possible. Use this mode when the rain/snow clutter's intensity differs according to directional orientation.

1. **Click on the Automatic Rain/Snow Clutter Suppression button.**

   [AUTO] (automatic) is displayed on the automatic rain/snow clutter suppression button.
   Each time this button is clicked on, the display switches between [AUTO] (automatic) and [MAN] (manual).



Auto Rain/Snow Clutter Suppression button

2. **Click the left mouse button of the button on the [Rain] (rain/snow clutter adjustment) slider, drag it with the trackball, and adjust the volume of the echo created by rain/snow clutter that is displayed on the screen.**
   Even while auto rain/snow clutter is being suppressed, the amount of images can be fine-adjusted manually.

5.3.6.2 Canceling automatic rain/snow clutter suppression

1. **Click on the Automatic Rain/Snow Clutter Suppression button.**

   [MAN] (manual) is displayed on the automatic rain/snow clutter suppression button.
   Each time this button is clicked on, the display switches between [AUTO] (automatic) and [MAN] (manual).

5.3.7 Adjusting to optimal images (Selection of observation scenes)

To obtain optimal images, it is necessary to understand the features of radar signal processing settings and perform adjustment according to the sea condition. When adjusting all setting values manually, such adjustment may sometimes difficult even for experienced operators.

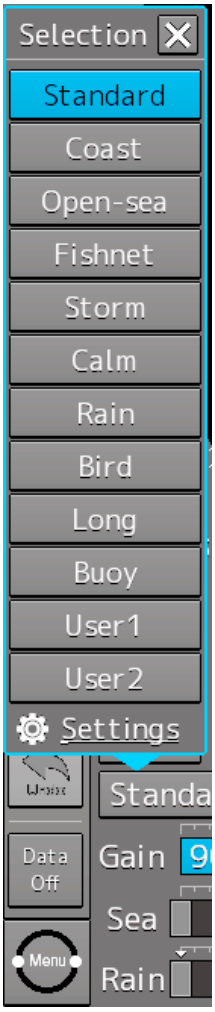
Thus, signal processing settings suitable for general usage are preset in the observation scene selection function at the time of factory shipment. In many cases, optimal images can be obtained quickly by selecting the observation scene corresponding to the current sea condition.

1. **Click on the Observation Scene Selection button in Radar signal information.**

The [Observation Scene Selection] dialog is displayed.

2. Select the observation scene corresponding to the current sea condition

Refer to the following table about the definitions of observation scene.



Observation Scene	Definition
Standard	Standard
Coast	Coastal navigation Use this scene to monitor a relatively short range, for example, bays and coasts where many boats and ships are running. (Importance is attached to resolution.)
Open-sea	Open-sea navigation Use this scene to monitor a relatively long range, for example, the open-sea. (Importance is attached to long range gain)
Fishnet	Fishnet Use this scene to detect small targets such as fishnets of round haul netters hidden by sea clutter returns. (Importance is attached to sea clutter suppression, and gain to moving targets lowers.)
Storm	Storm Use this scene when many rain/snow clutters or sea clutter are detected in stormy weather. (Importance is attached to rain/snow clutter and sea clutter suppression, and gain slightly lowers.)

Calm	Calm Use this scene when only a few rain/snow clutter or sea clutter are detected.
Rain	Rain Use this scene when sea clutter is not strong but rain/snow clutter is strong. (Importance is attached to rain/snow clutter suppression, and gain slightly lowers.)
Bird	Bird Use this scene to detect a flock of sea birds.
Long	Long distance detection Use this scene to monitor utmost distances in the broad ocean.
Buoy	Buoy Use this scene to detect small targets such as radio buoys outside of sea clutter. (Targets having low detection probability are displayed.)
User1	User 1 General scene used when the nine scenes above are not applicable.
User2	User 2 General scene used when the nine scenes above are not applicable.

3. **Adjust [Gain], [Sea] and [Rain] as necessary.**

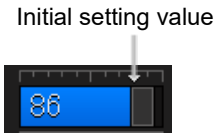
Note

When the setting value among the observation scene is changed from the initial value, underline is displayed for the observation scene selection button and a button corresponding to the [Selection] (observation scene selection) dialog is displayed.

Memo

If the optimal setting value was lost, it is recommended to reset to the initial value and tune up again.

The initial setting value is indicated as shown in the figure at right.



5.4 General Radar Operation

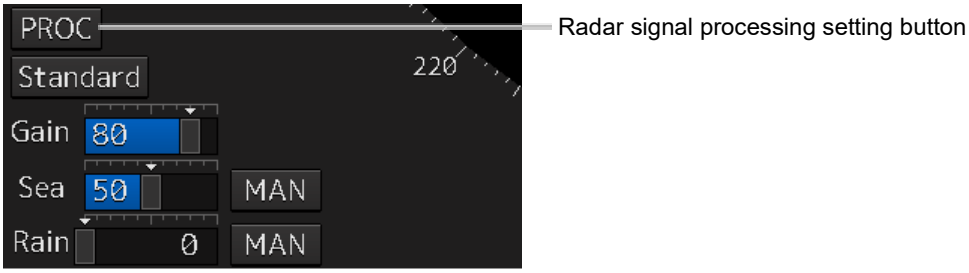
5.4.1 Interference Rejection (IR Function)

By setting IR (Interference Rejection) function, Interference by other radars is rejected.

Note

To observe the radar beacon and the SART signal, IR processing may occasionally suppress these images, so set IR to Off (interference rejection function OFF).

1. **Click on the RADAR Signal Processing Setting button in Radar signal information.**



The [RADAR Process] dialog box appears.

2. **Click on [IR] and then select the interference rejection level from the list.**

Setting items	Functions and effects
[Off]	Sets the IR function to Off.
[IR Low]	Sets the IR level to the low level.
[IR Middle]	Sets the IR level to the middle level.
[IR High]	Sets the IR level to the high level.

[Points on setting]

When a high interference rejection level is selected, the radar's ability of detecting small targets such as buoys and small boats is lower.

In general, [IR Low] should be selected.

5.4.2 Changing the transmitter pulse length

3. **Click on the Transmitter Pulse Length switch button in Radar signal information.**

Transmitter pulse length switch button.

Each time this button is clicked on, the transmitter pulse length changes.

Example: [MP1] → [MP2] → [LP1] → [LP2]

Transmitter pulse length	Functions and effects	Recommended condition for selection
[SP]	• The transmitter pulse becomes shorter, and the range resolution improves. • The effect of suppressing sea clutter and rain/snow clutter improves.	In bays/harbors where targets are densely crowded Rough sea state due to torrential rain or stormy weather
[MP]	• The normal transmitter pulse length is set. • Both range resolution and gain are appropriately set.	General navigation
[LP]	• The transmitter pulse becomes longer, and gain improves. • Small targets are zoomed and are easy to observe. • When the sea state is bad, detection performance decreases.	Detection of small targets in good weather conditions

Memo

Usable transmitter pulse length differs according to the type of radar antenna being used and the observation range being used.

5.4.3 Enhancing targets

This function enlarges the display sizes of images to enhance targets.

1. **Click on the RADAR Signal Processing Setting button in Radar system information.**

The [RADAR Process] dialog box appears.

2. **Select the target enhancement level from the list in [Target Enhance].**

Setting items	Functions and effects	Recommended use condition
[ENH Off]	Sets the target enhancement function to OFF.	Set this function to Off when resolution is particularly necessary.
[ENH Level1]	Enhances the radar echo by 1 level in the vertical and horizontal directions of the screen.	Normal navigation
[ENH Level2]	Enhances the radar echo by 2 levels in the vertical and horizontal directions of the screen.	Enhance the visibility of the radar image
[ENH Level3]	Enhances the radar echo by 3 levels in the vertical and horizontal directions of the screen.	Detect small targets such as buoys

[Setting points]

When [ENH Level3] is selected, sea clutter and rain/snow clutter are apt to be enlarged. To use, suppress images of sea clutter and rain/snow clutter using the [Sea] (sea clutter adjustment) slider and the [Rain] (rain/snow clutter adjustment) slider.

In general, [ENH Level1] or [ENH Level2] should be selected.

5.4.4 Using video processing (Echo Process)

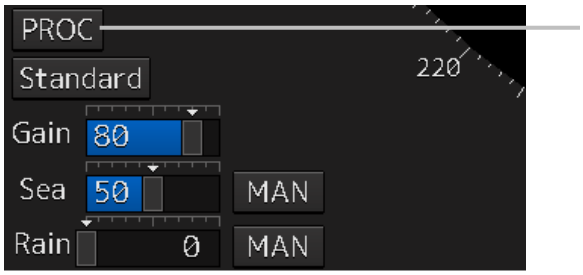
This function reduces undesirable noise and enhances targets.

Note

When viewing a radar beacon, SART signal, or fast moving target on the radar display, select [Process Off] (video process off).

If video processing mode is set to [CORREL], a high speed target is less-visible .

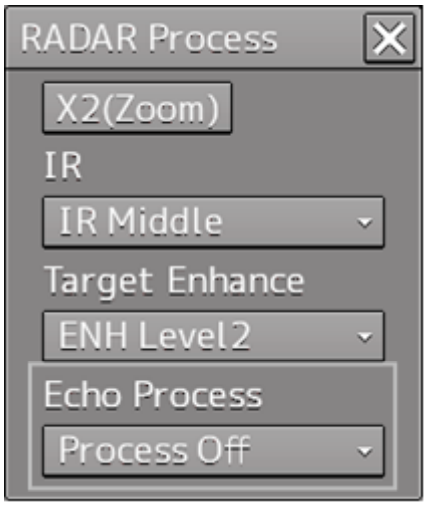
1. **Click on the RADAR Signal Processing Setting button in Radar signal information.**



Radar signal processing setting button

The [RADAR Process] dialog box appears.

2. **Select the video process mode from the list in [Echo Process].**

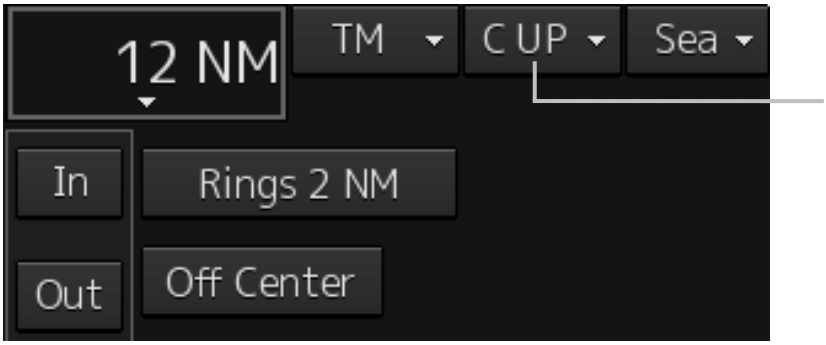


Setting items	Effects and recommended use conditions
[Process Off]	Sets the image processing function to Off.
[3 Scan CORREL]	Use when the rain/snow clutter images are heavy.
[4 Scan CORREL]	Use when enhancing the target while suppressing sea clutter images.
[5 Scan CORREL]	Use when detecting small targets in sea clutter images.
[Remain]	Use when own ship is rolling severely.
[Peak Hold]	Use for detection of small targets of low detection probability.

5.4.5 Setting the azimuth mode

Set the bearing for the radar video to be displayed on the radar display.

1. **Click on the Azimuth mode combo box in Presentation and mode information.**



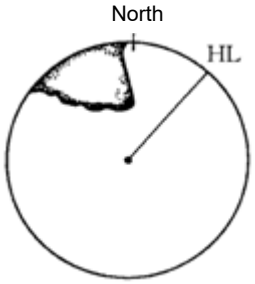
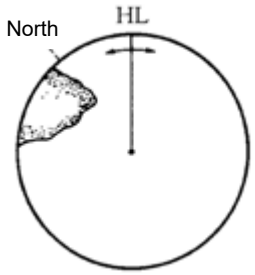
2. **Select the Azimuth mode.**

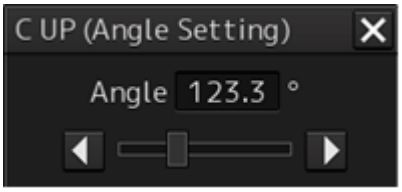
Note

Available combinations vary depending on the settings of the azimuth mode and the motion mode (refer to "5.4.5 Setting the azimuth mode" and “5.4.6 Setting a motion mode”).

Azimuth mode / Motion mode	N UP	H UP	C UP	W UP	C UP (Angle Setting)
TM	○	×	○	×	○
RM(T) or RM(R)	○	○	○	○	○

The following azimuth modes can be set.

Setting items	Description	Display image
[N UP]	North UP (North Up) The video is displayed so that the zenith of the PPI points to the due north. Fixed targets do not flicker and are easily identified on the chart, and the true bearing of a target can easily be read out.	
[H UP]	Head UP (Head Up) The video is displayed so that the ship's heading line is displayed at the top of the screen. Since targets are displayed in their directions relative to the ship's heading line, the operator can view the video in the same field of view as in operating the ship at sea. Therefore, This mode is suitable for watching over other ships This is not available for TM (True Motion) mode.	
[C UP]	Course UP (Course Up) At the setting of Course Up, the ship's heading (HDG) is fixed and displayed immediately above the screen. Similar to true bearing display, the positions of stationary targets will not deviate even if yawing occurs in the ship: targets are displayed stably and the bearing of the heading line moves only according to the amount of change in own ship's course. To change the course, select the Course UP display by clicking on the Azimuth mode combo box several times. A course can be set again.	
[W UP]	Way Point UP (Waypoint Up) The destination is displayed at the top of the screen.	

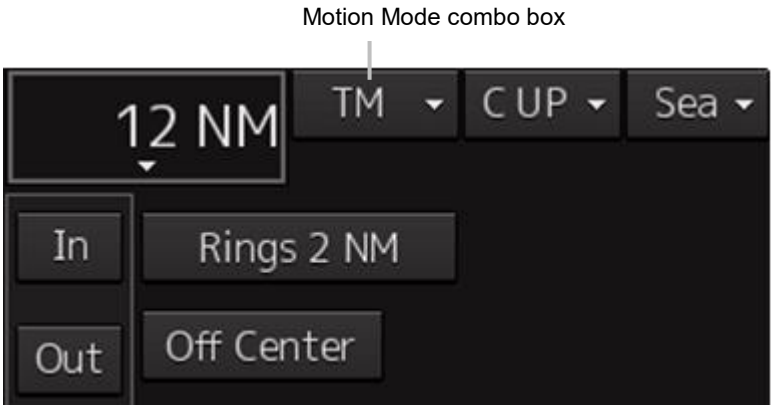
[C UP (Angle Setting)]	Course UP by angle setting (Course Up by angle setting) When C UP is selected, the [C UP (Angle Setting)] dialog box is displayed. The course angle that is set in the dialog box is displayed by being fixed at the top of the screen.  Input the angle of the ship's heading in the [Angle] input box of the [C UP (Angle Setting)] dialog box. The angle can also be input (increase/decrease) by operating the angle input slider. After completing the setting, click on the [X] button.	

5.4.6 Setting a motion mode

By setting a motion mode, the display method of the own ship's position on the radar screen can be changed.

5.4.6.1 Switching Relative Motion (RM) Mode to True Motion (TM) Mode

1. **Click on the Motion Mode combo box in Presentation and mode information.**

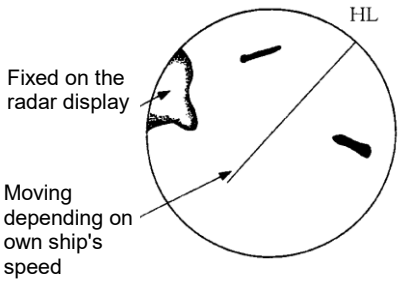


2. **Select the motion mode.**

Note

Available combinations vary depending on the settings of the motion mode and the azimuth mode (refer to "5.4.5 Setting the azimuth mode" and "5.4.6 Setting a motion mode").

Azimuth mode / Motion mode	N UP	H UP	C UP	W UP	C UP (Angle Setting)
TM	○	×	○	×	○
RM(T) or RM(R)	○	○	○	○	○

Setting items	Description	Display image
[TM]	True Motion Mode (True Motion display) In Ground mode, the own ship's display position moves according to the Speed Over the Ground (SOG) and fixed targets such as land are fixed on the radar screen. In Water mode, the own ship's display position moves according to the Speed Through Water (STW) and fixed targets such as land move according to the difference between the Speed Through Water (STW) and the Speed Over the Ground (SOG). When the own ship reaches to the true motion status, the own ship's position is set at the position of about 60% of the screen radius in direction opposite to the own ship's course by adding the influence of the tidal current. The ship's position starts to move according to the own ship's speed, course, and influence of the tidal current. When the own ship's position reaches the position of about 60% of the screen radius, the position is reset to the position of about 66% of the screen radius in the direction opposite to the own ship's course (COG) by adding the influence of the tidal current at that time.	
[RM(T)] or [RM(R)]	Relative Motion Mode (Relative Motion display) Own ship is fixed at the center of the radar screen and fixed targets such as land move relatively.	
[TM Reset]	TM Reset The own ship's position is reset in [TM] (true motion display) mode. For the details, refer to "5.4.6.2 Resetting Own Ship to its Initial Position in [TM] (True Motion display) Mode".	

5.4.6.2 Resetting Own Ship to its Initial Position in [TM] (True Motion display) Mode

1. **Select [TM Reset] from the Motion Mode.**
   Own ship is reset to its initial position as established when the relative motion mode is changed to the true motion mode. The ship starts moving from that position.

5.4.7 Setting the Stabilization Mode

1. **Click on the Stabilization Mode button in Presentation and mode information**

2. **Select the Stabilization Mode.**

   [GND]: Use the ship speed relative to ground in the Stabilization Mode.
   [Sea]: Use the ship speed relative to water in the Stabilization Mode.

5.4.8 Moving own ship's display position (Off Center)

The own ship's position can be moved from the display center to any position within 60% of the display radius. This function is convenient for observing a wide coverage in any direction.

> **Note**
> This function is not available on the 96 NM range.

1. **Click on the [Off Center] button in Presentation and mode information to turn the Off Center mode to "On".**
   The Off Center mode is switched to On/Off whenever the button is clicked on.

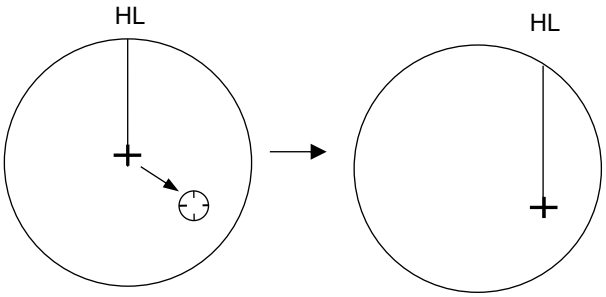
   Off Center mode is On: 

   Off Center mode is Off: 

   The cursor mode is set to the Off Center mode.

2. **Place the cursor on the position you want to move and click on it.**
   Own ship's display position will be moved to the clicked position.

> **Note**
> An own ship display position can be moved within the range in which the own ship display position and the antenna position do not exceed 60% of the screen radius.



Position the cursor on the destination.

Clicking fixes own ship's position.

5.4.8.1 Returning own ship's position to the center of the display

1. **Click on the [Off Center] button in Presentation and mode information to disable the Off Center mode.**
   The own ship position is returned to the center of the display (on relative motion) or the position to be reset (on true motion).

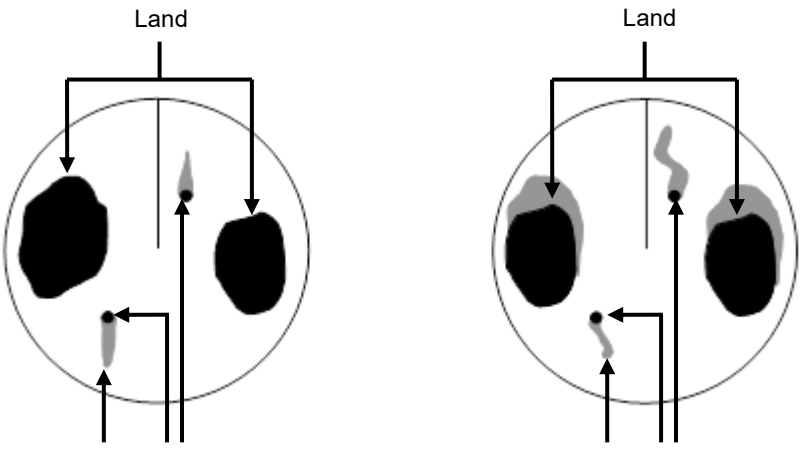
5.4.9 Displaying other ship's trails (Trails)

Other ships' movements and speeds can be monitored from the lengths and directions of their trails, serving for collision avoidance.

5.4.9.1 Trails motion mode

There are two types of trails: relative motion trail and true motion trail.

Relative motion trail:	The system plots the trails of a target at a position relative to the own ship. The operator can easily judge whether the target is approaching the own ship. While the own ship is moving, the system also plots the trails of land and other fixed targets.
True motion trail:	The system plots the absolute motion trails of a target, irrespective of the own ship's position. The operator can easily judge the course and speed of the target. The system does not plot the trails of land and other fixed targets.



True Motion Trail　　Relative Motion Trail

While the true motion trail mode is active, this equipment enables the continuous use of true motion trail even if any of the following operations is performed:

Motion mode change (TM/RM)

TM reset

Azimuth mode change

Off Center

Chart display on/off (Chart)

Note

Accurate true bearing signals and speed signals are necessary for using the true motion trail mode.

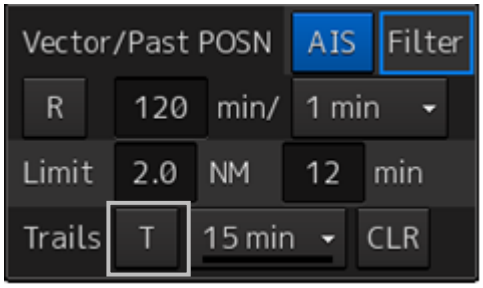
5.4.9.2 Changing motion mode of trails

The trail display mode can be switched by using the Trail true/relative switching button of other ship information.

Note
The available trail motion modes vary depending of the motion mode that is set.

True motion display (TM): Only true motion trail is available.
Relative motion display (RM): Relative motion trail and true motion trail can be selected.
[RM(R)] is displayed when relative motion trail is used.
[RM(T)] is displayed when true motion trail is used.

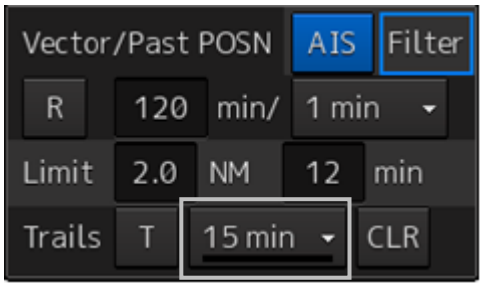
1. **Click on the Trails True/Relative switch button.**
   Each time this button is clicked on, the display mode of Trails switches between [T] and [R].



[T]: (True motion trail)
[R]: (Relative motion trail)
Foe the details of the motion mode of trails, refer to "5.4.9.1 Trails motion mode".

5.4.9.3 Setting the length of the trail

1. **Click on the Trail Length switch combo box in [Trails] of other ships' information.**



Select a radar trail length.

Short mode: Off, 15 sec, 30 sec, 1 min, 3 min, 6 min, 10 min, 15 min, 30 min, 60 min
Long mode: Off, 30 min, 1 hr, 2 to 24 hrs (at 1 hr interval from 1 to 24 hrs)

Memo

Saved trails cannot be erased even when the trail lengths are changed the Trail Length switch combo box.

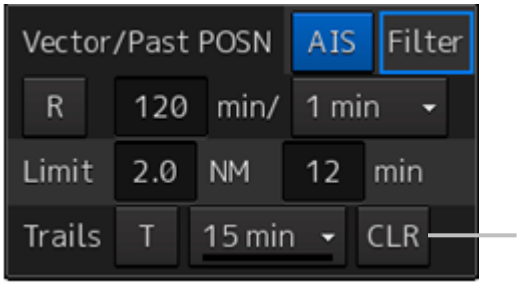
Even after the trails display is turned off once, the past trails can be displayed traced back by setting a desired time. The plot of the trail starts when starting the transmission.

The system is plotting trails even while the trails display is off.

If only a short time has elapsed after the commencement of transmission, the display may not reach the specified value. The time not to reach is indicated by the length of the blue bar shown at the lower part of the Trail Length switch combo box.

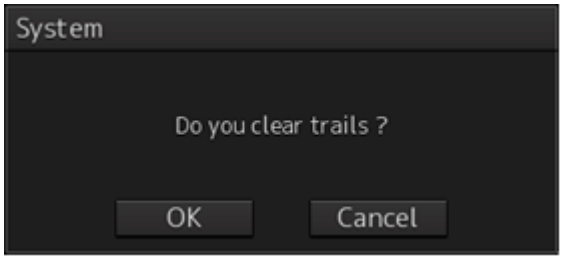
5.4.9.4 Clearing trails data

1. **Click on the [CLR] (clear trails) button.**



The confirmation dialog box appears.

2. **Click on the [OK] button.**



All the saved trails data will be cleared. The system starts plotting trails in initial state.

5.4.10 Doubling the size of radar image

This function doubles the size of radar video near a specified position.

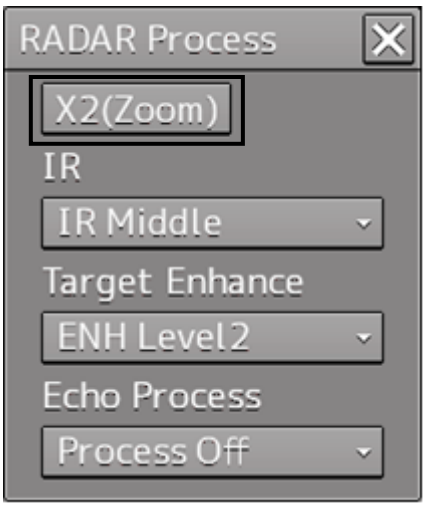
Note
If the range is 0.125 NM and the motion mode is in the TM mode, this function is not available.

1. **Click on the radar signal process setting button in Radar signal information.**

Radar signal process setting button

[RADAR Process] dialog box appears.

2. **Click on the [X2(Zoom)] (double zoom) button.**



Each time this button is clicked on, the double zoom function is switched On and Off.

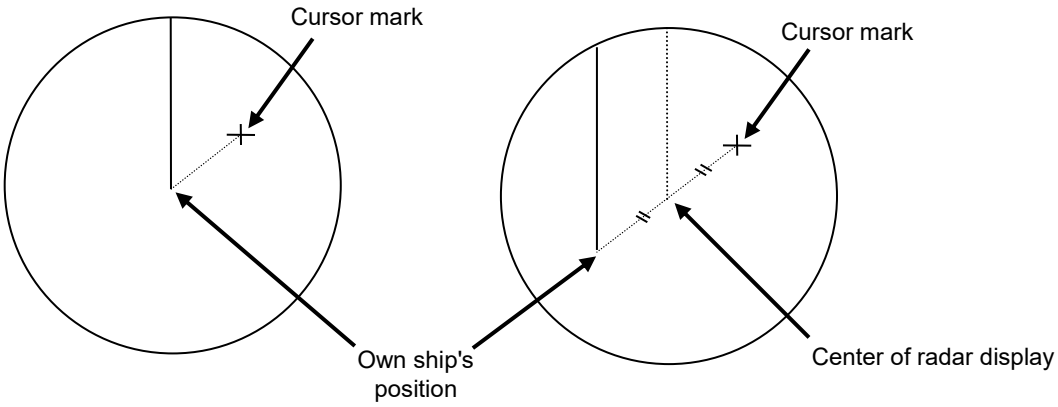
On display: 

Off display: 

When double zoom is set, the cursor mode changes to the off-set cursor.

3. **Place the offset cursor on a location you want to zoom and click on it.**

   Using the cursor position as the reference, the screen display is enlarged by a magnification of 2 so that the midpoint between the cursor and own ship's position comes at the center of the radar display.



Own Ship's Position before Zooming Position

Own Ship's Position after Zooming Position

5.4.10.1 Canceling zoom display

1. **Click on the [X2(Zoom)] button to turn the X2 Zoom function Off.**

   Off display: X2(Zoom)

5.4.11 Hiding the heading line (HL OFF)

1. **Click on the disclosure button on the left toolbar.**
   When the left toolbar is set to expanded display, this operation is not required.

2. **The ship's heading line is hidden while the［HL Off］button is pressed down.**
   When the button is released, the ship's heading line is redisplayed.

5.4.12 Hiding graphics information on radar display

On the radar screen of this equipment, various types of graphics information such as TT/AIS symbol, user map, and chart information are displayed. When the visibility of the radar screen deteriorates due to excessive amount of graphic information displayed, the visibility of the screen can be improved by temporarily clearing the unnecessary graphic information by using this function.

1. **While the [Data OFF] button on the left toolbar is being held down, graphic information other than the TT and AIS of danger targets, radar images, radar trails and cross cursors are hidden.**

   When the button is released, graphics information is redisplayed.

5.4.13 Setting true bearing

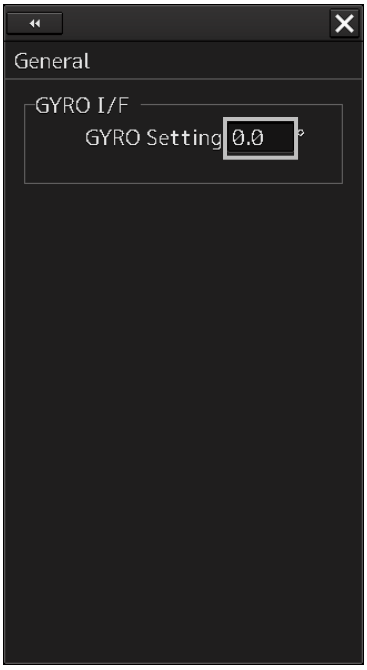
When the GYRO I/F is used to enter a gyro signal, there is a rare case in which a true bearing value indicated by the master gyro does not match the true bearing value indicated by this equipment.
In that case, adjust the true bearing value of this system so that it matches the value indicated by the master gyro.

1. **Click on the [Menu] button on the left toolbar.**

   A menu is displayed.
2. **Click [Settings] - [General] on the menu.**

   The [General] dialog box appears.

3. **Click on the input box of [GYRO Setting].**

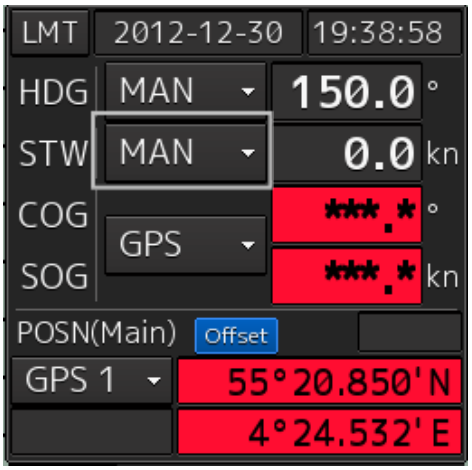


4. **Input a master gyro value on the software keyboard.**

5.4.14 Setting own ship speed

5.4.14.1 Switching own ship speed device

1. **Select the ship speed device from the STW Source combo box in the own ship information.**



When using 1-axis log, heading speed component can be detected, but transverse speed component cannot be detected. Then leeway effect (component drifted by wind) cannot be detected.

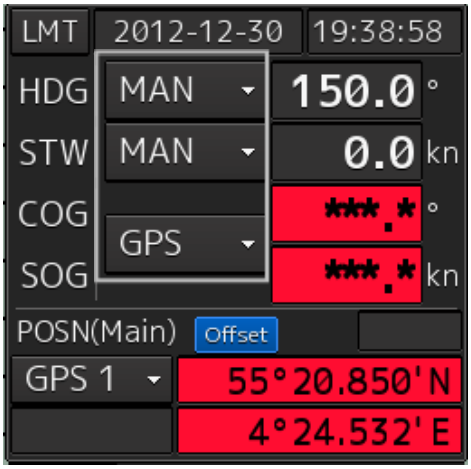
When using 2-axes ground log, its accuracy in shallow waters may be deteriorated, and its speed in deep sea areas may be unable to be detected.

When using a GPS, COG accuracy is less than ±3° at speed: from 1kn to 17kn, and is less than ±1° at speed: more than 17kn.

5.4.14.2 Entering the ship's heading/own ship's speed manually

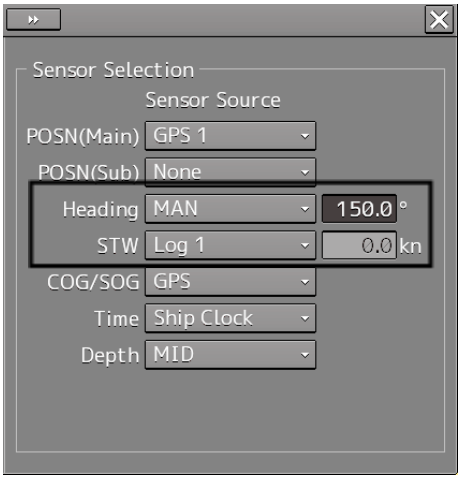
If any device such as LOG, etc., connected to this equipment malfunctions, it is possible to manually enter own ship's heading/speed by the method described below to use the target tracking (TT) and true motion display functions.

1. **Select [Menu] from the corresponding combo box.**



The [Sensor Selection/Status] dialog box is displayed.

2. **When inputting a ship's heading manually, select [MAN] from the [Heading] combo box. To input an own ship speed manually, select [MAN] from the [STW] combo box.**
3. **Click on the input box.**



4. **Enter a numeric value by using the software keyboard.**

6 Target Tracking and AIS

This section explains Target Tracking (hereinafter, referred to as target tracking or TT) and Automatic Identification System (hereinafter referred to as AIS).

⚠CAUTION	
	Use the target tracking function as your navigation aid. Final decision on the ship operation must be made by the ship operator himself. If you depend entirely on the information of the target tracking function for the final decision on ship operation, an accident may occur. An error may be contained in the vector, target value data and alarm indicated by the target tracking function. Further, the target not detected by radar cannot be captured or tracked. If you depend entirely on the information of the radar for the final decision on ship operation, such an accident as collision or stranding may result.
	Simulation is a function for determining if the target tracking function is working correctly or not. Accordingly, this function should be used only to check for the target tracking function operation. In particular, if this mode is used during navigation, a pseudo target will appear on the radar screen and cannot be easily identified from the real target. This may cause such an accident as collision. Do not use this mode during the navigation.

Target Tracking

This function calculates the course and speed of a target by automatically tracking the target's move.
This function enables the automatic acquisition of targets by using the automatic acquisition zone function.
This function also enables the simulation of the ship maneuvering method to avoid collisions by using the trial maneuver function.

Memo

If the mode is ground stabilization, SOG/COG used for own ship's information. If the mode is sea stabilization, STW (speed through the water)/HDG (heading) is used for own ship's information.
Target tracking range is 32 NM. (Available all range scale)

For the details, refer to "6.5 Setting and Operating Target Tracking".

AIS

This function shows the target's information on the radar display, using other ship's information sent out from the AIS unit.
For the details, refer to "6.6 Setting and Operating AIS".

6.1 Restrictions

The acquisition and Target Tracking functions have the following restrictions.

Depending on distance and echo size, resolution between adjacent targets during automatic target tracking usually ranges somewhere between 0.03 to 0.05 NM. If multiple targets approach each other, there is a possibility of swapping them or losing one of them. Such swapping or less of targets may also occur if the target being tracked is affected by rain/snow clutter or sea clutter or moves very close to land.

The intensity of echoes and the Target Tracking function have a correlationship, and thus the target will be lost if no echoes are detected during six scans in succession.
If such a lost target exists, therefore, radar gain must be increased to support detection of the target. If, however, radar gain is increased too significantly, sea clutter or other noise may be erroneously detected and tracked as a target, and resultingly, a false alarm may be issued.

To execute accurate tracking, it becomes necessary first to appropriately adjust the gain, sea clutter suppression, rain/snow clutter suppression and tune of the radar so that the target to be acquired and tracked is clearly displayed on the radar display.
Inappropriate settings of these adjustments reduce the reliability/accuracy of automatic target tracking.

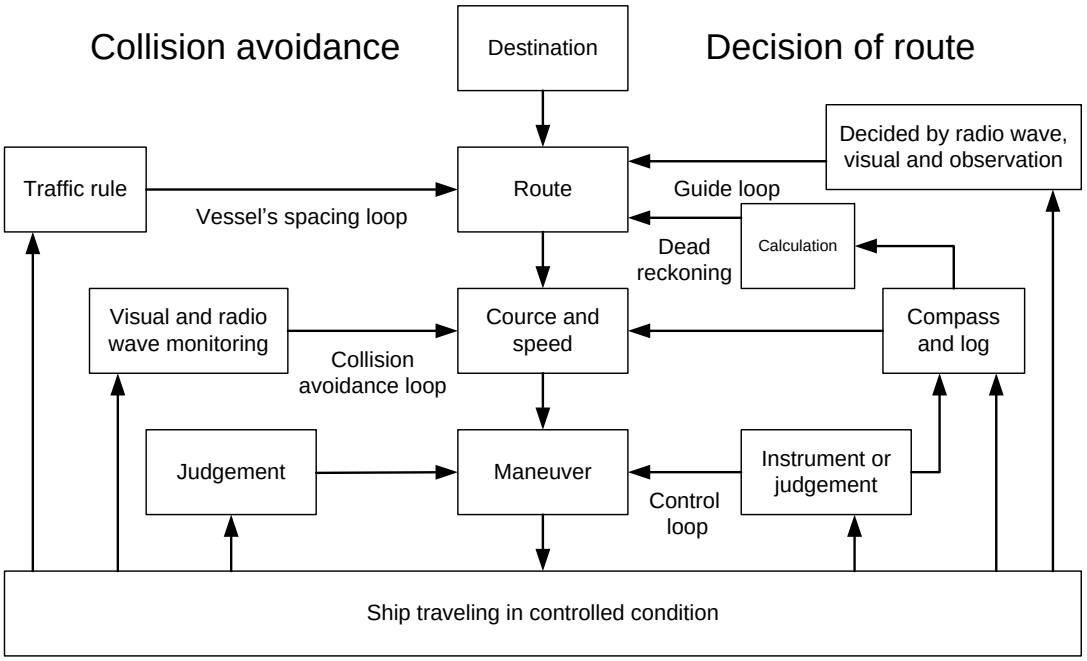
6.2 Collision Avoidance Issue (Explanation)

6.2.1 Collision Avoidance in Navigation

Marine collision avoidance in navigation is one of the problems that have been recognized from of old. This section contains a brief statement about the position of collision avoidance in navigation.

The navigation pattern of all mobile craft constitutes a system with some closed loops regardless of the media through which the mobile craft travels, whether air, water, the boundary between air and water, or space. This pattern consists of two closed loops in principle, one of which is a collision avoidance with another mobile craft and the other is a loop of finding a right and safe way to reach a predetermined destination.

The following figure shows the conceptual diagram of navigation pattern by Mr. E.W. Anderson. The closed loop of collision avoidance is shown on the left side and the closed loop of finding a safe route on the right side.



Navigation Pattern

6.2.2 Marine Accidents and Collisions

Among marine accidents, collision accidents have been highlighted as the tonnages and speeds of ships become higher along with the increase in traffic at sea.

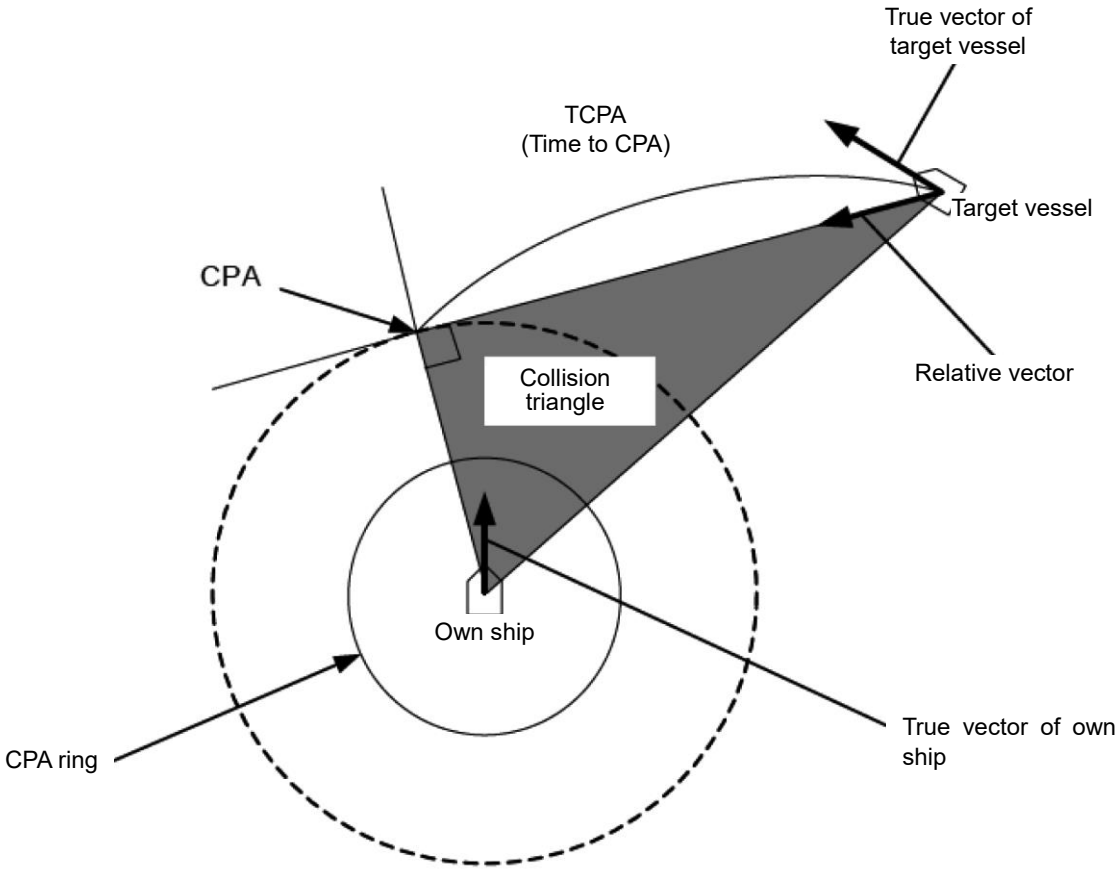
If a tanker carrying dangerous articles such as crude oil collides with any other vessel, then not only the vessels involved with the accident but other vessels in the vicinity, port facilities and inhabitants in the coastal area as well as marine resources may also suffer immeasurable influence.

Collision accidents have a high percentage of the marine accidents that have occurred in recent years. To cope with these problems, any effective measures are needed and some equipment to achieve collision avoidance requirements has been developed at rapid strides.

6.2.3 Basic Concept of Collision Avoidance

There are two aspects in collision avoidance: collision prediction and avoidance. Putting it in extreme terms, collision prediction is to predict that two or more vessels will happen to occupy the same point at the same time, while collision avoidance is to maneuver vessels not to occupy the same point at the same time.

In practical operation of vessels, a spot of collision has to be deemed to be a single point but a closed zone. This closed zone is conceptually defined as a CPA (Closest Point of Approach). Further, the time taken to arrive at CPA is required for collision prediction, and the danger of collision is judged considering the TCPA (Time to CPA). The following figure illustrates a diagram caked "Collision Triangle".



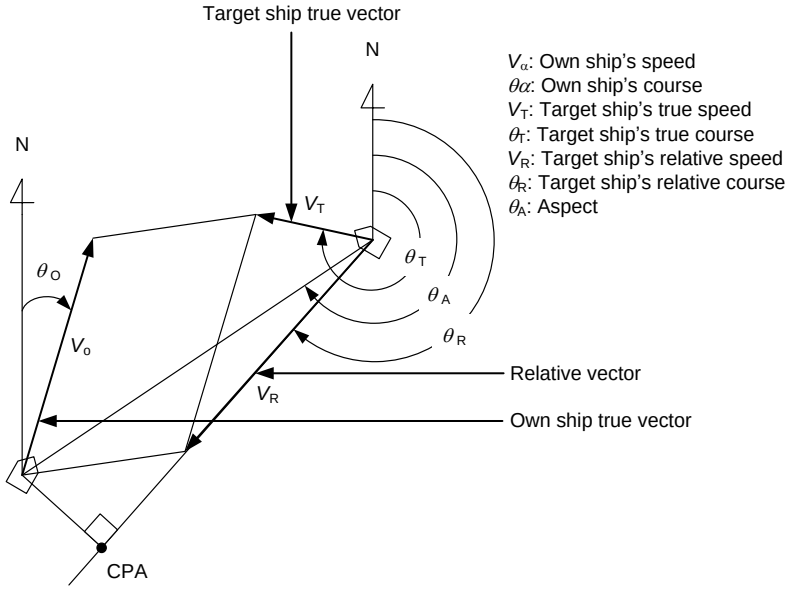
6.2.4 Relative Vector and True Vector

From two points of view, collision prediction and avoidance, it is necessary to obtain the relative vector of other ship for prediction and the true vector of other ship for collision avoidance in order to realize other ship's aspect.

The relationship between the relative vector and true vector is shown in the following figure.

Furthermore, the meanings of both vectors are explained.

Both rough CPA and TCPA can be obtained easily from the relative speed vector of other ship. This method has an advantage that the risks of collision with all other ships within the radar range can be seen at a glance. On the other hand, the course and speed of other ship can easily be obtained from its true speed vector, enabling other ship's aspect to be seen at a glance. Thus, the aspects of other ships (transverse, outsail, parallel run, reverse run, etc.) as described in the act of prevention of collision at sea can be readily understood. If there is a risk of collision with other ship, the operator can determine which rule to be applied and how to operate own ship.



6.2.5 Radar and Collision Avoidance

Radar is still playing an important role for collision prevention and positioning.

A plotter is used to further enhance the radar functionality. The plotter is capable of plotting other positions of other ships in 3 to 6 minute intervals to monitor their movement. The plots of other ships represent their tracks relative to own ship, and it is shown whether there is a risk of collision, namely CPA and TCPA can be obtained. This method using a plotter is fairly effective, but the number of target ship, which is manually plotted, is limited and it takes several minutes to measure those.

6.3 Displaying Symbols

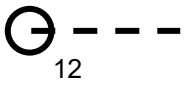
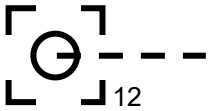
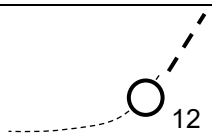
This section describes the symbols that are used for target tracking and AIS.

6.3.1 Displaying/hiding target tracking symbols/AIS target symbols

In the display setting at the time of shipment from the factory, the display of target tracking symbols and of the AIS target symbols is enabled. However, choosing [Options] – [Target] from the View menu can switch between display and hide.

For the details, refer to “9.2.7 Setting up the display of TT/AIS target".

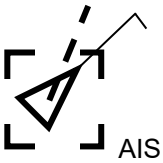
6.3.2 Types and Definitions of Target Tracking Symbols

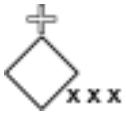
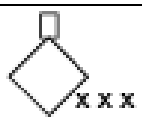
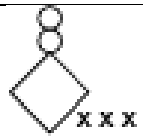
Symbol	Definition	Remarks
	Initial acquisition target	This symbol is displayed until the vector is displayed after target acquisition.
	Target acquired in automatic acquisition zone	The alarm sounds. The alarm message (New Target) turns orange and blinks. The symbol turns red and blinks.
	Tracked target	This means a tracked target.
	Dangerous target	The alarm sounds. The alarm message (CPA/TCPA) turns red and blinks. The symbol is enlarged and displayed in red.
	Numeric displayed target	When the numeric data is displayed, the target symbol is enclosed in a square.
	Lost target	The alarm sounds. The alarm message (Lost) turns orange and blinks. The symbol turns red.
	Past position	The past positions of an AIS target are displayed as well as the target tracking symbol.
	Target track	The track of another ship as an AIS target is displayed as well as the target tracking symbol.

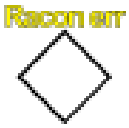
Memo

When a target acquired from RADAR is displayed, only the ID is displayed, not the symbol.

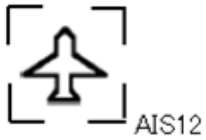
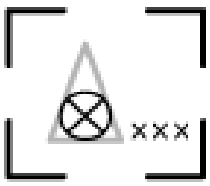
6.3.3 Types and Definitions of AIS Target Symbols

Symbol	Definition	Remarks
	Sleeping target	This symbol is displayed when received data is valid. The direction of the triangle's vertex indicates the target's heading or course.
	Target in pause state	When CTW/STW of the target cannot be received, the symbol is displayed in a broken line.
	Activated target	The heading direction is displayed with a solid line, and the course vector is displayed with a dotted line. The line perpendicular to the heading direction indicates the direction to which the course is to be changed. This line may not be displayed.
	Activated target	When CTW/STW of the target cannot be received, the symbol is displayed in a broken line.
	Outline display	The outlines of ships are displayed scaled down.
	Numeric displayed target	When the numeric data is displayed, the target symbol is enclosed in a square.
	Dangerous target	The alarm sounds. The alarm message (CPA/TCPA) turns red and blinks. The symbol is enlarged and displayed in red.
	Danger target	When CTW/STW of the target cannot be received, the symbol is displayed in a broken line.
	Lost target	The alarm sounds. The alarm message (Lost) turns orange and blinks. The symbol is displayed by overlaying red x marks.
	Sleeping AIS-SART target	Displayed by the same color as AIS symbol.

Symbol	Definition	Remarks
 AIS12	Activated AIS-SART target	Displayed target No. nearby the symbol.
 AIS12	Numerical display AIS-SART target	When the numeric data is displayed, the target symbol is enclosed in a square.
 AIS12	Lost AIS-SART target	Displayed if AIS-SART data is not received for 6 minutes.
	Physical AIS AtoN target (Racon)	The target No./AtoN name (xxx) is displayed next to the symbol.
	Physical AIS AtoN target (Emergency wreck mark)	The target No./AtoN name (xxx) is displayed next to the symbol.
	Physical AIS AtoN target (North cardinal mark)	The target No./AtoN name (xxx) is displayed next to the symbol.
	Physical AIS AtoN target (East cardinal mark)	The target No./AtoN name (xxx) is displayed next to the symbol.
	Physical AIS AtoN target (South cardinal mark)	The target No./AtoN name (xxx) is displayed next to the symbol.
	Physical AIS AtoN target (West cardinal mark)	The target No./AtoN name (xxx) is displayed next to the symbol.
	Physical AIS AtoN target (Port hand mark)	The target No./AtoN name (xxx) is displayed next to the symbol.
	Physical AIS AtoN target (Starboard hand mark)	The target No./AtoN name (xxx) is displayed next to the symbol.
	Physical AIS AtoN target (Isolated danger)	The target No./AtoN name (xxx) is displayed next to the symbol.

Symbol	Definition	Remarks
	Physical AIS AtoN target (Safe water)	The target No./AtoN name (xxx) is displayed next to the symbol.
	Physical AIS AtoN target (Special mark)	The target No./AtoN name (xxx) is displayed next to the symbol.
	Physical AIS AtoN target (Off position)	The symbol and target No./AtoN name (xxx) nearby the symbol are indicated in yellow.
	Physical AIS AtoN target (Numerical display)	When the numeric data is displayed, the target symbol is enclosed in a square.
	Physical AIS AtoN target (Lost display)	The alarm sounds. The alarm message (Lost) turns orange and blinks. The symbol is displayed by overlaying red x marks.
	Physical AIS AtoN target (Flood light abnormality)	"Unlit" is displayed in yellow at the top of the symbol. The target No./AtoN name (xxx) is displayed nearby the symbol.
	Physical AIS AtoN target (radar beacon abnormality)	"Racon err" is displayed in yellow at the top of the symbol. The target No./AtoN name (xxx) is displayed nearby the symbol.
	Virtual AIS AtoN target (Emergency wreck mark)	The target No./AtoN name (xxx) is displayed next to the symbol.
	Virtual AIS AtoN target (North cardinal mark)	The target No./AtoN name (xxx) is displayed next to the symbol.
	Virtual AIS AtoN target (East cardinal mark)	The target No./AtoN name (xxx) is displayed next to the symbol.
	Virtual AIS AtoN target (South cardinal mark)	The target No./AtoN name (xxx) is displayed next to the symbol.

Symbol	Definition	Remarks
	Virtual AIS AtoN target (West cardinal mark)	The target No./AtoN name (xxx) is displayed next to the symbol.
	Virtual AIS AtoN target (Port hand mark)	The target No./AtoN name (xxx) is displayed next to the symbol.
	Virtual AIS AtoN target (Starboard hand mark)	The target No./AtoN name (xxx) is displayed next to the symbol.
	Virtual AIS AtoN target (Isolated danger)	The target No./AtoN name (xxx) is displayed next to the symbol.
	Virtual AIS AtoN target (Safe water)	The target No./AtoN name (xxx) is displayed next to the symbol.
	Virtual AIS AtoN target (Special mark)	The target No./AtoN name (xxx) is displayed next to the symbol.
	Virtual AIS AtoN target (Numerical display)	When the numeric data is displayed, the target symbol is enclosed in a square.
	Virtual AIS AtoN target (Lost display)	The alarm sounds. The alarm message (Lost) turns orange and blinks. The symbol is displayed by overlaying red x marks.
	Virtual AIS AtoN target (Intended location of missing AtoN)	"Missing" is displayed in yellow at the top of the symbol. The target No./AtoN name (xxx) is displayed nearby the symbol.
	AIS SAR aircraft	Displayed by the same color as AIS symbol.

Symbol	Definition	Remarks
	Numerical display AIS SAR aircraft	When the numeric data is displayed, the target symbol is enclosed in a square.
	Lost AIS SAR aircraft	The alarm sounds. The alarm message (Lost) turns orange and blinks. The symbol is displayed by overlaying red x marks.
	AIS SAR ship	Displayed by the same color as AIS symbol.
	Numerical display AIS SAR ship	When the numeric data is displayed, the target symbol is enclosed in a square.
	Lost numerical display AIS SAR ship	The alarm sounds. The alarm message (Lost) turns orange and blinks. The symbol is displayed by overlaying red x marks.
	AIS coastal base station	Displayed by the same color as AIS symbol.
	Numerical display AIS coastal base station	When the numeric data is displayed, the target symbol is enclosed in a square.
	Lost AIS coastal base station	The alarm sounds. The alarm message (Lost) turns orange and blinks. The symbol is displayed by overlaying red x marks.

Memo

The AIS-SART target symbol is displayed in red when the target is activated.

6.3.4 About AIS AtoN (Aids to Navigation)

AIS AtoN is a system that displaying aid to navigation like a lighthouse, light buoy or unreal aid to navigation on the display unit on ships using AIS receiver.
There are following two kinds of AIS AtoN.

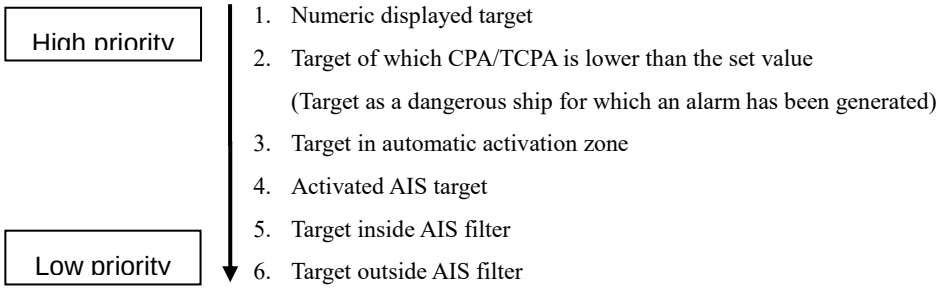
AIS AtoN type	Function	Operation example
Physical AIS AtoN	Installs the AIS on real aid to navigation, and displays its location on the display unit on ships.	In low visibility, receiving the Physical AIS AtoN symbols facilitates identification of the light location and light buoy.
Virtual AIS AtoN	Displays virtual aid to navigation on the display unit on ships according to the signals transmitted from the AIS station on the land.	In the sea area where installation of the light buoy is difficult, the Virtual AIS AtoN symbols are displayed as virtual light buoys that are used as targets for getting to the destination. This system can also be used as the aid substituted for the aid to navigation damaged by natural disasters.

6.3.5 About AIS-SART Information

The AIS-SART function enables information about the location of wrecked ship to be displayed on the screen.
For the details, refer to "7.5 Display of AIS-SART".

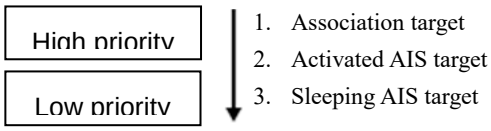
6.3.6 About Display Priority of AIS Targets

Up to 500*1 targets can be displayed in total of activated and sleeping AIS targets. Up to 500 activated AIS targets can be displayed in the total.
When there is an AIS target of 500*1 or more, the display is made according to the following priority order.



*1: The maximum number of AIS targets displayed can be changed to the option of 1000 targets.

If the number of targets at the same priority level exceeds the allowable maximum, they are displayed in the following priority order:



6.3.7 Switching between Ground Vector and Water Vector

The vector of an AIS target is to be displayed with a vector over ground or over water by switching the stabilization mode. The type of the currently displayed vector can be confirmed by viewing the setting of the stable mode.

When [GND] is selected for the stabilization mode: Ground vector

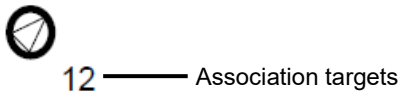
When [Sea] is displayed for the stabilization mode: Water vector

When the vector of an AIS target is displayed with a vector over water, the system has converted the AIS target's vector over ground to the vector over water according to the data received from the AIS and the own ship's information.

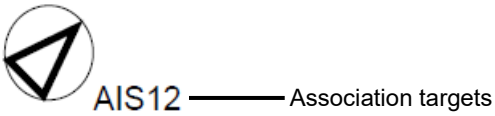
6.3.8 Association Target Symbols

When the TT target and AIS target are determined to be the same targets, the association symbols are displayed as follows.

Symbol display for high-priority TT targets



Symbol display for high-priority AIS targets

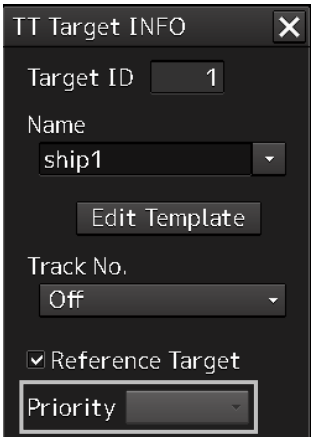


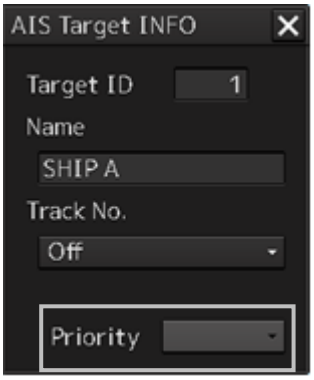
When the TT target and AIS target are determined to be the same targets, the TT target or AIS target that are displayed on a higher priority basis can be set.

1. **Right-click on the tracked target with association displayed.**
   The context menu appears.

2. **Click on [Property] in the context menu.**
   The [TT Target INFO] or [AIS Target INFO] dialog appears.

3. **Select [AIS] or [TT] from the [Priority] combo box.**





[AIS]: The AIS target is displayed on a higher priority basis.
[TT]: The TT target is displayed on a higher priority basis.

6.4 Preparation

6.4.1 Setting the Cursor Mode to AUTO Mode

If the cursor mode is set to the AUTO mode, various TT/AIS functions can be executed quickly.

1. **Click on the [AUTO] (cursor mode selection) button on the left toolbar.**

The cursor mode changes to the AUTO mode.

The [AUTO] mode performs operation in accordance with the object at the cursor position when clicked. For the details, refer to "3.13 Cursor AUTO Mode".

6.4.2 Setting Vector

A vector to represent a target's predicted position can be presented in the True vector or Relative vector mode. In each mode, a Vector Length can be freely changed for a time interval of 1 to 120 minutes.

6.4.2.1 Vector modes

Different vector modes can be used as described below according to the purpose.

To perceive the true state of the target: True Vector

To perceive the closest approach point of the target: Relative Vector

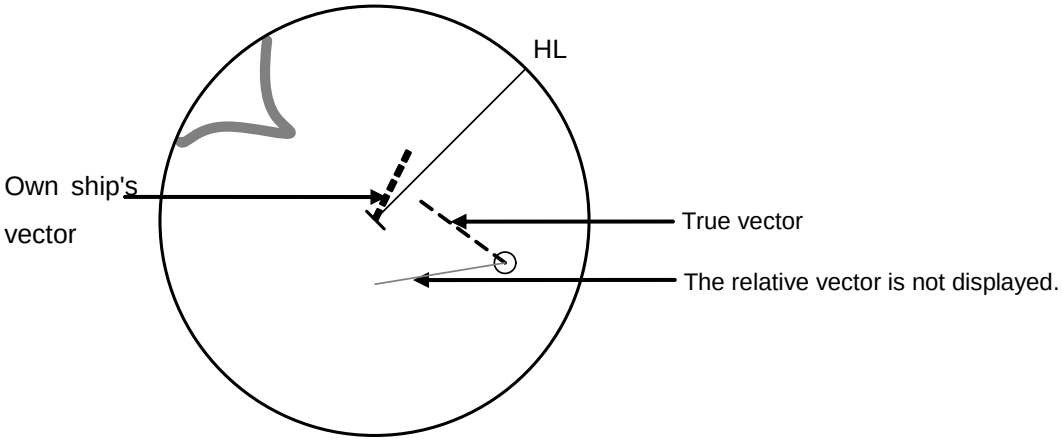
True vector mode

In the true vector mode, the directions of vectors indicate the true courses of targets and the Vector Lengths indicate the values which are proportional to their speeds.

In the true vector mode, the movements of other ships around own ship can be accurately and easily monitored.

Vectors of own ship are displayed as shown below.

Note
In true vector mode, CPA ring cannot be displayed.

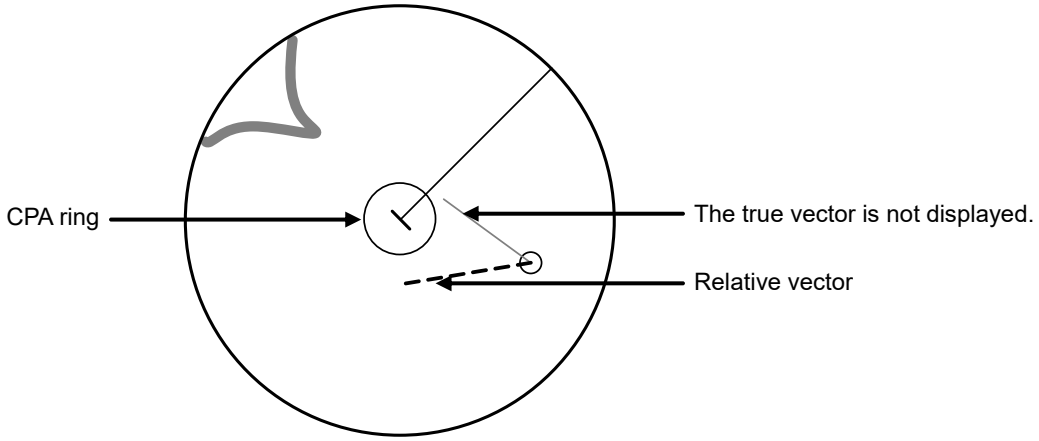


Example of True Vector Mode

Relative Vector Mode

The relative vector does not represent the true motion of the target, but its relative relation with own ship. A target with its relative vector directed to own ship (passing through the CPA limit ring) will be a dangerous target.

In the Relative Vector mode, it can be seen at a glance where the CPA limit of the dangerous target is.



Example of Relative Vector Mode

6.4.2.2 Setting vector mode

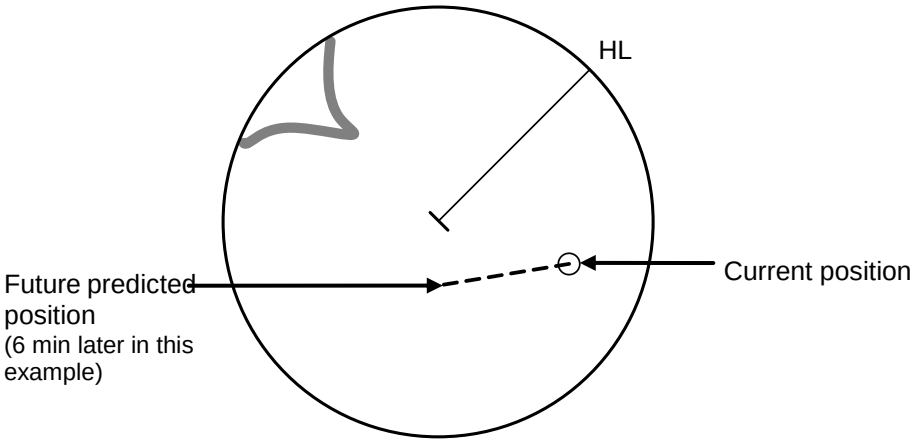
1. **Click on the trail true/relative selector button in the other ship information window.**

Each click switches track display mode between [T] and [R].

6.4.2.3 Vector Length (Vector Time)

The Vector Length of a target is proportional to its speed, and the vector time can be switched in a range of 1 to 120 minutes.

The following figure shows an example in which the Vector Length is set to 6 min, and the tip of the vector represents the target's position expected to reach 6 minutes later.



Example of Vector Length

6.4.2.4 Setting the Vector Length

The Vector Length is set in min in the range from 1 min to 120 min.

1. **Click on the Vector Length input box in the other ship information window.**

2. **Enter the Vector Length.**

6.4.3 Setting collision decision criteria

Collision decision criteria are set based on CPA and TCPA.

For an outline of CPA and TCPA, refer to "6.2.3 Basic Concept of Collision Avoidance."

Note

Set the optimum values of collision decision conditions, with consideration for vessel type, water area, weather and oceanographic conditions.

For the relations between those conditions and alarms, refer to "6.7 Alert Display".

6.4.3.1 Setting CPA limit

1. **Click on the CPA limit value input box in the other ship information window.**

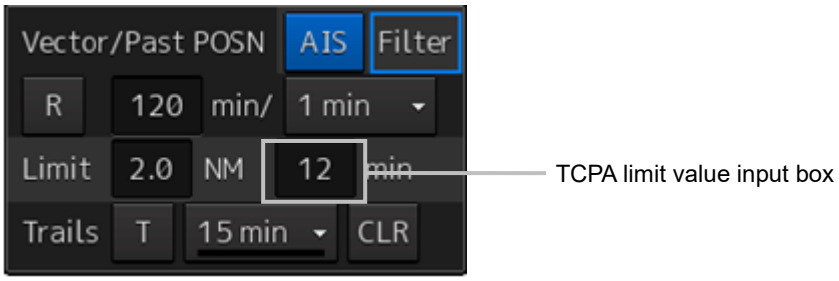
   Set the CPA limit in the unit of 0.1 NM within the range from 0.1 NM to 9.9 NM.

2. **Enter the CPA limit.**

6.4.3.2 Setting TCPA limit

1. **Click on the TCPA limit value input box in the other ship information window.**

   Set the TCPA limit in the unit of 1 min within the range from 1 min to 99 min.



2. **Enter the TCPA limit.**

For the details on how to set up alerts based on the collision determination condition, refer to “10.2 Collision Avoidance Alert Generation Conditions".

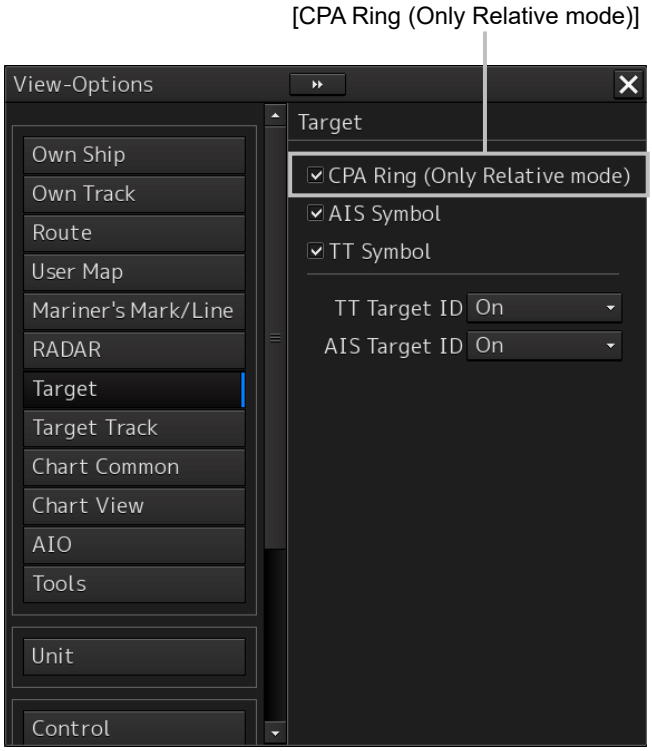
6.4.4 Showing the CPA ring

The CPA ring is rendered as a red circle with the own ship centered and the CPA limit set distance used as the radius.

1. **Click on the [Menu] button on the left toolbar.**
   The menu is displayed.

2. **Click on [View] - [Option] - [Target].**
   The [Target] dialog is displayed.

3. **Select [CPA Ring (Only Relative mode)].**



The CPA ring is shown.

Note:
When True is specified for the vector mode, [CPA Ring (Only Relative mode)] cannot be selected.

6.5 Setting and Operating Target Tracking

The Target Tracking function automatically tracks the acquired targets and records and displays the course and speed of the targets as vector. Alerts can also be output based on the set collision decision criteria (CPA and TCPA).

Note

At power off and during preparation for transmission, tracking data records are deleted.

6.5.1 Acquiring target

The methods for acquiring targets include Auto Acquisition (automatic acquisition) mode and ACQ MANUAL (manual acquisition) mode.
Both modes can also be used concurrently.

6.5.1.1 Automatic acquisition (automatic acquisition) mode

By setting up and enabling the automatic acquisition/activation zone (AZ), targets intruding into the AZ can automatically be acquired/tracked and also issue a new target warning.

Note

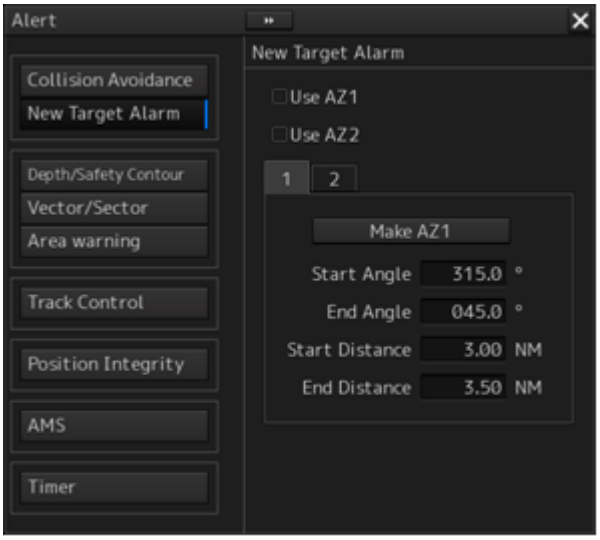
If manual acquisition is made in a state in which the number of targets being tracked has reached the maximum number of targets, the target with the lowest danger level among the targets that have been captured thus far automatically is erased successively.

When all the targets that are tracked are for manual acquisition and the number has reached the maximum number of targets, no further acquisition is allowed.

Take the following steps to enable automatic acquisition/activation zone (AZ).

1. **Click on the [Menu] button on the left toolbar.**
   The menu is displayed.

2. **Click [Alert] - [New Target Alarm] on the menu.**
   The [New Target Alarm] dialog is displayed.



3. **Check [Use AZ1] (automatic acquisition zone 1) or [Use AZ2] (automatic acquisition zone 2).**
   Automatic acquisition/activation zone (AZ) includes AZ1 and AZ2.
   To enable AZ1, check [Use AZ1].
   To enable AZ2, check [Use AZ2].

Memo
For the details of [New Target Alarm] dialog box, refer to “10.3 New Target Alarm Generation Conditions".

To automatic acquisition/activation zone (AZ):
Clear the check of [Use AZ1] or [Use AZ2].

The AZ can also be enabled/disabled with the [AZ] key on the keyboard operation unit.
For the details of function assignment to the [AZ] key, refer to “11.21 Setting Key Assignment".

6.5.1.2 ACQ MANUAL (manual acquisition) mode

Note

The manual acquisition mode does not function in the following states.

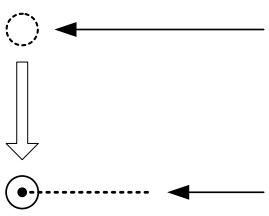
State	Action to Take
The number of tracked targets has reached the maximum count.	Erase unnecessary targets.
The radar antenna is in the standby state.	Wait until the radar antenna becomes ready.
A PROC (Interrupt) warning is being generated.	Clear the warning.
A Gyro (I/F)/Gyro (Data)/Heading (Data) warning is being generated.	
The tracked target is located 32 NM away from own ship.	The manual acquisition mode cannot be used.
The tracked target is located less than 0.1 NM from own ship.	

To acquire the tracked target in the manual acquisition mode

1. **Set the cursor mode to the AUTO mode.**

2. **Place the cursor on the target to be acquired and then click on.**

   The target is acquired and the initial acquisition symbol is displayed.
   The vector is displayed within 1 minute.



Memo

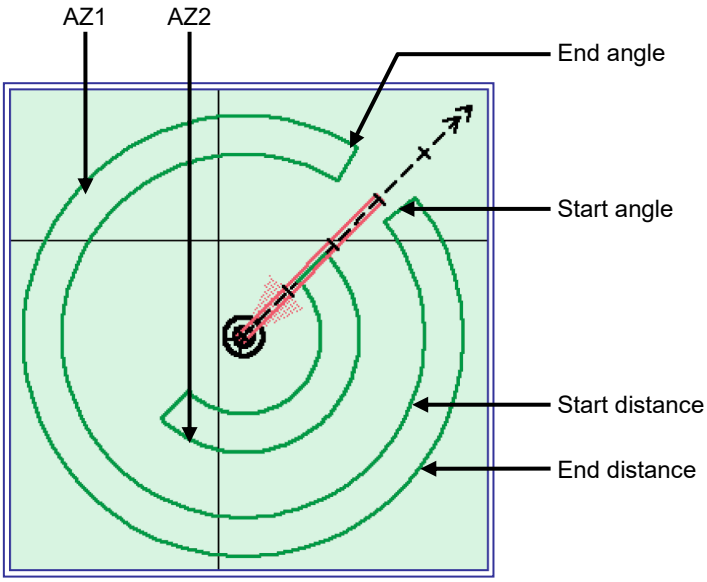
If only the manual acquisition mode will be used without using auto acquisition/activation together, disable the AZ.

6.5.1.3 Using manual acquisition and auto acquisition together

By using manual acquisition with AZ enabled, auto acquisition and manual acquisition can be used together. They may be used if a target to which particular attention should be given is manually acquired and other targets are automatically acquired.

6.5.2 Setting up the automatic acquisition/activation zone (AZ)

Auto acquisition/activation zone has the shape of sector set up according to the angle and distance as shown in the following figure.



Example of auto acquisition/activation zone (AZ)

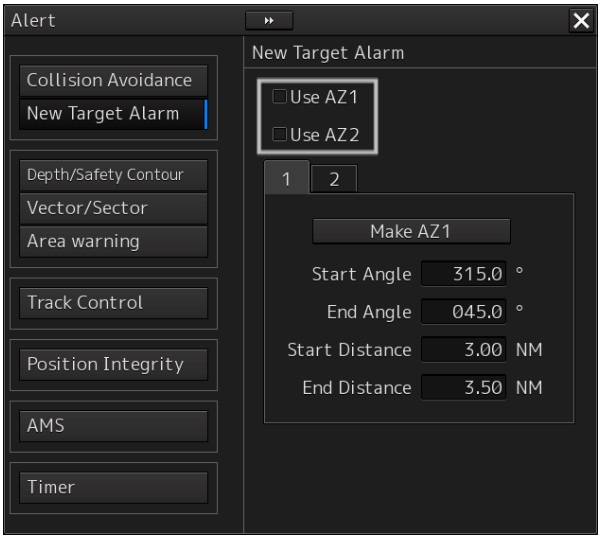
Auto acquisition/activation zone (AZ) is set up using the following three methods.

(1) Use the [New Target Warning] dialog in the [Alert] menu.
(2) Use the cursor.
(3) Use the EBL/VRM dial.

6.5.2.1 Using [New Target Warning] dialog box in the [Alert] menu

1. **Click on the [Menu] button on the left toolbar.**
   The menu is displayed.

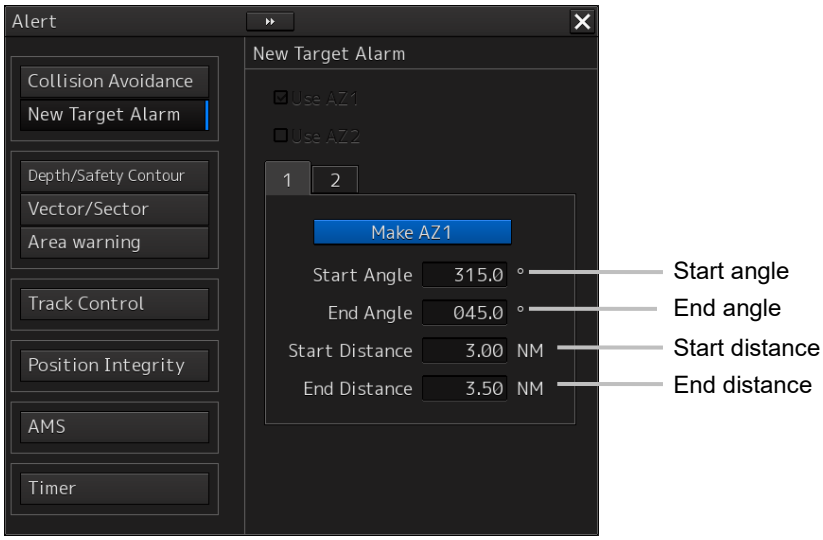
2. **Click [Alert] - [New Target Alarm] on the menu.**
   The [New Target Alarm] dialog is displayed.



3. **To set up AZ1, select the [Use AZ1] check box. To set up AZ2, select the [Use AZ2] check box.**

4. **To set up [Use AZ1], click on the [1] tab. To set up [Use AZ2], click on the [2] tab.**
   Their respective setting items are displayed.

5. **Enter the start angle, end angle, start distance and end distance of AZ.**

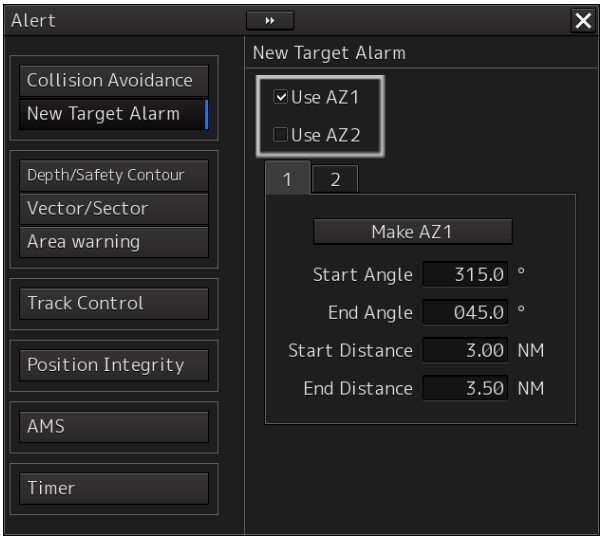


6.5.2.2 Using the cursor

1. **Click on the [Menu] button on the left toolbar.**
   The menu is displayed.

2. **Click [Alert] - [New Target Alarm] on the menu.**
   The [New Target Alarm] dialog is displayed.

3. **Select AZ ([Use AZ1] or [Use AZ2]) to be set.**



4. **Click at the start angle position.**
   The start angle is set.

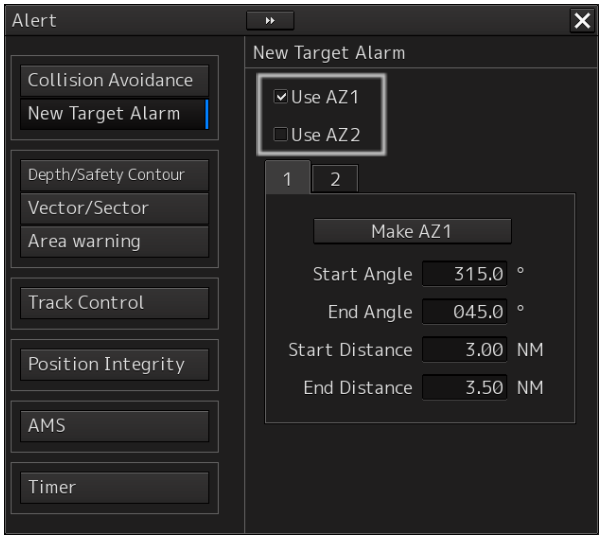
5. **Move the cursor and click at the end angle position.**
   The line connecting the start angle and end angle appears.

6. **Move the cursor and click at the start distance position.**
   An arc appears at the start distance position.

7. **Move the cursor and click at the end distance position.**
   Auto acquisition/activation zone (AZ) with the shape of sector enclosed by start angle, end angle, start distance and end distance is created.

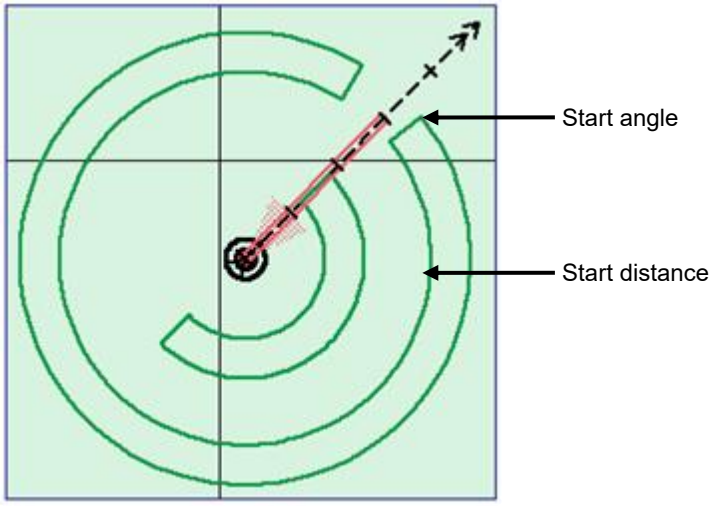
6.5.2.3 Using the EBL/VRM dial for the setting

1. **Click on the [Menu] button on the left toolbar.**
   The menu is displayed.
2. **Click [Alert] - [New Target Alarm] on the menu.**
   The [New Target Alarm] dialog is displayed.
3. **Select AZ ([Use AZ1] or [Use AZ2]) to be set.**



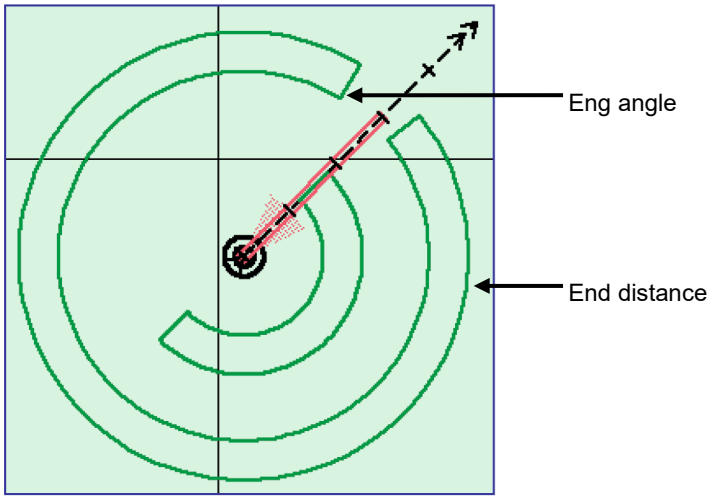
4. **Click on the [Make AZ1] button or [Make AZ2] button.**
   The cursor enters the AZ creation mode.

5. **Turn the EBL dial to set [Start Angle].**
6. **Turn the VRM dial to set [Start Distance]**



7. **Press the EBL dial and the VRM dial.**
8. **Turn the EBL dial to set [End Angle].**

9. **Turn the VRM dial to set [End Distance].**



10. **Press the EBL dial.**

6.5.3 Tracked target information display

Note

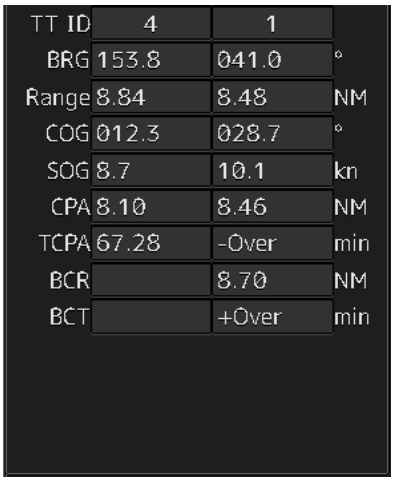
When a target or own ship changes its course, or when a new target is acquired, its vector may not reach a given level of accuracy until 3 minutes or more has passed after such course change or target acquisition.

Even if 3 minutes or more has passed, the vector may include an error depending upon the tracking conditions.

1. **Set the cursor mode to the AUTO mode.**

2. **Click on the target of tracking whose numerical value is to be displayed.**

   Numeric data for the specified target is displayed in the information monitoring window.



The symbol display is changed to "◯". The target data will remain on the radar display until the target is lost and its vector disappears, or until another target is designated.

If a target with the mark "◌" is designated, only its true bearing and range appear until its vector appears.

Cancellation of numeric data display

1. **Set the cursor mode to the AUTO mode.**
2. **Place the cursor on the tracked target to cancel numeric value display and then click on.**

The numeric value disappears.

Details on tracked target information

Item	Explanation
TT ID	ID No. of tracked target being displayed
BRG	True bearing
Range	Distance
CTW (Course Through the Water stabilization mode)/ COG (Course Over the Ground stabilization mode)	Course
STW (Speed Through the Water stabilization mode) / SOG (Speed Over the Ground stabilization mode)	Speed
CPA	Closest approach distance
TCPA	Time up to closest approach distance
BCR	Bow crossing distance
BCT	Bow crossing time

6.5.4 Erasing unwanted tracked targets

If the vectors and symbols of the unwanted tracked targets remain displayed, the radar screen may become difficult to view. In such a case, unwanted tracked targets can be erased from the radar screen using the following method.

To erase one target

1. **Place the cursor on the tracked target to be cancelled and then right-click.**
   The context menu is displayed.
2. **Click on the [Cancel TT] on the context menu.**
   The vector symbol of the tracked target disappears and only the radar image remains.

To erase multiple targets

1. **Place the cursor on the tracked target to be cancelled and then right-click.**
   The context menu is displayed.

2. **Click on the [Cancel TT mode] on the Context menu.**
   The cursor changes to the selection cursor.

3. **Place the cursor on another target to be cancelled and then click on.**

4. **Repeat the operation in step 3.**
   The vector symbols of the clicked tracked targets disappear and only the radar image remains.

To erase all targets

1. **Place the cursor on the tracked target to be cancelled and then right-click.**
   The context menu is displayed.

2. **Click on the [Cancel all TT mode] on the Context menu.**
   The vector symbols of all the tracked targets disappear and only the radar image remains.

Note
If all targets are cancelled, the tracking of all targets will stop; thus, automatic acquisition or manual acquisition must be performed newly. Unless necessary, do not cancel all targets.

6.5.5 Displaying Target ID No.

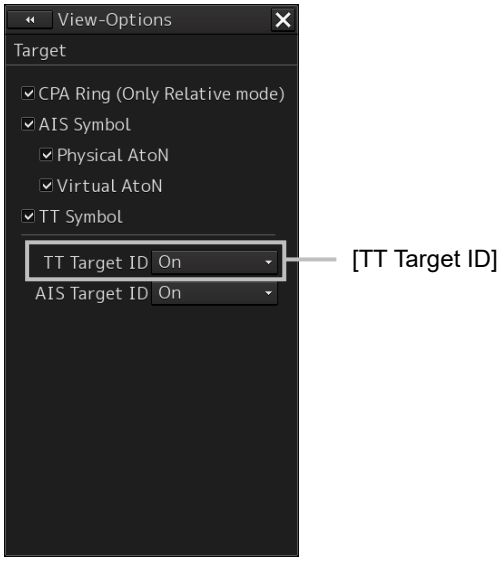
A target ID number is a value displayed beside the acquisition symbol when a target is acquired.
A target ID number 1 to 100 is automatically assigned to each target in acquisition order. Once a target ID number is assigned, it identifies the target until the target is lost or the target acquisition is canceled.

Memo
The ID number is always displayed for only targets with which numeric data is displayed.

1. **Click on the [Menu] button on the left toolbar.**
   The menu is displayed.

2. **Click on [View] - [Options] - [Target].**
   The [Target] dialog is displayed.

3. **Select the method for displaying ID No. from the [TT Target ID] list.**



[On]: Displays target ID numbers.
[Off]: Hides target ID numbers.
[TT Track]: Displays ID numbers of only targets set for track of other ships.
[Ship's Name]: When the ship's name has been input in the [TT Target INFO] (property of tracked target) dialog box, that ship name is displayed. If the ship's name has not been input, the identification number is displayed.

Memo

If there are many tracking targets and their symbol display is confusing, set Target Number Display to off to view the radar display easily.

6.5.6 Editing tracked target properties

The tracked target property such as tracked target ID name can be arbitrarily edited for individual tracked targets acquired.

The [TT Target INFO] dialog is used for editing.

Tracked target ID appears.

Tracked target ID name is set.
For the details, refer to "0

The track color of tracked target is set.
For the details, refer to "6.5.6.2 Setting track color of tracked target".

The target for which ground is fixed is set to a reference target.
For the details, refer to "6.5.7 Setting target for which ground is fixed to a reference target"

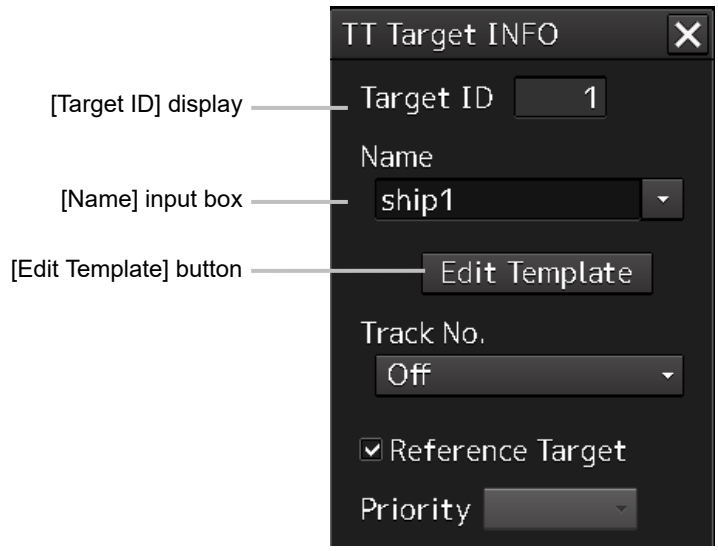
When a TT target and AIS target are determined to be the same targets, the TT target or AIS target to be displayed on a priority basis can be set.
For the details, refer to "6.3.8 Association Target Symbols"

6.5.6.1 Adding Tracked Target ID Name

An ID name can be added to the tracked target acquired.

1. **Right-click the cursor on the tracked target.**
   The context menu is displayed.

2. **Click on [Property] on the context menu.**
   The [TT Target INFO] dialog box appears



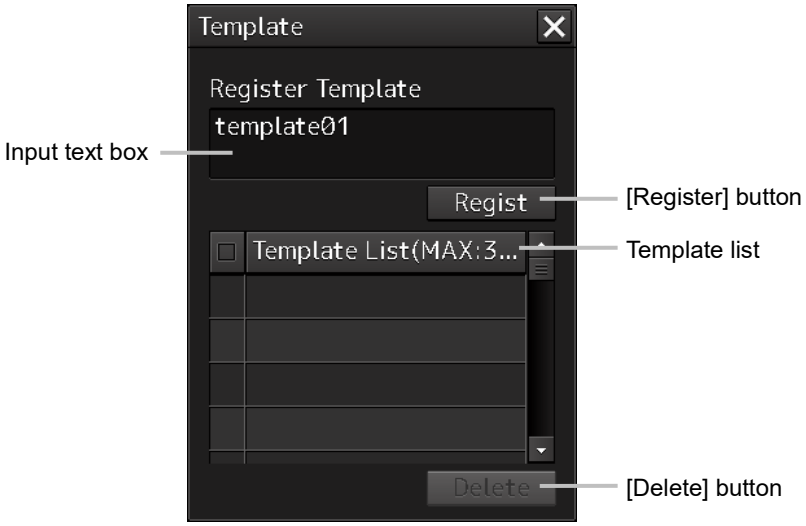
3. **Click on the [Name] input box or ▼.**
   The input method varies with the selected item.

   Input box : Enter a new name.
   When selected, the ship name ([Name]) entry window opens.
   Enter a ship name of up to 15 characters.

   ▼ : The names registered as templates are displayed in a list.
   Select a name from the list.

To register ship names as templates

1. **Click on the [Edit Template] button in the [TT Target INFO] dialog box.**
   The [Edit Template] dialog box appears.



2. **Enter the ship name to be registered as a template in the input text box.**

3. **Click on the [Register] button.**
   The entered ship name is registered in the template list.

4. **Repeat steps 2 and 3, and register necessary ship names.**

To cancel unwanted ship name registration

1. **On the template list in the [Edit Template] dialog box, check the checkbox of the ship name whose registration to be canceled.**

2. **Click on the [Delete] button.**
   The checked ship name is deleted from the template list.

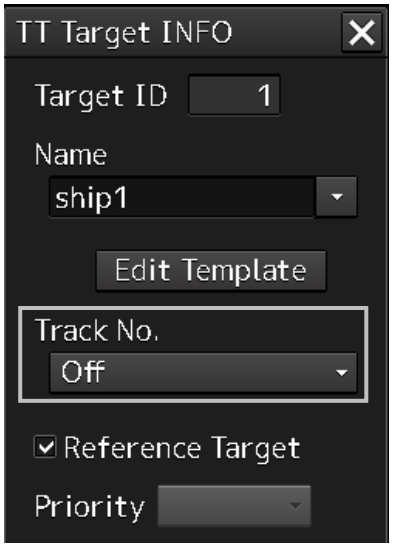
6.5.6.2 Setting track color of tracked target

The track color of tracked target is set.

1. **Right-click on the cursor at the tracked target.**

2. **Click on the [Property] on the context menu.**

   The [TT Target INFO] dialog box appears.



3. **Select track color from the [Track Color] list.**

   The selection items are as follows.

   Off, No.1-Color, No.2-Color, No.3-Color, No.4-Color, No.5-Color, No.6-Color, No.7-Color, No.8-Color, No.9-Color, No.10-Color, No.11 to 20-Color

   * In "Color," the track color name set by clicking [View] - [Options] - [Target Track] - [Plot] appears. For the details, refer to “9.2.8 Setting up the Display of Other Ship's Track"

6.5.7 Setting target for which ground is fixed to a reference target

By tracking the target for which ground is fixed and setting it to a reference target, the speed of the own ship can be obtained and displayed.

Note

The reference target function is to be used if the own ship's speed cannot be displayed normally due to trouble such as a speed sensor malfunction. Do not use the reference target function except in emergencies.

If the speed or course of the own ship is changed or a new reference target is set, the displayed speed may take 3 minutes or more to reach the specified speed after the speed/course change or the setting.

Even after 3 minutes or more has passed, the speed may differ from the specified speed depending on the tracking condition.

If a large radar echo such as a land target is set as a reference target, the vectors of the speed and other tracking targets will not be displayed correctly and may cause an accident.

If a sailing ship is set as a reference target, the vectors of the speed and other tracking targets will not be displayed correctly and may cause an accident.

If the reference target is lost or the Target Tracking function is stopped, the ship speed against the ground will be GPS. (Only if the GPS is equipped.).

If the reference target is lost or the Target Tracking function is stopped, that will make a major impact on the accuracy of the target tracking and the own ship speed.

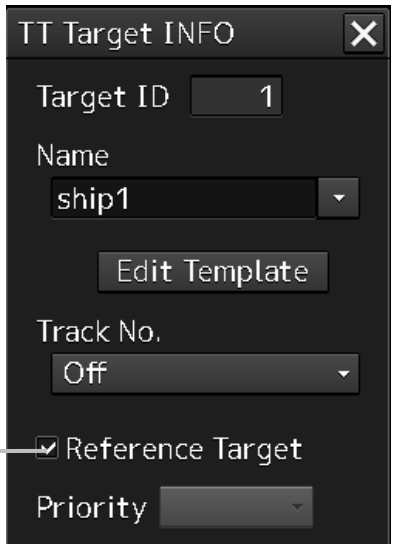
The reference targets are only used for the calculation of true speed.

Do not use own speed based on reference target tracking for relative speed and CPA/TCPA calculation of AIS targets because the response of own speed is slower than actual own ship's speed change and it may cause a big error on the collision judgement of AIS targets.

1. **Acquire the ground-fixed target.**

2. **Click the right button on the acquired target.**
   A context menu is displayed.

3. **Click on [Property] in the context menu.**
   The [TT Target INFO] dialog is opened.



4. **To set the target to a reference target, check [Reference Target].**
   To not set the target to a reference target, uncheck [Reference Target].

5. **Select [TGT] from the COG/SOG source combo box in the own ship information at the top right corner of the screen.**
   The ship speed is automatically calculated from the reference target and is displayed as the COG/SOG speed.
   When a reference target is set, the symbol display changes to "$_{R}\bigcirc$ ".

Note
Only one target can be set as a reference target.
When a new reference target is set, the previous reference target is cancelled.

6.5.8 Operation Test for Target Tracking

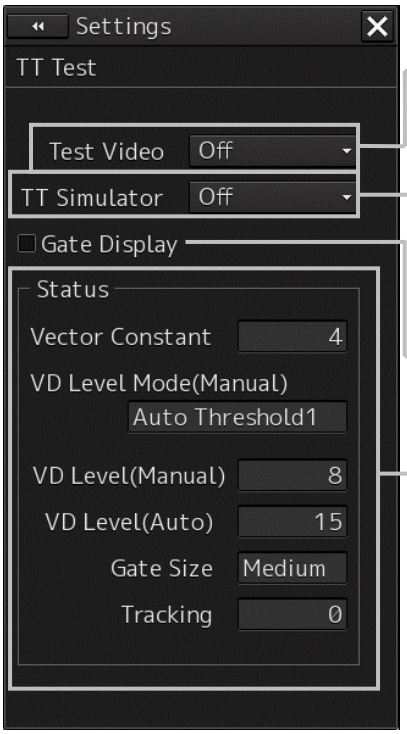
⚠CAUTION

Simulation is a function for determining if the target tracking function is working correctly or not. Accordingly, this function should be used only to check for the target tracking function operation.
In particular, if this mode is used during navigation, a pseudo target will appear on the radar screen and cannot be easily identified from the real target. This may cause such an accident as collision. Do not use this mode during the navigation.

The following operation test and checking are performed to check the operation of target tracking as required. The [TT Test] dialog is used for operation.

1. **Click on the [Menu] button on the left toolbar.**
   The menu is displayed.

2. **Click on the [Settings] - [TT Test] on the menu.**
   The [TT Test] (Test for Target Tracking) dialog is displayed.



The operation of target detection circuit is checked.
For the details, refer to "6.5.8.1 [Test Video".

A pseudo-target is generated on the radar screen to check that target tracking operates normally.
For the details, refer to "6.5.8.2 [TT Simulator] (Target tracking simulator)".

The gate size for acquiring and tracking targets are displayed.
For the details, refer to "6.5.8.3 [Gate Display]".

The status of Target Tracking function is displayed.
For the details, refer to "6.5.8.4 [Status] display".

6.5.8.1 [Test Video]

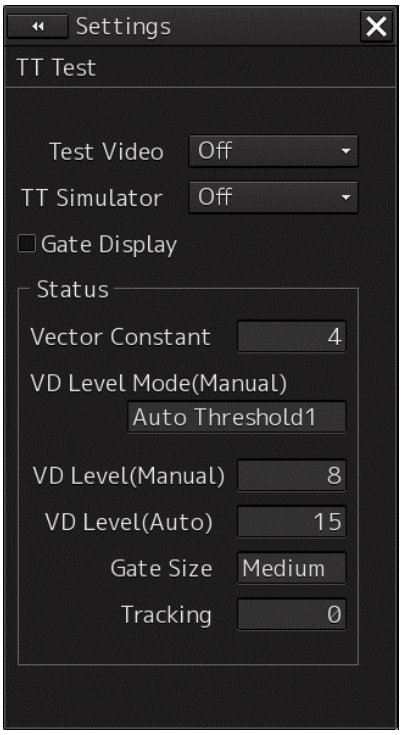
Test Video is used to check whether the video signals under target acquisition and tracking are input to and processed in the target detection circuit normally.
Normally, it is sufficient to just check that the VDIN of the Test Video is displayed.

Note
Test Video may not be displayed for a target which is not yet acquired or tracked. Test Video may not be displayed either if the [GAIN] dial or [SEA] dial is not properly adjusted.

1. **Click on the [Menu] button on the left toolbar.**
   The menu is displayed.

2. **Click on the [Settings] - [TT Test] on the menu.**
   The [TT Test] (Test for Target Tracking) dialog is displayed.

3. **Select test video to be displayed from the [Test Video] combo box.**



   The selected test video is displayed in the rearward of the radar image.

If any target displayed clearly in the normal radar display is not displayed in the Test Video mode, the target detection circuit of the Target Tracking unit may have a trouble.

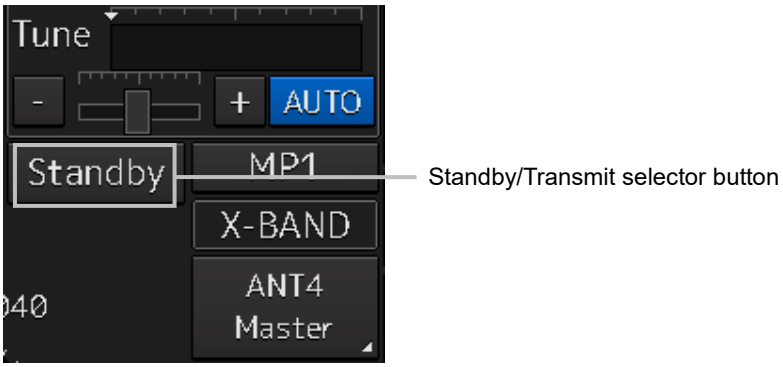
To cancel test video

1. **Select [Off] from the [Test Video] combo box.**
   Test Video display turns off.

6.5.8.2 [TT Simulator] (Target tracking simulator)

Pseudo-targets are generated in certain known positions to check whether the target tracking units are operating normally. Since the pseudo-targets move depending on known parameters, the values for these pseudo-targets can be compared with the known value if the pseudo-targets are acquired and tracked, and displayed. Thus, it can be checked if the system is operating normally.

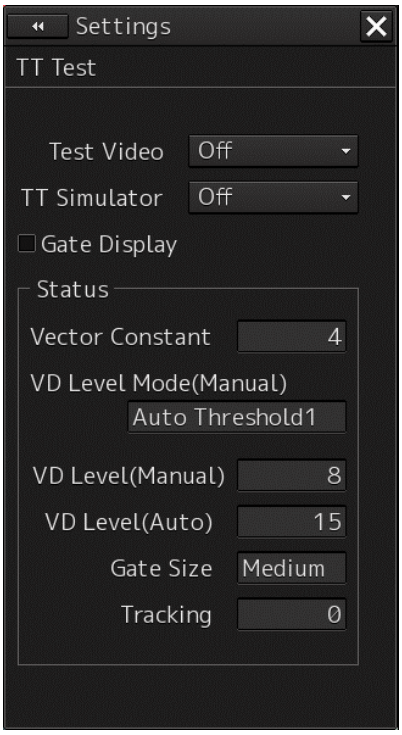
1. **Click on the Standby/Transmit selector button for Radar system information to place the radar in the standby state.**
   The button indication changes to [Standby].



2. **Click on the [Menu] button on the left toolbar.**
   The menu is displayed.

3. **Click on the [Settings] - [TT Test] on the menu.**
   The [TT Test] (Test for Target Tracking) dialog is displayed.

4. **Select simulator scenario from the [TT Simulator] combo box.**



List of target tracking simulator/scenario

Scenario	Target No.	Motion (true motion)	Moving start point		
		Speed [kn]	Course [°]	Range [NM]	Bearing [°]
Scenario1	1	28.3	45	9.5	270
	2	22.4	27	1.12	333
	3	15.3	293	9.25	45
Scenario2	1	30	135	8	23
	2	20	270	5	135
Scenario3	1	45	180	5	23
	2	0	-	3	340
	3	30	0	8	180
Scenario4	1	0	0	2.02	31
	2	70	225	7.01	37
Scenario5	1	20	45	4.47	288
	2	30	45	5.1	304
	3	40	45	6.71	288
	4	0	-	7.07	307
	5	60	200	12	352
	6	20	225	11	315
	7	40	190	14.4	349
	8	-	-	8	318
	9	-	-	9	318
	10	-	-	10	318
Scenario6	1	5	96	5	0
	2	105	225	6	45

Note

When the simulator is operating, set 0° as the heading bearing

5. **Click on the Standby/Transmit selector button to place the radar in the transmission state.**

The button indication changes to [Transmit].

The simulator turns on, the pseudo-target is generated, and the letter "X" appears on the lower side of the radar screen and near the pseudo-target to indicate that simulation mode is being executed.

To cancel simulation

1. **Click on the Standby/Transmit selector button to place the radar in the standby state.**

The button indication changes to [Standby] to enter transmission preparation state.

2. **Select [Off] from the [TT Simulator] combo box in the [TT Test] dialog.**
   TT Simulator display turns off.

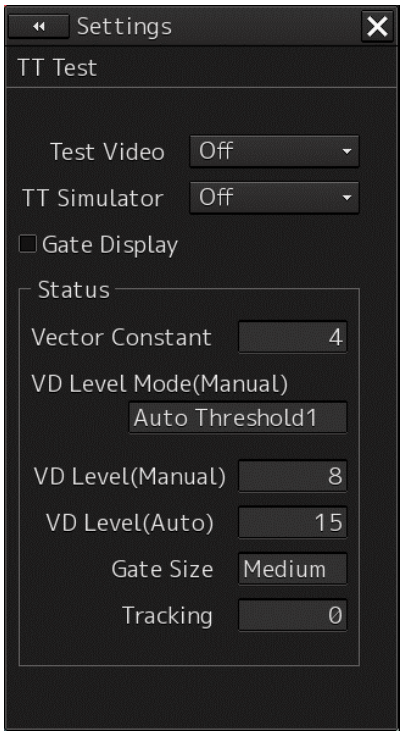
6.5.8.3 [Gate Display]

The gate displays an area monitoring a target using the TT function. This equipment allows the gate size to change automatically according to target range and size. The gate size can be checked using the following function.

1. **Click on the [Menu] button on the left toolbar.**
   The menu is displayed.

2. **Click on the [Settings] - [TT Test] on the menu.**
   The [TT Test] (Test for Target Tracking) dialog is displayed.

3. **Select the [Gate Display] checkbox.**

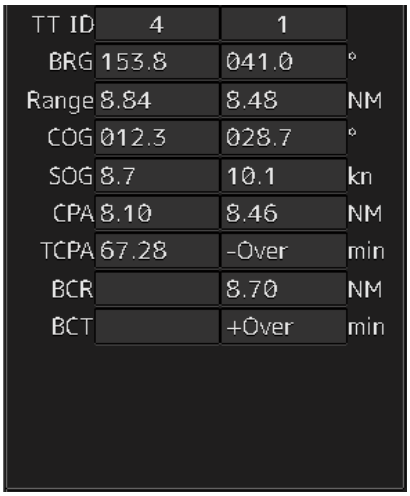


   When [Gate Display] is selected, the gate is displayed.
   When [Gate Display] is cleared, the gate is not displayed.

4. **Set the cursor mode to the AUTO mode.**

5. Click on the target of tracking whose numerical value is to be displayed.

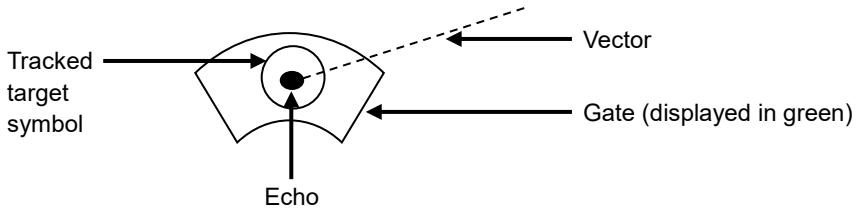
Numeric data for the specified target is displayed in the information monitoring window.



