

JMA-5312-6/6HS
JMA-5322-7/9/6HS
JMA-5332-12

**MARINE RADAR
EQUIPMENT**

**INSTRUCTION
MANUAL**



Japan Radio Co., Ltd.

◆◆◆PRECAUTIONS BEFORE OPERATION◆◆◆

■Cautions for high voltage

High voltages from hundreds volts to tens of thousands volts are to be applied to the electronic equipment such as radio and radar devices. You do not face any danger during normal operation, but sufficient care is required for maintenance, inspection and adjustment of their internal components. (Maintenance, check-up and adjustment of the inside of the equipment are prohibited except by maintenance specialists.)

High voltages of tens of thousands volts are so dangerous as to bring an instantaneous death from electric shock, but even voltages of hundred volts may sometimes lead to a death from electric shock. To prevent such an accident, make it a rule to turn off the power switch, discharge capacitors with a wire surely earthed on an end, make sure that internal parts are no longer charged before you touch any parts inside these devices. At the time, wearing dry cotton gloves ensures you further to prevent such danger. It is also a necessary caution to put one of your hands in the pocket and not to use your both hands at the same time.

It is also important to select a stable foothold always to prevent additional injuries once you were shocked by electricity. If you were injured from electric shock, disinfect the burn sufficiently and get it taken care of promptly.

■What to do in case of electric shock

When finding a victim of electric shock, turn off the power source and earth the circuit immediately.

If it is impossible to turn off the circuit, move the victim away promptly using insulators such as dry wood plate and cloth without touching the victim directly.

In case of electric shock, breathing may stop suddenly if current flows to the respiration center in the brain. If the shock is not so strong, artificial respiration may recover breathing. When shocked by electricity, the victim will come to look very bad with weak pulse or without beating, resulting in unconsciousness and rigidity. In this case, it is necessary to perform an emergency measure immediately.

◆◆◆FIRST-AID TREATMENTS◆◆◆

☆First-aid treatments

As far as the victim of electric shock is not in dangerous condition, do not move him and practice artificial respiration on him immediately. Once started, it should be continued rhythmically.

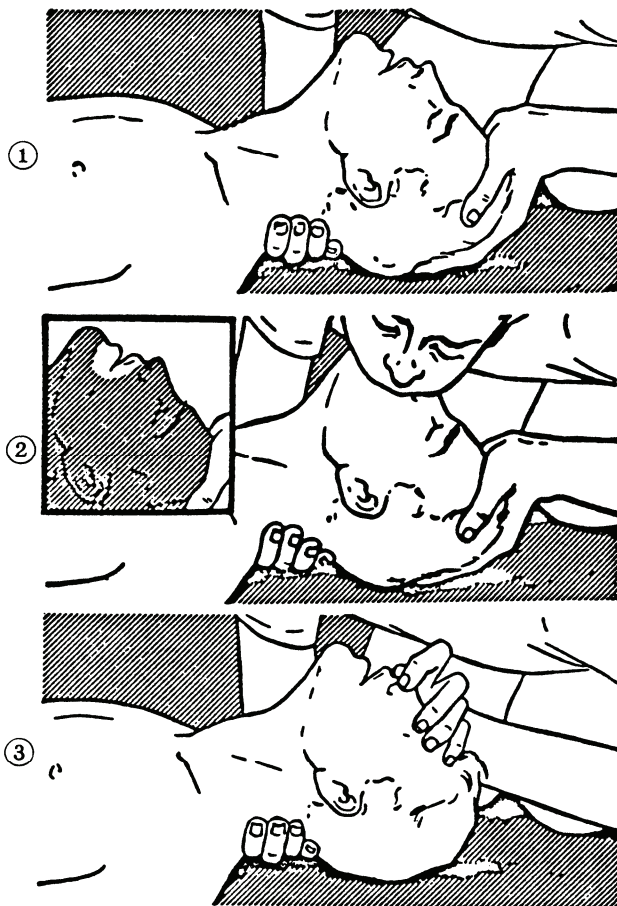
- (1) Do not touch the victim confusedly as a result of the accident, but the rescuer may also get an electric shock.
- (2) Turn off the power source calmly and move the victim away quietly from the electric line.
- (3) Call a physician or ambulance immediately or ask someone to call a doctor.
- (4) Lay the victim on this back and loosen his necktie, clothes, belt, etc.
- (5)
 - a. Examine the victim's pulse.
 - b. Examine his heartbeat bringing your ear close to his heart.
 - c. Examine his breathing bringing the back of your hand or your face close to his face.
 - d. Check the size of the pupils of his eyes.
- (6) Open the victim's mouth and take out artificial teeth, cigarette or chewing gum if any. Keep his mouth open, stretch his tongue and insert a towel or the like in his mouth to prevent the tongue from suffocating. (If it is hard to open his mouth due to set teeth, open it with a screwdriver and insert a towel in this mouth.)
- (7) Then, wipe his mouth so that foaming mucus does not accumulate inside.

☆When pulse is beating but breathing has stopped

(Mouth-to-mouth respiration) Fig. 1

- (1) Tilt the victim's head back as far as this face looks back. (A pillow may be inserted his neck.)
- (2) Push his jaw upward to open his throat wide (to spread his airway).
- (3) Pinch the victim's nostrils and take a deep breath, block his mouth completely with yours and blow into his mouth strongly. Take a deep breath again and blow into his mouth. Continue this 10 to 15 times a minutes (blocking his nostrils).
- (4) Carefully watch that he has recovered his natural breathing and atop practicing artificial respiration.
- (5) If it is difficult to open the victim's mouth, insert a rubber or vinyl tube into one of his nostrils and blow into it blocking the other nostril and his mouth completely.
- (6) When the victim recovers consciousness, he may try to stand up suddenly, but let him lie calmly and serve him with a cup of hot coffee or tea and keep him warm and quiet. (Never give him alcoholic drinks.)

Method of mouth-to-mouth respiration by raising head



- (1) Raise the victim's head. Support his forehead with one of your hand and his neck with the other hand. →①

When you tilt his head backward, the victim, in most cases, opens his mouth to the air. This makes mouth-to mouth respiration easy.

- (2) Cover his mouth as widely as possible with yours and press your cheek against his nose →②

or, pinch his nostrils with your fingers to prevent air from leaking. →③

- (3) Blow into his lungs. Continue blowing into his mouth until his breast swells. Blow into his mouth as quickly as possible for the first 10 times.