The numeric value for the target is displayed, and the gate is displayed in green around the target tracking symbol.

Memo

The Target Tracking can display the gate of two targets simultaneously.



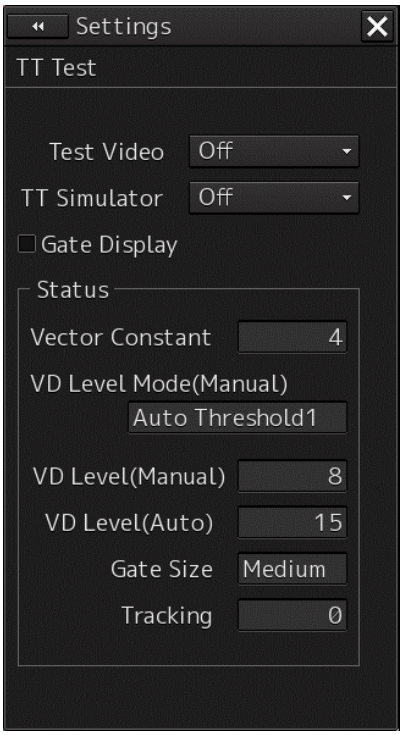
6.5.8.4 [Status] display

The status of the TT function is displayed.

1. **Click on the [Menu] button on the left toolbar.**
   The menu is displayed.

2. **Click on the [Settings] - [TT/AIS] - [TT Test] on the menu.**
   The [TT Test] (Test for Target Tracking) dialog is displayed.

3. **Check the display of [Status].**



[Vector Constant] : Vector response
[VD Level Mode (Manual)] : Using quantization level on manual acquisition
[VD Level (Manual)] : Quantization level on manual acquisition
[Video Level (Auto)] : Quantization level on automatic acquisition
[Gate Size] : Size of gate used for tracking
[Tracking] : Number of targets currently acquired

6.6 Setting and Operating AIS

6.6.1 Enabling AIS Function

Note

When the AIS function is set to Off, the AIS display function is turned off and AIS symbols are no longer displayed.

Once AIS function is set to Off, even If a dangerous target exists, the function is not automatically switched to On.

1. **Click on the [AIS] button for other ship information on the upper right of PPI.**

The button indication becomes ON and the AIS function becomes enabled.

ON indication: 

The received AIS information is displayed on the screen.

6.6.2 Activating AIS targets (Activate AIS)

Activates an AIS target, and displays the target's vector and make a collision decision.

6.6.2.1 Manual activation

Activates an AIS target in manual mode to display the vector and heading line.

1. **Set the cursor mode to the AUTO mode.**

2. **Place the cursor on the sleeping AIS symbol to be activated and then click on.**
   The selected AIS target is activated.

6.6.2.2 Automatic activation

Activate an AIS target in automatic mode to display the vector and heading line.
When the automatic activation function is used, AIS targets are automatically activated when they go into the automatic activation zone. The automatic activation zone is identical to the automatic acquisition zone (AZ) used for target tracking. For the zone setting, refer to "6.5.1.1 Automatic acquisition ".

Note
When the AIS target's symbol is activated but the vector is not displayed, the following are probable causes of the trouble:
COG/SOG is not input yet from the GPS.
The selected speed sensor is malfunctioning.

Memo
The bearing or range in the acquisition/activation zone shall be based on the position of the radar antenna.
If there are more AIS targets than the allowable maximum, they are deactivated from the low-priority (Refer to "6.3 Displaying Symbols").

6.6.3 Deactivating AIS targets

Deactivates an AIS target and clear the display of the vector and heading line.

[Deactivating one AIS target]

1. **Right-click on the AIS target to be deactivated.**
   The setting items for cursor modes are displayed.

2. **Click on the [Deactivate] on the Context menu.**
   The selected AIS target is deactivated.

[Deactivating multiple AIS targets]

1. **Right-click on the AIS target.**
   The setting items for cursor modes are displayed.

2. **Click on the [Deactivate mode] on the Context menu.**
   The cursor changes to the selection cursor.

3. **Click on the AIS target to be deactivated.**
   The selected AIS target is deactivated.

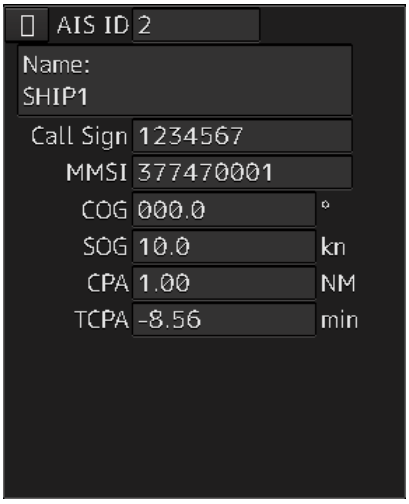
Note
This operation is available only for an activated AIS target.

6.6.4 Displaying AIS information

1. **Set the cursor mode to the AUTO mode.**

2. **Place the cursor on the AIS target to display the activated AIS target information and then click on.**

   The information of the selected AIS target is displayed.



Note

When the numeric data of a target is displayed but the mark " ⌜ ⌝ " is not on the radar display, the target is outside the display.

Canceling AIS target information display

1. **Set the cursor mode to the AUTO mode.**

2. **Move the cursor to and click on the activated AIS target whose AIS target information is to be cancelled.**

   The information display of the selected AIS target is canceled.

Details on AIS target information

Two AIS target information display modes are available, a standard mode, and an extended mode, and the items that are displayed vary depending on the mode.

Use the AIS Standard/Extended selector button for switching between the standard mode and the extended mode.

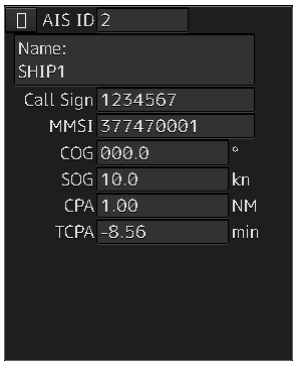
For verifying more detailed information of the AIS target, refer to "2.3.1.4 AID Detail INFO".

When the AIS Standard/Extended selector button is clicked to change display to , extended mode is entered.

When the button is clicked to change display to , standard mode is entered.

The display contents vary depending on the types of AIS targets.

[Normal AIS target]



Item	Explanation
AIS ID	ID No. of AIS target
Name	Ship name of AIS target
Call Sign	Call sign of AIS target
MMSI	Maritime Mobile Service Identity
COG or CTW	COG: Course Over the Ground CTW: Course Through Water * In ground mode, COG is displayed. In water mode, CTW is displayed.
SOG or STW	SOG: Speed Over the Ground STW: Speed Through Water *If the SOG or STW column is Over, the speed of other system is 102.2 kn or more. * In extended mode, the display area for two simple modes is used.
CPA	Closest approach distance
TCPA	Time up to closest approach distance
BRG	True direction * In standard mode, this item is not displayed.

Range	Distance * In standard mode, this item is not displayed.
Heading	Heading * In standard mode, this item is not displayed.
ROT	Rate of turn * In standard mode, this item is not displayed. * The display range of ROT is 0.00°/min to 697.50°/min. In the case of Over, the value will be greater. In the case of ±5/30s, it indicates that ±127 is received. At this time, only turning direction indicated on the turn indicator is reliable. The turn indicator is displayed as a straight line normal to the heading direction on the AIS symbol. (Refer to "6.3 Displaying Symbols.")
POSN	Latitude/longitude * In standard mode, this item is not displayed.
>10m or <10m	>10m: Low positioning accuracy <10m: High positioning accuracy * In standard mode, this item is not displayed.
Destination	Destination * In standard mode, this item is not displayed.
Navigation Status	The status is displayed by number. For the details, refer to "Navigation Status" table. * In standard mode, this item is not displayed.

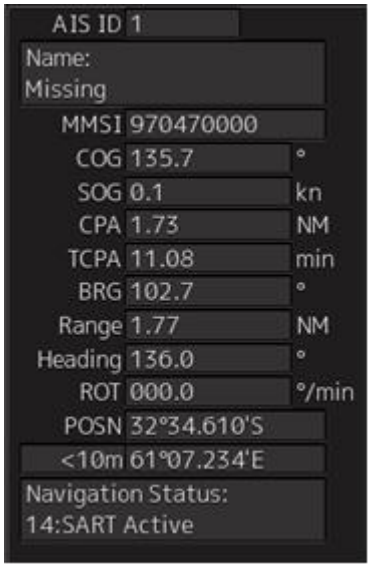
Memo

In the extended mode, a display area equivalent to two standard mode areas is used.

Navigation Status

Status
0: Under Way Using Engine
1: at Anchor
2: Not Under Command
3: Restricted Maneuverability
4: Constrained by Her Draught
5: Moored
6: Aground
7: Engaged in Fishing
8: Under Way Sailing
9: Reserved for HSC
10: Reserved for WIG
11-14: Reserved
15: Not Defined

[AIS SARTTarget]



There is neither the Call Sign nor Destination item. The display of some items of Navigation Status is different. Otherwise, the display contents are the same as those of usual AIS target.

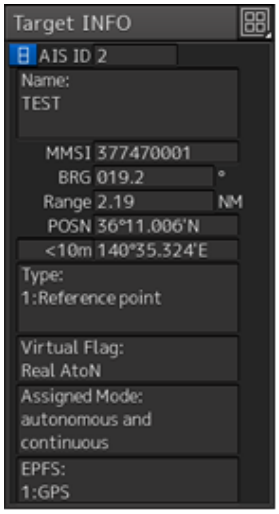
Navigation Status

Display
0 ~ 13: Same display as for the usual ship
14: AIS-SART ACTIVE(14)
15: AIS-SART TEST(15)

Memo

Switching between standard and extended modes is not provided.

[AIS AtoN Target]



Item	Description
AIS ID	AIS target ID
Name	Ship name of AIS target
MMSI	Maritime Mobile Service Identity code
BRG	True bearing
Range	Range
POSN	Latitude/longitude
>10m or <10m	>10m: Position fixing accuracy low <10m: Position fixing accuracy high
Type	Displays the AtoN type. Fort he details, refer to the “Type” table. * Not displayed in standard mode.
Virtual Flag	Real AtoN: Real AtoN Virtual AtoN: Virtual AtoN (does not exist) * Not displayed in standard mode.
Assigned Mode	Autonomous and continuous: Operating in autonomous/continuous mode Assigned: Operating in assignment mode * Not displayed in standard mode.
EPFS	Displays the EPFS type. For the details, refer to the “EPFS” table. * Not displayed in standard mode.

Type

Display
0: Not Available
1: Reference point
2: RACON
3: Fixed structure off shore
4: Spare
5: Light,without sectors
6: Light,with sectors
7: Leading Light Front
8: Leading Light Rear
9: Beacon,Cardinal N
10: Beacon,Cardinal E
11: Beacon,Cardinal S
12: Beacon,Cardinal W
13: Beacon,Port hand
14: Beacon,Starboard hand
15: Beacon,Preferred Channel Port hand
16: Beacon,Preferred Channel Starboard hand
17: Beacon,Isolated danger
18: Beacon,Safe water
19: Beacon,Special mark
20: Cardinal Mark N
21: Cardinal Mark E
22: Cardinal Mark S
23: Cardinal Mark W
24: Port hand Mark
25: Starboard hand Mark
26: Preferred Channel Port hand
27: Preferred Channel Starboard hand
28: Isolated danger
29: Safe Water
30: Special Mark
31: Light Vessel /LANBY/Rigs

EPSF

Display
0: Undefined
1: GPS
2: GLONASS
3: combined GPS/GLONASS
4: LORAN-C
5: Chayka
6: INS
7: surveyed
8: Galileo
15: internal GNSS
9-14: not used

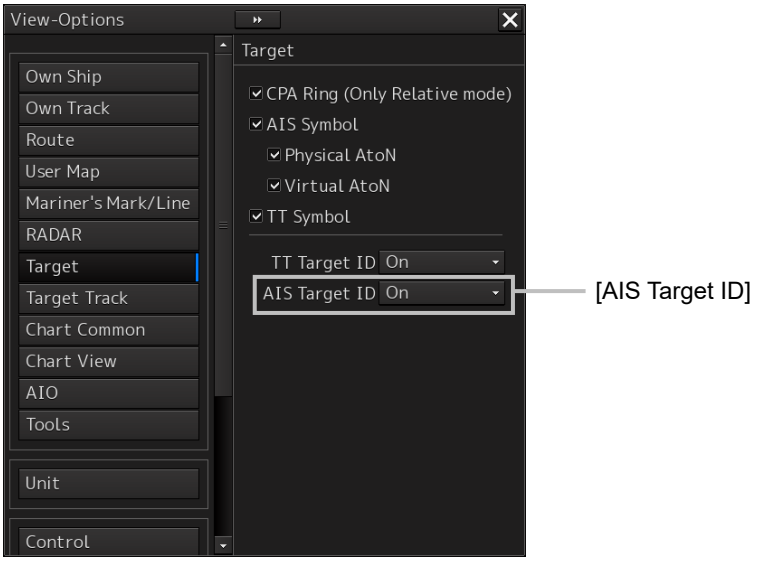
6.6.5 Displaying Target ID No.

When an AIS target is activated, a target ID number is displayed next to the AIS target symbol.
A target ID number 1 to 1000 is assigned to each target in the order of receiving targets by MFD. Once a target ID number is assigned, it identifies the AIS target until the AIS target is lost.

1. **Click on the [Menu] button on the left toolbar.**
   The menu is displayed.

2. **Click on the [View] - [Options] - [Target] on the menu.**
   The [Target] dialog is displayed.

3. **Select the method for displaying ID No. from the [AIS Target ID] combo box.**



[On] : Displays target ID numbers.
[Off] : Hides target ID numbers.
[AIS Track] : Displays ID numbers of only targets set for track of other ships.
[Ship's Name] : Displays the ship's name.

Memo

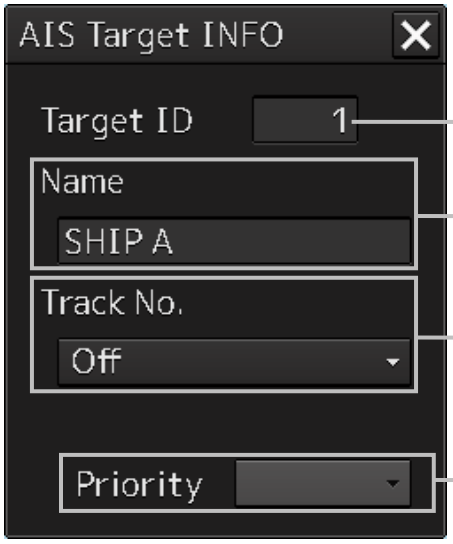
ID number or ship's name is always displayed for only targets with which numeric value is displayed.

If there are many AIS targets and their symbol display is confusing, set Target Number Display to off to view the radar display easily.

6.6.6 Checking and setting AIS target property

The AIS target property such as ID name can be checked for individual acquired AIS targets.
The track color of AIS target can also be set.

The [AIS Target INFO] dialog is used for editing.



AIS target ID appears.

AIS target ID name appears.

The track color of AIS target is set.
For the details, refer to "6.6.6.1 Setting track color of AIS target".

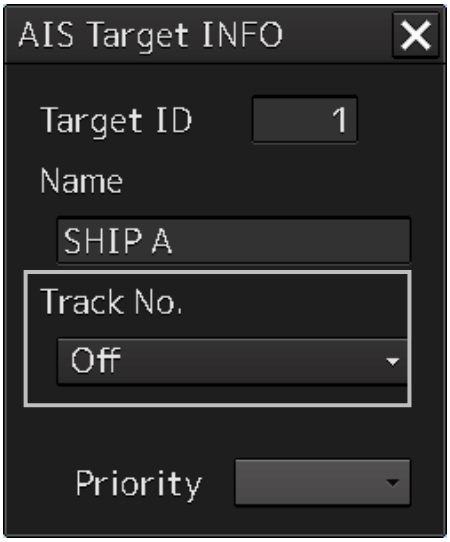
When a TT target and AIS target are determined to be the same targets, the TT target or AIS target to be displayed on a priority basis can be set.
For the details, refer to "6.3.8 Association Target Symbols".

6.6.6.1 Setting track color of AIS target

The track color of AIS target is set.

1. **Right-click on the AIS target.**
   The context menu is displayed.

2. **Click on [Property] on the context menu.**
   The [AIS Target INFO] dialog box appears.



3. **Select the track color from the [Track No.] combo box.**
   The selection items are as follows.
   Off, No.1-Color, No.2-Color, No.3-Color, No.4-Color, No.5-Color, No.6-Color, No.7-Color, No.8-Color, No.9-Color, No.10-Color, No.11 to 20-Color
   * In "Color," the track color name set by clicking [View] - [Options] - [Target Track] - [Plot] is displayed. For the details, refer to “9.2.8 Setting up the Display of Other Ship's Track".

6.6.7 Conditions for deciding AIS target to be lost

About an AIS target lost

When the data of a target cannot be received for a specified time, the target is decided to be lost and the target data is deleted. As shown in the table below, the time until target data is deleted varies depending on the class of received data and the target status.

Note

Since the lost time and that of the AIS indicator are different, this equipment may display lost information earlier than the AIS display depending on the target status (speed, navigation status, etc.).

The target of lost target is continuously displayed until Lost Warning is approved.
Since negligence of approval operation may hinder display of a new AIS target, perform approval operation as soon as possible.

Conditions for Deciding Target to be Lost

Target status	Time until data is lost		
	SOLAS ship (Class A)	Non-SOLAS ship (Class B)	
		CS (Carrier Sense)	SO (Self Organizing)
Vessel below 3 kn (Class A) or 2 kn (Class B) and it is now at anchor or on the berth	18 min	18 min	
Vessel of 3 kn or more and it is now at anchor or on the berth	60 sec	18 min	
Vessel of 0 to 14 kn (Class B: 2 to 14 knots)	60 sec	180 sec	
Vessel of 0 to 14 kn and it is now changing the course	60 sec	180 sec	
Vessel of 14 to 23 knots	36 sec	180 sec	90 sec
Vessel of 14 to 23 kn and it is now changing the course	36 sec	180 sec	90 sec
Vessel of 23 kn or more	30 sec	180 sec	30 sec
Vessel of 23 kn or more and it is now changing the course	30 sec	180 sec	30 sec
AtoN (Aids to navigation)	18 min	18 min	
SART	6 min	6 min	
AIS-AtoN	6 min	6 min	
AIS SAR aircraft	60 sec	60 sec	
AIS coastal base station	60 sec	60 sec	

Note

When a dangerous target ship is lost, a lost alarm is issued and the symbol changes to a lost symbol. The system calculates the current position from the last-received data and continues displaying the symbol for eternity.

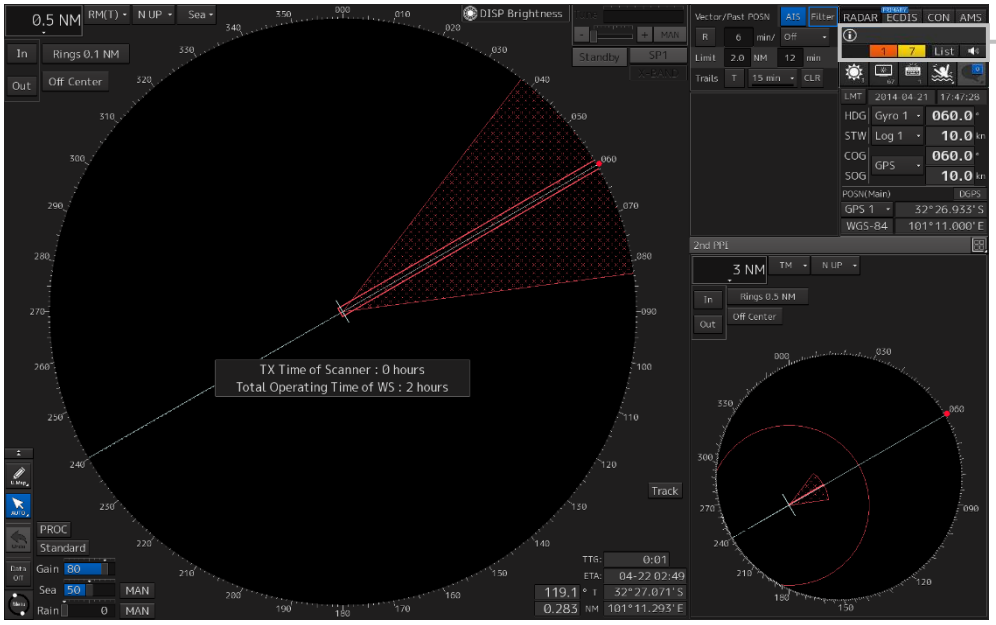
When the [AIS] button in the target ship information window is turned off, the symbol is canceled.

6.7 Alert Display

Target tracking and AIS system have the following alerts.

Message	Description
AIS ACT 95% Capacity	The number of activated AIS targets reached 95% of tolerance.
AIS 95% Capacity	The number of AIS targets reached 95% of tolerance.
CPA/TCPA(AIS)	CPA/TCPA warning (AIS)
Lost(AIS)	The AIS target was lost.
AIS MAX Target	The number of AIS targets reached the maximum number of targets displayed.
New Target(AIS)	The AIS target was acquired and activated.
Not Allowed(TT Out of Range)	Out of TT acquisition range
Trial	Under the trial process. Occurs instead of a danger target alarm when the predicted route of the tracking target intersects with the CPA/TCPA limit range
TT(95% Capacity)	The number of TT targets reached 95% of tolerance.
TT(CPA/TCPA)	CPA/TCPA warning (TT)
TT(Lost)	Acquired TT was lost.
TT(MAX Target)	The number of TT targets reached the maximum number of targets.
TT(New Target)	TT was acquired.
TT(Out of Range)	TT went out of 32NM.
TT(Reference Lost)	The TT reference target was lost.

An alert is displayed in the alert notification area (upper right of the screen).



6.7.1 Danger target alarm (CPA/TCPA)

⚠CAUTION

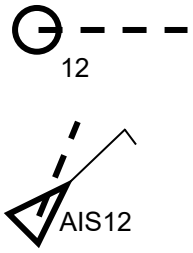
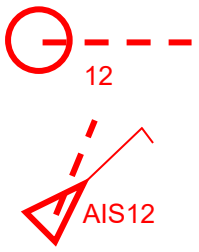
Since these alarms may include some errors depending on the target tracking conditions, the navigation officer himself should make the final decision for ship operations such as collision avoidance.
Making the final navigation decision based only on the alarm may cause accidents such as collisions.

In this system, targets are categorized into two types: tracked targets and dangerous targets depending on the danger level. The danger level can easily be recognized on the display at a glance. So, it is easily possible for the ship operator to judge which target is to be cautious about.

The danger target symbol of the tracked target will be displayed until either the tracking is stopped or the conditions no longer apply.

The types of target and alarm are shown below.

Dangerous Target Alarm

Status	Symbol on display	Alert characters	Alarm sound	Conditions
Tracked target Activated AIS target		(Off)	(Off)	CPA > CPA Limit 0 > TCPA TCPA > TCPA Limit The symbol is displayed when one or more of the above conditions are met.
Dangerous target	 Red blinking	CPA/ TCPA	Beep sound (beep-beep-beep) Alarm acknowledgeable	CPA≤CPA Limit 0≤TCPA≤ TCPA Limit An alarm is issued when all the conditions are met. The sleeping AIS targets will be activated.

CPA Limit and TCPA Limit: Setting Values

6.7.2 Alarm for new target acquired in automatic acquisition guard zone (New target)

⚠CAUTION

In setting an automatic acquisition guard zone, it is necessary to adjust the gain, sea clutter suppression and rain/snow clutter suppression to ensure that target echoes are displayed in the optimum conditions.

No automatic acquisition guard zone alarms will be issued for targets undetected by the radar, and this may cause accidents such as collisions.

The automatic acquisition function sets a zone in a range and issues an alarm when a new target (which is not yet acquired) goes into this zone.
For the setting of an automatic acquisition guard zone, refer to "6.5.1 Acquiring target".

Alarm for New Target Acquired in Automatic Acquisition Guard Zone

Status	Symbol on display	Alert characters	Alarm sound	Conditions
New target in automatic acquisition guard zone	 12 Red Blinking	New Target	Beep sound (beep-beep) Alarm acknowledgeable	The alarm is issued when a new target is acquired in the automatic acquisition guard zone.

Note

When an already acquired target goes into automatic acquisition guard zone, the alarm for the new target acquired in automatic acquisition guard zone does not sound.

6.7.3 Lost target notification (Lost)

Note

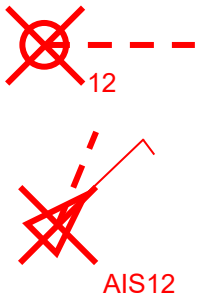
If the gain, sea clutter suppression, rain/snow clutter suppression are not adjusted adequately, the lost target notification may be easily generated. So, such adjustments should be very carefully.

When it is impossible to continue tracking any acquired and tracked target, or the data of AIS target cannot received for a specified time, the [Lost] notification will be issued. The typical causes for alarm are shown below:

- The target echo is very weak.
- The target is hidden by a shore or a large ship and its echo is not received.
- The target echo is blurred by sea clutter or rain/snow clutter.

If a target under tracking goes into a range over 32 NM and can no longer be tracked, it is canceled without a lost target notification being issued.

Lost Target Notification

Status	Symbol on display	Alert characters	Alarm sound	Conditions
Lost target	 Red Blinking	Lost	Beep sound (beep-beep) notification acknowledgeable	The notification will sound once when a lost target symbol is displayed.

6.7.4 Target Tracking function alarm (TT Data)

If some failure occurs in input signals or the processor circuits, an alarm will be issued. If an alarm is issued in the Target Tracking function, [TT(Data)] is displayed in the alarm indication and nothing is displayed in the indication of the target tracking information. Its cause is inferred that the Target Tracking function is malfunctioned. In that case, please consult with our branch office, branch shop, sales office, or our distributor in your district to repair it.

Target Tracking function Alarm

Alert characters	Alarm sound	Condition
TT (Data)	Beep sound (pipi)	If the Target Tracking function has some abnormal condition, this alarm issues.

6.7.5 Gyro set notification (Set Gyro)

The GYRO I/F in this system receives signals from a gyro. Even if the power is turned off, the system will follow up the gyro. However, the system stops the follow-up operation when the power of the master gyro is turned off or when any trouble occurs to the line. When the power of the master gyro is recovered, the [Set Gyro] notification will be issued.
When this notification is issued, set the true bearing value of the gyro. For the details, refer to “5.4.13 True bearing”.

Gyro Set Notification

Alert characters	Alarm sound	Conditions
Set Gyro	Beep sound (pi-)	The signals from the gyro are stopped, but the gyro is recovered.

6.8 Track Function

6.8.1 Setting the Past position

1. **Select the track display interval time from the past position interval selector combo box for other ship information at the upper right of PPI.**

   The past position is set.

   [Off] : Tracks are not displayed.
   [Numeric] : Tracks are displayed at intervals of the specified value.

The past position function can display up to ten past positions of a target under tracking. The past position display interval can be set to specified time intervals of 0.5, 1, 2, or 4 minutes, or specified range intervals of 0.1, 0.2, 0.5, or 1 NM.

When [Off] is displayed, the track display function is turned off.
The track mode operates in conjunction with the vector mode, and a true or relative track is displayed.
In relative vector mode, the relative tracks of the target are displayed.
In true vector mode, true tracks that are calculated from the relative bearing, range, own ship's course, and speed are displayed.

Note

When the target is acquired, past position of traced target is start plot. When the AIS target is displayed, past position of AIS target is start plot. If the past position plotted time or range is short, the indicated past position duration may not have achieved the specified time or range.

6.8.2 Setting the other ship's tracks

This function makes settings for the tracks of tracked targets and AIS targets.
This equipment can display the tracks of up to 20 target ships.

6.8.2.1 Setting track color

For the details on how to set the track color of tracked target, refer to "6.5.6.2 Setting track color of tracked target"
For the details on how to set the track color of AIS target, refer to "6.6.6.1 Setting track color of AIS target".

6.8.2.2 Turning on/off other ship's track function

For the details, refer to “11.10 Setting the Target Track Function to ON/OFF".

Note
Note that when this function is turned off, all the other ship's track functions are turned off. In this case, the track data of other ships is not saved, so they cannot be traced later.

6.8.2.3 Setting other ship's track colors

You can set either one track color for all targets under tracking, or individual colors for the ships of track numbers from 1st to 10th. The same color is used to display the 11th to 20th ships.
For the details, refer to “9.1.3 Setting up the display of Other Ship’s Track".

Note
If the other ship's track function (Target Track Function) is turned off, the track data of other ships is not saved.

6.8.2.4 Turning on/off other ship's track display

The target track display function can be turned on/off. Choices for track display are displaying/hiding the tracks of all ships and Individual (displaying the tracks of individual ships).
For the details, refer to “9.1.3 Setting up the display of Other Ship’s Track".

Note
Even when Target Track Display is turned off, the track data of other ships is saved if Track display Interval is set.

6.8.2.5 Setting up the display interval of other ship’s track

A display interval of other ship’s track can be set.

For the details, refer to “9.1.3 Setting up the display of Other Ship’s Track".

Note

This function is not available when the Target Track Function is turned off.

6.8.2.6 Clearing other ship's track

The other ship's track can be cleared by setting a color or a track number.

For the details, refer to “9.1.3 Setting up the display of Other Ship’s Track".

6.8.2.7 Saving and loading other ship's track data

Other ship's track data can be saved on HDD and load from the HDD.

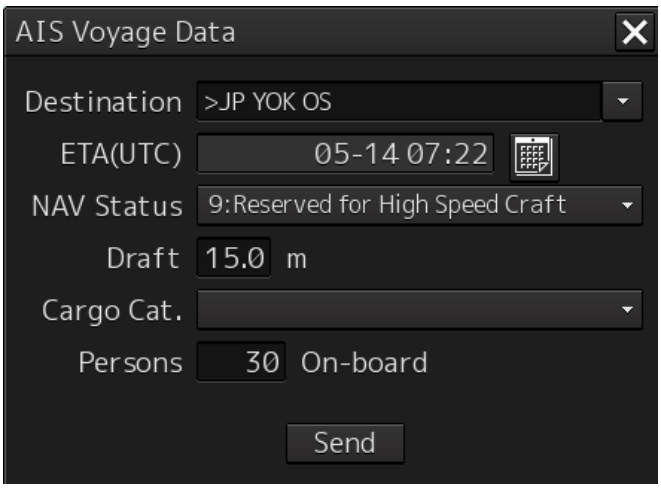
(Data can be saved to HDD until the data volume becomes full.)

For the details, refer to "3.20.2 File management".

6.9 Entering Own Ship's AIS Voyage Data

Set the own ship's AIS voyage data.

1. **Click on the [Menu] button on the left toolbar.**
   The menu is displayed.
2. **Click on [TT/AIS] - [AIS Voyage Data] on the menu.**
   The [AIS Voyage Data] dialog box appears.



   In the [AIS Voyage Data] dialog box, information collected from AIS is displayed.
3. **Enter information manually if not being displayed, or change the information being displayed.**

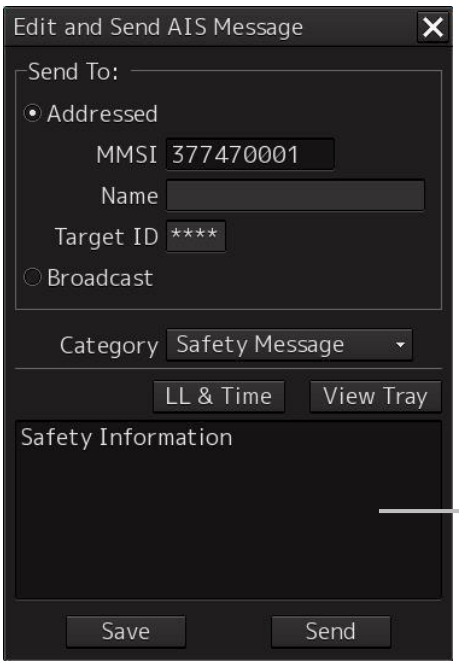
Item	Setting
Destination	Enter the destination in the [Destination] input box (maximum 20 characters), or display the history list and click on the destination to enter.
ETA (UTC)	Click on the calendar icon to display the date picker, and enter the expected date (and time) of arrival by clicking.
NAV Status	Select the [Navigation Status] from the combo box. For the details of Navigation Status, refer to "6.6.4 Displaying AIS information".
Draft	Enter the draft in the [Draft] input box in the range between 0 and 25.5 m. The draft can be entered in increments of 0.1 m. If the draft is more than 25.5 m, enter 25.5 m.
Cargo category	Select the cargo category from the combo box.
Persons on-board	Enter the number of persons on board in the [Persons on-board] input box in the range between 0 and 8191. If the number of persons on board is more than 8191 persons, enter 8191.

4. **Click on the [Send] button to save the input information.**

6.10 Editing and Sending AIS Messages

AIS messages can be edited and sent.

1. **Click on the [Menu] button on the left toolbar.**
   The menu is displayed.
2. **Click on [TT/AIS] - [Edit and Send AIS Message] on the menu.**
   The [Edit and Send AIS Message] dialog box appears.



3. **Specify whether a message will be sent by specifying an MMSI code or distributing a broadcast message.**
   For the details, refer to "To send a message by specifying an MMSI code:" and "To distribute a broadcast message:".
4. **Display the [Message Category] list and select the type of the message to send.**

   To send a safety related message: Click on [Safety Message].

   To send a routine message: Click on [Routine Message].
5. **Type a message in the message input area.**

   To automatically enter own ship's latitude/longitude/UTC:
   Click on the [LL&Time] (latitude/longitude/time) button.

   To copy an existing message: Click on the [View Tray] button to display the contents of the AIS Message Tray. Select the message to copy to display it, and then copy it. The message can be copied from the beginning up to the maximum number of characters.

Note

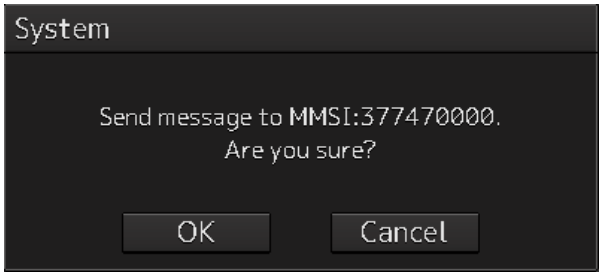
The maximum number of characters that can be input changes depending on the transmission method and the message type.

- Sending a message by specifying the MMSI code
  - Safety message: Up to 156 characters
  - Routine message: Up to 151 characters
- Distributing a broadcast message
  - Safety message: Up to 161 characters
  - Routine message: Up to 156 characters

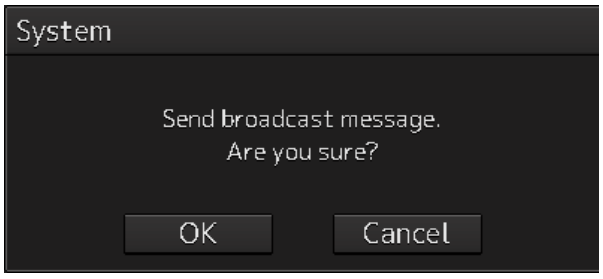
6. **Click on the [Send] button to send the message.**

   The message transmission confirmation dialog box appears.

When sending a message by specifying an MMSI code:



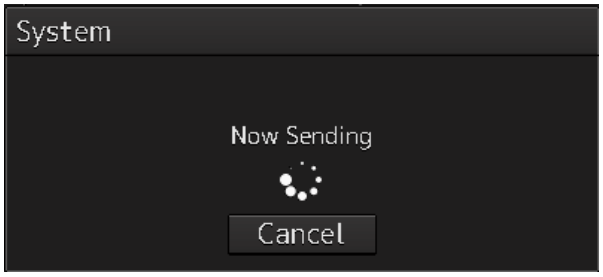
When distributing a broadcast message:



7. **Click on the [OK] button to send the message.**

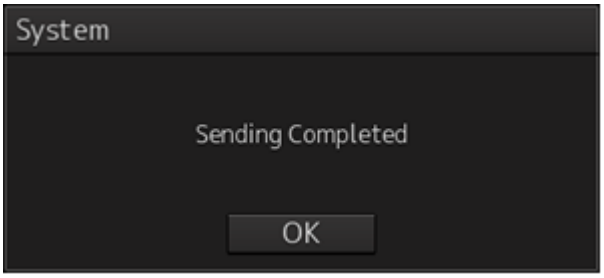
   To cancel the transmission of the message, click on the [Cancel] button.

   The following dialog box appears while sending a message.



The transmission of the message currently in progress can be stopped by clicking the [Cancel] button.

The following dialog box appears when the transmission of a message completes.



8. **Click on the [OK] button to close the dialog box.**

To save an MMSI code and a typed message in the case of MMSI transmission, click on the [Save] button.

9. **Click on the [x] button to close the dialog box.**

To send a message by specifying an MMSI code:

1. **Click on the [Addressed MMSI] (specified MMSI code) button.**
2. **Type an MMSI code (9 digits) in the [MMSI] input box.**
   The name of the ship having the entered MMSI code is displayed in the [Name] box.
   The identification number is displayed in the [Target ID] box.
3. **Type a message in the message input area.**
   In the case of a safety related message: Maximum 156 characters
   In the case of a routine message: Maximum 151 characters

To distribute a broadcast message:

1. **Click on the [Broadcast] button.**
2. **Type a message in the message input area.**
   In the case of a safety related message: Maximum 161 characters
   In the case of a routine message: Maximum 156 characters

6.11 AIS Message Tray

The received, sent and saved AIS messages are displayed in AIS Message Tray in a list form.

Memo

The information reference window such as AIS message tray can be switched to standard window display or extended window display.

In this example, extended window display is used.

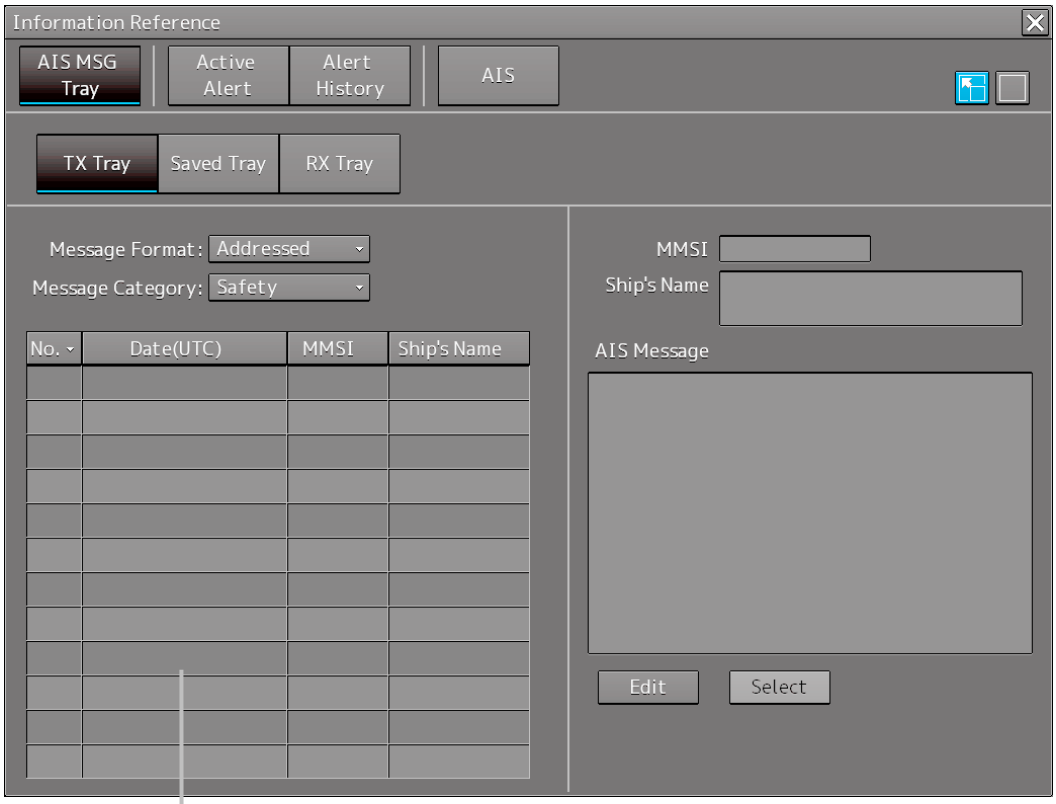
For the details of switching between standard window display and extended window display, refer to "2.3.2.1 Switching between a standard window and an extended window".

6.11.1 Displaying the AIS message tray

1. **Click on the [Menu] button on the left toolbar.**
   The menu is displayed.
2. **Click on [TT/AIS] - [AIS Message Tray] on the menu.**
   The "Information Reference" window appears.
3. **Click on the [AIS MSG Tray] button.**
   The AIS Message Tray is displayed.

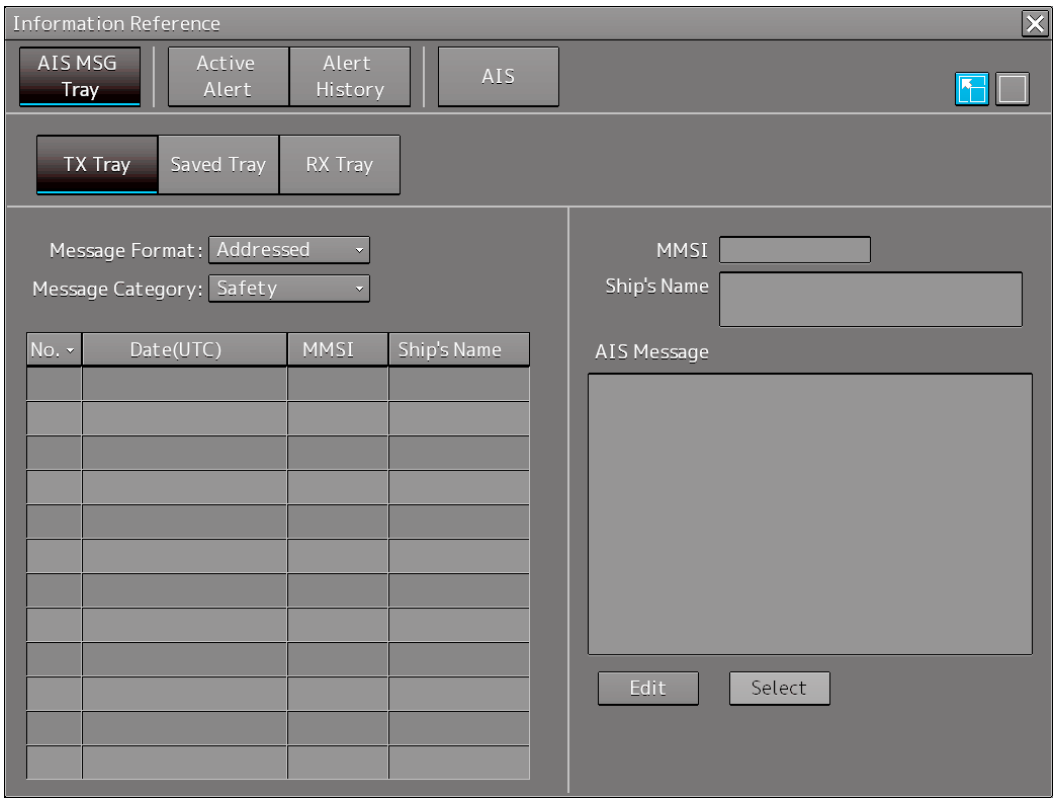
Memo

The AIS message tray can also be displayed by clicking on the [View Tray] button in the [Edit and Send AIS Message] dialog.



Up to 50 most recent messages are displayed in the message list, from the newest date first. When the 51st message is registered, the message having the oldest date will automatically be deleted.
By clicking any item of the title columns, messages can be sorted in ascending or descending order.
When a message is clicked in the message list, the detailed information of that message will be displayed in the right area of the list.

6.11.2 Switching message display



To display transmitted messages:

Click on the [TX Tray] (Transmitted Tray) button.

To display saved messages:

Click on the [Saved Tray] button.

To display received messages:

Click on the [RX Tray] (Received Tray) button.

Unread messages are displayed in boldface.

To filter messages by specifying the transmission method:

To display only messages sent/received by specifying an MMSI code: Click on the [Addressed] (address specification) button.

To display only messages distributed through broadcasting: Click on the [Broadcast] button.

When messages are not filtered by the transmission method: Click on the [All] (display all) button.

To filter messages by specifying category:

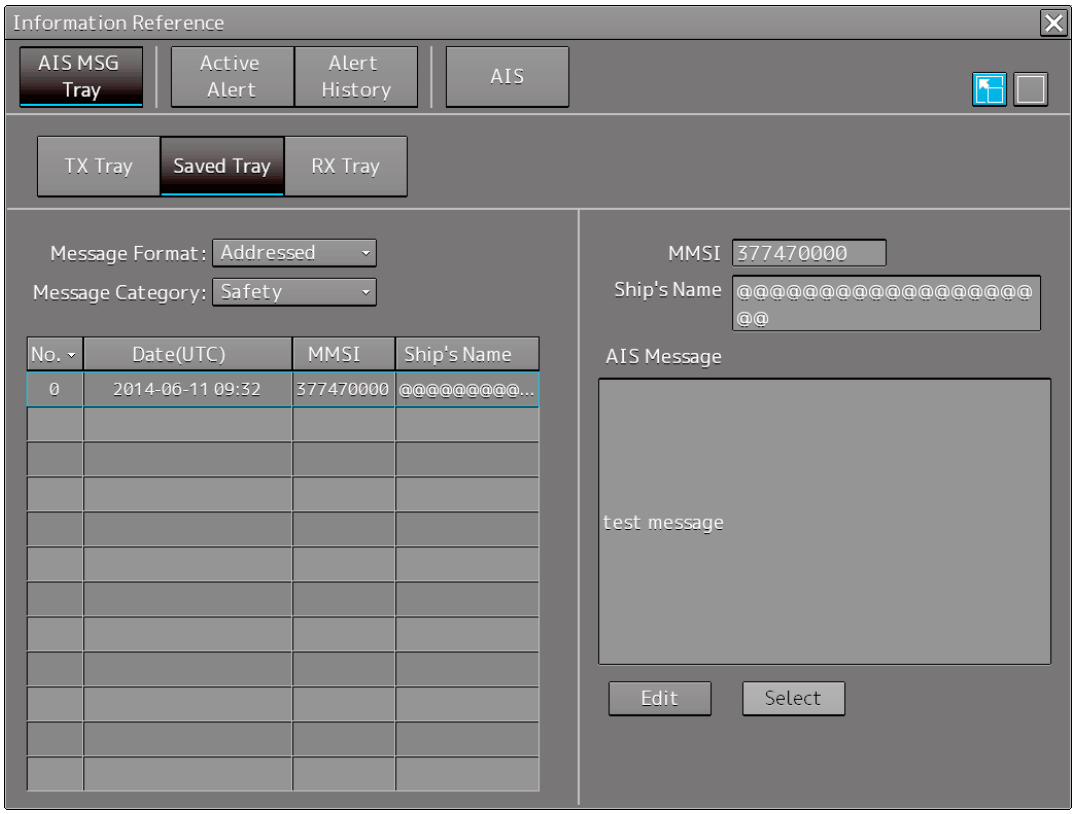
To display only safety related messages: Click on the [Safety] (safety related) button.

To display only routine messages: Click on the [Routine] button.

When messages are not filtered by category: Click on the [All] (display all) button.

6.11.3 Sending a message in the message tray after editing

1 **Click the message to copy in the message list.**



Click on the [Edit] or [Select] button.

When the AIS Message Tray is displayed by opening the AIS Message Tray submenu: Click the [Edit] button.

The [Edit and Send AIS Message] dialog box appears, and the AIS message will be copied to the [Edit and Send AIS Message] dialog box. When a message is sent by specifying an MMSI code, the MMSI code will also be copied:

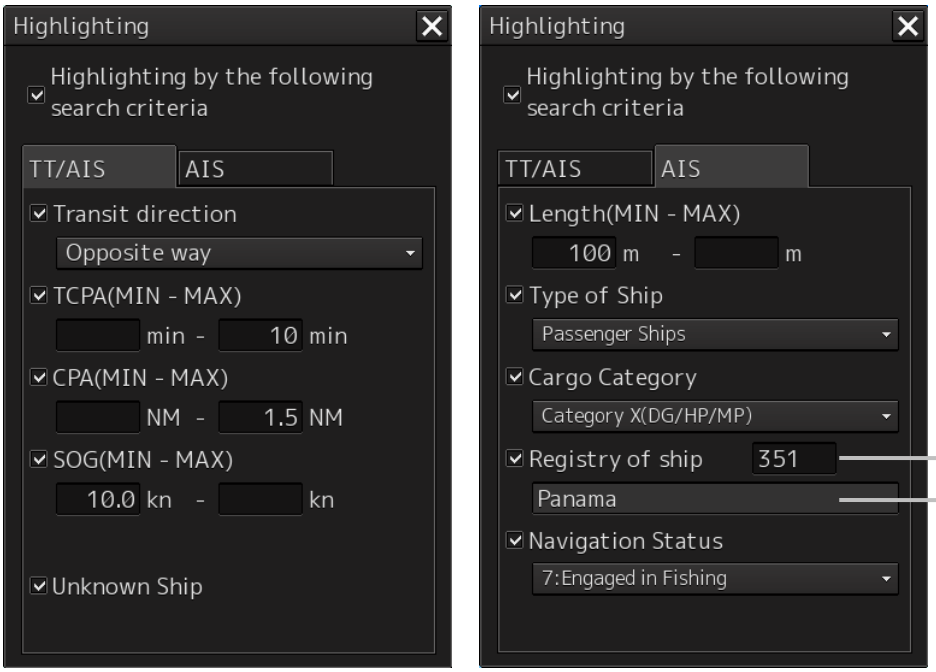
When the AIS Message Tray was displayed by clicking the [View Tray] button in the [Edit and Send AIS Message] dialog box: Click the [Select] button.

The AIS message will be copied to the [Edit and Send AIS Message] dialog box. The MMSI code is not copied by this method.

6.12 Highlighting TT/AIS Symbols

TT/AIS symbols can be searched by specifying criteria and highlight them.

1. **Click on the [Menu] button on the left toolbar.**
   The menu is displayed.
2. **Click on [TT/AIS] - [Highlighting] on the menu.**
   The [Highlighting] dialog box appears.



[TT/AIS] tab [AIS] tab

3. **To include all search criterions as highlight targets, select the [Highlighting by the following search criteria] checkbox.**
   To exclude all search criterions from highlight targets, clear the [Highlighting by the following search criteria] checkbox.
4. **If the [Highlighting by the following search criteria] checkbox is selected in step 3 above, clear the checkboxes of the search criterion to be excluded from highlighting.**

5. **Of the checked search items, specify the search criteria for highlighting.**

[Transit direction]: Select the transit direction from the combo box.

N	Sailing North
NE	Sailing North East
E	Sailing East
SE	Sailing South East
S	Sailing South
SW	Sailing South West
W	Sailing West
NW	Sailing North West
Same way	Same way
Opposite way	Opposite way

Item	Setting
TCPA	Specify the minimum and maximum values in the range between 1 to 99 min.
CPA	Specify the minimum and maximum values in the range between 0.1 to 9.9 NM.
SOG	Specify the minimum and maximum values in the range between 0.0 to 102.2 kn.
Unknown Ship	As a result of conducting association processing using the TT/AIS function, targets that were not identified will be categorized as unknown ships.
Length	Specify the minimum and maximum values in the range between 1.0 to 1022.0 m.
Type of ship	Open the list and click on the type of the ship to be highlighted.
Cargo category	Open the list and click on the cargo category to be highlighted.
Registry of ship	Specify the MMSI MID Code in the range between 200 and 800. The registry of ship corresponding to the entered code is displayed.
Navigation Status	Open the list and select the navigation status to be highlighted.

6.13 Trial Maneuvering

Note

- Trial maneuvering is to simulate own ship's course and speed in the conditions that the course and speed of a target ship are unchanged as they are. The situation is different from any actual ship maneuvering, so set values with large margins to CPA Limit and TCPA Limit.
- During trial, the CPA/TCPA (TT) alarm cannot be approved. To approve the alarm, terminate the trial.

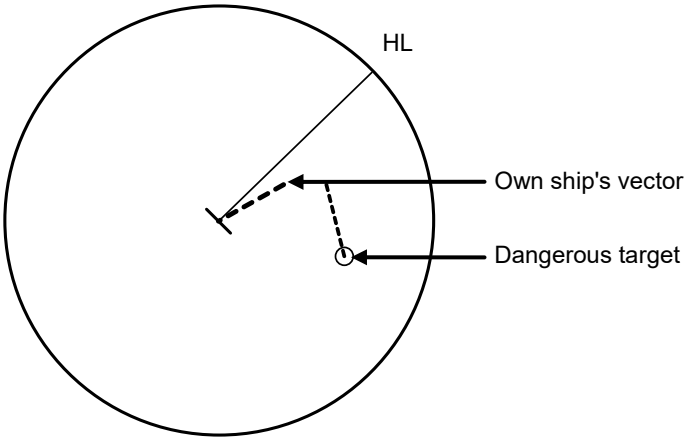
6.13.1 Outline of Trial Maneuvering

The trial maneuvering is the function of simulating own ship's course and speed for collision avoidance when a dangerous target appears. When the own ship's course and speed are entered in manual mode, the trial maneuvering function checks if pre-acquired or pre-activated targets are dangerous.

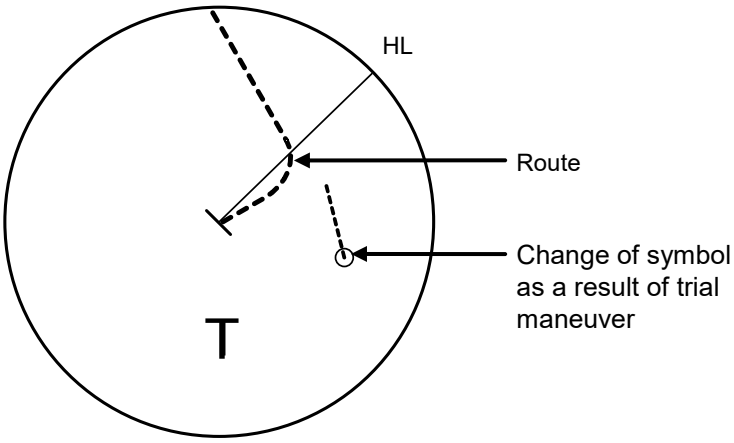
Trial maneuvering in the true vector mode

If the own ship's vector mode is the true vector mode, the own ship's vector is calculated according to the own ship's trial speed and trial course as well as the own ship's dynamic characteristic, and the result is displayed as the own ship's expected course. The following figures show an example of veering to the left: the dangerous target at front right has changed to a safe target as a result of trial maneuver. The tracked target information indicates the current CPA and TCPA values regardless of the result of simulation.

NORMAL



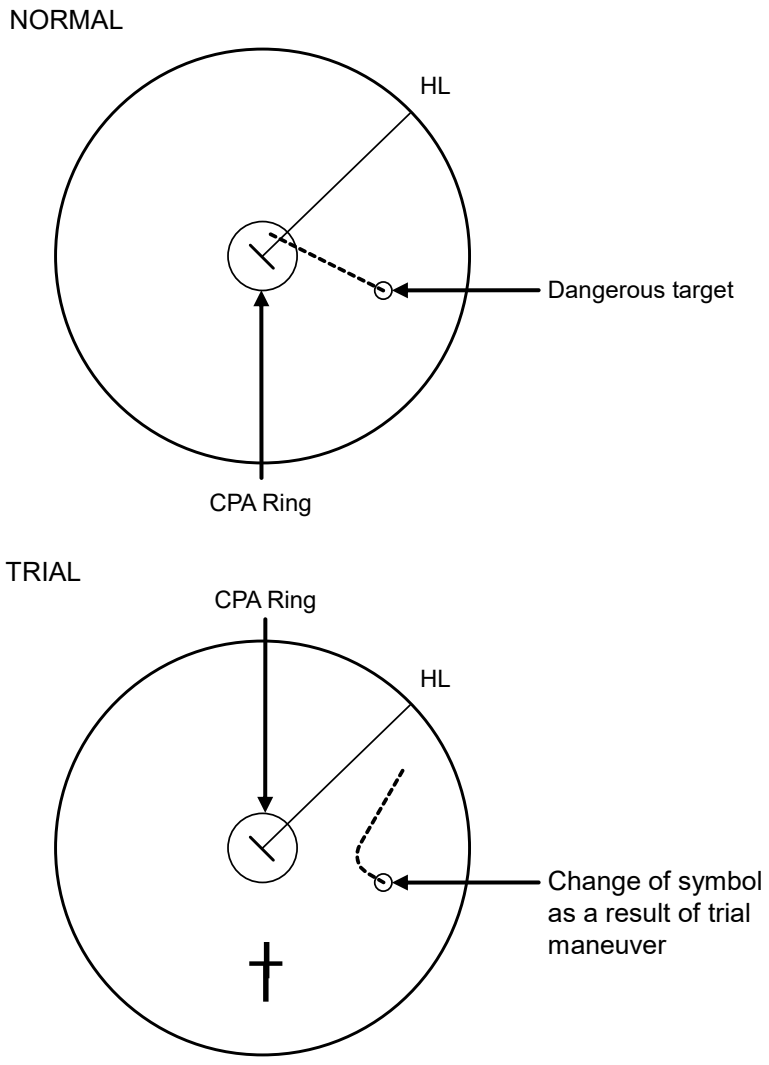
TRIAL



Trial Maneuvering in the True Vector Mode

Trial maneuvering in the relative vector mode

If the own ship's vector mode is the relative vector mode, an expected relative course of the target is displayed in relation to the own ship's expected course when in the true vector mode. The following figures show an example of a dangerous target changing to a safe target. The target vector will cross the CPA ring and will thus be a dangerous target. By trial maneuver of ship avoidance simulation (under the same condition as the true vector in the previous section), the relative vector (expected course) of the target changes to a safe target as shown in the lower figure.



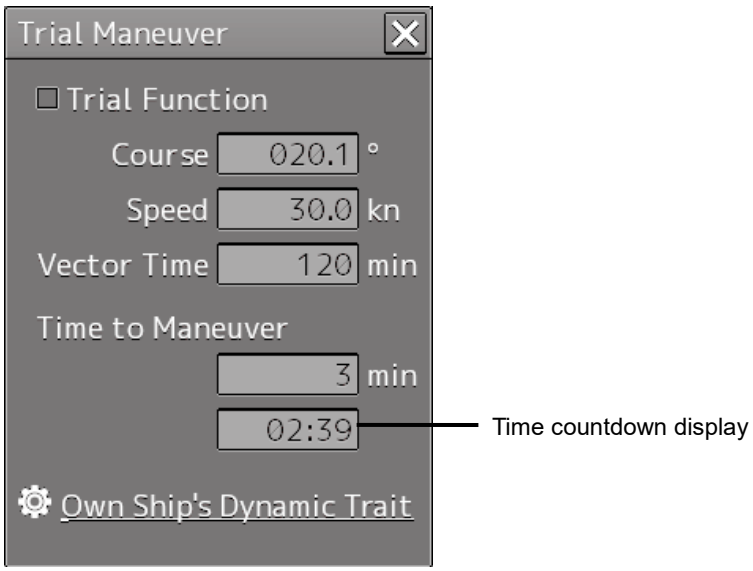
Trial Maneuvering in the Relative Vector Mode

The above figure shows that the relative vector of the target has changed as shown in the Figure as a result of simulation (course and speed) in the previous section, so that the symbol color is changed into "White", a safe target.

Irrespective of the simulation results, the current CPA and TCPA values are shown in the tracked target information just like when the true vector mode is active.
The course change of own ship is displayed as a dotted-line.
Better information is provided by using the trial relative vector mode when sea stabilization mode is active.

6.13.2 Performing a trial maneuver

1. **Click on the [Menu] button on the left toolbar.**
   The menu is displayed.
2. **Click on [TT/AIS] - [Trial Maneuver] on the menu.**
   The [Trial Maneuver] dialog box appears.



3. **Select the [Trial Function] checkbox.**
   The trial function is turned on.

   When Trial Function is set to On, the character "T" blinks at the bottom of the own ship display field in the radar display and means a trial maneuver.
4. **Enter a setting value in each of the [Course] and [Speed] input boxes.**

> **Memo**
> [Course] can be set up by turning the [EBL] dial and [Speed] by turning the [VRM] dial.

5. **Set other characteristics.**
   [Vector Time]: Vector time (1 to 120 min)
   [Time to Maneuver]: Time until trial maneuvering is started (0 to 30 min)
   [Own Ship's Dynamic Trait]:
   When this item is clicked, the dialog is displayed to set own ship's dynamic trait.
   For the details, refer to “11.8 Setting own ship's dynamic trait".

   For the settings of [Own Ship's Dynamic Trait], refer to “11.5.2 Setting own ship's dynamic trait".
   The dangerous target symbol is displayed in red and the safe target symbol is displayed in white. The color of the safe target symbol can be changed with [Target Symbol] of [Settings] - [General] - [Color and Brightness]. For the details, refer to “11.19 Setting Colors and Brightness".

Vector Time is valid only when Trial Function is set to On. If it is Off, the vector time before trial maneuvering is displayed.
Time until the start of trial maneuvering is counted down directly after the input.
The acceleration and deceleration are influenced depending on the relationship between the current speed and the input speed for trial maneuvering.
If 0.0 kn/min is set for [Acceleration] when the speed for trial maneuvering is faster than the current speed, or for [Deceleration] when the speed for trial maneuvering is slower than the current speed, the system performs simulation on the assumption that the speed is changed directly after the time set for [Time to Maneuver].

To finish trial operation:

1. **Clear the [Trial Function] checkbox.**

6.14 Displaying the TT/AIS Target List

The information of targets being monitored with the TT and AIS functions can be displayed in a list on the information monitoring window.

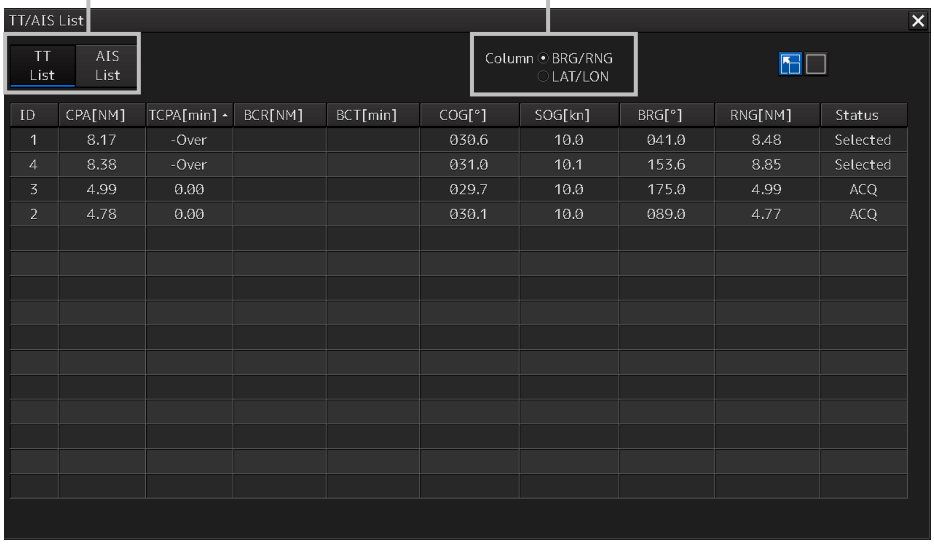
6.14.1 Displaying TT/AIS List

Take the following steps to display the TT list and AIS list.

1. **Click on the [Menu] button on the left toolbar.**
   The menu is displayed.
2. **Click on [TT/AIS] - [TT/AIS List] on the menu.**
   The "TT/AIS" list is displayed in the information monitoring window.

- In RADAR, the [TT List] button is displayed. Clicking on the button displays TT information.
- Clicking on the [AIS List] button displays AIS information.

When [BRG/RNG] is clicked, the Bearing and Range of the target from the own ship are displayed as the other ship's position in the row of the list.



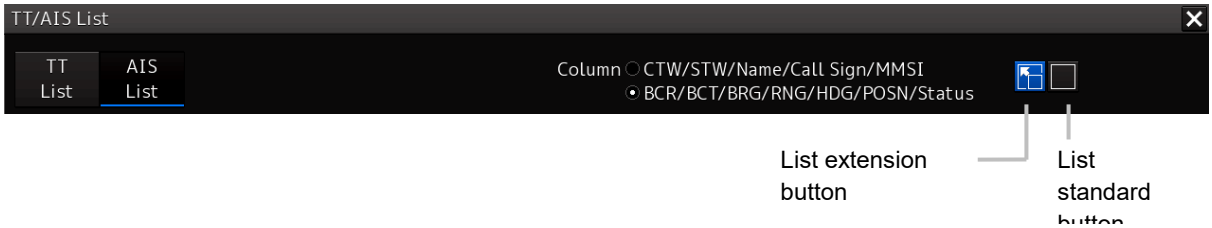
ID	CPA[NM]	TCPA[min]	BCR[NM]	BCT[min]	COG[°]	SOG[kn]	BRG[°]	RNG[NM]	Status
1	8.17	-Over			030.6	10.0	041.0	8.48	Selected
4	8.38	-Over			031.0	10.1	153.6	8.85	Selected
3	4.99	0.00			029.7	10.0	175.0	4.99	ACQ
2	4.78	0.00			030.1	10.0	089.0	4.77	ACQ

6.14.1.1 Switching between a standard window and an extended window

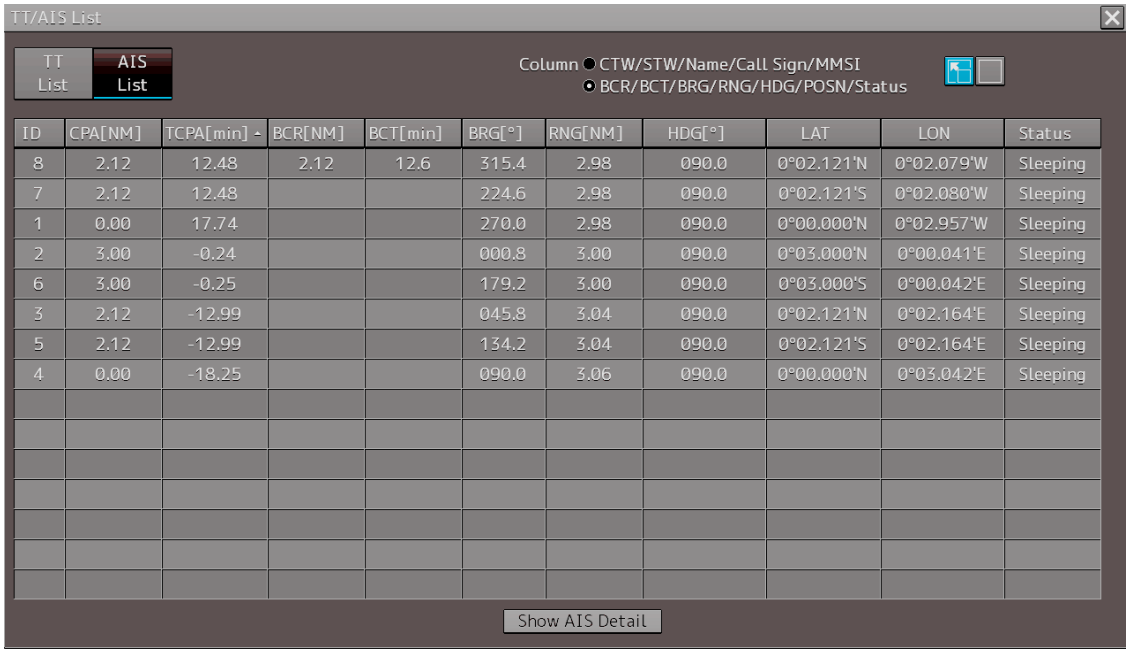
The TT/AIS list can be switched to a standard window or an extended window.

To switch to an extended window, click on the List extension button.

To switch to a standard window, click on the List Standard button.

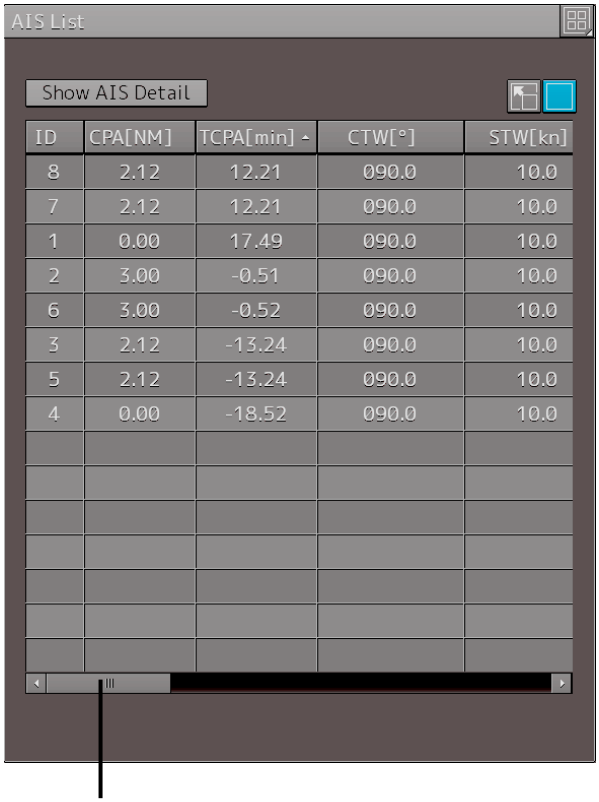


[Example of Extended window]



ID	CPA[NM]	TCPA[min]	BCR[NM]	BCT[min]	BRG[°]	RNG[NM]	HDG[°]	LAT	LON	Status
8	2.12	12.48	2.12	12.6	315.4	2.98	090.0	0°02.121'N	0°02.079'W	Sleeping
7	2.12	12.48			224.6	2.98	090.0	0°02.121'S	0°02.080'W	Sleeping
1	0.00	17.74			270.0	2.98	090.0	0°00.000'N	0°02.957'W	Sleeping
2	3.00	-0.24			000.8	3.00	090.0	0°03.000'N	0°00.041'E	Sleeping
6	3.00	-0.25			179.2	3.00	090.0	0°03.000'S	0°00.042'E	Sleeping
3	2.12	-12.99			045.8	3.04	090.0	0°02.121'N	0°02.164'E	Sleeping
5	2.12	-12.99			134.2	3.04	090.0	0°02.121'S	0°02.164'E	Sleeping
4	0.00	-18.25			090.0	3.06	090.0	0°00.000'N	0°03.042'E	Sleeping

[Example of standard window]



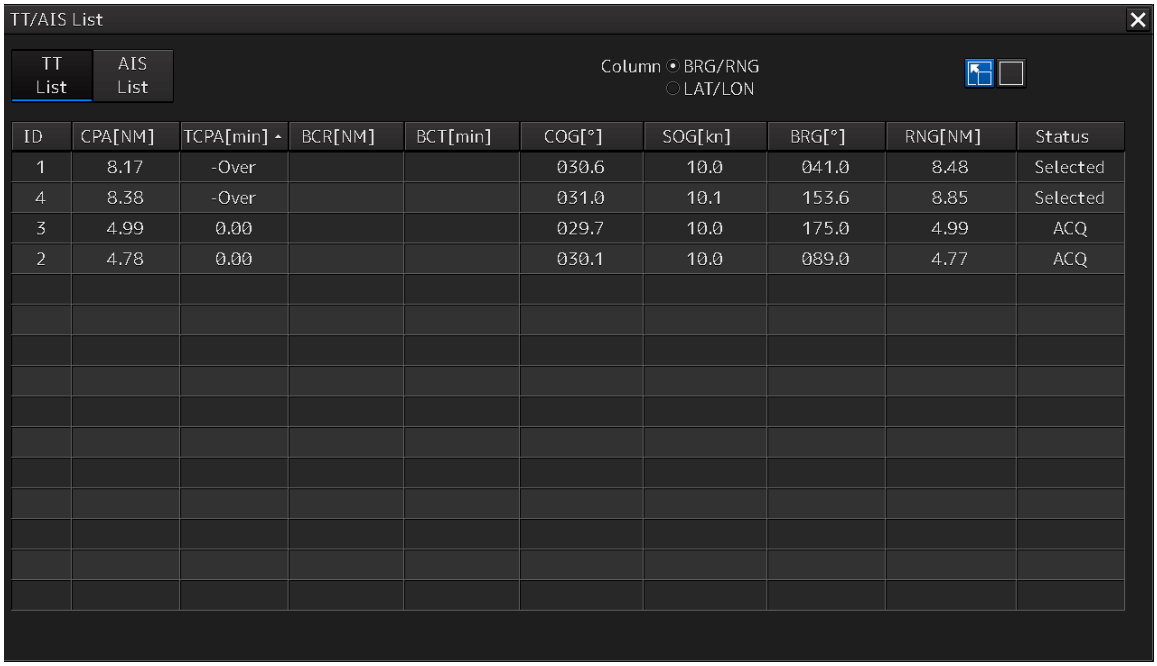
By dragging the scroll bar, the overlapped section can be displayed.

Memo

A standard window is displayed at the initial display.

When the RADAR transmission status is Transmit in RADAR mode, the extended window cannot be displayed.

6.14.2 TT List



ID	CPA[NM]	TCPA[min]	BCR[NM]	BCT[min]	COG[°]	SOG[kn]	BRG[°]	RNG[NM]	Status
1	8.17	-Over			030.6	10.0	041.0	8.48	Selected
4	8.38	-Over			031.0	10.1	153.6	8.85	Selected
3	4.99	0.00			029.7	10.0	175.0	4.99	ACQ
2	4.78	0.00			030.1	10.0	089.0	4.77	ACQ

Display Example

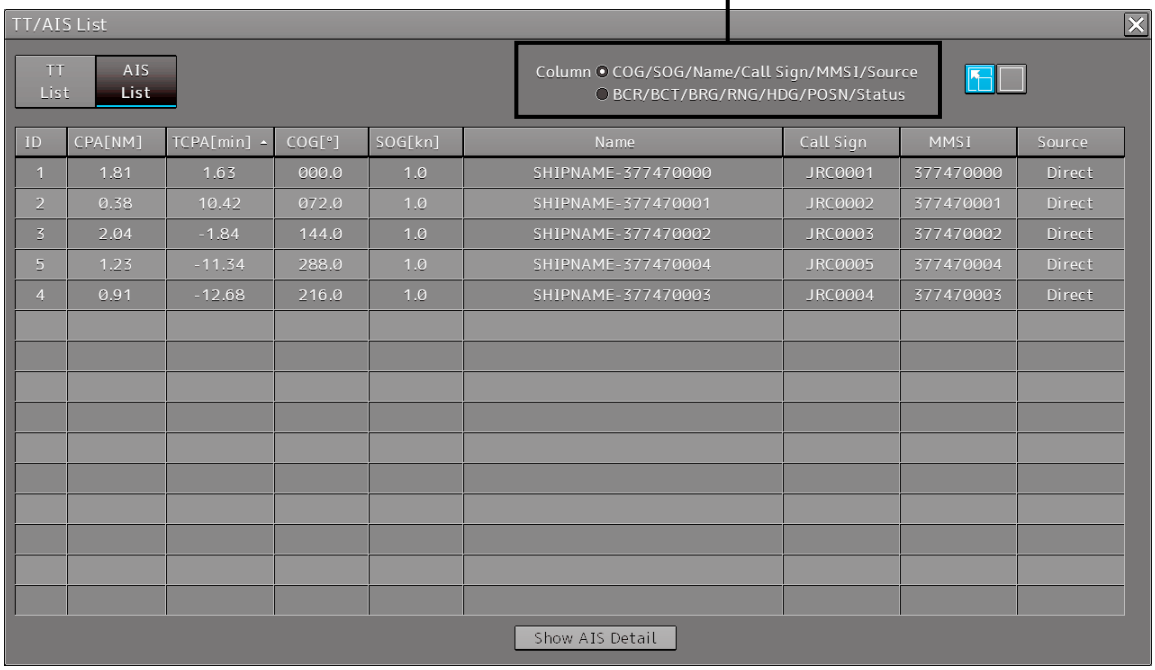
Item	Description
ID	ID No. of tracked target
CPA	Closest approach distance
TCPA	Time up to closest approach distance
BCR	Bow crossing distance
BCT	Bow crossing time
COG or CTW	COG: Course Over the Ground CTW: Course Through Water *In ground mode, COG is displayed. In water mode, CTW is displayed.
SOG or STW	SOG: Speed Over the Ground STW: Speed Through Water *In ground mode, SOG is displayed. In water mode, STW is displayed.
BRG	True direction
RNG	Distance
Lat	Latitude
Lon	Longitude
Status	Status Initial ACQ: Initial acquisition in progress Tracking: Acquisition in progress Lost: Lost status Danger: Dangerous ship

Memo

When the TT list is displayed initially, the items are sorted in the order of TCPA. When the sequence is changed, the items are displayed in the last sort sequence.

6.14.3 AIS List

When [CTW/STW/Name/Call Sign/MMSI/Source] is clicked, CTW, STW, Name, Call Sign, MMSI, and Source are displayed in the rows of list.
When [BCR/BCT/BRG/RNG/HDG/POSN/Status] is clicked, BCR, BCT, Bearing, Range, Heading, Lat, Lon, and Status are displayed in the row of list.



Display Example

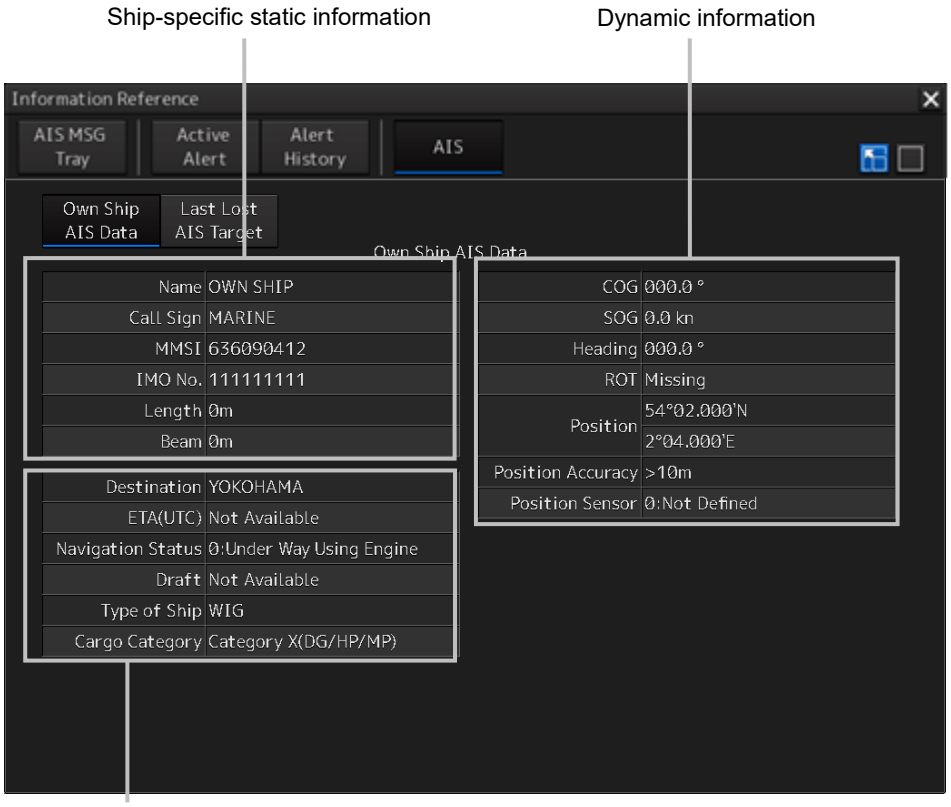
Item	Description
ID	ID No. of AIS
CPA	Closest approach distance
TCPA	Time up to closest approach distance
COG or CTW	COG: Course Over the Ground CTW: Course Through Water *In ground mode, COG is displayed. In water mode, CTW is displayed.
SOG or STW	SOG: Speed Over the Ground STW: Speed Through Water *In ground mode, SOG is displayed. In water mode, STW is displayed.
Name	Ship name
Call Sign	Call sign
MMSI	Maritime Mobile Service Identity

Source	AIS information source - Direct - Repeated - VTS
BCR	Bow crossing distance
BCT	Bow crossing time
BRG	True direction
RNG	Distance
HDG	Heading
Lat	Latitude
Lon	Longitude
Status	Status Sleeping: Sleeping in progress Activated: Activation in progress Lost: Lost status Danger: Dangerous ship
[Show AIS Detail] button	When one item is selected from the list and this button is clicked, AIS detail information is displayed in the information monitoring window. For the details, refer to "2.3.1.4 AIS Detail INFO".

6.15 Confirming Own Ship's AIS Information

Take the following steps to display own ship's AIS information.

1. **Click on the [Menu] button on the left toolbar.**
   The menu is displayed.
2. **Click on [TT/AIS] - [Own Ship AIS Data] on the menu.**
   The "Information Reference" (information monitoring window) is displayed.
3. **Click on the [Own Ship AIS Data] button.**
   Own ship's AIS information is displayed in the information monitoring window.



Memo

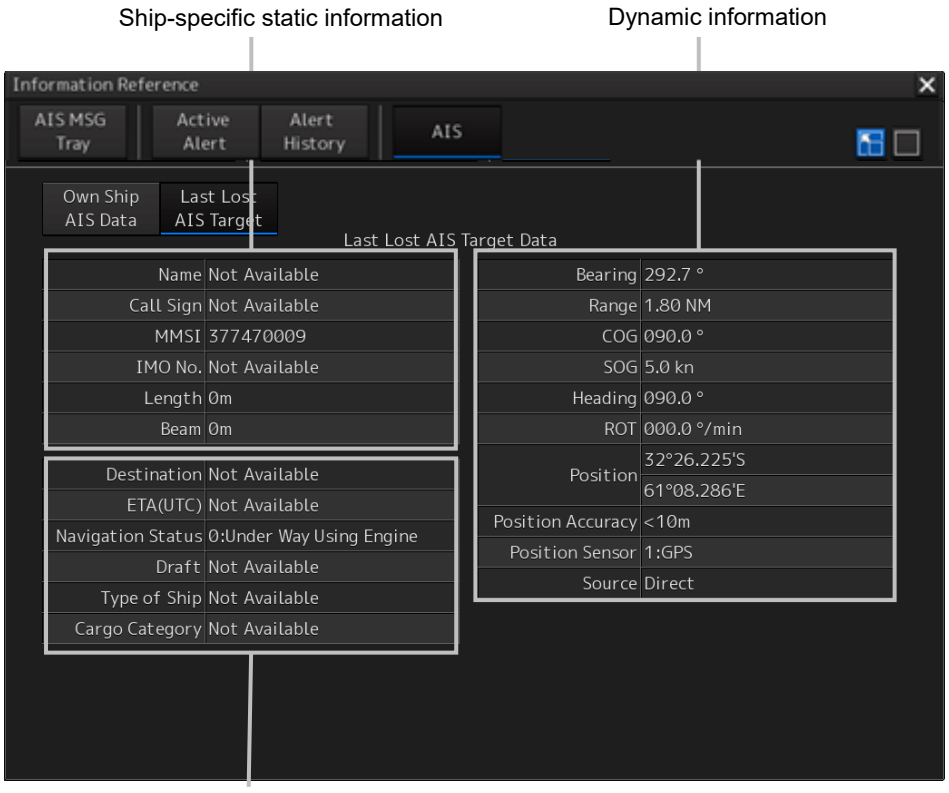
The Information Reference can be switched to standard window display or extended window display.

In the above example, the extended window is used.

For the details of switching between the standard window and the extended window, refer to "2.3.2.1 Switching between a standard window and an extended window".

6.16 Displaying the Last Lost AIS Target

1. **Click on the [Menu] button on the left toolbar.**
   The menu is displayed.
2. **Click on [TT/AIS] - [Last Lost AIS Data] on the menu.**
   The "Information Reference" (information monitoring window) is displayed.
3. **Click on the [Last Lost AIS Target] button.**
   The last lost information about AIS target is displayed in the information monitoring window.



Last Lost AIS Target (last lost information about AIS target)

Displayed information	Explanation
1. Name	2. Displays the ship name of an AIS target.
3. Call Sign	4. Displays a call sign.
5. MMSI	6. Displays a nine-digit identification number for a ship/ground station equipped with a DSC communication device.
7. IMO No.	8. Displays the 9-digit IMO number.
9. Length	10. Displays the length of an AIS target.
11. Beam	12. Displays the beam of an AIS target.
13. Destination	14. Displays the destination of an AIS target.
15. ETA or UTC	16. Displays the expected arrival time of an AIS target.
17. Navigation Status	18. Displays the navigation conditions of an AIS target. 19. 0: Under Way Using Engine 20. 1: At Anchor 21. 2: Not Under Command 22. 3: Restricted Maneuverability 23. 4: Constrained by Her Draft 24. 5: Moored 25. 6: Aground 26. 7: Engaged in Fishing 27. 8: Under Way Sailing 28. 9: Reserved for High Speed Craft 29. 10: Reserved for Wing In Ground 30. 11: Reserved 31. 15: Not Defined
32. Draft	33. Displays the draft of an AIS target.

34. Type of Ship	35. Displays the ship type of an AIS target. 36. 30: Fishing Vessel 37. 31: Towing Vessel 38. 32: Towing Vessel>200MB->25M (Towing and length of the tow exceeds 200m or breadth exceeds 25m) 39. 33: Dredge or Underwater OPE (Engaged in dredging or underwater operation) 40. 34: Vessel-Diving OPE (Engaged in diving operation) 41. 35: Vessel-Military OPE (Engaged in military operation) 42. 36: Sailing Vessel 43. 37: Pleasure Craft 44. 50: Pilot Vessel 45. 51: Search and Rescue Vessels 46. 52: Tugs 47. 53: Port Tenders 48. 54: With Anti-Pollution Equip(Vessels with anti-pollution facilities or equipment) 49. 55: Law Enforcement Vessels 50. 58: Medical Transports 51. 59: Resolution No18:MOB-83(Ships according to Resolution No18(Mob-83)) 52. 2X: WIG(Wing-in-Ground Effect Craft) 53. 4X: High Speed Craft 54. 6X: Passenger Ships 55. 7X: Cargo Ships 56. 8X: Tanker 57. 9X: Other Type of Ship
58. Cargo Category	59. When the setting of the type of a ship is 60. 2X, 4X, 6X, 7X, 8X or 9X, the digit shown at the end of the code represents the cargo/condition. 61. X1 Category X(DG/HP/MP) 62. X2 Category Y(DG/HP/MP) 63. X3 Category Z(DG/HP/MP) 64. X4 Category OS(DG/HP/MP) 65. X9 No Additional Information 66. X0 All Ships of This Type
67. Bearing	68. Displays the bearing of an AIS target.
69. Range	70. Displays the distance to an AIS target.
71. COG or CTW	72. Displays the course of an AIS target. Displayed as "COG" in the course over the ground mode and "CTW" in the course through the water mode.

73. SOG or STW	74. Displays the ship speed of an AIS target. Displayed as "SOG" in the speed over the ground mode and "STW" in the speed through the water mode.
75. Heading	76. Displays the heading of an AIS target.
77. ROT	78. Displays the turning speed of an AIS target.
79. Position	80. Displays the position of an AIS target.
81. Position Accuracy	82. When the position-fix accuracy of an AIS target is low, [>10m] is displayed. 83. When the position-fix accuracy of an AIS target is high, [<10m] is displayed.
84. Position Sensor	85. Displays the type of the position sensor used by an AIS target. 86. 0: Not Defined 87. 1: GPS 88. 2: GLONASS 89. 3: Combined GPS/GLONASS 90. 4: Loran-C 91. 5: Chayka 92. 6: Integrated Navigation System 93. 7: Surveyed 94. 8: Galileo 95. 15: Internal GNSS
96. Source	97. AIS information source 98. - Direct 99. - Repeated 100. - VTS

Memo

The Information Reference can be switched to standard window display or extended window display.

In the above example, the extended window is used.

For the details of switching between the standard window and the extended window, refer to "2.3.2.1 Switching between a standard window and an extended window".

7 True and False Echoes on Display

The radar operator has a role of interpreting the radar displays to provide his best aid in maneuvering the ship.

For this purpose, the operator has to observe the radar displays after fully understanding the advantages and disadvantages that the radar has.

For better interpretation of radar display, it is important to gain more experiences by operating the radar equipment in fair weathers and comparing the target ships watched with the naked eyes and their echoes on the radar display.

The radar is mainly used to monitor the courses of own ship and other ships in open seas, to check buoys and other nautical marks when entering a port, to measure own ship's position in the coastal waters relative to the bearings and ranges of the shore or islands using a chart, and to monitor the position and movement of a heavy rain if it appears on the radar display.

Various types of radar display are explained below.

7.1 Radar Wave with the Horizon

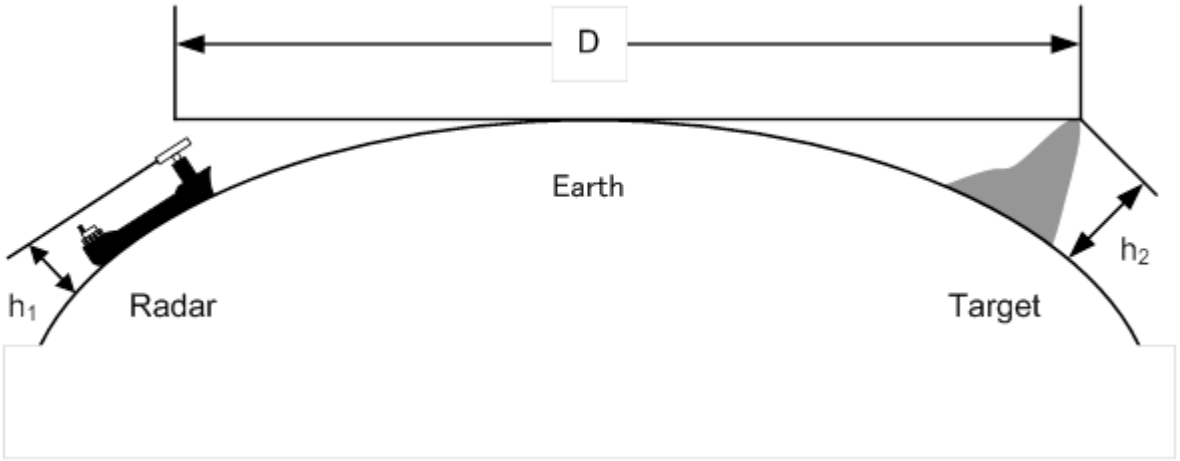
Radar beam radiation has the nature of propagating nearly along the curved surface of the earth. The propagation varies with the property of the air layer through which the radar beam propagates. In the normal propagation, the distance (D) of the radar wave to the horizon is approximately 10% longer than the distance to the optical horizon. The distance (D) is given by the following formula:

$$D = 2.23\left(\sqrt{h_1} + \sqrt{h_2}\right) \sqrt{h1} + \sqrt{h2} \text{(NM)}$$

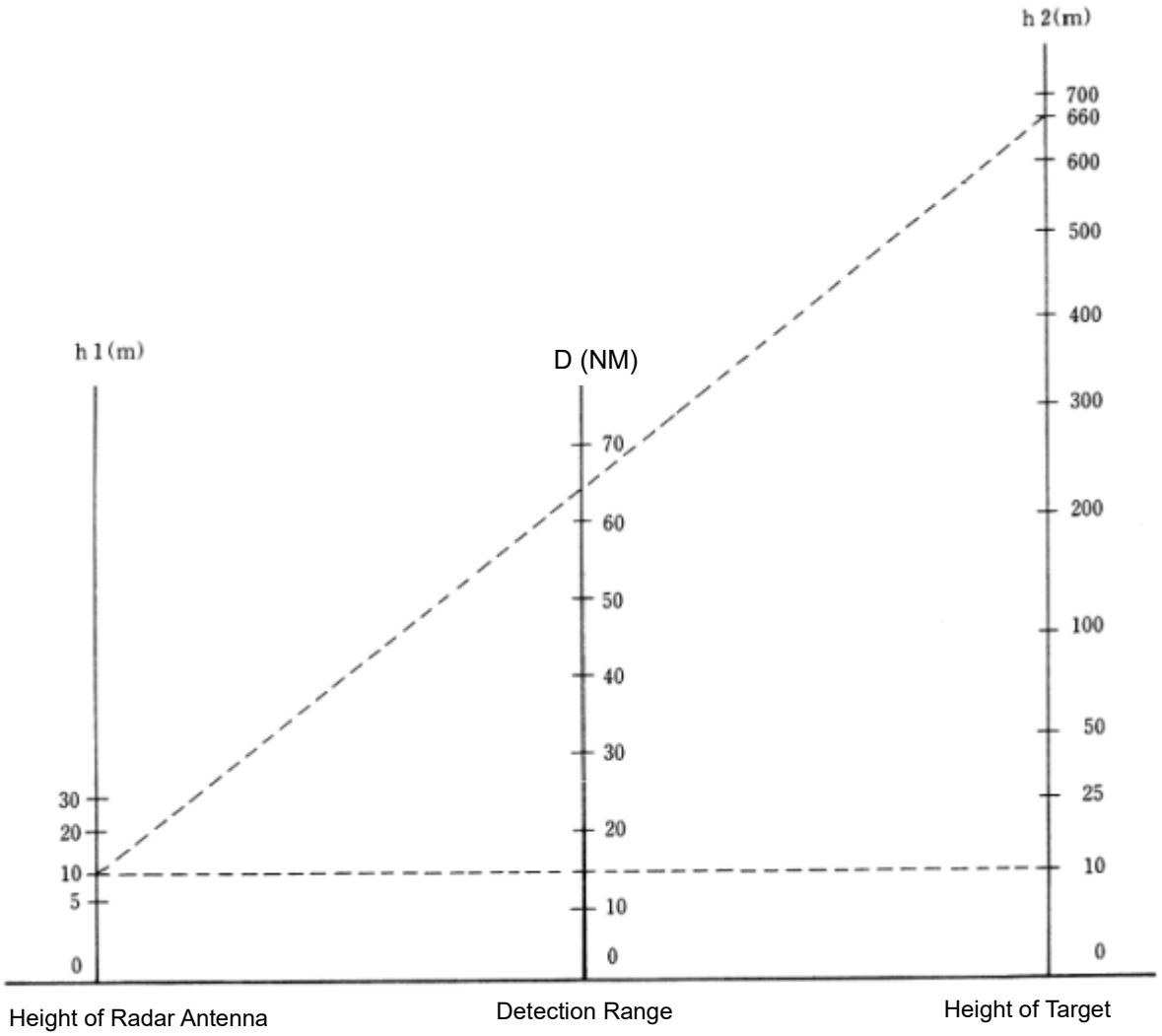
h_1: Height (m) of radar antenna above sea level

h_2: Height (m) of a target above sea level

The following figure illustrates a diagram for determining the maximum detection range of a target that is limited by the curve of the earth surface in the normal propagation.



Radar Wave with the Horizon



Maximum Radar Range

When the height of own ship's radar antenna is 10 m for instance,

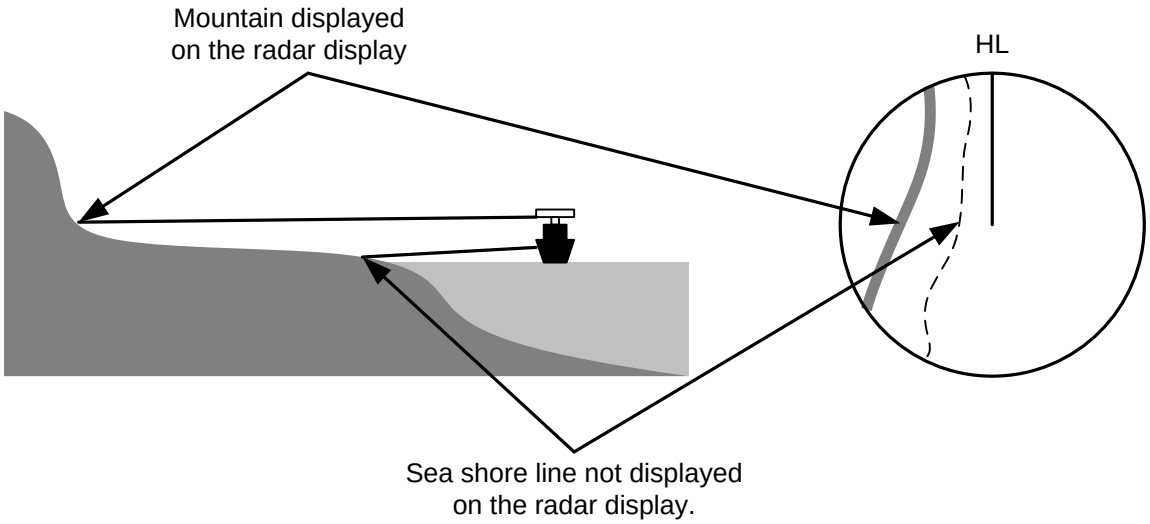
(1) A target that can be detected at the radar range of 64 NM on the radar display is required to have a height of 660 m or more.

(2) If the height of a target is 10 m, the radar range has to be approx. 15 NM.
However, the maximum radar range at which a target can be detected on the radar display depends upon the size of the target and the weather conditions, that is, the radar range may increase or decrease depending upon those conditions.

7.2 Intensity Reflected from the Target

The signal intensity reflected from a target depends not only on the height and size of the target but also on its material and shape. The echo intensity from a higher and larger target is not always higher in general.

In particular, the echo from a coast line is affected by the geographic conditions of the coast. If the coast has a very gentle slope, the echo from a mountain of the inland like the figure below appears on the radar display. Therefore, the distance to the coast line should be measured carefully.



Sea Shore Line Not Displayed on the Radar Display

The next table shows the relation between the target detection range and the radar reflection cross-sectional area (RCS) with regard to the type and the height of the target in a situation in which the weather is good, the sea state is calm and the radio wave propagation is normal. As revealed by this table, even on the same sea shore line, detection range greatly differs depending on the height of the target from the surface of the sea. Furthermore, because the target detection range is greatly influenced by the shape and material of the target and environmental conditions, such as the sea state, weather, and radio wave propagation, caution should be taken when detecting range of target.

Relation between Type and Height of Target and Detection Range and RCS

Type of target	Height from sea surface (m)	Detection range (NM)		RCS (m²)	
		X band	S band	X band	S band
Sea shore line	60	20	20	50,000	50,000
Sea shore line	6	8	8	5,000	5,000
Sea shore line	3	6	6	2,500	2,500
SOLAS target ship (>5000GT)	10	11	11	50,000	30,000
SOLAS target ship (>500GT)	5	8	8	1,800	1,000
Small boat with IMO standard compatible radar reflector	4	5.0	3.7	7.5	0.5
Marine buoy with corner reflector	3.5	4.9	3.6	10	1
Standard marine buoy	3.5	4.6	3.0	5	0.5
10-meter small boat without radar reflector	2	3.4	3.0	2.5	1.4
Waterway location beacon	1	2.0	1.0	1	0.1

Note

Detection range shown in the above table may greatly decrease depending on the shape of the target, sea state, weather and radio wave propagation conditions.

7.3 Sea Clutter and Rain/Snow Clutter

In addition to the echo required for observing ships and land, radar video image also includes undesirable echo, such as reflection from waves on the sea surface and reflection from rain and snow. Reflection from the sea surface is called "sea clutter," and reflection from rain and snow is called "rain and snow clutter," and those spurious waves must be eliminated by the clutter rejection function ([Signal Process]-[Video Noise Rejection] in the Menu. (Refer to “11.3 Performing basic adjustments on the radar".)

7.3.1 Sea clutter

Sea clutter appears as an image radiating outwardly from the center of the radar display and changing depending on the size and the shape of waves. Generally, as waves become larger, image level of the sea clutter is intensified and the clutter far away is also displayed. In this case, it is difficult to distinguish sea clutter from a small boat whose reflection intensity is weak. Accordingly, it is necessary to properly adjust the sea clutter rejection function.
The following tables show the relation between the sea state (SS) showing the size of waves generated by wind and the radar's detection probability.

Sea State and Probability of Target Detection

RCS	SS1 to 2	SS2 to 3	SS3 to 4	SS4 to 5
0.1 m^2	V	V-M	M-NV	
0.5 m^2	V	V	V-M	M-NV
1 m^2	V	V	V	V-M

S band radar (probability to detect a target at a range of 0.4 NM)

RCS	SS1 to 2	SS2 to 3	SS3 to 4	SS4 to 5
1m^2	V-M	M-NV		
5 m^2	V	V-M	M-NV	
10 m^2	V	V	V	V-M

X band radar (probability to detect a target at a range of 0.7 NM)

V: Detection probability of 80 %
M: Detection probability of 50 %
NV: Detection probability of less than 50 %

As shown in the following table, the number of SS increases as the wind speed becomes high and the waves become large. The tables in the previous page show that detection probability decreases from V (80 %) to NV (less than 50 %) as the number of SS increases. Therefore, even if the sea state is calm and a target clearly appears on the radar display, when the sea state becomes rough, target detection probability decreases resulting in difficulty of target detection by the radar.

Relation between Douglas Sea State and Average Wind Speed and Significant Wave Height

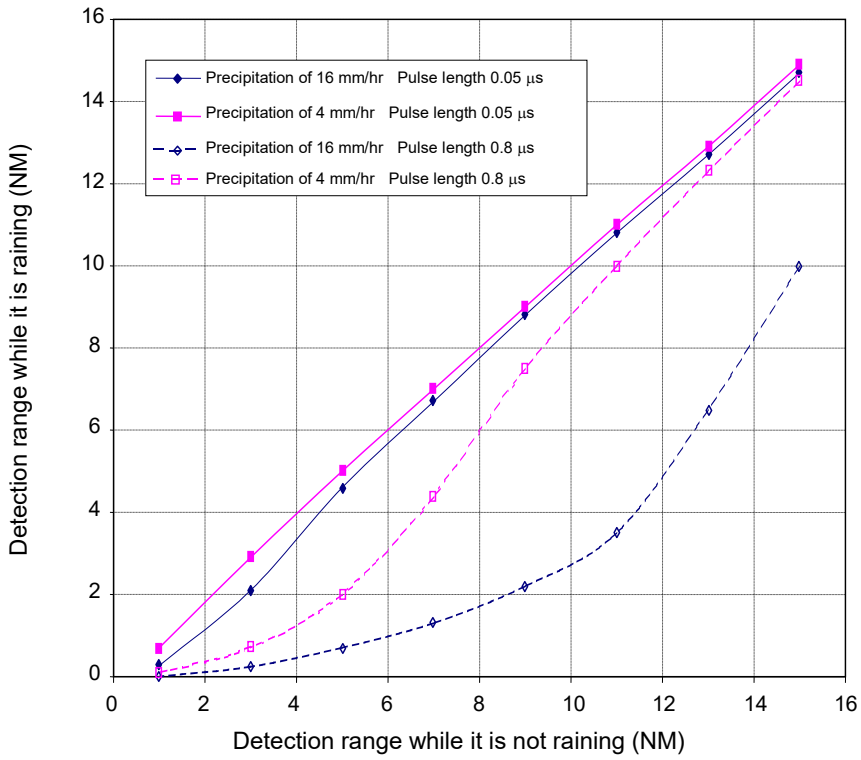
Sea state	Average wind speed (kn)	Significant wave height (m)
0	<4	<0.2
1	5-7	0.6
2	7-11	0.9
3	12-16	1.2
4	17-19	2.0
5	20-25	3.0
6	26-33	4.0

Significant wave height: an average of top N/3 higher waves when the number of waves detected within a constant time duration is N

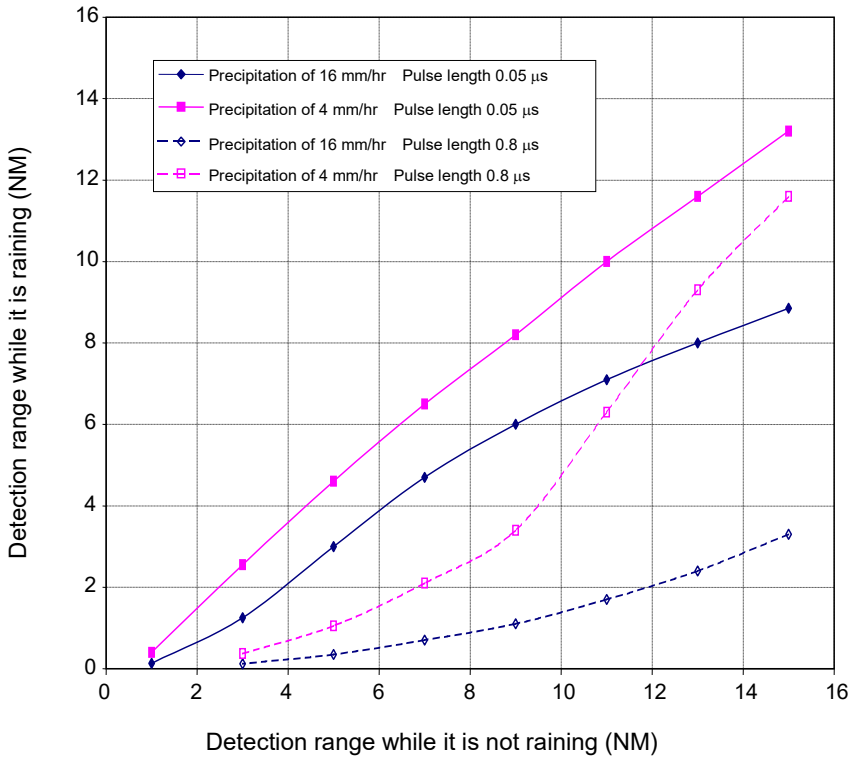
For example, in the case of a standard marine buoy, RCS of X band radar is 5 m^2 as shown in the Table “Relation between Type and Height of Target and Detection Range and RCS” on Page 7-4. When observing such a target in the sea state (SS3) in which significant wave height exceeds 1.2 meters, detection probability is M-NV, as shown in the Table on page 7-5, which indicates 50 % or less.

7.3.2 Rain and snow clutter

Rain and snow clutter is a video image that appears in a location where rain or snow is falling. The image changes according to the amount of rain (or the amount of snowfall). As precipitation increases, the image of rain and snow clutter becomes intensified on the radar display, and in the case of localized heavy rain, an image similar to the image indicating land is displayed in some cases. Furthermore, because radio waves tend to attenuate due to rain and snow, the ability to detect a target in the rain and snow clutter or a target beyond the rain and snow clutter may decrease. The amount of attenuation depends on the transmission frequency, antenna beam width, and the pulse length. The following 2 graphs show examples in which detection range is reduced due to the influence of precipitation. Because of this, a target, which clearly appeared up to 10 NM by an X band radar (pulse length of 0.8 μs) when it was not raining, may become dimly visible up to 5 NM when the amount of rain becomes 4 mm/hr. Furthermore, when comparing the X band radar with the S band radar, target detection range decreases less when an S band radar is used, which means it is influenced less by precipitation.



Decreased Target Detection Range by S Band Radar due to Precipitation



Decreased Target Detection Range by X Band Radar due to Precipitation

Note

Under rain, the targets that enter within sea clutter may be more difficult to detect.

7.3.3 Coping with sea clutter and rain/snow clutter

When the weather is bad and the ocean is rough, the use of an S band radar is effective because the radar is not influenced by sea clutter so much and attenuation due to rain drops is small. When an X band radar is used, reducing the pulse length will reduce the influence by undesired signal, and also the undesired signal rejection function effectively works; therefore, the use of short pulse is effective when the weather is bad. The effect of undesired signal control can be enhanced further by setting the various items on the dialog box that is displayed by clicking the RADAR signal processing setting button.

By using the observation scene selection function that is described above, a suitable setting value can be retrieved according to various conditions such as weather (in the case of storm it is recommended to set a value for Storm or Rain).

For the description of the observation scene button, refer to "5.3.7 Adjusting to optimal images (Selection of observation scenes)". While these settings are effective, targets, particularly, those that move at high speed may not be recognized visually.