Fig. 1 Mouth-to mouth respiration

☆When both pulse and breathing have stopped

Perform the (Cardiac massage) Fig. 2 and (Mouth-to-mouth respiration) Fig. 1

When no pulse has come not to be felt, his pupils are open and no heartbeat is heard, cardiac arrest is supposed to have occurred and artificial respiration must be performed.

- (1) Place your both hands, one hand on the other, on the lower one third area of his breastbone and compress his breast with your elbows applying your weight on his breast so that it is dented about 2cm (Repeat compressing his breast 50 times or so a minutes). (Cardiac massage)
- (2) In case of one rescuer,
Repeat cardiac massages about 15 times and blow into his mouth 2 times quickly, and repeat this combination.
In case of two rescuers,
One person repeats cardiac massages 15 times while the other person blow into his mouth twice, and they shall repeat this combination. (Perform the cardiac massage and mouth-to-mouth respiration)
- (3) Examine his pupils and his pulse sometimes. When the both have returned to normal, stop the artificial respiration, serve him with a cup of hot coffee or tea and keep him warm and calm while watching him carefully. Commit the victim to a medical specialist depending on his condition. (Never give him alcoholic drinks.) To let him recover from the mental shock, it is necessary for persons concerned to understand his situations and the necessary treatment.

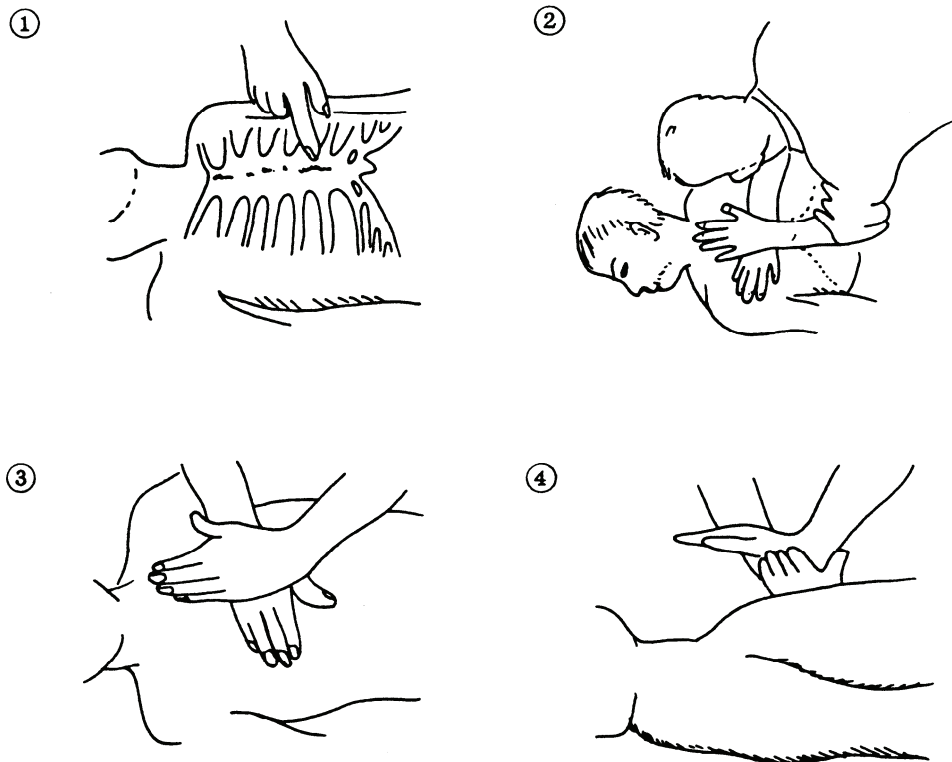


Fig. 2 Cardiac massage

PREFACE

Thank you very much for purchasing the JRC marine radar equipment, JMA-5300MK2 series.
This equipment is a marine radar equipment designed to obtain safe operation of marine ships.
This equipment consists of a radar signal transmitter-receiver unit, a LCD display unit and a scanner unit as its main units.




- Before operating the equipment, be sure to read this instruction manual carefully for correct operation.
- Maintain this instruction manual so that operators can refer to it at anytime.

Refer to this manual when any inconvenience or defect occurs.

● Before Operation ●

Pictorial Indication

Various pictorial indications are included in this manual and are shown on these 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 these equipment are 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 these equipment are not operated correctly.

Examples of Pictorial Indication



Electric Shock

The \triangle 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



Prohibited

The \odot 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



Instruction

The \bullet 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 ●

DANGER



Never conduct inspection or repair work of equipment components.

Inspection or repair work by uncertified personnel may result in fire hazard or electrocution.

For inspection and repair work of equipment components, consult with our branch office, branch shop, sales office, or our distributor in your district.



When conducting maintenance, make sure to turn the main power off.

Failure to comply may result in electrocution.



Turn off the main power before cleaning the equipment.

Especially when a rectifier is used, 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 to comply may result in equipment failure, or death or serious injury due to electric shock.



When conducting maintenance work on the scanner, make sure to turn its main power off.

Failure to comply may result in electrocution or injuries.

DANGER



Make sure to turn off the scanner safety switch. Failure to comply may result in injuries caused by physical contact with the rotating scanner.

WARNING



Never directly touch the internal components of the scanner or indicator. Direct contact with these high-voltage components may cause electrocution. For maintenance, inspection, or adjustment of equipment components, consult with our branch office, branch shop, sales office, or our distributor in your district. To contact our sales department, branch offices, branch shops, and sales offices:

Please refer to the "Office List" at the end of the document.



Do not get close to the radiant section of the scanner. 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 bridge, on the trestle, or on the radar mast so that no one can get close to it. When any work must be done on the scanner, make sure to turn the safety switch off.



WARNING



Microwave radiation level:

Keep out from a distance closer than that specified below for each type of scanner when it is transmitting. Being within the specified distance from the center of the front face of the scanner may cause microwave exposure which could result in injuries (especially of the eyes).

NKE-2103/2254 (radiation levels: 10 W/m²): 0.6 m

NKE-1130 (radiation levels: 10 W/m²): 1.1 m

NKE-1130 (radiation levels: 100 W/m²): 25 cm



Make sure to install the scanner at a place higher than human height.