7.4 False Echoes

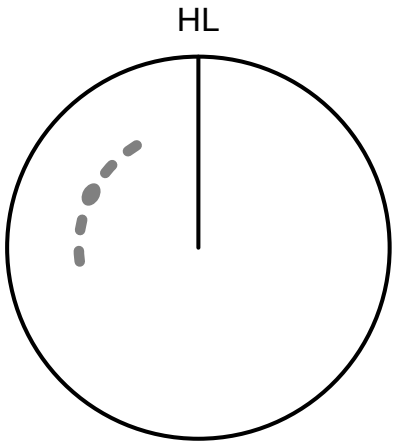
The radar observer may be embarrassed with some echoes that do not exist actually. These false echoes appear by the following causes that are well known:

7.4.1 Shadow

When the radar antenna is installed near a funnel or mast, the echo of a target that exists in the direction of the funnel or mast cannot appear on the radar display because the radar beam is reflected on the funnel or mast. Whether there are some false echoes due to shadows can be checked monitoring the sea clutter, in which there may be a part of weak or no returns. Such shadows appear always in the same directions, which the operator should have in mind in radar operation.

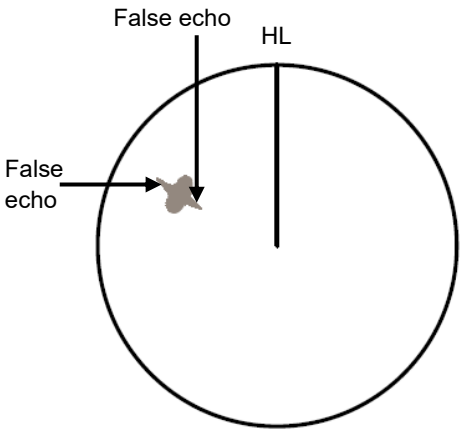
7.4.2 Side lobe effect

A broken-line circular arc may appear at the same range as the main lobe of the radar beam on the radar display. This type of false echo can easily be discriminated when a target echo appears isolated.



False Echoes

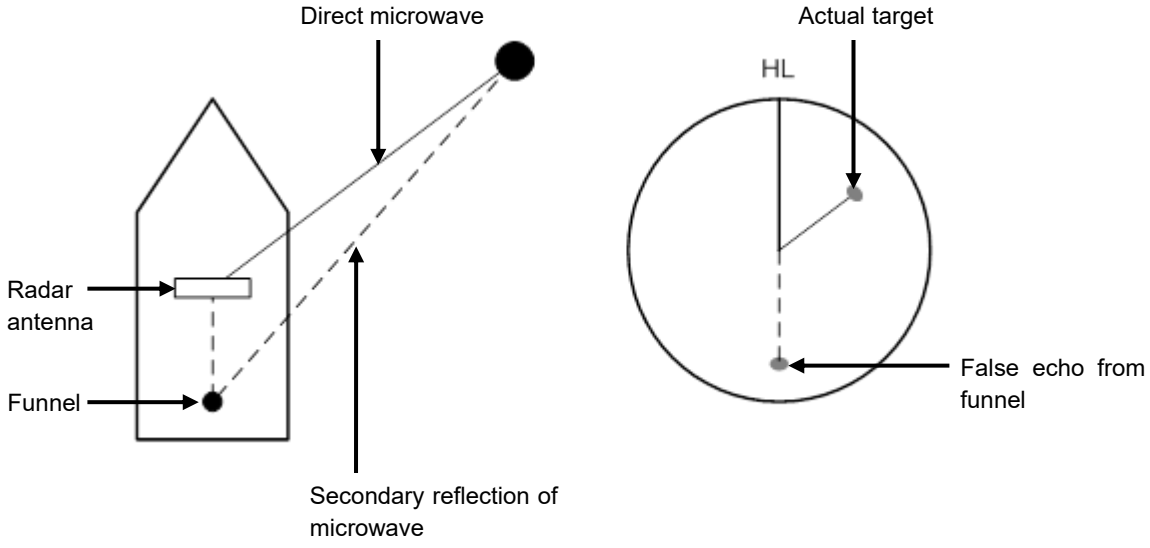
When a radar antenna for the solid-state radar is connected, a false echo may occur in the range direction of the target image. This false echo normally means a range side lobe, which is generated as a result of pulse compression processing when a large target such as a vessel is at a short distance.



Range Side Lobe

7.4.3 False echo by secondary reflection

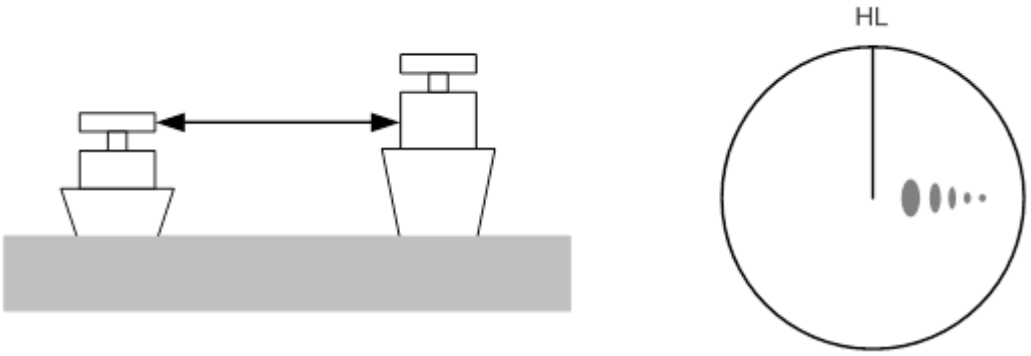
When a target exists near own ship, two echoes from the single target may appear on the radar display. One of those echoes is the direct echo from the target and the other is the secondary reflection from a mast or funnel that stands in the same direction as shown in the following Figure.



Example of false echo by secondary reflection

7.4.4 False echo by multiple reflection

When there is a large structure or ship with a high vertical surface near own ship as shown in the following Figure, multiple refection may appear on the radar display. These echoes appear in the same intervals, of which the nearest echo is the true echo of the target.



False Eco by Multiple Reflection

7.4.5 Second time echoes

The maximum radar detection range depends upon the height of the radar antenna and the height of a target as described in the section "7.1 Radar Wave with the Horizon". If a so-called "duct" occurs on the sea surface due to a certain weather condition, however, the radar beam may propagate to an abnormally long distance, at which a target may be detected by the radar.

For instance, assuming that the transmitter pulse length is MP3 (on the repetition frequency of 1400 Hz), the primary pulse is reflected about 58 NM or more away from a target and received during the next pulse repetition time. In this case, a target image appears as a false echo (second time echo) at a position that is about 58 NM less than the actual range on the radar screen.

If the false echo appears at 5 NM on the radar display, the true range of the target is 5 + 58 = 63 NM.

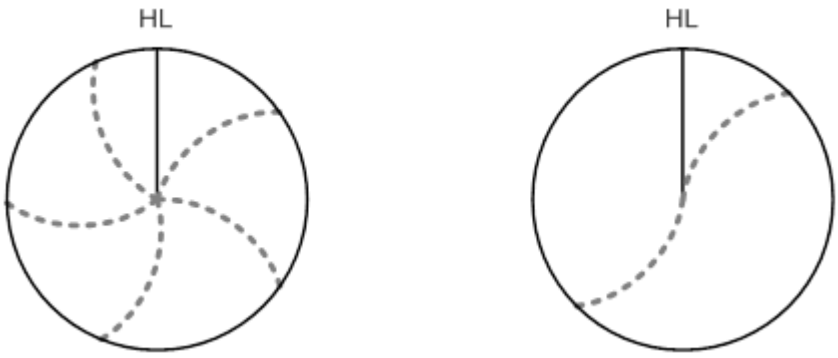
On the transmitter pulse length is SP1 (on the repetition frequency of 2250 Hz), a false echo may appear at a position that is about 36 NM less than the actual range.

This type of false echo can be discriminated by checking the change of the target range by switching the transmitted pulse length (the repetition frequency).

False echoes can be suppressed by setting [Economy] to [TXRX] - [TXRX] - [PRF] on the Settings menu or setting ON in [TXRX] - [TXRX] - [Stagger Trigger]. (For the details, refer to “11.6 Setting up Radar Antennas".)

7.4.6 Radar interference

When another radar equipment using the same frequency band is near own ship, a radar interference pattern may appear on the radar display. This interference pattern consists of a number of spots which appear in various forms. In many cases, these spots do not always appear at the same places, so that they can be discriminated from the target echoes.



If radar equipment causing an interference pattern and this equipment are of the same model, their transmitting repetition frequency is nearly the same. As a result, interference patterns may be displayed concentrically.

In this case, since the interference patterns cannot be rejected by using only the interference rejection function, fine-tune the transmitting repetition frequency. (Refer to “11.6 Setting up Radar Antennas")

By applying different transmitting repetition frequencies, the interference rejection effect can be improved.

7.5 Radar Transponder (SART) Screen Display

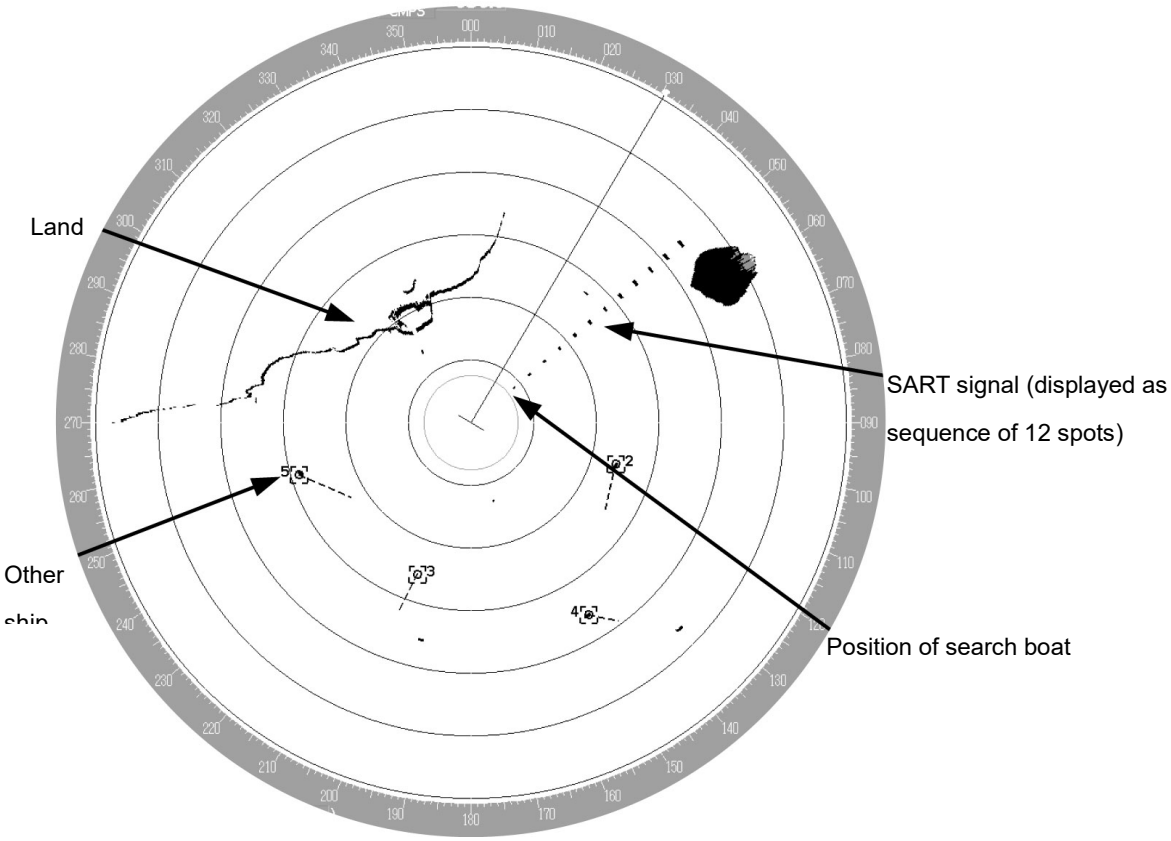
SART is life-saving equipment that was approved by GMDSS and is used for detecting positions of survivors who suffer from distress accidents. SART, which operates under the frequency band of 9GHz, receives a radar wave of 9GHz that is launched from the radar of the rescue boat or plane and generates a series of response signals to notify the accident position to the searchers.
Set the equipment to the following in order to receive SART signals. Use the settings for SART reception for detecting beacons and target enhancers also.

1. **Set the range scale to [6 NM] or [12 NM] by using the Range Scale button on the RADAR screen.**
2. **Set to ON the settings of [Echo]-[Signal Process]-[SART] in the Settings menu (Select the check box.).**

Note
The SART setting check boxes are not displayed at connection of a solid-state radar antenna.

The SART display mode is set to ON. In this case, the following items in the Settings menu are automatically changed to the values as indicated in the table below.
For the settings of SART, refer to “11.3 Setting Radar Signal Processing”

Setting item	Setting value
Sea (Sea clutter control)	In MAN (manual) mode, the value is changed to 0 (minimum value) and in AUTO (automatic) mode, the mode is changed to MAN and the value is changed to 0 (minimum value).
Rain (rain/snow clutter control)	
Manual Tune (Tuning)	Off (Set tuning to Off to weaken clutter display)
IR (Interference removal)	Off
Echo Process (Image processing)	Process Off



Note

When the SART display mode is set to ON to detect SART signals, small targets around own ship may no longer be displayed on the radar screen. Therefore, implement sufficient monitoring for the periphery of own ship to prevent collision and grounding. When multiple radars are installed, use one 9GHz-band radar for detection of SART signals and use other radars as normal radars for collision prevention, monitoring of targets in periphery of own ship, prevention of grounding, and checking of own ship's position.

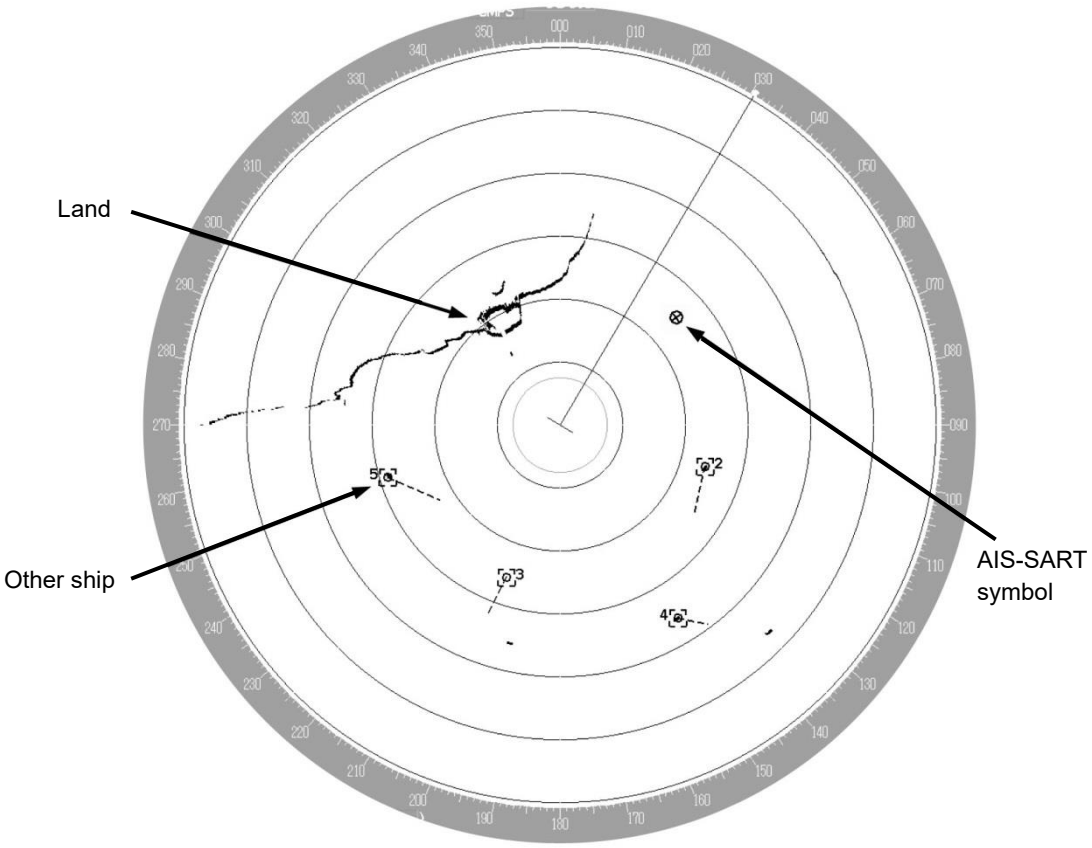
After termination of SART signal detection, set the SART display mode to OFF (Uncheck the check boxes of [Echo]-[Signal Process]-[SART] in the Settings menu). The radar is reset to the normal navigation mode.

7.6 Display of AIS-SART

AIS-SART is a device to display data relating to the position of the ship in distress on the AIS display unit of the ship station and coast radio station which install the AIS.
This device can be applied instead of Radar Transponder (SART).
When connecting this device with the AIS, AIS-SART symbols can be also displayed on the radar screen.

7.6.1 Radar screen display example

If receiving AIS-SART signals from its device, an AIS-SART symbol is displayed on the radar screen.

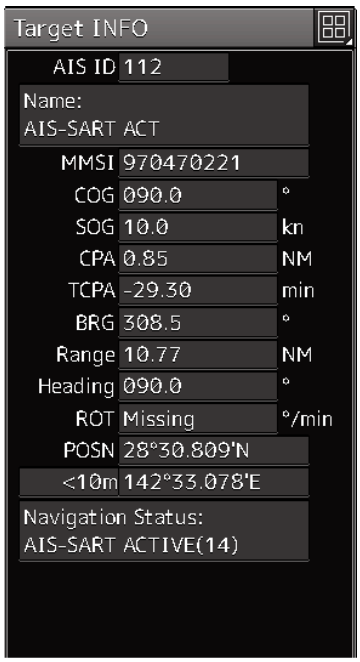


Example of AIS-SART Symbol Display

*For the details of AIS-SART symbols, refer to "6.3.3 Types and Definitions of AIS Target Symbols".

7.6.2 Numeric data display example

When the AIS-SART symbol is clicked on while it is displayed, AIS-SART numeric data is displayed in the Target Info on the information monitoring window.



Example of AIS-SART Numeric Data Display

The following are displayed in Navigation Status area according to operating conditions:
Normal operation: AIS-SART ACTIVE (14)
Trial operation: AIS-SART TEST (15)

If displaying "AIS-SART TEST (15)", it indicates that the AIS-SART operation test is performing.

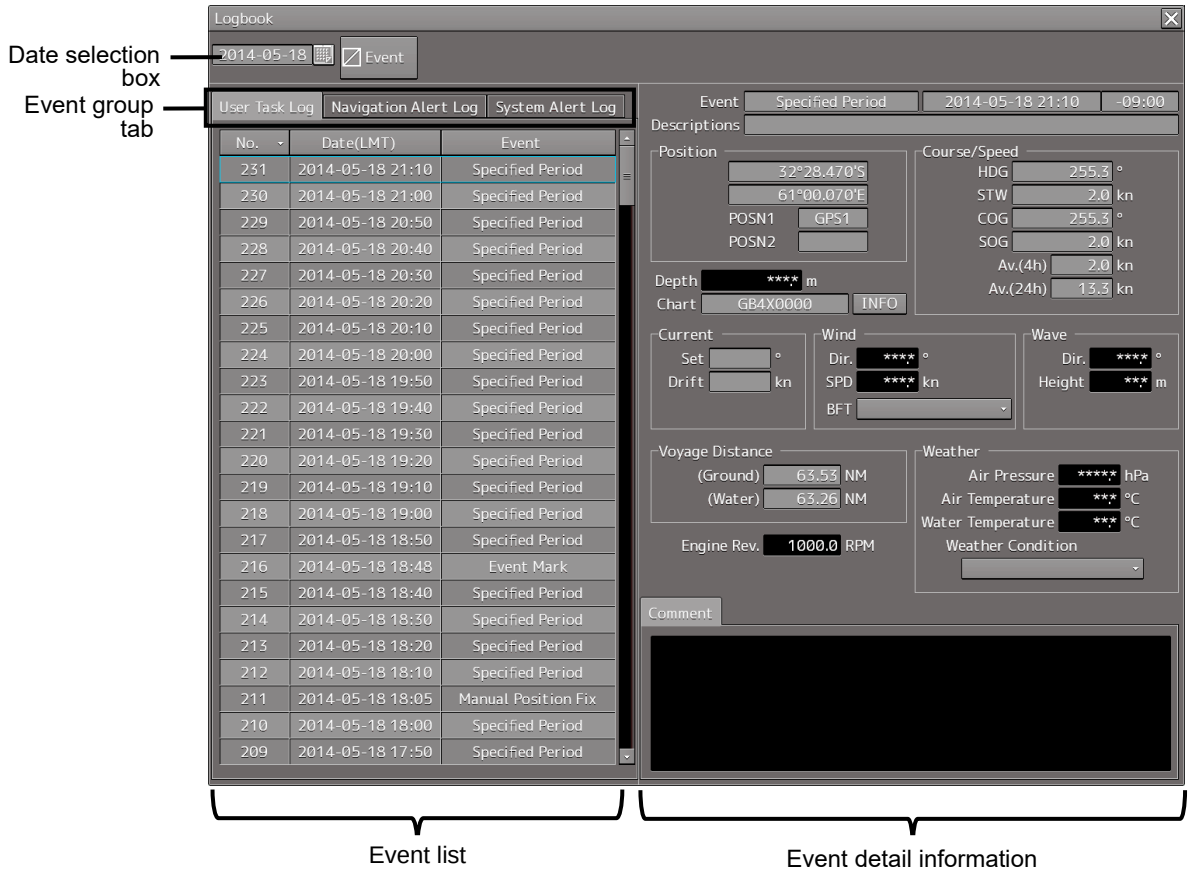
8 Logbook

Various types of information (events) during the voyage can be recorded/displayed in a logbook.

8.1 Browsing a Logbook

1 **Click on the [Menu] button on the left toolbar.**
The menu is displayed.

2 Click on [Logbook] on the menu.
The [Logbook] dialog box appears.



Memo

Events that are recorded/displayed in a logbook can be changed by using the [Settings] menu. For the details, refer to “11.16 Setting Logbook".

The following events are recorded in a logbook.

At Noon:	Recorded at 12:00 (LMT) every day.
Specified Period:	Recorded at any time interval.
Event Mark:	Recorded at marking an event mark.
Manual Position Fix:	Recorded at fixing a position manually.
System Start:	Recorded at the start of the system.
System Exit:	Recorded at the termination of the system.
Route Alert:	Recorded at the occurrence of a Route-related alert.
System Alert:	Recorded at the occurrence of an alert that does not belong to the types that are indicated above
MOB Start:	Recorded when MOB starts.
MOB Stop:	Recorded when MOB stops.

Searching an event based on the date

Enter a date and time in the date selection box.

The events of the date and time that were input are searched. The event list is scrolled and the line of the first event is highlighted in blue.

Sorting events

When turning on the power, events are registered in the event list starting from the event of the latest date.

When any of the items of the title line in the event list is clicked on, the events can be sorted based on the item. Whenever the item is clicked on, the events are sorted in the ascending order or descending order.

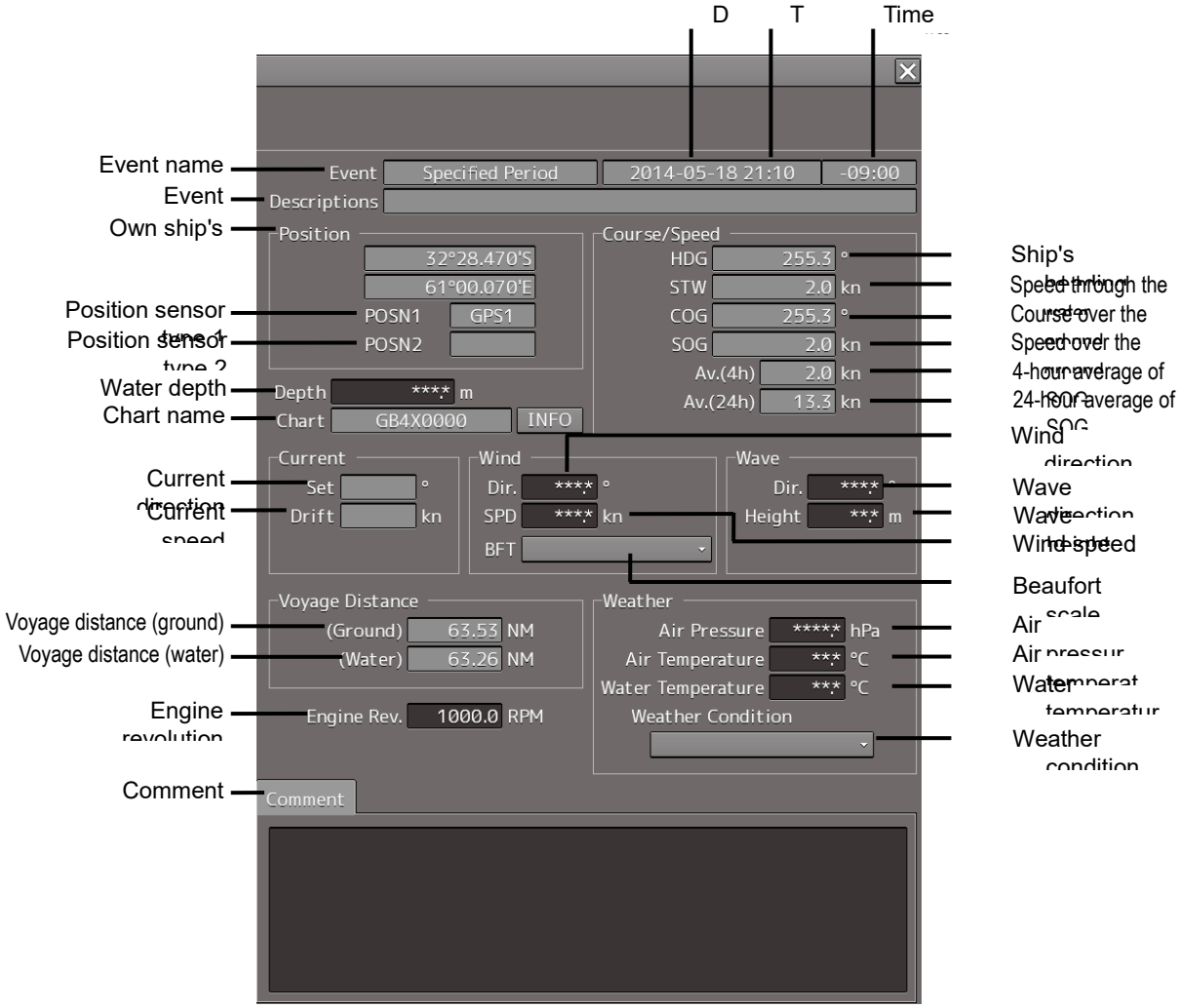
Switching the event groups

Events are classified into the following three event groups. When any of these tabs is clicked, the associated evens are displayed.

[User Task Log] tab:	Displays the events relating to user operations.
[Navigation Alert Log] tab:	Displays the events relating to navigation alerts.
[System Alert Log] tab:	Displays the events relating to system alerts.

8.1.1 Event detail information

Navigation record data is displayed as event detail information.



Detail information that can be edited

The information below can be edited during browsing.

[Depth] (Water depth): Enter a value within the range from 0 to 999.9 m.
[Engine Rev.] (Engine revolution): Enter a value within the range from -9999.9 to 9999.9 rpm.
[Wind Dir.] (Wind direction): Enter a value within the range from 0 to 359.9°.
[Wind SPD] (Wind speed): Enter a value within the range from 0 to 200.0 kn.
[Wave Dir.] (Wave direction): Enter a value within the range from 0 to 359.9°.
[Wave Height] (Wave height): Enter a value within the range from 0 to 50.0 m.
[Air Press.] (Air pressure): Enter a value within the range from 0 to 2000.0 hPa.
[Air Temp.] (Air temperature): Enter a value within the range from -50.0 to 99.9°C.
[Water Temp.] (Water temperature): Enter a value within the range from -10.0 to 50.0°C.

The information below can be input manually. The setting can be selected from the list.

[Beaufort scale]

- 0: Calm
- 1: Light air
- 2: Light breeze
- 3: Gentle breeze
- 4: Moderate breeze
- 5: Fresh breeze
- 6: Strong breeze
- 7: Near gale
- 8: Gale
- 9: Strong gale
- 10: Storm
- 11: Violent storm
- 12: Hurricane

[Weather condition]

- b: Blue sky
- bc: Fine but cloudy
- c: Cloudy
- o: Overcast
- r: Rainy
- q: Squalls
- s: Snow
- f: Foggy

A comment can be input in the [Comment] box by using up to 1000 characters.

8.2 Editing a Logbook

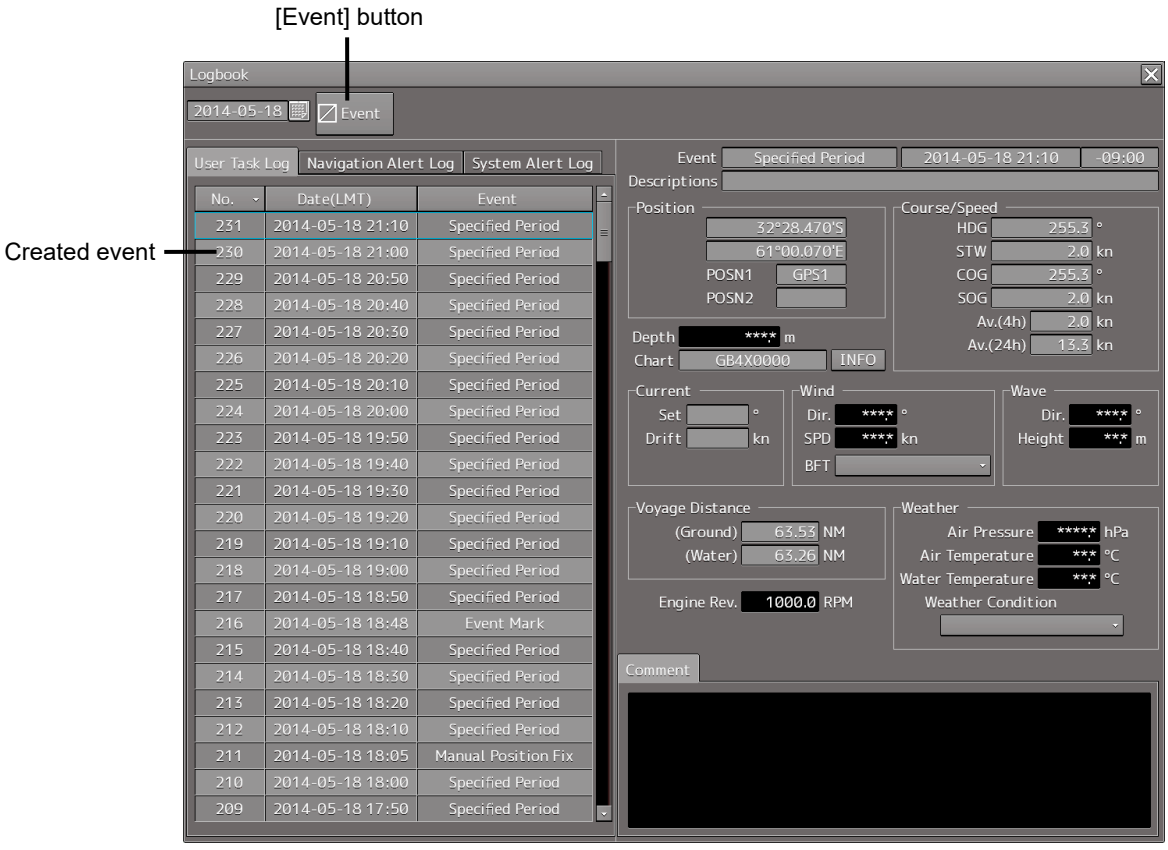
8.2.1 Adding an event

1 **Click on the [Event] button.**

An event mark is plotted at the own ship's position. An event called "Event Mark" is created with the current time and is registered in the top line of the event list.

The navigation data that has been acquired automatically is displayed as event detail information.

> **Memo**
> The data that is not automatically acquired is displayed as blank space.



Deleting an event mark

For deletion of event marks, refer to "8.12 Marking the Position of Own Ship with an Event Mark".

8.2.2 Editing event detail information

Use the procedure that is shown below to edit the event detail information that can be edited.
For the detail information that can be edited, refer to "Detail information that can be edited" in "8.1.1 Event detail information".

1 **Click on the box of the data that can be edited.**

2 Edit the information by using the software keyboard.

3 Click on the [Enter] key.
The editing is determined and the data is stored.

8.3 Outputting Event Data

By selecting an event, the detail information can be output as a file.

8.3.1 Outputting a logbook as a file

A logbook data can be output with "File Manager".

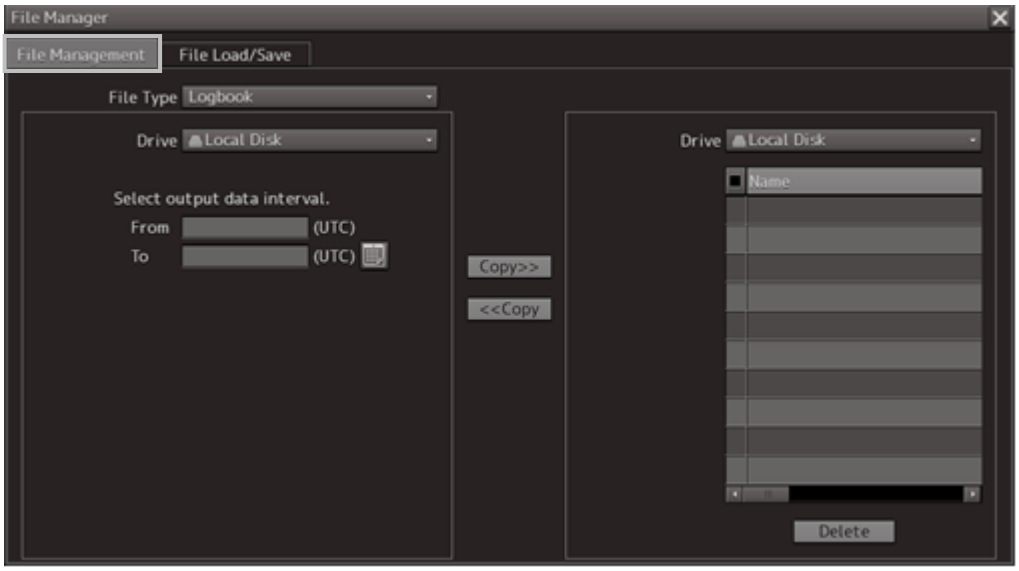
1 **Click on the [Menu] button on the left toolbar.**

The menu is displayed.

2 **Click on the [Tools] - [File Manager] on the menu.**

The [File Manager] dialog box appears.

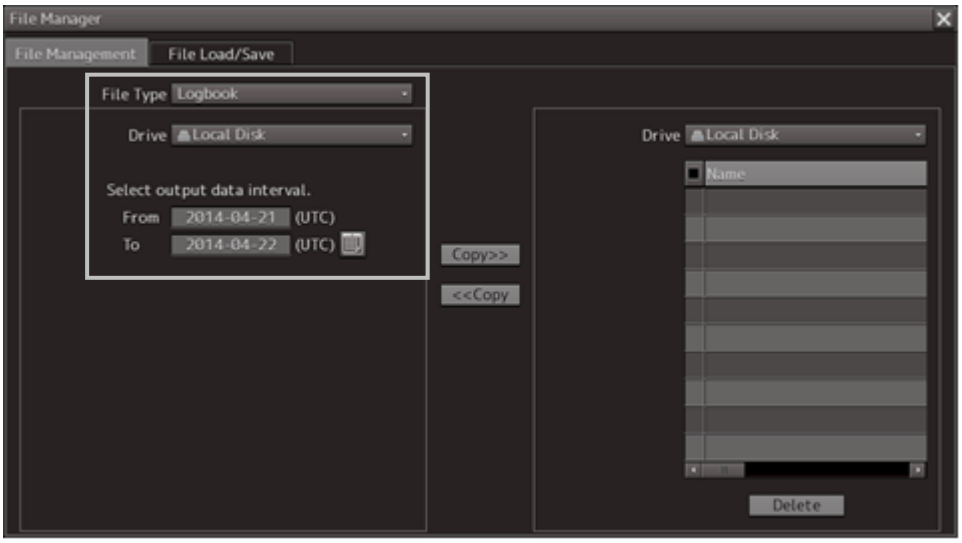
3 **Click on the [File Management] tab.**



4 **Select the [Logbook] from the [File Type] combo box.**

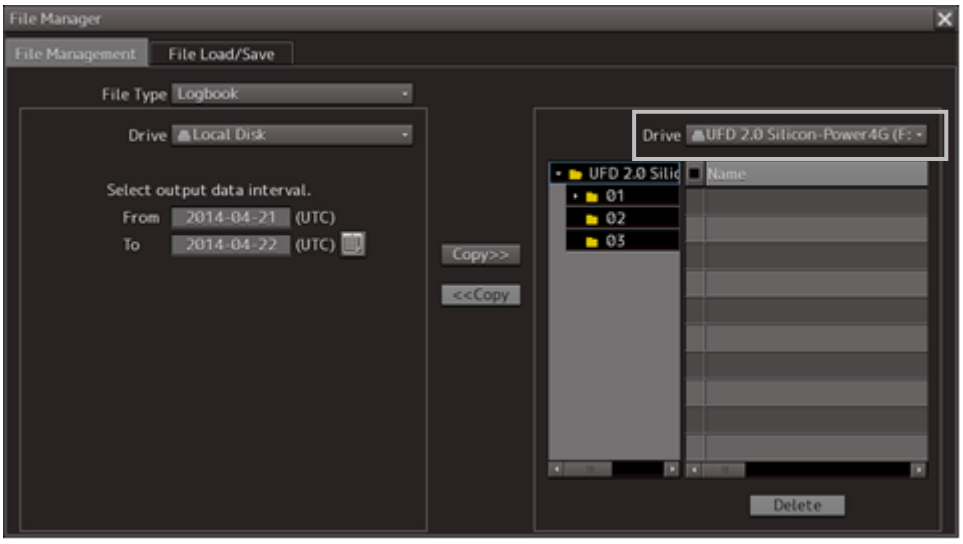
5 **Select the drive containing logbook data from the [Drive] combo box.**

6 Input the period of the logbook data to be output in [From] and [To] of [Select output data interval.].

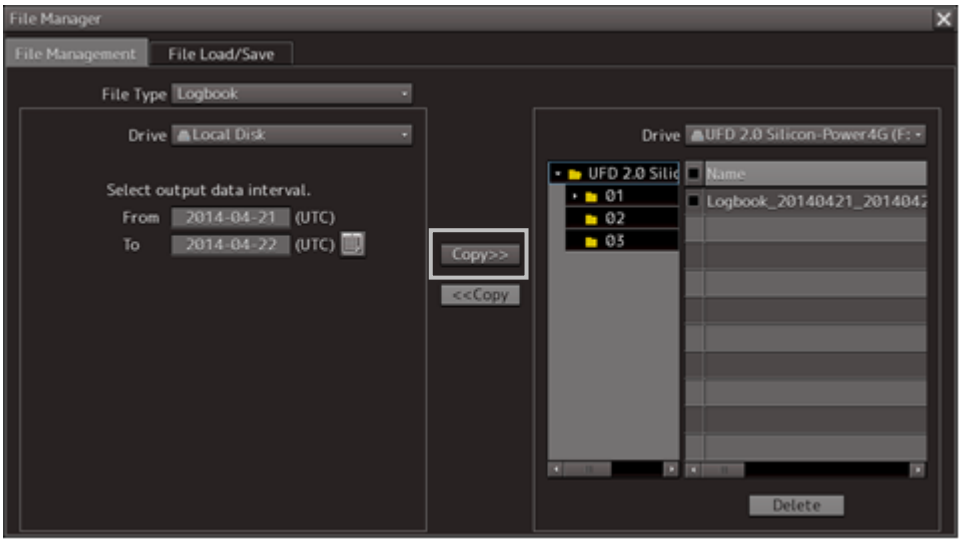


The [Copy] button is enabled.

7 Select the storage destination of the logbook data from the [Drive] combo box of the output destination.



8 **Click on the [Copy] button.**



9 Setting up Screen View

Screen display detail is set through the [View] menu.

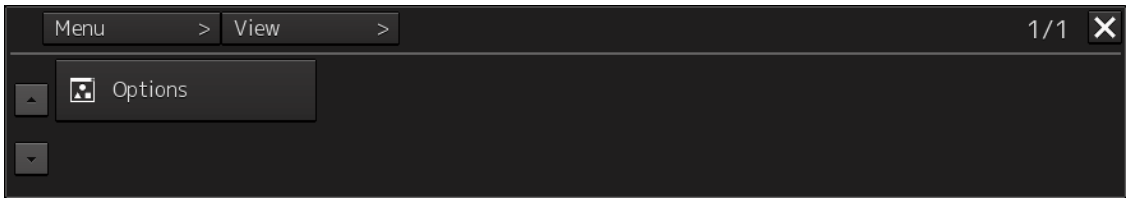
The display procedure of the View setup dialog box is as follows.

1 **Click on the [Menu] button on the left toolbar.**

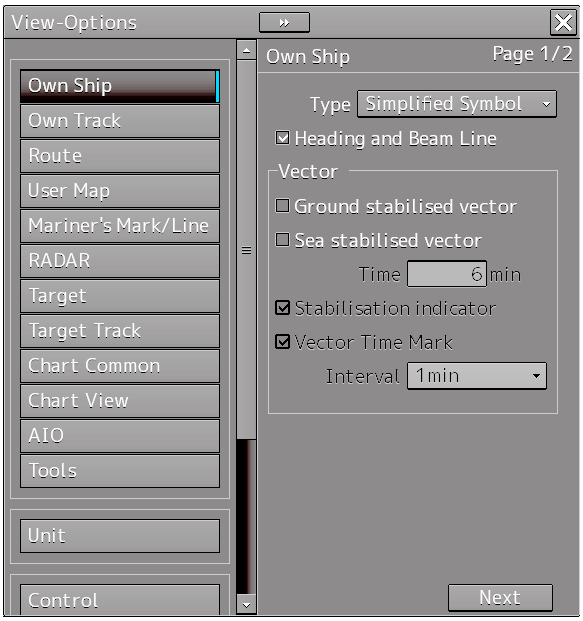
The menu is displayed.

2 **Click on the [View] button on the menu.**

The submenu is displayed.



When submenu buttons are clicked, their respective setup dialog boxes are displayed.

Button	Dialog box	Reference
Options		9.1 Setting Screen Display Options

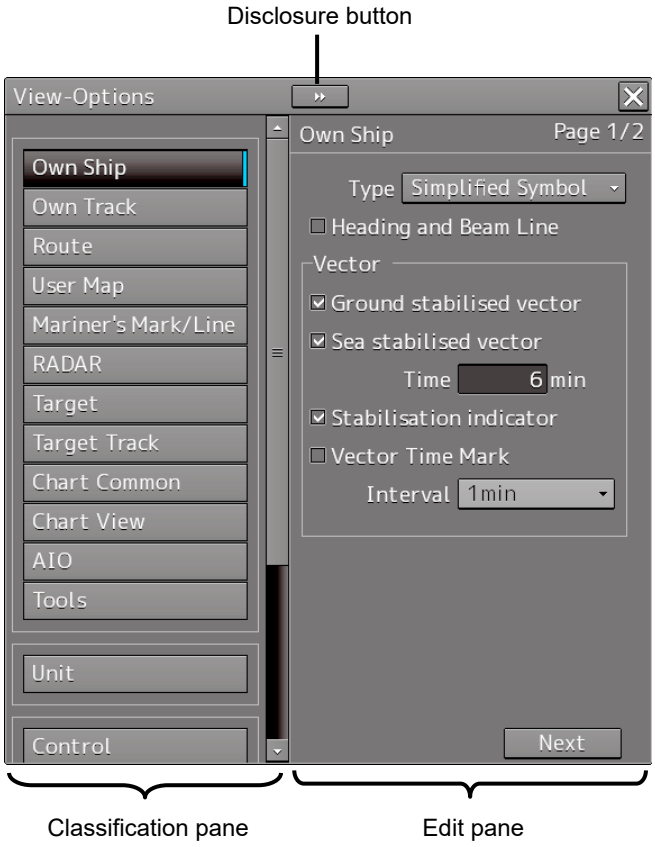
9.1 Setting Screen Display Options

In the [View-Options] dialog box, the screen display options can be set.

Take the following steps to display the [View-Options] dialog box.

1 **Click on the [Menu] button on the left toolbar.**
The menu is displayed.

2 **Click on the [View] - [Options] on the menu.**
The [View-Options] dialog box appears.



The [View-Options] dialog box consists of the classification panel and edit panel.
Click on the Disclosure button to hide the classification panel.

3 **Click on the screen view of which you want to set up the options in the classification panel.**
The Option setup dialog box for the screen view you have selected appears in the edit panel.

4 **Set up in the edit panel.**

Display targets for classification panel

The classification panel displayed in RADAR and reference of the explanation are as follows.

Classification panel	Reference
Own Ship	9.1.1 Setting up the display of Own Ship symbol
Target	9.1.2 Setting up the display of TT/AIS Target
Target Track	9.1.3 Setting up the display of Other Ship's Track
Unit	9.1.4 Setting up the display of Unit of Setting Value
Control	9.1.5 Setting up display of Own Ship Track Control, display format of Own Ship/Cursor Position and display of Sub-Information dialog
Depth Graph	9.1.6 Setting up the Water Depth display
Rudder Graph	9.1.7 Setting up the Rudder graph
Gyro/Rudder Graph	9.1.8 Setting up the Gyro/Rudder graph
ROT	9.1.9 Setting up the graph range of the ROT slide bar

Screen display set in the [View-Options] dialog box

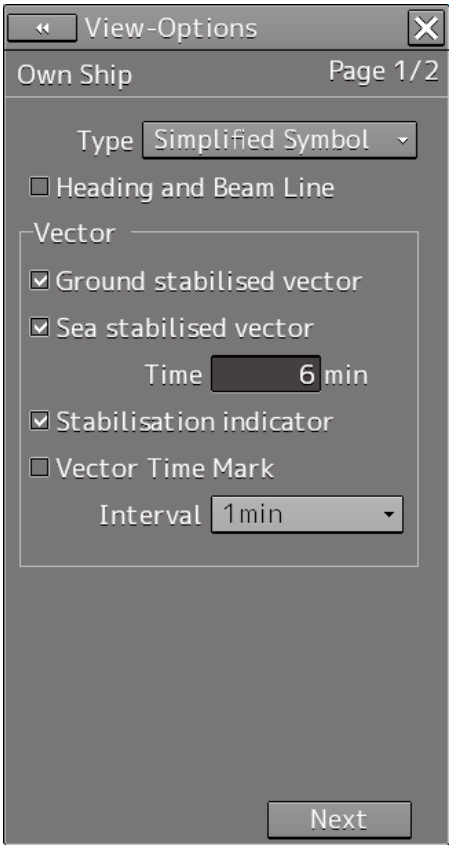
In the [View-Options] dialog box, the following screen display is set.

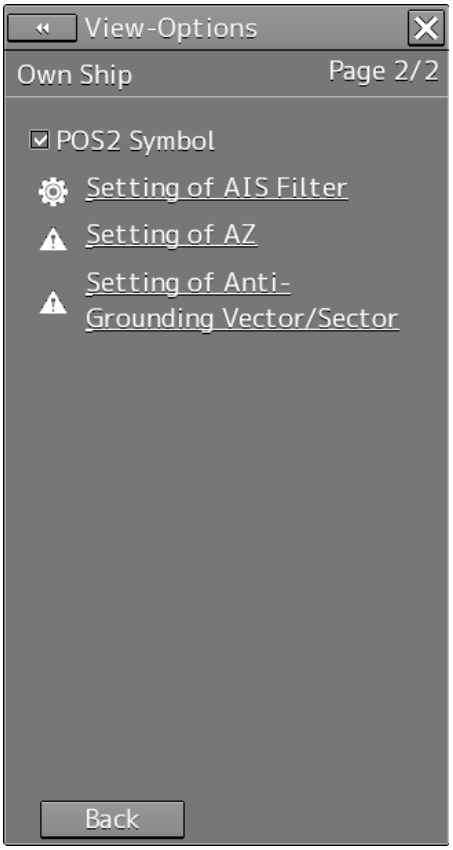
Target category	Item
Graphical Objects	Own Ship
	Own Track
	RADAR
	Target
	Target Track
Unit	Unit
Control	Control

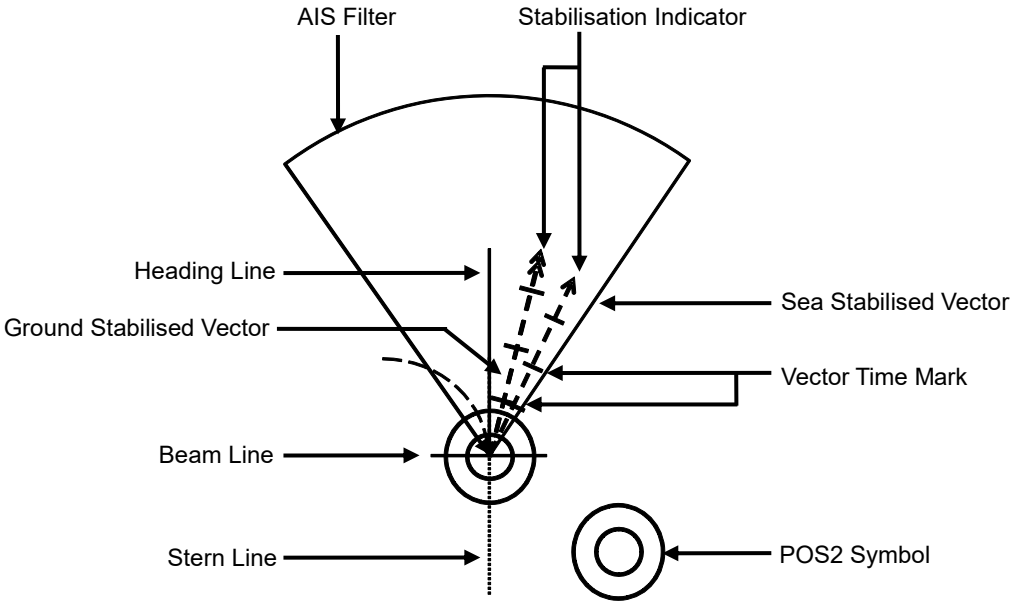
9.1.1 Setting up the display of Own Ship symbol

When you select [Own Ship] in the classification panel, the "Own Ship" dialog is displayed in the edit panel.

Configure the setting for own ship symbols.
The edit panel is divided into two dialogs.
To advance to the next dialog: Click on the [Next] button.
To return to the previous dialog: Click on the [Back] button.

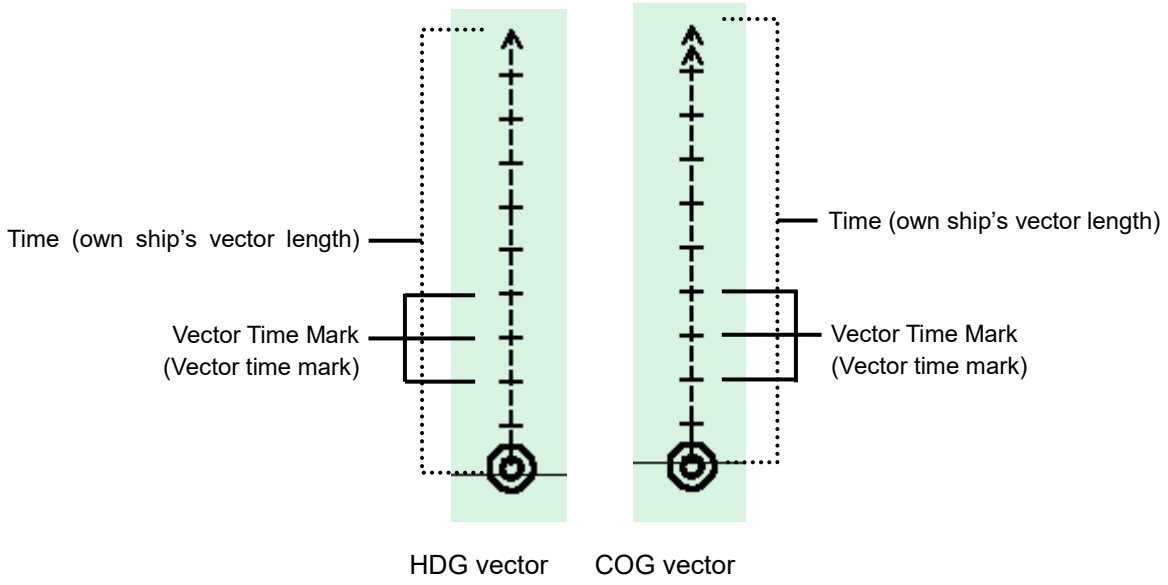





AIS Filter
Stabilisation Indicator
Heading Line
Ground Stabilised Vector
Sea Stabilised Vector
Vector Time Mark
Beam Line
Stern Line
POS2 Symbol

Vector display at primary position

In the own ship symbol, COG (Course Over the Ground) vector, HDG (Heading) vector, and heading line can be displayed. The COG or HDG vector can also be displayed by the length proportionate to the current ship speed in minute by the setting. For example, when the vector length is set to 10 minutes, the vector tip is at the predicted position after 10 minutes if the ship is assumed to navigate at the current speed.



- To display the COG (Course Over the Ground) vector, check [Ground Stabilised Vector] in [Vector].
- To display the HDG (Heading) vector, check [Sea Stabilised Vector] in [Vector].
- To display the heading line, check [Heading and Beam Line].

For details on the setting of type and length of the vector to be displayed, refer to the following table.

The descriptions of settings are shown in the table below.

Setting Item	Description of Setting	Setting Value
Type	Select an own ship symbol from the combo box (symbols of other ships are also linked).  : Auto  : Simplified Symbol  : Outline  : Minimized Symbol *In Auto, the display is switched between Outline and Minimized Symbol depending on the size of the symbol. When the beam side of the Outline symbol is 3mm or more, the symbol is displayed in Outline and when the symbol is less than 3mm, it is displayed in Minimized Symbol.  The beam side is 3mm or more	AUTO Outline Minimized Symbol [default] Outline
Stern Line	Selecting this enables to display a stern line.	To enable: Select. To disable: Clear.
Ground Stabilised Vector	Selecting this enables to display a ground stabilised vector.	To enable: Select. To disable: Clear.
Sea Stabilised Vector	Selecting this enables to display a sea stabilised vector.	To enable: Select. To disable: Clear.
Time (Length of own ship's vector)	Enter the own ship's vector length in the box.	0 to 120
Stabilization Indicator	Selecting this enables to display the stabilization indicator. **Note** When both the Ground Stabilised Vector and the Sea Stabilised Vector are effective, this automatically takes effect.	To enable: Select. To disable: Clear.
Vector Time Mark	Selecting this enables the interval of the vector time mark.	To enable: Select. To disable: Clear.
Interval (vector time mark interval)	Select a vector time mark interval from the pull-down menu when Vector Time Mark is valid.	1 to 6 min

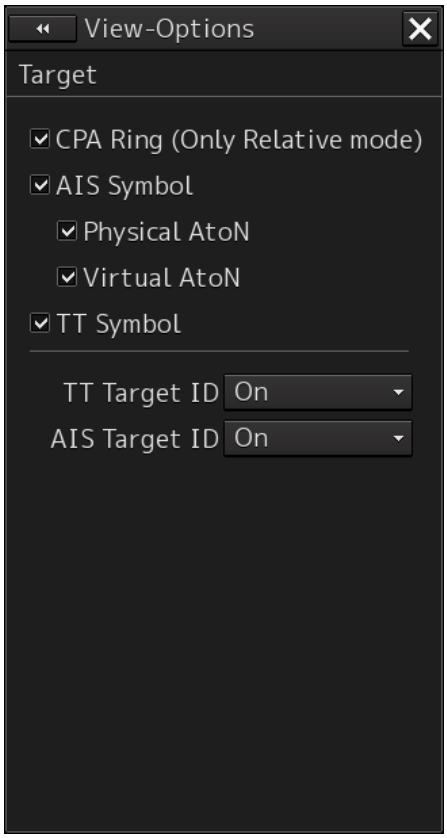
Shortcuts

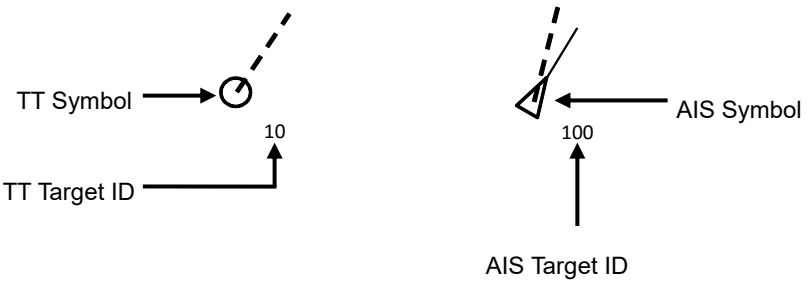
Click on any of available shortcuts to display the related dialog box.

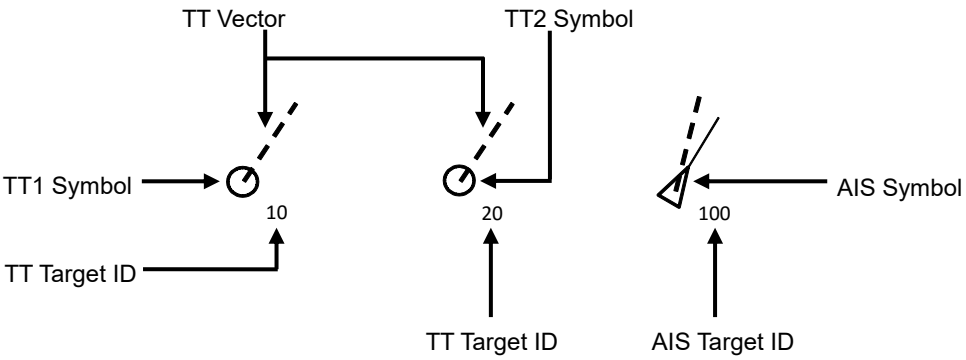
Shortcut	Setup Dialog
Setting of AIS Filter	[AIS Filter Setting] dialog box
Settings of AZ	[AZ Setting] dialog box
Settings of Anti-Grounding Vector/Sector	[Anti-Grounding Vector/Sector Setting] dialog box

9.1.2 Setting up the display of TT/AIS Target

When you select [Target] in the classification panel, the [Target] dialog is displayed in the edit panel. Configure the settings for TT/AIS targets.

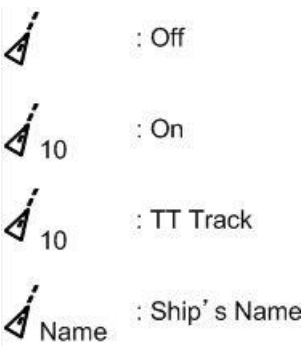






The descriptions of settings are shown in the table below.

Setting Item	Description of Setting	Setting Value
AIS Symbol	Selecting this enables to display the AIS symbol.	To enable: Select. To disable: Clear.
Physical AtoN	Selecting this enables to display the Physical AIS AtoN when the AIS Symbol is selected.	To enable: Select. To disable: Clear.
Virtual AtoN	Selecting this enables to display the Virtual AIS AtoN when the AIS Symbol is selected.	To enable: Select. To disable: Clear.
TT Symbol	Select this item to enable the TT symbol. Select the TT Symbol to be used from the combo box. TT1 Symbol TT2 Symbol TT1 Symbol indicates the TT target information that is received from RADAR1 and the TT Target ID is displayed as “T1-***” (*** indicates the target number or ship name). TT2 Symbol indicates the TT target information that is received from RADAR2 and the TT Target ID is displayed as “T2-***” (*** indicates the target number or ship name).	To enable: Select. To disable: Clear.

TT Target ID	Select a display mode of the TT target ID from the combo box. Off: Hide On: Show TT Track: Displays only the target that shows other ship's track. Display Ship's Name: When the ship’s name has been input in the [TT Target INFO] (property of tracked target) dialog, that ship name is displayed. If the ship’s name has not been input, the identification number is displayed. Display  	Off, On, TT Track
AIS Target ID	Select a display mode of the AIS target ID from the combo box. Off: Hide On: Show AIS Track: Displays only the target that shows other ship's track (target track). Ship's Name: When the ship’s name has been input in the [AIS Target INFO] (property of AIS target) dialog, that ship name is displayed. If the ship’s name has not been input, the identification number is displayed. Display  	Off, On, AIS Track, Ship's Name

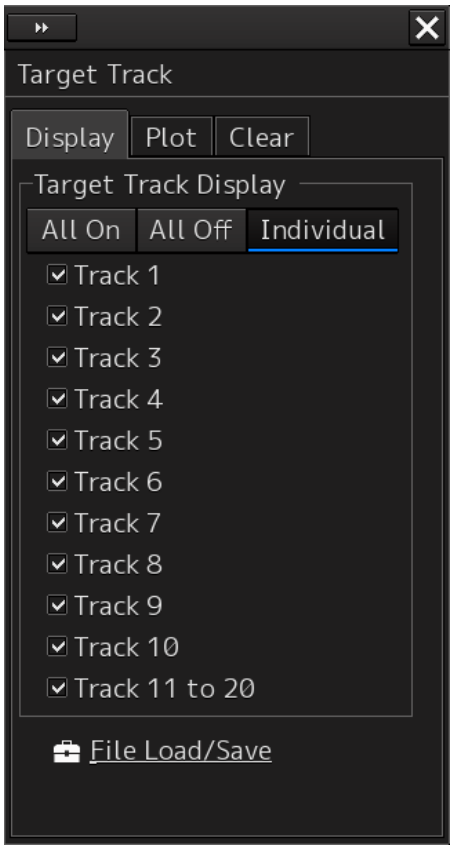
9.1.3 Setting up the display of Other Ship's Track

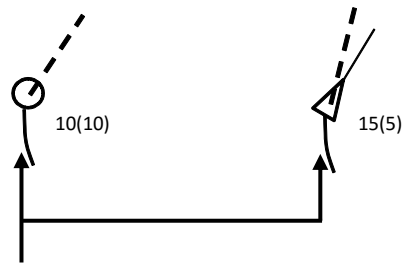
When you select [Target Track] in the classification panel, the [Target Track] dialog is displayed in the edit panel.

The [Target Track] dialog consists of the [Display], [Plot] and [Clear] tabs.

[Display] tab

On the [Display] tab, set up the display of other ship's tracks.





Target Track

The descriptions of settings are shown in the table below.

Setting Item	Description of Setting	Setting Value
Target Track Display (display of other ship's tracks)	Select to show/hide target tracks by clicking on the corresponding buttons and then specify the target tracks you want to display by checking them. All On: Shows all of target tracks. All Off: Hides all of target tracks. Individual: Shows selected target tracks.	All On, All Off **When Individual is selected:** Select from Tracks 1 to 10 and from Tracks 11 to 20.

Shortcut

Click on any of available shortcuts to display the related dialog box.

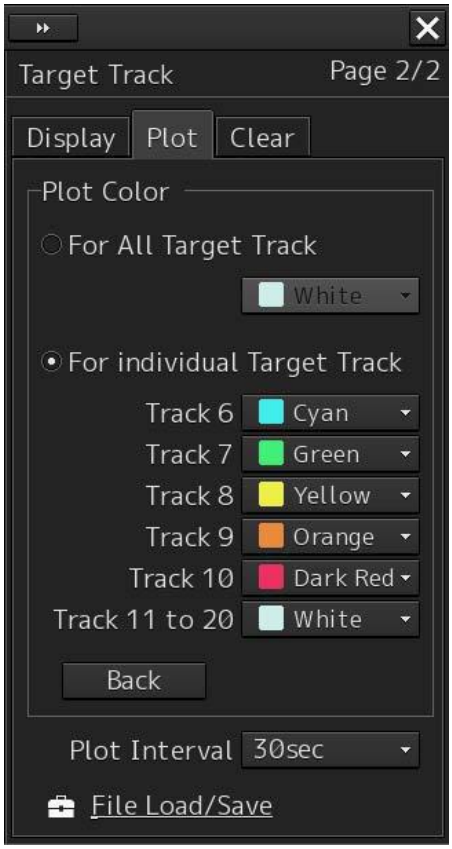
Shortcut	Setup Dialog Box
File Load/Save	[File Load/Save] dialog box in File Manager

[Plot] tab

The edit panel of the [Plot] tab is divided into two dialogs.

To advance to the next dialog: Click on the [Next] button.

To return to the previous dialog: Click on the [Back] button.



The descriptions of settings are shown in the table below.

Setting Item	Description of Setting	Setting Value
For All Target Track	Click on the check box and select a plot color of target tracks from the list.	White (Black), Gray, Amber, Magenta, Blue, Cyan, Green, Yellow, Orange and Dark Red
For Individual Target Track	Click on the check box and select plot colors of individual target tracks (Tracks 1 to 10 and Tracks 11 to 20) from the list.	White (Black), Gray, Amber, Magenta, Blue, Cyan, Green, Yellow, Orange and Dark Red
Plot Interval	Select a plot interval of target tracks from the combo box.	Off, 3s, 5s, 10s, 30s, 1 min, 3 min, 5 min, 10 min, 30 min, 60 min, 1 NM, 3 NM, 5 NM, 10 NM, 0.1 NM, 0.2 NM, 0.3 NM, 0.5 NM

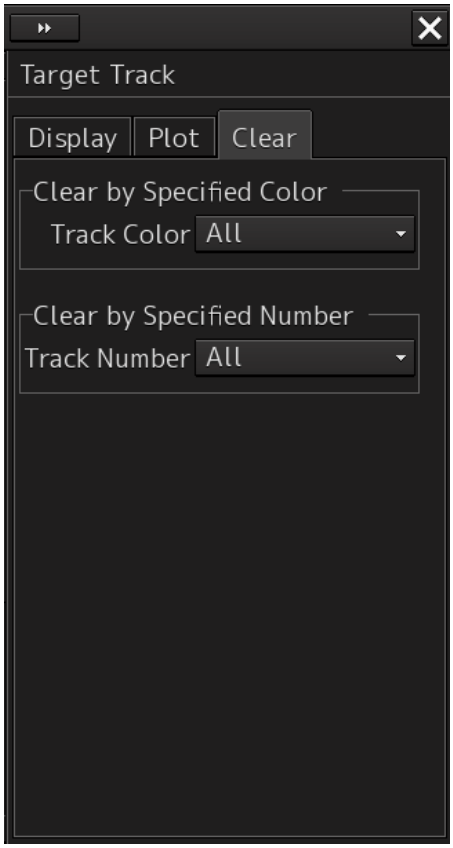
* White/Black interchanges under the following conditions.
  RADAR screen: Always White

Shortcut

Click on any of available shortcuts to display the related dialog box.

Shortcut	Setup Dialog Box
File Load/Save	[File Load/Save] dialog box in File Manager

[Clear] tab



To erase tracks by specifying a color

1 **Select the color of other ship's track to be erased from the [Track Color] combo box.**

You can select from All, White, Gray, Amber, Magenta, Blue, Cyan, Green, Yellow, Orange and Dark Red.

White/Black interchanges under the following conditions.

RADAR screen: Always White

A message dialog box prompting you to confirm erasing appears.

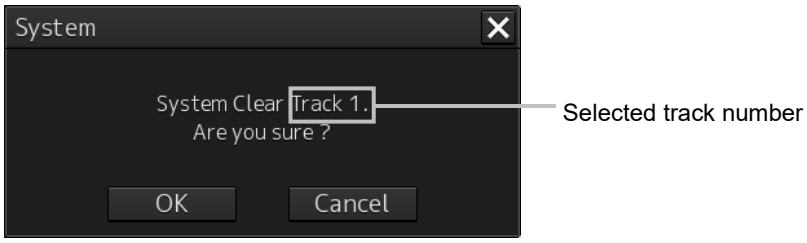
2 **To execute erasing, click on the [OK] button. To cancel erasing, click on the [Cancel] button or the [X] button.**

Erasing by specifying a track number

1 **Select the number of other ship's track to be erased from the [Track Number] combo box.**

Options of the track to be erased include All, Track 1, Track 2, Track 3,Track 4, Track 5,Track 6, Track 7, Track 8, Track 9, Track 10, and Track 11 – 20.

An erase confirmation message dialog is displayed.



2 **To execute erase, click the [OK] button. To cancel erase, click the [Cancel] button or the [x] button.**

9.1.4 Setting up the display of Unit of Setting Value

Note

Some items may not be displayed depending on the installation setting.

When you select [Unit] in the classification panel, the [Unit] dialog is displayed in the edit panel.

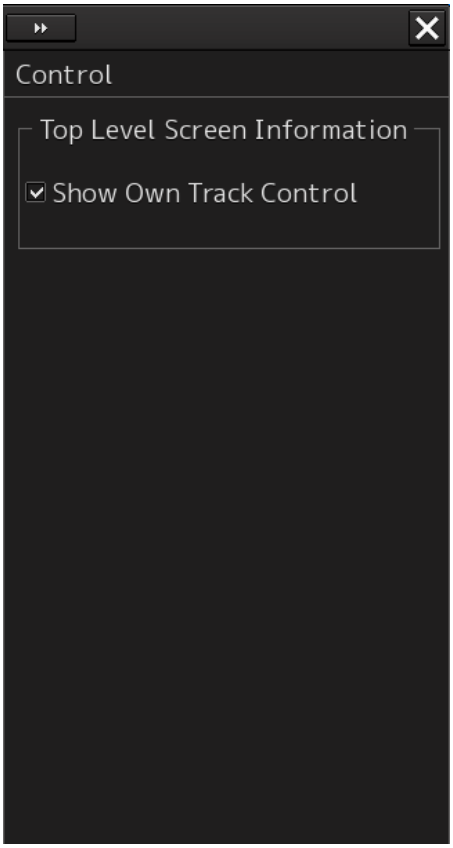
The descriptions of settings are shown in the table below.

Setting Item	Description of Setting	Setting Value
Depth (water depth)	Select a unit of water depth from the combo box.	m, ft, fm
Ship Speed	Select a unit of the ship speed from the combo box.	kn, m/s, km/h
Current Speed	Select a unit of the current speed from the combo box.	kn, m/s, km/h
Wind Speed	Select a unit of the wind speed from the combo box.	kn, m/s, km/h
Air TEMP	Select a unit of the air temperature from the combo box.	°C, °F
Water TEMP	Select a unit of the water temperature from the combo box.	°C, °F
Air Pressure	Select a unit of the air pressure from the combo box.	hPa, mbar
Wind Direction(True)	Select a wind direction (true) display method from the combo box.	16points, Degree

9.1.5 Setting up display of Own Ship Track Control, display format of Own Ship/Cursor Position and display of Sub-Information dialog

When you select [Control] in the classification panel, the [Control] dialog is displayed in the edit panel.

[RADAR Screen]



The descriptions of settings are shown in the table below.

Setting Item	Description of Setting	Setting Value
Show Own Track Control	Selecting this enables to display own track control. **Note** This item takes effect only on the RADAR screen.	To enable: Select. To disable: Clear.
Show Sub Information Window (sub information dialog box display)	Select this to enable to display the sub information dialog box, and then select the tab(s) you want to display. **Note** The [Depth] tab can only be selected when equipped with a water depth sensor. The [Current] tab can only be selected when equipped with a GPS, a gyro and a log sensor.	To enable: Select. To disable: Clear. **Tab selections** Watch(Vector / Radar / Target status), POSN DIFF(Difference between POSN(Main) and POSN(Sub)), Depth, Current

9.1.6 Setting up the Water Depth display

When [Depth Graph] is selected on the classification pain, the [Depth Graph] dialog is shown on the Edit pain.

v 

The following table shows the setting details:

Setting item	Description	Setting values
Depth Range(Docking)	Select a depth range for the docking depth graph from the combo box.	AUTO, 10 m, 25 m, 50 m
Depth Range(Voyage)	Select a depth range for the route depth graph from the combo box.	AUTO, 50 m, 100 m, 250 m
Time Range	Select a time range for the depth graph from the combo box.	10 min, 15 min, 30 min, 60 min, 12 hours
Reference	Select a reference for depth display from the combo box.	AUTO, Keel

9.1.7 Setting up the Rudder graph

When [Rudder Graph] is selected on the classification pain, the [Rudder Graph] dialog is displayed on the edit pain.

Note
This dialog may not be displayed depending on the equipment setting.

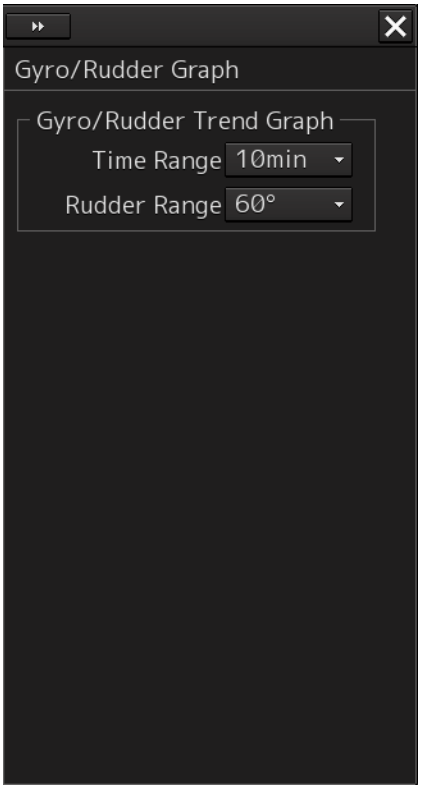
The following table shows the setting details:

Setting item	Setting	Setting value
Time Range	Select a time range for the Rudder graph from the combo box.	5 min, 10 min, 15 min, 30 min
Rudder Range	Select a rudder angle for the Rudder graph from the combo box.	30°, 40°, 50°, 60°, 70°, 80°

9.1.8 Setting up the Gyro/Rudder graph

When [Gyro/Rudder Graph] is selected on the classification pain, the [Gyro/Rudder Graph] dialog is displayed on the edit pain.

> **Note**
> This dialog may not be displayed depending on the equipment setting.



The following table shows the setting details:

Setting item	Setting	Setting value
Time Range	Select a time range for the Gyro/Rudder graph from the combo box.	5 min, 10 min, 15 min, 30 min
Rudder Range	Select a rudder angle for the Gyro/Rudder graph from the combo box.	30°, 40°, 50°, 60°, 70°, 80°

9.1.9 Setting up the graph range of the ROT slide bar

When [ROT] is selected on the classification pain, the [ROT] dialog is displayed on the edit pain.

The following table shows the setting details:

Setting item	Setting	Setting value
ROT Scale	Select a graph range for the ROT slide bar from the combo box.	30-0-30, 60-0-60, 90-0-90, 120-0-120, 150-0-150, 300-0-300

10 Setting up Alerts

By setting this equipment to generate an alert when the own ship’s position or the condition meets the specific condition or any other ship or obstacle approaches to a specific range, preliminary measures can be taken, avoiding collisions, grounding, and deviation from the route can be avoided.

This section explains the method of setting conditions (threshold values) for generating alerts, alert processing operations, and alert timer setting using the [Alert] menu.

10.1 Selecting Setting Items

When the [Alert] menu is opened, the [Alert] dialog box appears.

By selecting a setting item in the [Alert] dialog box, the setting dialog of the selected item can be displayed.

10.1.1 Displaying the [Alert] dialog box

1 **Click on the [Menu] button on the left toolbar.**
The menu is displayed.

2 **Click on the [Alert] button on the menu.**
The [Alert] dialog box appears.

The [Alert] dialog box consists of the classification panel and the edit panel.
By clicking the Disclosure button ( ), you can hide the classification panel. To show the classification panel again, click the Disclosure button ( ).

10.1.2 Selecting a setting item

1 **Click the alert classification you want to set up in the classification panel.**
The setting dialog of the selected item is displayed in the edit panel.

2 **Set up in the edit panel.**

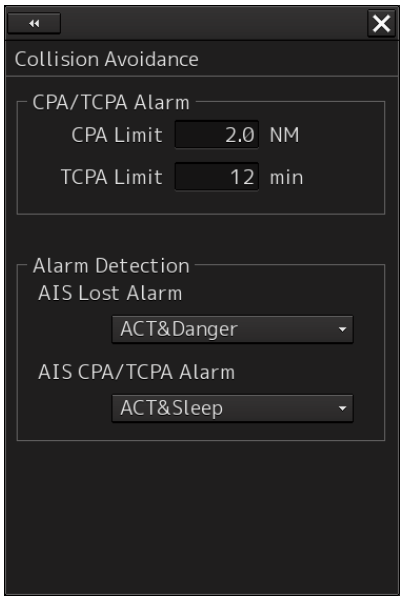
The following items can be set in the [Alert] dialog box.

Setting item	Setting contents	Function restriction
Collision Avoidance	Set the following conditions to generate a collision avoidance alert. • CPA/TCPA limit value • Status of the AIS target to be targeted for a lost alarm Refer to "10.2 Collision Avoidance Alert Generation Conditions".	
New Target Alarm	Set the following conditions to generate an automatic acquisition target alarm. • Area (AZ) for TT target automatic acquisition • Enable/disable AZ Refer to "10.3 New Target Alarm Generation Conditions".	
Position Integrity (Position sensor integrity)	Set the conditions for generating a position monitor warning and a HDOP limit caution. Refer to "10.6 Position Integrity Alert Generation Conditions".	

10.2 Collision Avoidance Alert Generation Conditions

When you select [Collision Avoidance] in the classification panel, the [Collision Avoidance] dialog is displayed in the edit panel.
In this dialog, the collision detection condition (CPA/TCPA limit) and the AIS target status, which is the target of alert detection, can be set.
For the details of CPA/TCPA, refer to "6.2 Collision Avoidance (Explanation)".

> **Note**
> As for the values of collision detection conditions, please specify the optimal values according to the ship type, sea area, weather and marine conditions. (For the condition and type of each alert, refer to "6.7 Alert Display".)



10.2.1 Setting the CPA/TCPA limit values

1. **Enter the value of [CPA Limit] in a range from 0.1 NM to 9.9 NM.**
2. **Enter the value of [TCPA Limit] in a range from 1 min to 99 min.**

10.2.2 Setting the status of the AIS target that is targeted for lost warning

1 **Select a target for detecting a lost warning of the AIS target from the [AIS Lost Alarm] combo box.**

ACT&Danger&Select: Activated AIS targets, danger targets and numeric value display targets are included.
Danger: Danger targets are included.
Off: Lost warnings are not generated.

> **Note**
> Lost warnings for sleeping AIS targets will not be generated.

> **Memo**
> If Off is being set, the following message is displayed in the alert status area.
> AIS Lost Alarm is Disabled

2 **Select a target for detecting a CPA/TCPA alarm of the AIS target from the [AIS CPA/TCPA Alarm] combo list.**

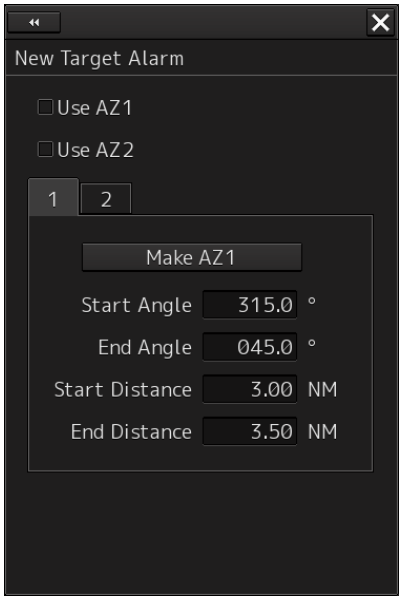
ACT & Sleep: Activated AIS targets and sleeping AIS targets are included.
ACT: Activated AIS targets are included.
Off: CPA/TCPA alarms are not generated.

10.3 New Target Alarm Generation Conditions

When you select [New Target Alarm] in the classification panel, the [New Target Alarm] dialog is displayed in the edit panel.

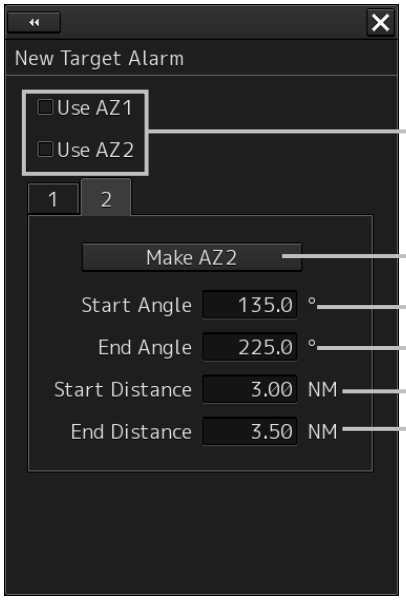
In this dialog, it is possible to set the AZ (automatic acquisition/activation zone) and switch the AZ to enable/disable.

For the details of the setting of the AZ, refer to "6.5.1.1 Automatic acquisition mode".



Settings of AZ1

(Automatic Acquisition/Activation



When one of these is selected, AZ1 or AZ2 takes effect.

When this is clicked on, the cursor mode is set to a Make AZ mode.

Enter the start angle.

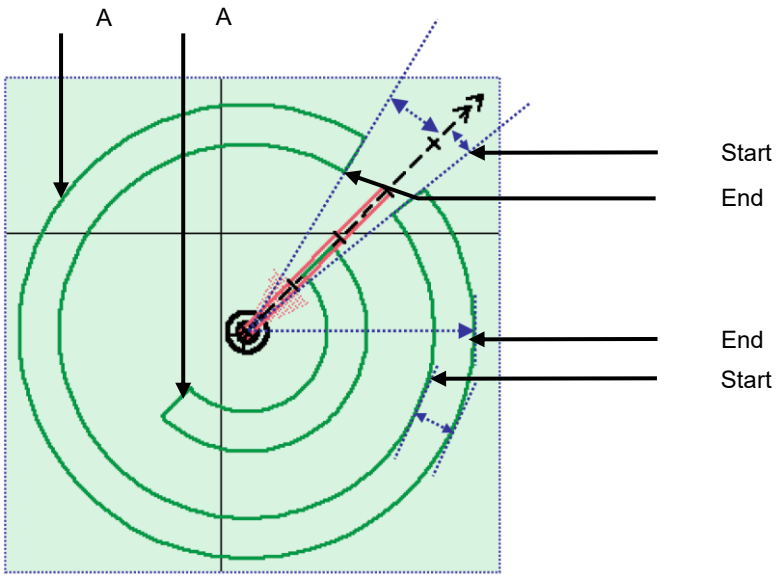
Enter the end angle.

Enter the start distance.

Enter the end distance.

Settings of AZ2

(Automatic Acquisition/Activation



10.3.1 Switching AZ1/AZ2 to enable/disable

10.3.1.1 Enabling AZ1 or AZ2

Select the [Use AZ1] or [Use AZ2] check box.
A TT target / AIS target in the applicable AZ is automatically acquired / activated and it becomes a target of collision detection.
A "  " mark and identification number are assigned to the acquired TT target on the radar screen, which are moved together with the TT target, and then a vector is displayed within 1 min.

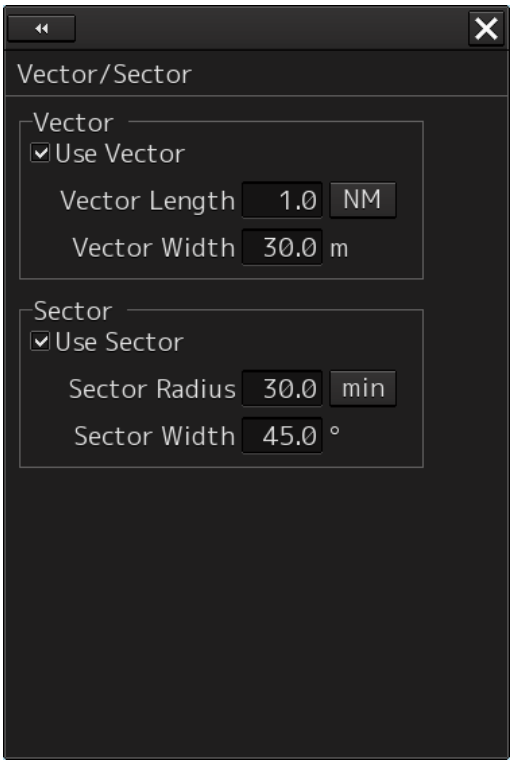
10.3.1.2 Disabling AZ1 or AZ2

Clear the [Use AZ1] or [Use AZ2] check box.
Acquired and activated zones disappear from the RADAR screen. However, already acquired TT targets are continuously tracked. Moreover, activated AIS targets remain activated.

10.4 Setting Up Vector/Sector

When [Vector/Sector] is selected in the classification panel, the [Vector/Sector] dialog is displayed in the edit panel.

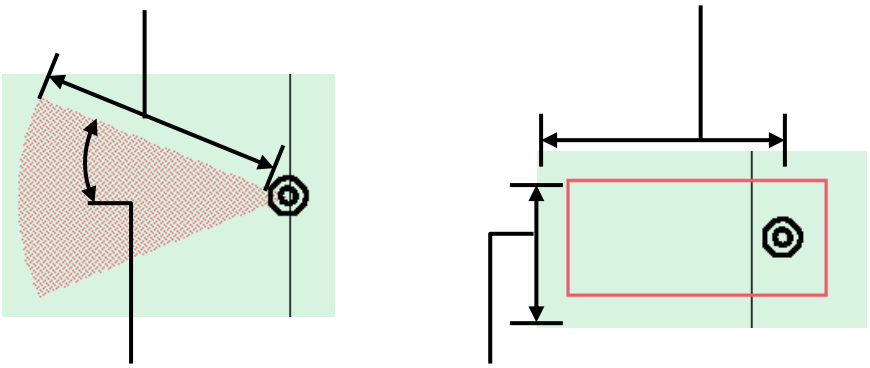
In this dialog, the selection of the sizes of both a danger detection vector/sector and the switching to enable/disable of them are possible.



This unit can monitor when own ship tries to cross over the preset safety contour or danger area, or when dangerous objects enter the sector specified around own ship. For this monitoring, danger detection vectors and sectors can be displayed. As for danger detection vectors, detection ranges for crossover of safety contours and danger areas can be specified in units of minutes or nautical miles, and notches on vectors and tips of vectors indicate predicted positions if navigated at the current speed. Also, the radius of a sector can be set up in units of miles or minutes.

Radius of a danger detection sector
(1.0 min to 30.0 min/0.1 NM to 5.0 NM)

Length of a dangerous detection vector
(1.0 min to 30.0 min/0.1 NM to 5.0 NM)



Angle of a danger detection sector
(0.1 degrees to 360.0 degrees)

Width of a dangerous detection vector
(Width of own ship to 25.0 m)

Dangerous Detection Vector and Sector

10.4.1 Switching to enable/disable a danger detection vector/sector

To enable a danger detection vector/sector, select [Use Vector] and/or [Use Sector] check box.
A danger detection vector and a danger detection sector appear on the chart.
To disable a danger detection vector/sector, clear [Use Vector] and/or [Use Sector] check box.
A danger detection vector and a danger detection sector disappear from the chart.

10.4.2 Setting up the size of a danger detection vector

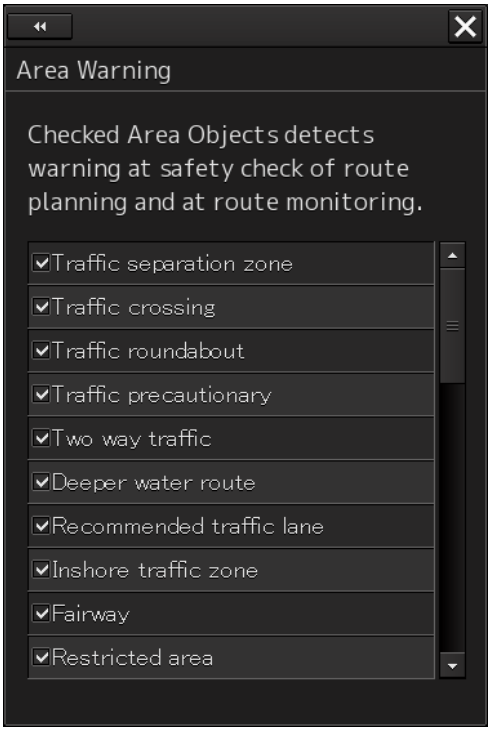
1. **Enter a value in [Vector Length].**
   Specify it in a range between 1.0 and 30.0 min or between 0.1 and 5.0 NM.
   The unit of the vector length can be switched between min and NM by clicking on the Change Unit button,
2. **Enter a value in [Vector Width].**
   Specify the vector width in a range between own ship's beam and 250.0 m.

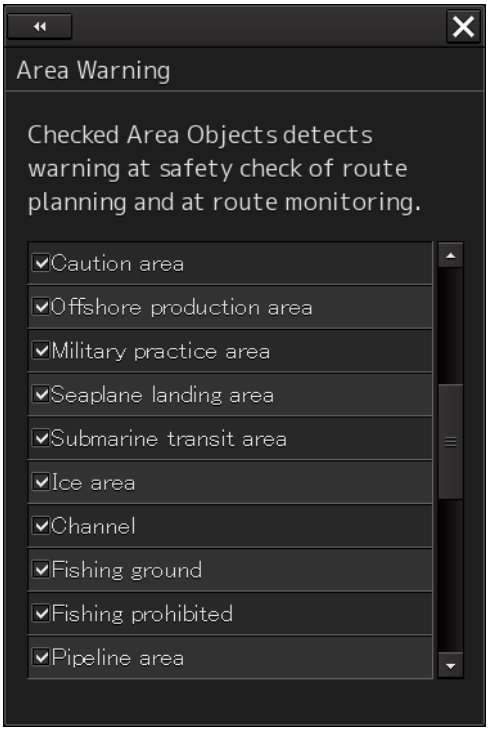
10.4.3 Setting up the size of a danger detection sector

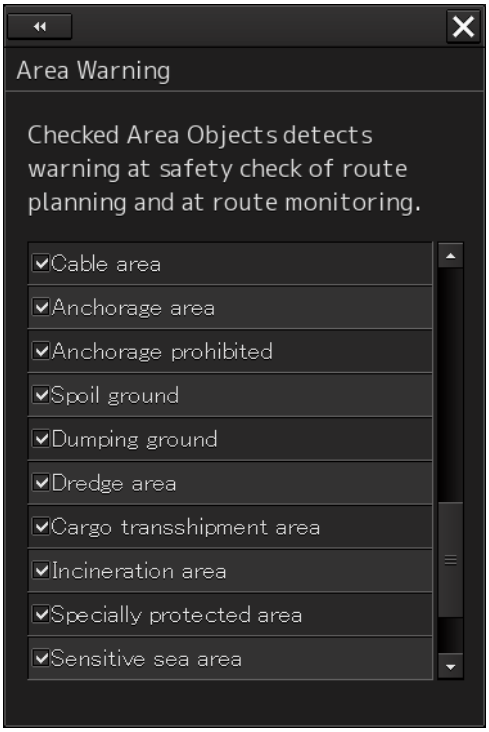
1. **Enter a value in [Sector Radius].**
   Specify it in a range between 1 and 30 min or between 0.1 and 5.0 NM.
   The unit of the sector radius can be switched between min and NM by clicking on the Change Unit button,
2. **Enter a value in [Sector Width].**
   Specify the sector width in a range between 0.1 and 360.0°.

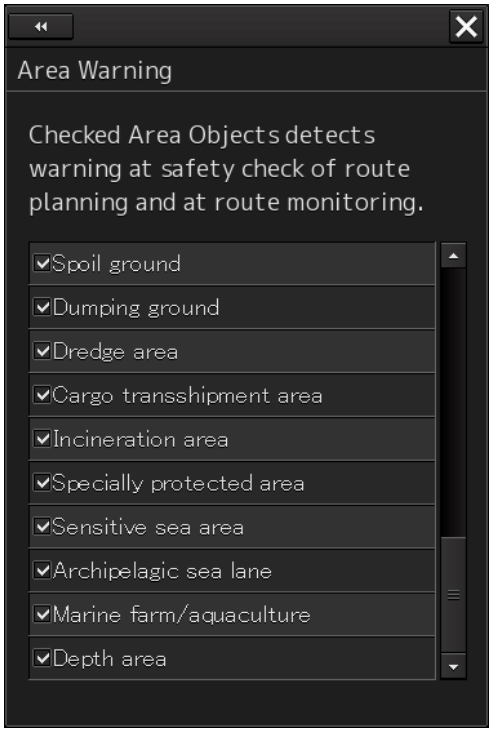
10.5 Area Warning Generation Conditions

When [Area Warning] is selected in the classification panel, the [Area Warning] dialog is displayed. In this dialog, set an area for generating a warning when the symbol on the chart touches the danger detection vector.









Select the check box of the area that is targeted for the alarm.
Clear the check box of the area not to be targeted for the alarm.

10.6 Position Integrity Alert Generation Conditions

When [Position Integrity] is selected in the classification panel, the [Position] dialog is displayed.
In this dialog, the generation condition of the Position monitor warning and the HDOP limit can be set up.

10.6.1 Setting up the generation condition of the Position monitor warning

Enter the following threshold values for generating the position monitor warning.

Position Difference Limit:
The difference in distances when two GPS positions are compared at every second is used as a threshold value. Specify the difference in a range between 0.010 and 9.990 NM.

> **Note**
> Position Difference Limit takes effect when two GPSs are installed.

Radius Limit (GPS):
The radius of a monitoring circle having the predicted position of a GPS 1 sec later at the center is used as a threshold value. If the position actually measured is not within the time monitoring circle specified in [Time Limit], it will be subjected to an alert. Specify the radius limit in a range between 10 and 100 m.

Radius Limit (DGPS):
The radius of a monitoring circle having the predicted position of DGPS 1 sec later at the center is used as a threshold value. If the position actually measured is not within the time monitoring circle specified in [Time Limit], it will be subjected to an alert. Specify the radius limit in a range between 10 and 100 m.

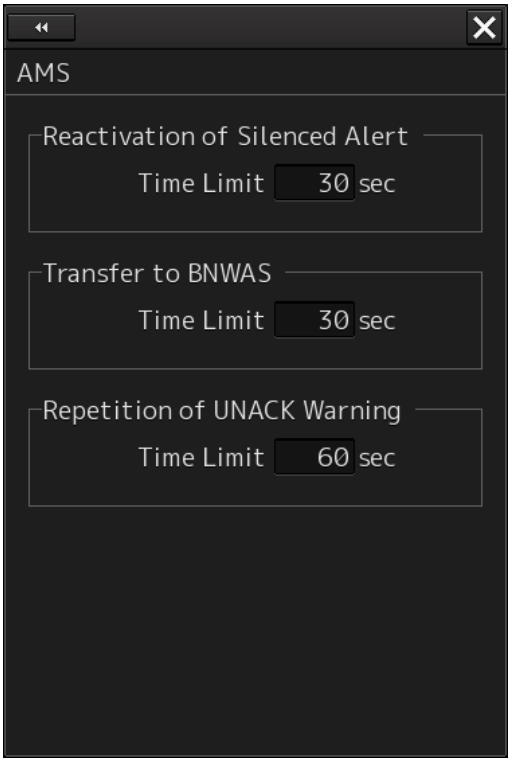
Time Limit:
The time during which the position actually measured by a GPS/DGPS deviates from the monitoring circle is used as a threshold value. The time limit can be specified in a range between 1 and 29s.

10.6.2 Setting up the HDOP exceeded caution generation condition

In the [HDOP Limit] combo box, select a threshold limit of HDOP (Horizontal Dilution of Precision). Select either one of [4], [10] and [20].

10.7 Setting up Alert Processing

When [AMS] is selected in the classification panel, the [AMS] dialog is displayed on the edit panel. In this dialog, the time to activate the action at the next stage when acknowledge is not performed for an alert can be set up.



Enter the wait time until an alert at the next stage is generated in [Time Limit].

Reactivation of Silenced Alert:
Set, in a range between 0 and 60s., the time required to reactivate the alert sound that was silenced temporarily.

Transfer to BNWAS:
When a BNWAS (Bridge Navigational Watch Alarm System) is connected, specify the time to transfer an unacknowledged alert to the BNWAS in a range between 0 and 60s.

Repetition of UNACK Warning:
Specify the time to regenerate an unacknowledged alert as an audible warning in a range between 0 and 300s. A warning will be generated repeatedly until it is acknowledged.

Note
- This is not applicable to the ECCW (Early Course Change Warning).

10.8 Setting Up the Alert Timer

When [Timer] is selected in the classification panel, the [Timer] dialog is displayed on the edit panel. In this dialog, the time to generate an alarm can be set up.

10.8.1 Setting up the timer

To turn on the timer, select the [(LMT)] check box.
To turn off the timer, clear the [(LMT)] check box.

10.8.2 Setting up the time

When you click on the [Timer(LMT)] input box, the numeric value input keyboard appears. Specify the time at which to generate an alarm in a range between 00:00 and 23:59.
For the use of the numeric value input keyboard, refer to "3.16.2 Name and function of each section of the keyboard".

11 Setting up the Operation Mode

11.1 Basic Operation of the [Settings] Dialog Box

You can set up the operation mode in the [Settings] dialog box.

Click on the [Menu] button on the left toolbar.

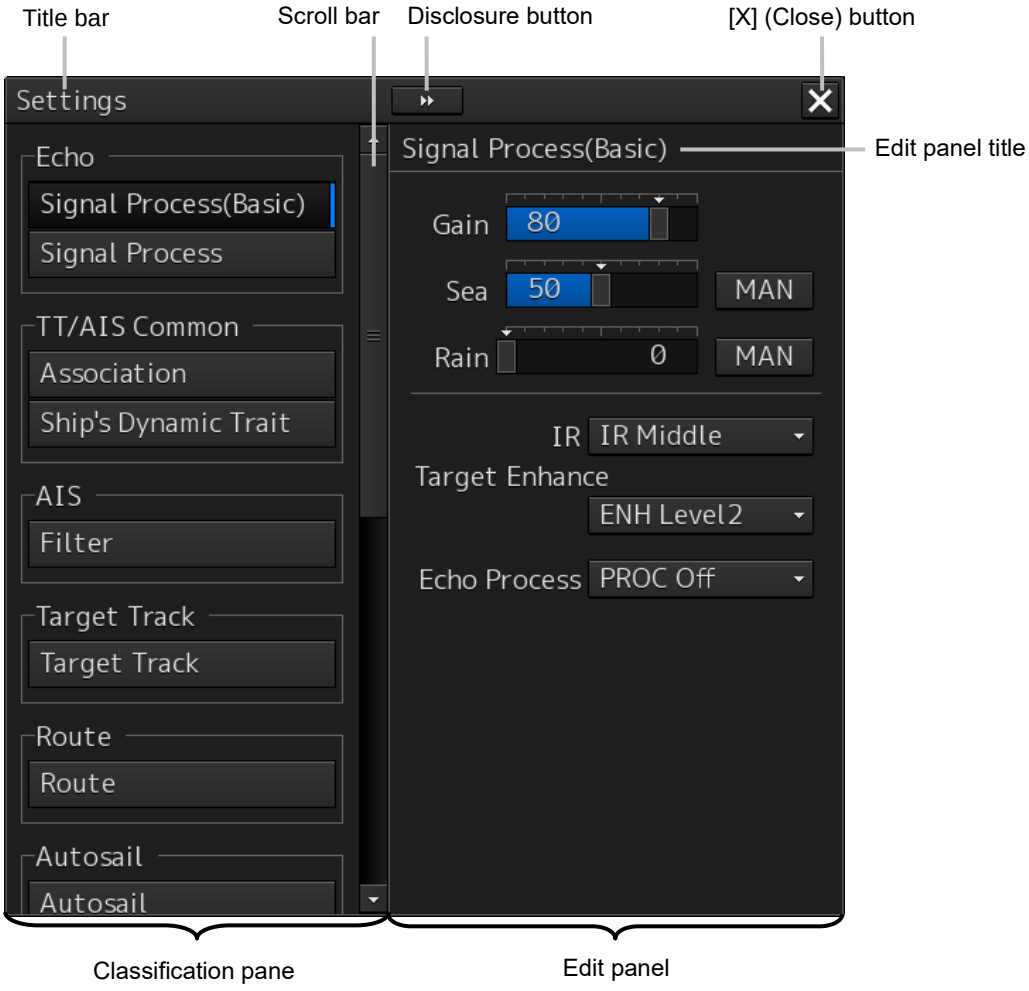
The menu is displayed.

Click on the [Settings] button.

The [Settings] dialog box appears.

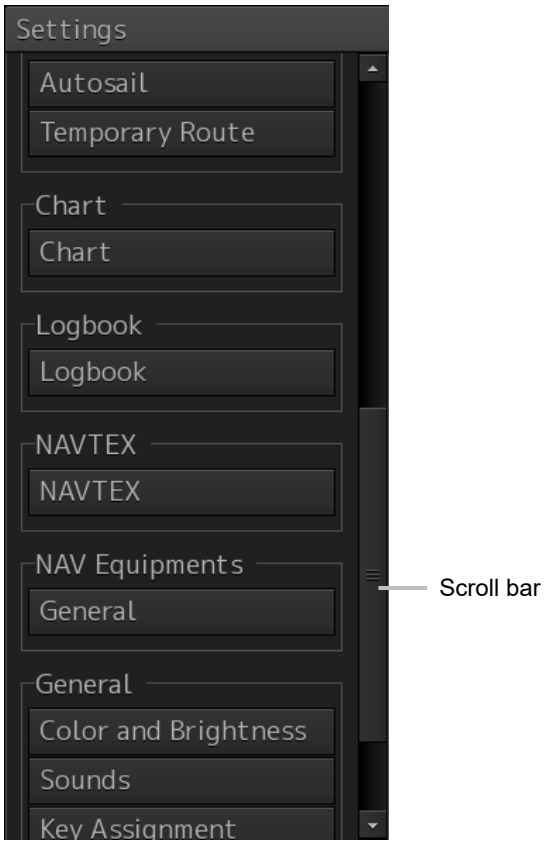
The [Settings] dialog box consists of the classification panel and the edit panel.

Click on the Disclosure button (>>) to hide the classification panel. To show the edit panel again, click on the Disclosure button (<<).



Display Example

When all the classification panels are not displayed, drag the scroll bar upwards and downwards.



Display example

Click on the item you want to set up in the classification panel.

The setup dialog of the item you selected is displayed.

Set up in the edit panel.

Classification panel display targets

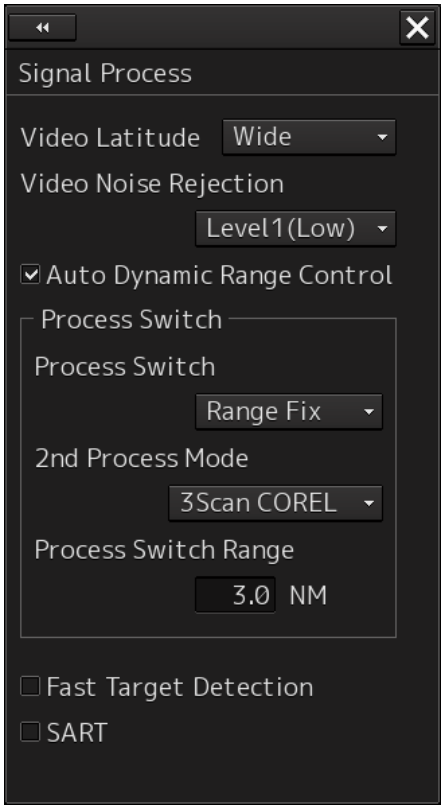
The table below provides the descriptions of the classification panels that are displayed.

Classification panel	Related section
Signal Process	11.2 Setting Radar Signal Processing
Obs, Scene Preset	11.3 Presetting Each Observation Scene
Trails	11.4 Setting Other Ship’s Radar Trails
TXRX	11.5 Setting Radar Antennas
Association	11.6 Setting Associations
Ship’s Dynamic Trait	Setting Own Ship's Dynamic Trait 18.8 Setting Dynamic Traits of Own Ship
TT Test	11.8 Setting Operation Tests
Filter	11.9 Setting AIS Filters
Target Track	11.10 Setting the Target Track Function to ON/OFF
General	11.11 Setting Navigation Equipment
Color and Brightness	11.12 Setting Colors and Brightness
Sounds	11.13 Setting Sounds
Key Assignment	11.14 Setting Key Assignment
Preferences	11.15 Setting Preferences Information
Screen capture	11.16 Setting Screen Capture

11.2 Setting Radar Signal Processing

Set [Signal Process] in the classification panel.

Set various processing methods for radar signals in the setting dialog of the edit panel.



Setting Item	Description of Setting	Setting Value
Video Latitude	Set up the gradation of the radar video.	Narrow Normal Wide Super Wide
Video Noise Rejection	Set up to remove noise and signals which are considered to be clutters of radar video.	Off Level1(Low) Level2(High)
Auto Dynamic Range Control	When this is selected, the dynamic range is automatically adjusted.	To enable: Select. To disable: Clear.
Process Switch	Specify a particular area and set up a mode for performing video processing on the inside and outside of the particular area.	Off Range Fix AUTO
2nd Process Mode	Set up a processing mode used in the outside of the particular area. This is enabled when other than [Off] is being selected in the Process Switch combo box.	PROC Off 3Scan CORREL 4Scan CORREL 5Scan CORREL Remain Peak Hold

Process Switch Range	Set up the boundary range of a particular area. Enabled when [Range Fix] is selected in the Process Switch combo box.	0.1 to 25.5 NM
Fast Target Detection	When this item is enabled, high-speed moving targets that are suppressed by the scan correlation processing can be detected more easily.	To enable: Select. To disable: Clear.
SART	If it is enabled, the Radar Transponder (SART: Search and Rescue Radar Transponder) screen can be displayed.	To enable: Select. To disable: Clear.

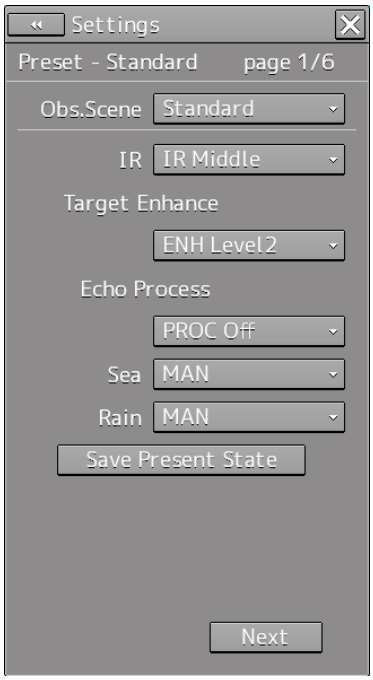
11.3 Presetting Each Observation Scene

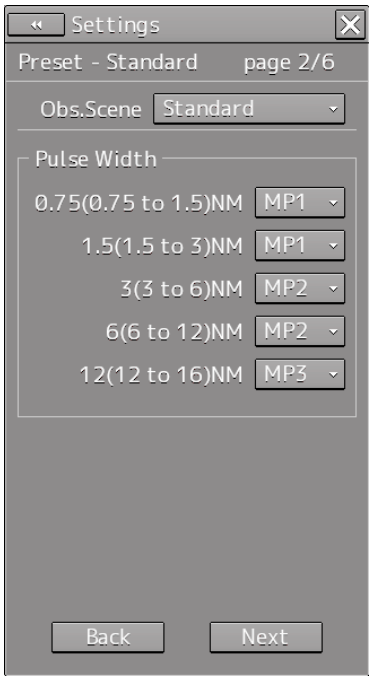
⚠CAUTION
Adjust the preset of the observation scene according to the oceanographic condition, with the thorough understanding of the features of the radar signal processing setting. The optimum radar performance may not be able to be demonstrated due to the contents of the changed setting or the oceanographic condition at that time.

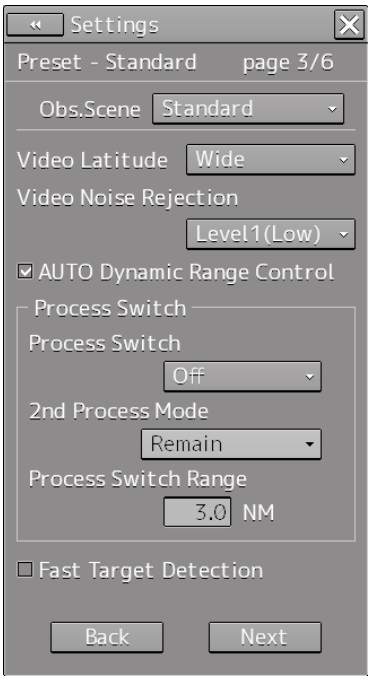
There are 12 types of observation scenes; you can preset each observation scene.
When you select [Obs, Scene Preset] in the classification panel, the items that can be preset are divided into six setup dialogs, which are then displayed in the edit panel.