Direct exposure to electromagnetic waves at close range will have adverse effects on the human body.



Direct exposure to electromagnetic waves at close range will have adverse effects on the human body. When it is necessary to get close to the scanner for maintenance or inspection purposes, make sure to turn the indicator power switch 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 and unplug the power connector J1 of the radar process unit 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 without unplugging the power connector may result in electrocution, equipment failure, or accidents.



WARNING



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 to comply will result in damage to the screen surface.



Do not change MBS Level/Area unless absolutely necessary. Incorrect adjustment will result in deletion of nearby target images and thus collisions may occur resulting in death or serious injuries.



When disposing of used lithium batteries, be sure to insulate the batteries by attaching a piece of adhesive tape on the \oplus and \ominus terminals. Failure to comply may cause heat generation, explosion, or fire when the batteries get shorted out.



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 may cause accidents such as collisions or running aground.

CAUTION



Use target tracking 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



A malfunction 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.



When using the [AUTO SEA] function, never set the suppression level too high canceling out all image noises from the sea surface at close range.

Detection of not only echoes from waves but also targets such as other ships or dangerous objects will become inhibited.

When using the [AUTO SEA] function, make sure to choose the most appropriate image noise suppression level.



When using the [AUTO RAIN] function, never set the suppression level too high canceling out all image noises from the rain or snow at close range.

Detection of not only echoes from the rain or snow but also targets such as other ships or dangerous objects will become inhibited.

When using the [AUTO RAIN] function, make sure to choose the most appropriate image noise suppression level.

CAUTION



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.



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.



Optimal values have been set for VD LEVEL and CONSTANT; therefore, never change their values unless absolutely necessary. Failure to comply may result in accidents that would lower target tracking performance.



Make sure to shut off the main power before replacing parts. Failure to comply may result in electrocution or equipment failure.



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 to comply may result in electrocution.

CAUTION



**Make sure to take off your watch when your hand must get close to the magnetron.
Failure to comply 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.



**Do not directly touch the inverter circuit of the LCD display with a bare hand since high voltage temporarily remains in the circuit even after the main power is shut off.
Failure to comply may result in electrocution.**



**Any adjustments must be made by specialized service personnel.
Incorrect settings may result in unstable operation.**



Do not make any adjustments during navigation. Failure to comply may result in adverse effects on the radar function which may lead to accidents or equipment failure.



**Any adjustments must be made by specialized service personnel.
Failure to comply may result in accidents or equipment failure.**



Do not make any adjustments during navigation. Failure to comply may result in adverse effects on the radar function which may lead to accidents or equipment failure.

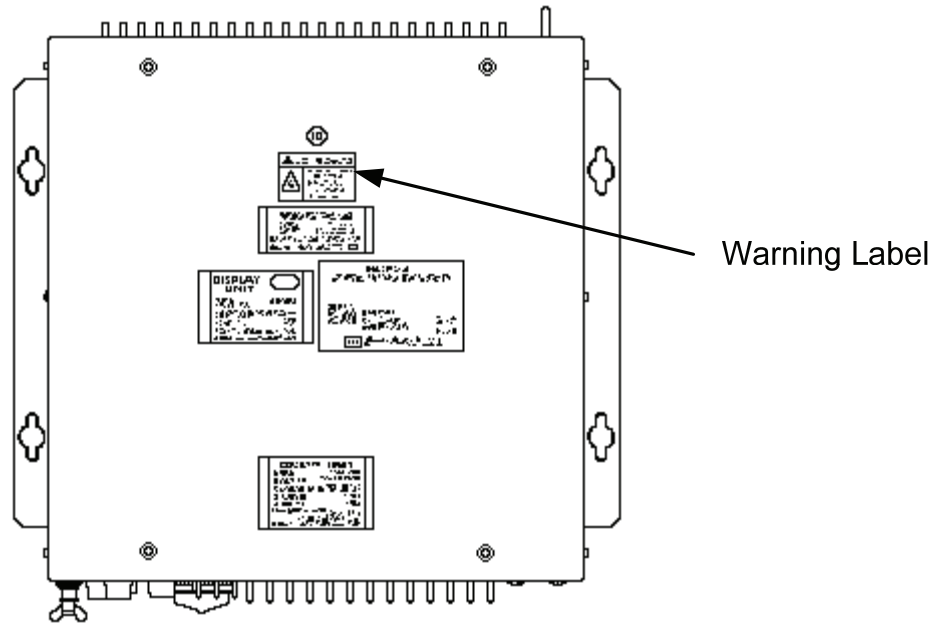


CAUTION

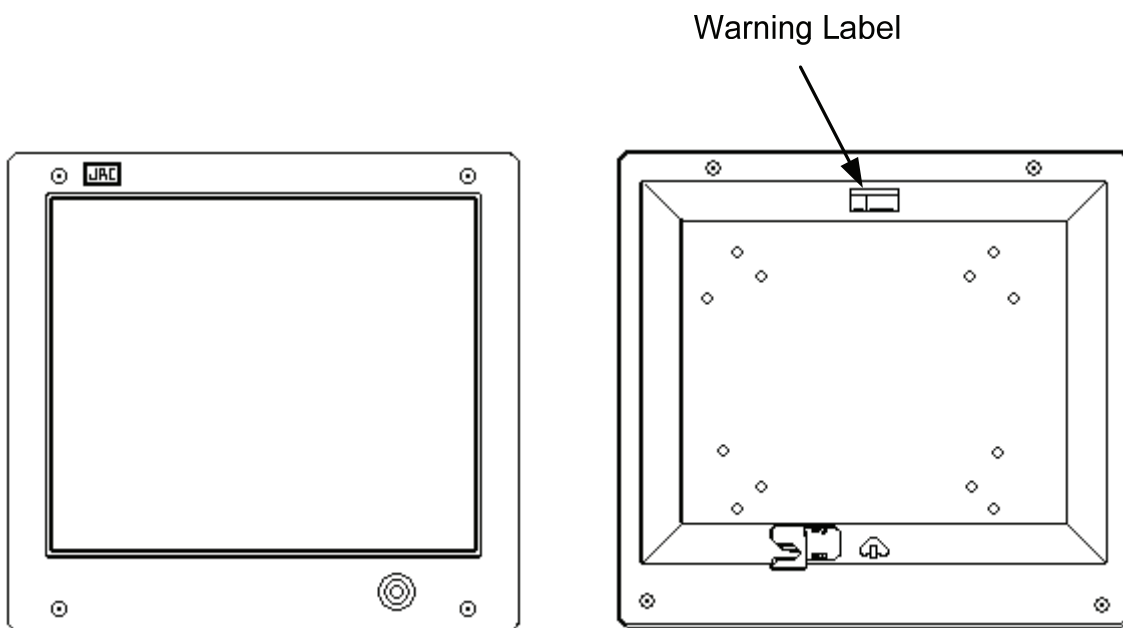


Do not change the quantization level settings unless absolutely necessary. If set at an inappropriate value, the target acquisition or target tracking function deteriorates, and this may lead to accidents.

The Mounting Point of the Warning Label



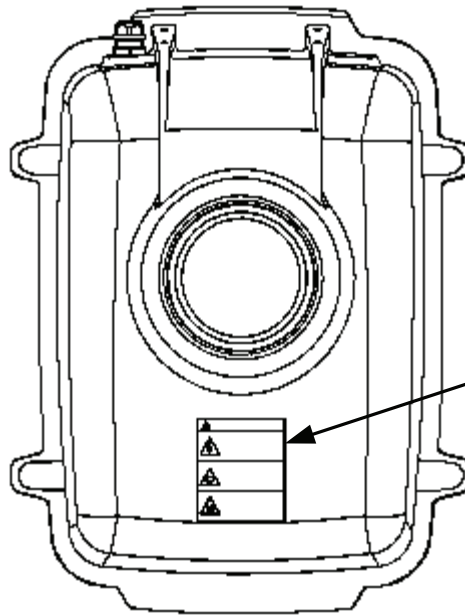
NCD-1417 Radar Process Unit



Front face

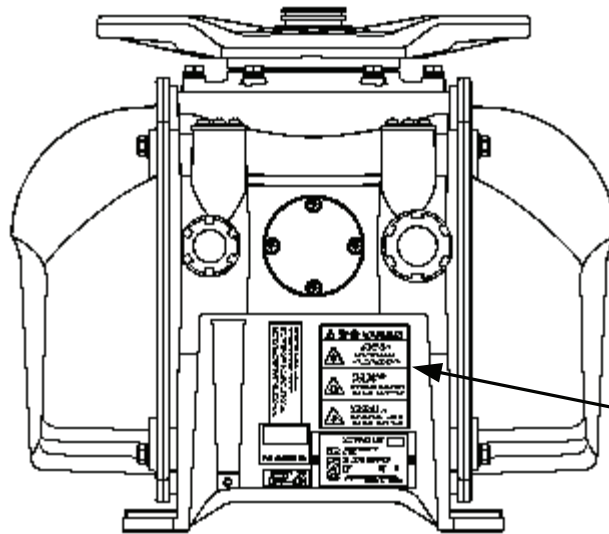
Back face

NWZ-173 LCD Monitor



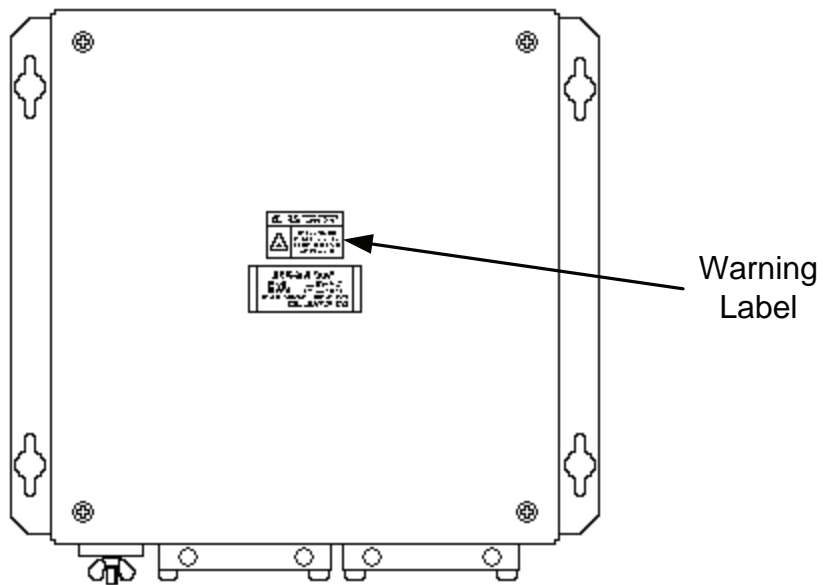
Warning Label

NKE-2103-6/6HS Scanner Unit

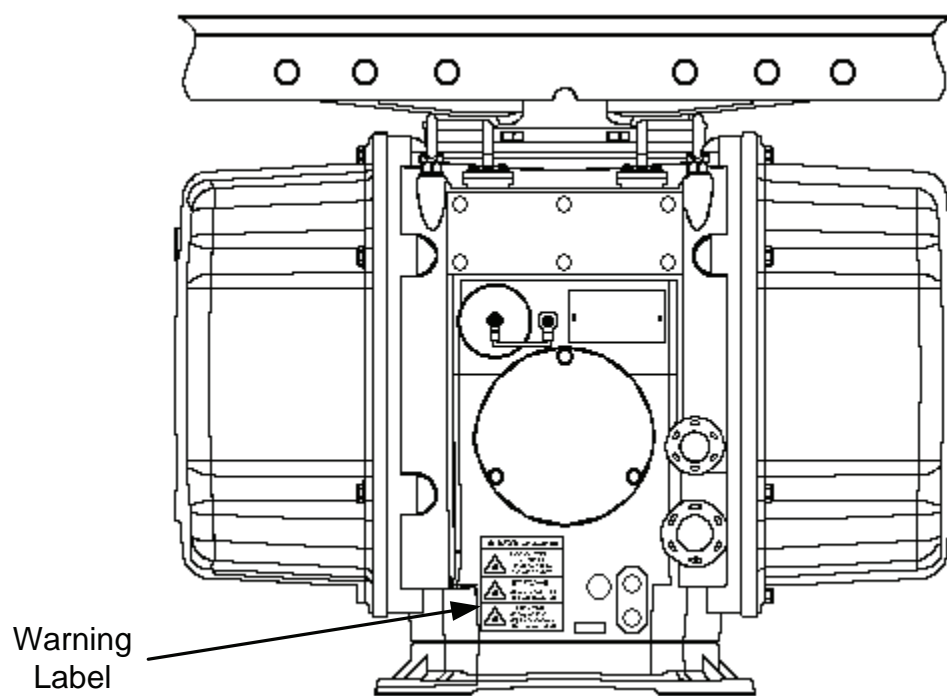


Warning Label

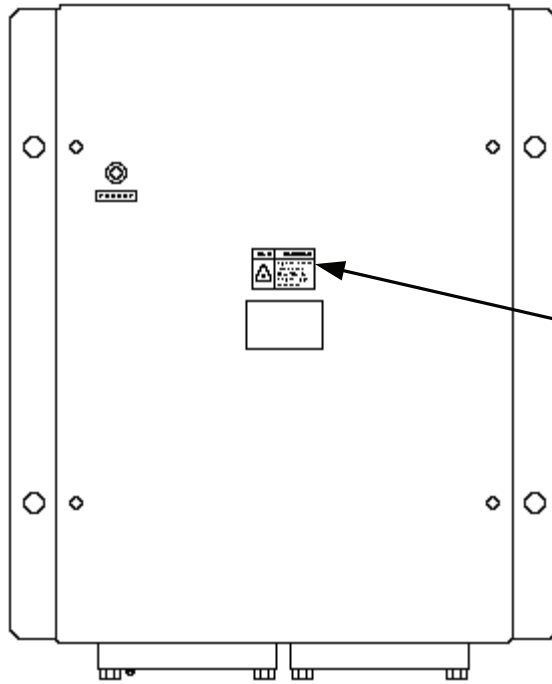
NKE-2254-7/9/6HS Scanner Unit



NQE-3151A Junction Box

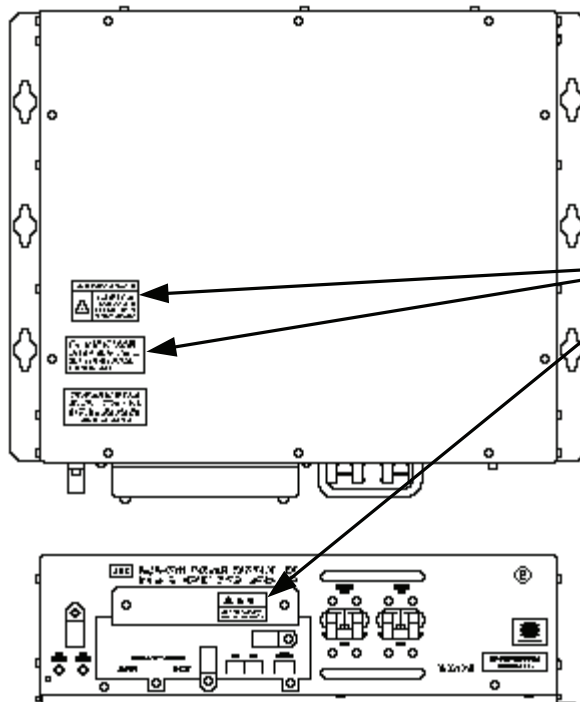


NKE-1130-12 Scanner Unit



Warning Label

NQE-3141-4A/8A Interswitch Unit



Warning Label

NBA-5111 Power Supply

EQUIPMENT APPEARANCE



Scanner Unit Type NKE-1130 (12 feet)



Scanner Unit Type NKE-2103-6/6HS (6 feet)



Scanner Unit Type NKE-2254-6HS (6 feet)



Scanner Unit Type NKE-2254-7 (7 feet)



Scanner Unit Type NKE-2254-9 (9 feet)



NDC-1417 Processor Unit (Desktop Type)



**NWZ-173 LCD Monitor Unit (Desktop Type)
NCE-5171 Operation Unit (Desktop Type)**

NCD-4530 Display Unit (Desktop Type)

GLOSSARY

This section describes the main terms used for this equipment and general related maritime terms.

A

AZ	Acquisition/Activation zone A zone set up by the operator in which the system should automatically acquire radar targets and activate reported AIS targets when entering the zone.
Activated target	A target representing the automatic or manual activation of a sleeping target for the display of additional information.
AIS	Automatic Identification System A system which enables ships and shore stations to obtain identifying and navigation information about other ships at sea, using an automated transponder.
Anti-clutter rain	Rain/snow clutter suppression.
Anti-clutter sea	Sea clutter suppression.
Associated target	A target simultaneously representing a tracked target and a reported AIS target having similar parameters (position, course, speed) which comply with an association algorithm.
AZI	AZimuth stabilization mode

B

BCR/BCT	Bow Crossing Range and Bow Crossing Time
----------------	--

C