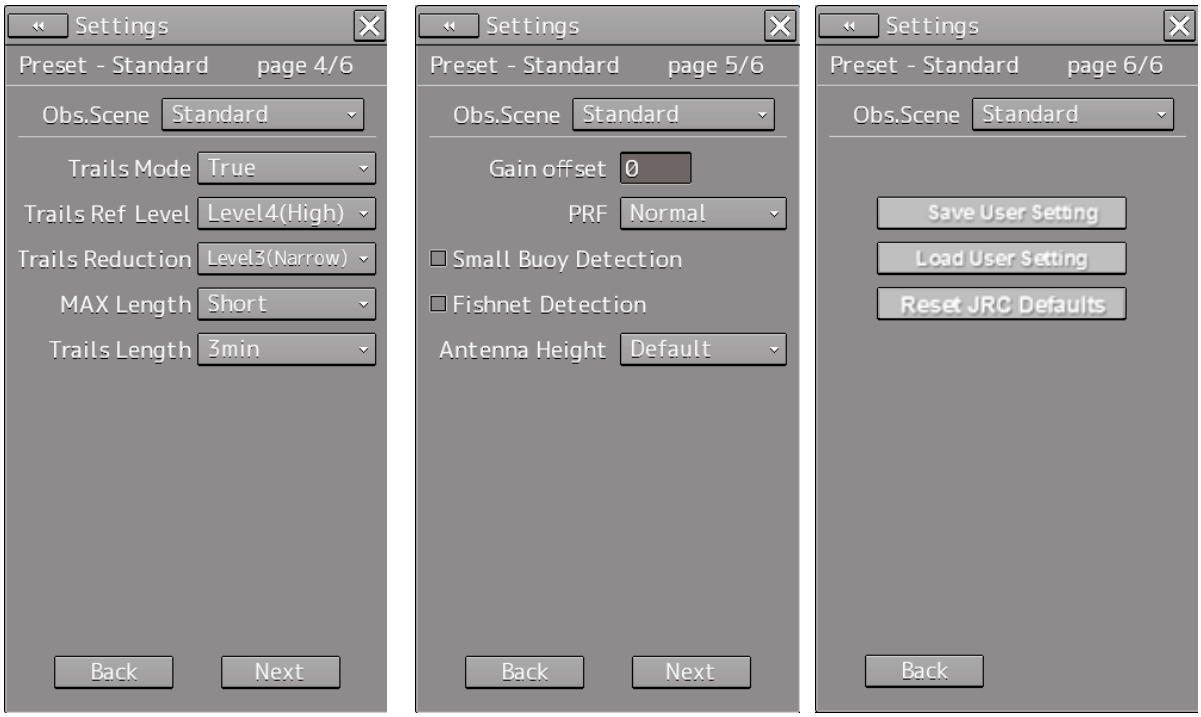
To proceed to the next page: Click the [Next] button.

To return to the previous page: Click the [Back] button.









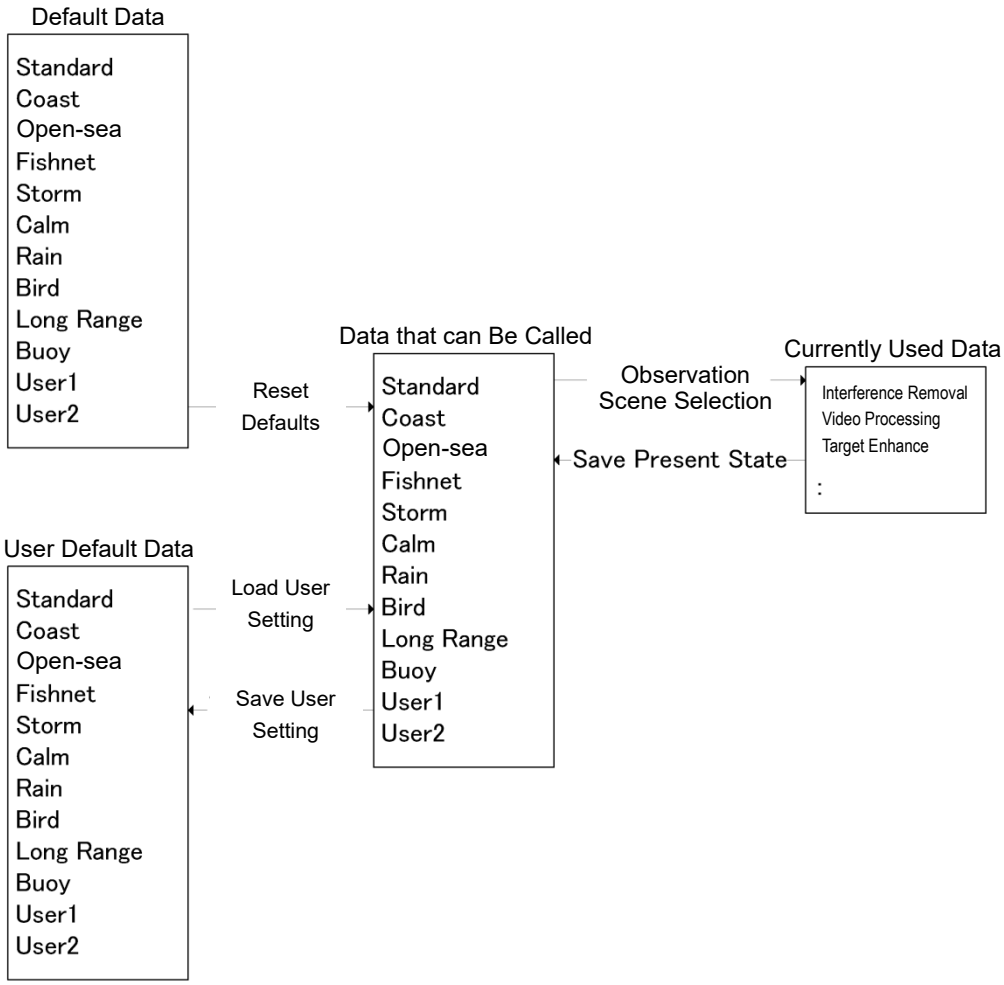
Setting Item	Description of Setting	Setting Value
Obs.Scene	Set up the observation scene.	Standard Coast Open-sea Fishnet Storm Calm Rain Bird Long Range Buoy User1 User2
IR	Set up the IR (Interference Removal) function.	Off IR Low IR Middle IR High
Target Enhance	Set up the Target Enhance function.	ENH Off ENH Level1 ENH Level2 ENH Level3

Echo Process	Set up the Echo Process function. If the ship's heading cannot be acquired, [PROC Off] is set.	PROC Off 3 Scan CORREL 4 Scan CORREL 5 Scan CORREL Remain Peak Hold
Sea (sea clutter adjustment)	You can switch between MAN and AUTO.	MAN: Manually removes sea clutters. AUTO: Automatically removes sea clutters.
Rain (rain/snow clutter adjustment)	You can switch between MAN and AUTO.	MAN: Manually removes rain/snow clutters. AUTO: Automatically removes rain/snow clutters.
0.75 (0.75 to 1.5) NM	Select a pulse with of 0.75 NM range.	<Radar Antenna 10kW> SP1/MP1 <Radar Antennas 25kW, 30kW> SP1/MP1 <Solid state> SP1/MP1
1.5 (1.5 to 3) NM	Select a pulse width of 1.5 NM range.	<Radar Antenna 10kW> SP1/MP1/MP2 <Radar Antennas 25kW, 30KW> SP1/MP1/MP2/MP3 <Solid state> SP1/MP1/MP2
3 (3 to 6) NM	Select a pulse width of 3 NM range.	<Radar Antenna 10kW> SP1/MP1/MP2/LP1 <Radar Antenna 25kW> SP1/MP1/MP2/MP3/LP1 <Radar Antenna 30KW> MP1/MP2/MP3/LP1 <Solid state> SP1/MP1/MP2/LP1/LP2
6 (6 to 12) NM	Select a pulse width of 6 NM range.	<Radar Antenna 10kW> SP1/MP1/MP2/LP1/LP2 <Radar Antenna 25kW> SP1/MP1/MP2/MP3/LP1/LP2 <Radar Antenna 30KW> MP1/MP2/MP3/LP1/LP2 <Solid state> MP1/MP2/LP1/LP2

12 (12 to 16) NM	Select a pulse width of 12 NM range.	<Radar Antenna 10kW> SP1/MP1/MP2/LP1/LP2 <Radar Antenna 25kW> SP1/MP1/MP2/MP3/LP1/LP2 <Radar Antenna 30KW> MP1/MP2/MP3/LP1/LP2 <Solid state> MP2/LP1/LP2
Video Latitude	Set up the radar image.	Narrow Normal Wide Super Wide
Video Noise Rejection	Set up to remove noise and signals which are considered to be clutters of radar images.	Off Level1(Low) Level2(High)
Auto Dynamic Range Control	When this is selected, the dynamic range is automatically adjusted.	To enable: Select. To disable: Clear.
Process Switch	Specify an area and set up a mode for performing video processing on the inside and outside of the area.	Off Range Fix AUTO
2nd Process Mode	Set up a processing mode used in the outside of the area. This is enabled when other than [Off] is being selected in the Process Switch combo box.	PROC Off 3Scan CORREL 4Scan CORREL 5Scan CORREL Remain Peak Hold
Process Switch Range	Set up the boundary range of a particular area.	0.1 to 25.5 NM
Fast Target Detection	When this item is enabled, high-speed moving targets that are suppressed by the scan correlation processing can be displayed more easily. This setting takes effect when the [2nd Process Mode] is [PROC3 to 5].	To enable: Select. To disable: Clear.
Trails Mode	Select a radar trail display mode.	True Relative
Trails Ref Level	Set up a video level required to draw radar trails. The higher the level gets, the higher the threshold value for drawing radar trails becomes.	Level1(Low) Level2 Level3 Level4(High)

Trails Reduction	Set up the radar trail reduction processing level. The higher the level gets, the stronger the reduction processing level becomes.	Off Level1(Wide) Level2 Level3(Narrow)
MAX Length	Select the maximum value of the time to display radar trails.	Short Long
Trails Length	Set up the interval for displaying radar trails.	<When Short is specified> Off/15s/30s/1 min/3 min/ 6 min/10 min/15 min/30 min/60 min <When Long is specified> Off/30 min/1 hour/2 hour/3 hour/…(thereafter, at intervals of 1 hour)…/24 hour
Gain Offset	Set up the gain offset for sensitivity compensation.	-32 to 32
PRF	Set up the operation mode of the transmitter's repetition transmission frequency. [Economy] cannot be selected when a solid state radar antenna is connected. If a solid state radar antenna is connected while [Economy] is being selected, the setting will be reset to the default (factory preset) value.	Normal Economy High Power
Small Buoy Detection	Turn On/Off the small target detection mode.	To enable: Select. To disable: Clear.
Fishnet Detection	Turn On/Off the fishnet detection mode.	To enable: Select. To disable: Clear.
Antenna Height	Set up the radar antenna height. When this is set to [Default], the value that has been set in [Antenna Height] by selecting [Service] - [Adjustment] - [TXRX] is used.	Default -5m 5-10m 10-20m 20m-

Overview of the Observation Scene Preset function

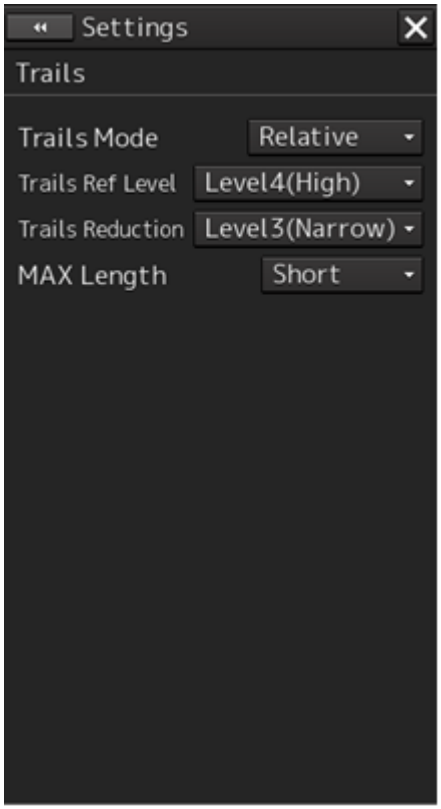


Setting Item	Description of Setting
Save Present State	The current settings are saved as the setting values of the currently selected observation scene. When this item is clicked on, the confirmation screen is displayed. To save the setting, click on [OK] and to cancel the operation, click on [Cancel].
Save User Setting	Data that can be called is saved as the user default values of the selected observation scene. When this item is clicked on, the confirmation screen is displayed. To save the setting, click on [OK] and to cancel the operation, click on [Cancel].
Load User Setting	Load the user default values to the data that can be called. When this item is clicked on, the confirmation screen is displayed. To call the set data, click on [OK] and to cancel the operation click on [Cancel].
Reset Defaults	Load the default values to the data that can be called. When this item is clicked on, the confirmation screen is displayed. To call the set data, click on [OK] and to cancel the operation click on [Cancel].

11.4 Setting Other Ship's Radar Trails

Select [Trails] in the classification panel.

Set other ship's radar trails in the setting dialog of the edit panel.

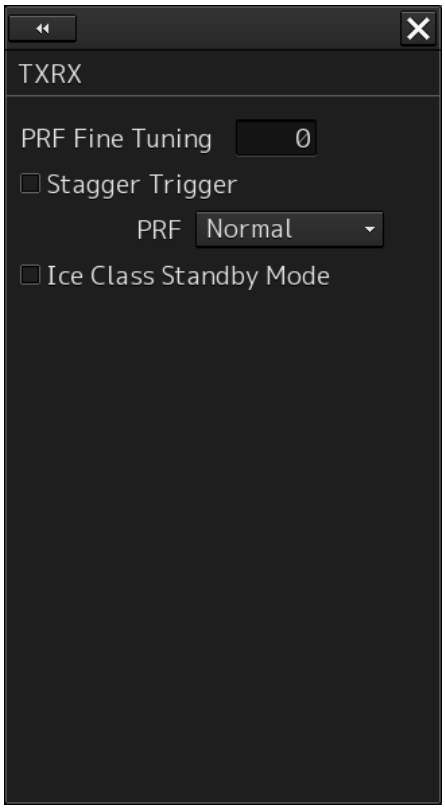


Setting Item	Description of Setting	Setting Value
Trails Mode	Select a radar trail display mode.	True Relative
Trails Ref Level	Set up a video level required to draw radar trails. The higher the level gets, the higher the threshold value for drawing radar trails becomes.	Level1(Low) Level2 Level3 Level4(High)
Trails Reduction	Set up the radar trail reduction processing level. The higher the level gets, the stronger the reduction processing level becomes.	Off Level1(Wide) Level2 Level3(Narrow)
MAX Length	Select the maximum value of the time to display radar trails.	Short Long

11.5 Setting Radar Antennas

Select [TXRX] in the classification panel.

Set radar antennas in the setting dialog of the edit panel.



Setting Item	Description of Setting	Setting Value
PRF Fine Tuning	You can reduce the setting value of the repetition transmission frequency by 0.2% (maximum value is 0).	0 to 31
Stagger Trigger	Select On/Off of the Radio Wave Interference Reduction function. It is not displayed when a solid state radar antenna is connected. The previous setting value is maintained, however.	To enable: Select. To disable: Clear.
PRF	Set up the operation mode of the transmitter's repetition transmission frequency. [Economy] is not displayed when a solid state radar antenna is connected. If a solid state radar antenna is connected while an operation mode is being specified, the setting will be reset to the default value.	Normal Economy High Power
Ice Class Standby Mode	Turn On/Off the Ice Class Standby mode.	To enable: Select. To disable: Clear.

Note

If a small solid state radar antenna is connected, the setting in [Stagger Trigger] will not be saved and it will turn On (its check box is already selected) at each startup.

11.6 Setting Associations

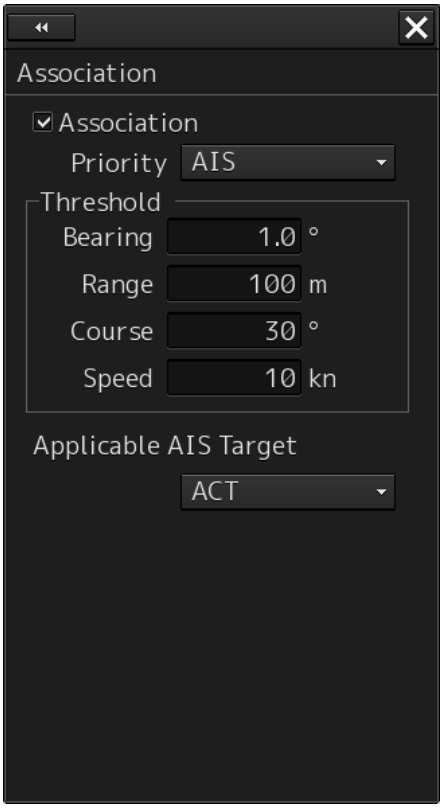
Select [Association] in the classification panel.

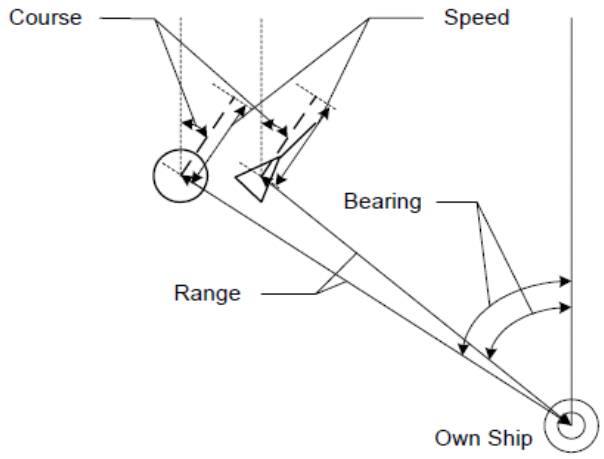
Set TT/AIS in the setting dialog of the edit panel.

The AIS target and the tracking target are checked if they are identical and if so, an association symbol is displayed for the targets. In this case, the AIS target symbol is automatically activated.

Note

If you don't want to perform an identical target judgement, or if you want to display hidden symbols, turn the association setting to Off.



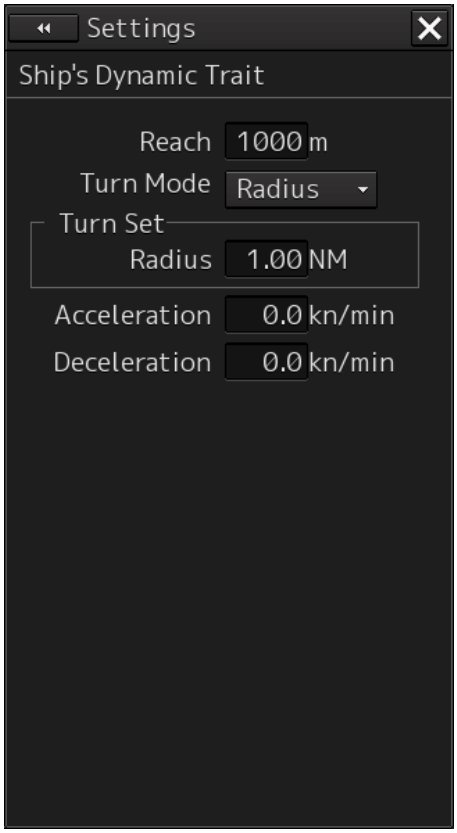


Setting Item	Description of Setting	Setting Value
Association	Turn On/Off the association setting.	To enable: Select. To disable: Clear.
Priority	Select a priority of association target display.	AIS TT
Bearing	Set up the bearing difference of the association target.	0.0 to 9.9°
Range	Set up the range difference of the association target.	0 to 999 m
Course	Set up the course difference of the association target.	0 to 99°
Speed	Set up the speed difference of the association target.	0 to 99 kn
Applicable AIS Target	Select a state of the AIS which will be an association target. Only the AIS target you specified will be an association target.	ACT ACT&Sleep

11.7 Setting Own Ship's Dynamic Trait

Select [Ship’s Dynamic Trait] in the classification panel.

Set dynamic traits of own ship in the setting dialog of the edit panel.

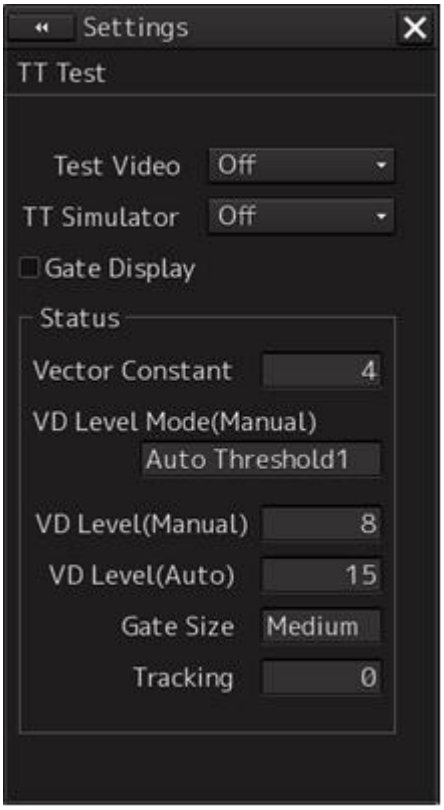


Setting Item	Description of Setting	Setting Value
Reach	Set up the distance to reach the turn.	0 to 2000 m
Turn Mode	Set up the Turn mode.	Radius Rate
Radius	Enter the radius of the turn rate. This is displayed when [Radius] is selected in the [Turn Mode] box.	0.10 to 2.00 NM
Rate	Enter the speed of the turn rate. This is displayed when [Rate] is selected in the [Turn Mode] box.	20 to 720°/min
Acceleration	Enter the rate of change of speed (acceleration) of own ship's dynamic trait.	0.0 to 100.0 kn/mir
Deceleration	Enter the rate of change of speed (deceleration) of own ship's dynamic trait.	0.0 to 100.0 kn/mir

11.8 Setting Operation Tests

Select [TT Test] in the classification panel.

Set an operation test in the setting dialog of the edit panel.



Setting Item	Description of Setting	Setting Value
Test Video	Set up the type of test video.	Off VDIN
TT Simulator	Set up the scenario of the TT Simulator mode.	Off Scenario1 Scenario2 Scenario3 Scenario4 Scenario5 Scenario6
Gate Display	Switches between On/Off of the Gate Display mode.	To enable: Select. To disable: Clear.
Vector Constant	Set up the vector's tracking performance.	1 to 8
VD Level Mode (Manual)	Display the threshold value display method of the quantization mode at manual acquisition.	Auto Threshold1 Auto Threshold2 Manual Threshold

VD Level (Manual)	Set up the quantization level when acquiring manually.	0 to 255
VD Level (Auto)	Set up the quantization level when acquiring automatically.	0 to 255
Gate Size	Display the gate size to be used for tracking.	Small Medium Large
Tracking	The number of currently acquired targets is displayed in a range from 0 to the maximum TT display count.	-

11.9 Setting AIS Filters

Select [Filter] in the classification panel.

Set an AIS filter in the setting dialog of the edit panel.

By setting an AIS filter, the AIS target within the area can be displayed preferentially or only the inside of the area can be displayed.

Setting Item	Description of Setting	Setting Value
Sector Filter	When this is selected, the Sector Filter is displayed on the screen and filtering is performed in the operation mode being selected in Filtering mode.	To enable: Select. To disable: Clear.
Start Angle	Set up the starting angle of the Sector Filter. The angle value indicates the relative bearing based on the ship's heading as the reference. When entry is confirmed, the entered value takes effect immediately.	0.0 to 359.9°
End Angle	Set up the end angle of the Sector Filter. The angle value indicates the relative bearing based on the ship's heading as the reference. When entry is confirmed, the entered value takes effect immediately.	0.0 to 359.9°
Ring Filter	When this is selected, the Ring Filter is displayed on the dialog box and filtering is performed in the operation mode being selected in Filtering mode.	To enable: Select. To disable: Clear.

Distance	Set up the distance of the Ring Filter. When entry is confirmed, the entered value takes effect immediately.	0.0 to 120.0 NM
Filtering Mode	Select an operation mode of the AIS filter. Display: AIS targets cannot be displayed outside of the AIS filter range. Priority: Priority is determined within the range of the AIS filter and AIS targets are displayed based on the priority.	Display Priority

Creating a filter in the dialog

Creating a Sector Filter

1 Click on the [Sector] tab.

Click on [Make AIS Filter].

The button is highlighted and the cursor mode is set to the Make AIS Filter mode.

Move the cursor, place it on the starting angle of the Sector filter you want to set up, and then click on it.

Move the cursor, place it on the end angle of the Sector filter you want to set up, and then click on it.

Creating a Ring Filter

2 Click on the [Ring] tab.

Click on [Make AIS Filter].

The button is highlighted and the cursor mode is set to the Make AIS Filter mode.

Move the cursor, place it on the distance of the Ring filter you want to set up, and then click on it.

Note

When the AZ function is ON, a distance smaller than the outer arc of AZ cannot be set for the Ring filter.

Memo

<Priority setting>

The sleeping AIS in the AIS filter has a higher priority than the sleeping AIS outside of the AIS filter (preferentially displayed).

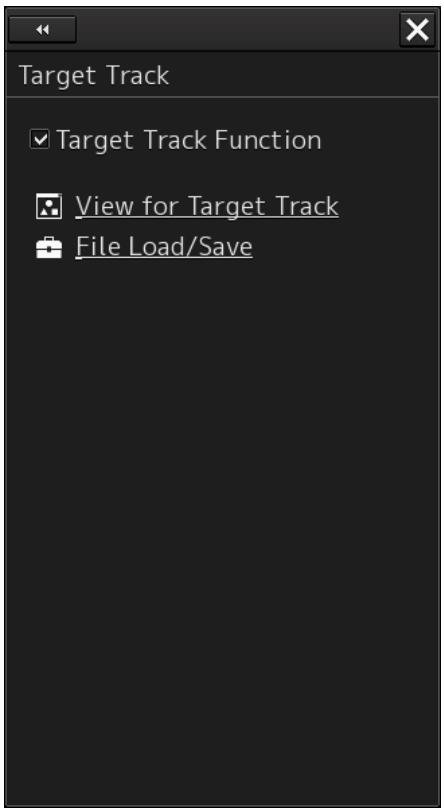
<AIS Filter OFF>

The sleeping AIS in the AIS filter has the same prioirty as the sleeping AIS outside of the filter.

11.10 Setting the Target Track Function to ON/OFF

Select [Target Track] in the classification panel.

Set the target track function to ON/OFF in the setting dialog of the edit panel.



Setting Item	Description of Setting	Setting Value
Target Track Function	Turn On/Off the target track function.	To enable: Select. To disable: Clear.

Shortcuts

Click on any of the following shortcuts to display the related dialog box.

Shortcut	Settings Dialog Box
View for Target Track	[Target Track] dialog box
File Load/Save	[File Manager] dialog box

11.11 Setting Navigation Equipment

Select [General] in the classification panel.

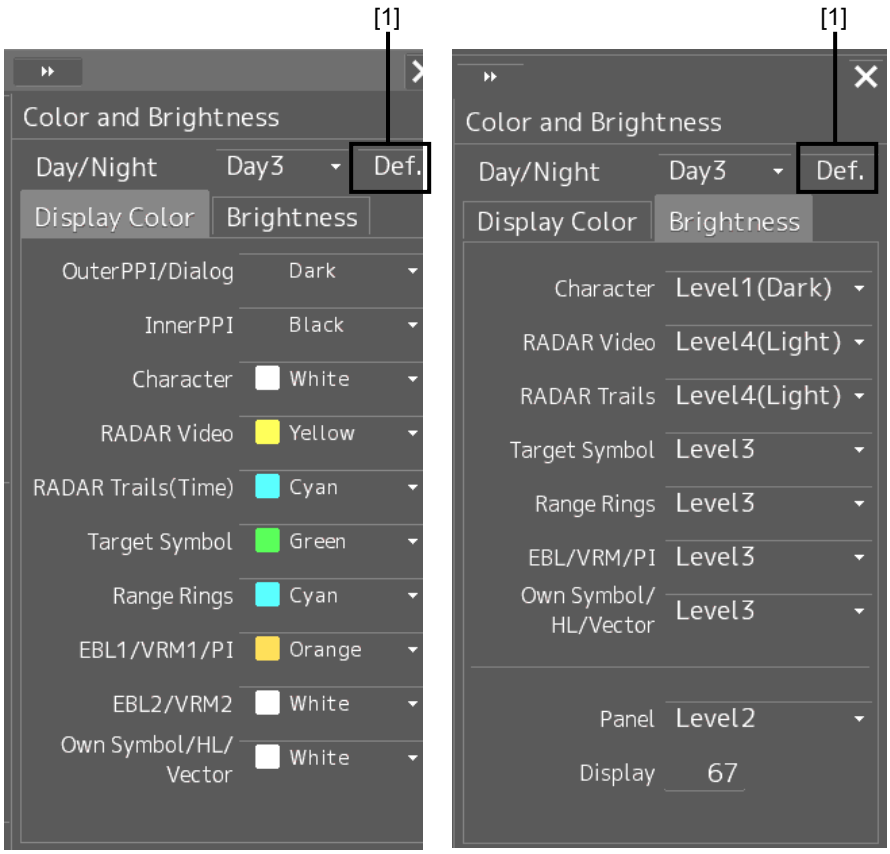
Set navigation equipment in the setting dialog of the edit panel.

Setting Item	Description of Setting	Setting Value
GYRO Setting	Enter the initial value of the gyro.	0.0 to 359.9°

11.12 Setting Colors and Brightness

Select [Color and Brightness] in the classification panel.

Set the color and the brightness of the display contents in the setting dialog of the edit panel.



[1] [Def.] (default value) button

When this button is clicked on, all the setting items of the mode that is selected on the [Day/Night] combo box are reset to the default values.

Setting Item	Description of Setting	Setting Value
[Display Color] tab		
Outer PPI/Dialog	Set up the color outside the PPI. The label changes depending on the screen to be called. The label will be Outer PPI/Dialog for the RADAR screen, and Dialog for others.	Dark [default] Black
Inner PPI	Set up the color inside the PPI. This item is displayed only on the RADAR screen.	Blue Dark Blue Black [default]
Character	Set up the text color.	White [default] Green
RADAR Video	Set up the color of radar video.	Yellow [default] Green Orange Purple Dark Red
RADAR Trails(Time)	Set up the color of radar trails. This item is displayed only on the RADAR screen.	White Blue Cyan [default] Green
Target Symbol	Set up the color of the target symbol.	White/Black*1 Cyan Green [default] Orange
Range Rings	Set up the color of range rings.	White/Black*1 Cyan [default] Green Orange
EBL1/VRM1/PI	Set up the color of EBL1, VRM1 and parallel index lines.	White/Gray*1 Cyan Green Orange [default]
EBL2/VRM2	Set up the color of EBL2 and VRM2.	White/Gray*1 [default] Cyan Green Orange
Own Symbol/HL/Vector	Set up the color of own ship symbol, heading line and vector.	White/Black*1 [default] Cyan Green, Orange

Setting Item	Description of Setting	Setting Value
[Brightness] tab		
Character	Set up the text brilliance.	Level1(Dark) [default of Day 3] Level2 [default of Day 2, Dusk] Level3 [default of Day 1] Level4(Light) [default of Night]
RADAR Video	Set up the brilliance of radar video.	Level1(Dark) Level2 Level3 Level4(Light) [default]
RADAR Trails	Set the brightness of the radar image trail.	Level1(Dark) Level2 Level3 Level4(Light) [default]
Target Symbol	Set up the brilliance of the target symbol.	Level0(Dark) Level1 Level2 Level3 [default of Day3/Dusk/Night] Level4(Light) [default of Day1/2]
Range Rings	Set up the brilliance of range rings.	Level1(Dark) Level2 [default of Night] Level3 [default of DAY3/Dusk] Level4(Light) [default of Day1/2]
EBL/VRM/PI	Set up the brilliance of EBL, VRM and parallel index lines.	Level1(Dark) Level2 Level3 [default of DAY3/Dusk/Night] Level4(Light) [default of Day1/2]
Own Symbol/HL/Vector	Set up the brilliance of own ship symbol, heading line and vector.	Level1(Dark) Level2 Level3 [default of DAY3/Dusk/Night] Level4(Light) [default of Day1/2]

Setting Item	Description of Setting	Setting Value
Panel	Set the brightness of the operation unit.	Off Level1(Dark) [default of Dusk/Night] Level2 [default of Day3] Level3 [default of Day2] Level4(Light) [default of Day1]
Display	Set the value that is input in the box for the brightness of the display unit.	0 to 100*2

The brightness default values are as follows.

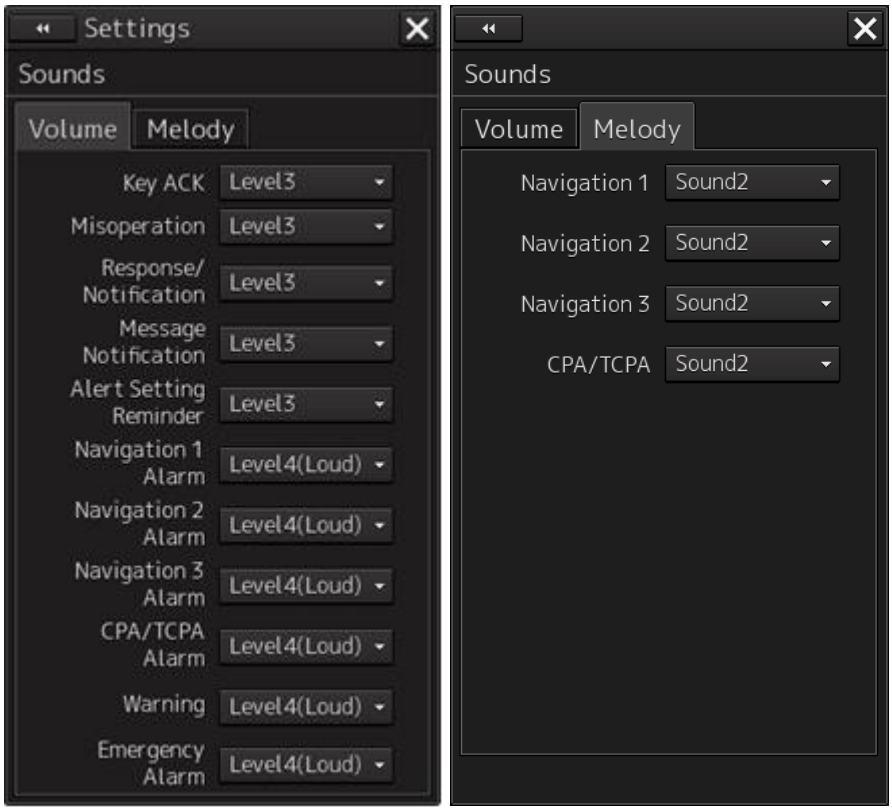
26inch screen	19inch screen
Day1/Day2/Day3: 67 Dusk: 60 Night: 11	Day1/Day2/Day3: 42 Dusk: 20 Night: 4

11.13 Setting Sounds

Select [Sounds] in the classification panel.

Set the volumes of the operation sound and operation error sound and alarm melody in the setting dialog of the edit panel.

When the volume or melody is changed, the selected volume or melody is played back, enabling the user to set while listening to the sound.



Setting item	Setting contents	Setting value
[Volume] tab		
Key ACK	Set the volume of the sound emitted when the key is pressed.	Off Level1(Soft) Level2 Level3 [Default] Level4(Loud)
Misoperation	Set the volume of the operation error sound.	Off Level1(Soft) Level2 Level3 [Default] Level4(Loud)
Response/Notification	Set the volume of the control response sound to external equipment and control completion notification sound (including the interswitch control) from external equipment.	Off Level1(Soft) Level2 Level3 [Default] Level4(Loud)
Message Notification	Set the volume of the message notification sound.	Off Level1(Soft) Level2 Level3 [Default] Level4(Loud)
Alert Setting Reminder	Set the volume of the sound notifying that the alarm condition has not been set.	Off Level1(Soft) Level2 Level3 [Default] Level4(Loud)
Navigation 1 Alarm	Set the volume of the navigation alarm sound.*2	Level1(Soft) Level2 Level3 Level4(Loud) [Default]
Navigation 2 Alarm*1		
Navigation 3 Alarm*1		
CPA/TCPA Alarm	Set the volume of the CPA/TCPA alarm sound. *2	Level1(Soft) Level2 Level3 Level4(Loud) [Default]
Warning	Set the volume of the system alarm sound. *2	Off Level1(Soft) Level2 Level3 Level4(Loud) [Default]

Emergency Alarm	Set the volume of the Emergency Alarm sound. *2	Level1(Soft) Level2 Level3 Level4(Loud) [Default]
[Melody] tab		
Navigation 1 Alarm	Set the melody of the Navigation 1 alarm.	Sound1 Sound2[Default] Sound3 Sound4
Navigation 2 Alarm*1	Set the melody of the Navigation 2 alarm.	Sound1 Sound2[Default] Sound3 Sound4
Navigation 3 Alarm*1	Set the melody of the Navigation 3 alarm.	Sound1 Sound2[Default] Sound3 Sound4
CPA/TCPA Alarm	Set the melody of the CPA/TCPA alarm.	Sound1 Sound2[Default] Sound3 Sound4
Warning	Set up the melody of Warning.	Sound1 Sound2[Default] Sound3 Sound4

*1 Navigation 2 Alarm and Navigation 3 Alarm are not practically used.

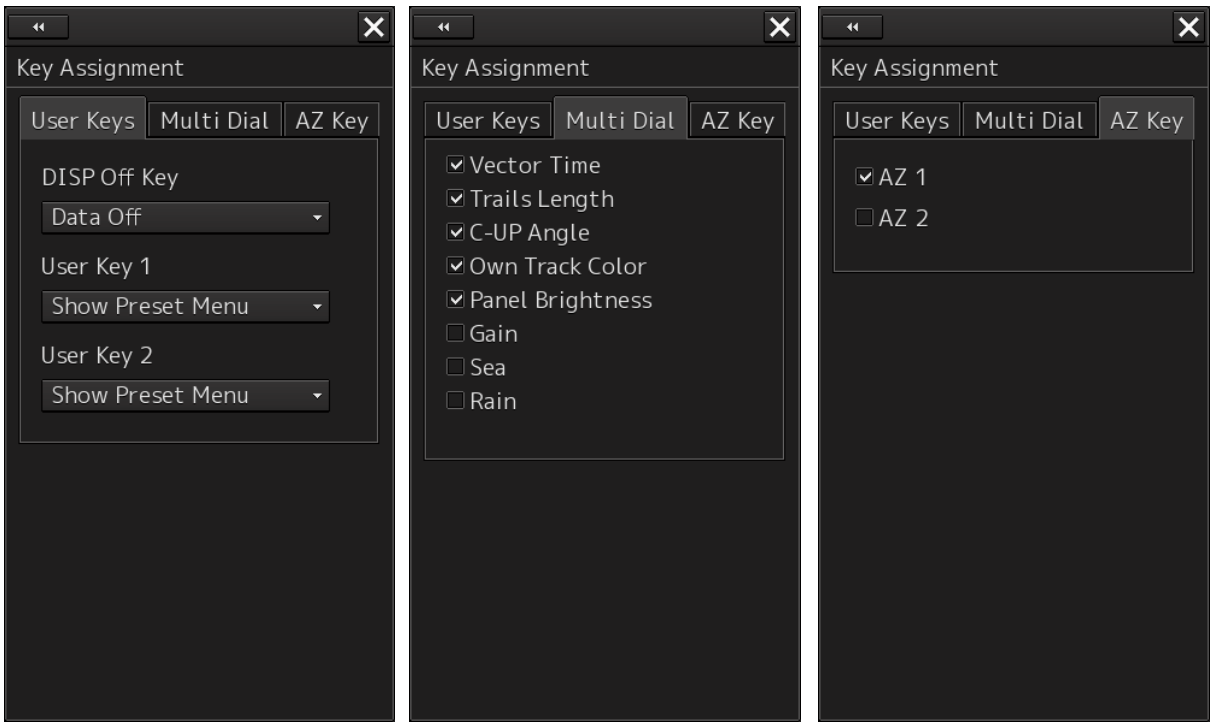
*2 For these volumes, only Level 4 (Loud) may be able to be selected depending on the setting.

11.14 Setting Key Assignment

Select [Key Assignment] in the classification panel.

Set the keys in the operation unit and the function assigned to the [MULTI] dial in the setting dialog of the edit panel.

Only the items whose functions are available on the task screen are displayed on the screen.



The [User Keys] and [AZ Key] tabs are displayed only when the optional operation unit is installed.

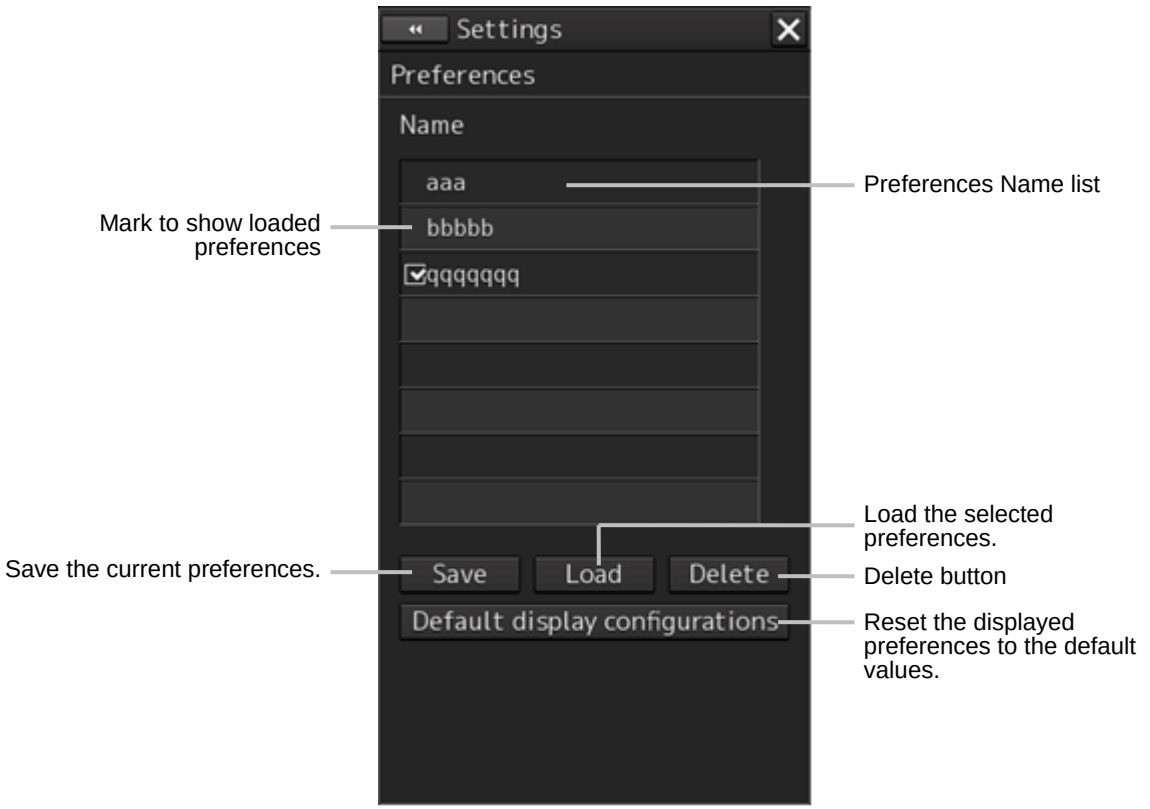
Setting Item	Description of Setting	Setting Value
[User Keys] tab		
DISP Off Key	Select a function to assign to the DISP Off key on the operation unit. [DISP Off Key] is displayed only when the optional operation unit is installed.	-
User Key 1	Select a function to assign to the [USER1] key on the operation unit. [User Key 1] is displayed only when the optional operation unit is installed.	Show Preset Menu Zoom Capture Screen
User Key 2	Select a function to assign to the [USER2] key on the operation unit. [User Key 2] is displayed only when the optional operation unit is installed.	Show Preset Menu Zoom Capture Screen

[Multi Dial] tab		
Vector Time	When this is selected, the vector length setup function will be manipulated with the [MULTI] control.	To enable: Select. To disable: Clear.
Trails Length	When this is selected, the radar trail length setup function will be manipulated with the [MULTI] control.	To enable: Select. To disable: Clear.
C UP Angle	When this is selected, the course adjustment function in the course-up mode will be manipulated with the [MULTI] control..	To enable: Select. To disable: Clear.
Own Track Color	When this is selected, the own ship track color switch function will be manipulated with the [MULTI] control.	To enable: Select. To disable: Clear.
Manual Tune	When this is selected, the manual tuning function will be manipulated with the [MULTI] control. This item is not displayed in the Slave (sub-display) mode, however.	To enable: Select. To disable: Clear.
Display Brightness	When this is selected, the display brightness adjustment function will be manipulated with the [MULTI] control. It cannot be changed since power is always on.	Always enabled.
Panel Brightness	When this is selected, the operation unit brightness adjustment function will be manipulated with the [MULTI] control. This item is always displayed.	To enable: Select. To disable: Clear.
Gain	When this is selected, the gain adjustment function will be manipulated with the [MULTI] control.	To enable: Select. To disable: Clear.
Sea	When this is selected, the sea adjustment function will be manipulated with the [MULTI] control.	To enable: Select. To disable: Clear.
Rain	When this is selected, the rain adjustment function will be manipulated with the [MULTI] control.	To enable: Select. To disable: Clear.
[AZ Key] tab		
AZ 1	When this is selected, AZ1 can be turned On/Off by pressing the [AZ] key. All checked items can be turned On/Off at once by pressing the [AZ] key.	To enable: Select. To disable: Clear.
AZ 2	When this is selected, AZ2 can be turned On/Off by pressing the [AZ] key. All checked items can be turned On/Off at once by pressing the [AZ] key.	To enable: Select. To disable: Clear.

11.15 Setting Preferences Information

Select [Preferences] in the classification panel.

The main operation/setting information relating to each task of RADAR can be stored and called collectively.

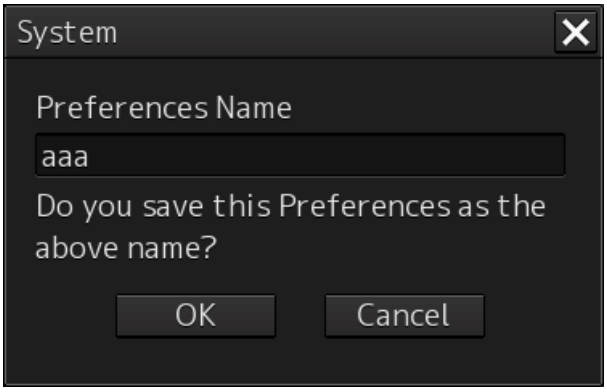


A maximum of 10 preferences names are displayed in the Preferences Name list. If all the file name characters do not fit in the display area, the remaining file name characters will be displayed with an abbreviation symbol (...).

To save a preferences

1 **Click on the [Save] button.**

The confirmation dialog box appears.



Enter a preferences name, and then click on the [OK] button.

The current preferences are saved.

A maximum of 64 characters can be entered for a file name. If all the file name characters do not fit in the display area, the remaining file name characters will be displayed with an abbreviation symbol (...).

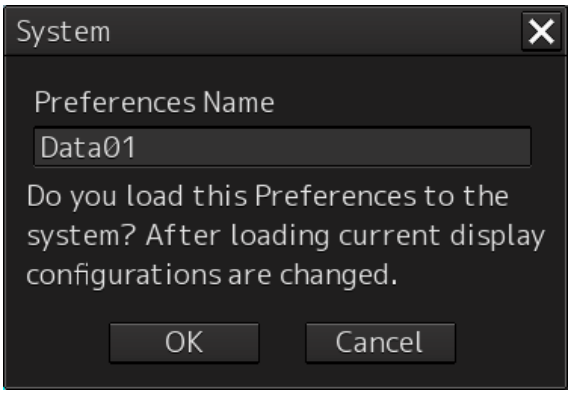
To cancel saving, click on the [Cancel] button.

When saving is completed, an item is added to a blank line in the Preferences Name list.

To load preferences

2 **Select the name of the preferences you want to load, and then click on the [Load] button.**

The confirmation dialog box appears.



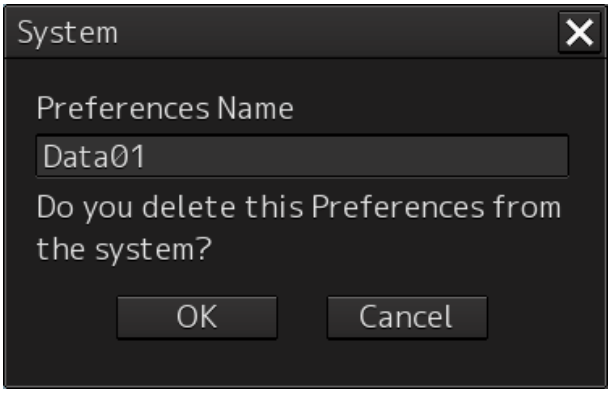
Click on the [OK] button.

The selected preferences are loaded.

A maximum of 64 characters can be entered for a file name. If all the file name characters do not fit in the display area, the remaining file name characters will be displayed with an abbreviation symbol (...).
To cancel loading, click on the [Cancel] button.

To delete preferences

3 Select the name of the preferences you want to delete, and then click on the [Delete] button.



The confirmation dialog box appears. A maximum of 64 characters can be entered for a file name. If all the file name characters do not fit in the display area, the remaining file name characters will be displayed with an abbreviation symbol (...).

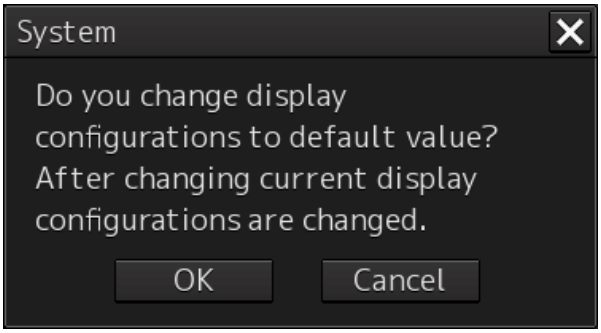
Click on the [OK] button.

The selected preferences are deleted.
To cancel deleting, click on the [Cancel] button.

To set up default display

4 Click on the [Default display configurations] button.

The confirmation dialog box appears.



Click on the [OK] button.

The display configurations are changed to the default values.

To cancel changing, click on the [Cancel] button.

Items of preferences and default display configurations

The items of preferences and default display configurations are shown in the tables below.

Task "Route monitoring"

Item saved	Preferences save target		Factory setting value, value when Default display configurations button is pressed
	Location	Item	
Position sensor	Common screen - Own Ship Information or Maintenance screen - Sensor Selection	Position source	GPS *1
Look-ahead time	Alert - Vector/Sector	Vector function On/Off Vector Length value Vector Length unit Vector Width value Sector function On/Off Sector Radius value Sector Radius unit Sector Width value	Vector function On/Off: On Vector Length value: 6min Vector Length unit: min Vector Width value: 30m Sector function On/Off: On Sector Radius value: 1.0NM Sector Radius unit: NM Sector Width value: 45.0°
Area Boundary	View Common	Area boundary	Symbolized

*1 GPS when there is only one GPS

Task "Collision avoidance"

Item saved	Preferences save target		Factory setting value, value when Default display configurations button is pressed
	Location	Item	
Gain and anti-clutter functions	Radar signal information	Reception sensitivity adjustment value (Gain) Sea clutter adjustment value (Sea) Sea clutter rejection mode Rain/snow clutter adjustment (Rain) Rain/snow clutter rejection mode	Reception sensitivity adjustment value (Gain): 80 Sea clutter adjustment value (Sea): 40 Sea clutter rejection mode: AUTO Rain/snow clutter adjustment (Rain): 50 Rain/snow clutter rejection mode: AUTO
Tuning	Radar system information	Tuning mode AUTO/MAN Fine tuning value (under MAN)	Tuning mode AUTO/MAN: AUTO Fine tuning value (under MAN): 0
Range	Presentation mode information	Range scale	6NM
Fixed rings	Presentation mode information	Range rings display On/Off	Off
AIS Lost Alarm	Alert - Collision Avoidance - AIS Lost Alarm	AIS Lost Alarm AIS Lost Alarm detection target setting On/Off	Off

VRMs	EBL/VRM read information area	VRM1 (VRM2) Display On/Off Control right Distance value EBL1/VRM1 measurement reference point (blank space/C/D and floating position. In the case of C, the information is stored in the form of DC coordinate and in the case of D, the information is stored in the form of latitude/longitude.) Unit of VRM distance (commonly applied to both VRM1 and VRM2)	VRM1: Display On/Off: On Control right: On Distance value: 0.25NM EBL1/VRM1 measurement reference point: Blank space (CCRP) VRM2: Display Off Unit of VRM distance: NM
EBLs	EBL/VRM read information area	RADAR screen - EBL/VRM read information area EBL1 (EBL2) Display On/Off Control right Bearing value EBL bearing True/Relative (commonly applied to both EBL1 and EBL2)	EBL1 Display On/Off: On Control right: On Bearing value: 000.0 EBL bearing True/Relative: True
Parallel index lines	PI (Parallel Index)	RADAR screen – PI (Parallel Index) Display On/Off Control right PI measurement reference point (blank space/C/D and floating position. In the case of C, the information is stored in the form of DC coordinate and in the case of D, the information is stored in the form of latitude/longitude.)	Display On/Off: On Control right: Off Bearing value: 0° Interval: 0.5NM Display for All Lines: On Mode: All Unit: NM Operation Area: One Side Floating: Off Heading Link: Off Reference Bearing: True

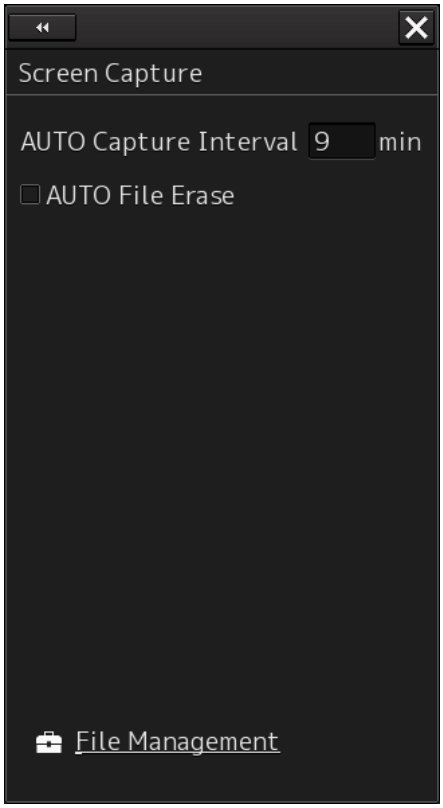
Display mode of the radar picture	Presentation mode information	Motion mode Bearing mode	True motion North-up TM reset position
Stabilization Sea/Ground	Presentation mode information	Stabilization mode (combo box)	GND
Off-centring	Presentation mode information	Off-Centre button→Off-Center On/Off status and Off-Center DC position	Off-center: Off=On center
Target trails	Other ship's information	Trail true/relative Trail length	Trail true/relative: True Trail length: 6min
Past positions	Other ship's information	Past POSN	Off
Vector mode	Other ship's information	Vector/past position true/relative	Relative
Vector time	Other ship's information	Vector Length	6min
Automatic radar target acquisition	Alert - New Target Alarm	AZ1 function On/Off AZ1 Start Angle value AZ1 End Angle value AZ1 Start Distance value AZ1 End Distance value AZ2 function On/Off AZ2 Start Angle value AZ2 End Angle value AZ2 Start Distance value AZ2 End Distance value	AZ1 function On/Off: Off AZ1 Start Angle value: 315.0° AZ1 End Angle value: 045.0° AZ1 Start Distance value: 3.00NM AZ1 End Distance value: 3.50NM AZ2 function On/Off: Off AZ2 Start Angle value: 135.0° AZ2 End Angle value: 225.0° AZ2 Start Distance value: 3.00NM AZ2 End Distance value: 3.50NM
Graphical AIS reported target display	View - Options - Target	AIS Symbol display On/Off	AIS Symbol display On/Off: On

Radar and AIS Target fusion	Settings - TT/AIS - Association	Association function On/Off	On
Collision warning	Other ship's information (Vector/Past POSN/Limit/Trails)	CPA limit TCPA limit	CPA limit: 2.0NM TCPA limit: 12min

11.16 Setting Screen Capture

Select [Screen capture] in the classification panel.

Set the screen capture in the setting dialog of the edit panel.



Setting Item	Description of Setting	Setting Value
AUTO Capture Interval	Set up the interval at which the Screen Capture dialog box is automatically saved. If this is set to 0, the Screen Capture dialog box will not automatically be saved.	0 to 999 min
AUTO File Erase	Specify whether or not to delete the screen shot file automatically.	To enable: Select. To disable: Clear.

Shortcut	Settings Dialog Box
File Management	[File Management] dialog box

12 Adjusting and Setting up Equipment (for Services)

This section describes the methods for radar adjustment, installation verification, and maintenance that are conducted by the service staff by using the Service menu at installation construction of this equipment.

⚠CAUTION	
	Never have the equipment adjusted by unauthorized service personnel. If the equipment is set up incorrectly, it may cause unstable operation. Further, an accident or trouble may occur.
	Never make adjustments while sailing. Doing so may adversely affect the radar functions, causing accidents and/or malfunctions.

12.1 Service Menu

The Service menu consists of three submenus of Adjustment, Installation and Maintenance. To display the Service menu, a password is required.

12.1.1 To display the Service menu:

1 **Click on the [MENU] button on the left toolbar.**
The menu is displayed.

2 **Change over to the second page using the page switching button, and click the [Code Input] button.**

The password input dialog is displayed.

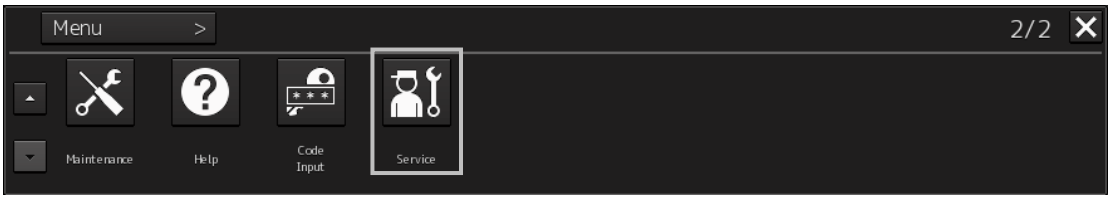
3 **Enter 0 in Password.**

4 **Click on the [MENU] button on the left toolbar.**

The menu is displayed.

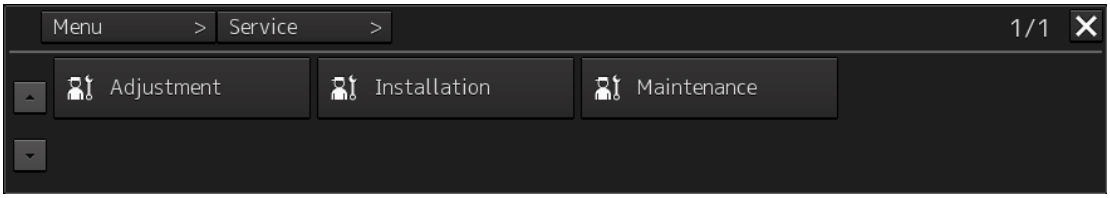
5 **Change to the 2nd page by using the page change button.**

The [Service] button is added



6 **Click the [Service] button.**

The submenu is displayed.



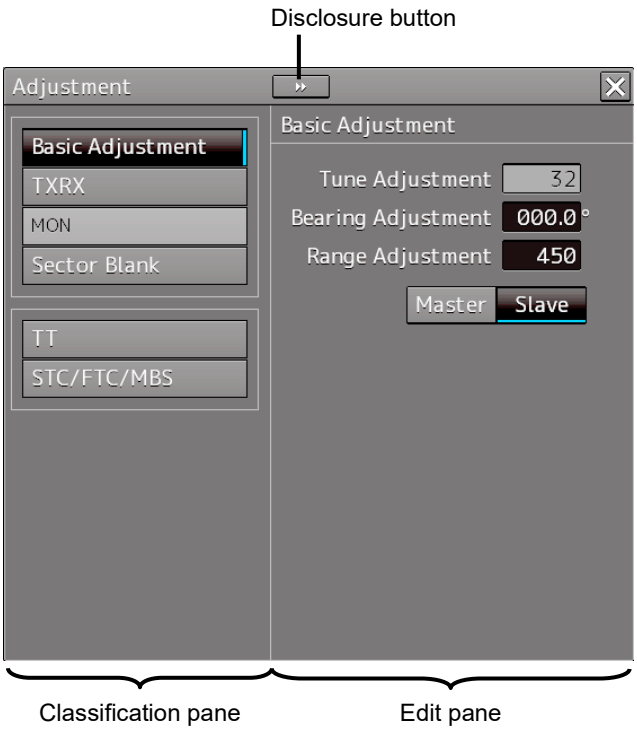
7 **Display a submenu dialog box by clicking on one of the [Adjustment], [Installation], and [Maintenance] buttons.**

12.2 Radar Adjustment

Use the [Adjustment] dialog box to adjust the radar of this equipment.

12.2.1 Displaying the [Adjustment] dialog box

Clicking the [Adjustment] button in the submenu displays the [Adjustment] dialog box.
The [Adjustment] dialog box consists of the classification panel and the edit panel.
By clicking the Disclosure button (>>) , you can hide the edit panel. To show the edit panel again, click the Disclosure button (<<).



[Adjustment] dialog box

1 **Click the item you want to set up in the classification panel.**
The setup dialog of the item you selected appears in the edit panel.

2 **Set up in the edit panel.**

12.2.2 Performing basic adjustments on the radar

Perform basic adjustments on the radar by using the [Basic Adjustment] dialog.

12.2.2.1 Displaying the "Basic Adjustment" dialog

When you select [Basic Adjustment] in the classification panel, the [Basic Adjustment] dialog is displayed in the edit panel.

12.2.2.2 Tune adjustment

Note

- After replacement of the magnetron, perform rough tuning while the image is stable after setting the radar to the Standby state for 20 to 30 minutes as the preheating time, operating the radar from the short pulse range, and shifting the operation to the long pulse range sequentially.
- This operation is disabled when the Radar Interswitch is set to the Slave mode.
- Not displayed when the solid-state radar antenna is connected.

1 **Click on the [Tune Adjustment] (rough tuning) input box.**
A numeric value input keyboard is displayed. (0 to 127)

2 **Enter an adjustment value (0 to 127) in the input box so that the tuning bar indicates the maximum level (the tuning bar touches the right-most position).**
For the method of using the numeric input keyboard, refer to "3.16.2 Name and function of each section of the keyboard".

12.2.2.3 Adjusting the bearing

Adjust the bearing so that the bearing of the target measured by the compass on the ship and the bearing of the image that is displayed on the radar match.

Note
This function is disabled when the radar interswitch is set to the Slave mode.

1. **Set the bearing mode to [H UP] and set the image processing mode to [Process Off].**
   For the bearing mode setting method, refer to "5.4.5 Setting the azimuth mode" and for the image processing mode setting method, refer to "5.4.4 Using video processing (Echo Process)".
2. **Measure a bearing in the ship's heading direction of a suitable target (for instance, halted ship, breakwater, and buoy) by using the compass on the ship.**
3. **Click on the [Bearing Adjustment] input box.**
   A numeric value input keyboard is displayed.
4. **Input an adjustment value in the input box so that the bearing of the target that was measured in Step 2 indicates a correct bearing. (0 to 359.9°)**
   For the method of using the numeric input keyboard, refer to "3.16.2 Name and function of each section of the keyboard".

12.2.2.4 Adjusting a distance

Adjust the distance of the target on the screen so that the correct distance is displayed.

1. **On the radar screen, specify a target whose distance is available in advance.**
2. **Click on the [Range Adjustment] input box.**
   A numeric value input keyboard is displayed.
3. **Enter an adjustment value in the input box so that the distance of the target specified in Step 1 indicates the correct distance. (128 to 1024)**
   For the method of using the numeric input keyboard, refer to "3.16.2 Name and function of each section of the keyboard".

12.2.2.5 Radar operation modes

Click one of the radar operation mode buttons to select either the [Master] mode or the [Slave] mode.

[Master]:
Can control the radar antenna.

[Slave]:
Cannot control the radar antenna. The display unit uses the radar signals controlled by the master radar antenna.

Note
While in the Slave mode, the operation to control the radar antenna is disabled.

12.2.3 Adjusting Antenna

Adjust the antenna by using the [TXRX] dialog.

12.2.3.1 Displaying the [TXRX] dialog

When you select [TXRX] in the classification panel, the [TXRX] dialog is displayed in the edit panel.

12.2.3.2 Adjusting an radar antenna height

1. **Measure the height from the sea surface to the radar antenna.**
2. **In the [Antenna height] combo box, select the setting value corresponding to the height of the antenna that was measured in step 1.**
   - Under 5m
   - 5-10m
   - 10-20m
   - 20m Over

12.2.3.3 Setting a tuning bar peak value

Set the scale when the tuning bar touches the peak value.

Notes
- This function is disabled under radar slave mode.
- Not displayed when a solid-state radar antenna is connected.

1 **Set the range to 48 NM or more.**

2 **Click on the [Tune Indicator] (tune indicator bar display) input box.**
A numeric value input keyboard is displayed.

3 **Input a setting value in the input box so that the tuning bar oscillates within the range from 80% to 90% of the maximum amplitude position (0 to 127).**
For the method of using the numeric input keyboard, refer to "3.16.2 Name and function of each section of the keyboard".

12.2.3.4 Adjusting a tuning peak value

Adjust a tuning indication and an echo peak.

Notes
- Disabled in radar slave mode.
- Displayed under 10kW radar (NKE-2103-6, NKE-2103-6HS) only.

1 **Adjust the tuning indication bar as described in “19.2.3.3 Setting a tuning bar peak value”.**

2 **Set the range to 48nm or more.**

3 **Click the [Tune Peak Adjustment] input box.**
A numerical value input keyboard is displayed.

4 **Adjust the tuning peak adjustment value so that the radar image becomes strongest when the tuning indication at the top left corner of the screen points to the maximum.**
For the method of using the numerical value input keyboard, refer to “3.16.2 Name and function of each section of the keyboard”.

12.2.3.5 Setting bearing pulse output

1 From the [Output BP] (bearing pulse output) combo box, select a bearing pulse count that is output from the radar antenna (2048 or 4096).

12.2.4 Adjusting a radar performance monitor

To adjust a radar transmitting/receiving status, use the [Performance Monitor] dialog or the [Performance Monitor (SSR)] dialog.

12.2.4.1 Displaying the [Performance Monitor]/[Performance Monitor (SSR)] dialog

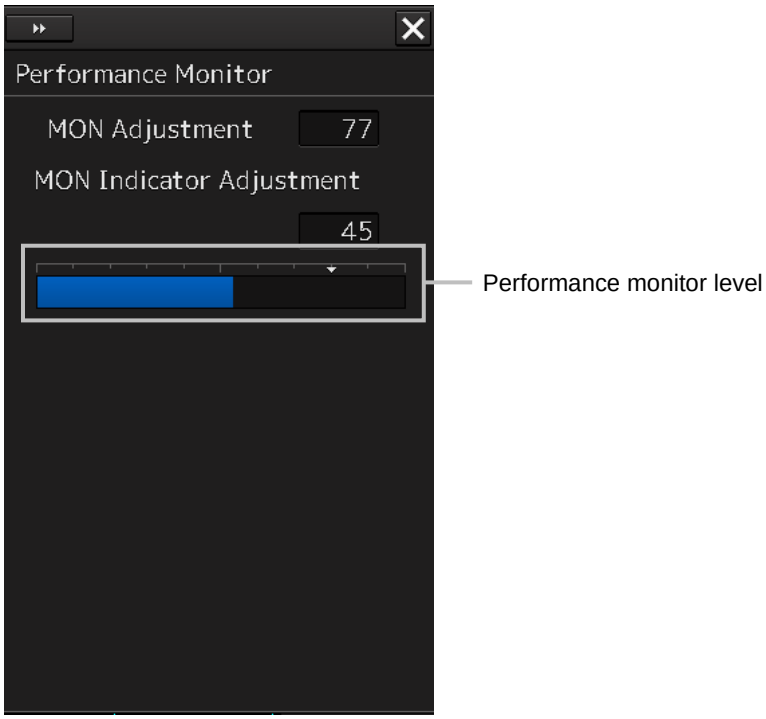
When you select [MON] in the classification panel, the [Performance Monitor] dialog (using a magnetron radar) or the [Performance Monitor (SSR)] dialog (using a solid-state radar) is displayed in the edit panel. The items to be displayed change according to the type of the radar antenna.

Note

- When the radar is in the Slave mode, the [Performance Monitor] dialog (or [Performance Monitor (SSR)] dialog is disabled.
- If a master unit other than straight connection is being set in interswitch setting, the "Performance Monitor" screen (or "Performance Monitor (SSR) " screen) is disabled (may also be enabled depending on the equipment setting.).
- When the [Performance Monitor] dialog is displayed, the sector blank in the PPI screen is hidden. When the solid state radar antenna is connected, the PM sector is displayed; in the case of the magnetron radar, the sector is not displayed.
- While adjusting the performance monitor, TGT acquisition is not canceled by the target tracking function.
  If a TGT symbol is displayed inside a pattern of the performance monitor and adjusting is difficult, cancel TGT acquisition once.

12.2.4.2 Adjusting a magnetron radar performance monitor

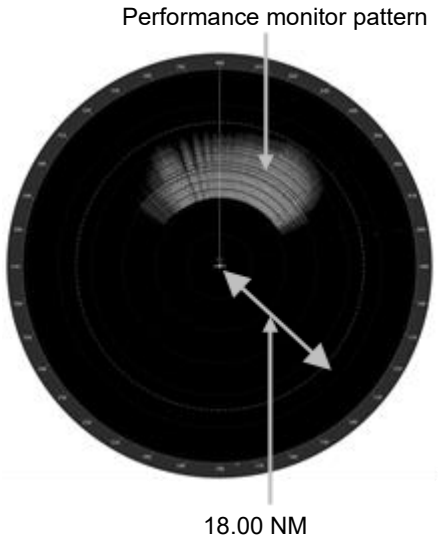
On the [Performance Monitor] dialog, adjust a magnetron radar transmitting/receiving status while checking the performance monitor level.



Adjusting a monitor reception level

Adjust the circuit for monitoring the radar equipment reception performance.

1. **Click on the [MON Adjustment] (MON reception level adjustment) input box.**
   A numeric value input keyboard is displayed.
2. **Enter a setting value in the input box so that the farthest position of the performance monitor pattern becomes 18.00 NM. (0 to 127)**
   For the method of using the numeric input keyboard, refer to "3.16.2 Name and function of each section of the keyboard".



Adjusting a monitor transmission level

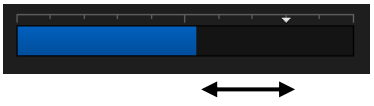
Adjust the circuit for monitoring the radar equipment transmission performance.

1 **Click on the [MON Indicator Adjustment] input box.**

A numeric value input keyboard is displayed.

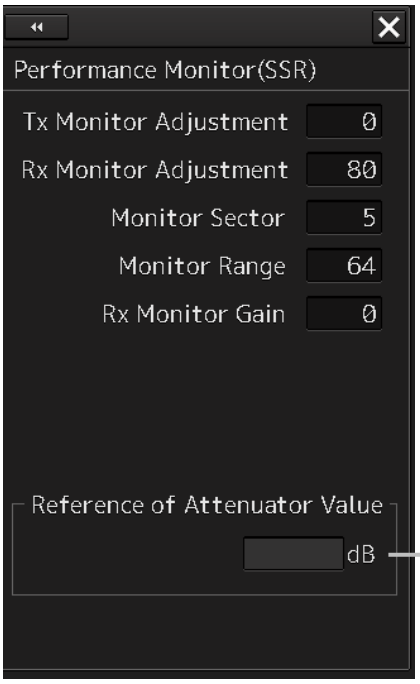
2 **Enter a setting value so that the MON level indicates "8" (0 to 127).**

For the method of using the numeric input keyboard, refer to "3.16.2 Name and function of each section of the keyboard".



12.2.4.3 Adjusting a performance monitor of a Solid State Radar (SSR)

Use the [Performance Monitor (SSR)] dialog.



The type of transmission/reception attenuator value that is used as the reference for the adjustment at the setting change varies depending on the setting item.

Setting	Display
Tx Monitor Adjustment	Tx Attenuator Value is displayed.
Rx Monitor Adjustment	Rx Attenuator Value is displayed.
Monitor Sector	Rx Attenuator Value is displayed.
Monitor Range	Rx Attenuator Value is displayed.
Rx Monitor Gain	Rx Attenuator Value is displayed.

Perform the following adjustments by using the transmission/reception attenuator value as the reference in the [Performance Monitor (SSR)] dialog.

Note
Do not change the values set in the [Monitor Range] input box and the [RX Monitor Gain] (reception monitor gain) input box.

Adjusting a monitor transmission level

Adjust the circuit for monitoring the radar equipment transmission performance.

1 **Click on the [TX Monitor Adjustment] (transmission monitor adjustment) input box.**
A numeric value input keyboard is displayed.

2 **Enter a setting value in the input box so that "0.0±1.0dB" is indicated as the [Reference Attenuator Value]. (0 to 127)**
For the method of using the numeric input keyboard, refer to "3.16.2 Name and function of each section of the keyboard".

Adjusting a monitor reception level

Adjust the circuit for monitoring the radar equipment reception performance.

1 **Click on the [Monitor Sector] input box.**
A numeric value input keyboard is displayed.

2 **Input a setting value in the input box so that the maximum value is indicated as the [Reference of Attenuator Value].**
For the method of using the numeric input keyboard, refer to "3.16.2 Name and function of each section of the keyboard".

3 **Click on the [RX Monitor Adjustment] (reception monitor adjustment) input box.**
A numeric value input keyboard is displayed.

4 **Enter a setting value so that "0.0±1.0dB" is indicated as the [Reference of Attenuator Value] (0 to 127).**
For the method of using the numeric input keyboard, refer to "3.16.2 Name and function of each section of the keyboard".

12.2.5 Setting Sector Blank

The sector blank is an area that has been set up by specifying a fan-shaped range (sector) , stopping the transmission in that bearing, and hiding radar echoes. The sector blank runs in the relative bearing using the ship's heading as reference.
Three types of sectors can be set up (sector blanks 1/2/3).
Set sector blank by using the [Sector Blank] dialog.

12.2.5.1 Displaying the [Sector Blank] dialog

When you select [Sector Blank] in the classification panel, the [Sector Blank] dialog is displayed in the edit panel.

12.2.5.2 Setting Sector Blank

Note
This function is disabled under the Slave mode of the interswitch.

1. **Select sector blank to be set by checking [Use Sector1/2/3] (using sector blank 1/2/3).**
2. **Click on the [Make Sector1/2/3] (creating sector blank 1/2/3) button that corresponds to the sector blank number that was selected in Step 1.**
   The cursor is set to the sector blank 1/2/3 creation mode.
3. **Draw sector blank with the cursor.**
   The following information items are displayed regarding the sector blank that is being created.
   Start Angle: Sector blank starting angle
   End Angle: Sector blank ending angle

12.2.6 Adjusting the TT function

Adjust the following TT function parameters by using the [TT] dialog.

- Vector constant
- Quantization level
- Target symbol display position
- Gate size used for tracking
- TT limit ring

What is quantization level?

A quantization level is a signal level that is recognized by the TT function as a target.
By setting a lower value, input of signals of weak targets in the TT target detection circuit is enabled. However, many unnecessary signals are also input, destabilizing acquisition and tracking of targets due to unnecessary signals. It is important to set a value greater than the value for detecting unnecessary signals by 4 or 5.

⚠CAUTION

Do not change the quantization level settings indiscreetly.
If inappropriate values are set, the acquisition of the target tracking function and the tracking function will deteriorate, possibly causing accidents.

12.2.6.1 Displaying the [TT] dialog

When [TT] is selected in the classification panel, the [TT] dialog is displayed in the edit panel.

12.2.6.2 Setting vector constants

Adjust the vector tracking of the target tracking function.

Note

Do not change this setting unnecessarily. Normally, set 4 for [Vector Constant].

12.2.6.3 Setting a quantization level at manual acquisition

⚠CAUTION

The optimum values are set for the VD Level and Constant. Do not change it carelessly. Otherwise, the performances of the target tracking function may be affected and an accident may result.

1 **Select a threshold value of a quantization mode at manual acquisition from the [VD Level Mode (Manual)] (quantization mode at manual acquisition) combo box.**

- Auto Threshold1
- Auto Threshold2
- Manual Threshold

12.2.6.4 Setting a quantization level at automatic acquisition.

⚠CAUTION
The optimum values are set for the VD Level and Constant. Do not change it carelessly. Otherwise, the performances of the target tracking function may be affected and an accident may result.

1 **Click on the [VD Level (Auto)] (quantization level at automatic acquisition) input box.**
A numeric value input keyboard is displayed.

2 **Enter a setting value in the input box. (0 to 255)**
For the method of using the numeric input keyboard, refer to "3.16.2 Name and function of each section of the keyboard".

12.2.6.5 Setting a gate size used for tracking

1 **Select a gate size from the [Gate Size] combo box.**

- Small
- Medium
- Large

12.2.6.6 Displaying a TT limit ring

1 **To display a TT limit ring, select the [Limit Ring] check box.**

12.2.7 Adjusting MBS

MBS (Main Bang Suppression) adjustment is to adjust a display unit processing circuit in order to suppress main bang, which is the reflection signal from a microwave transmission circuit of a waveguide that normally appears as an image of a circle at the center of the radar screen.
Perform MBS adjustment by using the [MBS] dialog.

⚠WARNING
Do not change Initial Level/Area Offset indiscreetly. If wrong adjustment is performed, the nearest target will be erased, causing collision to lead to death or serious injury.

12.2.7.1 Displaying the [MBS] dialog

When you select [MBS] in the classification panel, the [MBS] dialog is displayed in the edit panel.

12.2.7.2 Performing MBS adjustment

1 **Click on the [Initial Level] (MBS initial level) input box.**
A numeric value input keyboard is displayed.

2 **Enter an initial level of MBS so that the image of main bang becomes optimum (faint image remains on the screen. (0 to 1023)**
For the method of using the numeric input keyboard, refer to "3.16.2 Names and functions of the sections of the keyboard".

12.2.7.3 Adjusting a MBS application range

1 **Expand the display range up to the range where a main bang can be identified.**

2 **Click the [Area Offset] (MBS application) input box.**
A numerical value input keyboard is displayed.

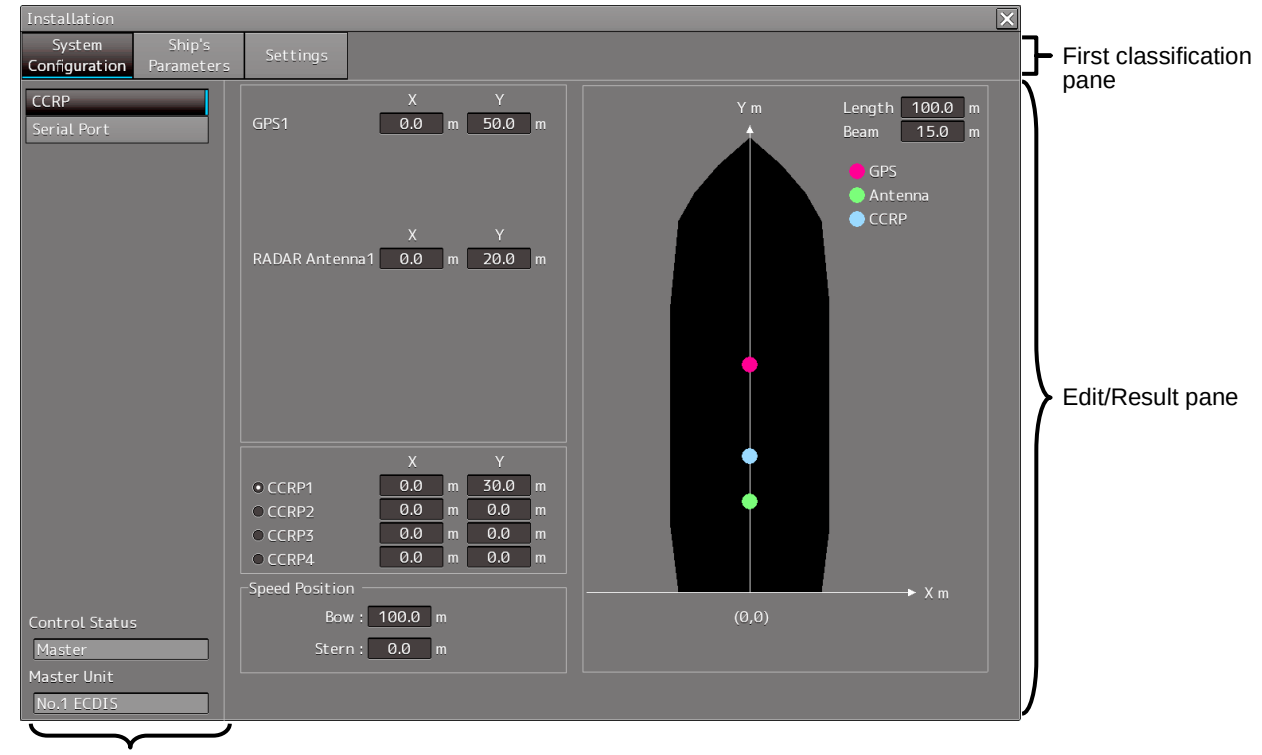
3 **Adjust the application range so that the main bang adjustment range becomes the optimum (distance where only the main bang section becomes the MBS adjustment range) (-0.200NM ~ 0.200NM).**
Adjust the range together with the MBS adjustment to the degree where the nearest target will not be lost.
For the method of using the numerical value input keyboard, refer to “3.16.2 Name and function of each section of the keyboard”.

12.3 Verifying Installation and Initial Setting

Use the [Installation] dialog box to verify the installation of this equipment and perform initial setting.

12.3.1 Displaying the [Installation] dialog box

Clicking on the [Installation] in the submenu, the [Installation] dialog box appears.
The [Installation] dialog box consists of the classification panel and the edit/result panel. The classification panel consists of two-level layers of the first classification panel and the second classification panel.



1 **Click the item you want to set up in the classification panel.**
The setup dialog of the item you selected is displayed in the edit/result panel.

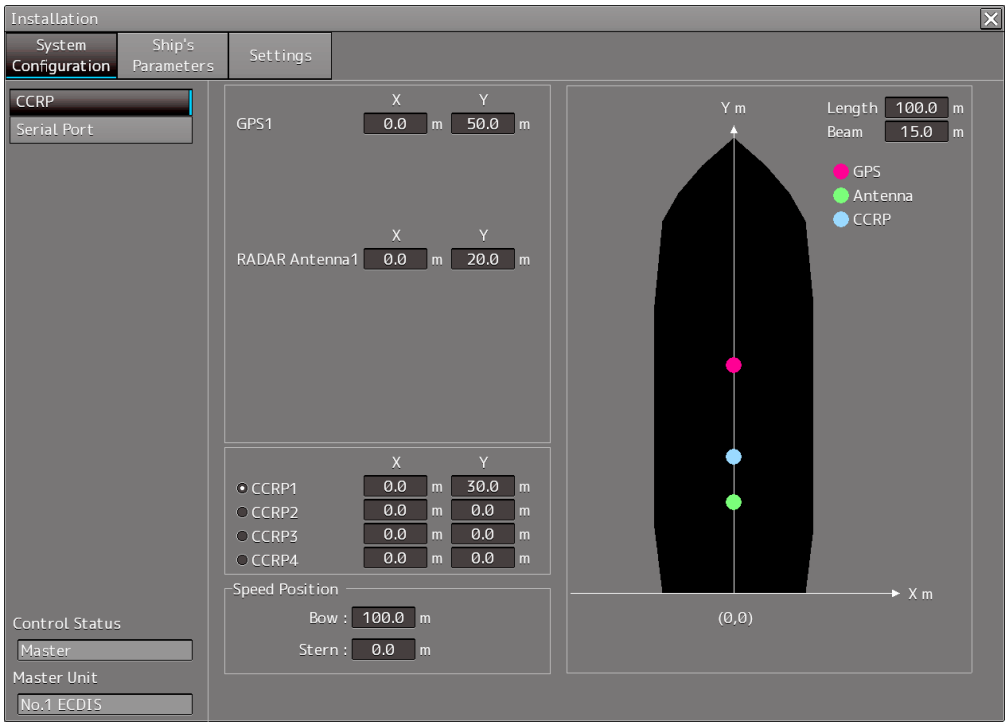
2 **Set up in the edit/result panel or check the setup result.**

12.3.2 Verifying/Setting CCRP (Consistent Common Reference Point)

Set a measurement reference position (CCRP) on own ship by using the "CCRP" dialog.

12.3.2.1 Displaying the [CCRP] dialog

When you select [System Configuration] in the first classification panel and [CCRP] in the second classification panel, the [CCRP] dialog is displayed in the edit/result panel.



Note

Set up the GPS radar antenna correctly. The latitude and longitude data received from the GPS is compensated and then displayed as own ship's latitude and longitude. If the GPS radar antenna is not set up correctly, an AIS symbol and a radar echo may deviate when displayed.

12.3.2.2 Setting CCRP

Set the following items in the [CCRP] dialog.

Setting Item	Description of Setting	Setting Value
Length (of ship)	Enter the ship's length in the box.	1.0 to 1022.0m
Beam (ship's width)	Enter the ship's width in the box.	1.0 to 126.0m
GPSx (When two or more GPS units are present, "x" indicates the unit number.)	Enter the equipment positions of GPSx in the boxes. X: Horizontal axis position on the ship of the applicable GPS (Center: 0) Y: Front-back axis position on the ship of the applicable GPS (Stern: 0) **Note** • This item may not be displayed depending on the equipment setting. • When the input range is changed by modifying [Length] and [Beam], if a value exceeding the input range after modifying has already been entered, the value will be corrected to the maximum or minimum value.	Changes depending on the value of [Length] and [Beam]. If Length=a and Beam=b: X -b/2 to b/2 Y 0.0 to a For example, • if Length=1.0 and Beam=1.0: X -0.5 to 0.5 Y 0.0 to 1.0 • if Length=700.0 and Beam=70.0: X -35.0 to 35.0 Y 0.0 to 700.0
Radar Antennas1 to 8 (equipment positions of radar antennas1 to 8)	Enter the equipment positions of Radar Antennas1 to 8 in the boxes. X: Horizontal axis position of radar antennas 1 to 8 on the ship (Center: 0) Y: Front-back axis position of radar antennas 1 to 8 on the ship (Stern: 0) **Note** • If "No Equipment" is specified in the [DipSW] settings of the interswitch unit, this is not displayed. • When the input range is changed by modifying [Length] and [Beam], if a value exceeding the input range after modifying has already been entered, the value will be corrected to the maximum or minimum value.	
CCRP1/2/3/4	Enter the positions of CCRP1 to CCRP4 of the ship in the boxes. X: Horizontal axis position of CCRP1/2/3/4 on the ship (Center: 0) Y: Front-back axis position of CCRP1/2/3/4 on the ship (Stern: 0) **Note** When the input range is changed by modifying [Length] and [Beam], if a value exceeding the input range after modifying has already been entered, the value will be corrected to the maximum or minimum value.	

Radio button on the left side of each CCRP	Select the position to be used as the ship's CCRP by clicking the applicable button.	CCRP1 CCRP2 CCRP3 CCRP4
Speed Position Bow	Enter the distance to the bow starboard/port speed display point.	0.0 to Ship's length m
Speed Position Stern	Enter the distance to the stern starboard/port speed display point.	0.0 to Ship's length m

12.3.3 Setting a Serial Port

Verify the setting of the serial port of this equipment and perform initial setting by using the [Serial Port] dialog.

12.3.3.1 Displaying the [Serial Port] dialog

When you select [System Configuration] in the first classification panel and [Serial Port] in the second classification panel, the [Serial Port] dialog is displayed in the edit/result panel.

12.3.3.2 [Diagnosis] lamp light colors

The [Diagnosis] lamp indicates the diagnosis result on whether or not the sentence of the sensor specified for each serial port has been received successfully and the status of ISW/MTR/Serial OPU.

Lit in red: Data not received.

Lit in green: Data is receiving.

Lit in orange: In diagnosis (before decision).

No color: Serial port is disabled.

12.3.3.3 Setting a serial port

In the [Serial Port] dialog, allocate the sensors to be connected for the serial port on CCU (Central Control Unit) and the serial port on SLC/ALC.

Setting a serial port on the CCU

Set each item as follows.

"Table A: Sensors that can be selected by serial ports on CCU" shows selectable sensors.

However, the sensors that actually can be selected vary depending on the equipment setting.

For the sensor communication speed, refer to "Selectable baud rates".

Setting Item	Description of Setting	Setting Value
Gyro	1. Select the check box and enable the serial port for the Gyro. 2. Select a sensor to be connected to the serial port for Gyro from the [Sensor] combo box. When not selecting a sensor, set [-].	To enable: Select. To disable: Clear.
LOG	1. Select the check box and enable the serial port for the LOG. 2. Select a sensor to be connected to the serial port for LOG from the [Sensor] combo box. When not selecting a sensor, set [-].	To enable: Select. To disable: Clear.
GPS	1. Select the check box and enable the serial port for the GPS. 2. Select a sensor to be connected to the serial port for the GPS from the [Sensor] combo box. When not selecting a sensor, set [-].	To enable: Select. To disable: Clear.
AIS	1. Select the check box and enable the serial port for the AIS. 2. Select a sensor to be connected to the serial port for the AIS from the [Sensor] combo box. When not selecting a sensor, set [-].	To enable: Select. To disable: Clear.

Table A: Sensors that can be selected by serial ports on CCU

Serial port	Sensor name
Gyro	Heading Sensor (NMEA) , Heading Sensor1 (NMEA) *1, Heading Sensor2 (NMEA) *1
	Heading Sensor (Gyro I/F) , Heading Sensor1 (Gyro I/F) *1, Heading Sensor2 (Gyro I/F) *1
LOG	Log (NMEA) , Log1 (NMEA) *2, Log2 (NMEA) *2
	Log (Gyro I/F) *3
	Selector
GPS	GPS 1
	GPS 2*4
	GPS 3*4
	GPS 4*4
	Selector
AIS	AIS

*1: Only when two heading sensors are available

*2: Only when two logs are available

*3: Only when Heading Sensor (Gyro I/F) is selected for Gyro of CCU

*4: May not be displayed depending on the number of GPS units

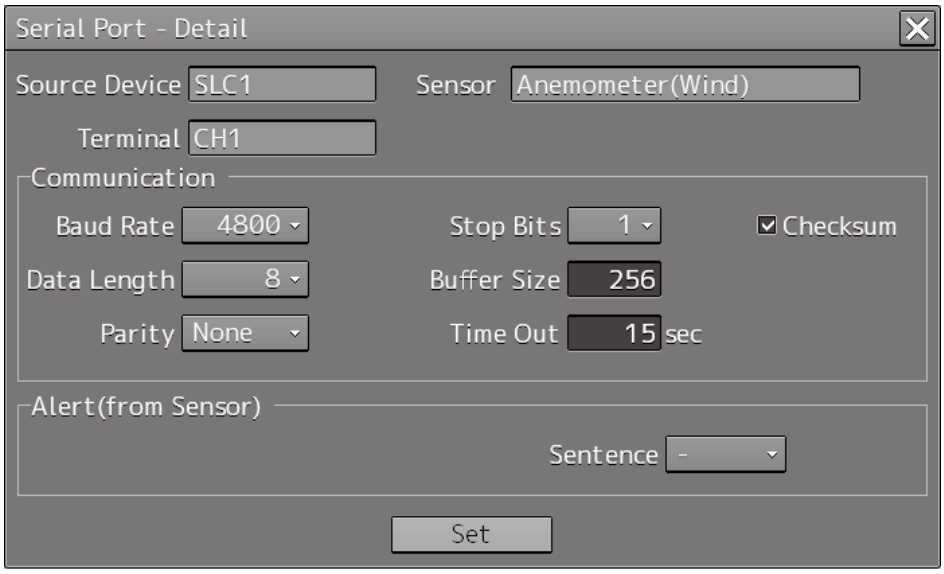
Setting serial ports on SLC/ALC

Set the serial ports on SLC/ALC that is installed as follows.

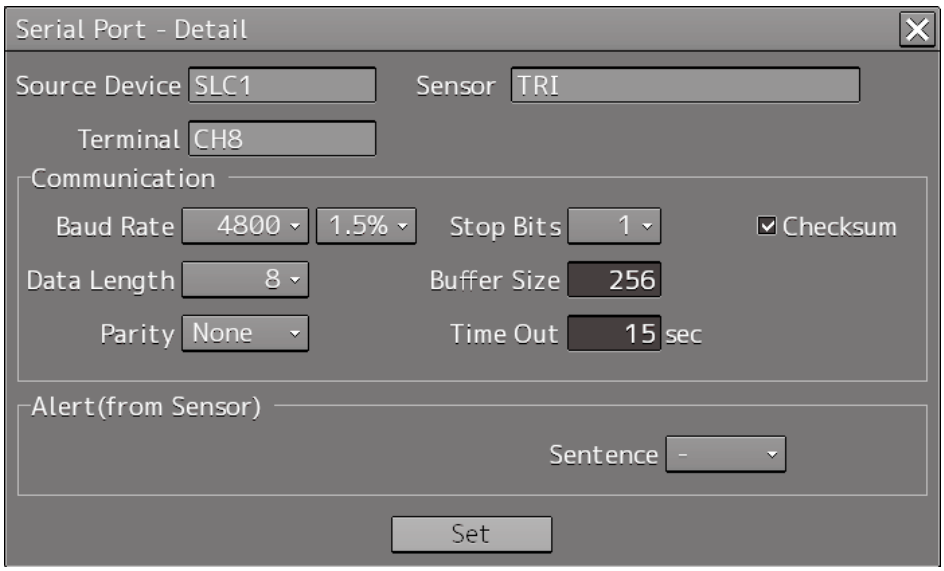
Setting item	Setting contents	Setting value
CH1 to CH8 (RS-422)	1. Click on any of the tabs, SLC1 (M) to SLC4 (M) /SLC1 (S) to SLC4 (S) /ALC1 to ALC4. 2. Enable the serial port of the channel by selecting the check box. 3. Select a sensor to be connected to the channel on the [Sensor] combo box. When not selecting a sensor, select [-].	Enable: Selected Disable: Clear
CH9/CH10 (RS-422/RS485)	1. Click on any of the tabs, SLC1 (M) to SLC4 (M) /SLC1 (S) to SLC4 (S) /ALC1 to ALC4. 2. Enable the serial port of the channel by selecting the check box. 3. Select a sensor to be connected to the channel on the [Sensor] combo box. When not selecting a sensor, select [-].	Enable: Selected Disable: Clear

12.3.3.4 To change the communication settings of the Serial Port

Click the [Detail] button of the enabled serial port and display the [Detail] dialog.



When selecting CH1 to CH7



When selecting CH8 to CH10

The setting target can be checked with [Source Device] display, [Terminal] display and [Sensor] display.

Perform the settings shown in the following table and then click on the [Set] button.

Setting Item	Description of Setting	Setting Value
Baud Rate	Select the baud rate of the serial port on the combo box. In the [Detail] dialog of any of CH8 to CH10, the [Baud Rate] addition ratio combo box is displayed on the right side of the [Baud Rate] combo box.	Selectable baud rates vary depending on the serial port (refer to "Selectable baud rates").
[Baud Rate] addition ratio combo box	Displayed in the [Detail] dialog of CH8 to CH10. By using this combo box, the addition ratio (%) for adjusting the baud rate can be changed. The baud rate is determined by adding the additional ratio to the value that is set in the [Baud Rate] combo box. Example) 4800 × (1 + 1.5 / 100) = 4872 Additional ratio	0.0% to 3.0% (can be set in the unit of 0.5%)
Data Length	Select the data length of the corresponding serial port from the combo box.	5/6/7/8
Parity	Select the parity of the corresponding serial port from the combo box.	None/Odd/Even
Stop Bits (Stop Bit Length)	Select the stop bit length of the corresponding serial port from the combo box.	1/2
Buffer Size	Enter the buffer size of the corresponding serial port from the list.	0 to 10240 byte
Time Out	Enter the time-out duration of the corresponding serial port from the list.	0 to 999s
Checksum	Select the check box and enable the checksum of the sentence of the corresponding serial port.	To enable: Select. To disable: Clear.
Subsystem	Set the equipment to be connected for Alert Handling. Displayed only when the sensor is "Alert (from Subsystem) " or "Alert (to CAM) ". The selection is also allowed for the subsystem that has already been used in the channel of some other serial port.	"Alert (from Subsystem) ": Equipment that is set as -/installed (Task Station and sensor) "Alert (to CAM) ": Equipment that is set as -/installed (Task Station)

Primary/Secondary	Select Primary or Secondary for IAS (MODBUS) input. Displayed only when the sensor is "IAS (MODBUS) ".	Primary: Primary system Secondary: Secondary system
Sentence	Select the sentence of Alert Handling. Displayed when the sensor is other than "Alert (BNWAS), "IAS (MODBUS)", or "DSC".	Normal sensor such as GPS and Log: -/ALR/ALF "Alert (from Subsystem/to CAM) ": ALR/ALF

Selectable baud rates

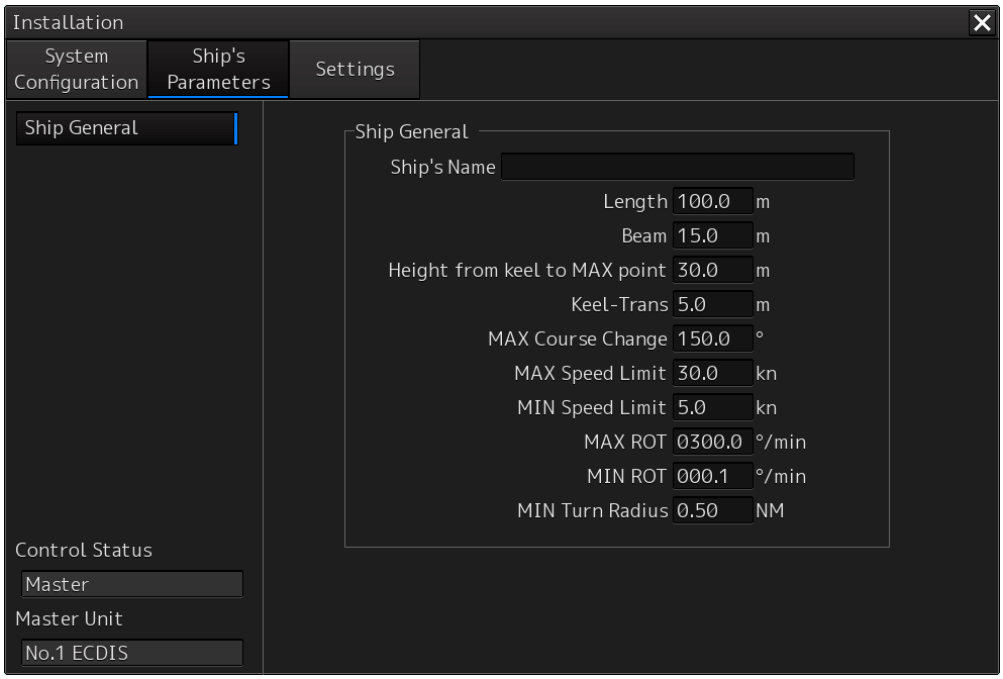
Serial port	Baud rate
Serial point on CCU	
Gyro (at selection of Heading Sensor (NMEA))	4800/38400
Gyro (at selection of Heading Sensor (Gyro I/F))	Fixed to 38400
Log (at selection of Log (NMEA))	Fixed to 4800
Log (at selection of Log (Gyro I/F))	Fixed to 38400
GPS	Fixed to 4800
AIS	Fixed to 38400
Serial port on SLC/ALC	
CH1-8	2400/4800/9600
CH9/10	2400/4800/9600/19200/38400
Gyro I/F	Fixed to 38400

12.3.4 Setting own ship's parameters

Set parameter values of own ship by using the [Ship's Parameters] dialog.

12.3.4.1 Displaying the [Ship's Parameters] dialog

When you select [Ship's Parameters] in the classification panel, the [Ship's Parameters] dialog is displayed in the edit/result panel.



12.3.4.2 Setting own ship's parameters

Set the following items in the [Ship's Parameters] dialog.

Setting Item	Description of Setting	Setting Value
Ship's Name	Enter own ship's name in the box.	Max. 20 characters
Length (of ship)	Enter own ship's length in the box.	1.0 to 1022.0 m
Beam (ship's width)	Enter own ship's beam in the box.	1.0 to 126.0 m
Height from keel to MAX point	Enter the height of the ship from the keel to the maximum point in the box.	1.0 to 126.0 m
Keel-Trans (distance between the transducer and the keel)	Enter the distance between the transducer of the depth sounder and the keel. (Required when displaying the water depth with the keel fixed)	0.0 to 20.0 m
MAX Course Change (limit value of course change angle)	Enter the limit value of the course change angle of the planned route in the box.	20.0 to 359.9°

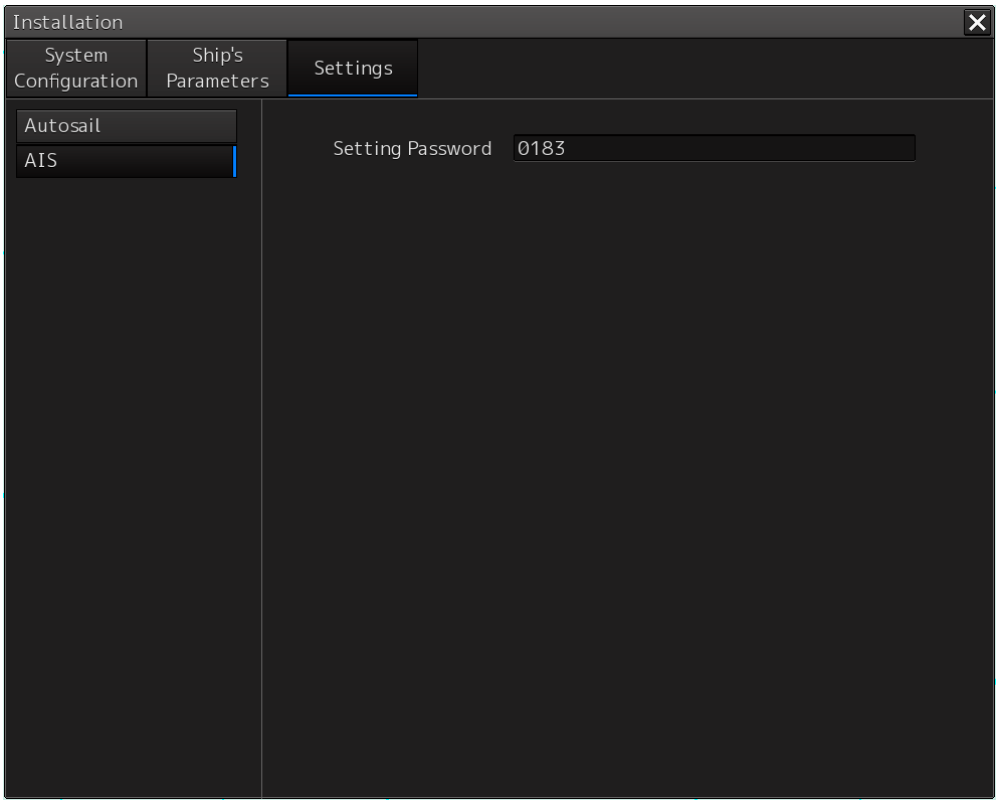
MAX Speed Limit	Enter the ship's maximum speed in the box.	10.0 to 99.9 kn
MIN Speed Limit	Enter the ship's minimum speed in the box.	0.0 to 89.9 kn
MAX ROT	Enter the maximum rate of turn in the box.	30.0 to 600.0°/min
MIN ROT	Enter the minimum rate of turn in the box.	0.0 to 570.0°/min
MIN Turn Radius	Enter the minimum turn radius in the box.	0.00 to 9.99 NM

12.3.5 Setting the AIS password

Set the AIS password by using the [AIS] dialog.

12.3.5.1 Displaying the [AIS] dialog

When [Settings] is selected in the 1st classification panel and [AIS] is selected in the 2nd classification panel, the [AIS] dialog is displayed in the edit/result panel.



12.3.5.2 Setting the AIS password

Set the following item on the [AIS] dialog.

Setting item	Description of setting	Setting value
Setting Password	To change Voyage data from the external device, JHS-183 requires the password. When the AIS password is changed, change this setting value. When the password is not required, this setting value is ignored in (JHS-182).	Up to 32 characters (numeric value only)

12.4 Maintenance

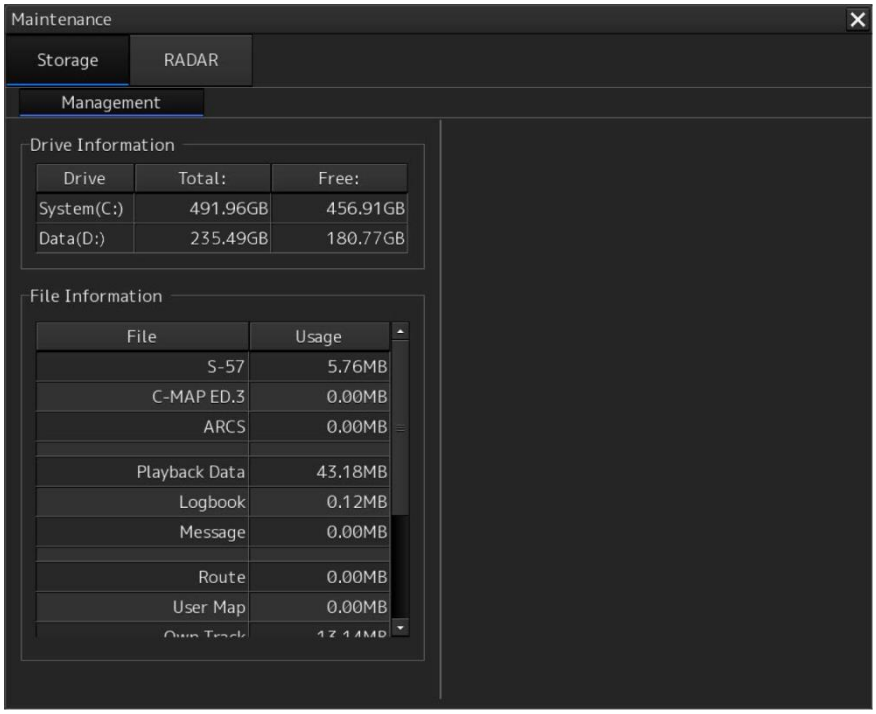
Use the [Maintenance] dialog box for maintenance operation of this equipment.

12.4.1 Displaying the [Maintenance] dialog box

Clicking the [Maintenance] button in the submenu displays the [Maintenance] dialog box.
The [Maintenance] dialog box in the submenu consists of the classification panel and the edit/result panel. The classification panel consists of two-level layers of the first classification panel and the second classification panel.

12.4.2 Managing storage

When you select [Storage] in the first classification panel and [Management] in the second classification panel, the [Management] dialog is displayed in the edit/result panel.



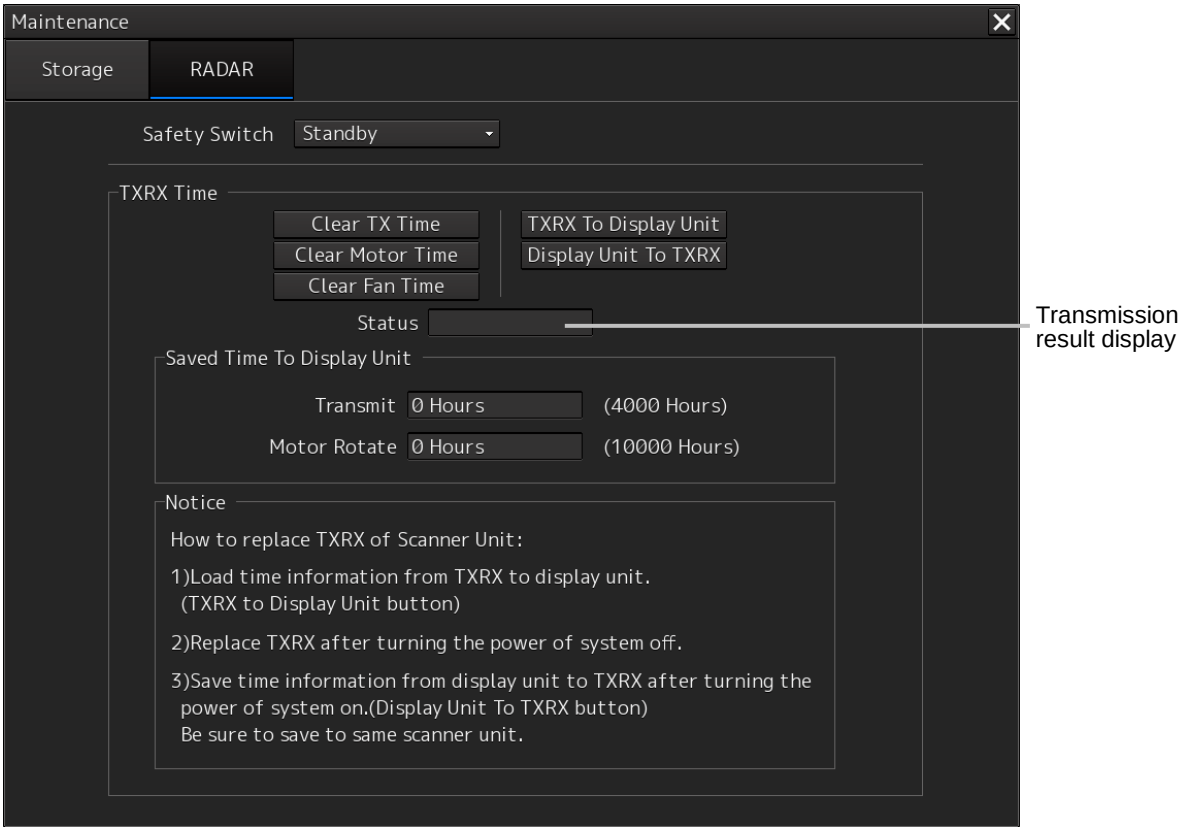
The total storage capacity and free space on each of the drives (C and D) are displayed in the [Drive Information] list. The capacity of each of the files stored on the drives is displayed in the [File Information] list. The files managed by File Manager are applicable.

12.4.3 Maintaining the radar

Use the [RADAR] dialog to maintain the radar.

12.4.3.1 Displaying the [RADAR] dialog

When you select [RADAR] in the classification panel, the RADAR dialog is displayed in the edit/result panel.



12.4.3.2 Changing the operation mode of the safety switch

Open the list of the [Safety Switch] box and select the operation to be performed when the safety switch of the antenna is set to OFF.

Setting	Operation
TX-Off	• No radiant section's rotation and transmission • PPI screen in the transmitting state • Maintains the transmitting state without generating BP or BZ alarm
Standby	• No radiant section's rotation and transmission • PPI screen standby
TX-On	• No radiant section's rotation, with transmission • PPI screen in the transmitting state • Maintains the transmitting state without generating BP or BZ alarm

12.4.3.3 Clearing a radar antenna operation time

The total transmission time and the total motor rotation time of a radar antenna can be cleared.

Clearing the total transmission time of a radar antenna

1 **Click on the [Clear TX Time] (resetting transmission time) button.**

Clearing the total motor rotation time of a radar antenna

1 **Click on the [Clear Motor Time] (resetting the motor rotation time) button.**

12.4.3.4 Replacing a TXRX circuit of a radar antenna

Verify the total transmission time and the total motor rotation time of the radar antenna and use the information as the guideline for replacement.

Acquiring the data of the total transmission time and the total motor rotation time from a radar antenna

1 **Click on the [TXRX To Display Unit] (transmitting from an antenna to a display unit) button.**

The data of the total transmission time and the total motor rotation time is acquired from the antenna and is stored in a display unit. The time that is acquired is displayed on the [Saved Time To Display Unit] display section.

Transmit: Total time acquired from the radar antenna

Motor Rotate: Total motor rotation time acquired from the radar antenna

Storing data of the total transmission time and the total motor rotation time in the radar antenna

1 **Click the [Display Unit To TXRX] button (transmission from the display to the radar antenna).**

The total transmission time and total motor ration time saved in the display unit are saved to the radar antenna.

If data is saved normally, the data saved in the display unit will be deleted.

When a command is sent from the display unit to the radar antenna, the transmission result is displayed as follows.

Result waiting state: "Sending..." is displayed blinking at intervals of 1 sec.

When the result is success: "Completed" is displayed.

When the result is failure: "Not Completed" is displayed.

Replacing a TXRX circuit

The operation procedure and notes are displayed on the Notice display.

1. **By clicking on the [TXRX To Display Unit] button, load the data of the total transmission time and the total motor rotation time from the radar antenna to the display unit.**
2. **Turn off the power of the system and replace the TXRX circuit.**
3. **Turn on the power of the system and write the data of the total transmission time and the total motor rotation time in the transceiver unit of the radar antenna by clicking on the [Display Unit To TXRX].**

Note

Make sure that data is written to the transceiver unit of the same radar antenna when the data is loaded.

13 Maintenance & Inspection

13.1 Maintenance Functions Executed from Menu

This section explains maintenance functions that are executed from the menu.

13.1.1 Starting maintenance functions

1 **Click on the [Menu] button on the left Toolbar.**
The menu is displayed.

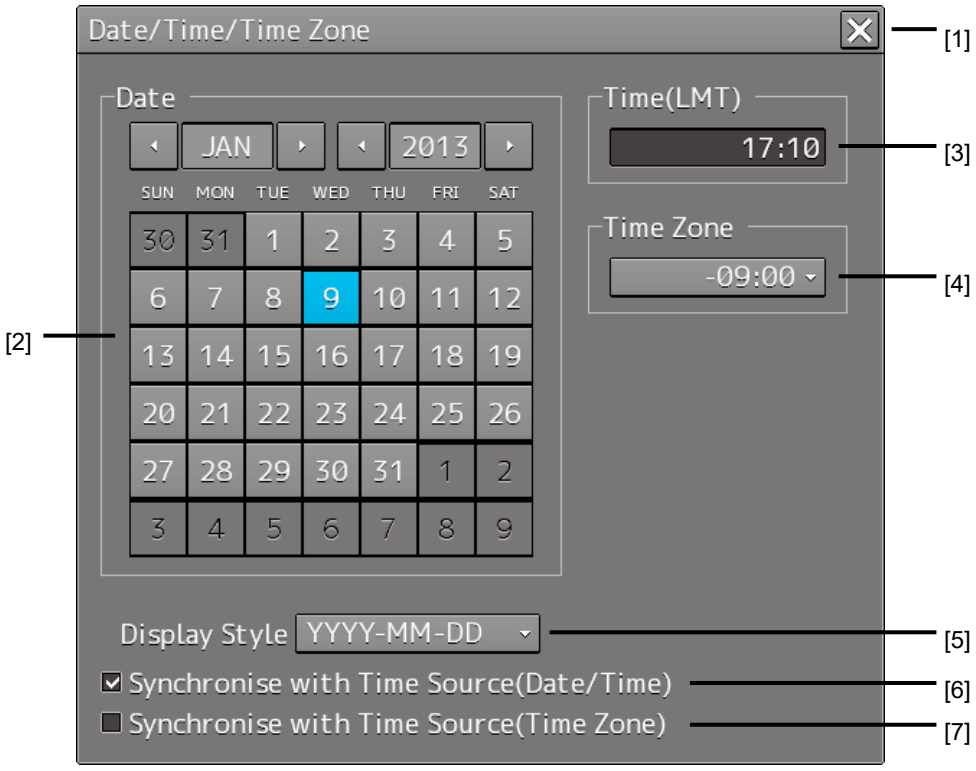
2 **Click on the [Maintenance] button on the menu.**
The submenu is displayed.

3 **Click on a button on the submenu.**
The dialog box of the selected maintenance function is displayed.

13.1.2 Setting Date/Time/Time Zone

1 **Click on the [Menu] button on the left Toolbar.**
The menu is displayed.

2 **Click on the [Maintenance] - [Date/Time/Time Zone] button on the menu.**
The [Date/Time/Time Zone] dialog box appears.



[1] [X] button

Click on this button to close the [Date/Time/Time Zone] dialog box.

[2] [Date]

Set the year, month and day on the calendar.

For the details of how to use the calendar, refer to "3.17 Setting a Date and a Time [Calendar Operation)".

[3] [Time(LMT)]

Enter the time in the input box. The time entered will be reflected on the clock.

[4] [Time Zone]

Enter the time zone in the time zone input box.

A time zone can be selected between -13:30 and +13:30 from UTC.

[5] [Display Style]

From the list, select the style to display the date.

MMM DD,YYYY (North American style)

DD MMM,YYYY (European style)

[6] [Synchronise with Time Source (Date/Time)](synchronization of time with GPS)

When this item is checked, date and time are synchronized by using the time information (ZDA sentence) from GPS.

[7] [Synchronise with Time Source (Time Zone)](synchronization of time difference with GPS)

When this item is checked, time difference is synchronized by using the time information (ZDA sentence) from GPS.

> **Note**
>
> When [Synchronize with Time Source (Date/Time)] is not checked, the time is reset to the initial value at the start of power supply. Therefore, set a correct time manually.

13.1.3 Confirming System Information

System information can be confirmed.

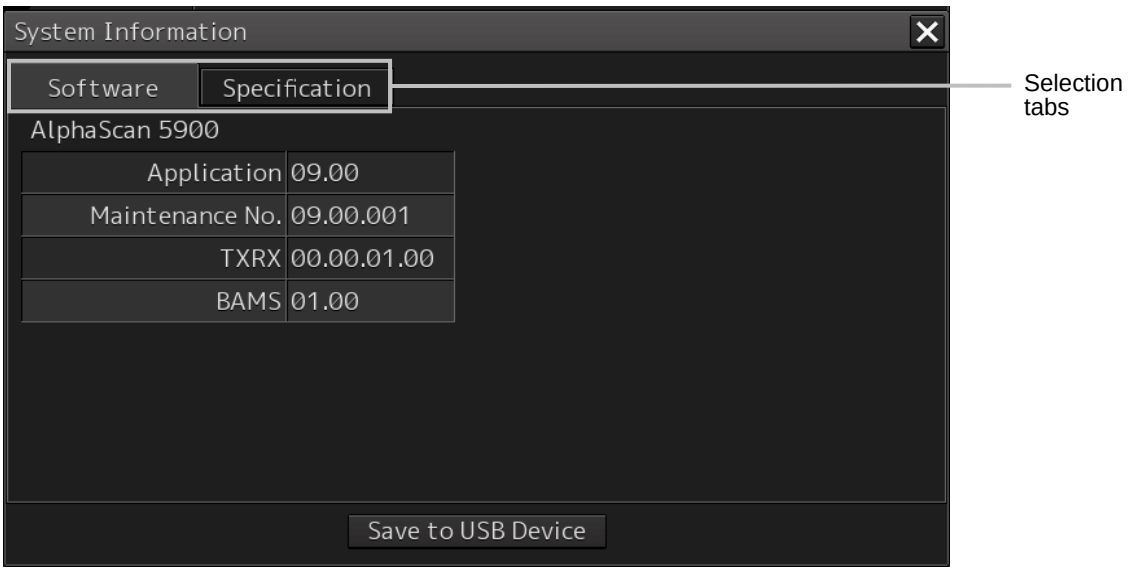
1 **Click on the [Menu] button on the left Toolbar.**

The menu is displayed.

2 **Click on the [Maintenance] - [System Information] button on the menu.**

The [System Information] dialog box appears.

The contents of the dialog will be switched by clicking on the selection tabs provided in the dialog box.



13.1.3.1 Confirming software information

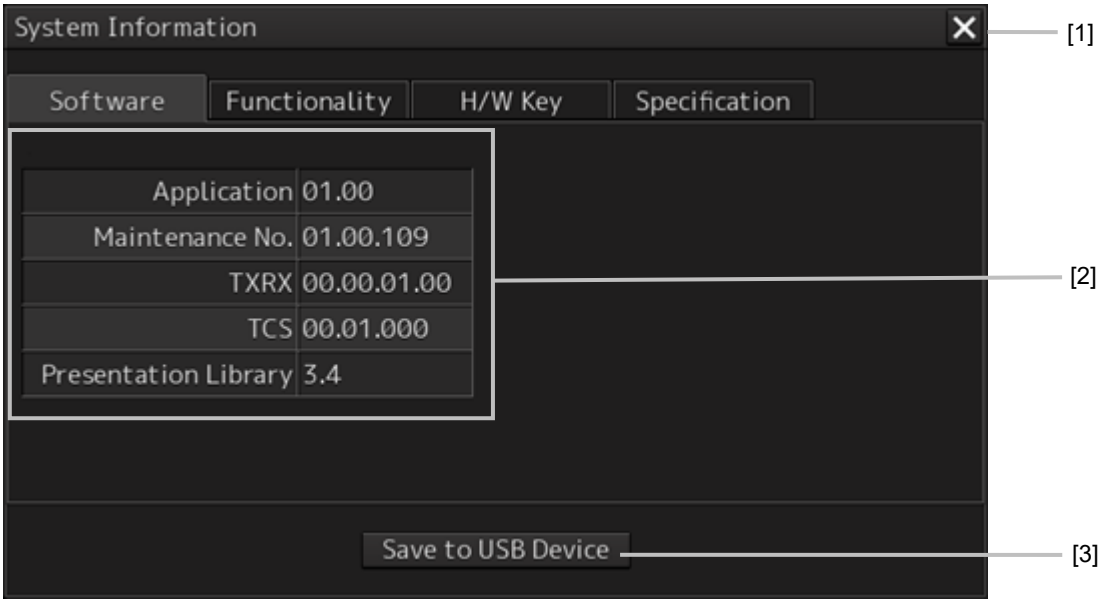
⚠WARNING	
	When you want to use a USB flash memory to read or write a file, make sure in advance that the USB flash memory is not affected by a computer virus. If the indicator is infected with a virus, other equipment will also be infected, with the result that a trouble will occur.
	Before removing the USB flash memory, check for the access lamp of the USB flash memory and make sure that it is not being accessed. If you remove the USB flash memory when it is accessed, data may be destroyed and a trouble may occur.

Software information can be confirmed.

1 **Click on the [Menu] button on the left Toolbar.**
The menu is displayed.

2 **Click on the [Maintenance] - [System Information] button on the menu.**
The [System Information] dialog box appears.

3 **Click on the [Software] tab.**
The software information is displayed.



[1] [X] button
Click on this button to close the [System Information] dialog box.

[2] Software information

Item	Displayed information
Jxx-xxxx	Type and model name of the system
Application	Version of the application software
Maintenance No.	7-digit maintenance number
TXRX	Version of the software used for the radar transmitter-receiver unit * This information is displayed when the system is equipped with the RADAR function.
TCS	Version of the software used for TCS * This information is displayed when the system is equipped with the TCS function.

[3] [Save to USB Device] (Saving to USB flash memory) button

Click on this button to save the displayed information in a USB flash memory in the text format.

13.1.3.2 Checking the enable/disable statuses of the functions that have been installed

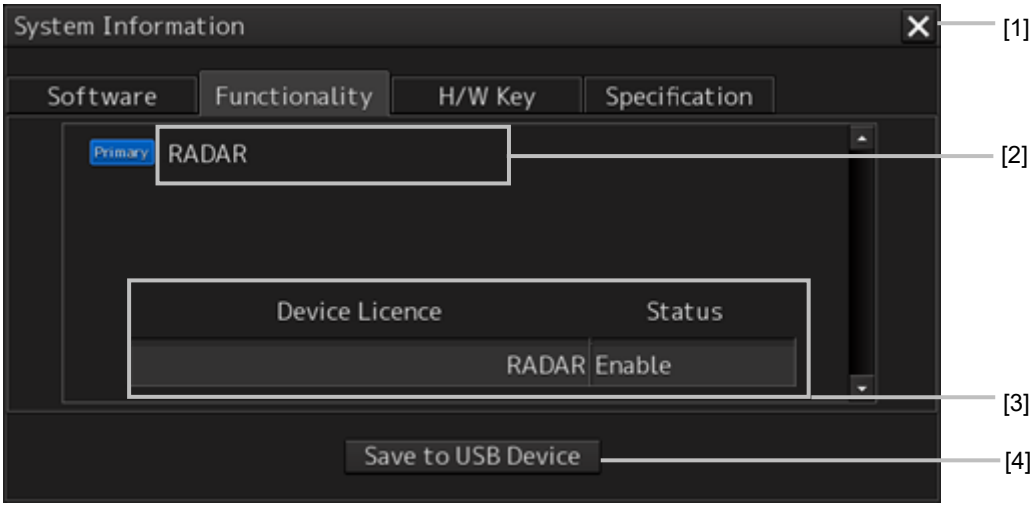
⚠WARNING	
	When you want to use a USB flash memory to read or write a file, make sure in advance that the USB flash memory is not affected by a computer virus. If the indicator is infected with a virus, other equipment will also be infected, with the result that a trouble will occur.
	Before removing the USB flash memory, check for the access lamp of the USB flash memory and make sure that it is not being accessed. If you remove the USB flash memory when it is accessed, data may be destroyed and a trouble may occur.

1 **Click on the [Menu] button on the left Toolbar.**
The menu is displayed.

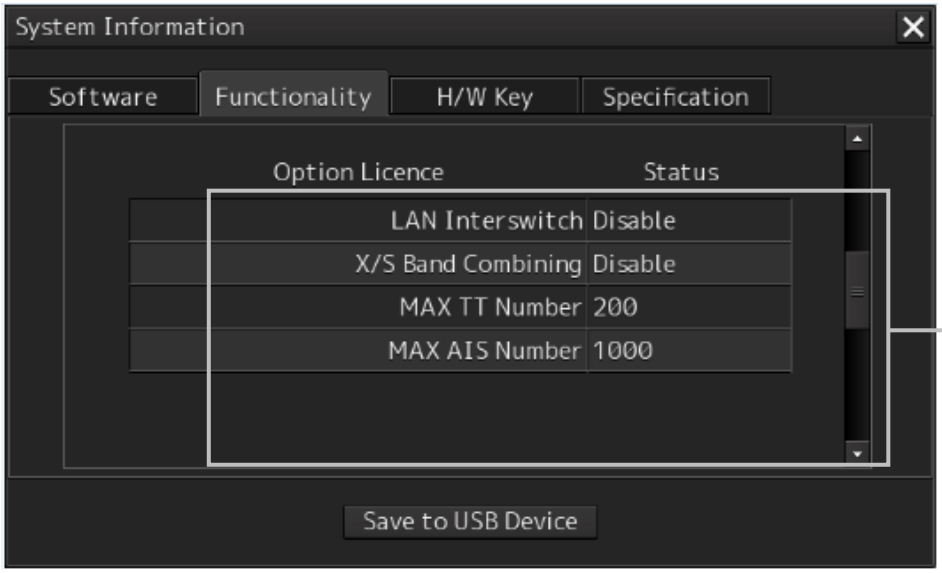
2 **Click on the [Maintenance] - [System Information] button on the menu.**
The [System Information] dialog box appears.

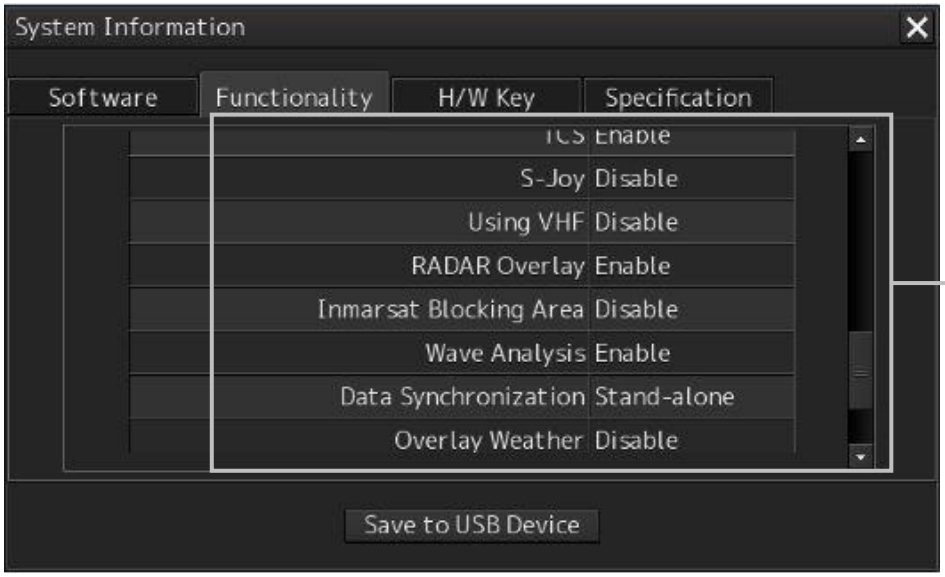
3 **Click on the [Functionality] tab.**
The functionality information is displayed.
The display contents vary depending on the number of operation modes and whether the modes include the primary task (shown by this equipment).

[The system has multiple operation modes and RADAR is the primary task]



[Section that is displayed when the above screen is scrolled down (example)]





[1] [X] button

Click on this button to close the [System Information] dialog box.

[2] Format

The system format and model name of this equipment are displayed.

(Example: AlphaScan 5901)

The [Primary] badge is displayed in front of the format for the primary task.

[3] Functionality

The functions that are installed are displayed in [Device Licence] and [Option Licence].

One of the following is displayed in [Status].

[Status]	Meaning
Enable	Indicates that the function can be used.
Disable	Indicates that the function cannot be used.
Value (such as 500)	Indicates the setting value of the option license of the function.
Stand-alone	This indicates that it is not possible to use the function of synchronization with other equipment, and independent operation has to be made.

[4] [Save to USB Device] (Saving to USB flash memory) button

Click on this button to save the displayed information in a USB flash memory in the text format.

13.1.3.3 Confirming the compliant standards for the equipment

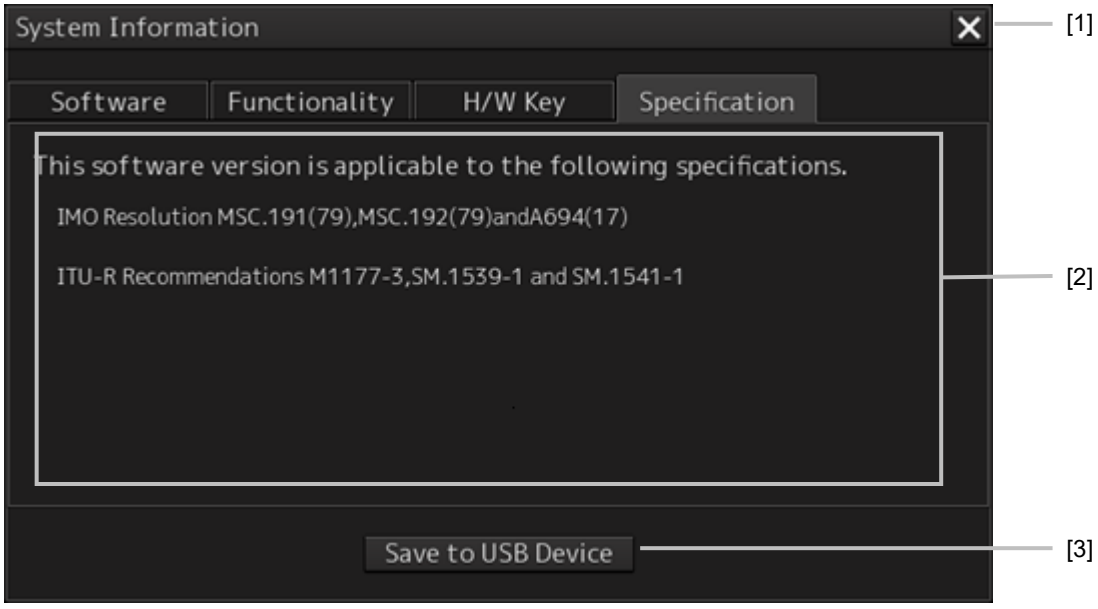
⚠WARNING	
	When you want to use a USB flash memory to read or write a file, make sure in advance that the USB flash memory is not affected by a computer virus. If the indicator is infected with a virus, other equipment will also be infected, with the result that a trouble will occur.
	Before removing the USB flash memory, check for the access lamp of the USB flash memory and make sure that it is not being accessed. If you remove the USB flash memory when it is accessed, data may be destroyed and a trouble may occur.

When the equipment license of RADAR is available, the standard relating to the equipment license is displayed.

1 **Click on the [Menu] button on the left Toolbar.**
The menu is displayed.

2 **Click on the [Maintenance] - [System Information] button on the menu.**
The [System Information] dialog box appears.

3 **Click on the [Specification] tab.**
The equipment license standard specification information is displayed.



[1] [×] button

Closes the [System Information] dialog box.

[2] Equipment license information

The equipment license standard specification information is displayed.

[3] [Save to USB Device] (Saving to USB flash memory) button

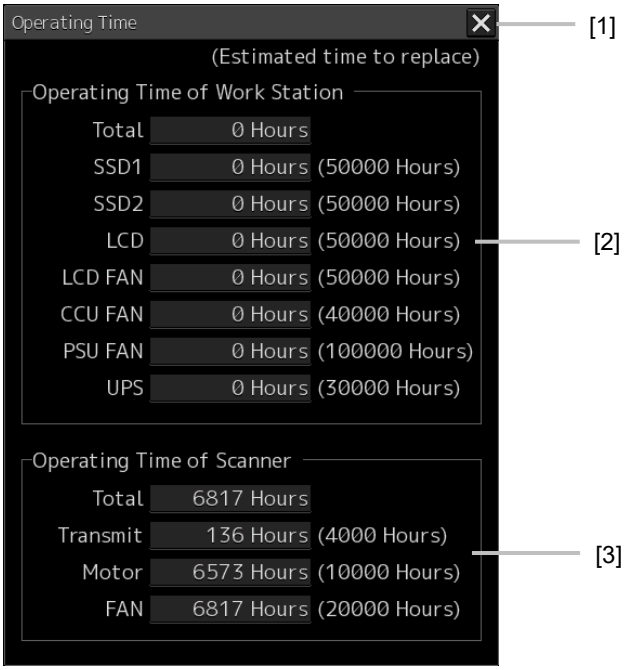
Click on this button to save the displayed information in a USB flash memory in the text format.

13.1.4 Confirming Operating Time

Confirm the operating time of this system.

1 **Click on the [Menu] button on the left Toolbar.**
The menu is displayed.

2 **Click on the [Maintenance] - [Operating Time] button on the menu.**
The [Operating Time] dialog box appears.



[1] [X] button
Click on this button to close the [Operating Time] dialog box.

[2] [Operating Time Of Work Station]
The operating time of this equipment is displayed.
[Total]: Total operating time of this equipment
[SSD1]: Total operating time of SSD1. The estimated replacement time is indicated in ( ).
[SSD2]: Total operating time of SSD2. The estimated replacement time is indicated in ( ).
[LCD]: Total operating time of LCD. The estimated replacement time is indicated in ( ).
[LCD FAN]: Total operating time of LCD FAN. The estimated replacement time is indicated in ( ).
[CCU FAN]: Total operating time of CCU FAN. The estimated replacement time is indicated in ( ).
[PSU FAN]: Total operating time of PSU FAN. The estimated replacement time is indicated in ( ).
[UPS]: Total operating time of UPS. The estimated replacement time is indicated in ( ).

Memo
[UPS] is displayed only when UPS is installed as an option.

[3] [Operating Time Of Scanner]

The total operating time of the radar antenna is displayed.

[Total]: Total operating time of the radar antenna

[Transmit]: Total operating time of the transmitter. The estimated replacement time is indicated in ( ).

[Motor]: Total operating time of the motor. The estimated replacement time is indicated in ( ).

[FAN]: Total operating time of the radar antenna fan.

> **Memo**
> [Operating Time Of Scanner] is displayed when it is connected with an antenna.

13.1.5 Displaying/Resetting the Current Voyage Distance

This equipment displays the current voyage distance (estimated voyage distance) that is calculated from the speed over the ground and the speed through the water.

The voyage distance can also be reset.

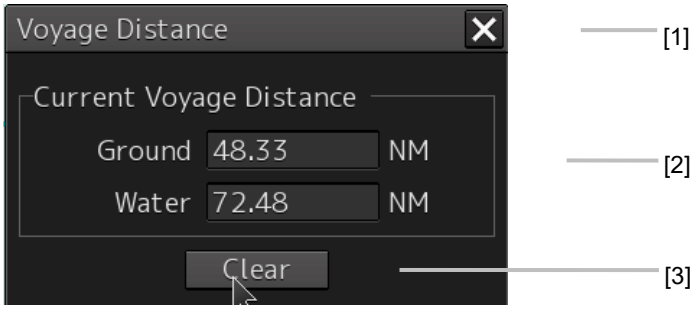
> **Note**
> While the ship is anchored or sailing at low speed, it takes up to around 2 minutes to reset the current voyage distance.

1 **Click on the [Menu] button on the Left Tool Bar.**

A menu is displayed.

2 **Click on [Maintenance] - [Voyage Distance] on the menu.**

The [Voyage Distance] dialog is displayed.



[1] [×] button

The [Voyage Distance] dialog is closed.

[2] [Current Voyage Distance]

The current voyage distance is displayed.

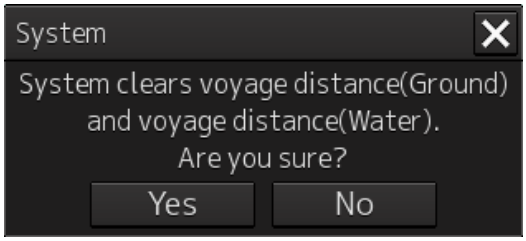
[Ground]: Indicates the current voyage distance that is calculated from the speed over the ground.

[Water]: Indicates the current sea distance that is calculated from the speed through the water.

[3] [Clear] button

The voyage distance is reset.

When this button is clicked on, a confirmation dialog is displayed.



To reset the voyage distance, click on the [Yes] button. When not resetting the voyage distance, click on the [No] button.

Memo

When the voyage distance is reset in the [Voyage Distance] dialog, the voyage distance in the event detailed information in the logbook is also reset. The [Voyage distance (ground)] and [Voyage distance (water)] in the event detailed information are reset.

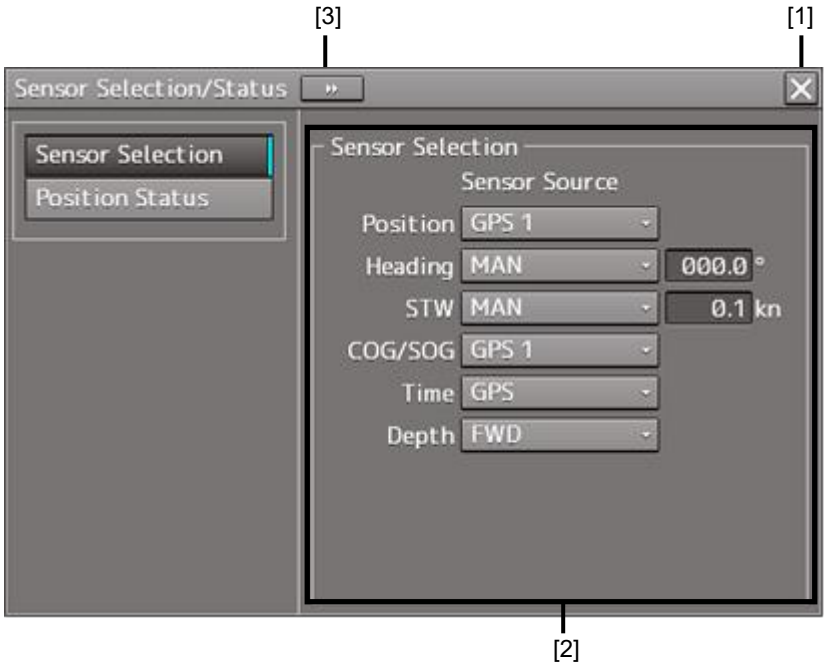
For the details of the event detailed information in the logbook, refer to “8.1.1 Event detailed information”.

13.1.6 Setting and confirming the Sensor Source

Set and confirm the sensor source.

1 **Click on the [Menu] button on the left Toolbar.**
The menu is displayed.

2 **Click on the [Maintenance] - [Sensor Selection/Status] button on the menu.**
The [Sensor Selection/Status] dialog box appears.



[1] [X] button
Closes [Sensor Selection/Status] dialog box.

[2] [Sensor Selection]
Enables selection of a sensor source.

Setting item	Setting contents	Setting value
Position	Select a Primary Position sensor source from the combo box.	GPS x, DR ("x": equipment number)
Heading	Select a heading sensor source from the combo box. * The sources that can be selected vary according to the installation. * When GyroSW is enabled, only Gryo and MAN can be selected. When the Gyro Compass system that is used has the automatic switching function, the sensor source display is switched automatically according to the switching condition. When the sensor source is set to [MAN], the ship's heading value can also be input in the input box. Ship's heading value input range: 0.0-359.9°	MAN, Gyro x, MAG, G/C ("x" indicates the unit number)
STW (Speed Through Water)	Select a Speed Through Water sensor source from the combo box. * The source that can be selected varies depending on the installation * When 1AX is installed in Log, Log cannot be selected from the sensor source. When the sensor source is set to [Manual], a Speed Through Water can also be input in the input box. Speed Through Water value input range: -99.9-99.9kn	MAN, Logx ("x" indicates the unit number)
COG/SOG (Course Over the Ground/Speed Over the Ground)	Select Course Over the Ground/Speed Over the Ground sensor source from the combo box. * The source that can be selected varies depending on the installation When GPS is selected for Position, the same GPS is selected automatically.	Log x, GPS ("x" indicates the unit number)
Time (Time correction)	Select a sensor source to be used for time correction of this equipment from the combo box. * The source that can be selected varies depending on the installation	GPS, Ship Clock
Depth (Water depth)	Select a water depth sensor source from the combo box. * The source that can be selected varies depending on the installation	FWD, AFT, MID, AUTO*1

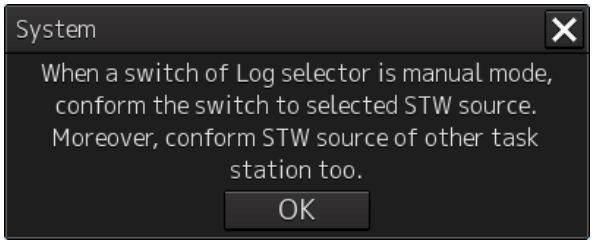
*1: When Echo Sounder 1 and Echo Sounder 2 are installed as depth sensor sources, E/S1 (AUTO) and E/S2 (AUTO) are displayed instead of AUTO.

[3] Disclosure button

Clicking on this hides the left panel.

Memo

When Log Selector is installed and the Log (speed) sensor is switched automatically, a popup window is displayed, notifying the effect.



13.2 General Maintenance

⚠ DANGER	
	Never attempt to check or repair the inside of the equipment. Checking or repair by an unqualified person may cause a fire or an electric shock. Contact our head office, or a nearby branch or local office to request servicing.
	Never remove the cover of this equipment. Touching the high-voltage section inside will cause an electric shock.
	Do not attempt to disassemble or tamper with this equipment. Otherwise, a fire, an electric shock, or a malfunction may occur.
	When conducting maintenance, make sure to turn the main power off. Failure may result in electric shock.
	Turn off all the main powers before cleaning the equipment. Make sure to turn it off since voltage is still outputted from the rectifier even after the indicator and the radar are turned off. Failure may result in equipment failure, or death or serious injury due to electric shock.
	When conducting maintenance work on the radar antenna, make sure to turn all the main powers off. Failure may result in electric shock or injuries.
	Make sure to turn off the radar antenna safety switch. Failure may result in injuries caused by physical contact with the rotating radar antenna.

For operating this equipment in the good conditions, it is necessary to make the maintenance work as described below. If maintenance is made properly, troubles will reduce. It is recommended to make regular maintenance work.
The general maintenance work common among each equipment is as follows.

Clean the equipment.
Remove the dust, dirt, and sea water rest on the equipment cabinet with a piece of dry cloth.
Especially, clean the air vents with a brush for good ventilation.

13.3 Maintenance on Each Unit

13.3.1 Radar antenna NKE-1125/1130

⚠WARNING

When turning off the power supply, do not hold down the power button of the operation unit.
Otherwise, a trouble may occur due to termination failure.

Never directly touch the internal components of the radar antenna or indicator. Direct contact with these high-voltage components may cause electric shock. For maintenance, inspection, or adjustment of equipment components, consult with our branch office, branch shop, sales office, or our distributor in your district.

Do not get close to the radiant section of the radar antenna. It is a rotating part, and it may cause injuries if it suddenly starts rotating and consequently hits the body. It is recommended that the radiant section be installed at a high place such as on the roof of the wheelhouse, on the flying bride, on the trestle, or on the radar mast so that no one can get close to it.

Keep away from the radar antenna during transmission.
Microwaves are generated from the front center of the radiant section of the radar antenna at the levels indicated in the table below. Exposure to microwaves at close range can result in injury (especially damage to eyes).

Microwave radiation level of the radar antenna

System	50 W/m^2	20 W/m^2	2.5 W/m^2
NKE-2103	n/a	26 cm	123 cm
NKE-1125/2254	5 cm	81 cm	162 cm
NKE-1130	11 cm	76 cm	181 cm

Make sure to install the radar antenna at a place higher than human height.
Direct exposure to electromagnetic wave at close range will have adverse effects on the human body.

When it is necessary to get close to the radar antenna for maintenance or inspection purposes, make sure to turn the power switch of the display unit to "OFF" or "STBY".
Direct exposure to electromagnetic waves at close range will have adverse effects on the human body.

When conducting maintenance work, make sure to turn off the power so that the power supply to the equipment is completely cut off.
Some equipment components can carry electrical current even after the power switch is turned off, and conducting maintenance work may result in electric shock, equipment failure, or accidents.

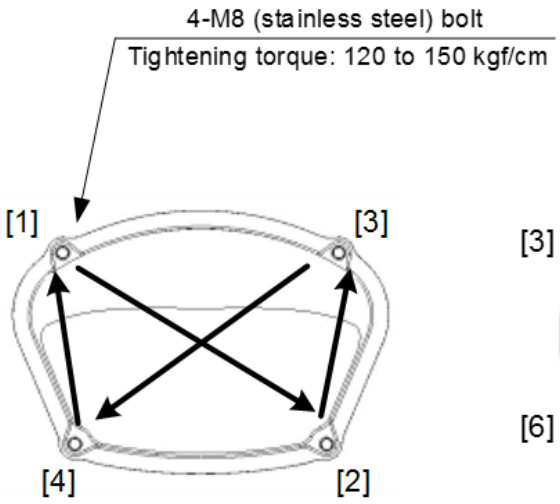
After the maintenance work, turn the safety switch to stop the radar antenna to "ON".

13.3.1.1 Precautions in mounting the cover

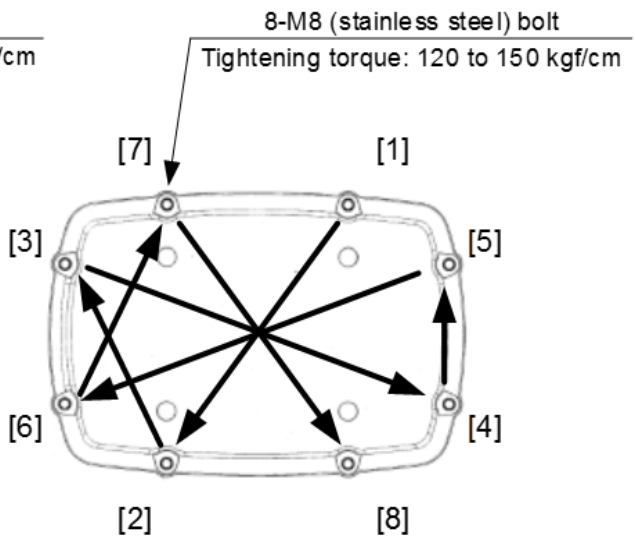
When the cover is removed for regular inspection and replacement of parts and refitted after such work, the procedures of fastening bolts shall be taken with the following precautions:

(1) The proper fastening torque of the fitting bolts (M8) is 1176 to 1470 N•cm (120 to 150 kgf•cm) (which makes the inside water-tight and protects the packings against permanent compressive strain). The packings start sticking out from the cover at a torque of approximately 1470 N•cm (150 kgf•cm). Do not fasten the bolts with a torque exceeding the specified value. Otherwise, the screws may be broken.
(2) Use an offset wrench of 11 mm × 13 mm or a double-ended wrench of 13 mm × 17 mm (not longer than 200 mm).
(3) Screw all the bolts by hand first to prevent them playing, then fasten them evenly in order not to cause one-sided fastening. (Fasten the bolts with 25% of the required torque at the first step.)

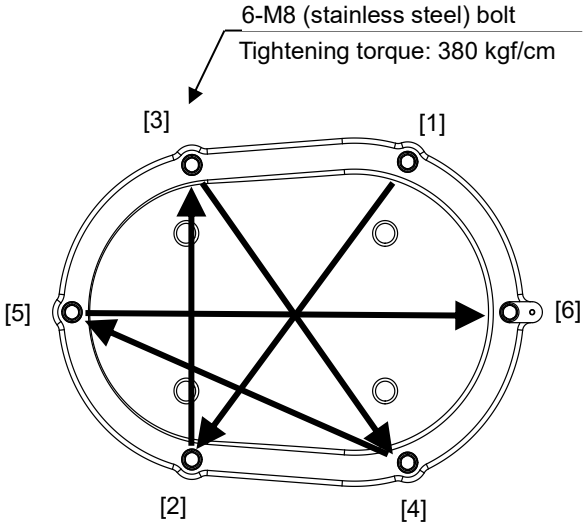
*: Fasten the bolts in the diagonal order.



Bolt Tightening Order of
NKE-1125 Cover



Bolt Tightening Order of
NKE-1130/1632 Cover



Bolt Tightening Order of
NKE-2632/2632-H Cover

13.3.1.2 Radiator

Perform inspection and cleaning of the radiator.

Note

If the radiator front face (radiation plane) is soiled with smoke, salt, dust, paint or birds' droppings, wipe it with a piece of soft cloth wetted with alcohol or water and try to keep it clean at all times. Otherwise, radar beam radiation may attenuate or reflect on it, resulting in deterioration of radar performance.

Never use solvents of gasoline, benzene, trichloroethylene and ketone for cleaning. Otherwise, the radiation plane may deteriorate.

13.3.1.3 Rotating section

Supply oil seal

When there is not a grease nipple, the replenishment of grease oil is unnecessary.
Remove the cap on the grease nipple located on the front of the part at which the radiator is supported, and grease with a grease gun. Make the oiling every six months. The oil quantity shall be approximate 100 g, which is as much as the grease comes out of the oil seal. Use the grease of Mobilux2 of Mobil Oil.

Oiling gears

Apply grease evenly to the tooth surfaces of the main shaft drive gear and the encoder drive gear with a spreader or brush. Oiling in short intervals is more effective to prevent the gears from wear and tear and extend their service life, but oil at least every six months.
Use the grease of Mobilux2 of Mobil Oil or equivalent.

Mounting legs

Check the mounting legs and mounting bolts of the radar antenna chassis for corrosion at intervals and maintain them to prevent danger. Apply paint to them once a half year because painting is the best measure against corrosion.

13.3.2 Coaxial cable (AlphaScan 5930-S3)

The coaxial tube gland of a coaxial cable terminal is fully waterproofed when installed. To prevent a water leakage accident, periodically inspect the coaxial tube gland. In particular, the coaxial tube gland should be repainted every six months.

⚠WARNING	
	Do not apply strong shock to the coaxial cable by striking it with a tool or hammering it. Otherwise, an open circuit failure may result.
	Do not place anything heavy on the coaxial cable. Otherwise, an open circuit failure may result.
	Do not twist or pull the coaxial cable. Otherwise, an open circuit failure may result.

For the details, refer to the coaxial cable installation procedure for S-band radars.

13.3.3 Display unit

⚠WARNING	
	When cleaning the screen, do not wipe it too strongly with a dry cloth. Also, do not use gasoline or thinner to clean the screen. Otherwise the screen surface may be damaged.

Dust accumulated on the screen will reduce clarity and darken the video.
For cleaning it, wipe it with a piece of soft cloth (flannel or cotton). Do not wipe it strongly with a piece of dry cloth nor use gasoline or thinner.

13.4 Performance Check

Make performance check on the radar equipment regularly and if any problem is found, investigate it immediately. Pay special attention to the high voltage sections in inspection and take full care that no trouble is caused by any error or carelessness in measurement. Take note of the results of inspection, which can be used effectively in the next inspection work.
Carry out performance check on the items listed in the check list below.

Check List

Equipment	Item to be checked	Criteria	Remarks
Transmitter-receive	Synchronization LED of Receiver	The LED is lit during operation	48 NM range
Display unit	Video and echoes on the screen Sensitivity Brightness Various markers Various numerical indications Lighting	Can be correctly controlled	
	Cleaning the DVD drive	13.4.10 Cleaning the lens of the DVD drive	
Radar antenna	Magnetron current	13.4.7 Checking the magnetron current level of the radar [Magnetron Curr.]	
	Performance Monitor	13.4.9 Checking the performance monitor status	

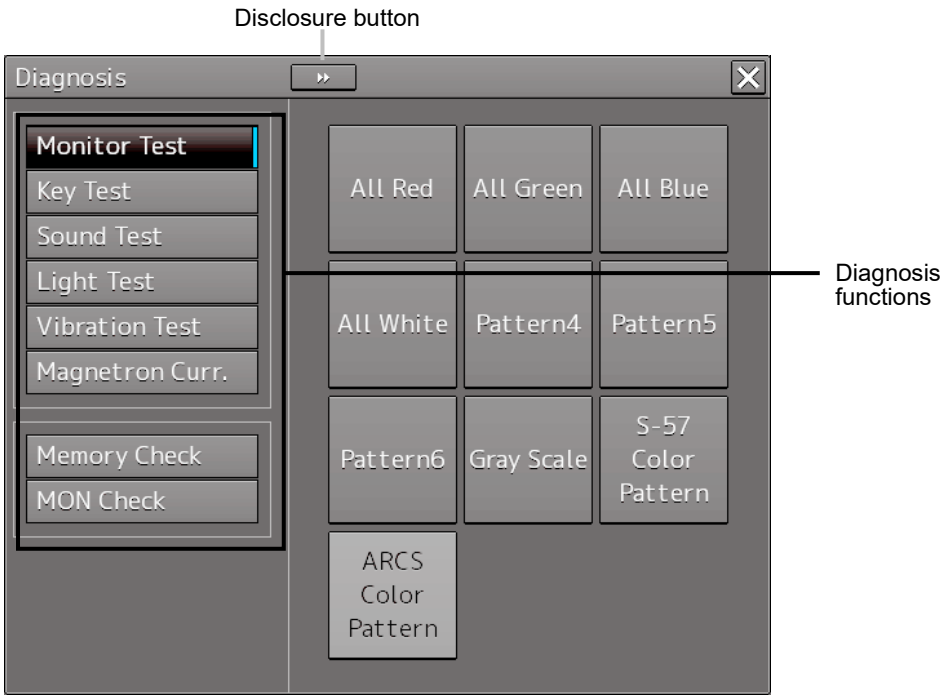
13.4.1 Starting Diagnosis functions

1 **Click on the [Menu] button on the left Toolbar.**

The menu is displayed.

2 **Click on the [Maintenance] - [Diagnosis] button on the menu.**

The [Diagnosis] dialog box appears.



The Diagnosis functions are displayed in the left panel.

Click on the disclosure button to hide the left pain.

3 **Click on a Diagnosis function to be executed.**

The execution dialog of the selected diagnosis function is displayed.

13.4.2 Confirming the screen status [Monitor Test]

Confirm the screen status.

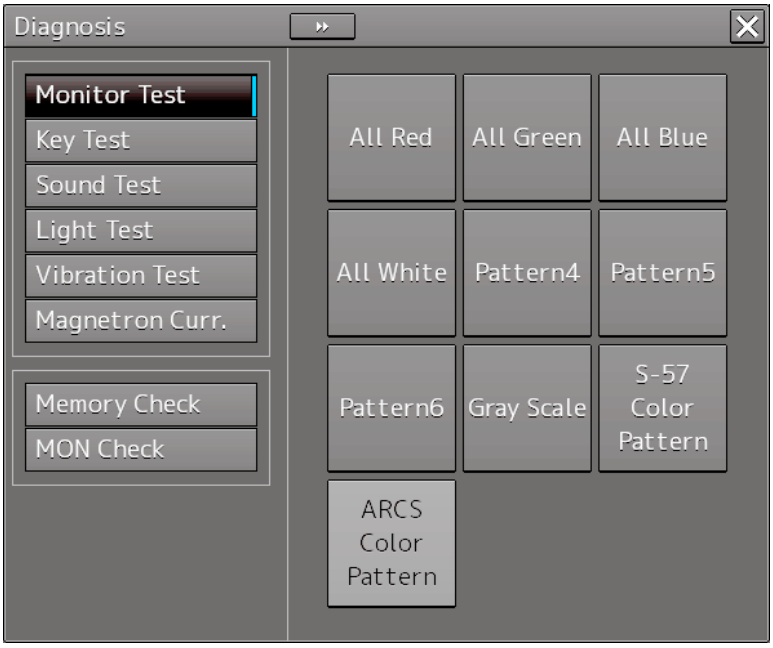
1 **Click on the [Menu] button on the left Toolbar.**

The menu is displayed.

2 **Click on the [Maintenance] - [Diagnosis] - [Monitor Test] button on the menu.**

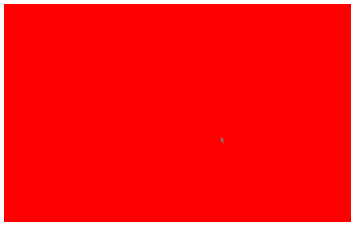
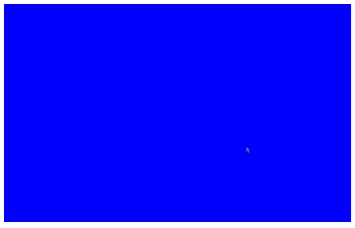
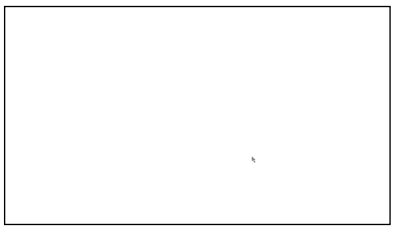
When the color or pattern of the dialog is clicked on, the color or pattern is displayed on the screen.

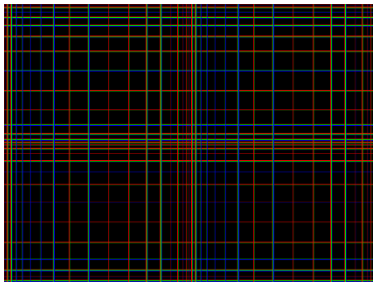
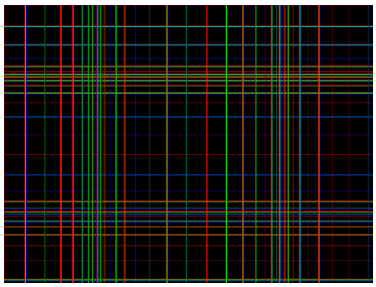
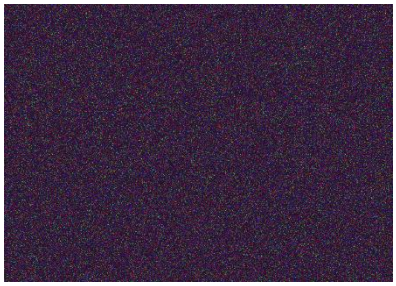
Check the screen status with the display status.

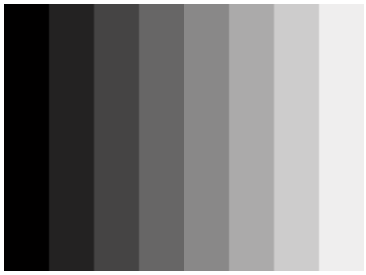


To reset the display, click the button again.

Pattern list

Pattern button name	Display
All Red	 The entire screen is displayed in red.
All Green	 The entire screen is displayed in green.
All Blue	 The entire screen is displayed in blue.
All White	 The entire screen is displayed in white.

Pattern4	 Displays the pattern for checking the communication quality for VDR.
Pattern5	 Displays the pattern for checking the communication quality for VDR.
Pattern6	 Displays the pattern for checking the communication quality for VDR.

Gray Scale	 Displays the grey scale pattern for checking the monitor brightness adjustment. Grey scale patterns can be identified with brightness in day/night mode. By adjusting the monitor brightness to facilitate identification of grey scale patterns, the optimum brightness can be set. The brightness in night mode can also be adjusted in the same way. Use the Day/Night button on the right Toolbar for switching between the day and night mode. For the details of the Day/Night button, refer to “2.2.2 Right toolbar”.

13.4.3 Confirming the operation of the operation unit [Key Test]

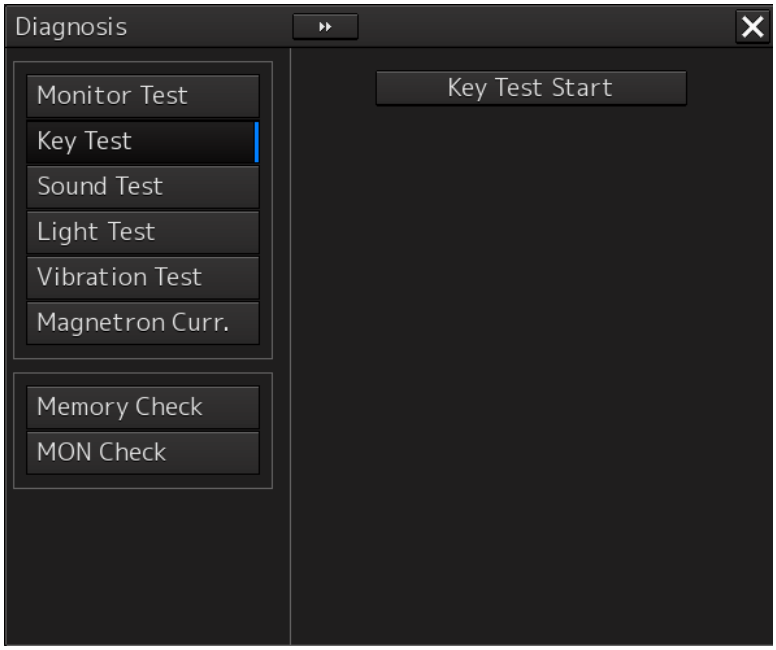
Confirm the operation of the keys of the operation unit.

1 **Click on the [Menu] button on the left Toolbar.**

The menu is displayed.

2 **Click on the [Maintenance] - [Diagnosis] - [Key Test] button on the menu.**

3 **Click on the [Key Test Start] button.**



Key Test screen is displayed.

4 **Operate the keys, buttons and dials in the operation unit.**

If the performance of the operation unit is normal, the colors of the keys, buttons and dials are changed.

5 **Click on the [Key Test Stop] button after the operation check.**

Returns to the [Diagnosis] dialog box.

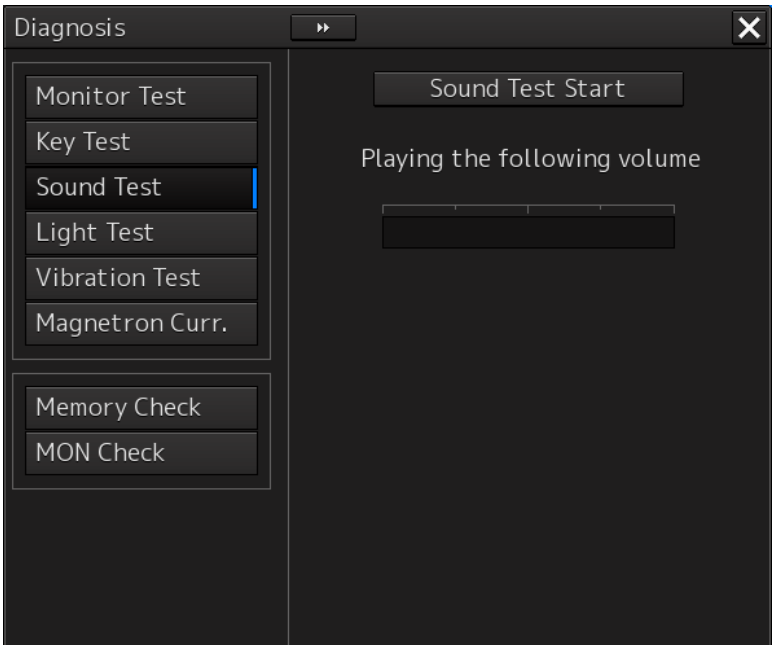
13.4.4 Confirming the alert sound [Sound Test]

Confirm the alert sound.

1 **Click on the [Menu] button on the left Toolbar.**
The menu is displayed.

2 **Click on the [Maintenance] - [Diagnosis] - [Sound Test] button on the menu.**

3 **Click on the [Sound Test Start] button.**
A sound test starts. All the available beep sound volumes can be tested by increasing the level from 0.



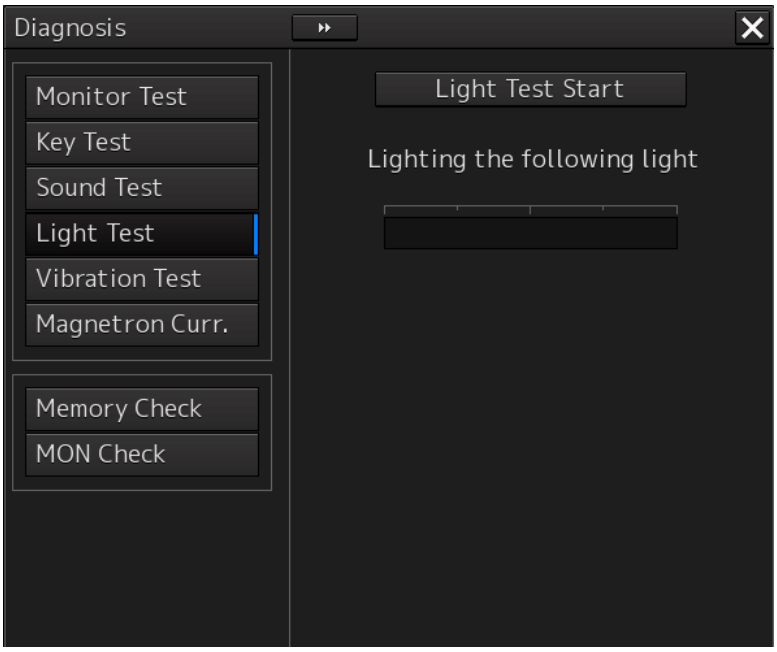
13.4.5 Testing the brightness of LED [Light Test]

Test the brightness of the LED of the operation unit.

1 **Click on the [Menu] button on the left Toolbar.**
The menu is displayed.

2 **Click on the [Maintenance] - [Diagnosis] - [Light Test] button on the menu.**

3 **Click on the [Light Test Start] button.**
A LED brightness test starts. All the available brightness levels can be tested by increasing the level from 0.



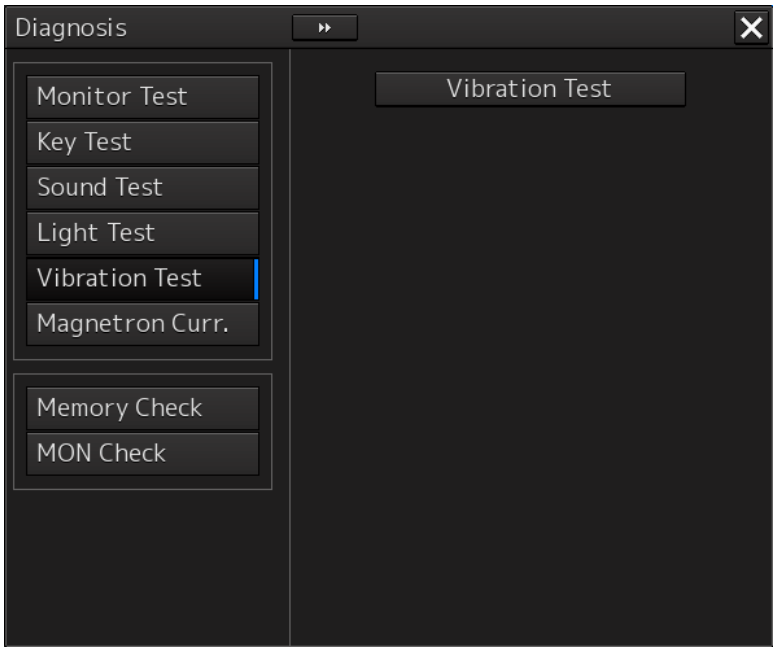
13.4.6 Testing a motor [Motor Vibration]

Test the vibrations of the motor.

1 **Click on the [Menu] button on the left Toolbar.**
The menu is displayed.

2 **Click on the [Maintenance] - [Diagnosis] - [Vibration Test] button on the menu.**

3 **Click on the [Vibration Test] button.**
The motor continuously vibrates while the button is pressed. When the button is released, vibration stops.



13.4.7 Checking the magnetron current level of the radar [Magnetron Curr.]

This function is used to check the magnetron current level of the radar.

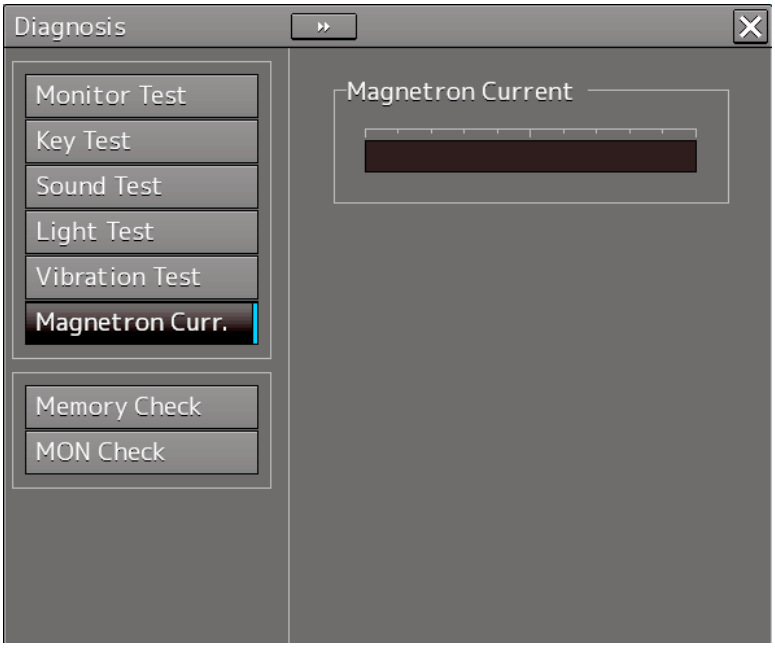
This function is displayed only when the magnetron radar antenna is connected.

1 **Click on the [Menu] button on the left Toolbar.**

The menu is displayed.

2 **Click on the [Maintenance] - [Diagnosis] - [Magnetron Curr.] button on the menu.**

The magnetron current level of the radar antenna is displayed.



The current level is normal if it is within the following scope under the 48NM range.

10kW transmitter: Scale 4 to 7

25/30kW transmitter: Scale 6 to 9

Note

In the sector blank area, the display of the magnetron current becomes unstable.

Check that there are no fluctuations (drift) of 2 scales or more while sector blank is not set. For the details of sector blank setting, refer to “12.2.5 Setting Sector Blank”.

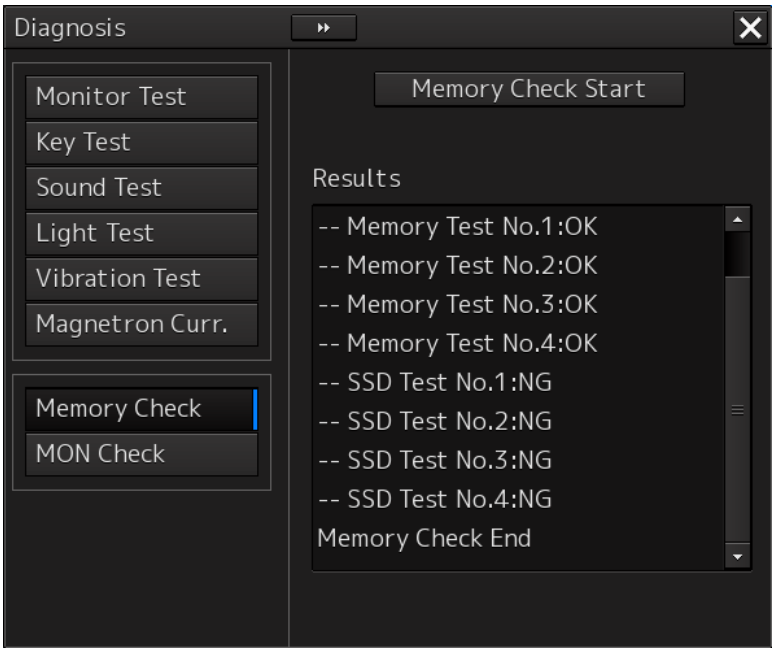
13.4.8 Checking the memory [Memory Check]

Check the memory.

1 **Click on the [Menu] button on the left Toolbar.**
The menu is displayed.

2 **Click on the [Maintenance] - [Diagnosis] - [Memory Check] button on the menu.**

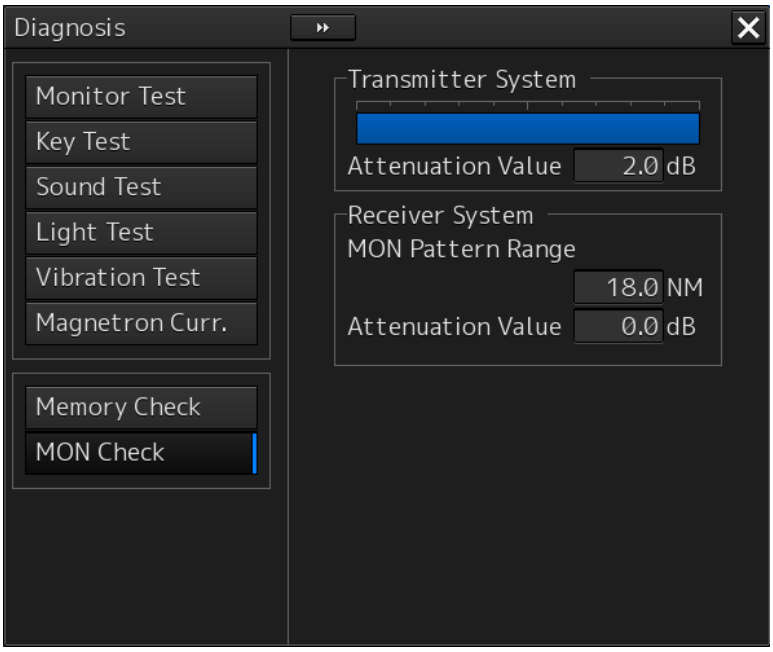
3 **Click on the [Memory Check Start] button.**
Memory checking starts and the checking result is displayed on the [Result] list.



13.4.9 Checking the performance monitor status

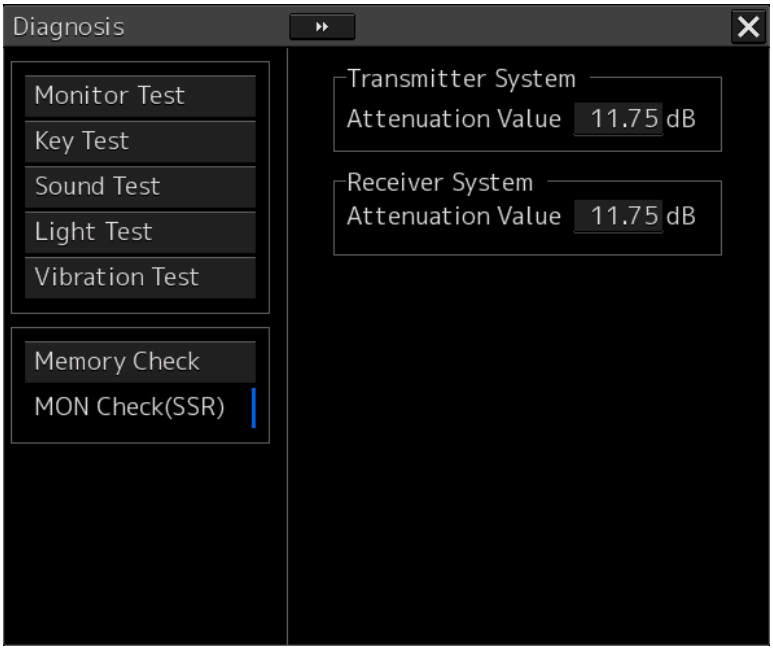
This function is used to check the condition of the radar performance monitor. Items displayed under this function vary depending on the type of the radar antenna.

When magnetron radar is used, the following dialog box appears.



For the details of this dialog box, refer to "13.4.9.1 MON Check."

When a solid-state radar is used, the following dialog box will be displayed.

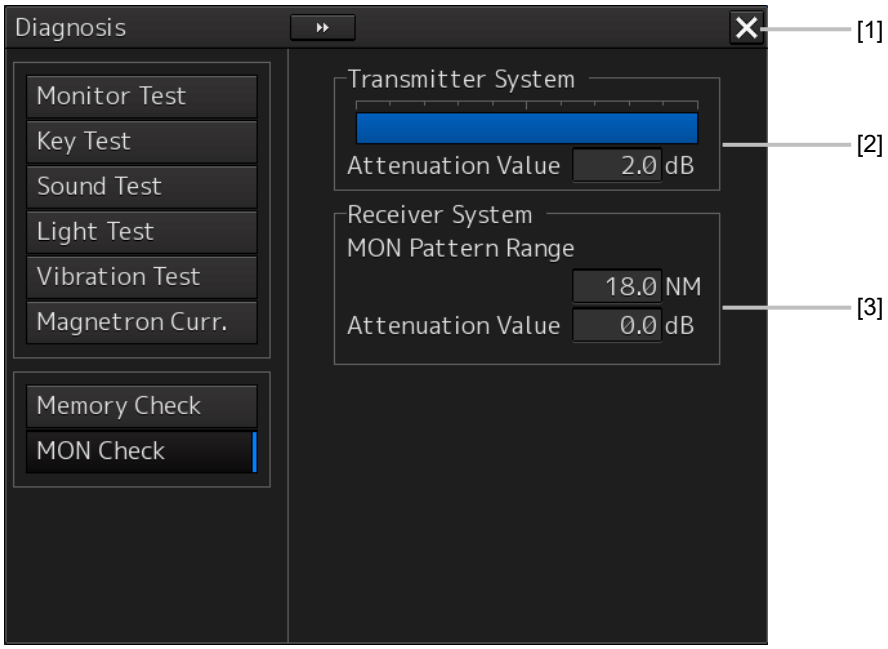


For the details of this dialog box, refer to "13.4.9.2 MON Check (SSR)".

13.4.9.1 MON Check

1 **Click on the [Menu] button on the left Toolbar.**
The menu is displayed.

2 **Click on the [Maintenance] - [Diagnosis] - [MON Check] button on the menu.**



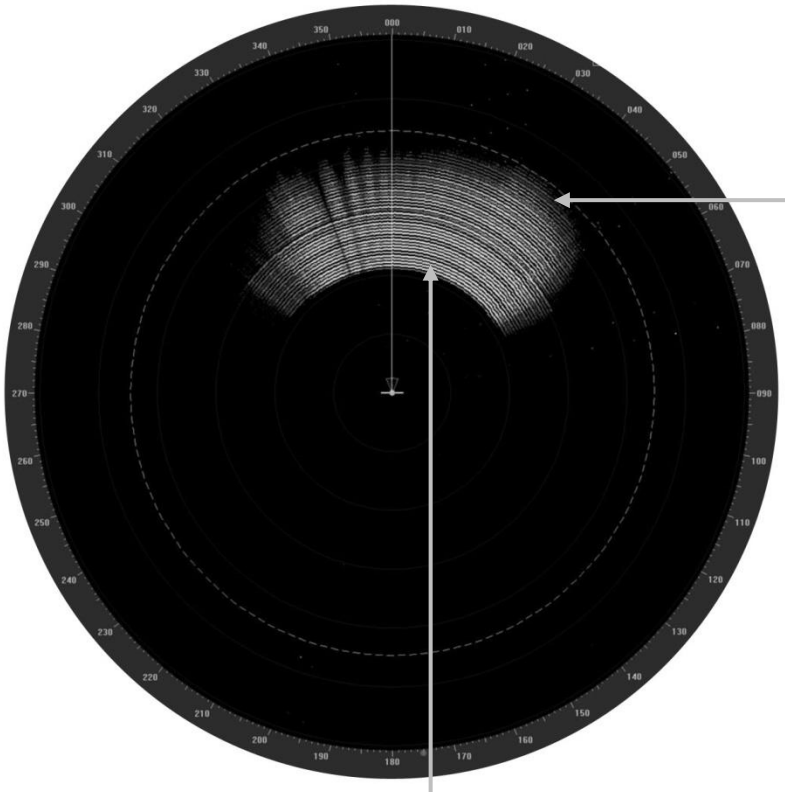
[1] [X] button
Click on this button to close the [Diagnosis] dialog box.

[2] [Transmitter System]
The amount of attenuation at the radar transmitter is displayed in a bar graph as well as in a numerical value [dB].

[3] [Receiver System]
MON Pattern Range
The distance [NM] is displayed when the user adjusts VRM to the farthest edge of the performance monitor pattern.
Attenuation Value
The amount of attenuation at the radar receiver is displayed in a numerical value [dB].

Checking a performance monitor status

In case of equiped with Interswitch function (Option)
To check the performance with the performance monitor, set the interswitch connection to straight (i.e. No. 1 radar antenna is connected to No. 1 display unit).



1 **Click on the [Menu] button on the left Toolbar.**
The menu is displayed.

2 **Click on the [Maintenance] - [Diagnosis] - [MON Check] button on the menu.**

3 **Turn the [VRM] control on the keyboard operation unit to the farthest edge of the performance monitor pattern.**

4 Check the amount of attenuation in the dialog box.

Benchmarks for the amount of attenuation are as follows:

Attention Value of Transmitter:

At normal: -6.9 dB to +2.0 dB

At degrading performances: -15.0 dB to -7.0 dB

Attention Value of Receiver:

At normal: -2.9 dB to +3.5 dB

At degrading performances: -15.0 dB to -3.0 dB

When confirming the attenuation value of the transmitter, after opening the dialog box, wait for one minute, and then read its value.

If the attenuation value of the transmitter is -7dB or lesser, or the receiver's attenuation indicator is -3dB or lesser, it is indicates that performances of the transmitter/receiver unit are degrading.

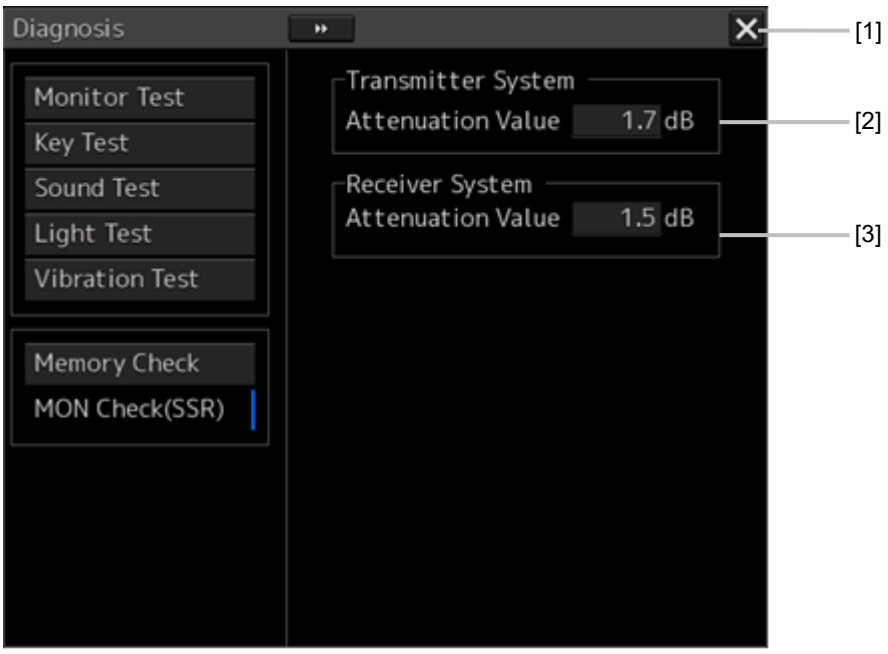
In this case, inspection by the specialized service personnel is required. Contact our dealer, the nearest service representative or Alphatron Marine sales.

13.4.9.2 MON Check (SSR)

1 Click on the [Menu] button on the left Toolbar.

The menu is displayed.

2 Click on the [Maintenance] - [Diagnosis] - [MON Check (SSR)] button on the menu.



[1] [X] button

Click on this button to close the [Diagnosis] dialog box.

[2] [Transmitter System]

The amount of attenuation at the radar transmitter is displayed in a numerical value [dB].

[3] [Receiver System]

The amount of attenuation at the radar receiver is displayed in a numerical value [dB].

3 Check the attenuation value with the dialog.

The guidelines of attenuation values are as follows.

Transmission section attenuation value:

Normal: -6.9dB to +7.0dB

Performance deterioration: -20.0dB to -7.0dB

Reception section attenuation value:

Normal: -6.9dB to +7.0dB

Performance deterioration: -20.0dB to -7.0dB

When confirming the attenuation value of the transmitter, after opening the dialog box, wait for one minute, and then read its value.

If the attenuation value of the transmitter is -7dB or lesser, or the receiver's attenuation indicator is -7dB or lesser, it is indicates that performances of the transmitter/receiver unit are degrading.

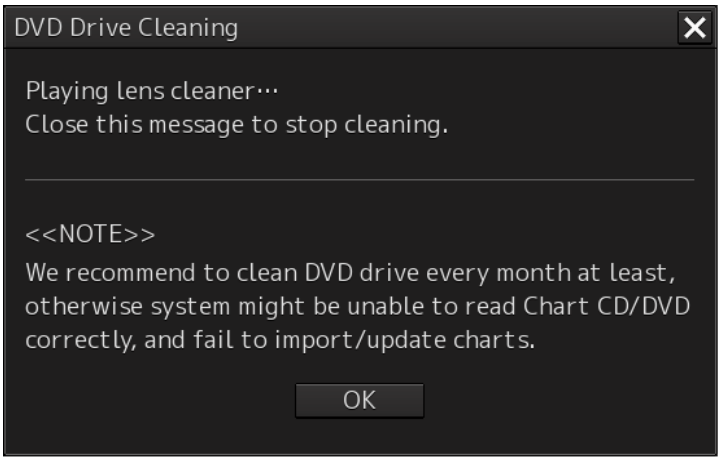
In this case, inspection by the specialized service personnel is required. Contact our dealer, the nearest service representative or Alphatron Marine sales.

13.4.10 Cleaning the lens of the DVD drive

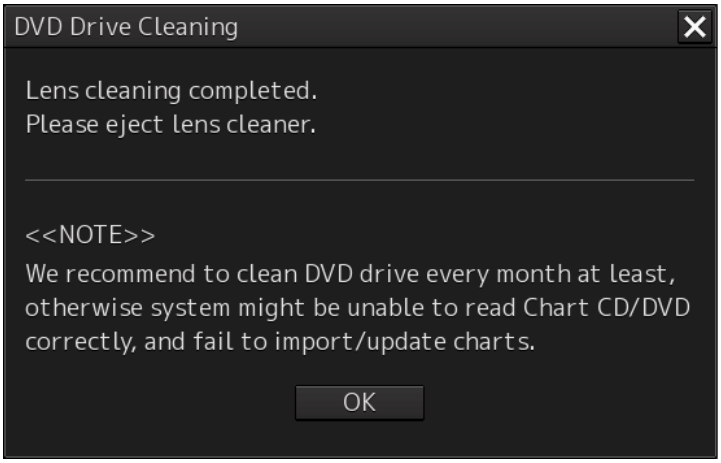
1 **Insert the supplied lens cleaner CD into the DVD drive.**

2 **Click on the [Menu] button on the left Toolbar.**
The menu is displayed.

3 **Click [Maintenance] - [Diagnosis] - [DVD Cleaning] from the menu.**
Cleaning automatically starts.
The following dialog box appears during cleaning:



4 **When the cleaning completion dialog box appears, click on the [OK] button.**



Remove the supplied lens cleaner CD.

Note

It is recommended that the DVD drive is cleaned at least once a month. If the lens becomes dirty, it may not be possible to read data from a CD/DVD, or else it may not be possible to install a chart or an update. When reading the lens cleaner CD fails, an error dialog box appears.

13.5 Replacement of Major Parts

The system includes parts that need periodic replacement. The parts should be replaced as scheduled. Use of parts over their service life can cause a system failure.

⚠CAUTION	
	Turn off the main power source before inspecting and replacing parts. Otherwise, an electric shock or trouble may be caused.
	The liquid crystal monitor shall be replaced by two more persons. If only one person does this work, he may drop the LCD, resulting in injury.

13.5.1 Parts required for periodic replacement

Here are parts required for periodic replacement.

Part type	Name	Part name	Interval	Replacement kit type
AlphaScreen 19-inch	19-inch Monitor Unit	FAN	40,000 hours	7ZYNA4004
AlphaScreen 26-inch	26-inch Monitor Unit	FAN	40,000 hours	7ZYNA4005
NBD-913	Power supply unit	FAN	100,000 hours	7ZYNA4007
QUINT-BAT/24DC/3.4 AH	DC UPS	Battery	30,000 hours	QUINT-BAT/24DC/3.4AH
NDC-1590	Central control unit	FAN	40,000 hours	7ZYNA4006
NKE-1130	S band radar antenna	Magnetron	4,000 hours	5VMAA00104
		Motor	10,000 hours	MDBW10823
		FAN for motor driver circuit	20,000 hours	7BFRD0002
		FAN for modulation	20,000 hours	5BFAB00674
NKE-1125	X band radar antenna	Magnetron	4,000 hours	5VMAA00106
		Motor	10,000 hours	MDBW10822
		Fan for magnetron	20,000 hours	7BFRD0002

		FAN for modulation	20,000 hours	7BFRD0002
NKE-2254-HS	X band radar antenna	Magnetron	4,000 hours	5VMAA00106
		Motor	10,000 hours	7BDRD0045A
		FAN for modulation	20,000 hours	7BFRD0002
		FAN for modulation	20,000 hours	7BFRD0002
NKE-2103	X band radar antenna	Magnetron	4,000 hours	5VMAA00102
		Motor	10,000 hours	7BDRD0048
NKE-1632	Solid state radar antenna	Motor	10,000 hours	MDBW10823
		FAN	100,000 hours	109L0912S410
NKE-2632	Solid state radar antenna	Motor	10,000 hours	MDBW10823
		FAN	100,000 hours	109L0912S410
NKE-2632-H	Solid state radar antenna	Motor	10,000 hours	MDBW10967
		FAN	100,000 hours	109L0912S410

13.5.2 Replacement of magnetron

⚠CAUTION	
	When replacing magnetrons, make sure to shut off the main power and let the equipment stand for more than 5 minutes to discharge the high-voltage circuit. Failure may result in electric shock.
	Make sure to take off your watch when your hand must get close to the magnetron. Failure may result in damage to the watch since the magnetron is a strong magnet.

Note

Replacement of magnetron must be made by a specialized service personnel.

For details, refer to Service Manual.

Use necessarily the parts to meet the part types in the above shown in the table.

Do not touch the magnet of the magnetron with a screwdriver or put the magnetron on an iron plate.
When replacing the magnetron, connect the lead wire correctly.

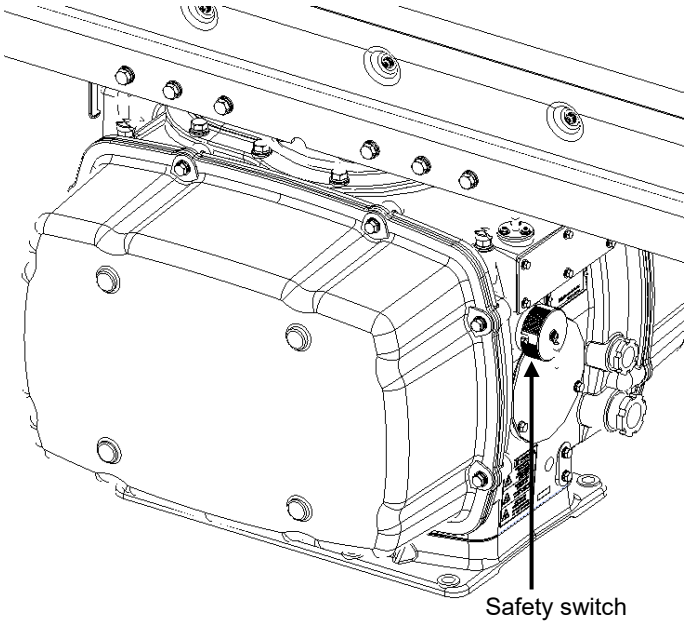
13.5.2.1 Handling of magnetron under long-time storage

The magnetron that has been kept in storage for a long time may cause sparks and operate unstably when its operation is started. Perform the aging in the following procedures:

1. **Warm up the cathode for a longer time than usually. (20 to 30 minutes in the standby state.)**
2. **Start the operation from the short pulse range and shift it gradually to the longer pulse ranges.**
   If the operation becomes unstable during this process, return it to the standby mode immediately.
   Keep the state for 5 to 10 minutes and repeat the operation.

13.5.2.2 Magnetron replacement procedure for radar antenna NKE-1130

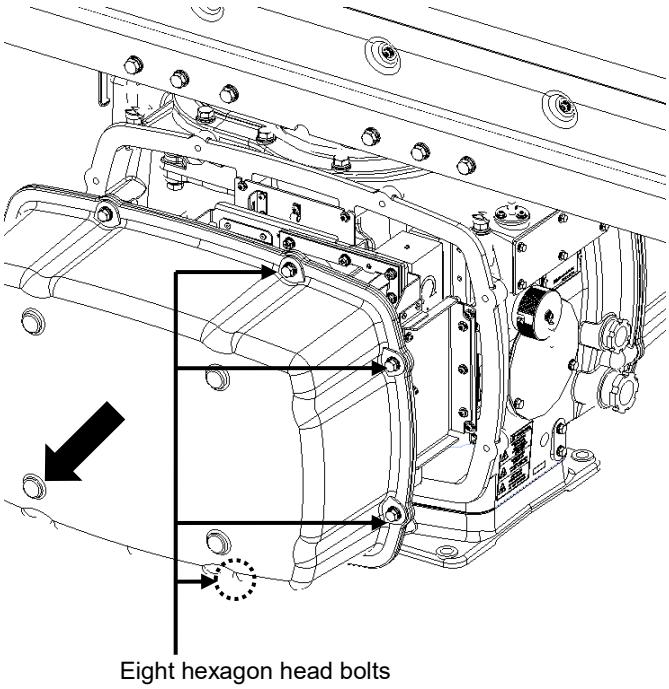
1 Turn Off the safety switch of the radar antenna.



⚠ When replacing a magnetron, ensure that the safety switch of the radar antenna is turned Off prior to commencing the replacement work.

The safety switch is located on the rear (stern) side of the radar antenna.
Remove the cover and turn Off (to the lower side) the safety switch.

2 Remove the cover.

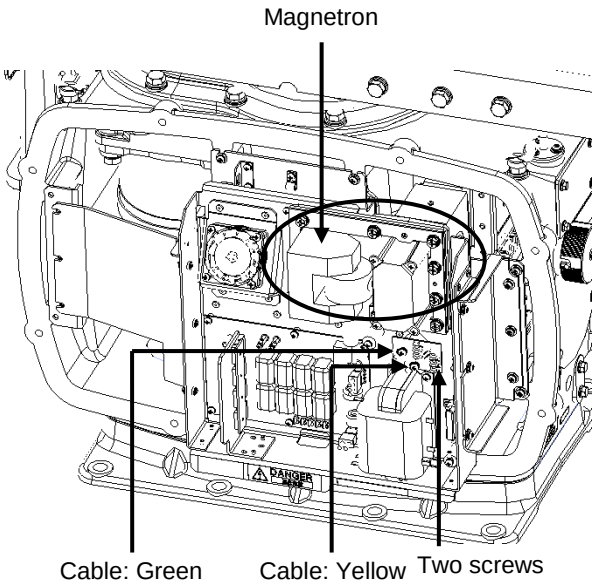


The magnetron is mounted on the left side (port side) of the radar antenna. Remove the left side cover.

The cover is secured in place with hexagon head bolts (M8, designed to be protected from falling out) at eight positions.

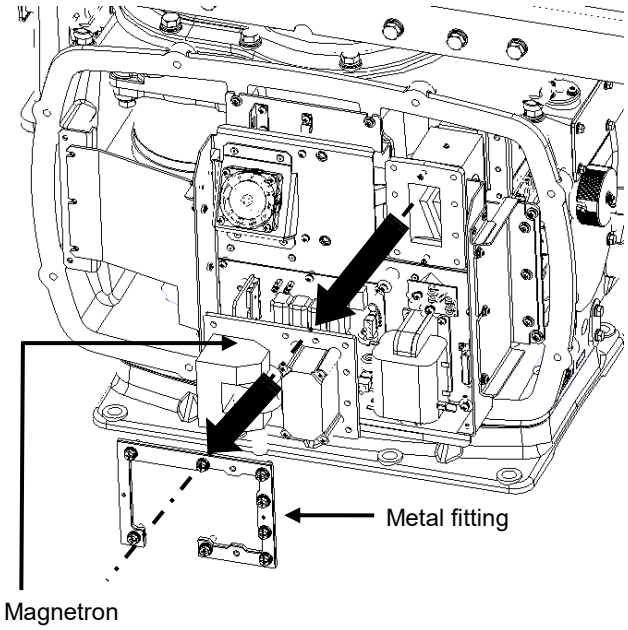
After removing the cover, place it in a safe area.
Exercise care to avoid dust or other foreign matters adhering to the packing.

3 Replace the magnetron.



To detach the cables to which the magnetron is connected, remove the two screws (M4×12) holding the cables.

Use caution not to lose the screws after removing them.



The magnetron is secured in place with a special metal fitting.
The fitting uses bolts protected from falling out. Loosen all bolts and demount the fitting and bolts together.

⚠ The magnetron is attached to the radar antenna with pins. Use caution not to drop the magnetron.

⚠ Use a shielded screwdriver for this work.

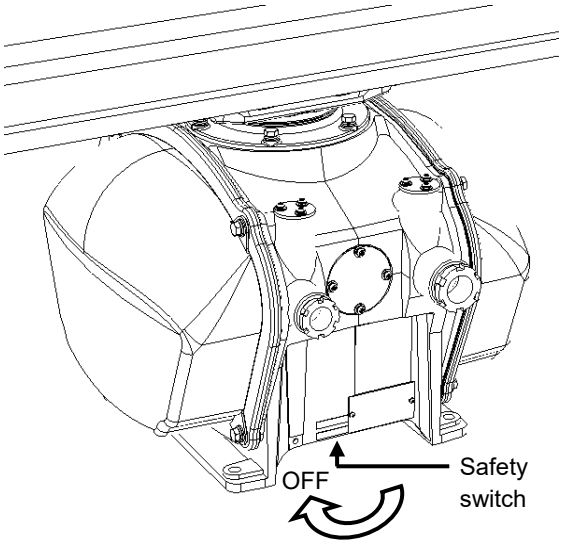
⚠ Contact with metal (tools) can cause performance degradation in the magnetron.

Install a replacement magnetron and cables.
After replacing the magnetron, reassemble the unit by following the same steps in reverse order.
Do not forget to tighten the bolts and screws, and do not forget to reconnect the cables.

The above steps complete the magnetron replacement procedure.

13.5.2.3 Magnetron replacement procedure for radar antenna NKE-1125

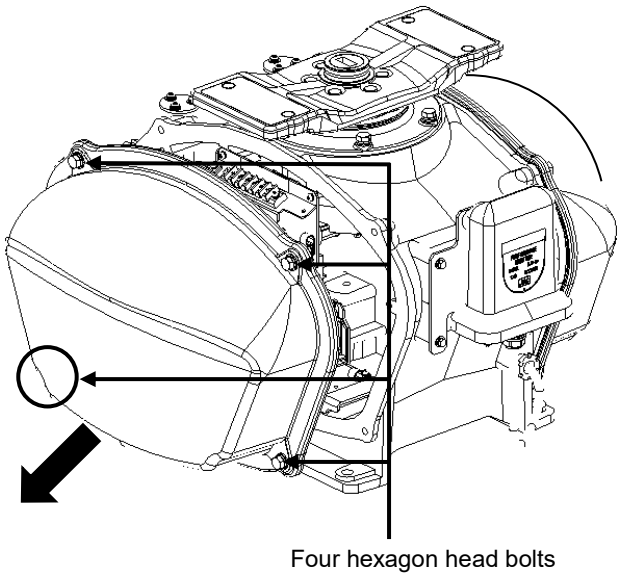
1 Turn Off the safety switch of the radar antenna.



⚠ When replacing a magnetron,, turn Off the safety switch of the radar antenna.

Turn off the safety switch located on the bottom of the stern side of the radar antenna.

2 Remove the cover.

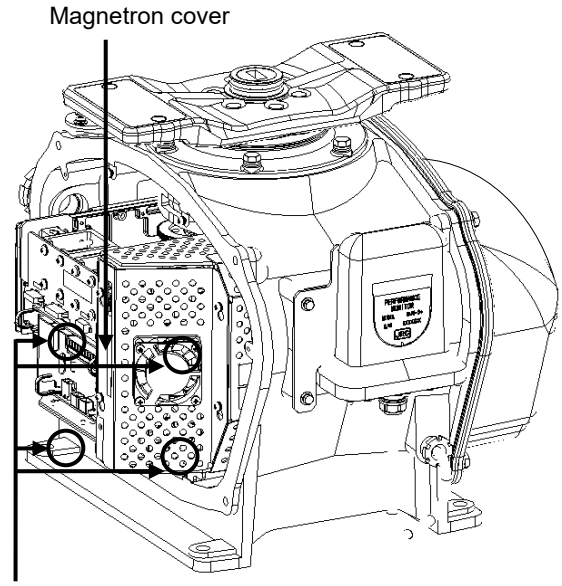


The magnetron is mounted on the right side (starboard side) of the radar antenna. Remove the right side cover.

The cover is secured in place with hexagon head bolts (M8, designed to be protected from falling out) at four positions.

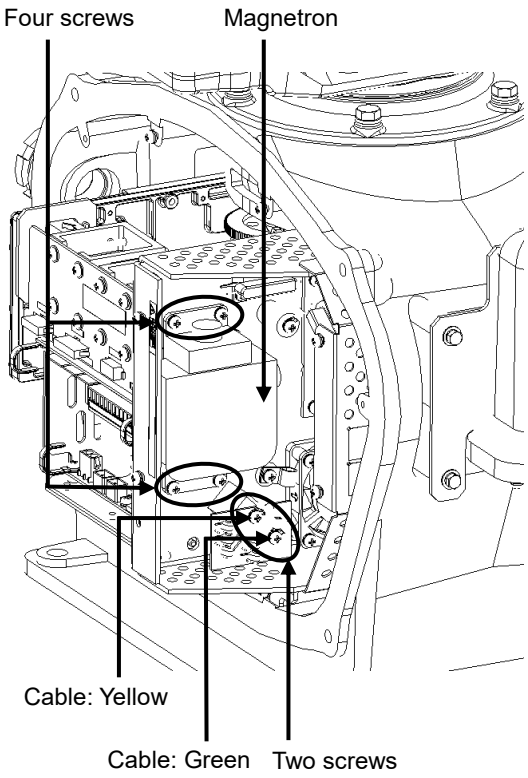
After removing the cover, place it in a safe area.
Exercise care to avoid dust or other foreign matters adhering to the packing.

3 Replace the magnetron.



Loosen the screws (M4×10) at four positions to remove the magnetron cover.

Remove the screws (M4×12) at two positions and detach the magnetron cables.



⚠ Use a shielded screwdriver for this work.
Contact with metal (tools) can cause performance degradation in the magnetron.

Remove the screws (M4×12) at four positions and demount the magnetron.

Exercise caution not to lose the screws after removing them.

Install a replacement magnetron and cables.

After replacing the magnetron, reassemble the unit by following the same steps in reverse order.

Do not forget to tighten the bolts and screws, and do not forget to reconnect the cables.

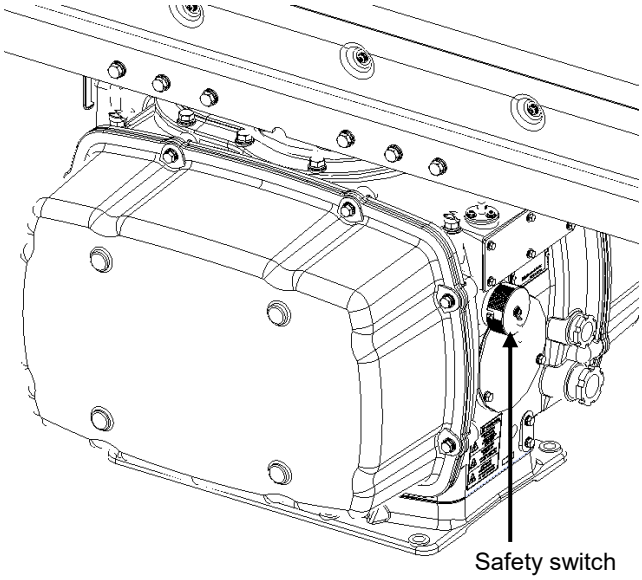
13.5.3 Replacing the motor

Note

Replacement of motor must be made by specialized service personnel.
For details, refer to Service Manual.
After replacement, connect the lead wire correctly.

2.1.1.3 Motor replacement procedure for radar antenna NKE-1130

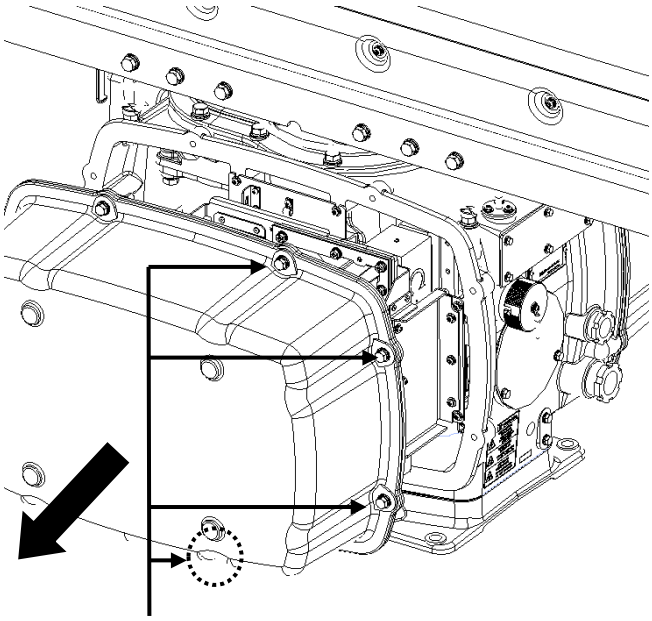
1 Turn Off the safety switch of the radar antenna.



⚠ When replacing a motor, ensure that the safety switch of the radar antenna is turned Off prior to commencing the replacement work.

The safety switch is located on the rear (stern) side of the radar antenna.
Remove the cover and turn Off (to the lower side) the safety switch.

2 Remove the cover.



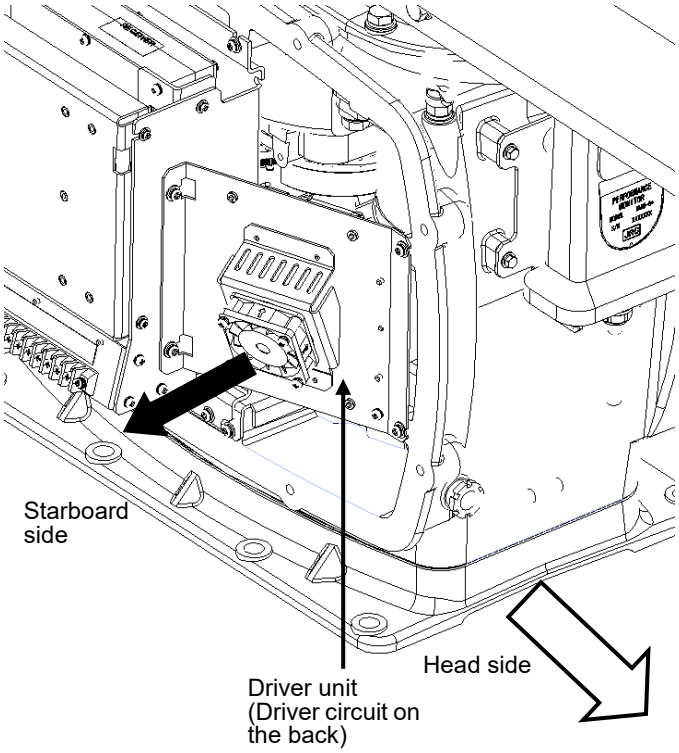
Eight hexagon head bolts

The motor is mounted on the front side (head side) of the radar antenna. Both left and right side covers need to be removed to carry out the motor replacement work.

The cover is secured in place with hexagon head bolts (M8, designed to be protected from falling out) at eight positions.

After removing the cover, place it in a safe area.
Exercise care to avoid dust or other foreign matters adhering to the packing.

3 Remove the motor cable

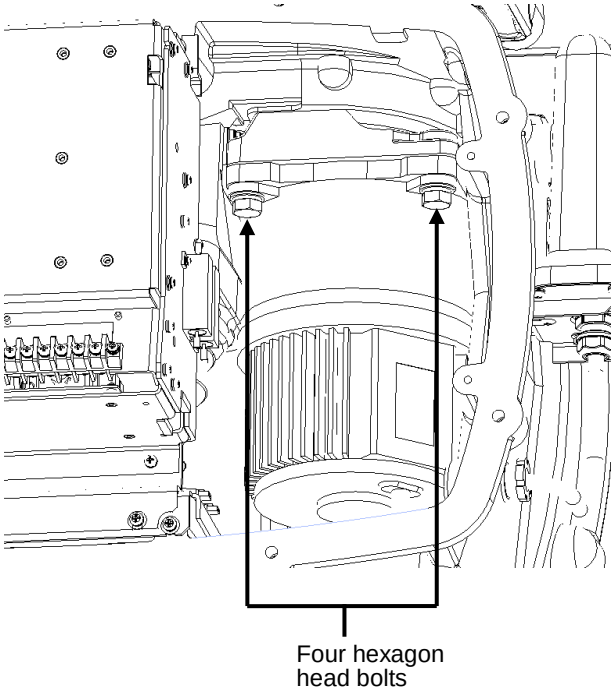


The motor driver unit is located on the right side (starboard side).

The motor driver is secured in place with screws (M5×12) at four positions.

Demount the motor driver unit and detach the motor cables connected to the driver circuit on the back of the driver unit.

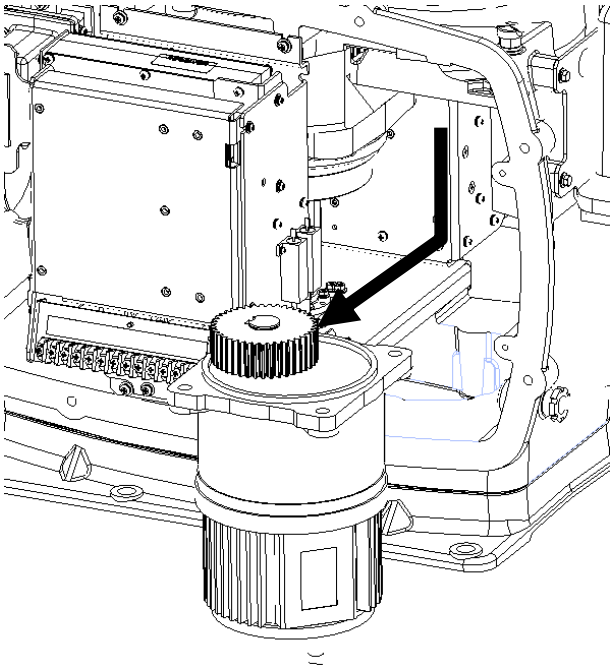
4 Replace the motor



The motor is secured in place with hexagon head bolts (M10×40, SW10 and W10) at four positions.

Remove the four hexagon head bolts.

⚠ The weight of the motor is about 10 kg.
Use due caution when undertaking this procedure.



Remove the motor.

Apply grease to the gear wheel of the new motor.

Install the new motor in the radar antenna.

Fasten the hexagon head bolts with proper torque (380 kgf•cm) to ensure that none of the bolts is left without being tightened or tightened too loosely.

5 Connect the motor cables.

Connect each cable back to its original position on the motor driver circuit.

6 Install the cover.

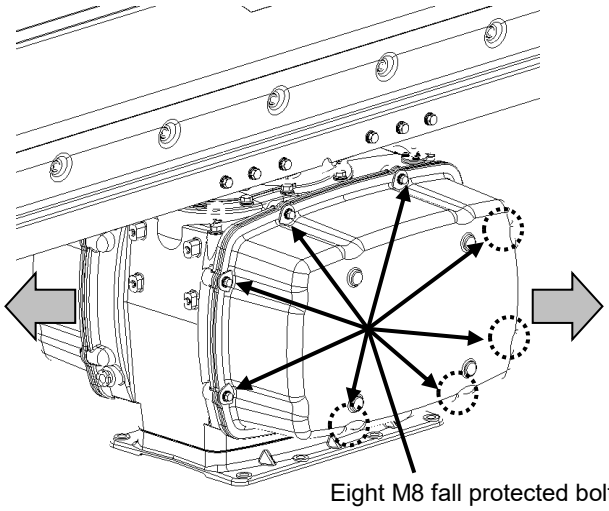
Before installing the cover on the radar antenna, check to confirm that there are no deformations, cracks or other abnormalities in the packing of the cover. Remove any foreign matters, dust or other contaminants if found.

Leaving any hexagon head bolts without tightened, or tightening them too loosely, may result in the waterproof performance of the radar antenna being adversely affected. Fasten the hexagon head bolts with proper torque to ensure that none of the bolts is left without being tightened or tightened too loosely.

When the motor replacement is complete, turn on the safety switch of the radar antenna and check if the equipment operates properly.

2.1.1.4 Motor replacement procedure for NKE-1632

1 Remove the cover.



Eight M8 fall protected bolts

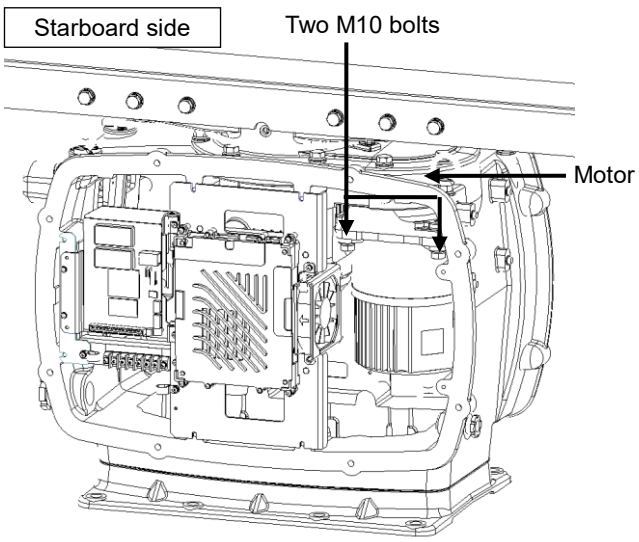
⚠ When replacing a motor, ensure that the safety switch of the radar antenna is turned Off prior to commencing the replacement work.

⚠ Exercise care not to lose bolts, screws and other parts removed from the radar antenna, as they will be used again in later steps.

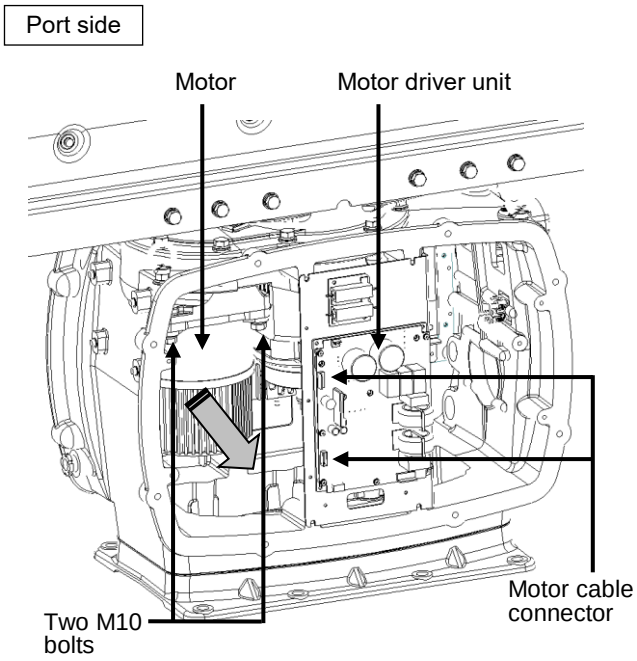
Both left and right side covers need to be removed to carry out the motor replacement work.