C up	Course up Own ship's course is pointed to the top center of the radar display.
CCRP	The Consistent Common Reference Point A location on own ship, to which all horizontal measurements such as target range, bearing, relative course, relative speed, CPA or TCPA are referenced, typically the conning position of the bridge.
Clutter	Unwanted reflections on a radar screen, from sea surface, rain or snow.

COG	Course Over Ground The direction of the ship's movement relative to the earth, measured on board the ship, expressed in angular units from true north
CORREL	CORRELation
CPA/TCPA	The distance to the Closest Point of Approach and Time to the Closest Point of Approach. Limits are set by the operator and are related to own ship.
CTW	Course Through Water The direction of the ship's movement through the water
D	
DRIFT	The current velocity for manual correction or the current speed on the horizontal axis of the 2-axis log is displayed.
E	
EBL	Electronic Bearing Line An electronic bearing line originated from own ship's position.
ETA	Estimated Time of Arrival
G	
Ground stabilization	A display mode in which speed and course information are referred to the ground, using ground track input data.
H	
HDG	Heading The horizontal direction that the bow of a ship is pointing at any instant, expressed in angular units from a reference direction .
HL	Heading line A graphic line on a radar presentation drawn from the consistent common reference point to the bearing scale to indicate the heading of the ship
HSC	Vessels which comply with the definition in SOLAS for high speed craft
H up	Head up Own ship's heading line is always pointed to the top center of the radar display.
I	
IMO	International Maritime Organization
Interswitch Unit	A device to switch over two or more radar display units and two or more scanners.

IR radar Interference Rejecter

ISW InterSWitch

L

Lost AIS target A target symbol representing the last valid position of an AIS target before the reception of its data was lost, or its last dead-reckoned position.