Loosen the M8 bolts designed to be protected from falling out at eight positions, and remove the cover.

2 Replace the motor.



[Starboard side]
Unscrew the M10 bolts at two positions.



[Port side]
Detach the motor cables connected to the motor driver.

Remove the M10 bolts at two positions and pull the motor carefully to demount it.

Apply grease to the gear wheel of the replacement motor prior to installation.

Install the new motor in the radar antenna.

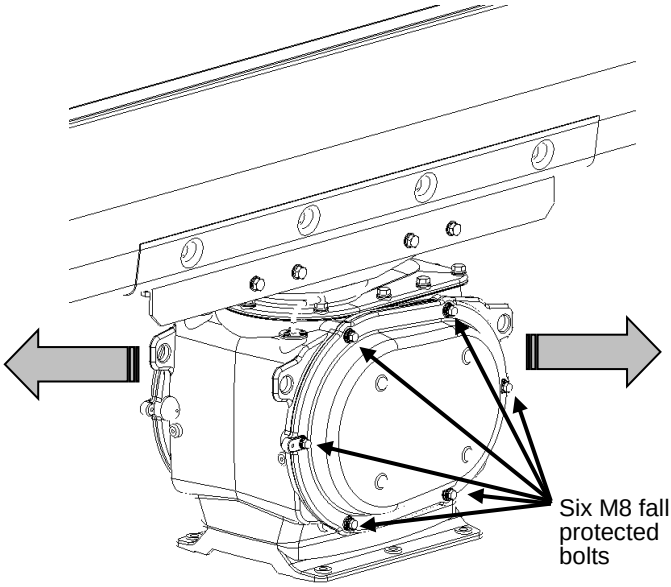
Fasten the hexagon head bolts with proper torque (380 kgf•cm) to ensure that none of the bolts is left without being tightened or tightened too loosely.

Install the cover by following the same steps in reverse order.

Turn On the safety switch and confirm if the equipment operates properly.

13.5.3.1 Motor replacement procedure for radar antenna NKE-2632/ NKE-2632-H

1 Remove the cover.



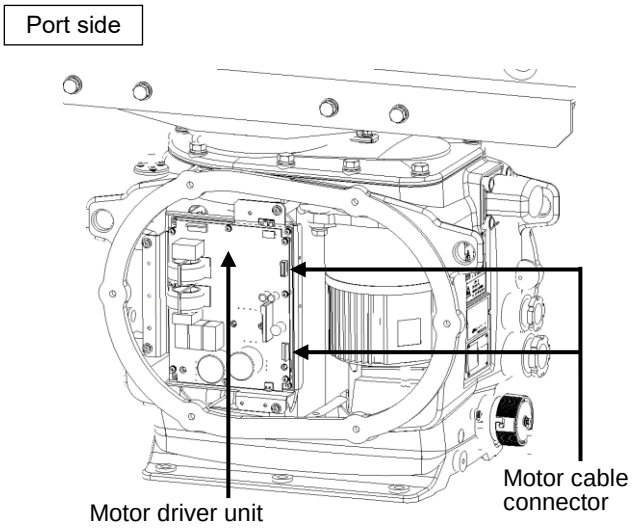
When replacing a motor, ensure that the safety switch of the radar antenna is turned Off prior to commencing the replacement work.

Exercise care not to lose bolts, screws and other **parts removed from the** radar antenna, as they will be used again in later steps.

Both left and right side covers need to be removed to carry out the motor replacement work.

Loosen the M8 bolts designed to be protected from falling out at six positions, and remove the cover.

2 (Port side) Detach the motor cable.

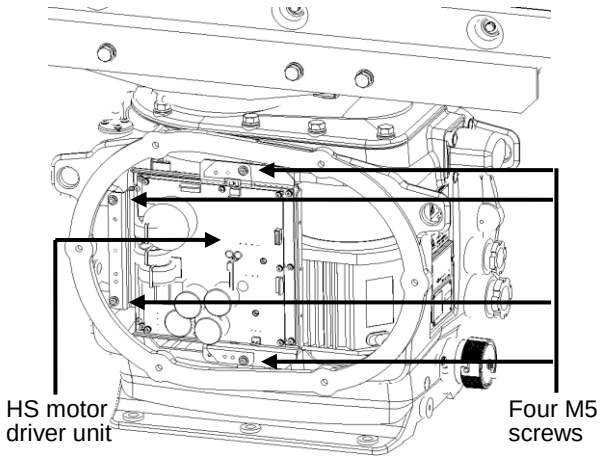


[Port side]

Detach the motor cables connected to the motor driver.

(Port side) Detach the motor cable. * In case of NKE-2632-H

Port side



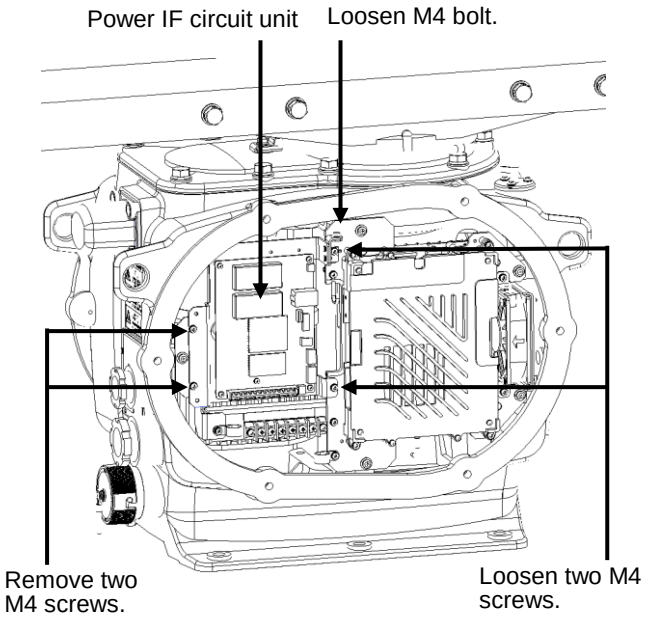
* In case of NKE-2632-H
Demount the HS motor driver unit.

[Port side]
Detach the cables connected to the HS motor driver unit.

Remove the M5 screws at four positions and demount the motor driver unit.

3 (Starboard side) Open the power IF circuit unit.

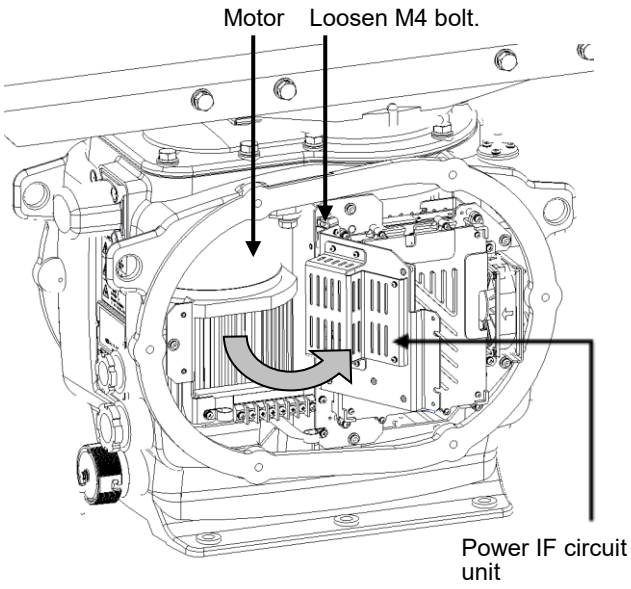
Starboard side



[Starboard side]

The power IF circuit unit can be opened to the near side by loosening the M4 bolts and two M4 screws while removing the other two M4 screws.

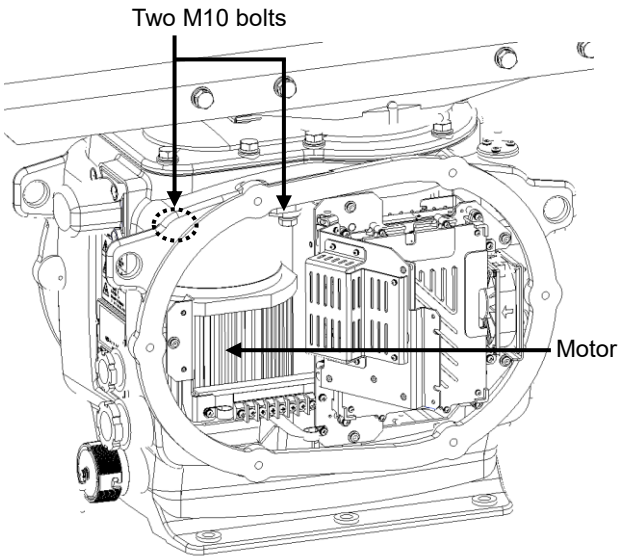
Starboard side



Loosen the M4 bolt and fix the power IF circuit unit with the unit open.

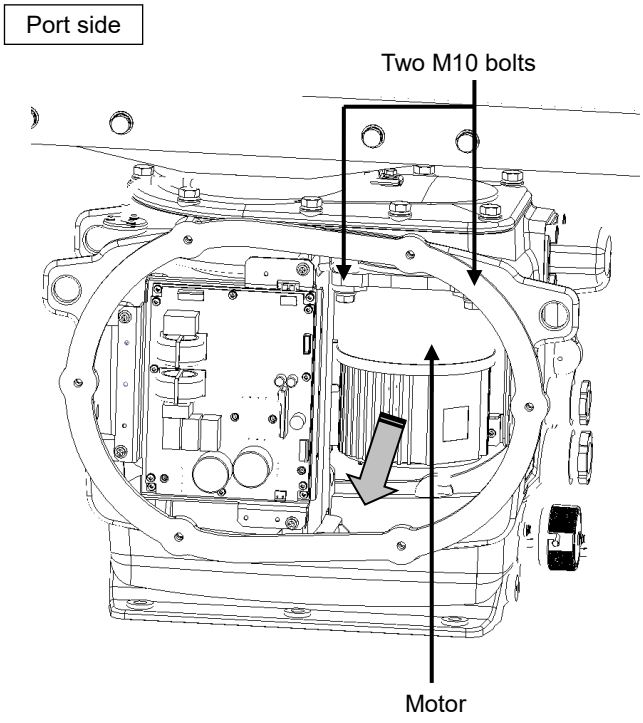
4 Replace the motor.

Starboard side



[Starboard side]

Remove the M10 bolts at two positions.



[Port side]

Remove the M10 bolts at two positions and pull the motor to demount it.

Apply grease to the gear wheel of the replacement motor prior to installation.

Install the new motor in the radar antenna.

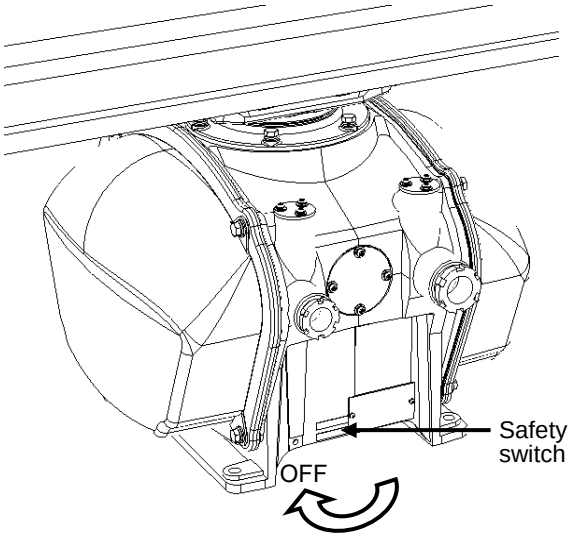
Fasten the hexagon head bolts with proper torque (380 kgf•cm) to ensure that none of the bolts is left without being tightened or tightened too loosely.

Install the cover by following the same steps in reverse order.

Turn On the safety switch and confirm if the equipment operates properly.

13.5.3.2 Motor replacement procedure for radar antenna NKE-1125

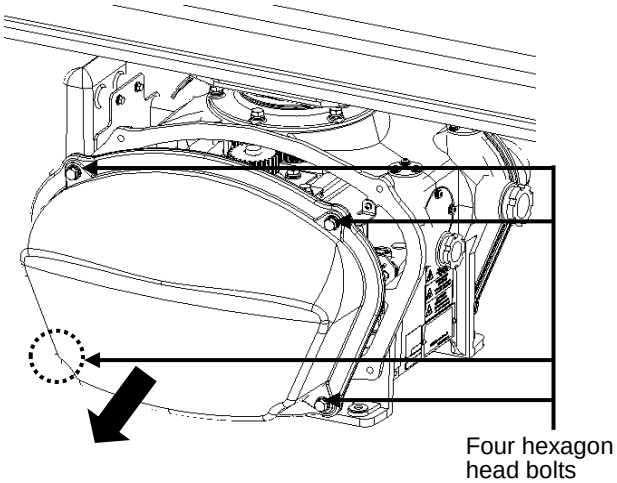
1 Turn Off the safety switch of the radar antenna.



⚠ When replacing a motor, ensure that the safety switch of the radar antenna is turned Off prior to commencing the replacement work.

Turn Off the safety switch located on the bottom of the stern side of the radar antenna.

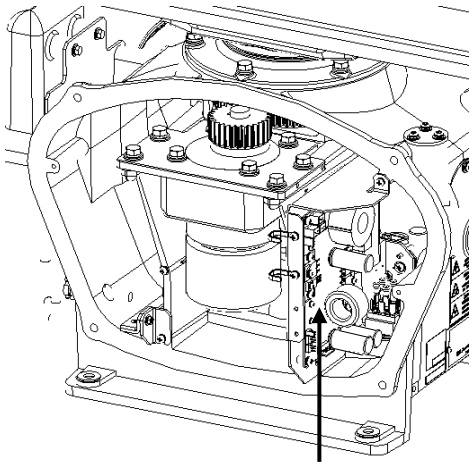
2 Remove the cover.



The motor is mounted on the left side (port side) of the radar antenna. Remove the left side cover.
The cover is secured in place with hexagon head bolts (M8, designed to be protected from falling out) at four positions.

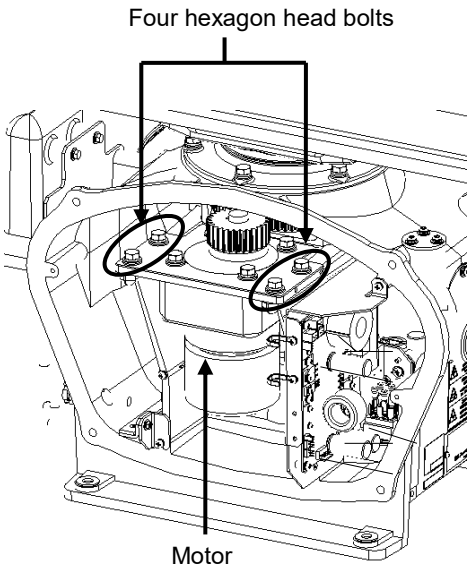
After removing the cover, place it in a safe area.
Exercise care to avoid dust or other foreign matters adhering to the packing.

3 Remove the cover.



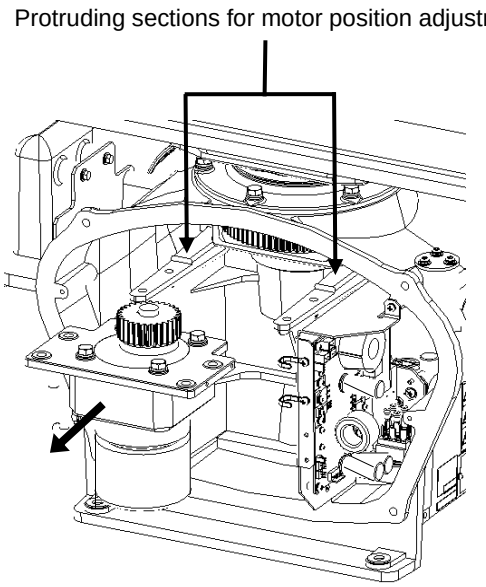
Detach the motor cables connected to the motor control power circuit.

4 Replace the motor.



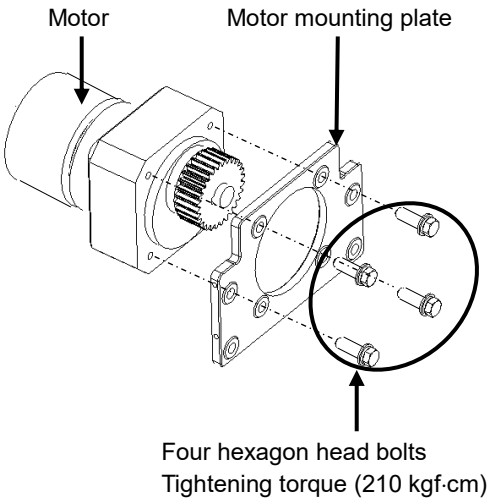
The motor is secured in place with hexagon head bolts (M8×20, SW + W assembled) at four positions.

Remove the four hexagon head bolts.



Demount the motor.

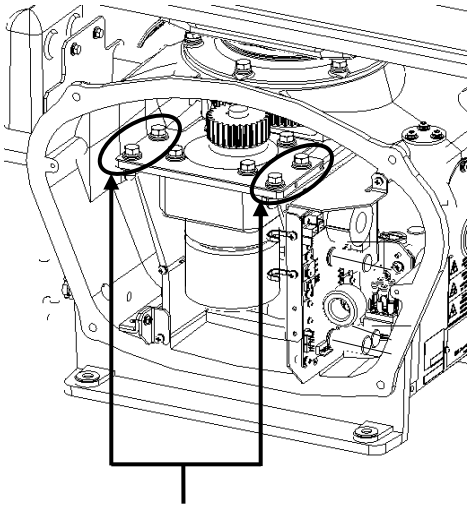
⚠ The weight of the motor is about 6 kg.
Use due caution when undertaking this procedure.



Set a mounting plate on a replacement motor.

Remove a motor mounting plate from the motor demounted from the radar antenna. The mounting plate is secured to the motor with stainless steel hexagon head bolts (M8×30, SW + W assembled) at four positions.

Attach the removed parts to the replacement motor.
Fasten the hexagon head bolts with proper torque (210 kgf•cm) to ensure that none of the bolts is left without being tightened or tightened too loosely.



Four hexagon head bolts
Tightening torque (140 kgf·cm)

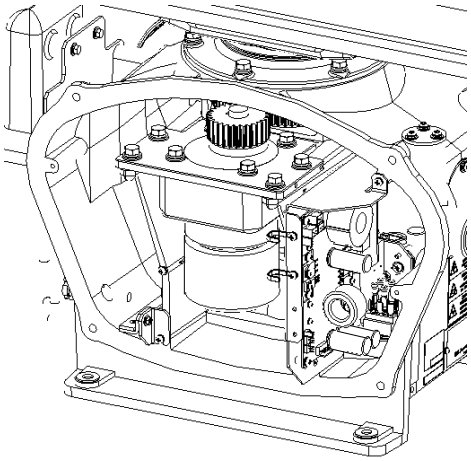
Install the motor in the radar antenna.

Press the motor against the mounting face of the motor-mounting arm projecting out from the cabinet, and secure it in place after making adjustment to minimize backlash.

Fasten the hexagon head bolts with proper torque (140 kgf·cm) to ensure that none of the bolts is left without being tightened or tightened too loosely.

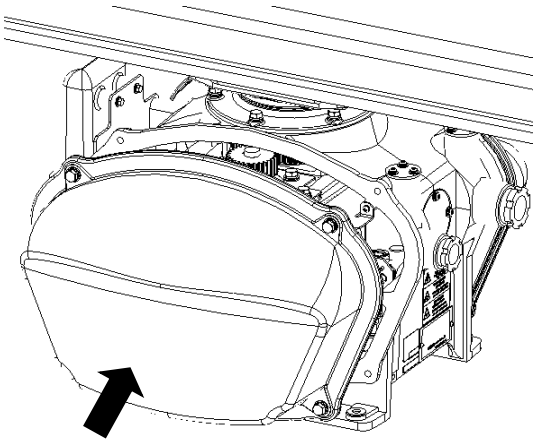
After installing the motor, apply grease to the gear wheel.

5 Connect the motor cables.



Connect each cable back to its original position on the motor control power circuit.

6 Install the cover.



Before installing the cover on the radar antenna, check to confirm that there are no deformations, cracks or other abnormalities in the packing of the cover. Remove any foreign matters, dust or other contaminants if found.

Secure the cover in place with hexagon head bolts (M8) at four positions.

Leaving any hexagon head bolts without tightened, or tightening them too loosely, may result in the waterproof performance of the radar antenna being adversely affected. Fasten the hexagon head bolts with proper torque to ensure that none of the bolts is left without being tightened or tightened too loosely.

When the motor replacement is complete, turn on the safety switch of the radar antenna.

13.6 Software Update

This section describes software update of this equipment.

Note

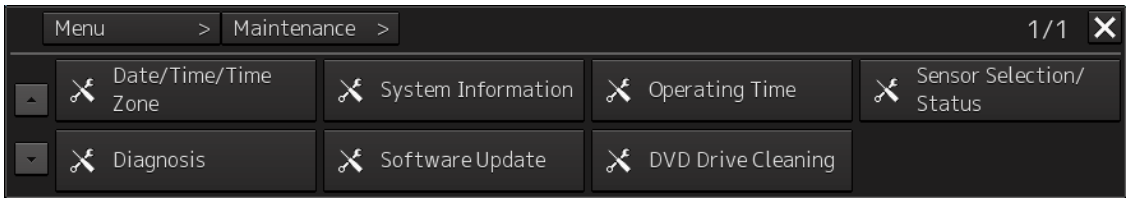
When software update starts, the tasks that are active are automatically terminated. Complete the necessary operation such as saving of settings prior to the start of update.

1 Set the CD/DVD or USB flash memory containing the update data.

2 Click on the [Menu] button on the left Toolbar.

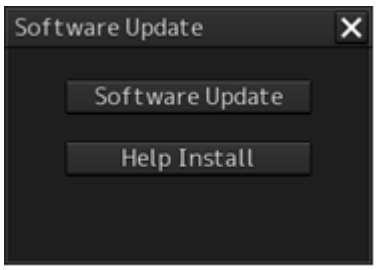
The menu is displayed.

3 Change over to the second page using the page switching button, and click [Maintenance] - [Software Update].

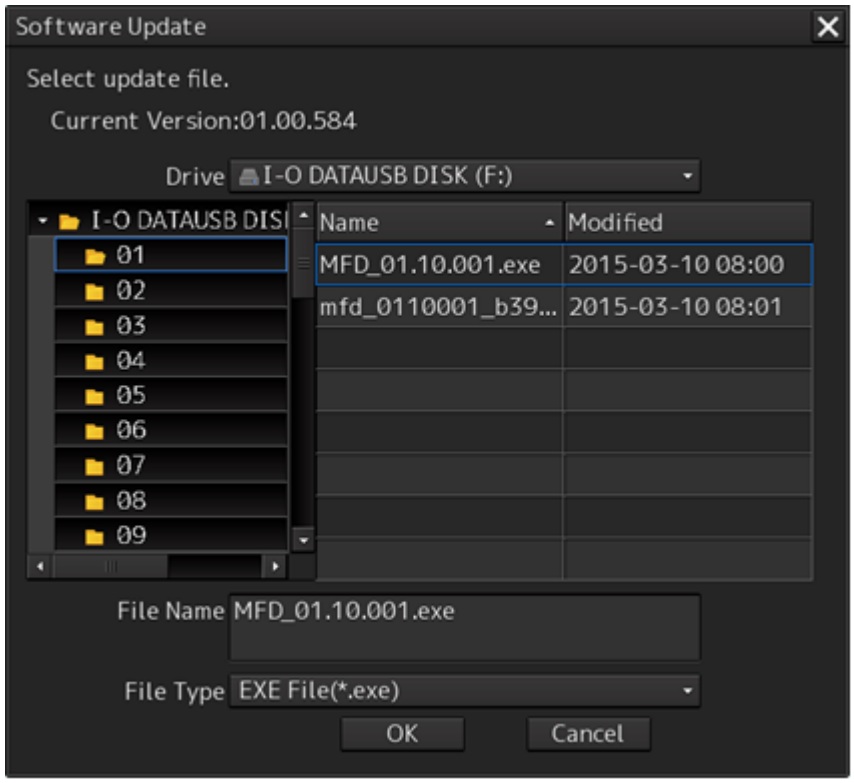


The [Software Update] dialog box appears.

4 Click on the [Software Update] button.



A file selection dialog box appears.



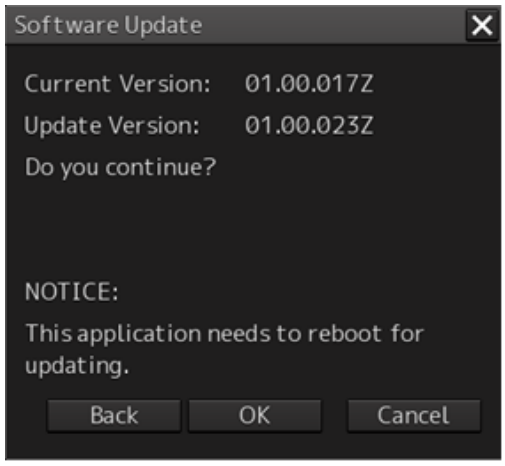
5 **From the [Drive] combo box, select the drive where the updating data is stored.**

6 **From the file list, select the file MFD_xx.xx.xxx.exe.**

MFD_xx.xx.xxx.exe is displayed in [File name].

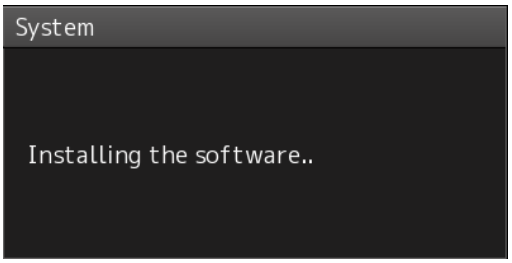
7 **Click the "OK" button.**

The update content confirmation dialog box appears.



8 **Confirm the contents and click [OK].**

Installation of the update is started and the following screen is displayed.



Wait for some time until the installation is completed.

> **Note**
> This equipment may restart during installation.

At completion of installation, the following screen is displayed.

9 **Switch OFF the power supply of this equipment.**

10 **Restart this equipment.**

11 **Start MFD, and confirm that the software version number has been updated in the [Software] tab by selecting [Maintenance] - [System Information].**

13.7 Updating Help Data

This section describes updating of help data of this product.

Note

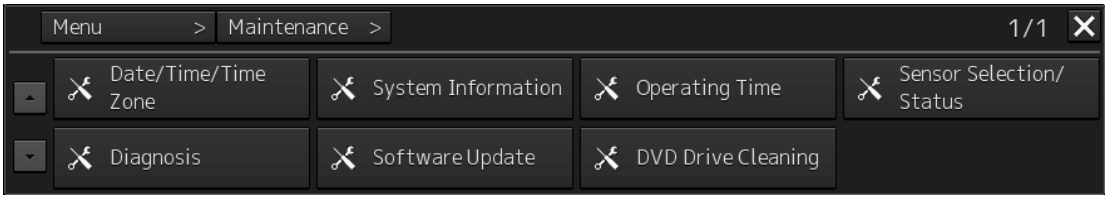
- Help data is classified to the data for RADAR
- To display help information on each of the RADAR screen, install the help data for each display.
- When Help update starts, currently active tasks are terminated automatically. Complete the necessary operations, such as saving the settings, before the start of update.

1 Set the CD/DVD or USB memory where update data is stored.

2 Click the [Menu] button on the Left Tool Bar.

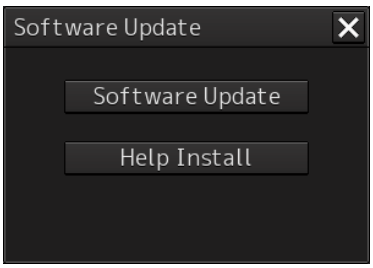
A menu is displayed.

3 Switch the page to the 2nd page by using the page switching button and click [Maintenance] - [Software Update].



The [Software Update] dialog is displayed.

4 Click the [Help Install] button.



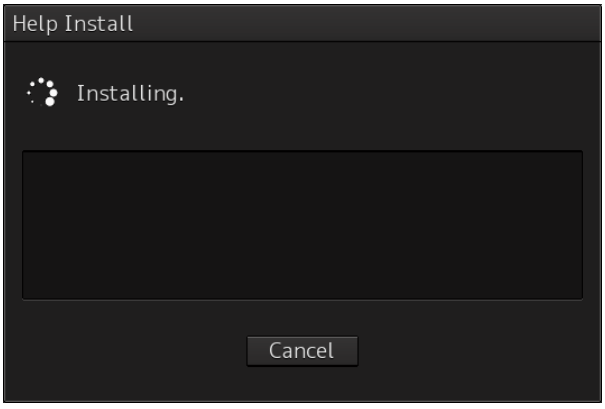
A file selection dialog is displayed.

5 **Select the drive containing update data from the [Drive] combo box.**

6 **Select the folder containing update data from the folder tree and check the file to be updated from the file list.**

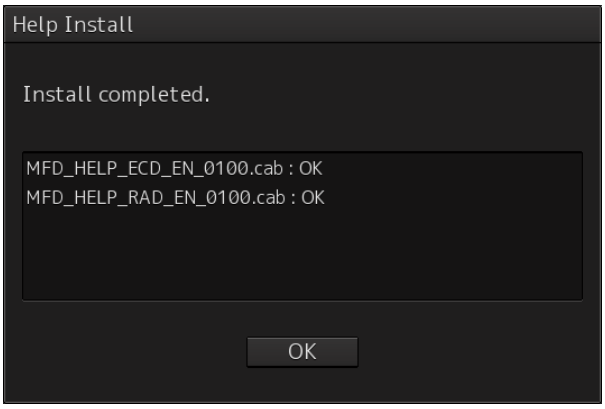
7 **Click the [Install] button.**

Installation starts and the following screen is displayed.



Wait until installation is completed.

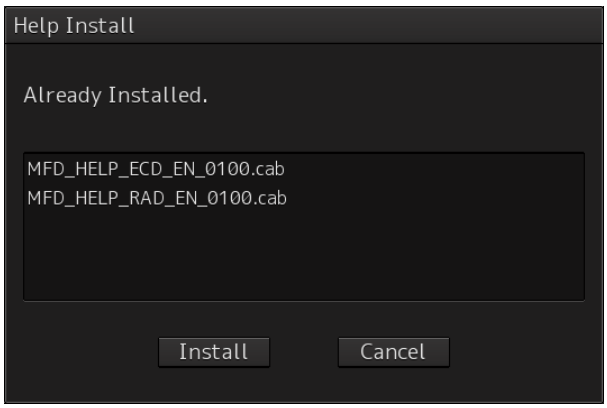
When installation is completed, the following screen is displayed.



8 Click the [OK] button.

Memo

- When the [Cancel] button is clicked during installation, installation of subsequent files is cancelled after the installation of the file that is currently being installed is completed.
- When the selected update file already exists, the following screen is displayed.



End the operation by clicking on the [Cancel] button.

13.8 Data Backup/Restore

⚠CAUTION	
	Do not turn off the power supply during backup/restore. Otherwise, a function fault occurs, leading to the possibility of an accident.
	Do not back up data during sailing. To start backup data, the radar application must be terminated. Otherwise, observation using a radar is disabled, leading to the possibility of an accident.

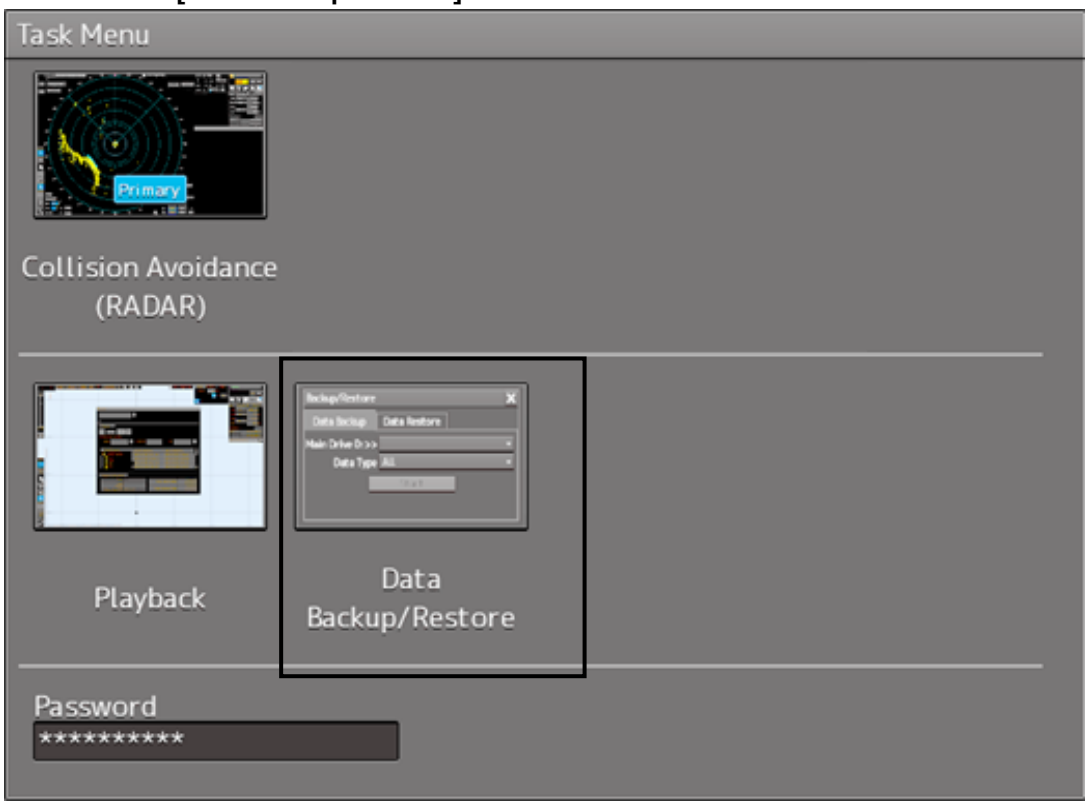
13.8.1 Backing up data

To maintain customer data, back up the data regularly by using the following procedure.
Connect an external medium such as USB memory for backup.

1 **Press the Power supply button of the operation unit.**

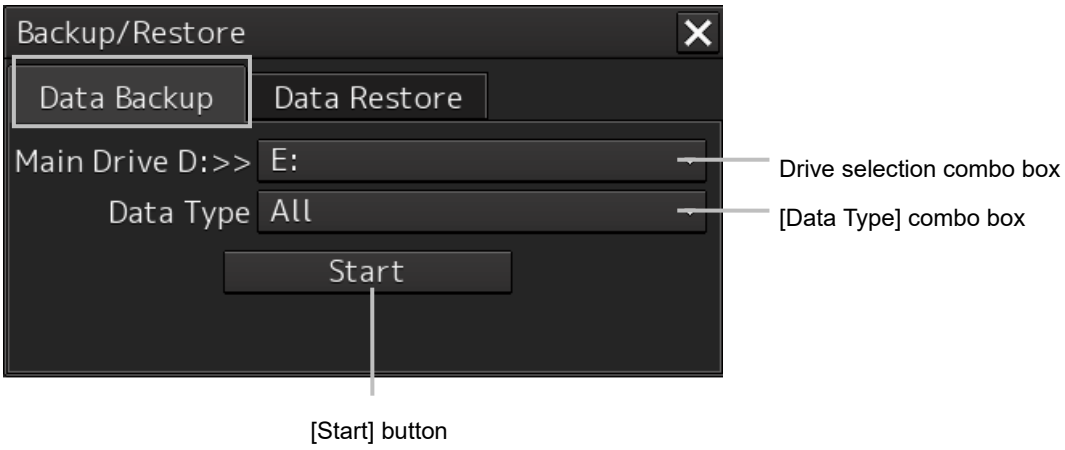
The power supply button is lit. Then, the task menu is displayed.

2 **Click on the [Data Backup/Restore] button in the task menu.**



The [Backup/Restore] dialog is displayed.

3 **Click on the [Data Backup] tab.**



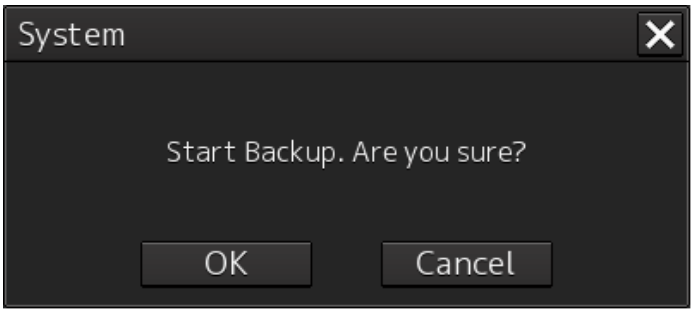
4 **Select a drive of the data backup destination from the drive selection combo box.**

5 **Select the type of the data to be backed up in the [Data Type] combo box.**

All: The entire user data is backed up.

6 **Click on the [Start] button.**

A confirmation dialog is displayed.



7 **Click on the [OK] button.**

Copying of data to the backup destination that is selected in the drive selection combo box starts.

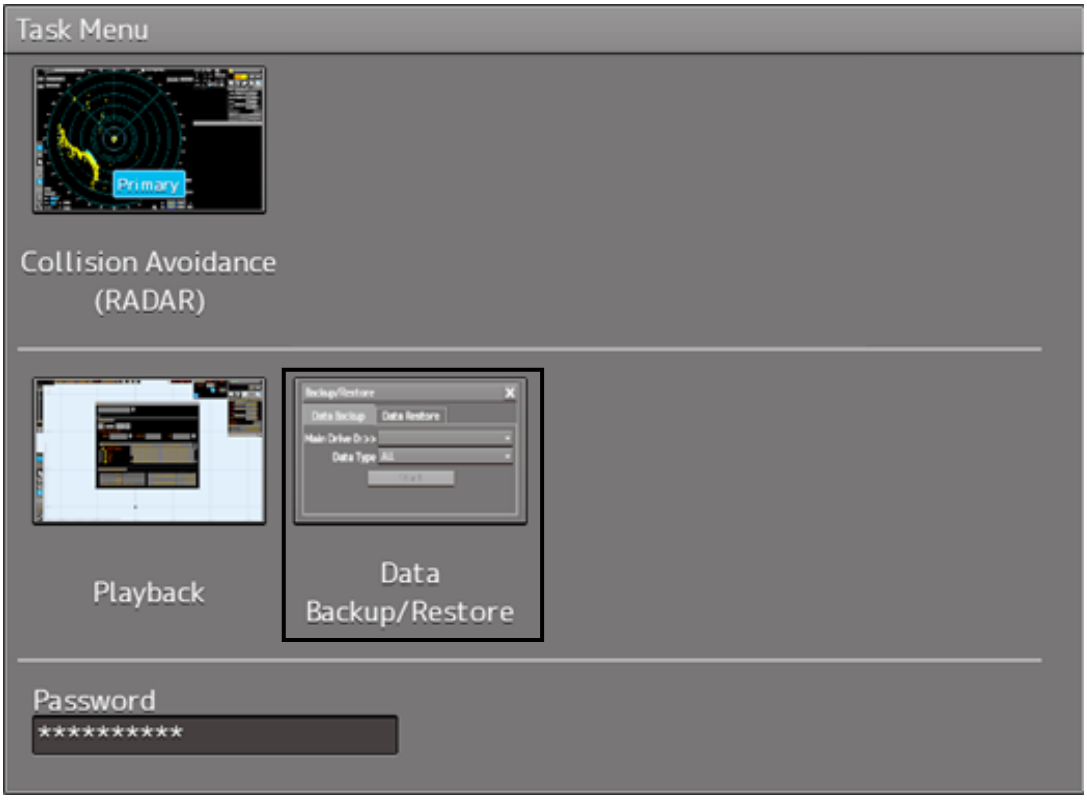
> **Note**
> Do not perform any other operations until backup is completed. Otherwise, backup may fail.

13.8.2 Restoring backed up data

Use the following procedure to restore backed up data into this equipment.
Connect the external medium (USB memory, etc.) in which backup data has been saved.

1 **Press the power supply button of the operation unit.**
The power supply button is lit. Then the task menu is displayed.

2 **Click on the [Data Backup/Restore] button in the task menu.**



The [Backup/Restore] dialog is displayed.

3 **Click on the [Data Restore] tab.**

4 **Select the drive in which backup data has been saved from the drive selection combo box.**

5 **Select the type of the data to be restored in the [Data Type] combo box.**
All: The entire user data is restored.

6 **Click on the [Start] button.**
A confirmation dialog is displayed.

7 Click on the [OK] button.

Restoration of data from the drive that was selected from the drive selection combo box to the hard disk of this equipment starts.

If data already exists in the hard disk, an overwriting confirmation dialog is displayed.

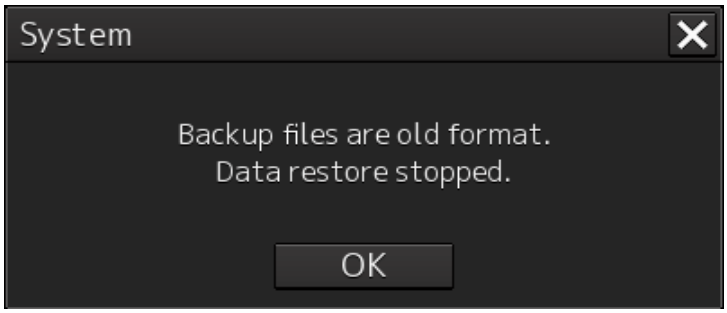
To start restoration, click the [OK] button.

Note

- Do not perform any operation until restoration is completed. If some operation is performed, restoration may fail.
- If backup is executed while enough free space is not available in the USB memory, the “Error” message is displayed. Secure free space before executing backup. For the size of the data to be backed up, check the “Usage” column in the “File Information” list in “19.4.2 Managing storage”.

Memo

If the data to be restored is incompatible with this equipment, the following dialog is displayed and data is not restored.



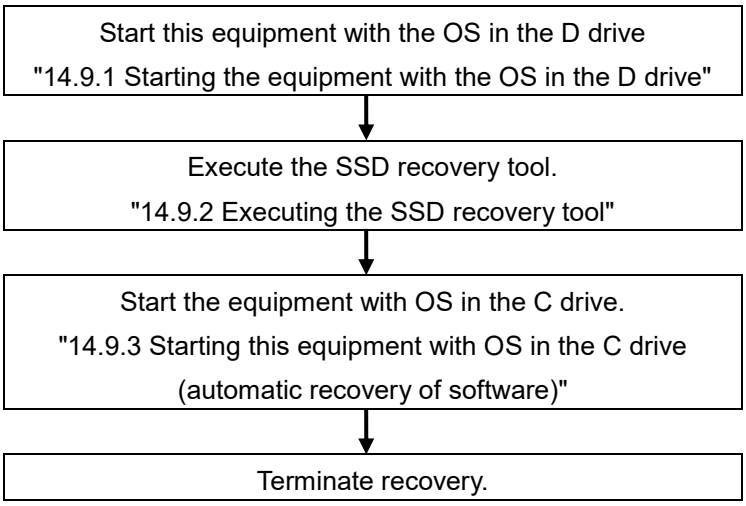
Cancel the task by clicking on the [OK] button.

13.9 Recovery of the Images in the C Drive

⚠CAUTION	
	The backup power supply (DC power supply, etc.) of the equipment must be connected when recovery of the C drive image is performed. If the power supply stops during recovery, an accident may occur.
	Do not turn off the power supply during recovery of the C drive image. Otherwise, equipment malfunction occurs, possibly causing an accident.

The operating system (OS) of this equipment runs on the C drive.
The contents of the C drive including the images are stored in the D drive.
When the OS operation on the C drive becomes unstable, the images in the C drive can be written back from the D drive.

The flow of writing back of images in the C drive is as follows.

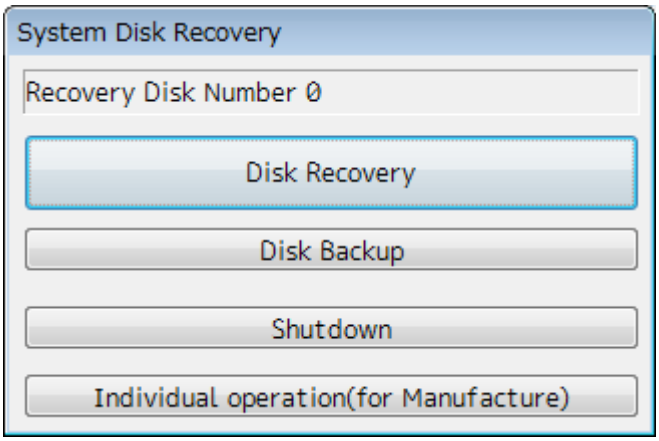


13.9.1 Starting the equipment with the OS in the D drive

Start this equipment with OS in the D drive by using the following procedure.

1 **Turn on the power supply of this equipment while pressing the [SILENCE] key and the [ZOOM OUT] key of the trackball operation unit simultaneously. The power is supplied to this equipment.**

When the equipment starts, the following screen is displayed.



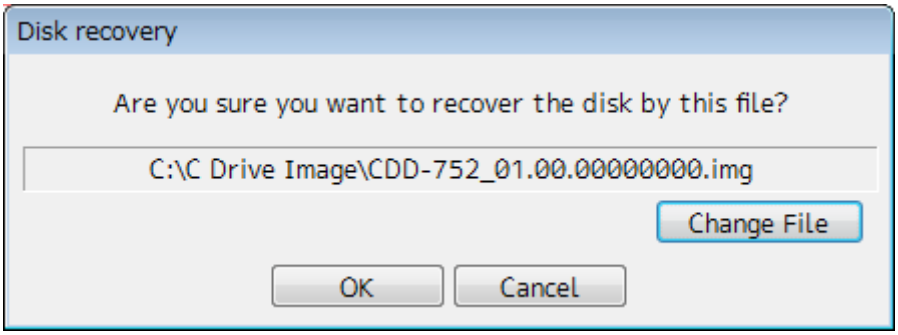
The SSD recovery tool can be executed in this state.

13.9.2 Executing the SSD recovery tool

Write back the images in the C drive by executing the SSD recovery tool.

1 **Click on the [Disk Recovery] button on the screen that is displayed at activation from the D drive.**

The following screen is displayed.



2 **Select an image file to be written back to the C drive.**

Normally, proceed with the next step with the image file that is currently displayed.

To specify a different image file, select a required image file from the list that is displayed by clicking on the [Change File] button.

Note

Since the equipment is started from the D drive, the usual C drive is displayed as the D drive and the usual D drive is displayed as C drive. Therefore, note this point when selecting an image file.

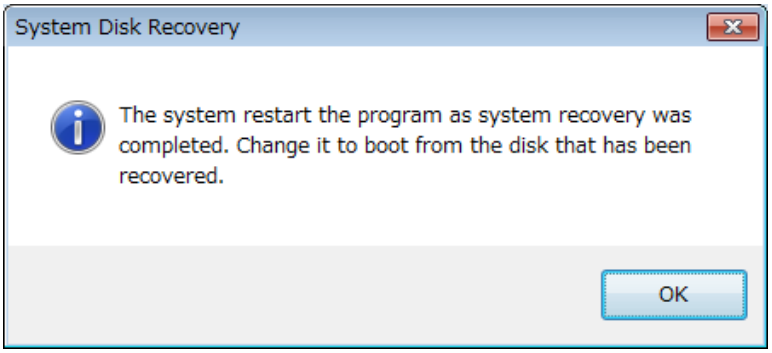
3 Click on the [OK] button.

Image file write-back operation starts.

Note

Do not perform any operation until write-back operation is completed. If any operation is performed, the image write-back operation may fail.

At termination of recovery, the following screen is displayed.



13.9.3 Starting the equipment with the OS in the C drive (Software automatic recovery)

Start this equipment with the OS that is written back to the C drive.

1 **Click on the [OK] button on the screen that is displayed at termination of write-back operation.**

The equipment starts from the C drive and, at the same time, the applications and various OS settings on the C drive are recovered automatically.

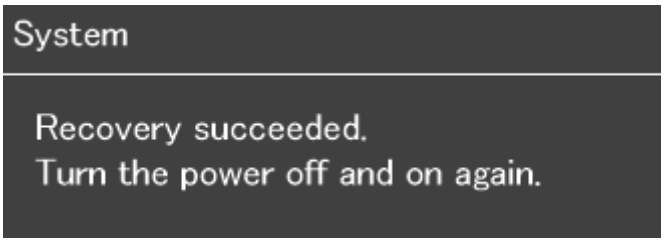
When recovery starts, the following screen is displayed for several seconds.

Note

This equipment restarts during the recovery operation. Do not perform any other operations until the recovery is completed.

Otherwise, recovery may fail, possibly causing an accident.

After completion of recovery, the following screen is displayed.



2 **Turn off the power supply of this equipment by pressing the power button of the operation unit.**

14 Failures and After-Sale Services

14.1 Failure Detection

Semiconductor circuits can be considered to be almost free from defective semiconductors and/or performance deterioration except when there are design and inspection errors, or external and human induced causes. Generally, the causes of comparably frequent failures include line disconnection due to humidity of the high resistor, failure of the variable resistor as well as contact failures of switches and relays.

In addition to faulty parts, faulty adjustments (especially faulty tuning) or faulty maintenance (especially faulty cable contact) occasionally make up causes of failures; thus, it is effective to reinspect or readjust these items.

14.1.1 About alerts

Failures can be detected from alerts.

For details on alerts, please refer to "Appendix B, Alert List."

14.1.2 Alert description

For a description of alerts to be displayed, please refer to "Appendix B, Alert List."

14.1.3 Fuse inspection

Because there is a specific cause for any fuse meltdown, it is necessary to check the related circuits even if there is no abnormality after changing a fuse. However, please give consideration that the fuse meltdown characteristics vary significantly. The following table shows a list of the fuses used in this unit.

List of Fuses Used

Fuse Name	Name of Model Used	Placement Location	Count	Part Spec.	Change Kit Model Name
Blade fuse (Auto fuse)	NBD-913	Power supply unit	2	32VDC 15A part	1015(5ZFCK00008)
Blade (mini) fuse (Auto fuse)	NQE-1143	JB	1	32VDC 15A part	1215(5ZFCK00017)
Blade (mini) fuse (Auto fuse)			2	32VDC 3A part	1203(5ZFCK00016)
Glass fuse			4	250V 0.5A part	MF51NR 250V 0.5(5ZFGD00019)

14.2 Countermeasures for Failures

Because radar equipment is composed of complex circuits, please ask a qualified technician for repair or instructions regarding countermeasures in case of failure.
Note that failures may be caused by the following causes, so check them during inspection or repair of failure.

Contact failure in terminal blocks of cables between equipment

a) Contact failure in terminal blocks
b) Cable terminal treatment failure - In contact with other grounded terminal
c) Cable disconnection

Contact failure of connectors inside equipment

14.2.1 Special parts

[I] NKE-1125/2254 (AlphaScan 5925-6X/6XH/9X)

Part No.	Item Name	Model Name	Manufacturer	Location of Use	Code
V101	Magnetron	M1568BS	New Japan Radio	Radar antenna	5VMAA00106
A101/A102	Circulator	NJC3901M	New Japan Radio	Radar antenna	5AJBV00007
A103	Dummy	NJC4002	New Japan Radio	Radar antenna	5ANDF00001
A104	Filter	NJC9952	New Japan Radio	Radar antenna	5AWAX00002
A301	Diode limiter	NJS6930	New Japan Radio	Radar antenna	5ATBT00006

[III] NKE-1130 (AlphaScan 5930-S)

Part No.	Item Name	Model Name	Manufacturer	Location of Use	Code
V101	Magnetron	M1555	New Japan Radio	Radar antenna	5VMAA00104
A101	Circulator	NJC3316	New Japan Radio	Radar antenna	5AJBV00008
A301	Diode limiter	NJS6318	New Japan Radio	Radar antenna	5ATBT00005

[V] NKE-2103-6/6HS (AlphaScan 5910-6X/6XH)

Part No.	Item Name	Model Name	Manufacturer	Location of Use	Code
V101	Magnetron	MAF1565N	New Japan Radio	Radar antenna	5VMAA00102
A101/A102	Circulator	FCX68R	Orient Microwave	Radar antenna	5AJIX00027
A103	Dummy	NJC4002	New Japan Radio	Radar antenna	5ANDF00001
A104	Filter	NJC9952	New Japan Radio	Radar antenna	5AWAX00002
A301	Diode limiter	NJS6930	New Japan Radio	Radar antenna	5ATBT00006

14.2.2 Repair circuit block

Repair Circuit Block (AlphaScan 5925-6X/9X)

Location	Circuit Block Name	Model Name	Remarks
Radar antenna	Geared motor	MDBW10822*	Common to 100/220VAC * indicates a revision such as A and B.
	Encoder circuit	CHT-71A	
	Motor driver circuit	H-7EPRD0034*	For 220VAC * indicates a revision such as A and B.
	Motor driver circuit	H-7EPRD0035*	For 100VAC * indicates a revision such as A and B.
	Brake circuit	CFA-253	
	Brake control circuit	CCB-655	
	Brake circuit unit	NZR-16	Including the CFA-259/260
	Performance monitor	NJU-85	
	T/R control circuit	CMC-1205R	
	Modulation unit	NMA-550-1	Including the CPA-264 Including the CMB-404 Including the CFR-229 Not including the magnetron
	Modulation circuit	CPA-264	
	Receiver	NRG-162A	Including the CMA-866A
	Power supply circuit	CBD-1682A	
	Relay filter circuit	CSC-656	
	Fan	H-7BFRD0002	

Display	Display unit	AlphaScreen 19-inch	
	19-inch MNU replacement FAN kit	H-7ZYNA4004	Incorporated into AlphaScreen 19-inch
	Display unit	AlphaScreen 26-inch	
	26-inch MNU replacement FAN kit	H-7ZYNA4005	Incorporated into AlphaScreen 26-inch
	Power supply unit	NBD-913	
	PSU replacement FAN kit	H-7ZYNA4007	Incorporated into NBD-913
	Central control unit	NDC-1590	
	DVD drive	CDD-754	Incorporated into NDC-1590
	CCU replacement FAN kit	H-7ZYNA4006	
	CCU repair kit	NZC-1590	
	Trackball operation unit	NCE-5605	
	Trackball	CCK-1060	Incorporated into NCE-5605
	Operation circuit A	CCK-1050	
	Operation circuit SW	CCK-1069	
	Operation circuit CN	CCK-1070	
Display	Keyboard operation unit	NCE-5625	
	Operation circuit B	CCK-1059	Incorporated into NCE-5625
	Optional keyboard	CCK-1061	
	ϕ38 button	MPHD30460	Incorporated into NCE-5625
	ϕ22 button	MPHD30459	
	Screw cover bottom	MTV305169	
	Screw cover top	MTV305170	
	Serial LAN interface circuit	CMH-2370	
	Gyro interface circuit	CMJ-554	
	Radar interface circuit	CQD-2273	
	Analog option circuit	CMJ-560	
	Sensor LAN switch	NQA-2443	

Repair circuit block (AlphaScan 5930-S)

Location	Circuit Block Name	Model Name	Remarks
Radar antenna	Geared motor	MDBW10823*	Common to 100/220VAC * indicates a revision such as A and B.
	Encoder circuit	CHT-71A	
	Motor driver circuit	H-7EPRD0034*	For 220VAC * indicates a revision such as A and B.
	Motor driver circuit	H-7EPRD0035*	For 100VAC * indicates a revision such as A and B.
	Brake circuit	CFA-255	
	Brake control circuit	CCB-655	
	Brake circuit unit	NZR-17	Including the CFA-261/262
	Performance monitor	NJU-84	
	T/R control circuit	CMC-1205R	
	Modulation unit	NMA-551-1	Including the CPA-264 Including the CMB-406 Including the CFR-229 Not including the magnetron
	Modulation circuit	CPA-264	
	Receiver	NRG-229	Including the CAF-595/CAE-499
	Power supply circuit	CBD-1682A	
	Relay filter circuit	CSC-656	
	Fan	H-7BFRD0002	

Display	Display unit	AlphaScreen 19-inch	
	19-inch MNU replacement FAN kit	H-7ZYNA4004	Incorporated into AlphaScreen 19-inch
	Display unit	AlphaScreen 26-inch	
	26-inch MNU replacement FAN kit	H-7ZYNA4005	Incorporated into AlphaScreen 26-inch
	Power supply unit	NBD-913	
	PSU replacement FAN kit	H-7ZYNA4007	Incorporated into NBD-913
	Central control unit	NDC-1590	
	DVD drive	CDD-754	Incorporated into NDC-1590
	CCU replacement FAN kit	H-7ZYNA4006	
	CCU repair kit	NZC-1590	
	Trackball operation unit	NCE-5605	
	Trackball	CCK-1060	Incorporated into NCE-5605
	Operation circuit A	CCK-1050	
	Operation circuit SW	CCK-1069	
	Operation circuit CN	CCK-1070	
	Keyboard operation unit	NCE-5625	
Display	Operation circuit B	CCK-1059	Incorporated into NCE-5625
	Optional keyboard	CCK-1061	
	ϕ38 button	MPHD30460	
	ϕ22 button	MPHD30459	
	Screw cover bottom	MTV305169	
	Screw cover top	MTV305170	
	Serial LAN interface circuit	CMH-2370	
	Gyro interface circuit	CMJ-554	
	Radar interface circuit	CQD-2273	
	Analog option circuit	CMJ-560	
	Sensor LAN switch	NQA-2443	

Repair circuit block (AlphaScan 9225-6XH)

Location	Circuit Block Name	Model Name	Remarks
Radar antenna	Geared motor	H-7BDRD0045A	DC brushless
	Encoder circuit	CHT-71A	
	Motor control circuit	CBD-1779	
	Brake circuit	CFA-257	
	Performance monitor	NJU-85	
	Heater control circuit	CHG-216	Option (100VAC)
	Power supply circuit	CBD-1682A	
	T/R control circuit	CMC-1205R	
	Modulation unit	NMA-550-1	Including the CPA-264, CMB-404, CFR-229 Not including the magnetron
	Modulation circuit	CPA-264	
	Receiver	NRG-162A	Including the CMA-866A
	Fan	H-7BFRD0002	
Display	Display unit	AlphaScreen 19-inch	
	19-inch MNU replacement FAN kit	H-7ZYNA4004	Incorporated into AlphaScreen 19-inch
	Display unit	AlphaScreen 26-inch	
	26-inch MNU replacement FAN kit	H-7ZYNA4005	Incorporated into AlphaScreen 26-inch
	Power supply unit	NBD-913	
	PSU replacement FAN kit	H-7ZYNA4007	Incorporated to NBD-913
	Central control unit	NDC-1590	
	DVD drive	CDD-754	Incorporated into NDC-1590
	CCU replacement FAN kit	H-7ZYNA4006	
	CCU repair kit	NZC-1590	
	Trackball operation unit	NCE-5605	
	Trackball	CCK-1060	Incorporated into NCE-5605
	Operation circuit A	CCK-1050	
	Operation circuit SW	CCK-1069	
	Operation circuit CN	CCK-1070	
	Keyboard operation unit	NCE-5625	
	Operation circuit B	CCK-1059	

	Optional keyboard	CCK-1061	Incorporated into NCE-5625
	ϕ38 button	MPHD30460	
	ϕ22 button	MPHD30459	
	Screw cover bottom	MTV305169	
	Screw cover top	MTV305170	
	Serial LAN interface circuit	CMH-2370	
	Gyro interface circuit	CMJ-554	
	Radar interface circuit	CQD-2273	
	Analog option circuit	CMJ-560	
	Sensor LAN switch	NQA-2443	

Repair Circuit Block (AlphaScan 5910-6X/6XH)

Location	Circuit Block Name	Model Name	Remarks
Radar antenna	Geared motor	7BDRD0048	DC brushless (common to HS)
	Modulation circuit	CME-363	Not including the magnetron
	Receiver	NRG-610	Including the CAE-529-1
	Power supply circuit	CBD-1783	
	Encoder circuit	CHT-71A	
	Motor control power supply circuit	CBD-1779	
	Brake circuit	CFA-252	
	Fan	H-7BFRD0002	
Display	Display unit	AlphaScreen 19-inch	
	19-inch MNU replacement FAN kit	H-7ZYNA4004	Incorporated into AlphaScreen 19-inch
	Display unit	AlphaScreen 26-inch	
	26-inch MNU replacement FAN kit	H-7ZYNA4005	Incorporated into AlphaScreen 26-inch
	Power supply unit	NBD-913	
	PSU replacement FAN kit	H-7ZYNA4007	Incorporated to NBD-913
	Central control unit	NDC-1590	
	DVD drive	CDD-754	Incorporated into NDC-1590
	CCU replacement FAN kit	H-7ZYNA4006	
	CCU repair kit	NZC-1590	
	Trackball operation unit	NCE-5605	
	Trackball	CCK-1060	Incorporated into NCE-5605
	Operation circuit A	CCK-1050	
	Operation circuit SW	CCK-1069	
	Operation circuit CN	CCK-1070	
	Keyboard operation unit	NCE-5625	
	Operation circuit B	CCK-1059	Incorporated into NCE-5625
	Optional keyboard	CCK-1061	
	ϕ38 button	MPHD30460	
	ϕ22 button	MPHD30459	
	Screw cover bottom	MTV305169	
	Screw cover top	MTV305170	
	Serial LAN interface circuit	CMH-2370	

	Gyro interface circuit	CMJ-554	
	Radar interface circuit	CQD-2273	
	Analog option circuit	CMJ-560	
	Sensor LAN switch	NQA-2443	

Repair circuit block (AlphaScan 5972-S)

Location	Circuit Block Name	Model Name	Remarks
Radar antenna	TRX module	CMN-797	
	Signal processing unit	NDC-4920	
	Power supply/interface circuit	CMP-493	
	Encoder	CHT-85	
	Fan	109L0912S410	
	Motor driver circuit	CBD-1949	Common to AC100/220V
	Motor with gear	MDBW10823*	Common to AC100/220V * indicates a revision such as A and B.
Display	Display unit	AlphaScreen 19-inch	
	19-inch MNU replacement FAN kit	H-7ZYNA4004	Incorporated into AlphaScreen 19-inch
	Display unit	AlphaScreen 26-inch	
	26-inch MNU replacement FAN kit	H-7ZYNA4005	Incorporated into AlphaScreen 26-inch
	Power supply unit	NBD-913	
	PSU replacement FAN kit	H-7ZYNA4007	Incorporated to NBD-913
	Central control unit	NDC-1590	
	DVD drive	CDD-754	Incorporated into NDC-1590
	CCU replacement FAN kit	H-7ZYNA4006	
	CCU repair kit	NZC-1590	
	Trackball operation unit	NCE-5605	
	Trackball	CCK-1060	Incorporated into NCE-5605
	Operation circuit A	CCK-1050	
	Operation circuit SW	CCK-1069	
	Operation circuit CN	CCK-1070	
	Keyboard operation unit	NCE-5625	
	Operation circuit B	CCK-1059	Incorporated into NCE-5625
	Optional keyboard	CCK-1061	
	ϕ38 button	MPHD30460	
	ϕ22 button	MPHD30459	
	Screw cover bottom	MTV305169	
	Screw cover top	MTV305170	
	Serial LAN interface circuit	CMH-2370	
	Gyro interface circuit	CMJ-554	

	Radar interface circuit	CQD-2273	
	Analog option circuit	CMJ-560	
	Sensor LAN switch	NQA-2443	

Repair circuit block (AlphaScan 5982-S)

Location	Circuit Block Name	Model Name	Remarks
Antenna	TRX module	CMN-797	
	Signal processing unit	NDC-4920	
	Power supply/IF circuit	CMP-493	
	Encoder	CHT-85	
	Fan	109L0912S410	
	Motor driver circuit	CBD-1949	Common to AC100/220V
	Motor with gear	MDBW10823*	Common to AC100/220V * indicates a revision such as A and B.
Display	Display unit	AlphaScreen 19-inch	
	19-inch MNU replacement FAN kit	H-7ZYNA4004	Incorporated into AlphaScreen 19-inch
	Display unit	AlphaScreen 26-inch	
	26-inch MNU replacement FAN kit	H-7ZYNA4005	Incorporated into AlphaScreen 26-inch
	Power supply unit	NBD-913	
	PSU replacement FAN kit	H-7ZYNA4007	Incorporated to NBD-913
	Central control unit	NDC-1590	
	DVD drive	CDD-754	Incorporated into NDC-1590
	CCU replacement FAN kit	H-7ZYNA4006	
	CCU repair kit	NZC-1590	
	Trackball operation unit	NCE-5605	
	Trackball	CCK-1060	Incorporated into NCE-5605
	Operation circuit A	CCK-1050	
	Operation circuit SW	CCK-1069	
	Operation circuit CN	CCK-1070	
	Keyboard operation unit	NCE-5625	
	Operation circuit B	CCK-1059	Incorporated into NCE-5625
	Optional keyboard	CCK-1061	
	ϕ38 button	MPHD30460	
	ϕ22 button	MPHD30459	
	Screw cover bottom	MTV305169	
	Screw cover top	MTV305170	
	Serial LAN interface circuit	CMH-2370	
	Gyro interface circuit	CMJ-554	
	Radar interface circuit	CQD-2273	
	Analog option circuit	CMJ-560	

	Sensor LAN switch	NQA-2443	

Repair circuit block (AlphaScan 5982-SH)

Location	Circuit Block Name	Model Name	Remarks
Antenna	TRX module	CMN-797	
	Signal processing unit	NDC-4920	
	Power supply/IF circuit	CMP-493	
	Encoder	CHT-85	
	Fan	109L0912S410	
	Motor driver circuit	CBD-1950	Common to AC100/220V
	Motor with gear	MDBW10967	Common to AC100/220V
Display	Display unit	AlphaScreen 19-inch	
	19-inch MNU replacement FAN kit	H-7ZYNA4004	Incorporated into AlphaScreen 19-inch
	Display unit	AlphaScreen 26-inch	
	26-inch MNU replacement FAN kit	H-7ZYNA4005	Incorporated into AlphaScreen 26-inch
	Power supply unit	NBD-913	
	PSU replacement FAN kit	H-7ZYNA4007	Incorporated into NBD-913
	Central control unit	NDC-1590	
	DVD drive	CDD-754	Incorporated into NDC-1590
	CCU replacement FAN kit	H-7ZYNA4006	
	CCU repair kit	NZC-1590	
	Trackball operation unit	NCE-5605	
	Trackball	CCK-1060	Incorporated into NCE-5605
	Operation circuit A	CCK-1050	
	Operation circuit SW	CCK-1069	
	Operation circuit CN	CCK-1070	
	Keyboard operation unit	NCE-5625	
	Operation circuit B	CCK-1059	Incorporated into NCE-5625
	Optional keyboard	CCK-1061	
	ϕ38 button	MPHD30460	
	ϕ22 button	MPHD30459	
	Screw cover bottom	MTV305169	
	Screw cover top	MTV305170	
	Serial LAN interface circuit	CMH-2370	
	Gyro interface circuit	CMJ-554	
	Radar interface circuit	CQD-2273	
	Analog option circuit	CMJ-560	
	Sensor LAN switch	NQA-2443	

Repair circuit block (AlphaScan 5925-6XH)

Location	Circuit Block Name	Model Name	Remarks
Antenna	Motor with gear	H-7BDRD0045A	DC brushless
	Encoder circuit	CHT-71A	
	Motor control circuit	CBD-1779	
	Brake circuit	CFA-257	
	Performance monitor	NJU-85	
	Heater control circuit	CHG-216	Optional (AC100V)
	Power supply circuit	CBD-1682A	
	T/R control circuit	CMC-1205R	
	Modulation unit	NMA-550-1	Including CPA-264, CMB-404, and CFR-229 Not including the magnetron
	Modulation circuit	CPA-264	
	Receiver	NRG-162A	Including CMA-866A
	Fan	H-7BFRD0002	
Display	Display unit	AlphaScreen 19-inch	
	19-inch MNU replacement FAN kit	H-7ZYNA4004	Incorporated into AlphaScreen 19-inch
	Display unit	AlphaScreen 26-inch	
	26-inch MNU replacement FAN kit	H-7ZYNA4005	Incorporated into AlphaScreen 26-inch
	Power supply unit	NBD-913	
	PSU replacement FAN kit	H-7ZYNA4007	Incorporated into NBD-913
	Central control unit	NDC-1590	
	DVD drive	CDD-754	Incorporated into NDC-1590
	CCU replacement FAN kit	H-7ZYNA4006	
	CCU repair kit	NZC-1590	
	Trackball operation unit	NCE-5605	
	Trackball	CCK-1060	Incorporated into NCE-5605
	Operation circuit A	CCK-1050	
	Operation circuit SW	CCK-1069	
	Operation circuit CN	CCK-1070	
	Keyboard operation unit	NCE-5625	
	Operation circuit B	CCK-1059	Incorporated into NCE-5625
	Optional keyboard	CCK-1061	
	ϕ38 button	MPHD30460	
	ϕ22 button	MPHD30459	
	Screw cover bottom	MTV305169	

	Screw cover top	MTV305170	
	Serial LAN interface circuit	CMH-2370	
	Gyro interface circuit	CMJ-554	
	Radar interface circuit	CQD-2273	
	Analog option circuit	CMJ-560	
	Sensor LAN switch	NQA-2443	

14.3 Troubleshooting

When this equipment does not operate correctly, check the following points before asking for repairs. Consult with your nearest subsidiary company, branch office, or sales office if the problem does not get solved even after checking and correcting these points, or if there are any abnormally locations other than the following items.

Symptom	Cause	Action
The power is not supplied. Alternatively, the equipment does not start even if the Power button of the operation unit is pressed.	The AC or DC power supply is not connected.	Connect the AC or DC power supply.
	The breaker at the front of the power supply unit (NBD-913) is not set to ON.	Set the breaker to ON by pushing up the lever of the breaker.
	The AC or DC power supply is not input within the specified voltage range.	Connect the AC or DC power supply within the specified voltage range.
	The internal wiring is faulty.	Make a request to the distributor for repair.
	The power supply unit (NBD-913) is faulty.	Make a request to the distributor for repair.
	The central control unit (NDC-1590) is faulty.	Make a request to the distributor for repair.
	The operation unit (NCE-5605) is faulty.	Make a request to the distributor for repair.
The power is not supplied to the monitor.	The display unit is not activated.	Activate the display unit.
	The internal wiring is faulty.	Make a request to the distributor for repair.
	Display (AlphaScreen 19/26-inch) is faulty.	Make a request to the distributor for repair.
Although the power is supplied to the monitor, the screen is not displayed.	The brightness of the monitor is set to the minimum level.	Adjust the brightness of the monitor to the appropriate level.
	The internal wiring is faulty.	Make a request to the distributor for repair.
	Display (AlphaScreen 19/26-incht) is faulty.	Make a request to the distributor for repair.
The brightness of the monitor cannot be adjusted.	The display (AlphaScreen 19/26-inch) is faulty.	Make a request to the distributor for repair.
The trackball or the option keyboard cannot be operated.	The internal wiring is faulty.	Make a request to the distributor for repair.
	The display unit (NCE-5605/NCE5625) is faulty.	Make a request to the distributor for repair.

Symptom	Cause	Action
The trackball does cannot be moved smoothly.	The trackball is dirty.	Clean the trackball.
Although the power is supplied and the screen is displayed, the display is frozen, disabling processing to advance up to display of the task menu.	The central control unit (NDC-1590) is abnormal.	Make a request to the distributor for repair.
Some task menus cannot be selected.	The device license has not been installed.	Install the license of the device to be used.
The cursor is not displayed correctly.	The central control unit (NDC-1590) is faulty.	Make a request to the distributor for repair.
Characters/symbols are not displayed correctly.	The central control unit (NDC-1590) is faulty.	Make a request to the distributor for repair.
Position information (GPS) is not displayed.	The communication is not set correctly.	Set the communication correctly.
	The power supply for the GPS equipment is not turned on.	Turn on the power supply for the GPS equipment.
	The GPS equipment does not perform positioning.	Check the state of the GPS equipment.
	The connection with the GPS equipment is abnormal.	Check the connection with the GPS equipment. When GPS equipment is connected to the serial LAN interface circuit, check if the LED of the corresponding port is lit at data reception.
	The power supply for the serial-LAN interface circuit (CMH-2370) is not turned on. (Case where the GPS equipment is connected to the serial-LAN interface circuit)	Turn on the power supply for the serial-LAN interface circuit.
	The serial-LAN interface circuit (CMH-2370) is faulty. (Case where the GPS equipment is connected to the serial-LAN interface circuit)	Make a request to the distributor for repair.
	The internal wiring is faulty.	Make a request to the distributor for repair.
	The central control unit (NDC-1590) is faulty.	Make a request to the distributor for repair.

Symptom	Cause	Action
AIS information is not displayed.	The communication is not set correctly.	Set the communication correctly.
	The power supply for the AIS equipment is not turned on.	Turn on the power supply for the AIS equipment.
	The AIS equipment does not perform positioning.	Check the state of the AIS equipment.
	The connection with the AIS equipment is abnormal.	Check the connection with the AIS equipment. When AIS equipment is connected to the serial LAN interface circuit, check if the LED of the corresponding port is lit at data reception.
	The power supply for the serial-LAN interface circuit (CMH-2370) is not turned on. (Case where the AIS equipment is connected to the serial-LAN interface circuit)	Turn on the power supply for the serial-LAN interface circuit.
	The serial-LAN interface circuit (CMH-2370) is faulty. (Case where the AIS equipment is connected to the serial-LAN interface circuit)	Make a request to the distributor for repair.
	The internal wiring is faulty.	Make a request to the distributor for repair.
	The central control unit (NDC-1590) is faulty.	Make a request to the distributor for repair.

Symptom	Cause	Action
The azimuth of the Gyro compass is not displayed. Alternatively, the azimuth rotation direction is not displayed correctly.	The communication is not set correctly.	Set the communication correctly.
	The power supply for the Gyro compass equipment is not turned on.	Turn on the power supply for the Gyro compass equipment.
	The connection with the Gyro compass equipment is abnormal.	Check the connection with the Gyro compass equipment. When gyro compass equipment is connected to the serial LAN interface circuit or gyro interface circuit, check if the corresponding LED is lit at signal reception.
	The power supply for the serial-LAN interface circuit (CMH-2370) is not turned on. (Case where the Gyro compass equipment is connected to the serial-LAN interface circuit)	Turn on the power supply for the serial-LAN interface circuit.
	The serial-LAN interface circuit (CMH-2370) is faulty. (Case where the Gyro compass equipment is connected to the serial-LAN interface circuit)	Make a request to the distributor for repair.
The azimuth of the Gyro compass is not displayed. Alternatively, the azimuth rotation direction is not displayed correctly.	The Gyro interface circuit (CMJ-554) is not set correctly (Case where the Gyro compass equipment is connected to the Gyro interface circuit)	Set the Gyro interface circuit correctly according to the Gyro compass equipment.
	The fuse of the gyro interface circuit (CMJ-554) has blown.	Replace the fuse of the gyro interface circuit.
	The Gyro interface circuit (CMJ-554) is faulty. (Case where the Gyro compass equipment is connected to the Gyro interface circuit)	Make a request to the distributor for repair.
	The internal wiring is faulty.	Make a request to the distributor for repair.
	The central control unit (NDC-1590) is faulty.	Make a request to the distributor for repair.

Symptom	Cause	Action
Log is not displayed or the values are not displayed correctly.	The communication is not set correctly.	Set the communication correctly.
	The power supply for the log equipment is not turned on.	Turn on the power supply for the log equipment.
	The connection with the log equipment is abnormal.	Check the connection with the log equipment. When log equipment is connected to the serial LAN interface circuit or gyro interface circuit, check if the corresponding LED blinks at signal reception.
	The power supply for the serial-LAN interface circuit (CMH-2370) is not turned on. (Case where the log equipment is connected to the serial-LAN interface circuit).	Turn on the power supply for the serial-LAN interface circuit.
	The serial-LAN interface circuit (CMH-2370) is faulty. (Case where the log equipment is connected to the serial-LAN interface circuit).	Make a request to the distributor for repair.
	The Gyro interface circuit (CMJ-554) is not set correctly. (Case where the log equipment is connected to the Gyro interface circuit).	Set the Gyro interface circuit correctly according to the log equipment.
	The Gyro interface circuit (CMJ-554) is faulty. (Case where the log equipment is connected to the Gyro interface circuit).	Make a request to the distributor for repair.

Symptom	Cause	Action
Log is not displayed or the values are not displayed correctly.	The internal wiring is faulty.	Make a request to the distributor for repair.
	The central control unit (NDC-1590) is faulty.	Make a request to the distributor for repair.
Rudder angles are not displayed. Alternatively, the values are not displayed correctly.	The communication is not set correctly.	Set the communication correctly.
	The power supply for the rudder angle indicator is not turned on.	Turn on the power supply for the rudder angle indicator.
	The connection with the rudder angle indicator is abnormal.	Check the connection with the rudder angle indicator. When a rudder angle indicator is connected to the serial LAN interface circuit, check if the LED of the corresponding port is lit at data reception.
	The power supply for the serial-LAN interface circuit (CMH-2370) is not turned on. (Case where the rudder angle indicator is connected to the serial-LAN interface circuit or the rudder angle indicator is connected to the analog option circuit)	Turn on the power supply for the serial-LAN interface circuit.
	The serial-LAN interface circuit (CMH-2370) is faulty. (Case where the rudder angle indicator is connected to the serial-LAN interface circuit or the rudder angle indicator is connected to the analog option circuit)	Make a request to the distributor for repair.
	The analog option circuit (CMJ-560) is not set correctly. (Case where the rudder angle indicator is connected to the analog option circuit)	Set the analog option circuit correctly according to the rudder angle indicator.
	The analog option circuit (CMJ-560) is faulty. (Case where the rudder angle indicator is connected to the analog option circuit)	Make a request to the distributor for repair.
	The internal wiring is faulty.	Make a request to the distributor for repair.
	The central control unit (NDC-1590) is faulty.	Make a request to the distributor for repair.

Symptom	Cause	Action
Wind direction/wind speed (anemoscope/anemometer) data is not displayed.	The communication is not set correctly.	Set the communication correctly.
	The power supply for the anemoscope/anemometer is not turned on.	Turn on the power supply for the anemoscope/anemometer.
	The connection with the anemoscope/anemometer is abnormal.	Check the connection with the anemoscope/anemometer. Check if the LED of the corresponding port of the serial LAN interface circuit is lit at data reception.
	The power supply for the serial-LAN interface circuit (CMH-2370) is not turned on.	Turn on the power supply for the serial-LAN interface circuit.
	The serial-LAN interface circuit (CMH-2370) is faulty.	Make a request to the distributor for repair.
	The internal wiring is faulty.	Make a request to the distributor for repair.
	The central control unit (NDC-1590) is faulty.	Make a request to the distributor for repair.
Water depth values are not displayed.	The communication is not set correctly.	Set the communication correctly.
	The power supply for the echo sounder is not turned on.	Turn on the power supply for the echo sounder.
	The connection with the echo sounder is abnormal.	Check the connection with the echo sounder. Check if the LED of the corresponding port of the serial LAN interface circuit is lit at data reception.
	The power supply for the serial-LAN interface circuit (CMH-2370) is not turned on.	Turn on the power supply for the serial-LAN interface circuit.
	The serial-LAN interface circuit (CMH-2370) is faulty.	Make a request to the distributor for repair.
	The internal wiring is faulty.	Make a request to the distributor for repair.
	The central control unit (NDC-1590) is faulty.	Make a request to the distributor for repair.

Symptom	Cause	Action
Sensor signals are not displayed.	The communication is not set correctly.	Set the communication correctly.
	The power supply for the sensor equipment is not turned on.	Turn on the power supply for the sensor equipment.
	The connection with the sensor equipment is faulty.	Check the connection with the sensor equipment. Check if the LED of the corresponding port of the serial LAN interface circuit is lit at data reception.
	The power supply for the serial-LAN interface circuit (CMH-2370) is not turned on.	Turn on the power supply for the serial-LAN interface circuit.
	The internal wiring is faulty.	Make a request to the distributor for repair.
	The display unit such as the serial-LAN interface circuit (CMH-2370), analog option circuit (CMJ-560), and central control unit (NDC-1590) is faulty.	Make a request to the distributor for repair.
Autopilot is disabled.	The communication is not set correctly.	Set the communication correctly.
	The autopilot function is not operated correctly.	Operate autopilot correctly.
	The power supply for the autopilot equipment is not turned on.	Turn on the power supply for the autopilot equipment.
	The connection with the autopilot equipment is faulty.	Check the connection with the autopilot equipment. Check if the LED of the corresponding port of the serial LAN interface circuit is lit at data reception.
	The power supply for the serial-LAN interface circuit (CMH-2370) is not turned on.	Turn on the power supply for the serial-LAN interface circuit.
	The serial-LAN interface circuit (CMH-2370) is faulty.	Make a request to the distributor for repair.
	The internal wiring is faulty.	Make a request to the distributor for repair.
	The central control unit (NDC-1590) is faulty.	Make a request to the distributor for repair.

Symptom	Cause	Action
Contact signals are not output.	The power supply for the serial-LAN interface circuit (CMH-2370) is not turned on. (Case where contact signal output is acquired from the serial-LAN interface circuit)	Turn on the power supply for the serial-LAN interface circuit.
	The serial-LAN interface circuit (CMH-2370) is faulty. (Case where contact signal output is acquired from the serial-LAN interface circuit)	Make a request to the distributor for repair.
	The internal wiring is faulty.	Make a request to the distributor for repair.
	The central control unit (NDC-1590) is faulty.	Make a request to the distributor for repair.

The radar antenna is not acknowledged.	The connection with the radar antenna is abnormal.	Check the connection with the radar antenna.
	Power is not supplied from the power supply unit to the radar antenna.	Check the power supply wiring between the power supply unit and the radar interface circuit. Check the power supply connection inside of the radar antenna. **[Note]** For checking wiring inside of the radar antenna, always request the work to the specialized service person. Before starting the work, turn off the power supply of the display unit. Otherwise, an unexpected accident may occur.
	Only AC power is supplied to the power supply unit. (NKE-2254 or NKE-2103 is connected as the radar antenna)	To connect the NKE-2254 or NKE-2103 antenna, the DC power supply must be connected to the power supply unit.
	The radar interface circuit (CQD-2273) is not set correctly.	Set the radar interface circuit correctly.
	The radar interface circuit (CQD-2273) is faulty.	Make a request to the distributor for repair.
	The radar antenna is faulty.	Make a request to the distributor for repair.
The radar antenna is not acknowledged.	The internal wiring is faulty.	Make a request to the distributor for repair.
	The central control unit (NDC-1590) is faulty.	Make a request to the distributor for repair.

Symptom	Cause	Action
The power is not supplied to the radar antenna.	The connection with the radar antenna is abnormal.	Check the connection with the radar antenna.
	The connection with the radar antenna is abnormal and overcurrent protection is functioning in the power supply unit.	Check the connection with the radar antenna and remove the cause of short-circuit.
	DC power is not supplied to the power supply unit. (NKE-2254 or NKE-2103 is connected as the radar antenna)	To connect the NKE-2254 or NKE-2103 radar antenna, DC power supply must be connected to the power supply unit.
	The 24V DC output fuse is blown out. (NKE-2254 or NKE-2103 is connected as the radar antenna.)	After removing the cause of fuse blow-out, replace the fuse. The fuse is the 15A blade fuse at the front of the power supply unit (NBD-913).
	The radar interface circuit (CQD-2273) is faulty.	Make a request to the distributor for repair.
	The internal wiring is faulty.	Make a request to the distributor for repair.
	The power supply unit (NBD-913) is abnormal.	Make a request to the distributor for repair.
	The central control unit (NDC-1590) is faulty.	Make a request to the distributor for repair.

Symptom	Cause	Action
The preheat count down of the radar antenna is not displayed.	The connection with the radar antenna is abnormal.	Check the connection with the radar antenna.
	The safety switch of the radar antenna is set to OFF.	Set the safety switch of the radar antenna to ON. [Note] For operating the safety switch of the radar antenna, always request the work to the specialized service person. Before starting the work, turn off the power supply of the display unit. Otherwise, an unexpected accident may occur.
	A solid-state radar antenna is connected.	Preheat count-down is not displayed for a solid-state radar antenna.
	The radar antenna is faulty.	Make a request to the distributor for repair.
	The radar interface circuit (CQD-2273) is not set correctly.	Set the radar interface circuit correctly.
	The radar interface circuit (CQD-2273) is faulty.	Make a request to the distributor for repair.
	The internal wiring is faulty.	Make a request to the distributor for repair.
	The central control unit (NDC-1590) is faulty.	Make a request to the distributor for repair.

Symptom	Cause	Action
The radar antenna does not rotate even if the [Transmit] button is pressed.	The connection with the radar antenna is abnormal.	Check the connection with the radar antenna.
	The safety switch of the radar antenna is set to OFF.	Set the safety switch of the radar antenna to ON. **[Note]** For operating the safety switch of the radar antenna, always request the work to the specialized service person. Before starting the work, turn off the power supply of the display unit. Otherwise, an unexpected accident may occur.
	Power is not supplied from the power supply unit to the radar antenna.	Check the power supply wiring between the power supply unit and the radar interface circuit. Check the power supply connection inside of the radar antenna. **[Note]** For checking the wiring inside of the radar antenna, always request the work to the specialized service person. Before starting the work, turn off the power supply of the display unit. Otherwise, an unexpected accident may occur.
	The motor driver circuit inside of the radar antenna is not set correctly. (NKE-1632, NKE-2632, or NKE-2632-H is connected as the radar antenna.)	Set the motor driver circuit correctly. **[Note]** For setting the motor driver circuit, always request the work to the specialized service person. Before starting the work, turn off the power supply of the display unit. Otherwise, an unexpected accident may occur.
	The radar antenna rotation unit is frozen.	De-freeze the frozen section by using the neck heater option.
	Strong wind of relative wind velocity exceeding 100kt (about 51.5m/s) is blowing.	When strong wind of relative wind velocity exceeding 100kt is blowing, the radar antenna does not rotate due to the protection function.
	The radar antenna is faulty.	Make a request to the distributor for repair.

Symptom	Cause	Action
The radar antenna does not rotate even if the [Transmit] button is pressed.	The radar interface circuit (CQD-2273) is faulty.	Make a request to the distributor for repair.
	The internal wiring is faulty.	Make a request to the distributor for repair.
	The power supply unit (NBD-913) is abnormal.	Make a request to the distributor for repair.
	The central control unit (NDC-1590) is faulty.	Make a request to the distributor for repair.
If the power supply is turned off, the track data is cleared without being stored.	The central control unit (NDC-1590) is faulty.	Make a request to the distributor for repair.
No radar image is displayed.	The connection with the radar antenna is abnormal.	Check the connection with the radar antenna.
	The GAIN value is set to the minimum.	Set a proper value for GAIN.
	The SEA/RAIN value is set to the maximum.	Set a proper value for SEA/RAIN.
	The magnetron is deteriorated significantly. (Case where an radar antenna that uses a magnetron is connected)	Replace the magnetron. **[Note]** For magnetron replacement, always request the work to the specialized service person. Before starting the work, turn off the power supply of the display unit. Otherwise, an unexpected accident may occur.
	The radar antenna is faulty.	Make a request to the distributor for repair.
	The radar interface circuit (CQD-2273) is faulty.	Make a request to the distributor for repair.
	The internal wiring is faulty.	Make a request to the distributor for repair.
	The power supply unit (NBD-913) is abnormal.	Make a request to the distributor for repair.
	The central control unit (NDC-1590) is faulty.	Make a request to the distributor for repair.

Symptom	Cause	Action
Radar images cannot be tuned.	The magnetron is deteriorated significantly. (Case where an radar antenna that uses a magnetron is connected)	Replace the magnetron. **[Note]** For magnetron replacement, always request the work to the specialized service person. Before starting the work, turn off the power supply of the display unit. Otherwise, an unexpected accident may occur.
	A solid-state radar antenna is connected.	Tuning bar is not displayed for a solid-state radar antenna.
The azimuth of the radar image is not displayed correctly.	Azimuth is not set correctly.	Set the azimuth correctly.
	CCRP is not set correctly.	Set CCRP correctly.
	The GPS radar antenna position is not set correctly.	Set the GPS radar antenna position correctly.
The range of the radar image is not displayed correctly.	The range is not set correctly.	Set the range correctly.
	CCRP is not set correctly.	Set CCRP correctly.
	The GPS radar antenna position is not set correctly.	Set the GPS radar antenna position correctly.
Interswitch does not function.	Power for the interswitch is not turned on.	Turn on the power for the interswitch.
	The connection with the interswitch is abnormal.	Check the connection with the interswitch.
	The interswitch is faulty.	Make a request to the distributor for repair.
	The radar interface circuit (CQD-2273) is not set correctly.	Set the radar interface circuit correctly.
	The radar interface circuit (CQD-2273) is faulty.	Make a request to the distributor for repair.
	The internal wiring is faulty.	Make a request to the distributor for repair.
	The central control unit (NDC-1590) is faulty.	Make a request to the distributor for repair.

Symptom	Cause	Action
If the power supply is turned off, the trail data is cleared without being stored.	The central control unit (NDC-1590) is faulty.	Make a request to the distributor for repair.
Radar images cannot be superimposed.	The radar overlay option license does not exist.	Install the radar overlay option license.
	The connection with the radar antenna is abnormal.	Check the connection with the radar antenna.
	The connection with the radar indicator is abnormal.	Check the connection with the radar indicator.
	The radar interface circuit (CQD-2273) is faulty.	Make a request to the distributor for repair.
	The internal wiring is faulty.	Make a request to the distributor for repair.
	The power supply unit (NBD-913) is faulty.	Make a request to the distributor for repair.
	The central control unit (NDC-1590) is faulty.	Make a request to the distributor for repair.
UPS does not function.	The connection with UPS is faulty.	Check the connection with UPS.
	UPS is not set correctly.	Set UPS correctly.
	The UPS battery is extremely depleted.	Replace the battery. [Note] At the battery replacement, make a request for the work to the specialized service staff. During the replacement, turn off the corresponding power supply breaker in the ship. Otherwise, an unexpected accident may occur.
	The internal wiring is faulty.	Make a request to the distributor for repair.
	UPS is faulty.	Make a request to the distributor for repair.
The following popup window is displayed. System has detected an error. Turn the power off and on again.	A communication error occurred.	Close the popup window and after checking that there is no problem even if the power of this equipment is turned off, turn off the power once and turn on the power again.
The system repeats restart.	DMA error.	When the system repeats restart, turn off the power of the equipment and contact the distributor.

14.4 After-Sale Services

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14.4.1 About the retaining period of service parts

The retaining period of the performance-critical parts for servicing this product (parts required to maintain the functionality of the product) is 10 years after the discontinuation of production.

14.4.2 When requesting a repair

If you suspect a failure, please read "22.3 Trouble shooting" thoroughly and check the unit again.
If you still detect abnormality, stop using the product and contact your sales representative, our sales department, nearest branch office or sales office.

Repair during the warranty period: If a failure occurs in the course of using the product correctly according to the explanations and instructions in the Instruction Manual, your sales representative or our company shall repair the product at no charge. However, repairs of failures caused by misuse, negligence, or act of God such as natural disasters and fire shall be chargeable.

If the warranty period has expired: If functionality can be recovered by repair, repair shall be made by the request of the customer for a fee.

Please provide the following information:

- Product name, model name, manufacturing date, serial number
- Description of abnormality (as detail as possible) (Please refer to the next page "Radar Failure Checklist.")
- Business name or organization name, address, phone number

14.4.3 Recommendation of inspection and maintenance

Although it depends on the usage state, performance may deteriorate by change in parts over time, Separately from regular care, inspection and maintenance are recommended.
Regarding inspection and maintenance, please contact your sales representative, our sales department, nearest branch office or sales office.
Please note that there is a charge for inspection and maintenance.

If you have questions regarding after-sale services, please inquire your sales representative, our sales department, nearest branch office or sales office.

Radar Failure Checklist

[Important] Before ordering a repair, please check and fill in the following items and then contact the applicable repair office.
If there are unknown items, please contact the ship and fill in as accurate as possible.

Ship Name: _____ Phone: _____ Fax: _____

Integrated Radar Model Name: AlphaScan- _____ Serial Number: _____
(Please fill in all digits accurately.)

(1) Check the following items sequentially and circle either YES or NO for each item.
If none is applicable, please write down the specific reason in No. (18) Others.
(2) If any of check items (1) through (5) is NO, please check the fuses of the equipment. (See "14.1.3 Fuse inspection.")
(3) Check items (4) through (17) with transmission (TX) ON.

* It may not be possible to use (14), (15) and (17) unless options and external devices are not connected; if they are not connected, it is not necessary to answer these items.

No.	Check Item	Result	
(1)	The power turns ON. (The light of the operation unit illuminates.)	YES	NO
(2)	The unit is placed in the standby state several minutes after turning the power ON.	YES	NO
(3)	When the power is turned ON (or transmission ON), something is displayed on the LCD/LED monitor. (Illuminates)	YES	NO
(4)	When transmission (TX) is turned ON, the Radar antenna rotates. (Check all of the following items with transmission ON.)	YES	NO
(5)	Magnetron current flows. (See the Instruction Manual.)	YES	NO
(6)	Tuning can be performed. (Check in a range of 6NM or above.)	YES	NO
(7)	Fixed markers are displayed.	YES	NO
(8)	The VRM is displayed.	YES	NO
(9)	White noise is displayed with minimum STC and FTC, maximum GAIN, IR-OFF and range 48NM.	YES	NO
(10)	Target reflection echoes are displayed,	YES	NO
(11)	The sensitivity of reflection echoes is normal.	YES	NO
(12)	The EBL is displayed.	YES	NO
(13)	The cursor symbols move.	YES	NO
*(14)	The GYRO course can be set up and is displayed normally.	YES	NO
*(15)	The LOG speed is displayed normally.	YES	NO
(16)	The target tracking function operates normally.	YES	NO

*(17)	If the straight mode (II) is switched to the cross mode (X) when an interswitch is provided, the failed (NO) items in (1) through (16) above are swapped between the right and left display units.	YES	NO
(18)	Other description (error messages, etc.)		

14.4.4 Extending the functions

The functions that are available for this equipment can be extended.
To extend a function, new license information (file) must be obtained and imported to this equipment. For function extension, please request to our sales department or our branch office, sales office, or agent near your premises.

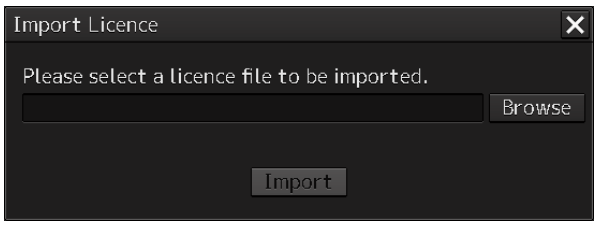
14.4.4.1 Importing the license information

Import the license information that was obtained (license file) to this equipment via the USB flash memory.
Connect the USB flash memory in which the license information is stored.

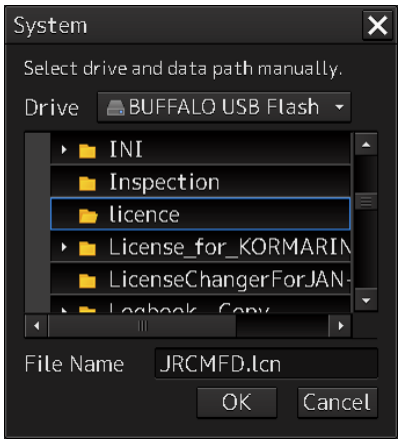
1 **Press the Power button of the operation unit.**
The Power button is lit. After a while, a task menu is displayed.

2 **Click on the password input section.**
A password input dialog is displayed.

3 **Enter the password, 9380.**
The [Import License] dialog is displayed.



4 **Click on the [Browse] button.**
The [System] dialog is displayed.



[File Name] combo box

5 **Select the name of the license file (example: JRCMFD.lcn) that is stored in the USB flash memory from the [File Name] combo box and click on the [OK] button.**

The [System] dialog is closed.

6 **Click on the [Import] button.**

When import is completed, a confirmation dialog box appears.

Close the dialog box by clicking on the [OK] button.

7 **Close the "import License" dialog box by clicking on [x] button and return to the task menu.**

In this case, a new license is adopted.

15 About Disposal

15.1 About Disposal of This Equipment

When disposing of this equipment, follow the regulations and/or rules of the local regulatory authority which has control over the location of disposal.

15.2 About Disposal of Used Magnetrons

A magnetron is used in the radar antennas (NKE-1125/1130/2254/2103) of this equipment.

When a magnetron is changed with new one, please return the old magnetron to our dealer or sales office.

For more information, please inquire our dealer or sales office.