Lost tracked target One for which target information is no longer available due to poor, lost or obscured signals.

LP Long Pulse

M

MMSI Maritime Mobile Service Identity

MOB Man OverBoard

MON Performance monitor

MP Medium Pulse

N

nm 1nm=1852m

N up North up
The north is always pointed to the top center of the radar display.

O

Own track Display function of own ship's track

P

PI Parallel Index line

Past positions Equally time-spaced past position marks of a tracked or AIS target and own ship.

POSN POSitioN

PRF Pulse Repetition Frequency
The number of radar pulses transmitted each second.

PROC PROCess
Radar signal processing function

R

Radar beacon A navigation aid which responds to the radar transmission by generating a radar signal to identify its position and identity

Radar cross-section	Radar cross-section of a target determines the power density returned to the radar for a particular power density incident on the target
Range Rings	A set of concentric circles labeled by distance from CCRP.
Reference target	A symbol indicating that the associated tracked stationary target is used as a speed reference for the ground stabilization
Relative course	The direction of motion of a target relative to own ship motion
Relative speed	The speed of a target relative to own ship's speed data
Relative vector	A predicted movement of a target relative to own ship's motion
RM	Relative Motion A display on which the position of own ship remains fixed, and all targets move relative to own ship.
RM(R)	Relative Motion. Relative Trails.
RM(T)	Relative Motion. True Trails.
ROT	Rate Of Turn Change of heading per time unit.
Route	A set of waypoints.
RR	Range Rings
S	
SART	Search And Rescue Transponder Radar transponder capable of operating in the 9GHz band
Sea stabilization	A display mode in which speed and course information are referred to the sea.
Sea state	Status of the sea condition due to the weather environment, expressed as a sea state 0 for flat conditions with minimal wind, to sea state 8 for very rough sea conditions.
SET	The current direction for manual correction or the current speed on the horizontal axis of the 2-axis log is displayed.
Sleeping AIS target	A target indicating the presence and orientation of a vessel equipped with AIS in a certain location.

SOG Speed Over the Ground
The speed of the ship relative to the earth, measured on board of the ship.

SP Short Pulse

STAB STABILization

STW Speed Through Water
The speed of the ship relative to the water surface.

T

TCPA Time to Closest Point of Approach to own ship

Test target Radar target of known characteristics used for test requirement

TM True Motion
A display across which own ship moves with its own true motion.

Trails Tracks displayed by the radar echoes of targets in the form of an afterglow.

Trial maneuver A graphical simulation facility used to assist the operator to perform a proposed maneuver for navigation and collision avoidance purposes.

True course The direction of motion relative to ground or to sea, of a target expressed as an angular displacement from north

True speed The speed of a target relative to ground, or to sea

True vector A vector representing the predicted true motion of a target, showing course and speed with reference to the ground or sea

TT Target Tracking.
A computer process of observing the sequential changes in the position of a radar target in order to establish its motion. Such a target is a Tracked Target.

TTG Time To Go.
Time to next waypoint.

TXRX Transceiver Unit

U

UTC Universal Time Coordinated.
The international standard of time, kept by atomic clocks around the world.

V

VRM

Variable Range Marker

An adjustable range ring used to measure the distance to a target.

W

Waypoint

A geographical location on a route indicating a event.

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INTERSWITCH (OPTION) NQE-3141 INSTRUCTION MANUAL

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FIG.5 TERMINAL BOARD CONNECTION DIAGRAM, TYPE JMA5332-12

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FIG.13 INTERCONNECTION DIAGRAM OF SCANNER UNIT, TYPE NKE-2103

FIG.14 INTERCONNECTION DIAGRAM OF SCANNER UNIT, TYPE NKE-2254

FIG.15 INTERCONNECTION DIAGRAM OF SCANNER UNIT, TYPE NKE-1130
(100/110/115V)

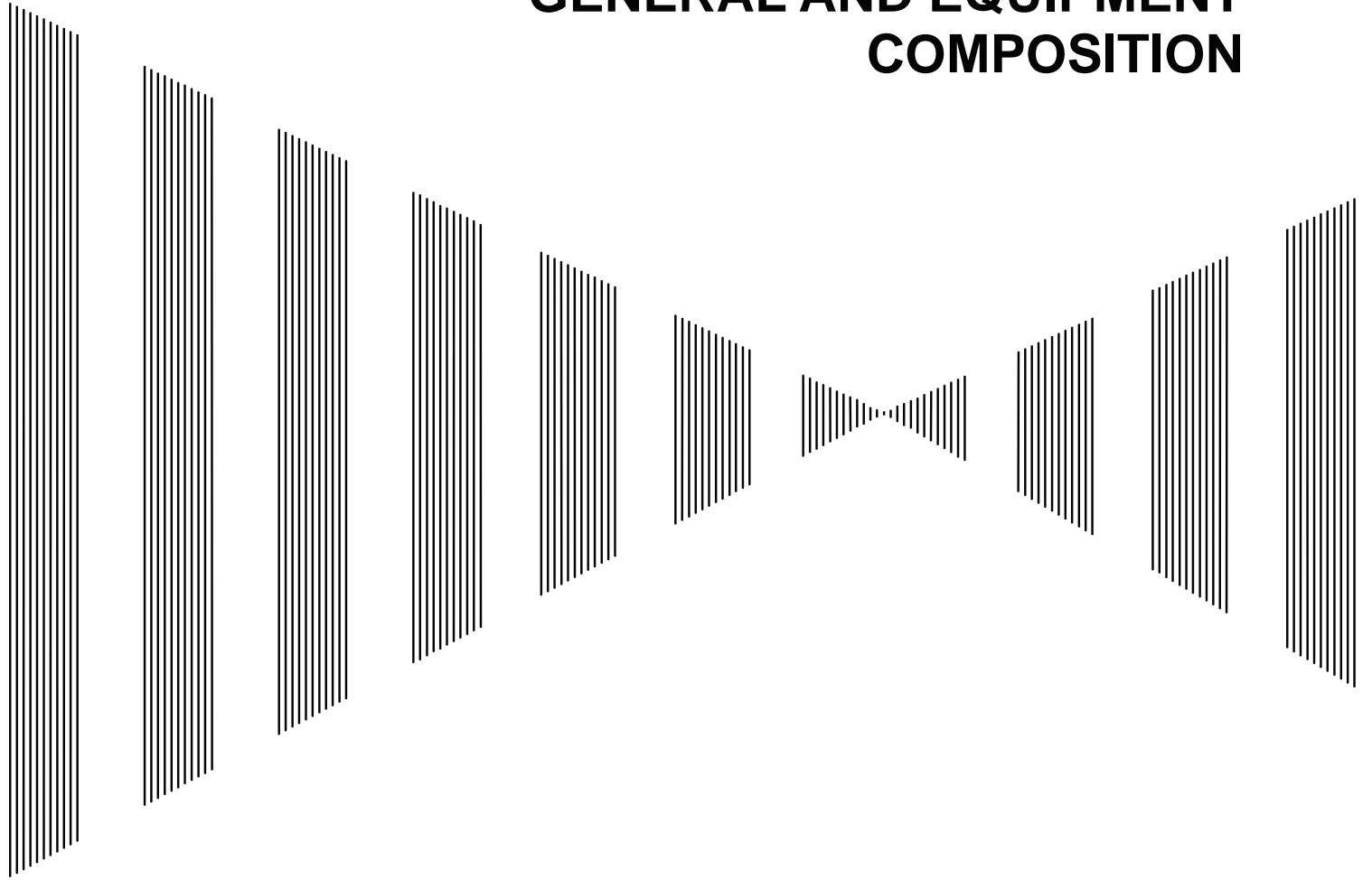
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FIG.17 INTERCONNECTION DIAGRAM OF INTERSWITCH UNIT,
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1.1 FUNCTIONS