16 Specifications

16.1 AlphaScan 5930-S

GENERAL SPECIFICATION	AlphaScan 5930-S
Class of emission	P0N
Display	Color Raster Scan
Screen	19inch Wide LCD (Effective diameter of RADAR: more than 250mm) or 26inch Wide LCD (Effective diameter of RADAR: more than 320mm)
Range Scale	0.125/0.25/0.5/0.75/1.5/3/6/12/24/48/96 NM
Range Resolution	Less than 30m
Minimum Detection Range	Less than 40m
Bearing Accuracy	Less than 1°
Bearing Indication	Relative motion mode: North UP/Course UP/Head UP/Waypoint UP True motion mode: North UP/Course UP/Waypoint UP
Ambient Condition - Operating Temperature	Scanner Unit: -25°C to +55°C (Storage -25°C to +70°C) Other Unit: -15°C to +55°C
Ambient Condition - Relative Humidity	+40°C, 93%
Ambient Condition - Vibration	2 to 13.2Hz: Amplitude ±1mm ±10% 13.2 to 100Hz: Acceleration 7m/s^2
Power Supply Input	100 to 115VAC, 50/60Hz 1ϕ 220 to 240VAC, 50/60Hz 1ϕ 24VDC
Power Consumption	Rating: Approx. 400VA Approx. 1900VA at Maximum wind speed (DC:72W at AC power outage)
Power Supply Voltage Fluctuation	AC input ±10% DC input +30%/-10%
Pre Heating Time	Within 4 minutes
From standby to transmit	Within 5 seconds
Scanner Unit	NKE-1130
See Section 24.26	
Performance Monitor	NJU-84

See Section 24.35	
Display	
Central control unit	NDC-1590
Power Supply Unit	NBD-913
Trackball Operation Unit	NCE-5605
Display	AlphaScreen 19-inch or AlphaScreen 26-inch
See Section 24.43	
Junction Box	NQE-1143
Keyboard Operation Unit	NCE-5625
Sensor LAN Switch Unit	NQA-2443
Operation Unit Desktop Frame Rack	CWB-1596
Inter Switch Unit	NQE-3141-4A NQE-3141-8A
Power Control Unit	NQE-3167
MAXIMUM CABLE LENGTH	
Display to scanner unit	65m
Scanner unit to TXRX	N/A
Display unit to transmitter receiver unit	N/A
SAFE DISTANCE FOR STANDARD COMPASS	
Scanner Unit	5.1m
Transmitter Receiver Unit	N/A
Display unit	2.4m

16.2 AlphaScan 5925-9X

GENERAL SPECIFICATION	AlphaScan 5925-9X
Class of emission	P0N
Display	Color Raster Scan
Screen	19inch Wide LCD (Effective diameter of RADAR: more than 250mm) or 26inch Wide LCD (Effective diameter of RADAR: more than 320mm)
Range Scale	0.125/0.25/0.5/0.75/1.5/3/6/12/24/48/96 NM
Range Resolution	Less than 30m
Minimum Detection Range	Less than 40m
Bearing Accuracy	Less than 1°
Bearing Indication	Relative motion mode: North UP/Course UP/Head UP/Waypoint UP True motion mode: North UP/Course UP/Waypoint UP
Ambient Condition - Operating Temperature	Scanner Unit: -25°C to +55°C (Storage -25°C to +70°C) Other Unit: -15°C to +55°C
Ambient Condition - Relative Humidity	+40°C, 93%
Ambient Condition - Vibration	2 to 13.2Hz: Amplitude ±1mm ±10% 13.2 to 100Hz: Acceleration 7m/s^2
Power Supply Input	100 to 115VAC, 50/60Hz 1ϕ 220 to 240VAC, 50/60Hz 1ϕ 24VDC
Power Consumption	Rating: Approx. 300VA Approx. 1700VA at Maximum wind speed (DC:72W at AC power outage)
Power Supply Voltage Fluctuation	AC input ±10% DC input +30%/-10%
Pre Heating Time	Within 4 minutes
From standby to transmit	Within 5 seconds
Scanner Unit	NKE-1125-9
See Section 24.28	
Performance Monitor	NJU-85
See Section 24.36	
Display	

Central control unit	NDC-1590
Power Supply Unit	NBD-913
Trackball Operation Unit	NCE-5605
Display	AlphaScreen 19-inch or AlphaScreen 26-inch
See Section 24.43	
Junction Box	NQE-1143
Option Unit	
Scanner Unit Deicing Heater	NKE-1125-9D
Keyboard Operation Unit	NCE-5625
Operation Unit Desktop Frame Rack	CWB-1596
Sensor LAN Switch Unit	NQA-2443
Inter Switch Unit	NQE-3141-4A NQE-3141-8A
Power Control Unit	NQE-3167
MAXIMUM CABLE LENGTH	
Display to scanner unit	65m
Scanner unit to TXRX	N/A
Display unit to transmitter receiver unit	N/A
SAFE DISTANCE FOR STANDARD COMPASS	
Scanner Unit	2.4m
Display unit	2.4m

16.3 AlphaScan 5925-6X

GENERAL SPECIFICATION	AlphaScan 5925-6X
Class of emission	P0N
Display	Color Raster Scan
Screen	19inch Wide LCD (Effective diameter of RADAR: more than 250mm) or 26inch Wide LCD (Effective diameter of RADAR: more than 320mm)
Range Scale	0.125/0.25/0.5/0.75/1.5/3/6/12/24/48/96 NM
Range Resolution	Less than 30m
Minimum Detection Range	Less than 40m
Bearing Accuracy	Less than 1°
Bearing Indication	Relative motion mode: North UP/Course UP/Head UP/Waypoint UP True motion mode: North UP/Course UP/Waypoint UP
Ambient Condition - Operating Temperature	Scanner Unit: -25°C to +55°C (Storage -25°C to +70°C) Other Unit: -15°C to +55°C
Ambient Condition - Relative Humidity	+40°C, 93%
Ambient Condition - Vibration	2 to 13.2Hz: Amplitude ±1mm ±10% 13.2 to 100Hz: Acceleration 7m/s^2
Power Supply Input	100 to 115VAC, 50/60Hz 1ϕ 220 to 240VAC, 50/60Hz 1ϕ 24VDC
Power Consumption	Rating: Approx. 300VA Approx. 1700VA at Maximum wind speed (DC:72W at AC power outage)
Power Supply Voltage Fluctuation	AC input ±10% DC input +30%/-10%
Pre Heating Time	Within 4 minutes
From standby to transmit	Within 5 seconds
Scanner Unit	NKE-1125-6
See Section 24.28	
Performance Monitor	NJU-85
See Section 24.36	

Display	
Central control unit	NDC-1590
Power Supply Unit	NBD-913
Trackball Operation Unit	NCE-5605
Display	AlphaScreen 19-inch or AlphaScreen 26-inch
See Section 24.43	
Junction Box	NQE-1143
Option Unit	
Scanner Unit Deicing Heater	NKE-1125-6D
Keyboard Operation Unit	NCE-5625
Operation Unit Desktop Frame Rack	CWB-1596
Sensor LAN Switch Unit	NQA-2443
Inter Switch Unit	NQE-3141-4A NQE-3141-8A
Power Control Unit	NQE-3167
MAXIMUM CABLE LENGTH	
Display to scanner unit	65m
Scanner unit to TXRX	N/A
Display unit to transmitter receiver unit	N/A
SAFE DISTANCE FOR STANDARD COMPASS	
Scanner Unit	2.4m
Display unit	2.4m

16.4 AlphaScan 5925-6XH

GENERAL SPECIFICATION	AlphaScan 5925-6XH
Class of emission	P0N
Display	Color Raster Scan
Screen	19inch Wide LCD (Effective diameter of RADAR: more than 250mm) or 26inch Wide LCD (Effective diameter of RADAR: more than 320mm)
Range Scale	0.125/0.25/0.5/0.75/1.5/3/6/12/24/48/96 NM
Range Resolution	Less than 30m
Minimum Detection Range	Less than 40m
Bearing Accuracy	Less than 1°
Bearing Indication	Relative motion mode: North UP/Course UP/Head UP/Waypoint UP True motion mode: North UP/Course UP/Waypoint UP
Ambient Condition - Operating Temperature	Scanner Unit: -25°C to +55°C (Storage -25°C to +70°C) Other Unit: -15°C to +55°C
Ambient Condition - Relative Humidity	+40°C, 93%
Ambient Condition - Vibration	2 to 13.2Hz: Amplitude ±1mm ±10% 13.2 to 100Hz: Acceleration 7m/s^2
Power Supply Input	100 to 115VAC, 50/60Hz 1ϕ 220 to 240VAC, 50/60Hz 1ϕ 24VDC
Power Consumption	Rating: Approx. 150VA, 150W DC Approx. 240VA, 350W DC at Maximum wind speed (DC:72W at AC power outage)
Power Supply Voltage Fluctuation	AC input ±10% DC input +30%/-10%
Pre Heating Time	Within 4 minutes
From standby to transmit	Within 5 seconds
Scanner Unit	NKE-2254-6HS
See Section 24.29	
Performance Monitor	NJU-85
See Section 24.36	
Display	

Central control unit	NDC-1590
Power Supply Unit	NBD-913
Trackball Operation Unit	NCE-5605
Display	AlphaScreen 19-inch or AlphaScreen 26-inch
See Section 24.43	
Junction Box	NQE-1143
Option Unit	
Scanner Unit Deicing Heater	N/A
Keyboard Operation Unit	NCE-5625
Operation Unit Desktop Frame Rack	CWB-1596
Sensor LAN Switch Unit	NQA-2443
Inter Switch Unit	NQE-3141-4A NQE-3141-8A
Power Control Unit	NQE-3167
MAXIMUM CABLE LENGTH	
Display to scanner unit	65m
Scanner unit to TXRX	N/A
Display unit to transmitter receiver unit	N/A
SAFE DISTANCE FOR STANDARD COMPASS	
Scanner Unit	2.4m
Display unit	2.4m

16.5 AlphaScan 5910-6X

GENERAL SPECIFICATION	AlphaScan 5910-6X
Class of emission	P0N
Display	Color Raster Scan
Screen	19inch Wide LCD (Effective diameter of RADAR: more than 250mm) or 26inch Wide LCD (Effective diameter of RADAR: more than 320mm)
Range Scale	0.125/0.25/0.5/0.75/1.5/3/6/12/24/48/96 NM
Range Resolution	Less than 30m
Minimum Detection Range	Less than 40m
Bearing Accuracy	Less than 1°
Bearing Indication	Relative motion mode: North UP/Course UP/Head UP/Waypoint UP True motion mode: North UP/Course UP/Waypoint UP
Ambient Condition - Operating Temperature	Scanner Unit: -25°C to +55°C (Storage -25°C to +70°C) Other Unit: -15°C to +55°C
Ambient Condition - Relative Humidity	+40°C, 93%
Ambient Condition - Vibration	2 to 13.2Hz: Amplitude ±1mm ±10% 13.2 to 100Hz: Acceleration 7m/s^2
Power Supply Input	100 to 115VAC, 50/60Hz 1ϕ 220 to 240VAC, 50/60Hz 1ϕ 24VDC
Power Consumption	Rating: Approx. 150VA, 150W DC Approx. 240VA, 200W DC at Maximum wind speed (DC:72W at AC power outage)
Power Supply Voltage Fluctuation	AC input ±10% DC input +30%/-10%
Pre Heating Time	Within 4 minutes
From standby to transmit	Within 5 seconds
Scanner Unit	NKE-2103-6
See Section 24.30	
Performance Monitor	NJU-85
See Section 24.36	
Display	

Central control unit	NDC-1590
Power Supply Unit	NBD-913
Trackball Operation Unit	NCE-5605
Display	AlphaScreen 19-inch or AlphaScreen 26-inch
See Section 24.43	
Junction Box	NQE-1143
Option Unit	
Scanner Unit Deicing Heater	N/A
Keyboard Operation Unit	NCE-5625
Operation Unit Desktop Frame Rack	CWB-1596
Sensor LAN Switch Unit	NQA-2443
Inter Switch Unit	NQE-3141-4A NQE-3141-8A
Power Control Unit	NQE-3167
MAXIMUM CABLE LENGTH	
Display to scanner unit	65m
Scanner unit to TXRX	N/A
Display unit to transmitter receiver unit	N/A
SAFE DISTANCE FOR STANDARD COMPASS	
Scanner Unit	2.4m
Display unit	2.4m

16.6 AlphaScan 5910-6XH

GENERAL SPECIFICATION	AlphaScan 5910-6XH
Class of emission	P0N
Display	Color Raster Scan
Screen	19inch Wide LCD (Effective diameter of RADAR: more than 250mm) or 26inch Wide LCD (Effective diameter of RADAR: more than 320mm)
Range Scale	0.125/0.25/0.5/0.75/1.5/3/6/12/24/48/96 NM
Range Resolution	Less than 30m
Minimum Detection Range	Less than 40m
Bearing Accuracy	Less than 1°
Bearing Indication	Relative motion mode: North UP/Course UP/Head UP/Waypoint UP True motion mode: North UP/Course UP/Waypoint UP
Ambient Condition - Operating Temperature	Scanner Unit: -25°C to +55°C (Storage -25°C to +70°C) Other Unit: -15°C to +55°C
Ambient Condition - Relative Humidity	+40°C, 93%
Ambient Condition - Vibration	2 to 13.2Hz: Amplitude ±1mm±10% 13.2 to 100Hz: Acceleration 7m/s^2
Power Supply Input	100 to 115VAC, 50/60Hz 1ϕ 220 to 240VAC, 50/60Hz 1ϕ 24VDC
Power Consumption	Rating: Approx. 150VA, 150W DC Approx. 240VA, 300W DC at Maximum wind speed (DC:72W at AC power outage)
Power Supply Voltage Fluctuation	AC input ±10% DC input +30%/-10%
Pre Heating Time	Within 4 minutes
From standby to transmit	Within 5 seconds
Scanner Unit	NKE-2103-6HS
See Section 24.30	
Performance Monitor	NJU-85
See Section 24.36	
Display	

Central control unit	NDC-1590
Power Supply Unit	NBD-913
Trackball Operation Unit	NCE-5605
Display	AlphaScreen 19-inch or AlphaScreen 26-inch
See Section 24.43	
Junction Box	NQE-1143
Option Unit	
Scanner Unit Deicing Heater	N/A
Keyboard Operation Unit	NCE-5625
Operation Unit Desktop Frame Rack	CWB-1596
Sensor LAN Switch Unit	NQA-2443
Inter Switch Unit	NQE-3141-4A NQE-3141-8A
Power Control Unit	NQE-3167
MAXIMUM CABLE LENGTH	
Display to scanner unit	65m
Scanner unit to TXRX	N/A
Display unit to transmitter receiver unit	N/A
SAFE DISTANCE FOR STANDARD COMPASS	
Scanner Unit	2.4m
Display unit	2.4m

16.7 AlphaScan 5972-S

GENERAL SPECIFICATION	AlphaScan 5972-S
Class of emission	P0N, Q0N
Display	Color Raster Scan
Screen	19inch Wide LCD (Effective diameter of RADAR: more than 250mm) or 26inch Wide LCD (Effective diameter of RADAR: more than 320mm)
Range Scale	0.125/0.25/0.5/0.75/1.5/3/6/12/24/48/96 NM
Range Resolution	Less than 30m
Minimum Detection Range	Less than 35m
Bearing Accuracy	Less than 1°
Bearing Indication	Relative motion mode: North UP/Course UP/Head UP/Waypoint UP True motion mode: North UP/Course UP/Waypoint UP
Ambient Condition - Operating Temperature	Scanner Unit: -25°C to +55°C (Storage -25°C to +70°C) Other Unit: -15°C to +55°C
Ambient Condition - Relative Humidity	+40°C, 93%
Ambient Condition - Vibration	2 to 13.2Hz: Amplitude ±1mm±10% 13.2 to 100Hz: Acceleration 7m/s^2
Power Supply Input	100 to 115VAC, 50/60Hz 1ϕ 220 to 240VAC, 50/60Hz 1ϕ 24VDC
Power Consumption	Rating: Approx. 400VA Approx. 1800VA at Maximum wind speed (DC:72W at AC power outage)
Power Supply Voltage Fluctuation	AC input ±10% DC input +30%/-10%
Pre Heating Time	Within 10 seconds
From standby to transmit	Within 5 seconds
Scanner Unit	**NKE-1632**
See Section 24.31	
Display	
Central control unit	NDC-1590
Power Supply Unit	NBD-913

Trackball Operation Unit	NCE-5605
Display	AlphaScreen 19-inch or AlphaScreen 26-inch
See Section 24.43	
Junction Box	NQE-1143
Option Unit	
Scanner Unit Deicing Heater	NKE-1632-D/NKE-1632-E
Keyboard Operation Unit	NCE-5625
Operation Unit Desktop Frame Rack	CWB-1596
Sensor LAN Switch Unit	NQA-2443
Inter Switch Unit	NQE-3141-4A NQE-3141-8A
Power Control Unit	NQE-3167
MAXIMUM CABLE LENGTH	
Display to scanner unit	65m
Scanner unit to TXRX	N/A
Display unit to transmitter receiver unit	N/A
SAFE DISTANCE FOR STANDARD COMPASS	
Scanner Unit	0.8m
Transmitter Receiver Unit	N/A
Display unit	2.4m

16.8 AlphaScan 5982-S

GENERAL SPECIFICATION	AlphaScan 5982-S
Class of emission	P0N, Q0N
Display	Color Raster Scan
Screen	19inch Wide LCD (Effective diameter of RADAR: more than 250mm)
Range Scale	0.125/0.25/0.5/0.75/1.5/3/6/12/24/48/96 NM
Range Resolution	Less than 30m
Minimum Detection Range	Less than 35m
Bearing Accuracy	Less than 1°
Bearing Indication	Relative motion mode: North UP/Course UP/Head UP/Waypoint UP True motion mode: North UP/Course UP/Waypoint UP
Ambient Condition - Operating Temperature	Scanner Unit: -25°C to +55°C (Storage -25°C to +70°C) Other Unit: -15°C to +55°C
Ambient Condition - Relative Humidity	+40°C, 93%
Ambient Condition - Vibration	2 to 13.2Hz: Amplitude ±1mm±10% 13.2 to 100Hz: Acceleration 7m/s^2
Power Supply Input	100 to 115VAC, 50/60Hz 1ϕ 220 to 240VAC, 50/60Hz 1ϕ 24VDC
Power Consumption	Rating: Approx. 350VA Approx. 1400VA at Maximum wind speed (DC:72W at AC power outage)
Power Supply Voltage Fluctuation	AC input ±10% DC input +30%/-10%
Pre Heating Time	Within 10 seconds
From standby to transmit	Within 5 seconds
Scanner Unit	**NKE-2632**
See Section 24.32	
Display	
Central control unit	NDC-1590
Power Supply Unit	NBD-913
Trackball Operation Unit	NCE-5605
Display	AlphaScreen 19-inch or AlphaScreen 26-inch

See Section 24.43	
Junction Box	NQE-1143
Option Unit	
Scanner Unit Deicing Heater	NKE-2632-D/NKE-2632-E
Keyboard Operation Unit	NCE-5625
Operation Unit Desktop Frame Rack	CWB-1596
Sensor LAN Switch Unit	NQA-2443
Inter Switch Unit	NQE-3141-4A NQE-3141-8A
Power Control Unit	NQE-3167
MAXIMUM CABLE LENGTH	
Display to scanner unit	65m
Scanner unit to TXRX	N/A
Display unit to transmitter receiver unit	N/A
SAFE DISTANCE FOR STANDARD COMPASS	
Scanner Unit	0.8m
Transmitter Receiver Unit	N/A
Display unit	2.4m

16.9 AlphaScan 5982-SH

GENERAL SPECIFICATION	AlphaScan 5982-SH
Class of emission	P0N, Q0N
Display	Color Raster Scan
Screen	19inch Wide LCD (Effective diameter of RADAR: more than 250mm) or 26inch Wide LCD (Effective diameter of RADAR: more than 320mm)
Range Scale	0.125/0.25/0.5/0.75/1.5/3/6/12/24/48/96 NM
Range Resolution	Less than 30m
Minimum Detection Range	Less than 35m
Bearing Accuracy	Less than 1°
Bearing Indication	Relative motion mode: North UP/Course UP/Head UP/Waypoint UP True motion mode: North UP/Course UP/Waypoint UP
Ambient Condition - Operating Temperature	Scanner Unit: -25°C to +55°C (Storage -25°C to +70°C) Other Unit: -15°C to +55°C
Ambient Condition - Relative Humidity	+40°C, 93%
Ambient Condition - Vibration	2 to 13.2Hz: Amplitude ±1mm±10% 13.2 to 100Hz: Acceleration 7m/s^2
Power Supply Input	100 to 115VAC, 50/60Hz 1ϕ 220 to 240VAC, 50/60Hz 1ϕ 24VDC
Power Consumption	Rating: Approx. 400VA Approx. 1800VA at Maximum wind speed (DC:72W at AC power outage)
Power Supply Voltage Fluctuation	AC input ±10% DC input +30%/-10%
Pre Heating Time	Within 10 seconds
From standby to transmit	Within 5 seconds
Scanner Unit	**NKE-2632-H**
See Section 24.32	
Display	
Central control unit	NDC-1590
Power Supply Unit	NBD-913

Trackball Operation Unit	NCE-5605
Display	AlphaScreen 19-inch or AlphaScreen 26-inch
See Section 24.43	
Junction Box	NQE-1143
Option Unit	
Scanner Unit Deicing Heater	NKE-2632-HD/NKE-2632-HE
Keyboard Operation Unit	NCE-5625
Operation Unit Desktop Frame Rack	CWB-1596
Sensor LAN Switch Unit	NQA-2443
Inter Switch Unit	NQE-3141-4A NQE-3141-8A
Power Control Unit	NQE-3167
MAXIMUM CABLE LENGTH	
Display to scanner unit	65m
Scanner unit to TXRX	N/A
Display unit to transmitter receiver unit	N/A
SAFE DISTANCE FOR STANDARD COMPASS	
Scanner Unit	0.6m
Transmitter Receiver Unit	N/A
Display unit	2.4m

16.10 NKE-1130

GENERAL SPECIFICATION	NKE-1130
Dimension	Height 791 × Swing Circle 4000 (mm)
Mass	Approx. 180kg
Polarization	Horizontal
Horizontal beam width:	1.9°
Vertical beam width:	25°
Side lobe level:	below -26dB (within ±10°) below -30dB (outside ±10°)
Revolution	Approx. 24 rpm
Power Supply for Motor	100 to 115VAC, 50/60Hz 1ϕ or 220 to 240VAC, 50/60Hz 1ϕ
Maximum Wind Velocity	51.5m/s (100kt)
Transmitting Frequency	3050 ±20MHz
Transmitting Power	30kW ±50%
Transmitting Tube	Magnetron [M1555]
TX Pulse width / Repetition Frequency (Observation Range)	SP1: 0.07μs/2250Hz (0.125NM, 0.25NM, 0.5NM, 0.75NM, 1.5NM) MP1: 0.2μs/2250Hz (0.75NM, 1.5NM, 3NM, 6NM, 12NM) MP2: 0.3μs/1900Hz (1.5NM, 3NM, 6NM, 12NM) MP3: 0.4μs/1400Hz (1.5NM, 3NM, 6NM, 12NM, 24NM) LP1: 0.8μs/750Hz (3NM, 6NM, 12NM, 24NM) LP2: 1.0μs/650Hz (6NM, 12NM, 24NM, 48NM) LP3: 1.2μs/510Hz (96NM)
Modulator	Solid State Modulator Circuit
Duplexer	Circulator + Diode Limiter
Frond End Module	Built-in
Overall Noise Figure	7.5dB (typical)
Tuning	Manual/AUTO
Intermediate Frequency Amplifier	
Intermediate Frequency	60MHz
Band Width	25/8/3MHz
Gain	More than 90dB
Amplifying Characteristics	Logarithmic Amplifier

16.11 NKE-1125

GENERAL SPECIFICATION	NKE-1125-9
Dimension	Height 536 × Swing Circle 2825 (mm)
Mass	Approx. 60kg
Polarization	Horizontal
Horizontal beam width:	0.8°
Vertical beam width:	20°
Side lobe level:	below -26dB (within ±10°) below -30dB (outside ±10°)
Revolution	Approx. 24 rpm
Power Supply for Motor	100 to 115VAC, 50/60Hz 1ϕ or 220 to 240VAC, 50/60Hz 1ϕ
Maximum Wind Velocity	51.5m/s (100kt)
Transmitting Frequency	9410 ±30MHz
Transmitting Power	25kW ±50%
Transmitting Tube	Magnetron [M1568BS]
TX Pulse width / Repetition Frequency (Observation Range)	SP1: 0.07μs/2250Hz (0.125NM, 0.25NM, 0.5NM, 0.75NM, 1.5NM, 3NM, 6NM, 12NM) MP1: 0.2μs/2250Hz (0.75NM, 1.5NM, 3NM, 6NM, 12NM) MP2: 0.3μs/1900Hz (1.5NM, 3NM, 6NM, 12NM) MP3: 0.4μs/1400Hz (1.5NM, 3NM, 6NM, 12NM, 24NM) LP1: 0.8μs/750Hz (3NM, 6NM, 12NM, 24NM) LP2: 1.0μs/650Hz (6NM, 12NM, 24NM, 48NM) LP3: 1.2μs/510Hz (96NM)
Modulator	Solid State Modulator Circuit
Duplexer	Circulator + Diode Limiter
Frond End Module	Built-in
Overall Noise Figure	7.5dB (typical)
Tuning	Manual/AUTO
Intermediate Frequency Amplifier	
Intermediate Frequency	60MHz
Band Width	25/8/3MHz
Gain	More than 90dB
Amplifying Characteristics	Logarithmic Amplifier
GENERAL SPECIFICATION	NKE-1125-6

Dimension	Height 536 × Swing Circle 1910 (mm)
Mass	Approx. 55kg
Polarization	Horizontal
Horizontal beam width:	1.2°
Vertical beam width:	20°
Side lobe level:	below -26dB (within ±10°) below -30dB (outside ±10°)
Revolution	Approx. 24 rpm
Power Supply for Motor	100 to 115VAC, 50/60Hz 1ϕ or 220 to 240VAC, 50/60Hz 1ϕ
Maximum Wind Velocity	51.5m/s (100kt)
Transmitting Frequency	9410 ±30MHz
Transmitting Power	25kW
Transmitting Tube	Magnetron [M1568BS]
TX Pulse width / Repetition Frequency (Observation Range)	SP1: 0.07μs/2250Hz (0.125NM, 0.25NM, 0.5NM, 0.75NM, 1.5NM, 3NM, 6NM, 12NM) MP1: 0.2μs/2250Hz (0.75NM, 1.5NM, 3NM, 6NM, 12NM) MP2: 0.3μs/1900Hz (1.5NM, 3NM, 6NM, 12NM) MP3: 0.4μs/1400Hz (1.5NM, 3NM, 6NM, 12NM, 24NM) LP1: 0.8μs/750Hz (3NM, 6NM, 12NM, 24NM) LP2: 1.0μs/650Hz (6NM, 12NM, 24NM, 48NM) LP3: 1.2μs/510Hz (96NM)
Modulator	Solid State Modulator Circuit
Duplexer	Circulator + Diode Limiter
Frond End Module	Built-in
Overall Noise Figure	7.5dB (typical)
Tuning	Manual/AUTO
Intermediate Frequency Amplifier	
Intermediate Frequency	60MHz
Band Width	25/8/3MHz
Gain	More than 90dB
Amplifying Characteristics	Logarithmic Amplifier

16.12 NKE-2254-6HS

GENERAL SPECIFICATION	NKE-2254-6HS
Dimension	Height 536 × Swing Circle 1910 (mm)
Mass	Approx. 55kg
Polarization	Horizontal
Horizontal beam width:	1.2°
Vertical beam width:	20°
Side lobe level:	below -26dB (within ±10°) below -30dB (outside ±10°)
Revolution	Approx. 48 rpm
Power Supply for Motor	24VDC
Maximum Wind Velocity	51.5m/s (100kt)
Transmitting Frequency	9410 ±30MHz
Transmitting Power	25kW ±50%
Transmitting Tube	Magnetron [M1568BS]
TX Pulse width / Repetition Frequency (Observation Range)	SP1: 0.07μs/2250Hz (0.125NM, 0.25NM, 0.5NM, 0.75NM, 1.5NM, 3NM, 6NM, 12NM) MP1: 0.2μs/2250Hz (0.75NM, 1.5NM, 3NM, 6NM, 12NM) MP2: 0.3μs/1900Hz (1.5NM, 3NM, 6NM, 12NM) MP3: 0.4μs/1400Hz (1.5NM, 3NM, 6NM, 12NM, 24NM) LP1: 0.8μs/750Hz (3NM, 6NM, 12NM, 24NM) LP2: 1.0μs/650Hz (6NM, 12NM, 24NM, 48NM) LP3: 1.2μs/510Hz (96NM)
Modulator	Solid State Modulator Circuit
Duplexer	Circulator + Diode Limiter
Frond End Module	Built-in
Overall Noise Figure	7.5dB (typical)
Tuning	Manual/AUTO
Intermediate Frequency Amplifier	
Intermediate Frequency	60MHz
Band Width	25/8/3MHz
Gain	More than 90dB
Amplifying Characteristics	Logarithmic Amplifier

16.13 NKE-2103

GENERAL SPECIFICATION	NKE-2103-6
Dimension	Height 458 × Swing Circle 1910 (mm)
Mass	Approx. 36kg
Polarization	Horizontal
Horizontal beam width:	1.2°
Vertical beam width:	20°
Side lobe level:	below -26dB (within ±10°) below -30dB (outside ±10°)
Revolution	Approx. 27 rpm
Power Supply for Motor	24VDC
Maximum Wind Velocity	51.5m/s (100kt)
Transmitting Frequency	9410 ±30MHz
Transmitting Power	10kW ±50%
Transmitting Tube	Magnetron [MAF1565N]
TX Pulse width / Repetition Frequency (Observation Range)	SP1: 0.08μs/2250Hz (0.125NM, 0.25NM, 0.5NM, 0.75NM, 1.5NM, 3NM, 6NM, 12NM) MP1: 0.25μs/1700Hz (0.75NM, 1.5NM, 3NM, 6NM, 12NM) MP2: 0.5μs/1200Hz (1.5NM, 3NM, 6NM, 12NM, 48NM) LP1: 0.8μs/750Hz (3NM, 6NM, 12NM, 24NM) LP2: 1.0μs/650Hz (6NM, 12NM, 24NM, 48NM, 96NM)
Modulator	Solid State Modulator Circuit
Duplexer	Circulator + Diode Limiter
Frond End Module	Built-in
Overall Noise Figure	7.5dB (typical)
Tuning	Manual/AUTO
Intermediate Frequency Amplifier	
Intermediate Frequency	60MHz
Band Width	25/8/3MHz
Gain	More than 90dB
Amplifying Characteristics	Logarithmic Amplifier
GENERAL SPECIFICATION	NKE-2103-6HS
Dimension	Height 458 × Swing Circle 1910 (mm)
Mass	Approx. 37kg
Polarization	Horizontal

Horizontal beam width:	1.2°
Vertical beam width:	20°
Side lobe level:	below -26dB (within ±10°) below -30dB (outside ±10°)
Revolution	Approx. 48 rpm
Power Supply for Motor	24VDC
Maximum Wind Velocity	51.5m/s (100kt)
Transmitting Frequency	9410 ±30MHz
Transmitting Power	10kW
Transmitting Tube	Magnetron [MAF1565N]
TX Pulse width / Repetition Frequency (Observation Range)	SP1: 0.08μs/2250Hz (0.125NM, 0.25NM, 0.5NM, 0.75NM, 1.5NM, 3NM, 6NM, 12NM) MP1: 0.25μs/1700Hz (0.75NM, 1.5NM, 3NM, 6NM, 12NM) MP2: 0.5μs/1200Hz (1.5NM, 3NM, 6NM, 12NM, 48NM) LP1: 0.8μs/750Hz (3NM, 6NM, 12NM, 24NM) LP2: 1.0μs/650Hz (6NM, 12NM, 24NM, 48NM, 96NM)
Modulator	Solid State Modulator Circuit
Duplexer	Circulator + Diode Limiter
Frond End Module	Built-in
Overall Noise Figure	7.5dB (typical)
Tuning	Manual/AUTO
Intermediate Frequency Amplifier	
Intermediate Frequency	60MHz
Band Width	25/8/3MHz
Gain	More than 90dB
Amplifying Characteristics	Logarithmic Amplifier

16.14 NKE-1632

GENERAL SPECIFICATION	NKE-1632
Dimension	Height 791 × Swing Circle 4000 (mm)
Mass	Approx. 160kg
Polarization	Horizontal
Horizontal beam width:	1.9°
Vertical beam width:	25°
Side lobe level:	below -26dB (within ±10°) below -30dB (outside ±10°)
Revolution	Approx. 24 rpm
Power Supply for Motor	100 to 115VAC, 50/60Hz 1ϕ or 220 to 240VAC, 50/60Hz 1ϕ
Maximum Wind Velocity	51.5m/s (100kt)
Transmitting Frequency	P0N(3035MHz), Q0N(3065 ±4MHz) or (3060 ±4MHz)
Transmission output	Peak-to-peak value 250W ±50% (Average value 5.8W or lower)
Transmitting Tube	Solid State Device
TX Pulse width (1st) / (TX Pulse width, Frequency Deviation Width (2nd)) / Repetition Frequency (Observation Range)	SP1: 0.07μs/(4.6μs, 8MHz)/1860Hz or 2280Hz (0.125NM, 0.25NM, 0.5NM, 0.75NM, 1.5NM, 3NM) MP1: 0.14μs/(9.1μs, 8MHz)/1860Hz or 2280Hz (0.75NM, 1.5NM, 3NM, 6NM) MP2: 0.29μs/(9.1μs, 8MHz)/1860Hz or 2280Hz (1.5NM, 3NM, 6NM, 12NM) LP1: 0.57μs/(9.1μs, 8MHz)/1280Hz (3NM, 6NM, 12NM, 24NM) LP2: 1.14μs/(18.3μs, 8MHz)/640Hz (3NM, 6NM, 12NM, 24NM, 48NM, 96NM)
Duplexer	Circulator + Diode Limiter
Frond End Module	Built-in
Overall Noise Figure	4.0dB (typical)
Performance Monitor	Built-in
Intermediate Frequency Amplifier	
Intermediate Frequency	63MHz
Band Width	30MHz
Gain	More than 28dB
Amplifying Characteristics	Linear Amplifier

16.15 NKE-2632

GENERAL SPECIFICATION	NKE-2632
Dimension	Height 720 × Swing Circle 2770 (mm)
Mass	Approx. 85kg
Polarization	Horizontal
Horizontal beam width:	2.7°
Vertical beam width:	25°
Side lobe level:	below -26dB (within ±10°) below -30dB (outside ±10°)
Revolution	Approx. 24 rpm
Power Supply for Motor	100 to 115VAC, 50/60Hz 1ϕ or 220 to 240VAC, 50/60Hz 1ϕ
Maximum Wind Velocity	51.5m/s (100kt)
Transmitting Frequency	P0N(3035MHz), Q0N(3065 ±4MHz) or (3060 ±4MHz)
Transmission output	Peak-to-peak vlue 250W ±50% (Average value 5.8W or lower)
Transmitting Tube	Solid State Device
TX Pulse width (1st) / (TX Pulse width, Frequency Deviation Width (2nd)) / Repetition Frequency (Observation Range)	SP1: 0.07μs/(4.6μs, 8MHz)/1860Hz or 2280Hz (0.125NM, 0.25NM, 0.5NM, 0.75NM, 1.5NM, 3NM) MP1: 0.14μs/(9.1μs, 8MHz)/1860Hz or 2280Hz (0.75NM, 1.5NM, 3NM, 6NM) MP2: 0.29μs/(9.1μs, 8MHz)/1860Hz or 2280Hz (1.5NM, 3NM, 6NM, 12NM) LP1: 0.57μs/(9.1μs, 8MHz)/1280Hz (3NM, 6NM, 12NM, 24NM) LP2: 1.14μs/(18.3μs, 8MHz)/640Hz (3NM, 6NM, 12NM, 24NM, 48NM, 96NM)
Duplexer	Circulator + Diode Limiter
Frond End Module	Built-in
Overall Noise Figure	4.0dB (typical)
Performance Monitor	Built-in
Intermediate Frequency Amplifier	
Intermediate Frequency	63MHz
Band Width	30MHz
Gain	More than 28dB
Amplifying Characteristics	Linear Amplifier

GENERAL SPECIFICATION	NKE-2632-H
Dimension	Height 720 × Swing Circle 2770 (mm)
Mass	Approx. 90kg
Polarization	Horizontal
Horizontal beam width:	2.7°
Vertical beam width:	25°
Side lobe level:	below -26dB (within ±10°) below -30dB (outside ±10°)
Revolution	Approx. 48 rpm
Power Supply for Motor	100 to 115VAC, 50/60Hz 1ϕ or 220 to 240VAC, 50/60Hz 1ϕ
Maximum Wind Velocity	51.5m/s (100kt)
Transmitting Frequency	P0N(3035MHz), Q0N(3065 ±4MHz) or (3060 ±4MHz)
Transmission output	Peak-to-peak vlue 250W ±50% (Average value 5.8W or lower)
Transmitting Tube	Solid State Device
TX Pulse width (1st) / (TX Pulse width, Frequency Deviation Width (2nd)) / Repetition Frequency (Observation Range)	SP1: 0.07μs/(4.6μs, 8MHz)/1860Hz or 2280Hz (0.125NM, 0.25NM, 0.5NM, 0.75NM, 1.5NM, 3NM) MP1: 0.14μs/(9.1μs, 8MHz)/1860Hz or 2280Hz (0.75NM, 1.5NM, 3NM, 6NM) MP2: 0.29μs/(9.1μs, 8MHz)/1860Hz or 2280Hz (1.5NM, 3NM, 6NM, 12NM) LP1: 0.57μs/(9.1μs, 8MHz)/1280Hz (3NM, 6NM, 12NM, 24NM) LP2: 1.14μs/(18.3μs, 8MHz)/640Hz (6NM, 12NM, 24NM, 48NM, 96NM)
Duplexer	Circulator + Diode Limiter
Frond End Module	Built-in
Overall Noise Figure	4.0dB (typical)
Performance Monitor	Built-in
Intermediate Frequency Amplifier	
Intermediate Frequency	63MHz
Band Width	30MHz
Gain	More than 28dB
Amplifying Characteristics	Linear Amplifier

16.16 NJU-84

GENERAL SPECIFICATION	NJU-84
Dimension	Width 130 × Depth 180 × Height 70 (mm)
Mass	0.7kg
Operating Frequency	3050 ±30MHz

16.17 NJU-85

GENERAL SPECIFICATION	NJU-85
Dimension	Width 130 × Depth 149 × Height 70 (mm)
Mass	0.7kg
Operating Frequency	9410 ±30MHz

16.18 Display Unit

FUNCTIONAL SPECIFICATION	
View	
Range Scale	0.125, 0.25, 0.5, 0.75, 1.5, 3, 6, 12, 24, 48, 96NM
Motion mode	TM (True Motion) display/(RM (Relative Motion) display
Bearing display mode	Relative motion mode: North UP/Course UP/Head UP/Waypoint UP True motion mode: North UP/Course UP/Head UP/Waypoint UP
Constaview	Yes
Off Center	Within 66% of Radius, except 96NM range.
Tuning Indication	Bar graph
Trails Indication	Off/0.25/0.5/1/3/6/10/15/30/60min
Own ship track	Yes
2nd PPI	Yes
Navigational tools	
Bearing Scale	360° in 1° step
Heading Line Indication	Yes
Range Marker	0.025, 0.05, 0.1, 0.25, 0.5, 1, 2, 4, 8, 16 NM
Range Accuracy	Less than 1% of the Range Scale in use, or 30m whichever is larger.
Variable Range Marker (VRM)	2
VRM range display	0.000 to 96.0NM, 4-digit display
Electronic Bearing Line (EBL)	2 (center/independent)
EBL bearing display	0.000 to 359.9°, 4-digit display
Trackball Cursor	Yes (range, true/relative bearing, TTG, ETA display)
Parallel Index Line (PI)	Yes (All/Individual/Track/Equiangular)
Signal Process	
Anti Sea Clutter (SEA)	Manual/AUTO
Anti Rain Clutter (RAIN)	Manual/AUTO
Interference Rejection (IR)	Yes
Video Process	Yes
TT/AIS	
Auto-acquisition Zone (AZ)	2 (Sector)
TT indication	100
AIS indication	500 (Sleeping/Activate) #Option: up to 1000
User Map	
Export	Possible (USB memory)
Other functions	
Data display functions	Conning data block display
Self-diagnosis function	Available
Remote maintenance function	Available
Upgrading to multi-function display	Possible
Receivable signals (i)	
Ship heading	THS > HDT (over 40Hz)
Course	GGA > RMC > RMA > GNS > GLL
Geodetic positioning system	DTM
Date information	ZDA
COG/SOG	RMC > RMA > VTG
Ship speed through water	VBW
Turning speed	ROT
Water depth	DPT > DBS > DBT > DBK
Wind direction/wind speed	MWV > MWD
Air temperature	XDR > MTA > MDA
Water temperature	MTW > MDA
Atmospheric pressure	XDR > MMB > MDA
Humidity	XDR > MHU > MDA
AIS	VDM, VDO
Alert	ACK, ALR

Transmittable signals	
RADAR system data	RSD
Own ship data	OSD
Watch Timer Reset	EVE*1
TT data	TTM, TLL, TTD, TLB
AIS target data	TTM, TLL, TTD, TLB
AIS remote control data	VSD, AIR, AIQ, ABM, BBM
Remote maintenance data	JRC format
Alert	ACK, ALR
Azimuth/distance to the destination	BWC (output under the radar license only)
Visual range	
Visual range	1.05m from the center of display

i. The Speed measuring accuracy of speed sensor shall confirm to IMO Resolution MSC.96(72).
The measuring accuracy of GPS shall confirm to IMO Resolution MSC.112(73).

*1 When the value exceeds the set value, a message is output indicating a non-operation state. The value is set at installation.

16.19 Target Tracking

FUNCTIONAL SPECIFICATION	
Acquisition	
Acquisition Mode	Manual/AUTO (AUTO mode uses Auto-acquisition Zone)
Manual Cancellation	Any one Target or All targets at once
Acquisition Range	0.1NM to 32NM (Available in all range scale)
Tracking	
Number of Target	100 targets
Tracking Range	0.1NM to 32NM (Available in all range scale)
View	
Motion mode	TM (True Motion) / RM (Relative Motion)
Azimuth mode	North UP, Head UP, Course UP, Waypoint UP
Vector mode	True / Relative Display
Vector Length	Variable, 1 to 120 min. (1min. step)
Past Position	True / Relative Display Number of Dots --- 10 points Display Interval Time --- 0.5 / 1 / 2 / 4 min Display range: 0.1NM, 0.2NM, 0.5NM, and 1NM
Time to Display Vector	within 1 minute
Time to Stabilize Vector	within 3 minutes
Alarm	
Auto-acquisition Zone (AZ)	2 (sector)
Setting range	0.5NM to 32NM
Alarm Indication	Symbol on Display, Visible/Audible Alarm
Safe Limits (CPA/TCPA)	
CPA LIMIT	0.1 to 9.9NM
TCPA LIMIT	1 to 99 minutes
Conditions	
Safe Target	CPA > CPA Limit 0 > TCPA TCPA > TCPA Limit
Dangerous Target	CPA ≤ CPA Limit 0 ≤ TCPA ≤ TCPA Limit
Lost Target	Symbol on Display, Visible/Audible Alarm
Alert Indication	
Safe Target	Color: White, Alert: OFF, Buzzer: OFF
Dangerous Target	Color: Red, Alert: ON, Buzzer: ON
Data Indication	
Target Data	Simultaneous display for 10 targets (26-inch screen)/4 targets (19-inch screen) True Bearing, Range, True Course, True Speed, CPA, TCPA, BCR, BCT
Own Ship's Data	Course and Speed
Trial Maneuver	
Manual Setting	
Trial Course	0° to 359.9°
Trial Speed	0 to 100 kn
Accuracy of Display	**Complied with IMO Requirements**
System Failure	**Visible / Audible Alarm**
Speed Input	**Manual / AUTO (LOG)**

16.20 AIS

FUNCTIONAL SPECIFICATION	
Activation	
Acquisition Mode	Manual/AUTO (AUTO mode uses Auto-acquisition Zone)
Manual Cancellation	Any one Target
Presentation	
Number of Target (Sleeping and activated)	500 [475] targets (Option: 1000 [950])*1
No. targets processed	1024 targets
Past Position	True / Relative Display Number of Dots --- 10 points Display Interval Time --- 0.5 / 1 / 2 / 4 min Display Interval Distance --- 0.1 / 0.2 / 0.5 / 1 NM
Message	Broadcast Message, Addressed Message
Motion mode	TM (True Motion) / RM (Relative Motion)
Azimuth mode	North UP, Head UP, Course UP, Waypoint UP
Vector mode	True / Relative Display
Vector Length	Variable, 1 to 60 min. (1min. step)
Alarm	
Auto-acquisition Zone (AZ)	2 (sector)
Setting range	0.5NM to 32NM
Alarm Indication	Symbol on Display, Visible/Audible Alarm
Safe Limits (CPA/TCPA)	
CPA LIMIT	0.1 to 9.9NM
TCPA LIMIT	1 to 99 minutes
Conditions	
Safe Target	CPA > CPA Limit 0 > TCPA TCPA > TCPA Limit
Dangerous Target	CPA ≤ CPA Limit 0 ≤ TCPA ≤ TCPA Limit
Lost Target	Symbol on Display, Visible/Audible Alarm
Alert Indication	
Safe Target	Color: White, Alert: OFF, Buzzer: OFF
Dangerous Target	Color: Red, Alert: ON, Buzzer: ON
Data Indication	
Target Data	Simultaneous and Continuous Display for 10 Targets
Simple Display	Ship's name, Call sign, MMSI, Course, Speed, CPA and TCPA
Details Display	Ship's name, Call sign, MMSI, Course, Speed, CPA, TCPA, Bearing, Range, Ship's Heading Bearing, Rate of turn, Latitude, Longitude, Destination and Navigation Status
Own Ship's Data	The ship's name, Call sign, MMSI, Course, Speed, Ship's heading bearing, Rate of turn, Latitude, Longitude, Destination, and Navigation status of own ship
Trial Maneuver	
Manual Setting	
Trial Course	0° to 359.9°
Trial Speed	0 to 100 kn
Accuracy of Display	**Complied with IMO Requirements**
System Failure	**Visible / Audible Alarm**
Speed Input	**AUTO (LOG)**

*1 The value in [ ] indicates the 95% of the number of maximum targets.

16.21 Central Control Unit

GENERAL SPECIFICATION	NDC-1590: Central Control Unit
CPU	Intel Core i5 2515E 2.5GHz
Main Memory	2GB (DDR3)
JRC ASIC	Yes
Mechanical	
Dimension	Width 400 × Depth 240 × Height 125 (mm)
Mass	5.6kg
FAN	1
Environment	
Operational Temperature	-15°C to +55°C
Operational Humidity	40°C RH 93%
Vibration	Sweep 2Hz to 13.2Hz at ± 1mm, 13.2Hz to 100Hz at 7m/s^2 and for 2h on each resonance, otherwise 2h at 30Hz in all three axes
EMC	IEC60945-Ed4.0
Ingress Protection Rating	IP20
Interfaces	
DVI-D	1
VGA	1 (Slave output as DVI-D)
IEC61162-1	2 input (GPS and LOG)
IEC61162-2	2 input (AIS and THD)
IEC61162-450	2 (IEEE802.3u/IEEE802.3ab compliance (100BASE-TX/1000BASE-T))
Dry Contact Output	2 (Power Fail and Watch Timer Reset)
Normally Close	Power Fail (32V 0.8A MAX)
Normally Open	Watch Timer Reset (32V 0.8A MAX)
Operation Unit	1 (5m max)
Extended Operation Unit	1 (up to 30m)
USB I/F	3 (1 for MNU, Others are general purpose)
RADAR I/F	1 input for scanner unit, 1 output for other equipment
Power	Connecting with NBD-913

16.22 Power Supply Unit

GENERAL SPECIFICATION	NBD-913: Power Supply Unit
AC Input	
Voltage	100 to 115VAC, 50/60Hz 1ϕ 220 to 240VAC, 50/60Hz 1ϕ
Voltage Range	85 to 264VAC
Overvoltage Protection	295VAC ±2V
Input Current	Max 6.8A(100VAC) / 3.4A(220VAC)
Over current Protection	YES
DC Input	
Voltage	24VDC
Voltage Range	21.6 to 31.2VDC
Overvoltage Protection	42V
Input Current	Max 16A
Over current Protection	YES
Rated Output	
Output 1	12.0V ±0.24V 2A
Output 2A (for CCU)	24.0V ±0.48V 4A
Output 2B (for MNU)	24.0V ±0.48V 6A
Output 3 (for TXRX)	48.0V ±0.96V 4A
Mechanical	
Dimension	Width 400 × Depth 240 × Height 85 (mm)
Mass	4.2kg
FAN	2
Environment	
Operational Temperature	-15°C to +55°C
Operational Humidity	40°C RH 93%
Vibration	Sweep 2Hz to 13.2Hz at ± 1mm, 13.2Hz to 100Hz at 7m/s^2 and for 2h on each resonance, otherwise 2h at 30Hz in all three axes
EMC	IEC60945-Ed4.0
Ingress Protection Rating	IP20

16.23 Trackball Operation Unit

GENERAL SPECIFICATION	NCE-5605: Trackball Operation Unit
Pointing Device	2inch Trackball
Click Button	2-buttons (Left and Right)
USB I/F	1
Speaker	1
Vibration	1
Keys	SILENCE/ALERT ACK/ZOOM IN/ZOOM OUT
Knob	Multi Function Knob
Cable Length	Up to 5m (Up to 30m when using the extended option)
Mechanical	
Dimension	Width 130 × Depth 210 × Height 177 (mm)
Mass	1.3kg
Environment	
Operational Temperature	-15°C to +55°C
Operational Humidity	40°C RH 93%
Vibration	Sweep 2Hz to 13.2Hz at ± 1mm, 13.2Hz to 100Hz at 7m/s^2 and for 2h on each resonance, otherwise 2h at 30Hz in all three axes
EMC	IEC60945-Ed4.0
Ingress Protection Rating	Front : IP22

16.24 19-inch Monitor Unit

GENERAL SPECIFICATION	AlphaScreen 19-inch
Screen Size	19inch
Full Resolution	1280×1024
Supported format	1280×1024,1280×960,1024×768,800×600,640×480,720×400
Dot Pitch	0.294mm
Viewing Area	376.3mm × 301mm
Display Colors	16.7 million colors
Contrast Ratio	2000:1
Viewing Angles (H / V)	178°/ 178°
Back Light	LED
Brightness	590cd/m2 Type
Digital Scanning Frequency (H / V)	Horizon 31kHz to 64kHz Vertical 59Hz to 61Hz
DVI-D input	1
VGA input	1
VGA output	N/A
USB	1
Power	21.6 to 31.2VDC
Overvoltage Protection	N/A
DC Reverse Connection Protection	Self Return Type
Cables	Up to 5m
Glass Bonding	Standard
Mechanical	
Dimension	Width 429 × Depth 75 × Height 406 (mm)
Mass	5.9kg
Fan	1
Environment	
Operational Temperature	-15°C to +55°C
Operational Humidity	10 -90% (R.H., non condensing)
EMS	IEC60945
Ingress Protection Rating	Front:IP65 Back:IP22

16.25 26-inch Monitor Unit

GENERAL SPECIFICATION	AlphaScreen 26-inch
Screen Size	26inch
Aspect Ratio	16:10
Full Resolution	1920×1200RB
Supported format	1920×1200RB,1680×1050,1680×1050RB,1600×1200,1600×1200RB, 1280×1024,1024×768,800×600,640×480
Dot Pitch	0.2865mm
Viewing Area	550.08mm × 343.8 mm
Display Colors	16.77 million colors
Contrast Ratio	1500:1
Viewing Angles (H / V)	176° / 176°
Back Light	LED
Brightness	400cd/m^2 Type
Digital Scanning Frequency (H / V)	Horizontal 30kHz to 75kHz Vertical 56Hz to 75Hz
DVI-D input	1
VGA input	1
VGA output	1
USB I/F	1
Power	21.6 to 31.2VDC 85 to 265VAC 50/60Hz
Overvoltage Protection	N/A
DC Reverse Connection Protection	Self-Return Type
Cables	Up to 5m
Glass Bonding	Optional
Mechanical	
Dimension	Width 624 × Depth 85 × Height 456 (mm)
Mass	16kg
Fan	2
Glass	Tempered Glass + AR Coating
Environment	
Operational Temperature	-15°C to +55°C
Operational Humidity	40°C RH 93%
EMC	IEC60945-Ed4.0
Ingress Protection Rating	Front: IP65 Back: IP22

16.26 Keyboard OPU

GENERAL SPECIFICATION	NCE-5625: Keyboard Operation Unit
PC Keyboard	
Layout	QWERTY
Pitch	15mm
Stroke	2mm
Dedicated Keys	
Keys	HOME, TX/STBY, PI, DISP OFF, AZ, PANEL, DAY/NIGHT, MOB, USER1, USER2
Knobs	EBL, VRM, SEA, RAIN, GAIN
Mechanical	
Dimension	Width 270 × Depth 210 × Height 30 (mm)
Mass	0.8kg
Environment	
Operational Temperature	-15°C to +55°C
Operational Humidity	40°C RH 93%
Vibration	Sweep 2Hz to 13.2Hz at ± 1mm, 13.2Hz to 100Hz at 7m/s^2 and for 2h on each resonance, otherwise 2h at 30Hz in all three axes
EMC	IEC60945-Ed4.0
Ingress Protection Rating	Front : IP22

16.27 Sensor LAN Switch Unit

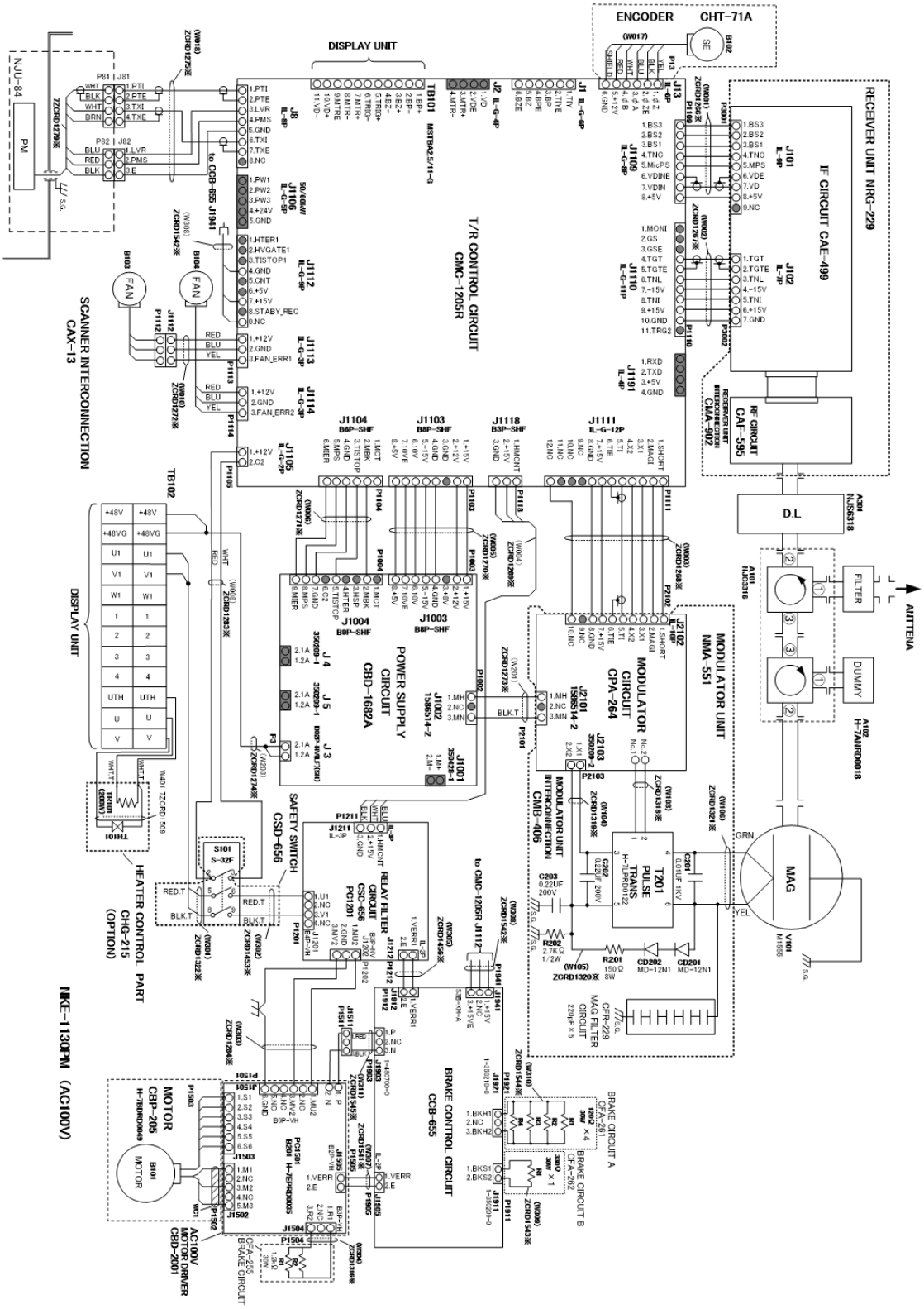
GENERAL SPECIFICATION	NQA-2443: Sensor LAN switch unit
Technology	
Standards	IEEE802.3, 802.3u, 802.3x
Processing type	Store and Forward, with IEEE802.3 full duplex, back pressure flow control
Forward and Filtering Rate	148810 pps
Latency	Less than 5us
Interface	
Number of ports	16
RJ45	10/100BASE-T(X) auto negotiation speed, F/H duplex mode, and auto MDI/MDI-X connection
LED	Power, Fault, Speed
Power	
Input Voltage	12 to 48 VDC, redundant inputs
Input Current	0.34A max
Over Current Protection	1.6A
Reverse Polarity Protection	Yes
Mechanical	
Dimension	Width 53.6 × Depth 135 × Height 105 (mm)
Mass	1.5kg
Environment	
Operational Temperature	-15°C to +55°C
Operational Humidity	40°C RH 93%
Vibration	Sweep 2Hz to 13.2Hz at ± 1mm, 13.2Hz to 100Hz at 7m/s^2 and for 2h on each resonance, otherwise 2h at 30Hz in all three axes
EMC	IEC60945-Ed4.0

16.28 Junction Box

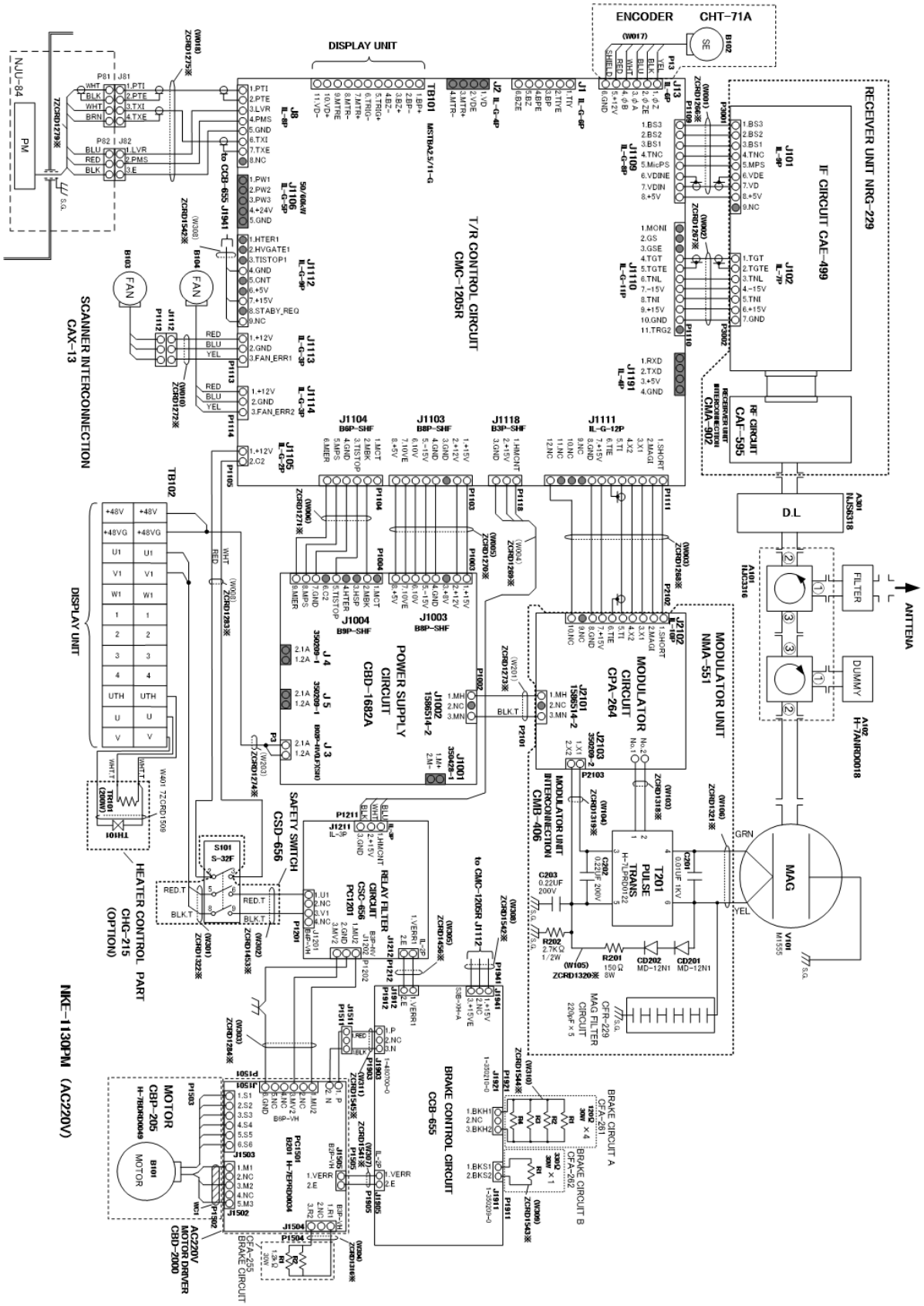
GENERAL SPECIFICATION	NQE-1143: Junction Box
Mechanical	
Dimension	Width 400 × Depth 86 × Height 261.5 (mm)
Mass	3.8kg
Environment	
Operational Temperature	-15°C to +55°C
Operational Humidity	40°C RH 93%
Vibration	Sweep 2Hz to 13.2Hz at ± 1mm, 13.2Hz to 100Hz at 7m/s^2 and for 2h on each resonance, otherwise 2h at 30Hz in all three axes
EMC	IEC60945-Ed4.0
Ingress Protection Rating	Front : IP20
Power	
Input Voltage	21.6 to 31.2 VDC
Power Consumption	48W MAX
Over Current Protection	3A×2, 15A×1 Mini Blade Fuse
Reverse Polarity Protection	Yes
FUNCTIONAL SPECIFICATION	**CMH-2370: Serial LAN Interface Circuit**
Interface	
IEC61162-1	8 input / 8 output
IEC61162-2	2 input / 2 output
IEC61162-450	1 (100BASE-TX)
Dry Contact Output (N.C/N.O selectable)	8 (32V, 0.8A sink MAX)
Dry Contact Input	8 (5V, 50mA source MAX)
Ingress Protection Rating	Front : IP20
FUNCTIONAL SPECIFICATION	**CMJ-554: Gyro Interface Circuit**
GYRO	
STEP	22 to 70 VDC
SYNC	24 to 115VAC, 50/60/400Hz
RATIO	36X/90X/180X/360X
OUTPUT	THS (50Hz)
LOG	
PULSE	Dry contact: 30V(max), 50mA(max) Voltage signal: 0-50V (threshold level is 2V)
RATIO	100/200/400/800 [P/NM]
OUTPUT	VBW (1Hz), VLW (0.1Hz)
FUNCTIONAL SPECIFICATION	**CQD-2286: Radar Interface Circuit**
Interface	
Scanner Input	1
Slave Video output	1
radar video	0 to -2.6 VDC, output with 50 ohm termination, log scale: 50dB/V
trigger	Positive, 4V, 1us to 4.4us, output with 50 ohm termination
BP (:Bearing Pulse)	2048 pulse/round, open-collector output with 5V-1k ohm pull-up
BZ (:Bearing Zero)	1 pulse/round, open-collector output with 5V-1k ohm pull-up
ISW	YES

Appendix A Radar Antenna Block Diagrams

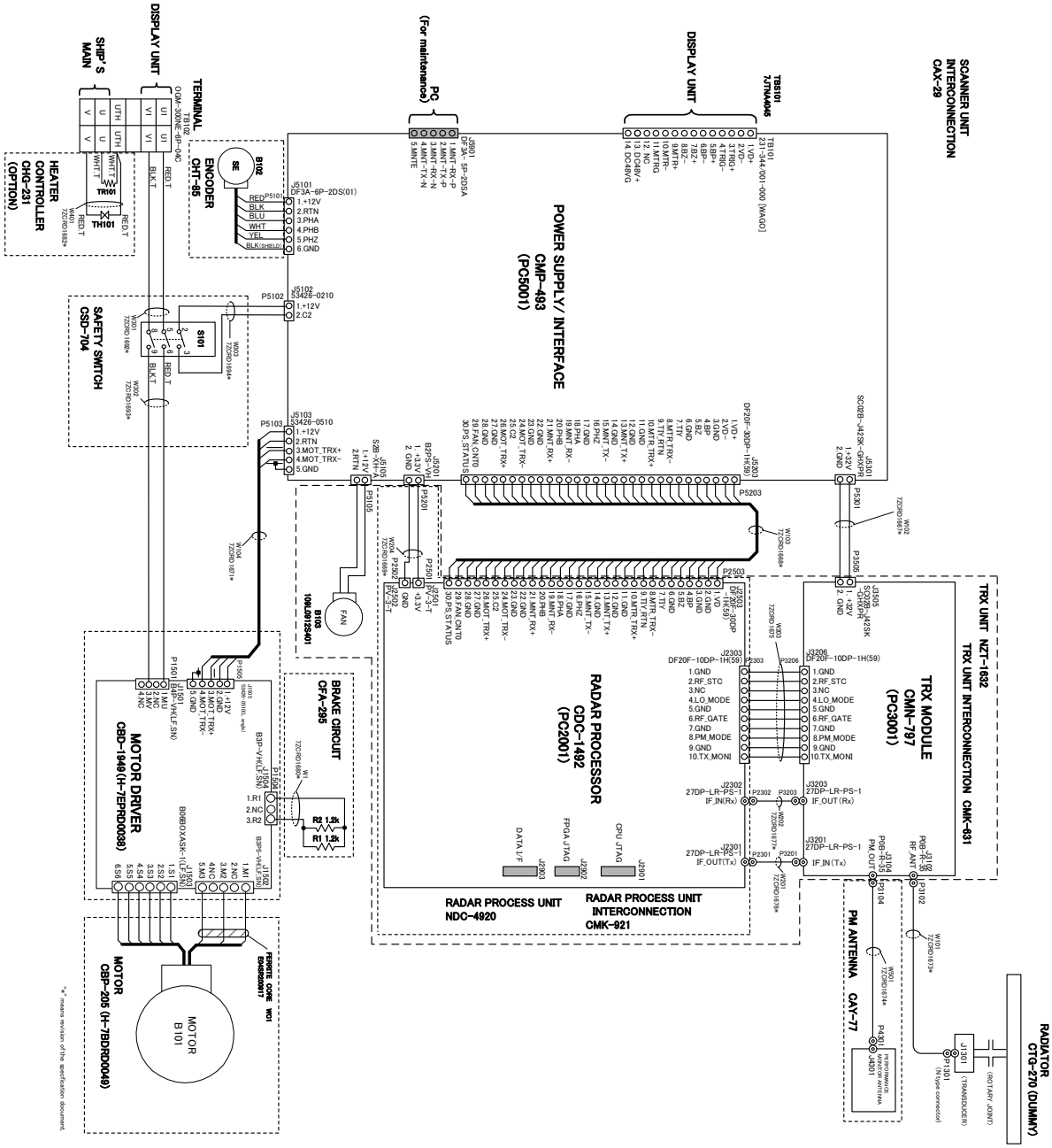
NKE-1130 (110 VAC)



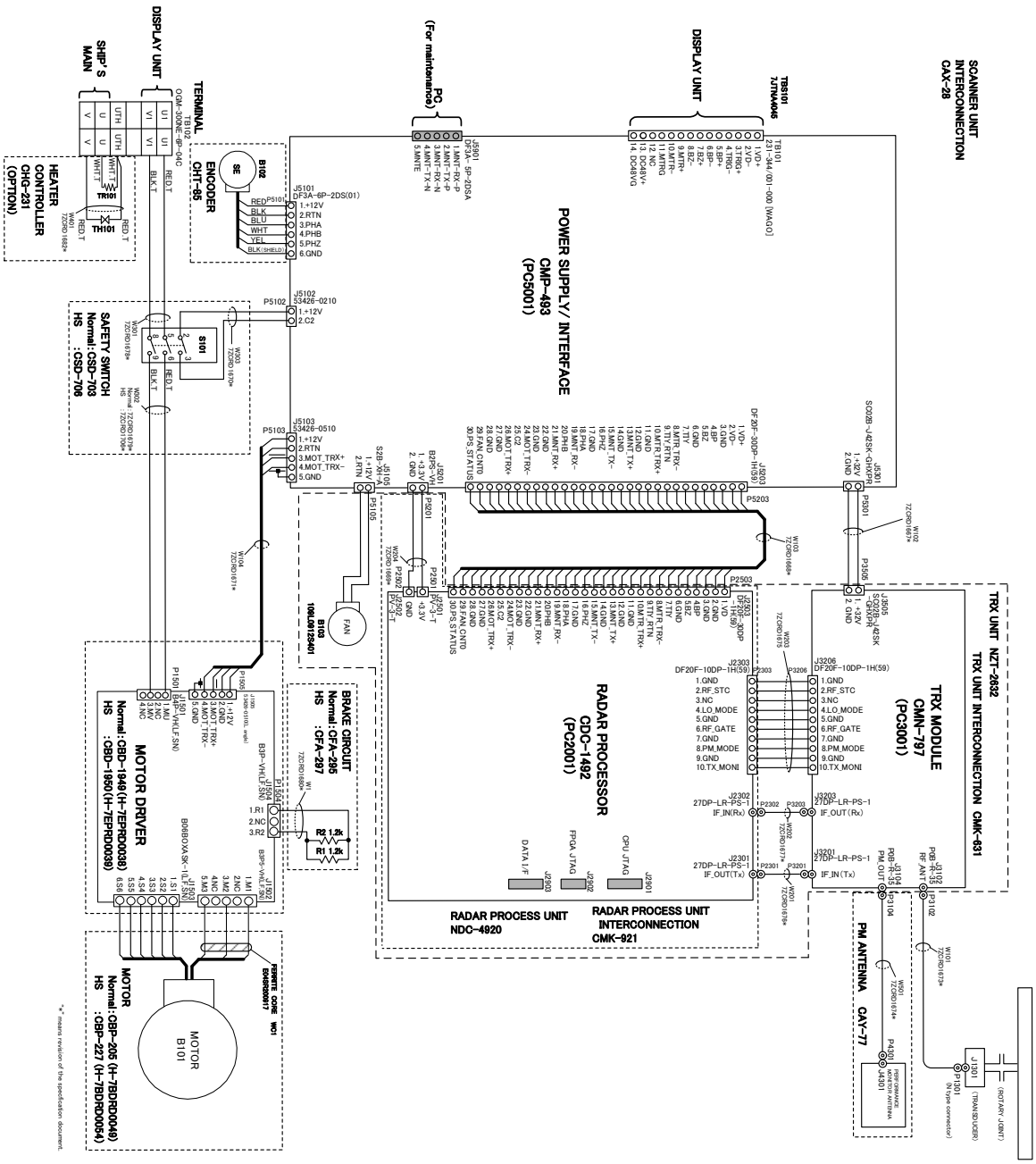
NKE-1130 (220 VAC)



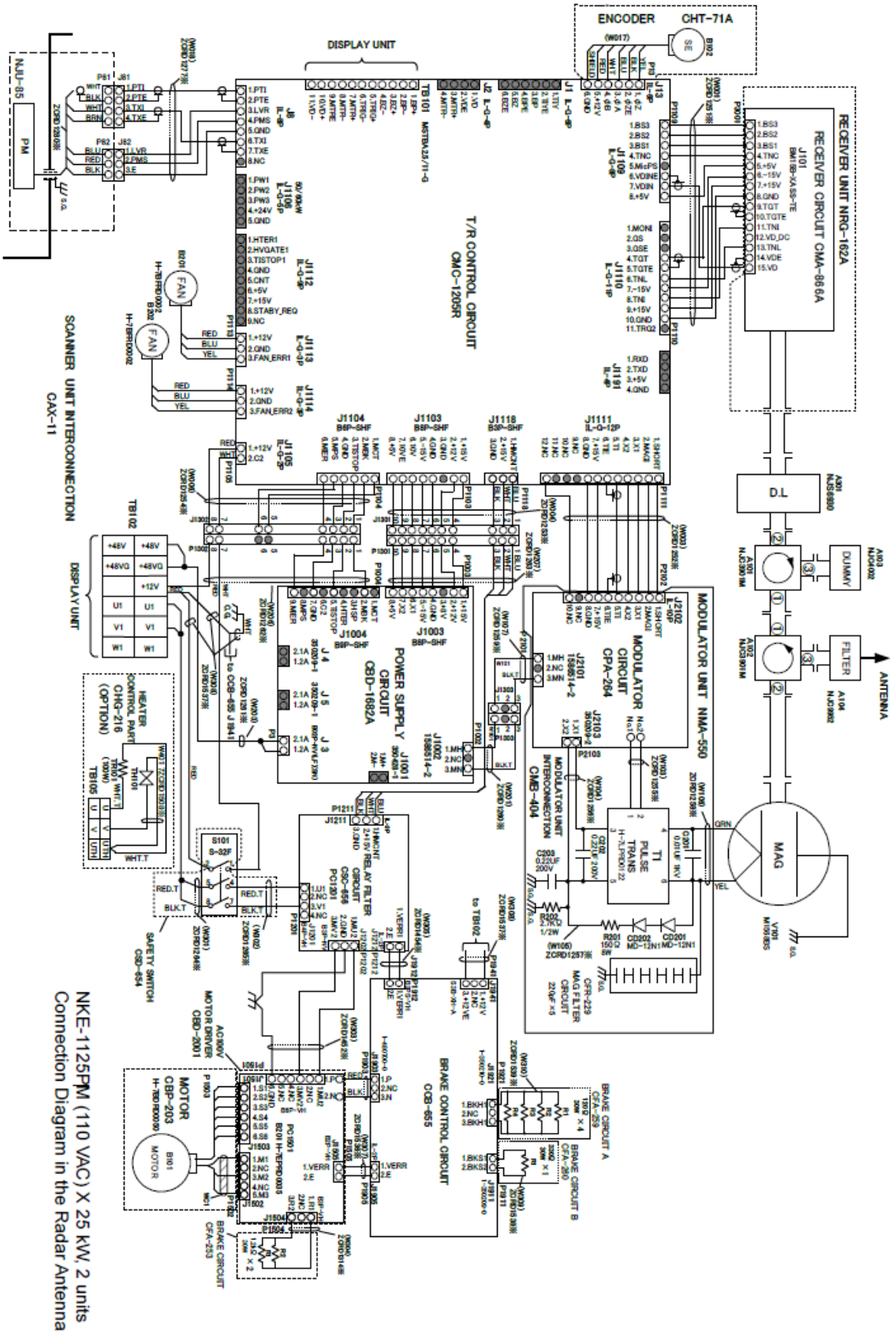
NKE-1632


SHIP'S MAIN
DISPLAY UNIT
TERMINAL
HEATER CONTROLLER CHG-231 (OPTION)
ENCODER CHT-85
SAFETY SWITCH CSD-704
PC (For maintenance)
DISPLAY UNIT
SCANNER UNIT INTERCONNECTION CAX-29
POWER SUPPLY/ INTERFACE CMP-493 (PC5001)
BRAKE CIRCUIT CFA-295
MOTOR DRIVER CBD-1948(H-TEPRD0038)
MOTOR CBP-205 (H-TBDR00049)
RADAR PROCESSOR CDC-1492 (PC2001)
RADAR PROCESS UNIT NDC-4920
RADAR PROCESS UNIT INTERCONNECTION CMK-921
TRX MODULE CMN-797 (PC3001)
TRX UNIT NZT-1632
TRX UNIT INTERCONNECTION CMK-831
PM ANTENNA CAY-77
RADIATOR CTG-270 (DUMMY)

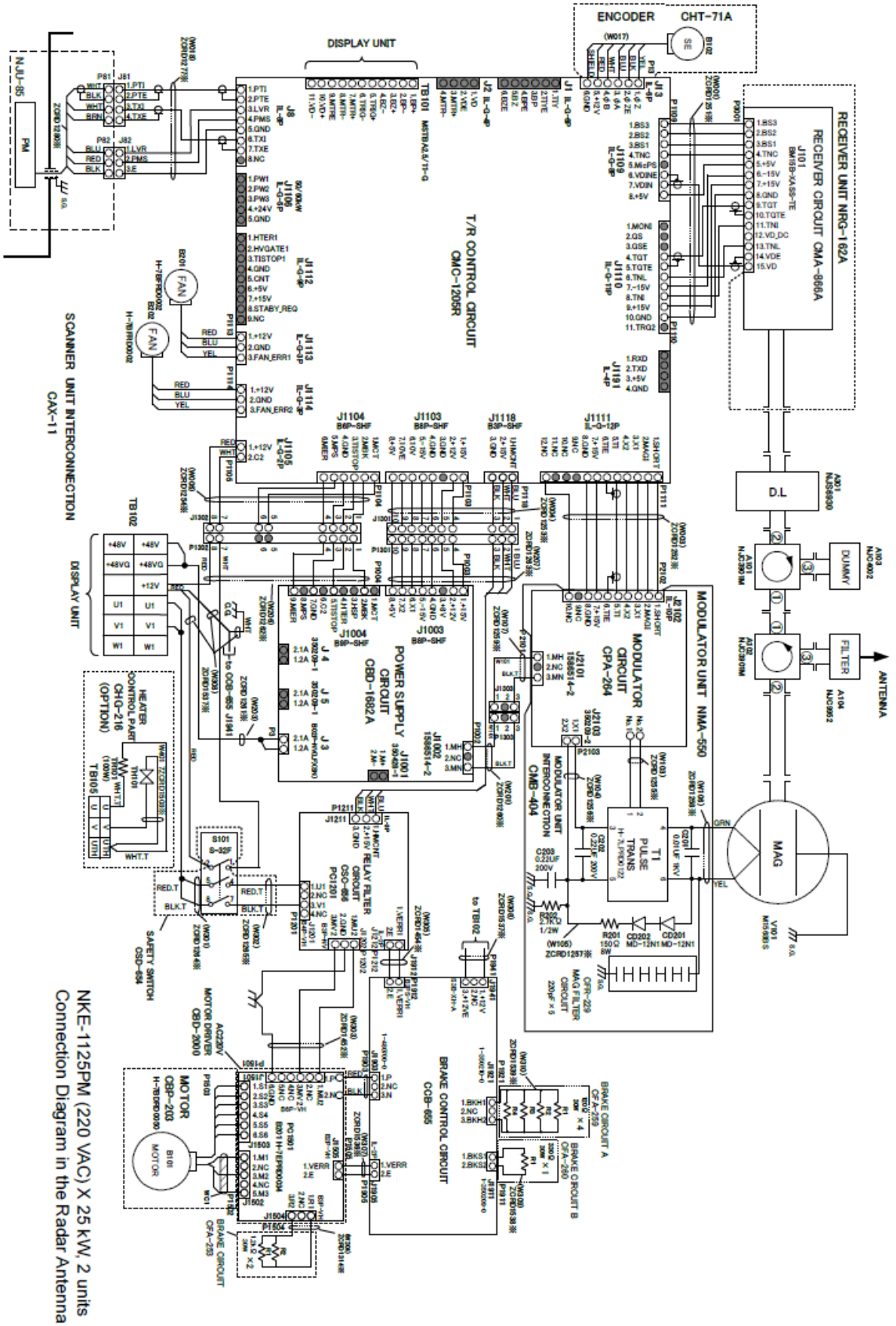
NKE-2632/2632-H



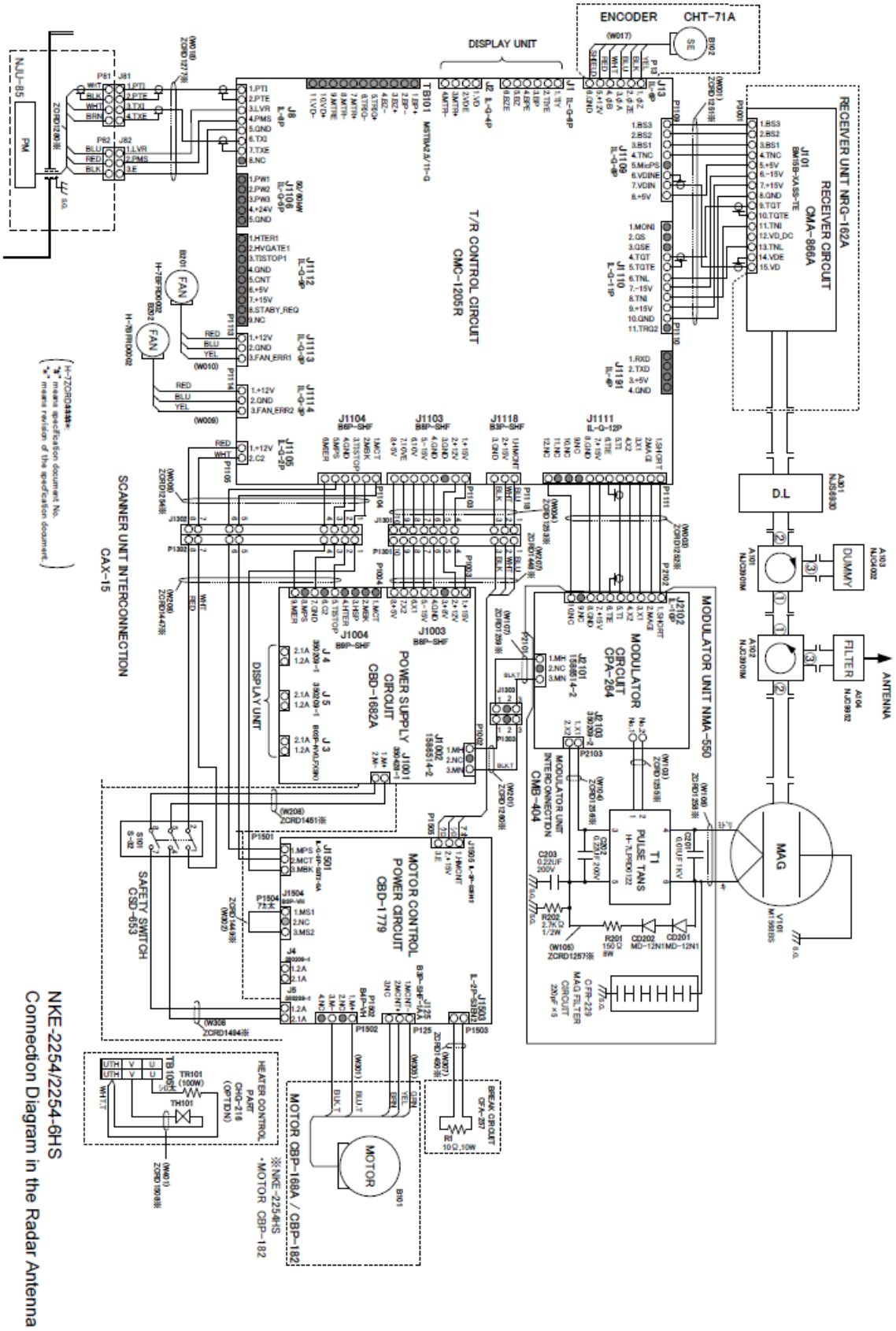
NKE-1125PM (110 VAC)



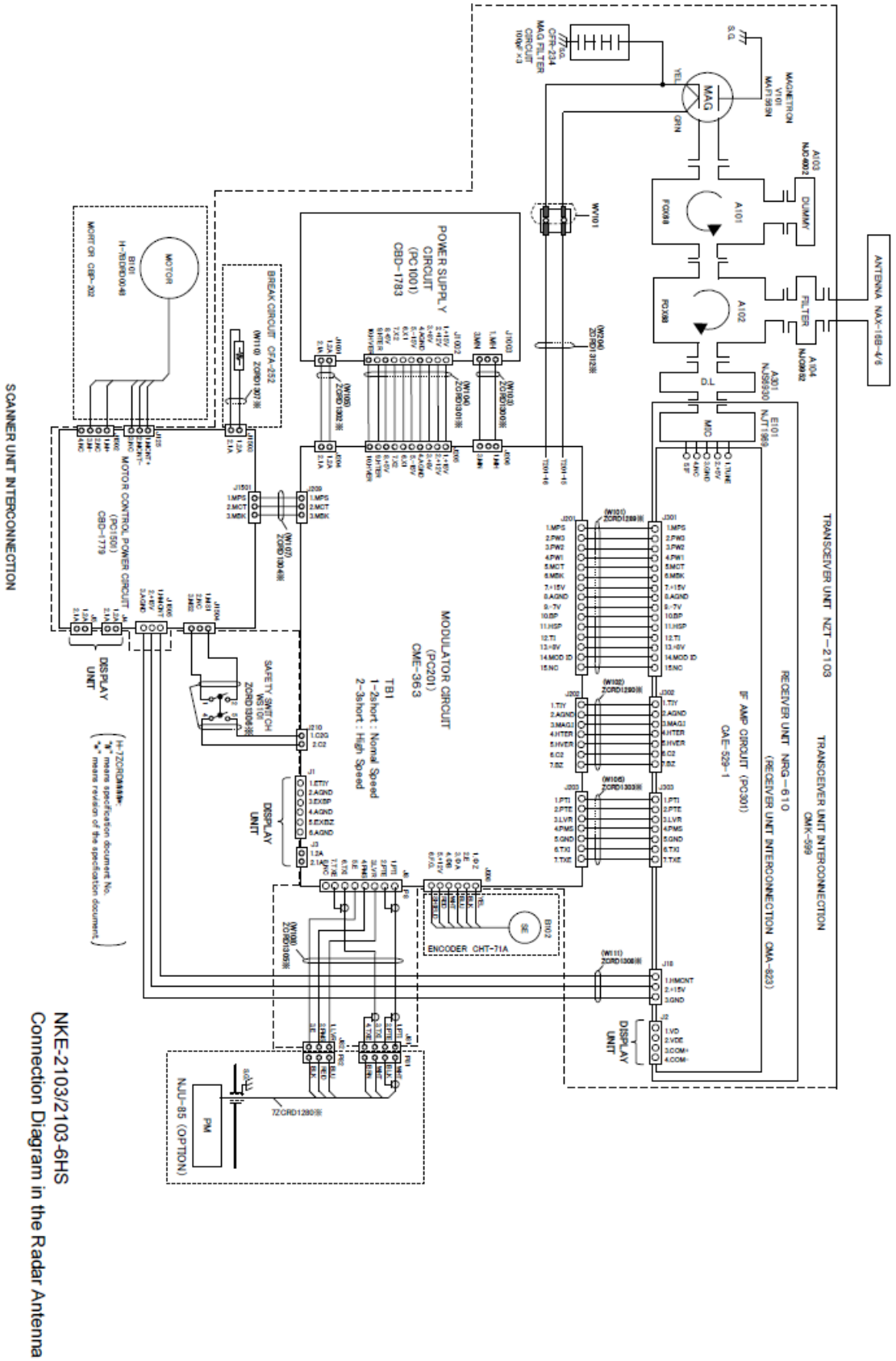
NKE-1125PM (220 VAC)



NKE-2254/2254-6HS

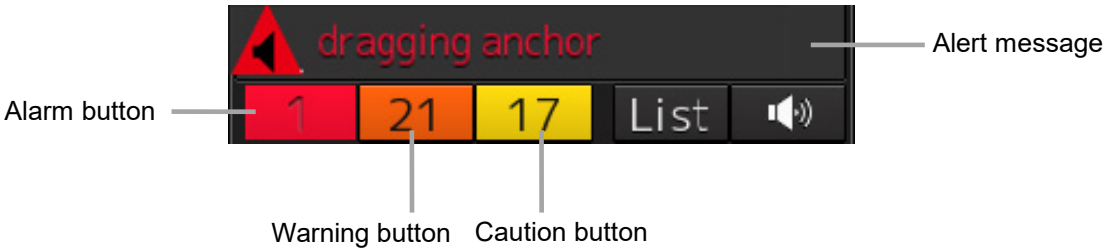


NKE-2103/2103-6HS



Appendix B Alert List

When an alert occurs, alert information is displayed in the alert notification area.



The numbers displayed in the buttons indicate the number of such alerts that have occurred.

Memo

The alert button of a category that has not occurred will not be displayed.

The display colors of alert messages are defined as follows according to the type and seriousness of alerts.

Alert Type	Alert Class (Seriousness)	Display Color	Alert Display Status	Alert Sound
Alarms (An alert indicating a state asking sailors to pay immediate attention and take immediate action.)	Alarms	Red	Before alarm acknowledgement: Blinking After alarm acknowledgement: Lighting	Present (repetitive)
Warnings (An alert indicating that the state has changed, which although is not immediately dangerous, but may become so in the near future if no action is taken. Warnings are alerts displayed for preventing possible future hazardous states.)	Warnings	Orange	Before alarm acknowledgement: Blinking After alarm acknowledgement: Lighting	Present (once)
Cautions (Although these are neither alarms nor warnings, these alerts indicate that it is necessary to pay more than normal attention to cautions, statuses, or to the supplied information.)	Cautions	Yellow	Lighting	No sound
No Alarm	-	Green	-	-

The list of alert messages by alert type is shown below.
Each item in the “Subject” column indicates the following.
TCS: Alert relating to the TCS function
HCS: Alert relating to the HCS function
RADAR/AIS: Alert relating to the RADAR/AIS function
Control unit: Alert relating to the control unit
Antenna: Alert relating the antenna
Display unit: Alert relating to the display unit
Operation unit: Alert relating to the operation unit
Power supply: Alert relating to power supply
AIS: Alert relating to the AIS function
Maintenance: Alert relating to maintenance
Others: Other alert

Alarms

Message	Subject	Explanation
ACCA	TCS	Reached Wheel Over Line alert (Displayed by TCS Ed.1.)
ACCA(Back-up Navigator Call)	TCS	Arrival at Wheel Over Line Alarm was not acknowledged for 30 seconds. (Displayed by TCS Ed.1.)
Actual course change	TCS	Arrival at Wheel Over Line Alarm was not acknowledged for 30 seconds. If the alarm is not acknowledged for an extra period of 30 seconds, Back-up Navigator Call is transferred to BNWAS. (Displayed by TCS Ed.2.)
Change Autopilot steering mode	TCS	Manual steering prompt alert (Displayed by TCS Ed.1.)
Change Autopilot steering mode	TCS	Manual steering prompt alert (Displayed by TCS Ed.2.)
CPA/TCPA(AIS)	RADAR/AIS	CPA/TCPA alarm
CPA/TCPA(TT)	RADAR/AIS	CPA/TCPA alarm

Message	Subject	Explanation
Heading(Sensor Failure)	TCS	Heading sensor failure (Displayed by TCS Ed.1.)
Heading(Sensor Failure)	TCS	Heading sensor failure If the failure is not acknowledge for a period of 30 seconds, Back-up Navigator Call is transferred to BNWAS. (Displayed by TCS Ed.2.)
Heading(Sensor Failure, Back-up Navigator Call)	TCS	A Heading sensor failure was not acknowledged for a period of 30 seconds. (Displayed by TCS Ed.1.)
POSN1(Sensor Failure)	TCS	POSN1 sensor failure (Displayed by TCS Ed.1.)
POSN1(Sensor Failure)	TCS	POSN1 sensor failure If the failure is not acknowledged for a period of 30 seconds, Back-up Navigator Call is transferred to BNWAS. (Displayed by TCS Ed.2.)
POSN1(Sensor Failure, Back-up Navigator Call)	TCS	A POSN1 sensor failure was not acknowledged for a period of 30 seconds. (Displayed by TCS Ed.1.)
Speed(Sensor Failure)	TCS	Speed sensor failure (Displayed by TCS Ed.1.)
Speed(Sensor Failure)	TCS	Speed sensor failure If the failure is not acknowledged for a period of 30 seconds, Back-up Navigator Call is transferred to BNWAS. (Displayed by TCS Ed.2.)
Speed(Sensor Failure, Back-up Navigator Call)	TCS	A speed sensor failure was not acknowledged for a period of 30 seconds. (Displayed by TCS Ed.1.)

Warnings

Message	Subject	Explanation
AIS ACT Max	RADAR/AIS	The number of activated AIS targets has reached the maximum number of active targets.
AIS(Communication failed, Direct)	INS	AIS communication failure on serial port of CCU
AIS(invalid)	INS	AIS data validity error
AIS(unavailable)	INS	AIS data not received yet
AIS Max Target	RADAR/AIS	The AIS target count exceeded the maximum target display count
Anemometer(Communication failed, Main LAN)	INS	Anemometer communication failure (wind direction/wind speed) on LAN1(Main network)
Anemometer(Communication failed, Sub LAN)	INS	Anemometer communication failure (wind direction/wind speed) on LAN2(Sub network)
Autopilot(Invalid)	INS	Autopilot data validity error
Autopilot(Not Plausible)	INS	Autopilot data plausibility error
Autopilot(Unavailable)	INS	Autopilot data not received yet
Autopilot(Communication failed, Main LAN)	INS	Autopilot communication failure on LAN1(Main network)
Autopilot(Communication failed, Sub LAN)	INS	Autopilot communication failure on LAN2(sub line)
Blizzard#n-DSP#m(Communication error)	Control section	Communication error with the DSP (Blizzard#n - DSP#m)
Blizzard#n DSP#m (Load Failed)	Control section	The transfer of the DSP program did not succeed. (Blizzard #n - DSP#m)
Blizzard#n High TEMP	Control section	Blizzard#n temperature rise
Blizzard(Process Error)	Radar antenna	Signal process error within Blizzard
Blizzard(SYNC Signal Lost)	Radar antenna	Interrupt signal (without external synchronous signal)
BNWAS(Communication failed, Main LAN)	INS	BNWAS communication failure on LAN1 (Main network)
CCU Fan	Control section	Drop in CCU fan revolution per speed
CIF(Communication error)	Control section	Communication error between the CPU and the Companion MPU
CMP RelaySoftware(Communication error)	Control section	Communication error between the Companion MPU relay software and the MFD

COG/SOG(doubtful)	INS	Integrity verification of COG/SOG data is doubtful
COG/SOG(failed)	INS	Integrity verification of COG/SOG data failed
COG/SOG(invalid)	INS	COG/SOG data validity error
COG/SOG(not plausible)	INS	COG/SOG data plausibility error
COG/SOG(unavailable)	INS	COG/SOG data not received yet
Course difference(heading deviates from track course)	TCS	Course difference (ship's heading deviates from track course) (Displayed by TCS Ed.1/Ed.2.)
CPU Core#n Clock down	Control section	CPU Core#n clock down
CPU Core#n High TEMP	Control section	CPU Core#n temperature rise
CPU High TEMP	Control section	(RPS) CPU temperature rise
Current(invalid)	INS	Current data validity error
Current(not plausible)	INS	Current data plausibility error
Current(unavailable)	INS	Current data not received yet
Current (Communication failed, Main LAN)	INS	Current communication failure on LAN1 (Main network)
Current(Communication failed, Sub LAN)	INS	Current communication failure on LAN2 (sub line)
Data Disk(Failed)	Control section	Disk #n failed and cannot be accessed
Data Disk (Not Connected)	Control section	Disk #n not acknowledged yet
DATUM(invalid)	INS	DTM sentence validity error
DATUM(not plausible)	INS	DTM sentence plausibility error
DATUM(unavailable)	INS	DTM sentence not received yet
Depth(doubtful)	INS	Integrity verification of depth data is doubtful
Depth(failed)	INS	Integrity verification of depth data failed
Depth(invalid)	INS	Depth data validity error
Depth(not plausible)	INS	Depth data plausibility error
Depth(unavailable)	INS	Depth data not received yet
DSC(Communication failed, Main LAN)	INS	DSC (Digital Selective Calling) communication failure on LAN1 (Main network)
DSP(Heading Data)	RADAR/AIS	Heading data error (heading error received by the Companion MPU)
DSP(Sweep Data)	RADAR/AIS	Missing header in sweep data
Echo Sounder(Communication failed, Main LAN)	INS	Echo sounder communication failure on LAN1 (Main network)

Echo Sounder(Communication failed, Sub LAN)	INS	Echo sounder communication failure on LAN2 (Sub network)
Emergency Mode	Others	The system is running in the Emergency Mode activated when both disks have failed
External TT#n(invalid)	INS	TT#n data validity error
External TT#n(unavailable)	INS	TT#n data not received yet
GIF(Communication error)	Control section	Communication error between the Companion MPU and the Gyro IF (USB connection)
GIF-RIF(Open)	Control section	The open state was detected between the GIF and the RIF
GIF-SLC(Open)	Control section	The open state was detected between the GIF and the SLC
GPS #n(Communication failed, Direct)	INS	GPS#n communication failure in the CCU serial port
GPS #n(Communication failed, Main LAN)	INS	GPS #n communication failure in LAN1 (Main network)
GPS #n(Communication failed, Sub LAN)	INS	GPS #n communication failure in LAN2 (Sub network)
GPS Compass(Communication failed, Direct)	INS	GPS Compass communication failure on serial port of CCU
GPS Compass(Communication failed, Main LAN)	INS	GPS Compass communication failure on LAN1 (Main network)
GPS Compass(Communication failed, Sub LAN)	INS	GPS Compass communication failure on LAN2 (Sub network)
Gyro #n(Communication failed, Direct)	INS	Gyro communication failure on the CCU serial port
Gyro #n(Communication failed, GIF-Direct)	INS	Gyro IF communication failure on the CCU serial port
Gyro #n(Communication failed, GIF-Main LAN)	INS	Gyro IF communication failure on LAN1 (Main network)
Gyro #n(Communication failed, GIF-Sub LAN)	INS	Gyro IF communication failure on LAN2 (Sub network)
Gyro #n(Communication failed, Main LAN)	INS	Gyro communication failure on LAN1 (main network)
Gyro #n(Communication failed, Sub LAN)	INS	Gyro communication failure on LAN2 (sub network)
HASP(Communication error)	Control section	Communication error between the CPU and the HASP
Heading(invalid)	INS	Heading validity error

Heading(not plausible)	INS	Heading plausibility error
Heading(unavailable)	INS	Heading data not received yet
Message	Subject	Explanation
Heading(failed)	INS	Integrity verification of heading data failed
IAS(Communication failed, Main LAN)	INS	IAS communication failure on LAN1 (Main network)
IAS(Communication failed, Sub LAN)	INS	IAS communication failure on LAN2 (sub line)
ISW(Communication error)	RADAR/AIS	Communication error between the Companion MPU and the ISW
LCD Fan#n(LCD)	Display Unit	The LCD fan#n stopped
LCD High TEMP	Display Unit	LCD temperature rise
Log #n(Communication failed, Direct)	INS	Log communication failure on the CCU serial port
Log #n (Communication failed, GIF-Direct)	INS	Failure of log communication via Gyro IF on the CCU serial port
Log #n (Communication failed, GIF-Main LAN)	INS	Failure of log communication via Gyro IF on LAN1 (main network)
Log #n (Communication failed, GIF-Sub LAN)	INS	Failure of log communication via Gyro IF on LAN2 (sub network)
Log #n (Communication failed, Main LAN)	INS	Log communication failure on LAN1 (main network)
Log #n (Communication failed, Sub LAN)	INS	Log communication failure on LAN2 (sub network)
Lost(AIS)	RADAR/AIS	AIS target lost
Lost(TT)	RADAR/AIS	TT target lost
Low Speed	TCS	Low speed alarm (Displayed by TCS Ed.1.)
New Target(AIS)	RADAR/AIS	AIS is in the initial acquisition state
New Target(TT)	RADAR/AIS	TT is in the initial acquisition state
No.#n Radar(Communication failed, Main LAN)	INS	No.#n Radar communication failure on LAN1 (Main network)
OPA-OPB(Communication error)	Operation section	OPA-OPB open detection
OPU-Serial(Communication error)	Control section	Communication error between the Companion MPU and the operation unit (serial)

OPU-USB(Communication error)	Control section	Communication error between the Companion MPU and the operation unit (USB connection)
Port Rudder(Communication failed, Main LAN)	INS	Port Rudder (steering) communication failure on LAN1 (main line)
Position monitor	TCS	Monitoring of the position (Displayed by TCS Ed.1/Ed2.)
Position(failed)	INS	Integrity verification of Position data failed
Position(GPS#n) Not Differential	INS	GPS#n is not DGPS
Position(invalid)	INS	Position validity error
Position(not plausible)	INS	Position plausibility error
Position(unavailable)	INS	Position not received yet
Power(AC Low Voltage)	Power supply	AC Power supply OFF
Power(DC Low Voltage)	Power supply	DC Power supply voltage low
Power Fail	Control section	3.3V/2.5V/1.5V/1.2V and other receiving power dropped or stopped
Power(Fan)	Power supply	The fan in the power supply unit is broken
Power(TXRX, Failed)	Power supply	Radar antenna power supply failure operation
PROC(AZI)	RADAR/AIS	Azimuth signal abnormality (signal processor)
PROC(HL)	RADAR/AIS	Heading line signal abnormality (signal processor)
PROC(Interrupt 1)	RADAR/AIS	Stern interrupt abnormality in the signal processor
PROC(Trigger)	RADAR/AIS	Trigger signal abnormality (signal processor)
PROC(Video)	RADAR/AIS	Radar video signal abnormality (signal processor)
RADAR PROC(Data)	RADAR/AIS	RADAR PROC or RADAR Draw control failure
RIF(Communication error)	Control section	Communication error with Companion MPU-RIF
ROT(invalid)	INS	ROT data validity error
ROT(unavailable)	INS	ROT data not received yet
RTC Abnormal	Control unit	RTC operation abnormality
Rudder(Communication failed, Main LAN)	INS	Rudder communication failure on LAN1 (Main network)

SLC1-#n(Communication failed, Main LAN)	INS	SLC1-#n Communication failure on LAN1 (Main network)
Stbd Rudder(Communication failed, Main LAN)	INS	Stbd Rudder (steering) communication failure on LAN1 (main line)
STW Speed(invalid)	INS	STW validity error
STW Speed(not plausible)	INS	STW plausibility error
STW Speed(unavailable)	INS	STW data not received yet
TEMP(invalid)	INS	Water temperature data validity error
TEMP(unavailable)	INS	Water temperature data not received yet
TT: Out of Range	RADAR/AIS	TT exceeded 32NM
TT: REF TT(Lost target)	RADAR/AIS	TT reference target lost
TT: Max Target	RADAR/AIS	The maximum number of TT targets is being acquired
TXRX(AZI)	Radar antenna	Azimuth signal abnormality (transceiver section)
TXRX(Communication error)	RADAR/AIS	Communication error between Companion MPU and radar antenna
TXRX(DRV AC LKV)	Radar antenna	Drive section failure (insufficient AC power supply)
TXRX(DRV AC OVV)	Radar antenna	Drive section failure (AC over-voltage)
TXRX(DRV COM)	Radar antenna	Drive section failure (communication error)
TXRX(DRV CPU1)	Radar antenna	Drive section failure (motor driver CPU1 failure)
TXRX(DRV Hall Sensor)	Radar antenna	Drive section failure (hall sensor failure)
TXRX(DRV High Rotate)	Radar antenna	Drive section failure (high rotation speed error)
TXRX(DRV IPM OVH)	Radar antenna	Drive section failure (IPM overheating)
TXRX(DRV Low Rotate)	Radar antenna	Drive section failure (low rotation speed error)
TXRX(DRV MOT OVH)	Radar antenna	Drive section failure (motor overheating)
TXRX(DRV OVC)	Radar antenna	Drive section failure (over-current)
TXRX(DRV Over Rotate)	Radar antenna	Drive section failure (over-rotation error)
TXRX(DRV VBUS LKV)	Radar antenna	Drive section failure (insufficient VBUS voltage)
TXRX(DRV VBUS OVV)	Radar antenna	Drive section failure (VBUS over-voltage)
TXRX(Fan #n)	Radar antenna	Radar antenna Fan #n abnormality (This warning is not issued when a solid

		state antenna is connected.)
TXRX(Heater)	Radar antenna	Magnetron heater over-voltage error (Although radar transmission can be continued while this warning is issued, it is recommended to restrict the use of the equipment under an emergency situation only since the equipment is damaged.)
TXRX(High Temperature)	Radar antenna	Radar antenna (internal temperature failure)
TXRX(HL)	Radar antenna	Ship's heading signal abnormality (transceiver section)
TXRX(IF PLL)	Radar antenna	PLL lock error inside of DAC for IF
TXRX(LO PLL)	Radar antenna	Radar antenna LO frequency error
TXRX(Magnetron Current)	Radar antenna	Prevention of modulation circuit damage by damaged magnetron
TXRX(MHV)	Radar antenna	Modulation voltage error
TXRX(Motor Current)	Radar antenna	Motor over-current error
TXRX(Option)	Radar antenna	Radar antenna Option module error
TXRX(PROC)	Radar antenna	Radar antenna Signal processing circuit error
TXRX(PS)	Radar antenna	Radar antenna Power supply circuit error
TXRX(SSW Off)	Radar antenna	Safety switch OFF
TXRX(Reverse)	Radar antenna	Radar antenna rotating in reverse
TXRX(Trigger)	Radar antenna	Trigger signal abnormality (transmission/reception section)
TXRX(Video)	Radar antenna	Radar video signal abnormality (transmission/reception section)
VDR(Delivery Failed)	RADAR/AIS	The delivery of capture images for the VDR failed continuously for 1 min (i.e., continuously 4 times)
VDR(Unexpected Data)	RADAR/AIS	Abnormality when the connected socket received some signal at image distribution to VDR
VDR (Communication failed, Main LAN)	INS	VDR communication failure on LAN1 (Main network)
VDR(Communication failed, Sub LAN)	INS	VDR communication failure on LAN2 (sub network)
Water Thermometers(Communication failed, Main LAN)	INS	Water TEMP communication failure on LAN1 (Main network)

The AIS alerts received from external sensors are as shown below.

For the AIS alerts received from external sensors, alert messages are suffixed by (External).

Example: Antenna VSWR exceeds limit (External)

Message	Subject	Explanation	Alert ID
Antenna VSWR exceeds limit	AIS	Antenna output error	002
Data Flash memory err	AIS	Transponder data storage circuit error	063
external EPFS lost	AIS	Abnormality in external EPFS connection	025
general failure	AIS	General error	006
Heading lost/invalid	AIS	Ship's heading data has not been input or is invalid.	032
MKD connection lost	AIS	Abnormality in the connection between the transponder and the controller	008
mkd connection lost	AIS	No response from the transponder (detected in the display)	064
no sensor position in use	AIS	Internal GPS data has not been input or is invalid.	026
no valid COG information	AIS	COG data has not been input or is invalid.	030
no valid ROT information	AIS	ROT data has not been input or is invalid.	035
no valid SOG information	AIS	SOG data has not been input or is invalid.	029
Not Transmitting Tx malfunction	AIS	Malfunction at or during transmission	001
Pa current error	AIS	Error in the current during transmission	054
Pa temp error	AIS	Abnormal temperature rise during transmission	055
Power supply error	AIS	Error in power supply voltage	053
Program Flash memory err	AIS	Control circuit error of the transponder	062
Rx channel 1 malfunction	AIS	Malfunction of reception channel 1	003
Rx channel 2 malfunction	AIS	Malfunction of reception channel 2	004
Rx channel 70 malfunction	AIS	Malfunction of reception channel 70	005
SSD mismatch	AIS	Mismatch in static information (between the display and the transponder)	065

Tx pll unlock	AIS	Error in the synthesizer circuit for transmission	060
Tx power down	AIS	Transmit by reducing output power due to error	051
Tx power supply error	AIS	Error in power supply voltage during transmission	052
Tx power too high	AIS	Power is higher than the specified transmission power.	059
Tx power too low	AIS	Power is lower than the specified transmission power.	056
Tx stop interrupt	AIS	Transmission is forcibly stopped by the transmission monitoring circuit.	058
Vr error	AIS	Transmission system output error	057

Cautions

Message	Subject	Explanation
AIS(invalid)	INS	AIS data validity error
AIS(unavailable)	INS	AIS data not received yet
AIS 95% Capacity	RADAR/AIS	Exceeded 95% of the maximum number of AIS targets
AIS ACT 95% Capacity	RADAR/AIS	Exceeded 95% of the maximum number of AIS activation targets
Autopilot(invalid)	INS	Autopilot data validity error
Autopilot(unavailable)	INS	Autopilot data not received yet
AZ area : Different thresholds entered	INS	Threshold value was entered, but the AZ area is different.
COG/SOG(invalid)	INS	COG/SOG data validity error
COG/SOG(unavailable)	INS	COG/SOG data not received yet
DATUM(invalid)	INS	DTM sentence validity error
DATUM(unavailable)	INS	DTM sentence not received yet
Depth(invalid)	INS	Water depth data validity error
Depth(unavailable)	INS	Water depth data not received yet
External TT#n(invalid)	INS	TT#n data validity error
External TT#n(unavailable)	INS	TT#n data not received yet
HDOP Exceeded (GPS #n)	INS	GPS #n HDOP increased (deterioration of GPS precision)
Heading(invalid)	INS	Heading data validity error
Heading(No Correction)	TCS	No correction for Gyro azimuth
Heading(unavailable)	INS	HDG data not received yet
Life Expectancy FAN(CCU)	Maintenance	CPU FAN approaching its life expectancy
Life Expectancy FAN(Power)	Maintenance	Power FAN approaching its life expectancy
Life Expectancy LCD Backlight	Maintenance	LCD Backlight approaching its life expectancy
Life Expectancy LCD FAN#n	Maintenance	LCD FAN#n approaching its life expectancy
Life Expectancy Magnetron#n	Maintenance	Magnetron#n approaching its life expectancy
Life Expectancy SSD#n	Maintenance	SSD#n approaching its life expectancy
Life Expectancy TXRX#n FAN	Maintenance	Antenna#n fan approaching its life expectancy
Life Expectancy TXRX#n Motor	Maintenance	Antenna#n motor approaching its life expectancy
Life Expectancy UPS	Maintenance	UPS approaching its life expectancy
Position(invalid)	INS	Position validity error
Position(not plausible)	INS	Position plausibility error
Position(unavailable)	INS	Position not received yet
Position(Low Integrity, GPS#n)	Track	GPS#n measurement position integrity

	Control	deterioration
Position(NON-WGS84)	RADAR/AIS	DATUM of the position that is currently used is not WGS84.
ROT(invalid)	INS	ROT data validity error
ROT(unavailable)	INS	ROT data not received yet
RSA(invalid)	INS	RSA data validity error
RSA(unavailable)	INS	RSA data not received yet
Scanner Rotating	RADAR/AIS	The scanner is rotating (waveforms not transmitted yet): ICE CLASS standby
STW Speed(invalid)	INS	STW data validity error
STW Speed(unavailable)	INS	STW data not received yet
TEMP(invalid)	INS	Water temperature data validity error
TEMP(unavailable)	INS	Water temperature data not received yet
TIME(invalid)	INS	Time validity error
TIME(unavailable)	INS	Time not received yet
Trial	RADAR/AIS	Trial
TT 95% Capacity	RADAR/AIS	Exceeded 95% of the maximum number of TT targets
Wind(invalid)	INS	Wind direction/wind data validity abnormal
Wind(not plausible)	INS	Wind direction/wind speed data plausibility abnormal
Wind(unavailable)	INS	Wind direction/wind speed data not received

List of Alert Icons

The alert icons displayed in the alert status area are listed below.

No.	Name of alert icon	Functional outline	Alert icon
1	Active – unacknowledged alarm	A flashing red triangle. A symbol of loudspeaker in the middle of the triangle.	
2	Active – silenced alarm	A flashing red triangle. A symbol as in icon number 1 with a prominent diagonal line above it.	
3	Active – acknowledged alarm	A red triangle. An exclamation mark in the middle of the triangle.	
4	Active - responsibility transferred alarm	A red triangle. An arrow pointing towards the right in the middle of the triangle.	
5	Rectified – unacknowledged alarm	A flashing red triangle. A tick mark in the middle of the triangle.	
6	Active - unacknowledged warning	A flashing yellowish orange circle. A symbol of loudspeaker in the middle of the circle.	
7	Active – silenced warning	A flashing yellowish orange circle. A symbol as in icon number 6 with a prominent diagonal line above it.	
8	Active – acknowledged warning	A yellowish orange circle. An exclamation mark in the middle of the circle.	
9	Active - responsibility transferred warning	A yellowish orange circle. An arrow pointing towards the right in the middle of the circle.	
10	Rectified – unacknowledged warning	A flashing yellowish orange circle. A tick mark in the middle of the circle.	
11	Caution	A yellow square. An exclamation mark in the middle of the square.	

a	Aggregation	A plus sign. To be presented together with icons number 1 to 11	
b	Acknowledge not allowed for alarm	A red triangle with a cross in the middle of triangle. To be presented together with icons number 1, 2 and 5.	
c	Acknowledge not allowed for warning	A yellowish orange circle with a cross in the middle of circle. To be presented together with icons number 6, 7 and 10.	

Appendix C Setting the Inter switch

Overview

The Inter switch NQE-3141 is equipment that makes it possible to freely select several radar display units provided in the bridge and the several radar antennas with different properties.

Even when the power supply of the display unit has been switched OFF or has become faulty, it is possible to operate the radar antennas from other display units.
When it has become impossible to use the Inter switch, it is possible to carry out operations independently.
The selection can be made up to a maximum of 8 units.
When the radar antenna is switched, the following settings are read out.

Setting	Reference
Rough adjustment tuning	19.2.2 Performing basic adjustments on the radar
Bearing adjustment	
Range adjustment	
Antenna height	19.2.3 Adjusting TXRX
TXRX settings	
Performance monitor adjustment	19.2.4 Adjusting a radar performance monitor
Sector blank	19.2.5 Setting Sector Blank
Radar antenna position	19.3.2 Verifying/Setting CCRP (Consistent Common Reference Point)

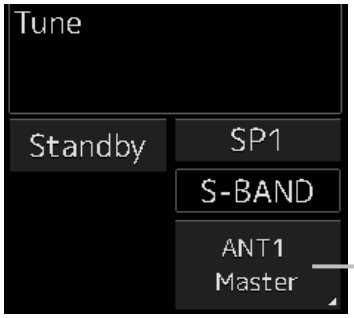
The setting of each of coarse adjustment tuning, tuning peak setting, tuning indication level, bearing adjustment, monitor transmission level (performance monitor adjustment), Tune Indicator (TXRX adjustment), and Sector Blank is read from the antenna at switching.
Other settings are read from the indicator that is used.
The settings that are saved in the indicator are saved by antenna and the previous setting is read at the connection.

Checking the connection status with the connected radar antennas

The status of connection with the connected radar antenna is displayed by the Inter switch connection change button of the Radar system information.

Note

Always a display unit that becomes the master is necessary for making a slave connection.
When putting a slave display unit in the transmit state, it is necessary to put the master display unit in the transmit state.



Inter switch connection change button

The name of the connected radar antenna is displayed in the upper part.
The connection state is displayed in the lower part.

Memo

In simple Inter switch mode, only the connection status is displayed.

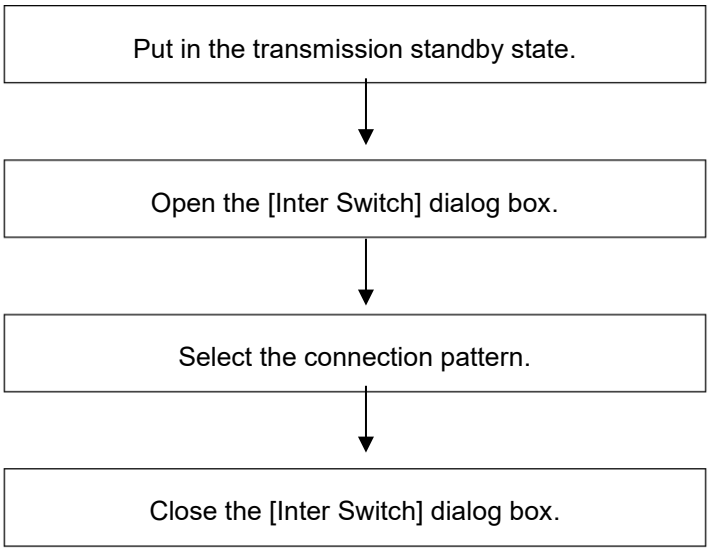
Connection state
[Master]: The state in which the display unit can control the radar antenna.
[Slave]: The control of the radar antenna is not possible.

In the [slave] state, transmit/stop, and pulse length change cannot be made. Also, there will be restrictions on the usable range.

Inter switch Operations

When changing the connection pattern, carry out the operations according to the following flow.

Flow of operations



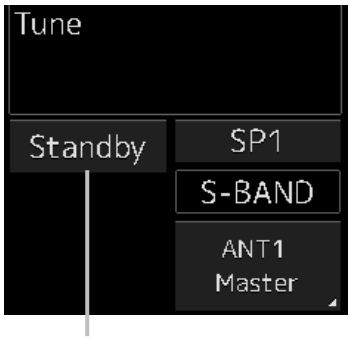
Opening the [Inter Switch] dialog box

Memo

The [Inter Switch] dialog can be displayed in the Transmission Not Ready state or preheat state. When transmission is not ready, "Preheat" or "Standby (disable)" is displayed on the Standby/Transmission change button.

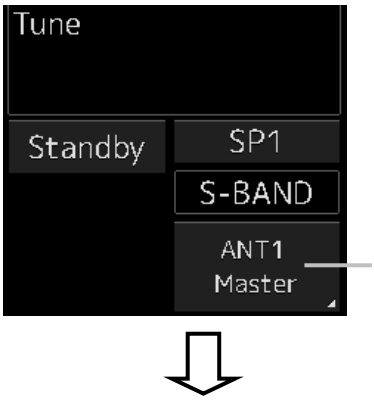
1 **In the transmission state, click on the Standby/Transmission change button.**

"Standby" is displayed on the button and the equipment is set to Transmission Not Ready state. If the equipment is already in the Transmission Not Ready state, this operation is not required.