This equipment is a high-performance radar equipment consisting of a scanner unit, a transceiver unit and a high resolution color LCD display unit.

1.1.1 Function of This System

The JMA-5300MK2 series is a color radar system designed to comply with the international standards of the IMO.

The main functions include:

- gain 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
- own track display
- colored own track display (7 colors) (option)
- NAV line and marker displays
- TM (True Motion) presentation
- self-diagnostic facilities
- radar performance monitoring (Performance Monitor, option)
- Target Tracking (TT) functions (manual / automatic target acquisition and automatic tracking, vector and track displays and alarm displays) (option)
- simple plotter functions:
 - marker and line display (up to 2000 items.)
 - marker and line display (up to 20000 items.)(option)
 - waypoint / route setting (option)
- 8-unit switchover (Inter switch) function (option)

Note: Performance monitor, ARPA/ATA Process Unit, AIS Process Unit and GYRO Interface Unit must be fitted on ships compliant to IMO.

1.2 FEATURES

Realization of Large, Easy-to-see Screen with High Resolution

The 19-inch color LCD with high resolution of 1280 × 1024 pixels can display radar images of 250 mm or more in diameter. Even short-range targets can also be displayed as high-resolution images.

Target Detection by Latest Signal Processing Technology

The system employs the latest digital signal processing technology to eliminate undesired clutter from the radar video signals that are obtained from the receiver with a wide dynamic range, thus improving the target detection.

Advanced Technology Based Target Tracking (TT) Functions (Option)

The target acquisition and tracking performance is enhanced by the use of the fastest DSP and tracking algorithm. So stable operation in target tracking under clutter is ensured.

- Acquisition and tracking of 100 targets for High performance edition, 30 targets for Normal edition.
- Hazardous conditions are represented by shapes and colors of symbols as well as sounds.
- Trial maneuvering functions provided. (High performance edition)
- Tracks of up to 20 target ships can be stored with a maximum of 1,500 points for each of them, and displayed distinguished by using 7 different colors.

Note: ARPA/ATA Process Unit must be fitted on ships compliant to IMO.

Overlay of Radar Images, Coastlines, and Own Ship's Track

As well as operator-created NAV lines, the data of coastlines, objects such as buoys, and own ship's tracks / target tracks / AIS tracks, which is stored on the memory card can be superimpose-displayed with radar images and radar trails in all display modes including the head-up mode.

Creation / display of marks and lines (up to 2000 items).

Use of the optional plotter function enables the own track display distinguished by using 7 different colors, creation of marks and lines (up to 20000 items) and the settings of waypoints / courses.

Easy Operation with GUI

All the radar functions can be easily controlled by simply using the trackball and 2 switches to operate the buttons shown on the radar display.

Improved Day / Night Mode

Five types of background colors are available in Day / Dusk / Night mode.

Each background color can be reproduced to be suited for the user's operating environment by simple key operation. The radar echoes and a variety of graphics can also be represented in different colors, ensuring easy-to-see displays.

Self-diagnostic Program Incorporated

The Self-diagnostic program always monitors all the functions of the system. If any function deteriorates, an alarm message will appear on the radar display and an alarm sounds at the same time. Even when the system is operating, the functionality test can be carried out. (except on some functions)

Performance Monitor (Option)

The radar performance (transmitted output power and receiving sensitivity) can appear on the radar display.

Note: Performance monitor must be fitted on ships compliant to IMO.

Easy Interswitch Operation (Option)

If an interswitch unit (option) is connected, up to four JMA-5300MK2 radars can be switched over by performing simple operation.

* An interswitch (NQE-3141) is needed separately.

Various Functions

- RADAR Trails
- TM (True Motion) display
- Head-up / North-up / Course-up display
- Own ship's track display
- Automatic Acquisition / Activation function

1.3 CONFIGURATION

Specified of scanner, and categories of ship/craft for SOLAS V

Radar Model	Antenna Type	Transmitted Output Power	Band	Rate of Rotation	Category
JMA-5312-6	6 ft slot antenna	10 kW	X	27rpm	CAT 2
JMA-5312-6HS	6 ft slot antenna	10 kW	X	48rpm	CAT 2H
JMA-5322-7	7 ft slot antenna	25 kW	X	24rpm	CAT 2
JMA-5322-9	9 ft slot antenna	25 kW	X	24rpm	CAT 2
JMA-5322-6HS	6 ft slot antenna	25 kW	X	48rpm	CAT 2H
JMA-5332-12	12 ft slot antenna	30 kW	S	24rpm	CAT 2

*The class of emission: P0N (All scanner types)

Radar Configuration and Ship's Mains

Radar Model	Scanner Unit	Performance Monitor (option)	Display Unit	Ship's Mains
JMA-5312-6	NKE-2103-6	NJU-85	NCD-4530	24 VDC
JMA-5312-6HS	NKE-2103-6HS	NJU-85	NCD-4530	24 VDC
JMA-5322-7	NKE-2254-7	NJU-85	NCD-4530	24 VDC
JMA-5322-9	NKE-2254-9	NJU-85	NCD-4530	24 VDC
JMA-5322-6HS	NKE-2254-6HS	NJU-85	NCD-4530	24 VDC
JMA-5332-12	NKE-1130	NJU-84	NCD-4530	24 VDC
			*NQE-3151A	100/110/115VAC,1 ϕ ,50/60Hz 220/230/240VAC,1 ϕ ,50/60Hz

* The NQE-3151A included in JMA-5332-12 is a connection unit to supply AC power for the motor to the scanner unit.