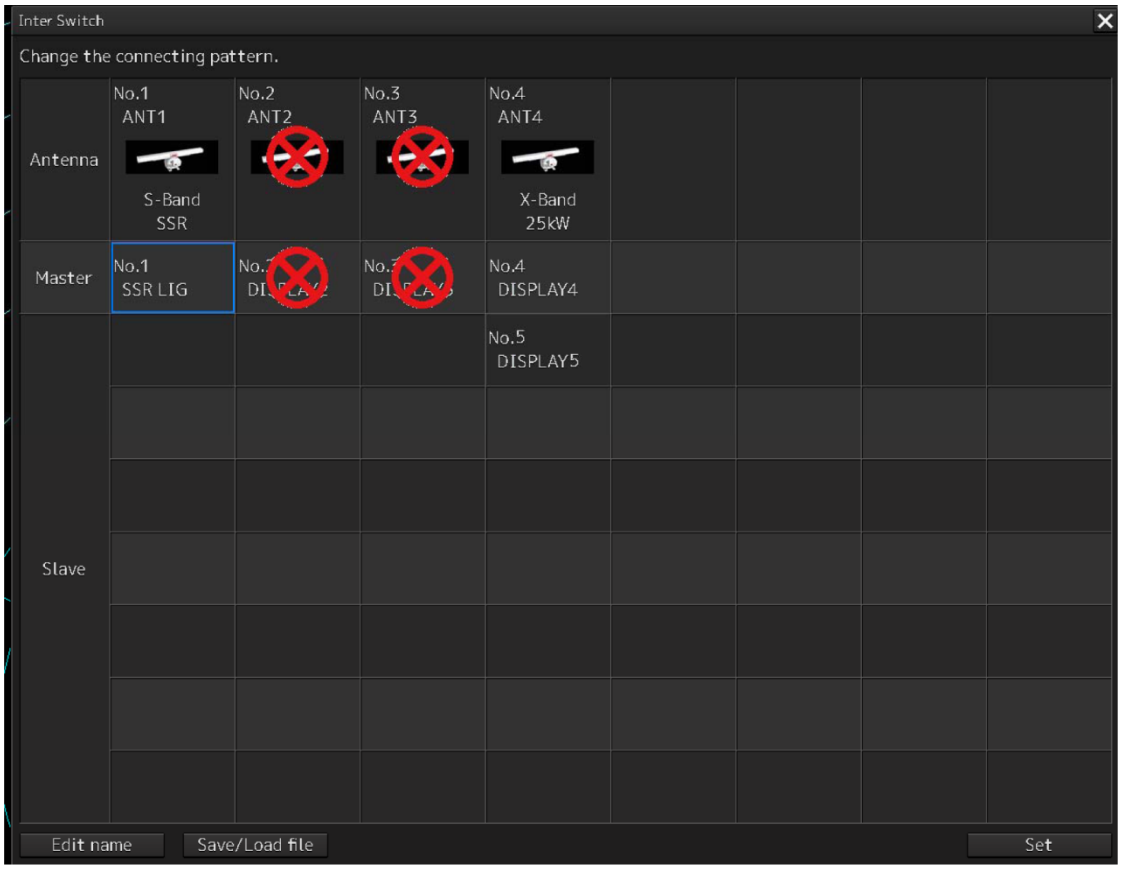


Standby/Transmit changeover button

2 **Click the Change Inter switch connection button.**



Change Inter switch connection button

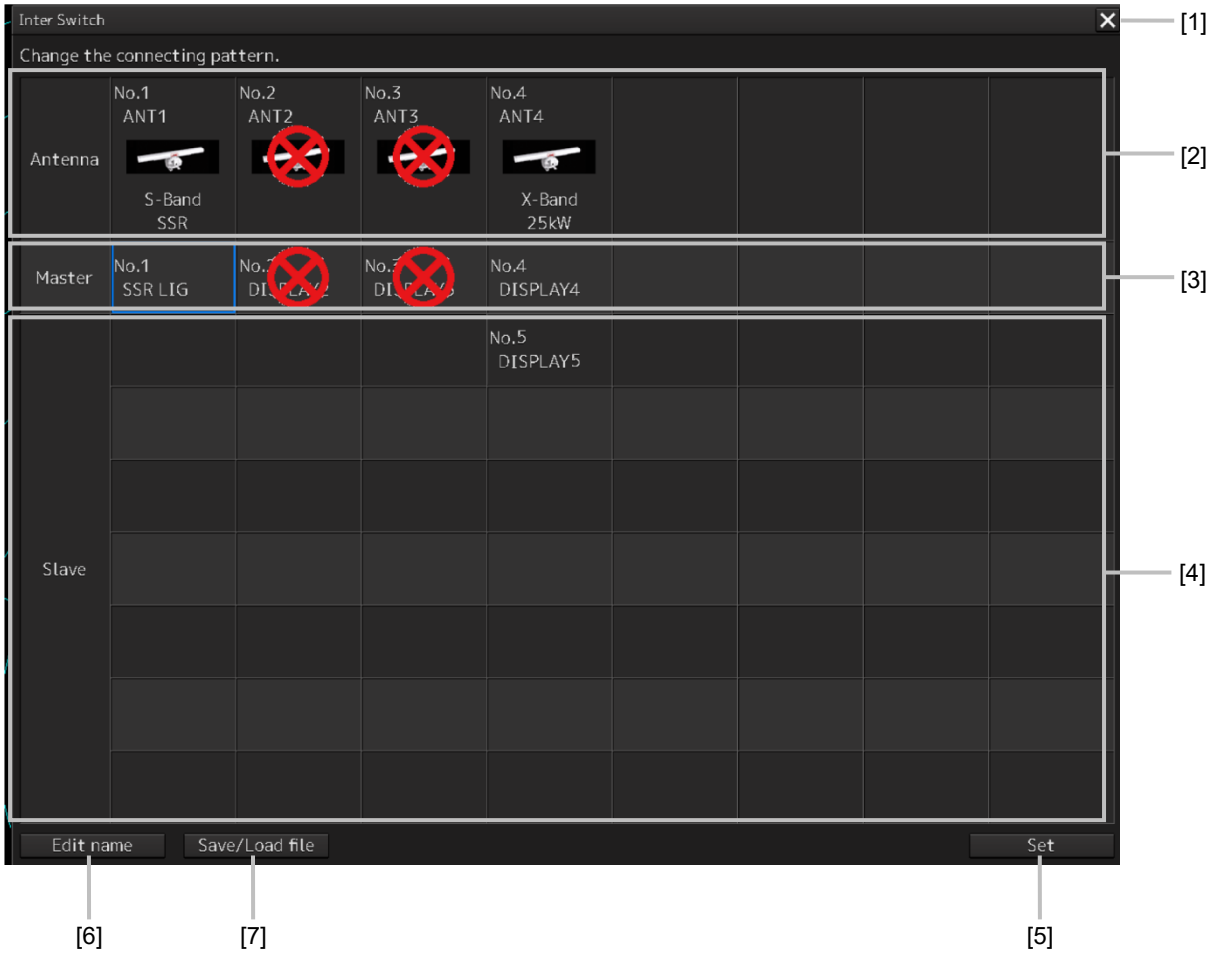


The [Inter Switch] dialog box is displayed.

The connection state between the current radar antenna and the display unit obtained by communication with the Inter switch is displayed in the [Inter Switch] dialog box.

Checking the connection pattern

■ When connecting 3 to 4 radar antennae (extension) × 3 to 8 display units

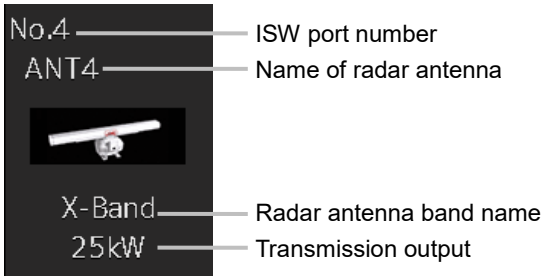


[1] [×] button

Closes the [Inter Switch] dialog box.

[2] Connected radar antenna

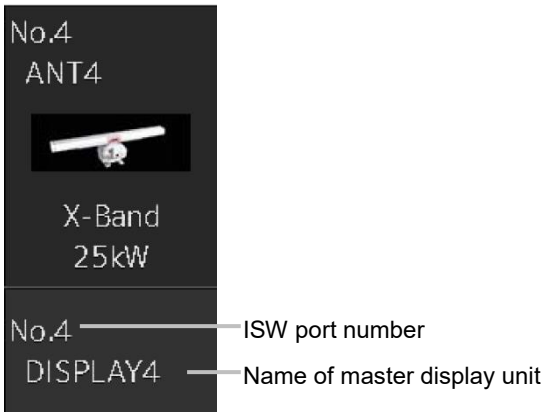
The connected radar antennas are displayed.



[3] Master display unit selection button

Displays radar antenna to which the master display units are respectively connected.

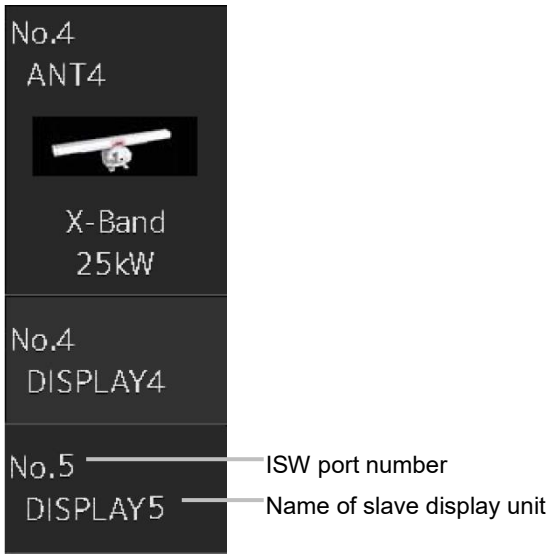
For changing the combinations of master display units and radar antennas, refer to "0 Changing the connection pattern".



[4] Slave display unit selection button

Displays radar antenna to which the slave display units are respectively connected.

For changing the combinations of slave display units and radar antennas, refer to "0 Changing the connection pattern".



[5] [Set] button

When this button is clicked, the information of the set connection pattern is transmitted to the Inter switch.

Note

When a master or slave display unit button in which the error notification mark () is being displayed, the [Set] button becomes disabled.

For the details of error notification marks, refer to " 0 About equipment defect mark and error notification mark".

[6] [Edit name] button

When this button is clicked, a dialog box is displayed for changing the names of the radar antennas and display units.

Regarding the operations in the [Edit name] dialog box, refer to "Changing the name of radar antenna or display unit".

[7] [Save/Load file] button

When this button is clicked, the [Connection pattern file operation] dialog box is displayed.

The current connection pattern can be saved in the file or the connection pattern that has been saved previously can be loaded.

For details of the [Connection pattern file operation] dialog box, refer to "Using the set connection pattern".

About equipment defect mark and error notification mark

■ Equipment defect mark

This mark is displayed when the power supply of the radar antenna or the indicator unit is OFF or faulty. Check the cause and take corrective action.

■ Error notification mark

This mark is displayed when there is some error in the settings of a radar antenna or a display unit. Check the cause and take corrective action.

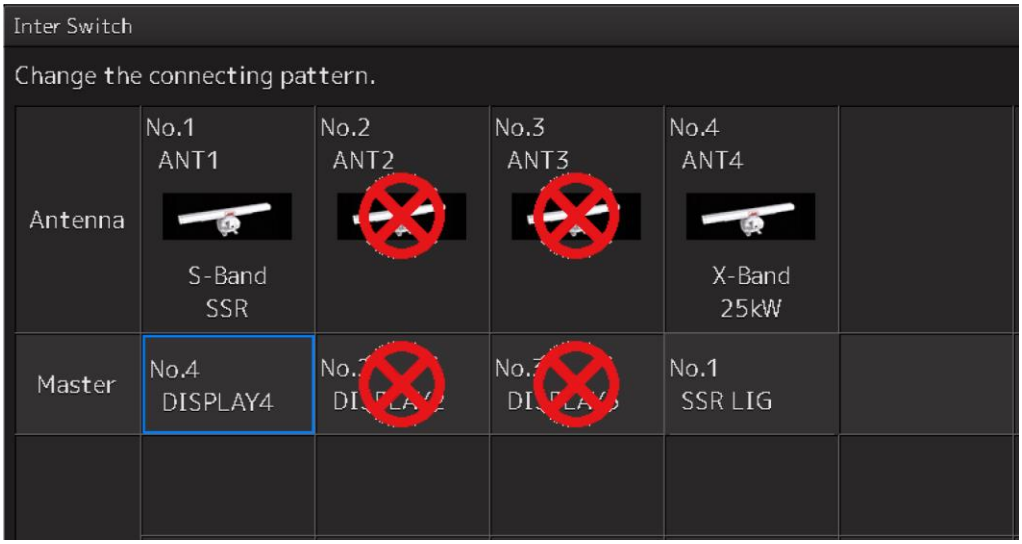
Cause	Countermeasure
The master display unit does not exist or is faulty although the slave display unit is connected.	Connect the master display unit.
The master or slave display unit that is connected is not permitted to be connected to a radar antenna.	Check the setting by selecting [Service] - [Installation] - [Settings] - [Inter switch] on the menu and permit the connection to the display unit or connect another display unit whose connection to the radar antenna is permitted.

Changing the connection pattern

1 **Click the "Change Inter switch connection" button.**
The [Inter Switch] dialog box is displayed.

2 **Click the Master or Slave display unit selection button to be connected to the radar antenna.**
The selected display unit is highlighted.

3 **Place the cursor to the destination of change and click it on.**



The currently selected display unit and the change destination display unit are interchanged.

4 **If necessary, carry out the steps 2 and 3 for other display units.**

5 **Click the [Set] button.**

The information of the set connection pattern is transmitted to the Inter switch.

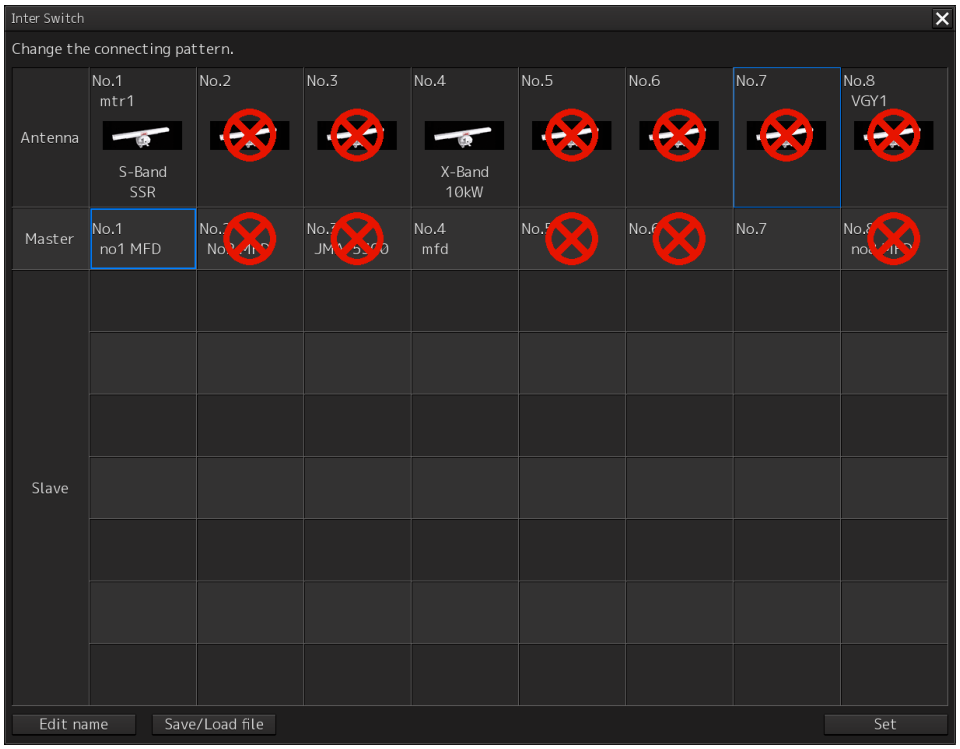
6 **Click the [×] button.**

The [Inter Switch] dialog box is closed.

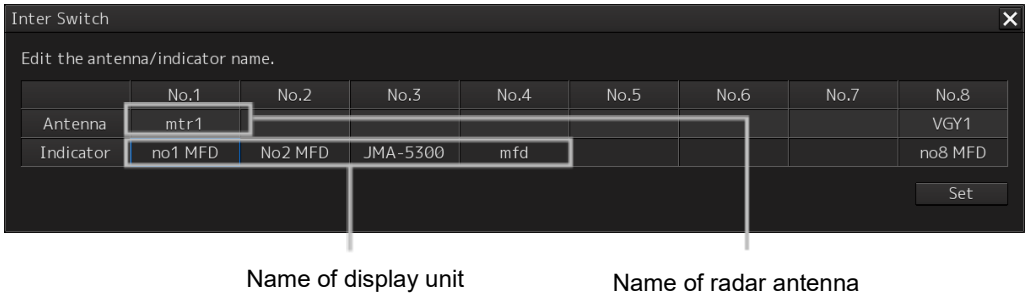
Changing the name of radar antenna or display unit

1 **Click the [Edit name] button of the [Inter Switch] dialog box.**

The [Edit name] dialog box is displayed.



2 **Click the name of the radar antenna or the display unit whose name is to be edited.**



A software full keyboard is displayed.

3 **Change the name.**

The name can be input by using 1 to 8 alphanumeric characters and symbols.

4 **Click the [Set] button.**

The name is changed.

5 **Click the [×] button.**

The [Edit name] dialog box is closed.

Using the set connection pattern

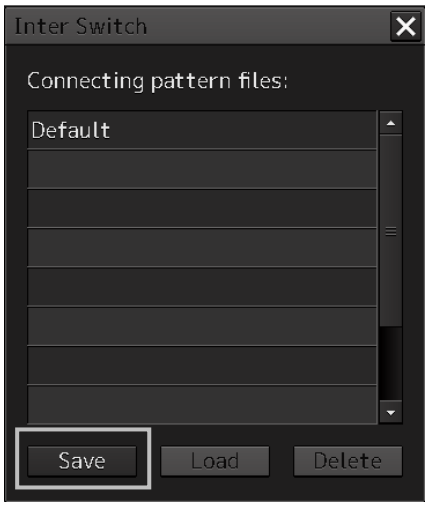
When connecting 3 to 8 radar antennas × 3 to 8 display units, it is possible to save the set connection pattern in a file. By reading out the saved connection pattern when required, it is possible to quickly change the connection pattern.

■ Saving a connection pattern

1 **After setting a connection pattern, click the [Save/Load file] button of the [Inter Switch] dialog box.**

The [Connection pattern file] dialog is displayed.

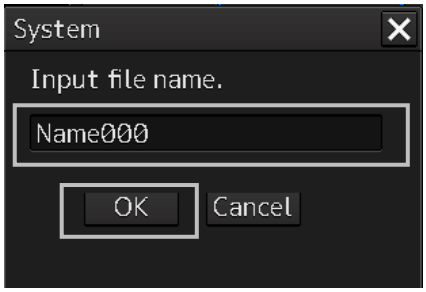
2 **Click the [Save] button.**



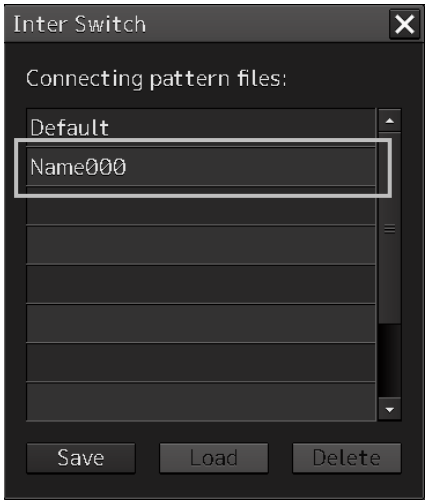
The [Input file name] dialog is displayed.

3 **Input the file name using the software full keyboard.**

4 **Click the [OK] button.**



The connection pattern is saved, and the connection pattern name is displayed in the [Connecting pattern files] dialog.



Note

- The number of connection patterns that can be saved is up to 10 apart from the connection pattern set at the time of shipment from the factory (default).
  If any more connection patterns are attempted to be saved, the following message dialog box appears.

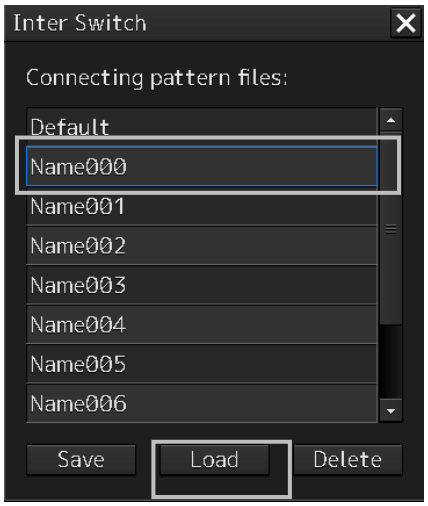
- The pattern that is set at factory delviery (Default) cannot be changed.

■ Loading a connection pattern

5 Click the [Save/Load file] button of the [Inter Switch] dialog box.

The [Connecting pattern files] dialog is displayed.

6 **Click the connection pattern to be loaded.**



7 **Click on the [Load] button.**

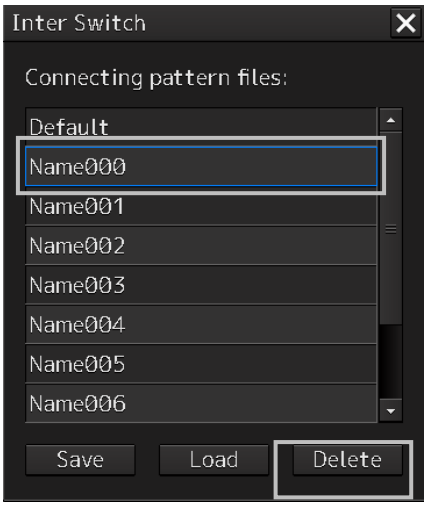
The loaded connection pattern is displayed in the [Inter Switch] dialog.

■ Deleting a connection pattern file

8 **Click the [Save/Load file] button of the [Inter Switch] dialog box.**

The [Connecting pattern files] dialog is displayed.

9 **Click the connection pattern to be deleted.**



10 **Click the [Delete] button.**

A dialog box for confirmation of deleting is displayed.

11 **Click the [OK] button in the dialog box to delete.**

The selected connecting pattern file is deleted.

Reference

Pre-heat time after changing the connection pattern

After changing an Inter switch connection pattern has been completed, the pre-heat time varies depending on the connection state of the radar antenna and display unit before the change.
This is for protecting the electron tube that emits the radio waves.

- If the radar antenna was already being used before setting the new connection pattern, a pre-heat time will not be required.
- If the radar antenna was not being used before setting the new connection pattern, a pre-heat time will be required.

Precautions while changing the connection pattern

A setting of change of the connection pattern may not be reflected immediately. This is because time is taken for the internal processing and, in this case, repeat the changing operation again after leaving a time gap of several seconds.

Precautions during a slave connection

When the master display unit is not in the transmit state, it is not possible to put the slave display unit in the transmit state. Further, when the master display unit goes from the transmit state to the transmission standby state, the slave display unit is forcibly put into the transmission standby state. In this case, the message "ISW(Master Standby)" is displayed in the alert notification area and the notification sound is made.

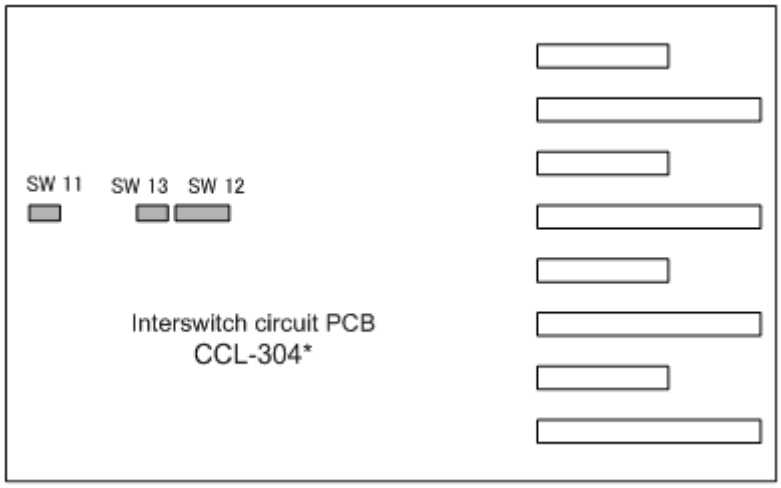
It is not possible to carry out control of tuning in a slave display unit. Tuning is controlled by a master display unit.

Changing the distance range of a slave display unit is restricted by the range and transmission pulse length/transmission pulse repetition frequency of the master display unit. As a rule, although it is not possible to change the range of the slave display unit to a range larger than the range of the master display unit, depending on the range, if the transmission pulse length and the transmission pulse repetition frequency are the same, it may be possible to select a range larger than the range of the master display unit. When the master display unit makes the range smaller or changes the transmission pulse length, the range of the slave display unit may be changed forcibly. In this case, the message "Master Range CHG" is displayed in the alert notification area and the notification sound is made.

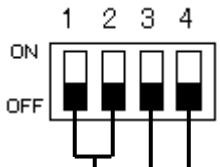
Setting during installation

■ Setting of the Inter switch circuit (CCL-304*)

The details of the dip switches SW11, SW12, and SW13 are given below.



1) Setting of SW11 (setting of extended mode, master/slave)



Extended mode setting

4	Description
ON	Extended mode
OFF	Normal mode

Set to OFF when 4 or fewer units are connected.

Master/slave setting

3	Description
ON	Slave
OFF	Master

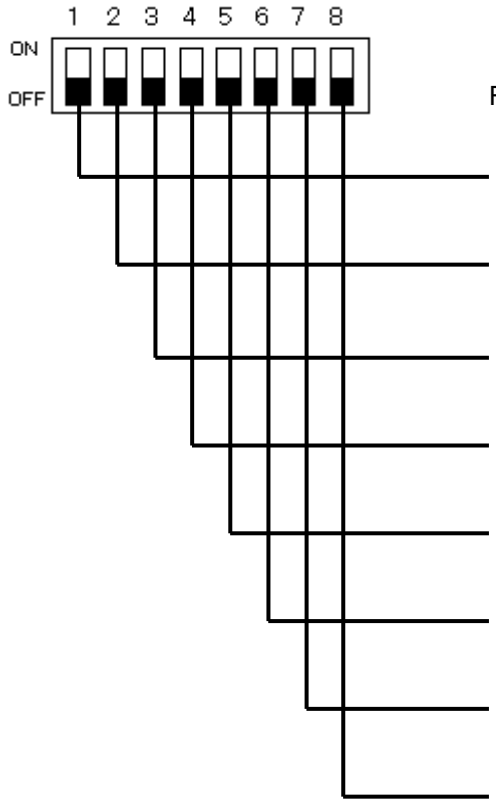
During the extended mode, set to ON in the ISW board on the slave side.

Not used

1, 2	Description
ON	Not used
OFF	Not used

Normally set to OFF.

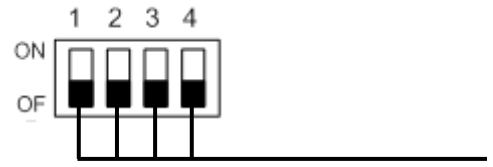
2) Setting of SW12 (Radar connection setting)



Radar connection setting

1	ON	Display unit No.1 connection present
	OFF	Display unit No.1 connection not present
2	ON	Radar antenna No.1 connection present
	OFF	Radar antenna No.1 connection not present
3	ON	Display unit No.2 connection present
	OFF	Display unit No.2 connection not present
4	ON	Radar antenna No.2 connection present
	OFF	Radar antenna No.2 connection not present
5	ON	Display unit No.3 connection present
	OFF	Display unit No.3 connection not present
6	ON	Radar antenna No.3 connection present
	OFF	Radar antenna No.3 connection not present
7	ON	Display unit No.4 connection present
	OFF	Display unit No.4 connection not present
8	ON	Radar antenna No.4 connection present
	OFF	Radar antenna No.4 connection not present

3) Setting of SW13 (Not used)



1, 2, 3 and 4	Not used (all OFF)

Note

When setting the dip switches of the Inter switch circuit, turn OFF the circuit breaker of the Inter switch, and ensure safety before carrying out the setting.

Appendix D Menu List and Materials

Menu List

This section shows the menus and dialog items of this equipment by target menu.

* Items that are enclosed by a frame of broken lines indicate the dialog and window names that are displayed by selecting the relevant menu.

Route Monitoring

Route
To WPT
[File Operations] dialog box display button → [File Operations] dialog box
Voyage Information → [Voyage Information] dialog box
Voyage Calculation → [Voyage Calculation] dialog box
Pair of data → [Pair of data] dialog box

Anchor Watch

Monitoring Anchor
Mode
(Mode: Selecting [Circle])
Position
Radius
(Mode: Selecting [Polygon])
New
Point
(list)

User Map

File Operation
- New
- Delete
- Copy
- Import
- Export
- Merge Display Files
- Geodetic
- (File List)
- Edit User Map
- Display Objects

Mark/Line List
- User Map tab
  - Symbol
  - Line
  - Area
  - Text
  - Delete
  - Page feed button
  - Page number specification
  - Object list
  - Jump
- Mariner's Mark/Line tab
  - Event Mark
  - Information Mark
  - Tidal Stream
  - Highlight
  - Clearing Line
  - Delete
  - All Delete
  - Page feed button
  - Page number specification
  - Object list
  - Jump
- Manual Update tab
  - Symbol
  - Line
  - Area
  - Text
  - Hide
  - Restore
  - Chart Type
  - Page feed button
  - Page number specification
  - Object list
  - Jump

Delete by type/color
- Type
- Color
- OK

TT/AIS

AIS Voyage Data
- Destination
- ETA(UTC)
- Calendar Icon
- NAV Status
- Draft
- Cargo cat.
- Persons on-board
- Send

Edit and Send AIS Message
- (Send To:)
  - Addressed MMSI
  - Name
  - Target ID
  - Broadcast
- Category
- LL&Time
- View Tray
- Message
- Save
- Send

AIS Message - AIS MSG Tray: Same as the common information window (AIS MSG Tray of the information reference screen)
- Tray Select
- Message Format:
- Message Category:
- Message List
- MMSI
- Ship's Name
- AIS Message
- Edit
- Select

Highlighting
- Highlighting by the following search criteria
- (TT/AIS)
  - Transit direction
  - TCPA(MIN-MAX)
  - TCPA MIN
  - TCPA MAX
  - CPA(MIN- MAX)
  - CPA MIN
  - CPA MAX
  - SOG(MIN- MAX)
  - SOG MIN
  - SOG MAX
  - Unknown Ship
- (AIS)
  - Length MIN- MAX
  - Type of Ship
  - Cargo category
  - Registry of ship
  - Navigation Status

Trial Maneuver RADAR

- Trial Function
- Course
- Speed
- Vector Time
- Time to Maneuver
- Own Ship's Dynamic Trait

TT/AIS List: Same as the TT/AIS list of the common information window (information monitoring screen)

- List Select
- List Expand
- List Normal
- (TT List)
  - Column
  - ID
  - CPA
  - TCPA
  - BCR
  - BCT
  - CTW or COG
  - STW or SOG
  - BRG
  - RNG
  - LAT
  - LON
  - Status
- (AIS List)
  - Column
  - ID
  - CPA
  - TCPA
  - CTW
  - STW
  - Name
  - Call Sign
  - MMSI
  - Source
  - BCR
  - BCT
  - BRG
  - RNG
  - HDG
  - LAT
  - LON
  - Status
  - Show AIS Detail

Own Ship AIS Data: Same as AIS of the common information window (information reference screen)

- Own Ship AIS Data/Last Lost AIS Target
  - Name
  - Call Sign
  - MMSI
  - IMO No.
  - Length
  - Beam
  - Destination
  - ETA(UTC)
  - Navigation Status
  - Draft
  - Type of Ship
  - Cargo category
  - CTW or COG
  - STW or SOG
  - Heading
  - ROT
  - Position
  - Position Accuracy
  - Position Sensor

Last Lost AIS Target: Same as AIS of the common information window (information reference screen)

- Own Ship AIS Data/Last Lost AIS Target
  - Name
  - Call Sign
  - MMSI
  - IMO No.
  - Length
  - Beam
  - Destination
  - ETA(UTC)
  - Navigation Status
  - Draft
  - Type of Ship
  - Cargo category
  - Bearing
  - Range
  - CTW or COG
  - STW or SOG
  - Heading
  - ROT
  - Position
  - Position Accuracy
  - Position Sensor
  - Source

Tools

Marker

- Position
- Bearing
- Range
- Unit switching button
- TTG
- Time

PI Menu

- Display for All Lines
- Mode
- (All)
- PI Bearing
- Interval
- Unit switching button
- Operation Area
- (Individual)
- Index Line
- Display
- PI Bearing
- Interval
- Unit switching button
- Length L
- Length R
- Unit switching button
- Sequential
- (Track)
- Group
- Display
- PI Bearing
- Interval
- Unit switching button
- (Equiangular)
- Group
- Display
- PI Bearing
- Vertical Angle
- Floating
- Heading Link
- Reference Bearing

EBL Maneuver Setting

- Display Maneuver curve
- Course T
- Course R
- Reach
- (Turn set)
  - Radius
  - Rate
- WOL
- TTG

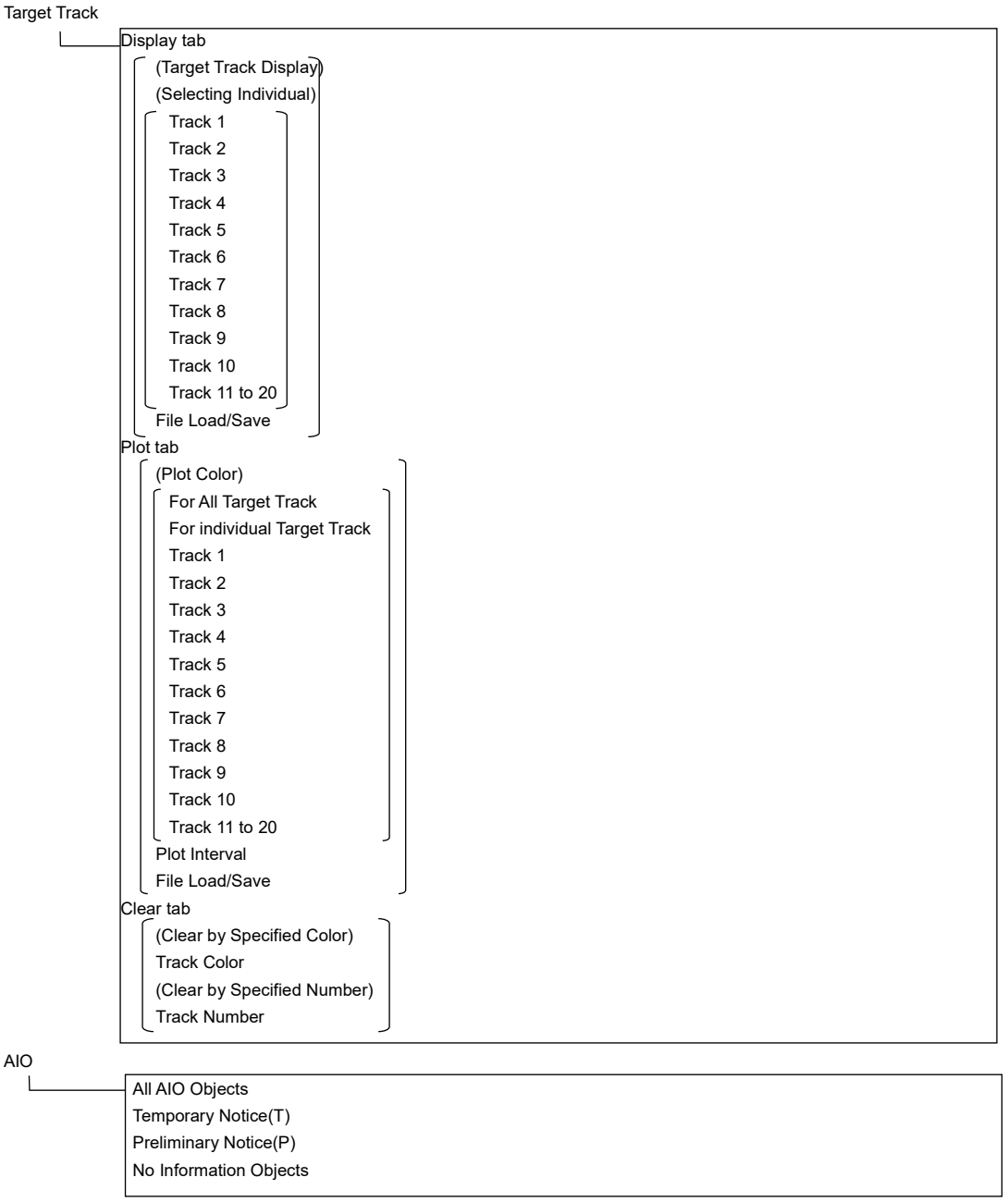
File Manager

- File Management tab
  - File Type
  - Drive
  - Name
  - Copy >>
  - << Copy
  - Select All
  - Delete
- File Load/Save tab
  - File Type
  - File Type (Included GPS Buoy Track)*
  - *Setting for using [Utilities] - [GPS Buoy] when [File Type] is [Target Track]
  - File List - Name
  - File List - Modified
  - File List - Display
  - Load Mode
  - Load
  - Unload
  - Save Current Target Track

View

View-Options

- Own Ship
  - Stern Line
  - (Vector)
    - Ground stabilised vector
    - Sea stabilised vector
    - Time
    - Stabilization indicator
    - Vector Time Mark
    - Interval
  - Setting of AIS Filter
  - Setting of AZ
    - Setting of Anti-Grounding Vector/Sector *
- RADAR
  - RADAR
  - RADAR Overlay
  - Transparency of Echo/Trails
- Target
  - CPA Ring
  - AIS Symbol
    - (Selecting AIS Symbol)
    - Physical AtoN
    - Virtual AtoN
  - TT Symbol
  - TT1 Symbol
  - TT1 Symbol Source Selection
  - TT2 Symbol
  - TT2 Symbol Source Selection
  - TT Target ID
  - AIS Target ID


Target Track
Display tab
(Target Track Display)
(Selecting Individual)
Track 1
Track 2
Track 3
Track 4
Track 5
Track 6
Track 7
Track 8
Track 9
Track 10
Track 11 to 20
File Load/Save
Plot tab
(Plot Color)
For All Target Track
For individual Target Track
Track 1
Track 2
Track 3
Track 4
Track 5
Track 6
Track 7
Track 8
Track 9
Track 10
Track 11 to 20
Plot Interval
File Load/Save
Clear tab
(Clear by Specified Color)
Track Color
(Clear by Specified Number)
Track Number
AIO
All AIO Objects
Temporary Notice(T)
Preliminary Notice(P)
No Information Objects

Tools
- Range Rings
- EBL1
- EBL2
- VRM1
- VRM2
- PI
- Index Line 1
- Index Line 2
- Index Line 3
- Index Line 4
- Index Line 5
- Index Line 6
- Index Line 7
- Index Line 8
- Node Fixed EBL/VRM

Unit
- Depth
- Current Speed
- Wind Speed
- Air TEMP
- Water TEMP
- Air Pressure
- Wind Direction(True)

Control
- (Top Level Screen Information on RADAR)
- * Group box units
  - Show Own Track Control

Depth Graph *

* Case where the depth sensor is connected.
- (Depth Trend Graph)
- Depth Range(Voyage)
- Time Range
- Reference

Rudder Graph

* Case where the gyro and rudder is connected.

(Rudder Trend Graph)
[Time Range
  Rudder Range]

Gyro/Rudder Graph *

* Case where the depth sensor is connected.

(Gyro/Rudder Trend Graph)
[Time Range
  Rudder Range]

ROT

(ROT)
[ROT Scale]

Alert

Collision Avoidance
- (CPA/TCPA Alarm)
  - CPA Limit
  - TCPA Limit
- (Alarm Detection)
  - AIS Lost Alarm
  - AIS CPA/TCPA Alarm

New Target Alarm
- Use AZ 1
- Use AZ 2
- 1 tab
  - Make AZ1 ⇒ Change to the AZ1 range setting mode
  - Start Angle
  - End Angle
  - Start Distance
  - End Distance
- 2 tab
  - Make AZ 2 ⇒ Change to the AZ2 range setting mode
  - Start Angle
  - End Angle
  - Start Distance
  - End Distance

Position Integrity
- (Position monitor warning)
  - Position Difference Limit
  - Radius Limit (GPS)
  - Radius Limit (DGPS)
  - Time Limit
- (HDOP exceeded caution)
- [HDOP Limit]

AMS
- (Reactivation of Silenced Alert)
- Time Limit
- (Transfer to BNWAS)
- Time Limit
- (Repetition of UNACK Warning)
- Time Limit

Timer
- (Timer)
- (LMT)

Settings

Signal Process

- Video Latitude
- Video Noise Rejection
- Auto Dynamic Range Control
- (Process Switch)
  - Process Switch
  - 2nd Process Mode *
  - * Case where [Process Switch] is set to [Off]
  - Process Switch Range *
  - * Case where [Process Switch] is set to [Range Fix]
- Fast Target Detection
- SART

Obs, Scene Preset

- Obs.Scene
- (page 1/6)
- IR
- Target Enhance
- Echo Process
- Sea
- Rain
- Save Present State
- Next
- (page 2/6) 4kW, 6kW, 10kW, 25kW, 30KW, 50kW, 60kW scanner or solid-state radar connector
- (Pulse Width)
  - 0.75(0.75 to 1.5)
  - 1.5(1.5 to 3)NM
  - 3(3 to 6)NM
  - 6(6 to 12)NM
  - 12(12 to 16)NM
- Back
- Next
- (page 3/6)
- Video Latitude
- Video Noise Rejection
- AUTO Dynamic Range Control
- (Process Switch)
  - Process Switch
  - 2nd Process Mode *
  - * [Process Switch] is other than [Off]
  - Process Switch Range *
  - * [2nd Process Mode] is other than [Range Fix]
- Fast Target Detection
- Back
- Next
- (page 4/6)
- Trails Mode
- Trails Ref Level
- Trails Reduction
- MAX Length
- Trails Length
- Back
- Next

(page 5/6)
Gain offset
PRF
Small Buoy Detection
Fishnet Detection
Antenna Height
Back
Next
(page 6/6)
Save as User Default
Load User Default
Initialize
Back

Trails
- Trails Mode
- Trails Ref Level
- Trails Reduction
- MAX Length

TXRX
- PRF Fine Tuning
- Stagger Trigger
- PRF
- Ice Class Standby Mode

Association
- Association
- Priority *
- (Threshold) *
  - Bearing
  - Range
  - Course
  - Speed
- Applicable AIS Target *

* Case where [Association] is [On]

Ship's Dynamic Trait
- Reach
- Turn Mode
- (Turn Set)
  - Radius
  - Rate
- Acceleration
- Deceleration

TT Test
- Test Video
- TT Simulator
- Gate Display
- (Status)
  - Vector Constant
  - VD Level Mode (Manual)
  - VD Level (Manual)
  - VD Level (Auto)
  - Gate Size
  - Tracking

Filter

- Sector Filter
  - Start Angle
  - End Angle
  - Ring Filter
  - Distance
  - Filtering Mode
  - Sector tab
    - Make AIS Filter
    - Start Angle *
    - End Angle *
    - * Case where [Make AIS Filter] is On
  - Ring tab
    - Make AIS Filter
    - Distance *
    - * Case where [Make AIS Filter] is On

General

- (Gyro I/F) *
  - GYRO Setting
  - * Gyro I/F is equipped

Color and Brightness

- Day/Night
- Def.
- Display Color tab
  - OuterPPI */Dialog
  - InnerPPI *
  - Character
  - RADAR Video *
  - * Under radar connection
  - RADAR Trails(Time)
  - Target Symbol *
  - * Displayed at the equipment setting for receiving TT information
  - Range Rings *
  - * Under radar connection
  - EBL1/VRM1/PI
  - EBL2/VRM2
  - Own Symbol/HL/Vector
- Brightness tab
  - Character
  - RADAR Video *
  - * Under radar connection
  - Target Symbol *
  - * Displayed at the equipment setting for receiving TT information
  - Range Rings *
  - * Under radar connection
  - EBL/VRM/PI
  - Own Symbol/HL/Vector
  - Panel
  - Day1 : Level4 / Day2 : Level3 / Day3 : Level2 / Dusk,Night : Level1
  - Display
  - <26 inch>[0~100]Day1/Day2/Day3 : 67 / Dusk : 60 / Night : 11
  - <19 inch> Day1/Day2/Day3 : 42 / Dusk : 20 / Night : 4

Sounds

- Volume tab
  - Key ACK
  - Misoperation
  - Response/Notification
  - Message Notification
  - Alert Setting Reminder
  - Navigation 1 Alarm *
  - * For UKC alarm
  - Navigation 2 Alarm
  - Navigation 3 Alarm
  - CPA/TCPA Alarm
  - Warning
- Melody tab
  - Navigation 1
  - Navigation 2
  - Navigation 3
  - CPA/TCPA

Key Assignment

- User Keys tab *
  - * Under the connection of the optional unit
  - DISP Off Key
  - User Key 1
  - User Key 2
- Multi Dial tab
  - Vector Time
  - Trails Length
  - C UP Angle
  - Own Track Color
  - Manual Tune
  - Display Brightness
  - Panel Brightness
  - Gain *
  - Sea *
  - Rain *
  - * Under radar connection
- AZ Key tab *
  - * Under the connection of the optional unit and radar
  - AZ 1
  - AZ 2

Preferences

- Name
- Save *
- * Disable is displayed when up to the maximum private settings are saved.
- Load *
- * Disable is displayed when no item is selected in the name list.
- Delete *
- * Disable is displayed when no item is selected in the name list.
- Default display configurations

Screen capture

- AUTO Capture Interval
- AUTO File Erase
- * Disable is displayed when [AUTO Capture Interval] is set to [0].
- File Management

Maintenance

Date/Time/Time Zone
- (Date)
  - Month
  - Year
  - Day
- Time(LMT)
- Time Zone
- Display Style
- Synchronise with Time Source(Date/Time)
- Synchronise with Time Source(Time Zone)

System Information
- Software tab
  - Type
  - Application
  - Maintenance No.
  - TXRX
  - TCS
  - Presentation Library
- Functionality tab
  - Device Licence Status
  - Option Licence Status
- Specification tab
  - Specifications
- Save to USB Device

Operating Time
- (Operating Time of Work Station)
  - Total
  - SSD1
  - SSD2
  - LCD
  - LCD FAN
  - CCU FAN
  - PSU FAN
  - UPS
- (Operating Time of Scanner)*

* Under radar connection
- Total
- Transmit
- Motor
- FAN

Voyage Distance
- (Current Voyage Distance)
  - Ground
  - Water
- Clear

- Sensor Selection/Status
  - Sensor Selection
    - (Sensor Selection)
      - Position (POSN(Main))
      - POSN(Sub)
      - Heading
      - STW
      - COG/SOG
      - Time
      - Depth
  - Position Status
    - Position Status
      - CCRP
- Diagnosis
  - Monitor Test
    - All Red
    - All Green
    - All Blue
    - All White
    - Pattern4
    - Pattern5
    - Pattern6
    - Gray Scale
    - S-57 Color Pattern
    - ARCS Color Pattern
  - Key Test
    - Key Test Start
      - Key
        - Key Test Stop
  - Sound Test
    - Sound Test Start
  - Light Test
    - Light Test Start
  - Vibration Test
    - Vibration Test
  - Magnetron Curr. *
    - * Under magnetron radar connection
    - Magnetron Current
  - Memory Check
    - Memory Check Start
    - Results
  - MON Check *
    - * Under magnetron radar connection
    - (Transmitter System)
      - Bar
      - Attenuation Value
    - (Receiver System)
      - MON Pattern Range
      - Attenuation Value
    - Push aside this dialog
    - Back
  - MON Check(SSR) *
    - * Under solid-state radar connection
    - (Transmitter System)
      - Attenuation Value
    - (Receiver System)
    - Attenuation Value
    - Back

Software Update

Software Update
Help Install

DVD Drive Cleaning

Help

←
→
Home
(Contents tab)
(Search tab)

keyword
Search
Results

Code Input

Password

Service

Adjustment

- Basic Adjustment
  - Tune Adjustment *
    - * Under magnetron radar connection
    - Bearing Adjustment
    - Range Adjustment
    - Master/Slave (radar operation mode)
- TXRX
  - Antenna Height
    - Tune Peak Adjustment *
    - * Under magnetron radar connection
    - Tune Indicator
    - Output BP
- Performance Monitor (under magnetron connection)
  - MON Adjustment
    - MON Indicator Adjustment
    - MON Level
- Performance Monitor(SSR) (under SSR connection)
  - TX Monitor Adjustment
    - RX Monitor Adjustment
    - Monitor Sector
    - Monitor Range
    - RX Monitor Gain
    - Reference of Attenuator Value
- Sector Blank
  - Use Sector1
    - Use Sector2
    - Use Sector3
    - 1 tab
    - Make Sector1
    - Start Angle
    - End Angle
    - 2 tab
    - Make Sector2
    - Start Angle
    - End Angle
    - 3 tab
    - Make Sector3
    - Start Angle
    - End Angle
- TNI Blank RADAR (Menu for a person in charge of installation)
  - Use TNI Blank *
    - * Under magnetron radar connection
    - Make Sector
    - Start Angle
    - End Angle
- Input BP Count (Menu for a person in charge of installation)
  - RADAR1
    - RADAR2
- Output BP Count (Menu for a person in charge of installation)
  - Output BP
- Echo Noise Level (Menu for a person in charge of installation)
  - Echo Noise Level
    - Adjustment Mode

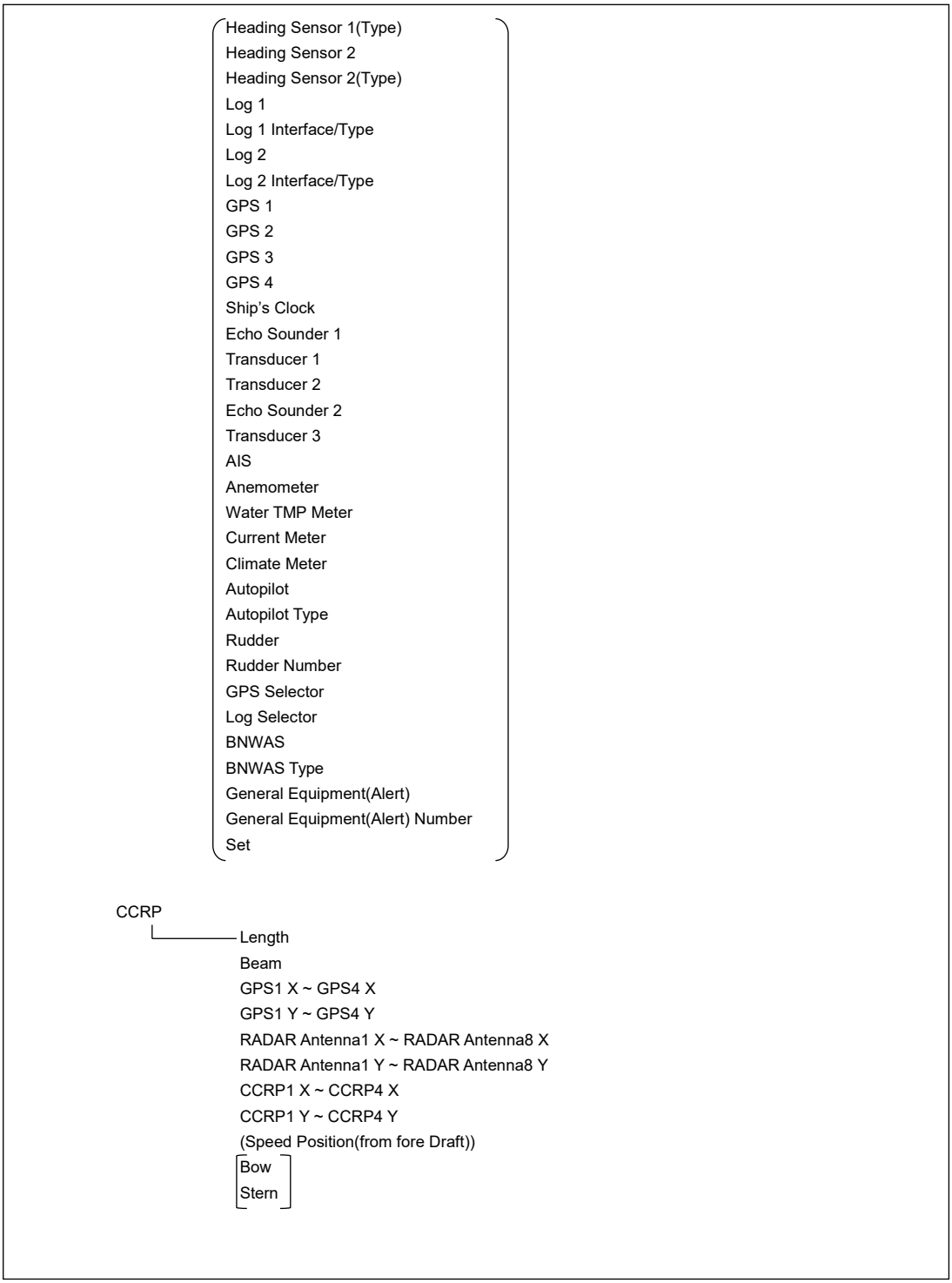
TT
- Vector Constant
- VD Level Mode (Manual)
- VD Level (Manual)
- VD Level (Auto)
- Gate Size
- Limit Ring

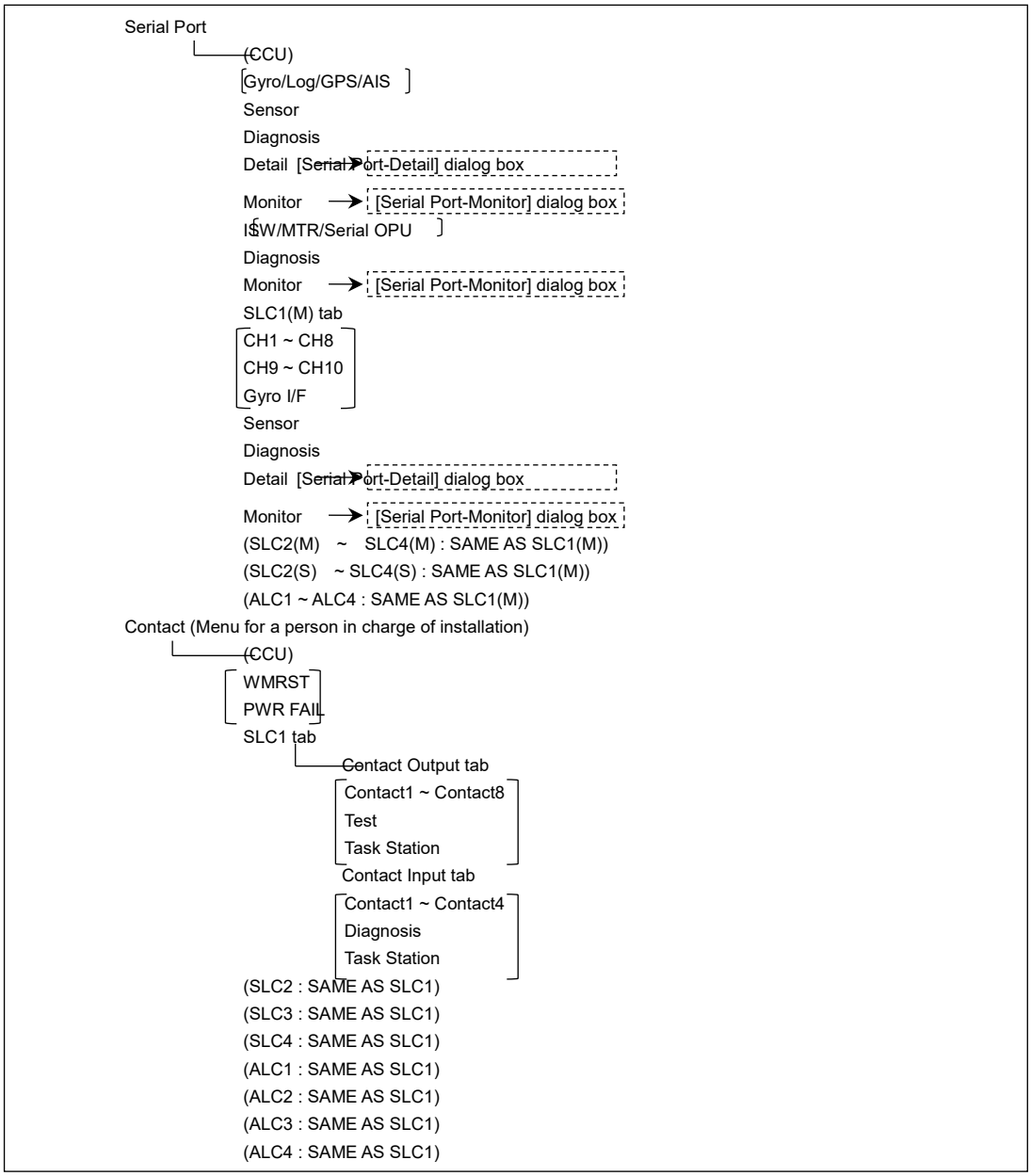
MBS
- Initial Level
- Area Offset

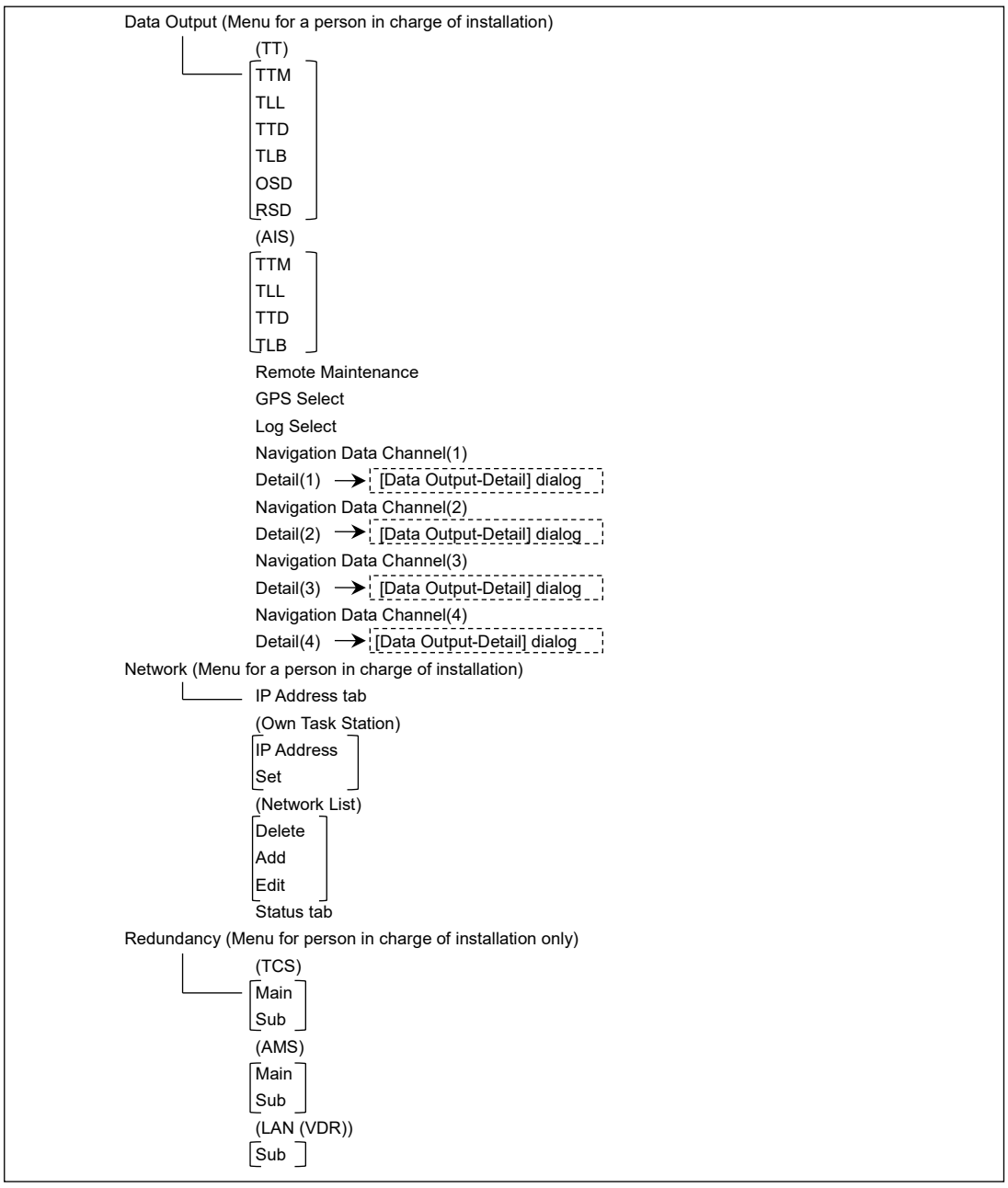
Cable Attenuation (Menu for a person in charge of installation)
- Correction Level

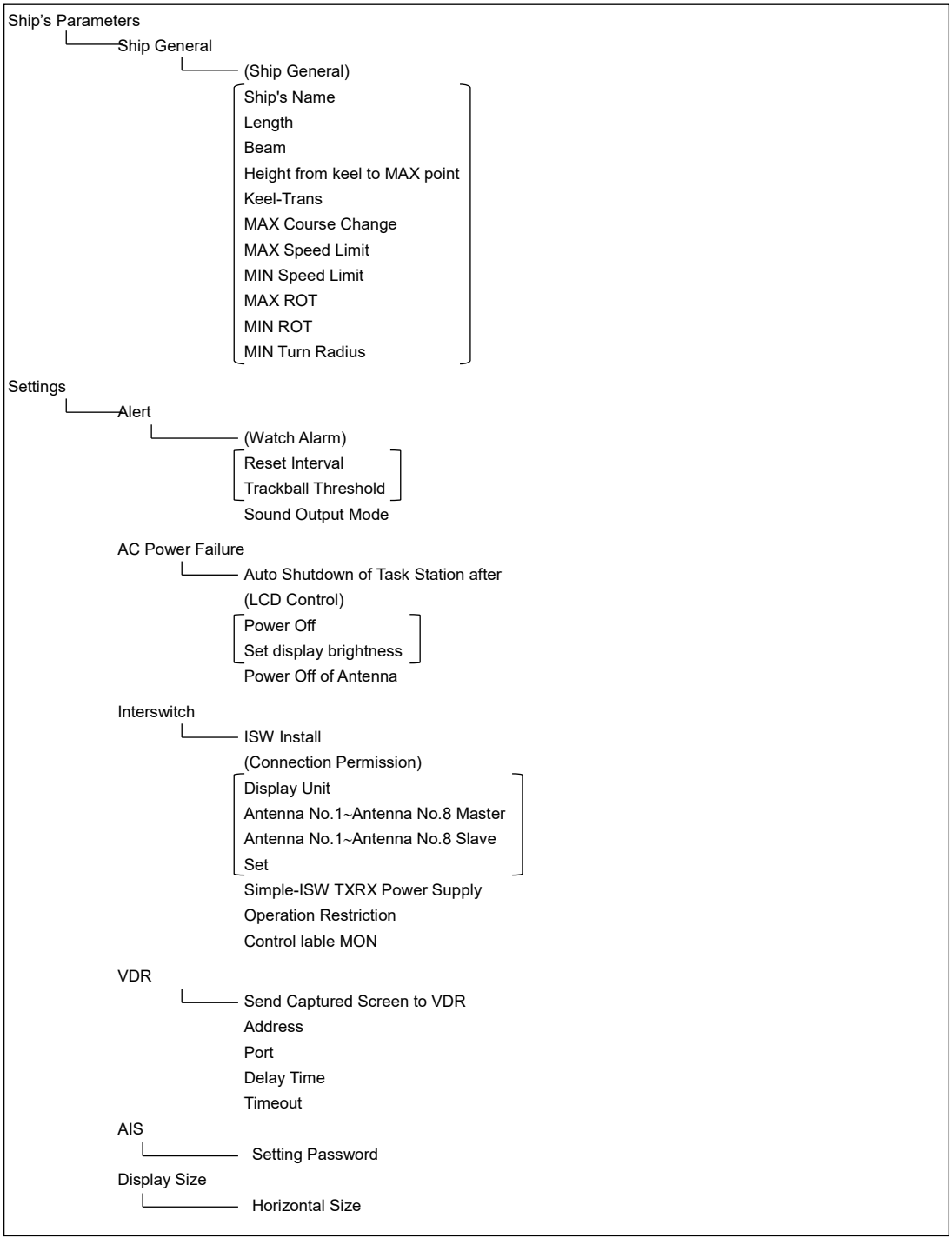
Installation

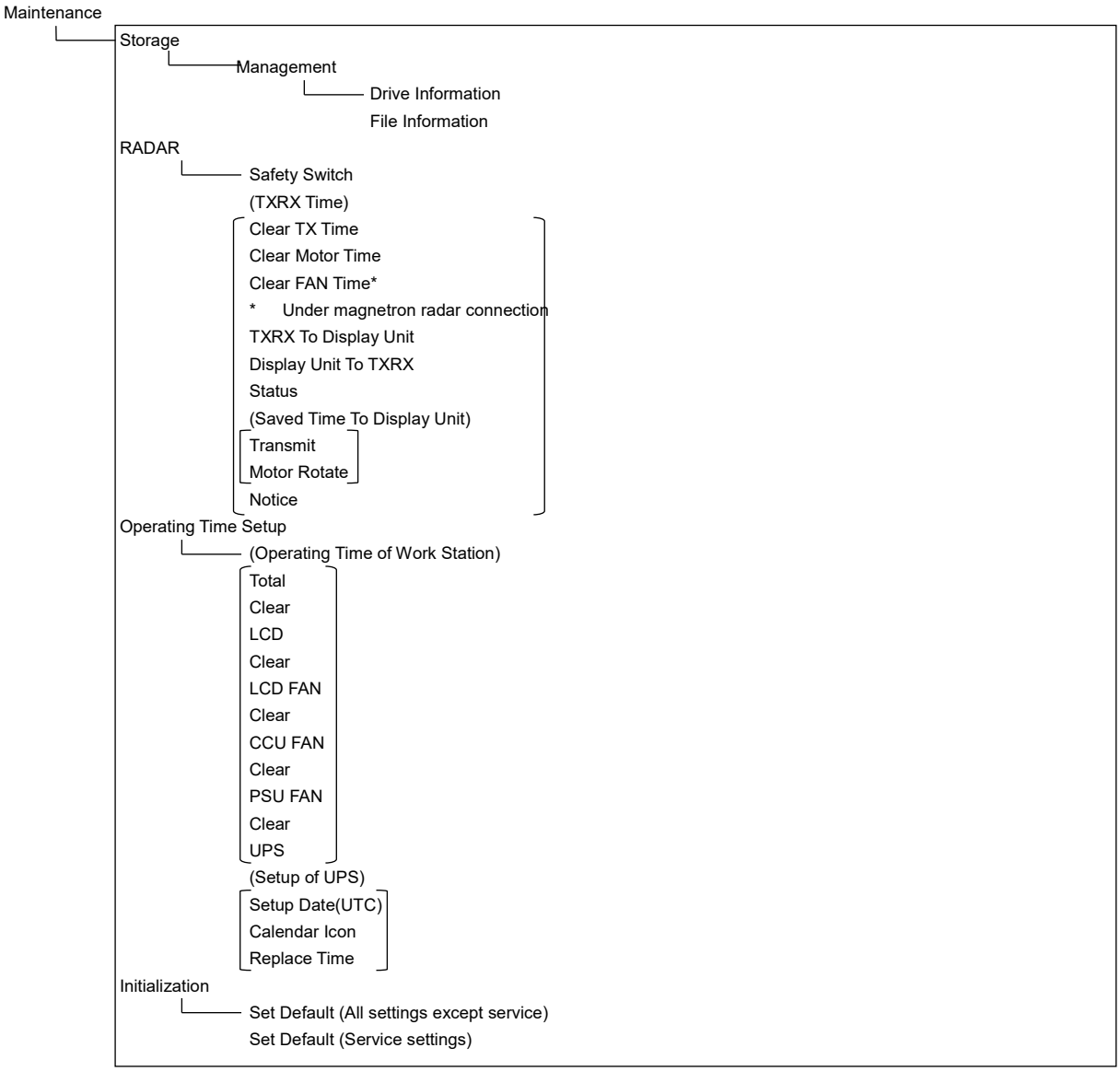
- Installation Information (Menu for a person in charge of installation)
  - (Installation Information)
    - Date:
    - Calendar Icon
    - Name:
    - Company:
    - SSR Scanner type *
    - * Under compact solid-state radar connection
- Language (English version only) (Menu for a person in charge of installation)
  - Language
- System Configuration
  - Subsystem Installation (Menu for a person in charge of installation)
    - (Own Task Station)
      - Task Station No.
      - Own Equipment No.
      - IP Address(Main):
      - IP Address(Sub):
      - USB OPU
      - Serial OPU
    - (Junction Box)
      - Junction Box 1
      - Task Station
      - Space A
      - Space B
    - (Junction Box 2 : Same as Junction Box 1)
    - (Junction Box 3 : Same as Junction Box 1)
    - (Junction Box 4 : Same as Junction Box 1)
    - (Junction Box 5 : Same as Junction Box 1)
    - (Junction Box 6 : Same as Junction Box 1)
    - (Junction Box 7 : Same as Junction Box 1)
    - (Junction Box 8 : Same as Junction Box 1)
    - (Device Installation)
      - Task Station 1
      - Equipment No. 1
      - Task Station 2
      - Equipment No. 2
      - Task Station 3
      - Equipment No. 3
      - Task Station 4
      - Equipment No. 4
      - Task Station 5
      - Equipment No. 5
      - Task Station 6
      - Equipment No. 6
      - Task Station 7
      - Equipment No. 7
      - Task Station 8
      - Equipment No. 8
      - RADAR 1
      - RADAR 2
      - VDR(JRC)
      - Printer
      - Heading Sensor 1


Heading Sensor 1(Type)
Heading Sensor 2
Heading Sensor 2(Type)
Log 1
Log 1 Interface/Type
Log 2
Log 2 Interface/Type
GPS 1
GPS 2
GPS 3
GPS 4
Ship's Clock
Echo Sounder 1
Transducer 1
Transducer 2
Echo Sounder 2
Transducer 3
AIS
Anemometer
Water TMP Meter
Current Meter
Climate Meter
Autopilot
Autopilot Type
Rudder
Rudder Number
GPS Selector
Log Selector
BNWAS
BNWAS Type
General Equipment(Alert)
General Equipment(Alert) Number
Set
CCRP
Length
Beam
GPS1 X ~ GPS4 X
GPS1 Y ~ GPS4 Y
RADAR Antenna1 X ~ RADAR Antenna8 X
RADAR Antenna1 Y ~ RADAR Antenna8 Y
CCRP1 X ~ CCRP4 X
CCRP1 Y ~ CCRP4 Y
(Speed Position(from fore Draft))
Bow
Stern


Serial Port
(CCU)
Gyro/Log/GPS/AIS
Sensor
Diagnosis
Detail [Serial Port-Detail] dialog box
Monitor [Serial Port-Monitor] dialog box
ISW/MTR/Serial OPU
Diagnosis
Monitor [Serial Port-Monitor] dialog box
SLC1(M) tab
CH1 ~ CH8
CH9 ~ CH10
Gyro I/F
Sensor
Diagnosis
Detail [Serial Port-Detail] dialog box
Monitor [Serial Port-Monitor] dialog box
(SLC2(M) ~ SLC4(M) : SAME AS SLC1(M))
(SLC2(S) ~ SLC4(S) : SAME AS SLC1(M))
(ALC1 ~ ALC4 : SAME AS SLC1(M))
Contact (Menu for a person in charge of installation)
(CCU)
WMRST
PWR FAIL
SLC1 tab
Contact Output tab
Contact1 ~ Contact8
Test
Task Station
Contact Input tab
Contact1 ~ Contact4
Diagnosis
Task Station
(SLC2 : SAME AS SLC1)
(SLC3 : SAME AS SLC1)
(SLC4 : SAME AS SLC1)
(ALC1 : SAME AS SLC1)
(ALC2 : SAME AS SLC1)
(ALC3 : SAME AS SLC1)
(ALC4 : SAME AS SLC1)


Data Output (Menu for a person in charge of installation)
(TT)
TTM
TLL
TTD
TLB
OSD
RSD
(AIS)
TTM
TLL
TTD
TLB
Remote Maintenance
GPS Select
Log Select
Navigation Data Channel(1)
Detail(1)
[Data Output-Detail] dialog
Navigation Data Channel(2)
Detail(2)
[Data Output-Detail] dialog
Navigation Data Channel(3)
Detail(3)
[Data Output-Detail] dialog
Navigation Data Channel(4)
Detail(4)
[Data Output-Detail] dialog
Network (Menu for a person in charge of installation)
IP Address tab
(Own Task Station)
IP Address
Set
(Network List)
Delete
Add
Edit
Status tab
Redundancy (Menu for person in charge of installation only)
(TCS)
Main
Sub
(AMS)
Main
Sub
(LAN (VDR))
Sub


Ship's Parameters
Ship General
(Ship General)
Ship's Name
Length
Beam
Height from keel to MAX point
Keel-Trans
MAX Course Change
MAX Speed Limit
MIN Speed Limit
MAX ROT
MIN ROT
MIN Turn Radius
Settings
Alert
(Watch Alarm)
Reset Interval
Trackball Threshold
Sound Output Mode
AC Power Failure
Auto Shutdown of Task Station after
(LCD Control)
Power Off
Set display brightness
Power Off of Antenna
Interswitch
ISW Install
(Connection Permission)
Display Unit
Antenna No.1~Antenna No.8 Master
Antenna No.1~Antenna No.8 Slave
Set
Simple-ISW TXRX Power Supply
Operation Restriction
Control lable MON
VDR
Send Captured Screen to VDR
Address
Port
Delay Time
Timeout
AIS
Setting Password
Display Size
Horizontal Size


Maintenance
Storage
Management
Drive Information
File Information
RADAR
Safety Switch
(TXRX Time)
Clear TX Time
Clear Motor Time
Clear FAN Time*
* Under magnetron radar connection
TXRX To Display Unit
Display Unit To TXRX
Status
(Saved Time To Display Unit)
Transmit
Motor Rotate
Notice
Operating Time Setup
(Operating Time of Work Station)
Total
Clear
LCD
Clear
LCD FAN
Clear
CCU FAN
Clear
PSU FAN
Clear
UPS
(Setup of UPS)
Setup Date(UTC)
Calendar Icon
Replace Time
Initialization
Set Default (All settings except service)
Set Default (Service settings)

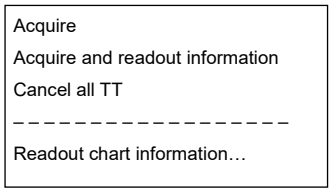
Context Menu List

This section shows the context menus that are displayed by clicking the right button by target object.

* The items that are enclosed by the frame of broken lines indicate the dialogs and windows that are displayed by selecting the relevant menu.

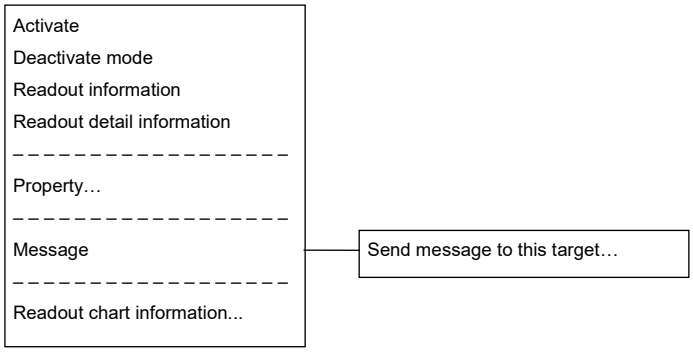
No object

RADAR screen

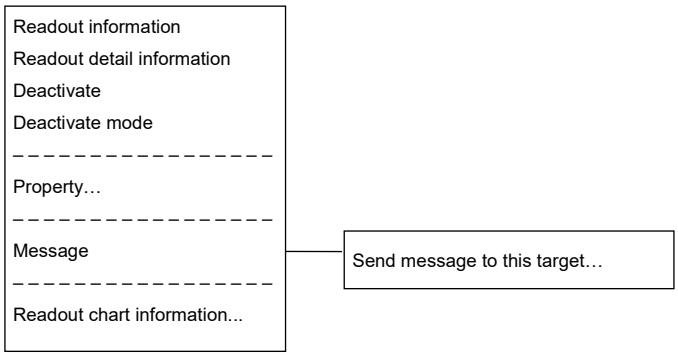


AIS

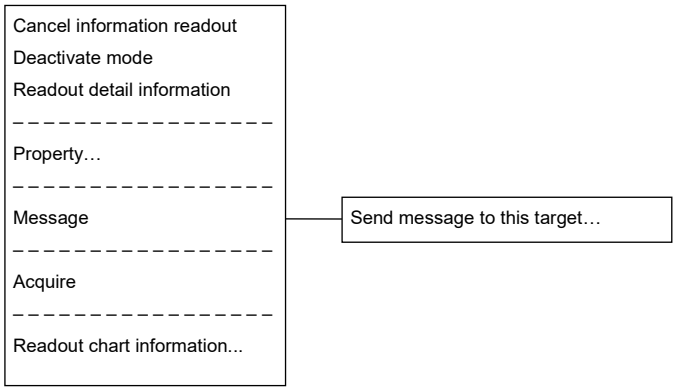
Sleeping AIS target



Activated AIS target

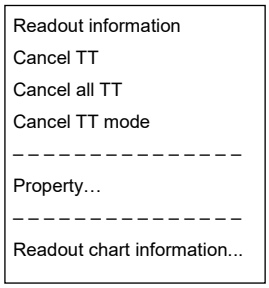


Numeric displayed AIS target

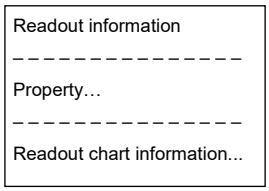


TT

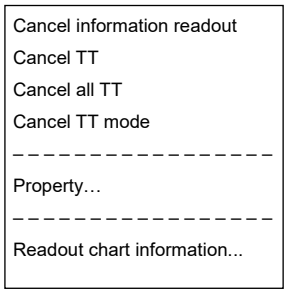
Internal TT



External TT



TT detail information display (internal TT)



TT detail information display (external TT)

Cancel information readout

– – – – – – – – – – – – – – – –

Property…

– – – – – – – – – – – – – – – –

User map

Symbol

Move this object.
Delete this object.
– – – – – – – – – – – – – – – – – –
Show Mark/Line List
– – – – – – – – – – – – – – – – – –
Readout chart information...

Simple line

Add vertex
Insert vertex
Move vertex
Delete vertex
– – – – – – – – – – – – – – – – – –
Select All
Move this object.
Delete this object.
– – – – – – – – – – – – – – – – – –
Show Mark/Line List
– – – – – – – – – – – – – – – – – –
Readout chart information...

Line - Circle

Change radius
Move this object.
Delete this object.
– – – – – – – – – – – – – – – – – –
Show Mark/Line List
– – – – – – – – – – – – – – – – – –
Readout chart information...

Line - Ellipse

Change horizontal and vertical
Move this object.
Delete this object.
– – – – – – – – – – – – – – – – – –
Show Mark/Line List
– – – – – – – – – – – – – – – – – –
Readout chart information...

Arc

Change radius
Change start angle
Change end angle
Move this object.
Delete this object.
– – – – – – – – – – – – – – – – – –
Show Mark/Line List
– – – – – – – – – – – – – – – – – –
Readout chart information...

Polygon

Insert vertex
Move vertex
Delete vertex
– – – – – – – – – – – – – – – – – –
Move this object.
Delete this object.
– – – – – – – – – – – – – – – – – –
Show Mark/Line List
– – – – – – – – – – – – – – – – – –
Readout chart information...

Area - Circle

Change radius
Move this object.
Delete this object.
– – – – – – – – – – – – – – – – – –
Show Mark/Line List
– – – – – – – – – – – – – – – – – –
Readout chart information...

Area - Ellipse

Change horizontal and vertical
Move this object.
Delete this object.
– – – – – – – – – – – – – – – – – –
Show Mark/Line List
– – – – – – – – – – – – – – – – – –
Readout chart information...

Fan

Change radius
Change start angle
Change end angle
Move this object.
Delete this object.
– – – – – – – – – – – – – – – – – –
Show Mark/Line List
– – – – – – – – – – – – – – – – – –
Readout chart information...

Text

Move this object.
Delete this object.
– – – – – – – – – – – – – – – – – –
Show Mark/Line List
– – – – – – – – – – – – – – – – – –
Readout chart information...

Arrow

Move start point
Move end point
Move this object.
Delete this object.
– – – – – – – – – – – – – – – – – –
Show Mark/Line List
– – – – – – – – – – – – – – – – – –
Readout chart information...

Manual Update

Objects that have not been saved

Same as "User map"

Saved objects (hidden)

Hide
Restore
– – – – – – – – – – – – – – – – – – –
Show Mark/Line List
– – – – – – – – – – – – – – – – – – –
Readout manual update information...
– – – – – – – – – – – – – – – – – – –
Readout chart information...

Monitored route

Monitored route

Readout WPT information …
– – – – – – – – – – – – – – –
Edit this route
– – – – – – – – – – – – – – –
Readout chart information...

Abbreviations of Geodetic Data

No.	Geodetic Data	Display to the top screen	DTM sentence	
			Abbreviation	User-defined No.
0	WGS 84	WGS 84	W84	0
1	WGS 72	WGS 74	W74	1
2	Tokyo	TOY	TOY	2
3	North American 1927(USA)	NAS	NAS(*2)	3
4	North American 1927(Canada & Alaska)	NAS	NAS(*2)	4
5	European 1950	EUR	EUR	5
6	Australian Geodetic 1966	AUA	AUA	6
7	Ordnance Survey of Great Britain	OGB	OGB	7
8	North American 1983	NAR	NAR	8
9	No Use	Blank display	-	9
10	No Use	Blank display	-	10
11	Adindan	ADI	ADI	11
12	Arc 1950	ARF	ARF	12
13	Australian Geodetic 1984	AUG	AUG	13
14	Bermuda 1957	BER	BER	14
15	Bogota Observatory	BOO	BOO	15
16	Campo Inchauspe	CAI	CAI	16
17	Chatam Island Astro 1971	CHI	CHI	17
18	Chua Astro	CHU	CHU	18
19	Corrego Alegre	COA	COA	19
20	Djakarta (Batavia)	BAT	BAT	20
21	European 1979	EUS	EUS	21
22	Geodetic Datum 1949	GEO	GEO	22
23	Guam 1963	GUA	GUA	23
24	Hayford 1910	024	024(*1)	24
25	Hjorsey 1955	HJO	HJO	25
26	Indian	IND	IND	26
27	Ireland 1965	IRL	IRL	27
28	Kertau 1948	KEA	KEA	28
29	L. C. 5 Astro 1961	LCF	LCF	29

30	Liberia 1964	LIB	LIB	30
31	Luzon	LUZ	LUZ	31
32	Merchich	MER	MER	32
33	Minna	MIN	MIN	33
34	Nahrwan	NAH	NAH	34
35	Naparima, BWI	NAP	NAP	35
36	Old Egyptian 1907	OEG	OEG	36
37	Old Hawaiian	OHA	OHA	37
38	Pico de las Nieves	PLN	PLN	38
39	Provisional South American 1956	PRP	PRP	39
40	Provisional South Chilean 1963	HIT	HIT	40
41	Puerto Rico	PUR	PUR	41
42	Qornoq	QUO	QUO	42
43	RT 90	043	043(*1)	43
44	Sao Braz	SAO	SAO	44
45	South American 1969	SAN	SAN	45
46	Graciosa Base SW 1948	GRA	GRA	46
47	Timbalai 1948	TIL	TIL	47
48	No Use	Blank display	-	48
49	No Use	Blank display	-	49

Lists of Terminologies, Units, and Abbreviations

Abbreviation	Term
A/D = AD	Analog/ Digital
A/P = AP	Auto Pilot
AC	Alternating Current
ACC	Actual Course Change
ACCA	Actual Course Change Alarm
ACK	Acknowledge
ACQ	Acquire, Acquisition
ACT	Activate
AIO	Admiralty Information Overlay (additional information to the navigation)
AIS	Automatic Identification System
ALC	Alert LAN Converter
AMP	Amplifiers
AMS	Alert Management System
ANT	Antenna
Anti-clutter rain	Rain/snow clutter suppression
Anti-clutter sea	Sea clutter suppression
ASCII	American Standard Code for Information Interchange
ASIC	Application Specific Integrated Circuit
AtoN	Aids to Navigation
AUTO = auto	Automatic
Av. = AVE	Average
AZ	Acquisition Zone
AZI	Azimuth Stabilization Mode
BAM	Bridge Alert Management
BCR	Bow Crossing Range
BCT	Bow Crossing Time
BFT	Beaufort
BNWAS	Bridge Navigational Watch Alarm System
BP	Bearing Pulse

BRG	Bearing
BZ	Bearing Zero
C UP	Course Up. Own ship’s course is pointed to the top center of the radar display.
CA-CFAR	Cell Averaging CFAR
Cargo.Cat	Cargo Category
CCRP	Consistent Common Reference Point.
CCRS	Consistent Common Reference System
CCU	Central Control Unit
CCW	Counterclockwise
CFAR	Constant False Alarm Rate
CH	Channel
CHG	Change
CID	Conning Information Display
CIF	Companion MPU Interface
CLR	Clear
COG	Course Over the Ground
COM	Communication Port
CONT	Contrast, Control
CONV	Conventional
CORREL	Correlation
CPA	Closest Point of Approach
CPU	Central Processing Unit
CTS	Course To Steer. Heading command.
CTW	Course Through the Water
Curr.	Current
CW	Clockwise
D/N	Day/Night
DC	Direct Current
Def.	Definition
DGPS	Differential GPS
DIFF	Difference
DIR = Dir.	Direction
DISP = Disp	Display

DIST	Distance
DNV	Det Norske Veritas
DR	Dead Reckoning, Dead Reckoned Position
DRIFT	The current velocity for manual correction or the current speed on the horizontal axis of the 2-axis log is displayed.
DSC	Digital Selective Calling
DSP	Digital Signal Processor
EBL	Electronic Bearing Line
ECC	Early Course Change
Ed.	Edition
EGC	Enhanced Group Calling
ENC	Electronic Navigational Chart
ENH	Enhance
EP	Estimated Position
EPA	Electronic Plotting Aids
EPFS	Electronic Position Fixing System
EQUIP	Equipment
ETA	Estimated Time of Arrival
ETD	Estimated Time of Departure
F.ETA	Final Estimated Time of Arrival. Estimated time of arrival to the last WPT
FPGA	Field Programmable Gate Array
FTC	Fast Time Constant
FWD	Forward
GC	Great Circle
GIF	Gyro Interface
GLONASS	Global Orbiting Navigation Satellite System
GND	Ground
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
GZ	Guard Zone
H UP	Head Up
H/W = HW	HardWare
HASP	Hardware Against Software Piracy
HC	Heading Control
HCS	Heading Control System

HDG	Heading
HDOP	Horizontal Dilution of Precision
HL	Heading Line
HO	Hydrographic Organization
HSC	High Speed Craft
I/F = IF	Interface
I/O	Input/Output
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
IALA-A	IALA - Region A
IALA-B	IALA - Region B
ID	Identification
IMO	International Maritime Organization
IND	Indication
INFO	Information
INIT	Initialisation
INS	Integrated Navigation System
INT	Interval
IP Address	Internet Protocol Address
IR	Interference Rejection
ISW	Interswitch
L/L = LL	Latitude/ Longitude
LAN	Local Area Network
LAT	Latitude
LCD	Liquid Crystal Display
LMT	Local Mean Time
LON	Longitude
LOP	Line of Position
LORAN	Long Range Navigation
LP	Long Pulse
M/E	Main Engine
MAG	Magnetic
MAN	Manual
MAX	Maximum
MBS	Main Bang Suppression

MFDF	Medium Frequency Direction Finding
MHV	Modulator High Voltage
MIC	Microphone
MID	Middle
MIN	Minimum
MMSI	Maritime Mobile Services Identity Number
MOB	Man Overboard
MON	Monitor
MP	Medium Pulse
MSC	Maritime Safety Committee
MSG	Message
N UP	North Up
NAV = NAVI	Navigation
NAVTEX	Navigational Telex
NE	North East
NFU	Non Follow Up
NLT	Not Less Than
NMEA	National Marine Electronics Association
NMEA0183	NMEA 0183 standards
NMT	Not More Than
No. = NUM	Number
NW	North West
OPE	Operation
OPU	Operation Unit
OSD	Own Ship Data
OVRD	Override
PI	Parallel Index Line
PIN	Personal Identification Number
PL	Pulse Length
PORT	Port/ Portside
POS = POSN	Position
PPI	Plan Position Indicator
PRF	Pulse Repetition Frequency

PROC	Process
PS	Power Supply
PWR	Power
R	Relative
RADAR	Radio Detecting and Ranging
RAND	Random
REF	Reference
REL	Relative
Rev.	Revolution
RIF	Radar I/F Circuit
RL	Rhumb Line
RM	Relative Motion
RM(R)	Relative Motion. Relative Trails.
RM(T)	Relative Motion. True Trails.
RMS	Root Mean Square
RNG	Range
RoRo	Roll On/ Roll Off (Vessel)
ROM	Read Only Memory
ROT	Rate of Turn
RX	Receiver
SA	Scheme Administrator
SAR	Search and Rescue
SART	Search and Rescue Transponder
SATNAV	Satellite Navigation
SBAS	Satellite Based Augmentation System
SCL	Serial LAN Converter
SDK	Software Development Kit
SE	South East
SEL	Select

Seq	Sequence
SFI	System Function ID
SLC	Serial LAN Converter
SOG	Speed Over the Ground
SP	Short Pulse
SPD	Speed
SprsLvl	Spurious Level
SSD	Solid State Drive
SSE	Security Scheme Error
SSR	Solid State Radar
SSW	Safety Switch
STAB	Stabilised , Stabilisation
STBD	Starboard, Starboard Side
STC	Sensitivity Time Control
STD	Standard
STW	Speed Through the Water
SW HUB	Switching Hub
SYNC	Synchronisation
SYS	System
T	True
T & P	Temporary and Preliminary Notice to Mariners
TCPA	Time to CPA
TD	Time Difference
TEMP / Temp.	Temperature
TGT	Target
TM	True Motion
TNI	Tune Indicator
TPL	Transferred Line of Position
TRX	Transceiver
TT	Target Tracking
TTG	Time to Go

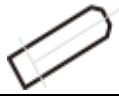
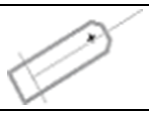
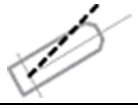
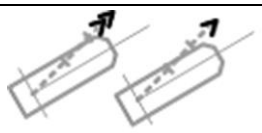
TX	Transmitter
TXRX	Transmitter Receiver Unit
U.Map	User Map
UNACK	Un-Acknowledge
Up.No.	Update Number
USB	Universal Serial Bus
UTC	Coordinated Universal Time
VD	Video
VDIN	Video In
VDR	Voyage Data Recorder
Ver.	Version
VHF	Very High Frequency
VOL	Volume
VRM	Variable Range Marker
W UP	Waypoint Up
WGS	World Geodetic System
WIG	Wing-in-ground effect craft
WOL	Wheel Over Line
WPT	Waypoint
WS	Work Station
WTRST	Watch Timer Reset

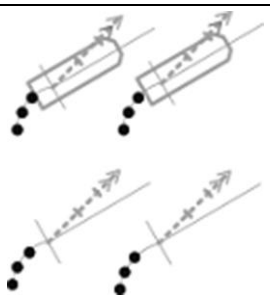
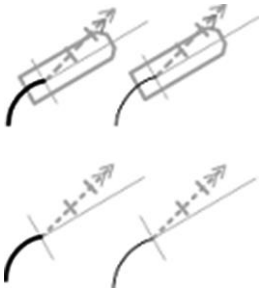
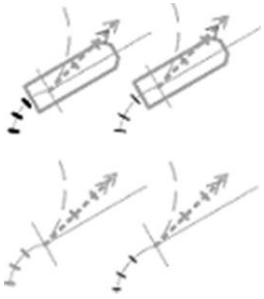
Unit	
bps	bit per second
cm	centimetre
dB	decibel
deg	degree
fm	fathom
ft	feet, foot
h = hr	hour
hPa	hecto pascal
Hz	hertz
kg	kilogram
km	kilometre
kn = kts	knot
m	metre
mbar	millibar
min	minute
mph	mile per hour
NM	nautical mile
RAD	radius
rpm	revolutions per minute
s	second
sm	statute mile

List of Navigation-related Symbols

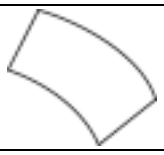
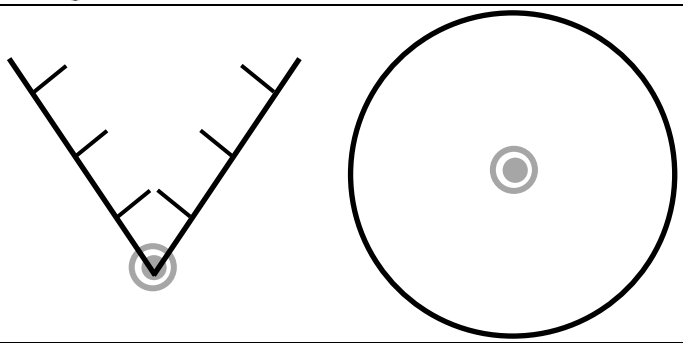
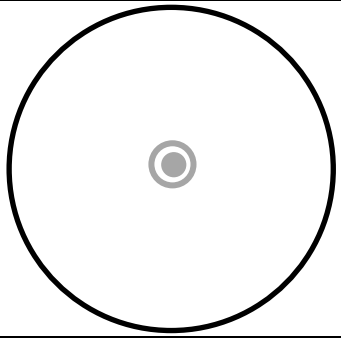
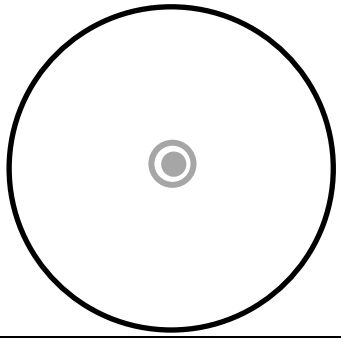
The navigation-related symbols that are displayed in this equipment are listed below.

Related to own ship symbols

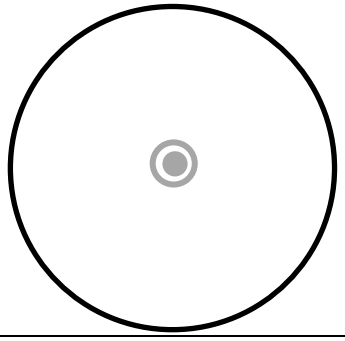
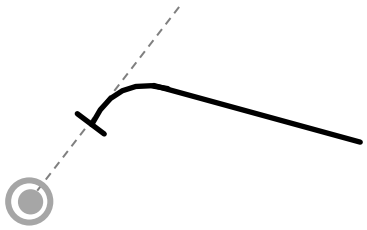
No.	Drawn object name	Drawn object display example
1	Own ship symbol (True Scaled Outline)	
2	Own ship symbol (Simplified Symbol)	
3	Radar antenna position	
4	Heading Line	
5	Beam Line	
6	Stern Line	
7	Vector	
8	Ground vector indicator	
9	Water vector indicator	

No.	Drawn object name	Drawn object display example
10	Own ship track Time Mark	
11	POS2 Symbol	
12	PastPOSN	
13	Own ship track	
14	Vector Time Mark	

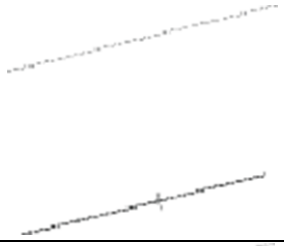
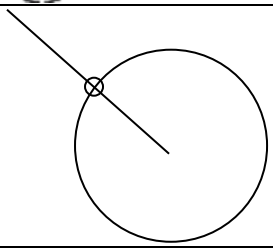
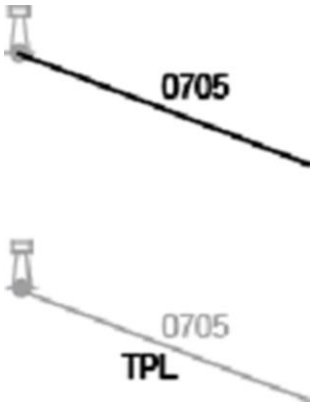
TT/AIS related

No.	Drawn object name	Drawn object display example
1	AZ	
2	AIS Filter	
3	CPA Ring *Thin red circle	
4	Limit Ring *Thin green circle	
5	Sector Blank	

Navigation monitoring related

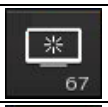
No.	Drawn object name	Drawn object display example
1	Dredging anchor monitoring circle *Thick red circle	
2	WPT	
	Routes	
3	EBL Maneuver	

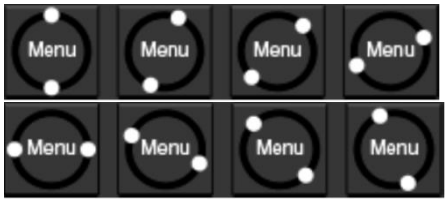
Tool related

No.	Drawn object name	Drawn object display example
1	Range Ring	
2	EBL	
3	VRM	
4	Node Fixed EBL/VRM *Thin orange line and circle	
5	PI	
6	MOB	
7	LOP	

List of Icons/Icon Buttons

The icons/icon buttons displayed in this equipment are listed below.

No.	Name	Functional outline	Displayed image
1	Active indicator	Indicates that the computer is processing by an animation.	
2	Delete	Deletes the item.	
3	Check again	Checks the contents being displayed again.	
4	Setting mark	Displayed when the operation is valid. (E.g., Latitude and longitude offset of chart)	
5	Drive	Displayed at the left of the name when a drive is selected.	
6	Folder	Displayed at the left of the name when a folder is selected.	
7	Home	Changes from the currently displayed screen to the home screen.	
8	Close	Closes the dialog box.	
9	Date selection	Displays the calendar picker.	
10	Dialog box display	Opens another dialog box. (E.g., [Route selection] dialog)	
11	Day/Night	Displays the state of the current Day/Night setting by an icon.	
12	Screen brightness	Enables adjustment of the screen brightness.	
13	Panel brightness	Enables adjustment of the brightness of operation unit.	
14	MOB	Starts the MOB (Man Over Board) mode. In the MOB mode, a symbol display of the position of the sailor falling over board and a dotted like connecting it to the own ship are displayed graphically.	

No.	Name	Functional outline	Displayed image
15	Message notification	When there is a message from outside (AIS safety related messages, etc.), the number of messages is displayed in a badge over the icon. The message window is displayed when the icon is clicked.	
16	Menu	"Menu" button with freeze indicator function. Displays the menu. Indicates using animation that the system is operating.	
17	Writing tool	Changes to the writing mode, which includes user map creation [a)], manual updating [b)] and route creation [c)]. Label of icon changes according to drawing mode.	 a) b) c)
18	Cursor mode selection	Changes the cursor mode to AUTO mode.	
19	Undo	Executes an undo operation.	
20	Screen capture	Creates the capture image at the time this is pressed.	
21	Eraser tool	Changes to the user map deleting mode, and user maps can be deleted successively.	
22	Silencing	Silences the alert sound.	
23	Multiple knob (small knob)	Displays the functions assigned to the multiple knob. Displayed as an icon with the function name at left.	
24	Brightness	Sets the brightness of the screen.	
25	Cursor information display	Displays the cursor read out information area. When pressed again, the cursor read out information area is closed.	

26	Page selection	The [Page Selection] dialog box is displayed.	
27	Expand List	Displays the TT/AIS list of the standard mode newly in an expanded window.	
28	Standard List	Closes the expand mode TT/AIS list (separate window), and displays in the standard mode (information monitoring window panel)	
29	Standard AIS	Changes to standard AIS display.	
30	Expand AIS	Changes to expanded AIS display.	
31	Route Monitoring	Opens the dialog box for route monitoring. When a route is selected, displays the information up to the next target location, and monitors whether the own ship is traveling according to the route.	
32	TT/AIS	Opens the TT/AIS related menu. This also has the function of highlighting the display of the TT/AIS symbol depending on the conditions, or the function of sending a message to an AIS ship, etc.	
33	Tools	Tool related menu, such as the range and bearing measurement EBL/VRM or PI, etc.	
34	View	Opens the View related menu. Settings are made of the display of objects in the radar PPI or in the chart.	
35	Alert	Opens the alert related menu. Settings related to the alerts from the equipment can be made. When clicked, the [Alert] dialog box appears. Alert settings can be made in the dialog box.	
36	Settings	Opens the menu related to the operation settings of the equipment.	

37	Maintenance	The maintenance related menu for the users is displayed. It is possible to check the software version and to monitor the status of the equipment.	
38	Help	Opens the help screen.	
39	Code Input	Input the password.	
40	Service	The menu related to adjustment, servicing, and maintenance is displayed for the servicing personnel.	
41	Back space	Carries out a backspace operation.	
42	Backward movement of the input position	Moves back the input position.	
43	Forward movement of the input position	Moves the input position forward	
44	Operation guide	Displays the operation guide when clicked.	
45	Search	Displayed in the search text box.	
46	Thumbnail / list display selection	Switches between thumbnail and list displays.	 
47	Original scale	Changes the scale of the screen to the original scale of the chart being displayed at the center of the screen.	
48	Event	Places the event mark at the position of the own ship.	
49	Zoom Area	Makes and enlarged display of the specified square area.	
50	Offset display	Displays the offset amounts of the chart being displayed.	

51	AIS display	Selects ON/OFF of the AIS display.	
52	TT	Selects ON/OFF of the TT display.	
53	Move backward	Changes the chart display to the position and scale before the display was changed.	
54	All	Consolidated mode of PI This is the mode of operating the orientation and spacing of all the parallel lines.	
55	Individual	Individual mode of PI The orientation of each line, the distance from the reference position, and the length are operated independently in this mode.	
56	Track	PI tracking mode This is the mode of operating the orientation and spacing between two parallel lines. The two parallel lines are placed to the left and right taking CCRP as the reference.	
57	Equiangular	Equal angle mode of PI This is the mode of operating the angle of two lines that intersect at the reference position.	
58	Contents selection	The display contents of the panel are changed directly	

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For additional information on export of the Software, refer to the website: http://www.microsoft.com/en-us/exporting/default/aspx.

Font License Agreement

This product uses Migu font (http://mix-mplus-ipa.sourceforge.jp/migu/) to display characters on the screen. Migu font data is distributed from the URL stated above. Migu font is distributed in compliance with "IPA Font License Agreement v1.0" (http://ipafont.ipa.go.jp/ipa_font_License _v1.html). This product loaded with the Migu font is also in compliance with "IPA Font License Agreement v1.0." You may use this product under the agreement to the provisions of "IPA Font License Agreement v1.0." You have the right to change the font used for the display of this product from Migu font to IPA font. However, there is no need to change the Migu font to IPA font in the specifications of this product. Moreover, this product is designed to provide the display which is optimized for using Migu font. Note that using IPA font for the display may cause a problem of compatibility of font data with regard to the form of some characters resulting in degradation of the display on the screen. If you desire to change from Migu font to IPA font, consult with our service agent.

IPA Font License Agreement v1.0

The Licensor provides the licensed Program (as defined in Article 1 below) under the terms of this License Agreement (“Agreement”). Any use, reproduction or distribution of the licensed Program, or any exercise of rights under this Agreement by a Recipient (as defined in Article 1 below) constitutes the Recipient's acceptance of this Agreement.

Article 1 (Definitions)

In this Agreement, the following terms set forth in each item shall be defined as therein.

1. “Digital Font Program” shall mean a computer program containing, or used to render or display fonts.
2. “Licensed Program” shall mean a Digital Font Program licensed by the Licensor under this Agreement.
3. “Derived Program” shall mean a Digital Font Program created as a result of a modification, addition, deletion, replacement or any other adaptation to or of a part or all of the licensed Program, and includes a case where a Digital Font Program newly created by retrieving font information from a part or all of the licensed Program or Embedded Fonts from a Digital Document File with or without modification of the retrieved font information.
4. “Digital Content” shall mean products provided to end users in the form of digital data, including video content, motion and/or still pictures, TV programs or other broadcasting content and products consisting of character text, pictures, photographic images, graphic symbols and/or the like.
5. “Digital Document File” shall mean a PDF file or other Digital Content created by various software programs in which a part or all of the licensed Program becomes embedded or contained in the file for the display of the font (“Embedded Fonts”). Embedded Fonts are used only in the display of characters in the particular Digital Document File within which they are embedded, and shall be distinguished from those in any Digital Font Program, which may be used for display of characters outside that particular Digital Document File.
6. “Computer” shall include a server in this Agreement.
7. “Reproduction and Other Exploitation” shall mean reproduction, transfer, distribution, lease, public transmission, presentation, exhibition, adaptation and any other exploitation.
8. “Recipient” shall mean anyone who receives the licensed Program under this Agreement, including one that receives the licensed Program from a Recipient.

Article 2 (Grant of License)

The Licensor grants to the Recipient a License to use the licensed Program in any and all countries in accordance with each of the provisions set forth in this Agreement. However, any and all rights underlying in the licensed Program shall be held by the Licensor. In no sense is this Agreement intended to transfer any right relating to the licensed Program held by the Licensor except as specifically set forth herein or any right relating to any trademark, trade name, or service mark to the Recipient.

1. The Recipient may install the licensed Program on any number of Computers and use the same in accordance with the provisions set forth in this Agreement.
2. The Recipient may use the licensed Program, with or without modification in printed materials or in Digital Content as an expression of character texts or the like.
3. The Recipient may conduct Reproduction and Other Exploitation of the printed materials and Digital Content created in accordance with the preceding Paragraph, for commercial or non-commercial purposes and in any form of media including but not limited to broadcasting, communication and various recording media.
4. If any Recipient extracts Embedded Fonts from a Digital Document File to create a Derived Program, such Derived Program shall be subject to the terms of this agreement.
5. If any Recipient performs Reproduction or Other Exploitation of a Digital Document File in which Embedded Fonts of the licensed Program are used only for rendering the Digital Content within such Digital Document File then such Recipient shall have no further obligations under this Agreement in relation to such actions.
6. The Recipient may reproduce the licensed Program as is without modification and transfer such copies, publicly transmit or otherwise redistribute the licensed Program to a third party for commercial or non-commercial purposes (“Redistribute”), in accordance with the provisions set forth in Article 3 Paragraph 2.
7. The Recipient may create, use, reproduce and/or Redistribute a Derived Program under the terms stated above for the license d Program: provided, that the Recipient shall follow the provisions set forth in Article 3 Paragraph 1 when Redistributing the Derived Program.

Article 3 (Restriction)

The License granted in the preceding Article shall be subject to the following restrictions:

1. If a Derived Program is Redistributed pursuant to Paragraph 4 and 7 of the preceding Article, the following conditions must be met :
   (1) The following must be also Redistributed together with the Derived Program, or be made available online or by means of mailing mechanisms in exchange for a cost which does not exceed the total costs of postage, storage medium and handling fees:
      (a) a copy of the Derived Program; and
      (b) any additional file created by the font developing program in the course of creating the Derived Program that can be used for further modification of the Derived Program, if any.
   (2) It is required to also Redistribute means to enable recipients of the Derived Program to replace the Derived Program with the licensed Program first released under this License (the "Original Program"). Such means may be to provide a difference file from the Original Program, or instructions setting out a method to replace the Derived Program with the Original Program.
   (3) The Recipient must license the Derived Program under the terms and conditions of this Agreement.
   (4) No one may use or include the name of the licensed Program as a program name, font name or file name of the Derived Program.

(5) Any material to be made available online or by means of mailing a medium to satisfy the requirements of this paragraph may be provided, verbatim, by any party wishing to do so.

2. If the Recipient Redistributes the licensed Program pursuant to Paragraph 6 of the preceding Article, the Recipient shall meet all of the following conditions:
   (1) The Recipient may not change the name of the licensed Program.
   (2) The Recipient may not alter or otherwise modify the licensed Program.
   (3) The Recipient must attach a copy of this Agreement to the licensed Program.
3. This licensed program is provided by the licensor “as is” and any expressed or implied warranty as to the licensed program or any derived program, including, but not limited to, warranties of title, non-infringement, merchantability, or fitness for a particular purpose, are disclaimed. In no event shall the licensor be liable for any direct, indirect, incidental, special, extended, exemplary, or consequential damages (including, but not limited to; procurement of substituted goods or service; damages arising from system failure; loss or corruption of existing data or program; lost profits), however caused and on any theory of liability, whether in contract, strict liability or tort (including negligence or otherwise) arising in any way out of the installation, use, the reproduction or other exploitation of the licensed program or any derived program or the exercise of any rights granted hereunder, even if advised of the possibility of such damages.
4. The Licensor is under no obligation to respond to any technical questions or inquiries, or provide any other user support in connection with the installation, use or the Reproduction and Other Exploitation of the licensed Program or Derived Programs thereof.

Article 4 (Termination of Agreement)

1. The term of this Agreement shall begin from the time of receipt of the licensed Program by the Recipient and shall continue as long as the Recipient retains any such licensed Program in any way.
2. Notwithstanding the provision set forth in the preceding Paragraph, in the event of the breach of any of the provisions set forth in this Agreement by the Recipient, this Agreement shall automatically terminate without any notice. In the case of such termination, the Recipient may not use or conduct Reproduction and Other Exploitation of the licensed Program or a Derived Program: provided that such termination shall not affect any rights of any other Recipient receiving the licensed Program or the Derived Program from such Recipient who breached this Agreement.

Article 5 (Governing Law)

1. IPA may publish revised and/or new versions of this License. In such an event, the Recipient may select either this Agreement or any subsequent version of the Agreement in using, conducting the Reproduction and Other Exploitation of, or Redistributing the licensed Program or a Derived Program. Other matters not specified above shall be subject to the Copyright Law of Japan and other related laws and regulations of Japan.
2. This Agreement shall be construed under the laws of Japan.

All over the world, close to the customer

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Project	AlphaScan 5900 series
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