Notes:

- The JMA-5332-12 needs 24 VDC as the power supply of the radar process unit, and AC power for the motor to drive the scanner unit.
- The table above shows six types of power supplies available for the motor of JMA-5332-12.
- An optional POWER SUPPLY NBA-5111 is necessary for using Ship's Mains 100/110/115/220/230/240 VAC,1 ϕ ,50/60Hz.
- The DISPLAY UNIT NCD-4530 has a separate structure consisting of the following:

LCD MONITOR	NWZ-173
CONTROL UNIT	NCM-853

 The control unit NCM-853 is consisting of the following

RADAR PROCESS UNIT	NDC-1417
OPERATION UNIT	NCE-5171
- The ship with radar of IMO conformity must mount a Performance Monitor.

1.4 EXTERIOR DRAWINGS

Fig. 1.1 Exterior Drawing of Scanner Unit, Type NKE-2103-6 / 6HS

Fig. 1.2 Exterior Drawing of Scanner Unit, Type NKE-2254-7

Fig. 1.3 Exterior Drawing of Scanner Unit, Type NKE-2254-9

Fig. 1.4 Exterior Drawing of Scanner Unit, Type NKE-2254-6HS

Fig. 1.5 Exterior Drawing of Scanner Unit, Type NKE-1130

Fig. 1.6 Exterior Drawing of Display Unit, Type NWZ-173

Fig. 1.7 Exterior Drawing of Display Unit, Type NWZ-173 with Stand MPBC42446 (option)

Fig. 1.8 Exterior Drawing of Processing Unit, Type NDC-1417

Fig. 1.9 Exterior Drawing of Operating Unit, Type NCE-5171

Fig. 1.10 Exterior Drawing of Connecting Unit, Type NQE-3151A

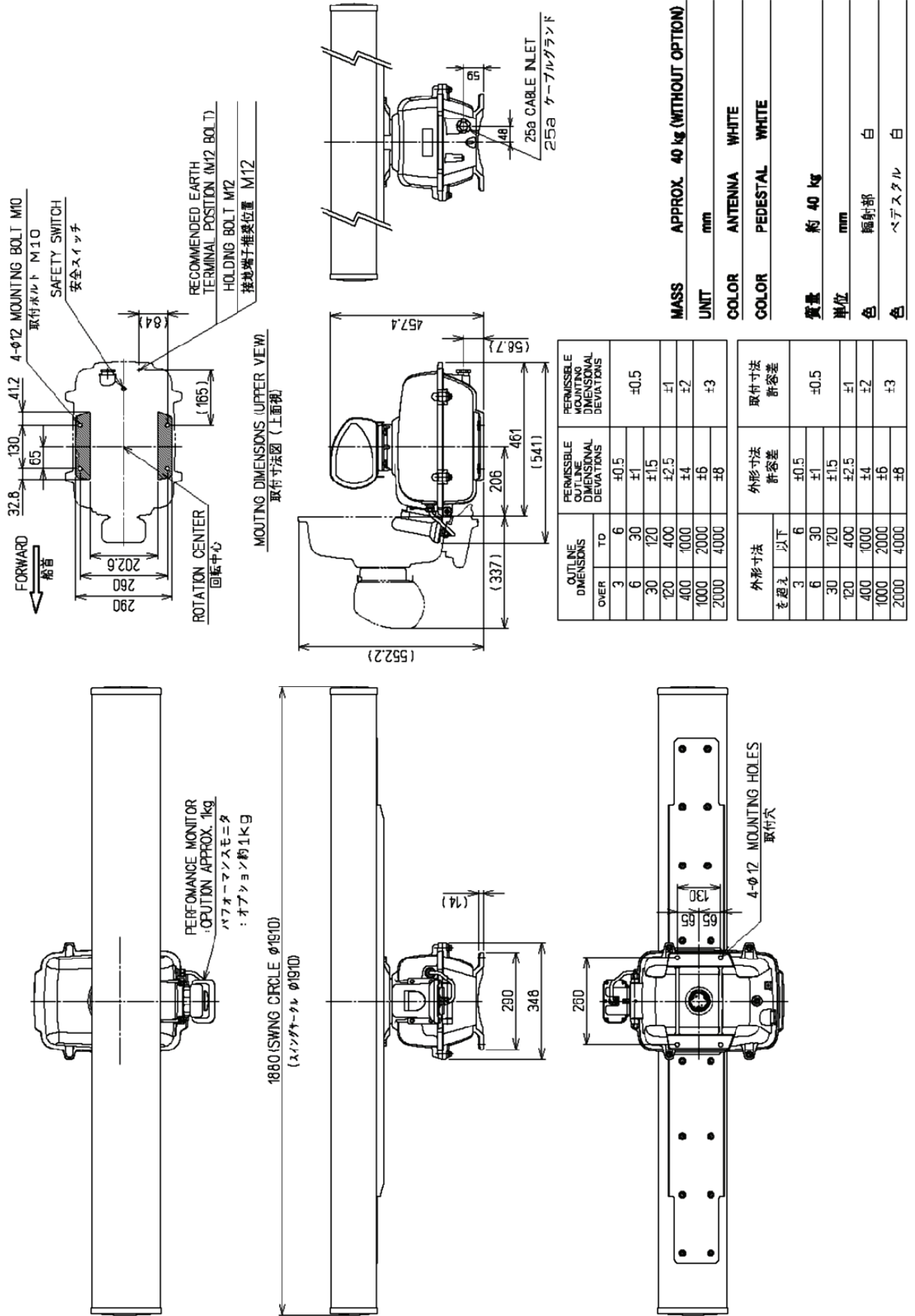
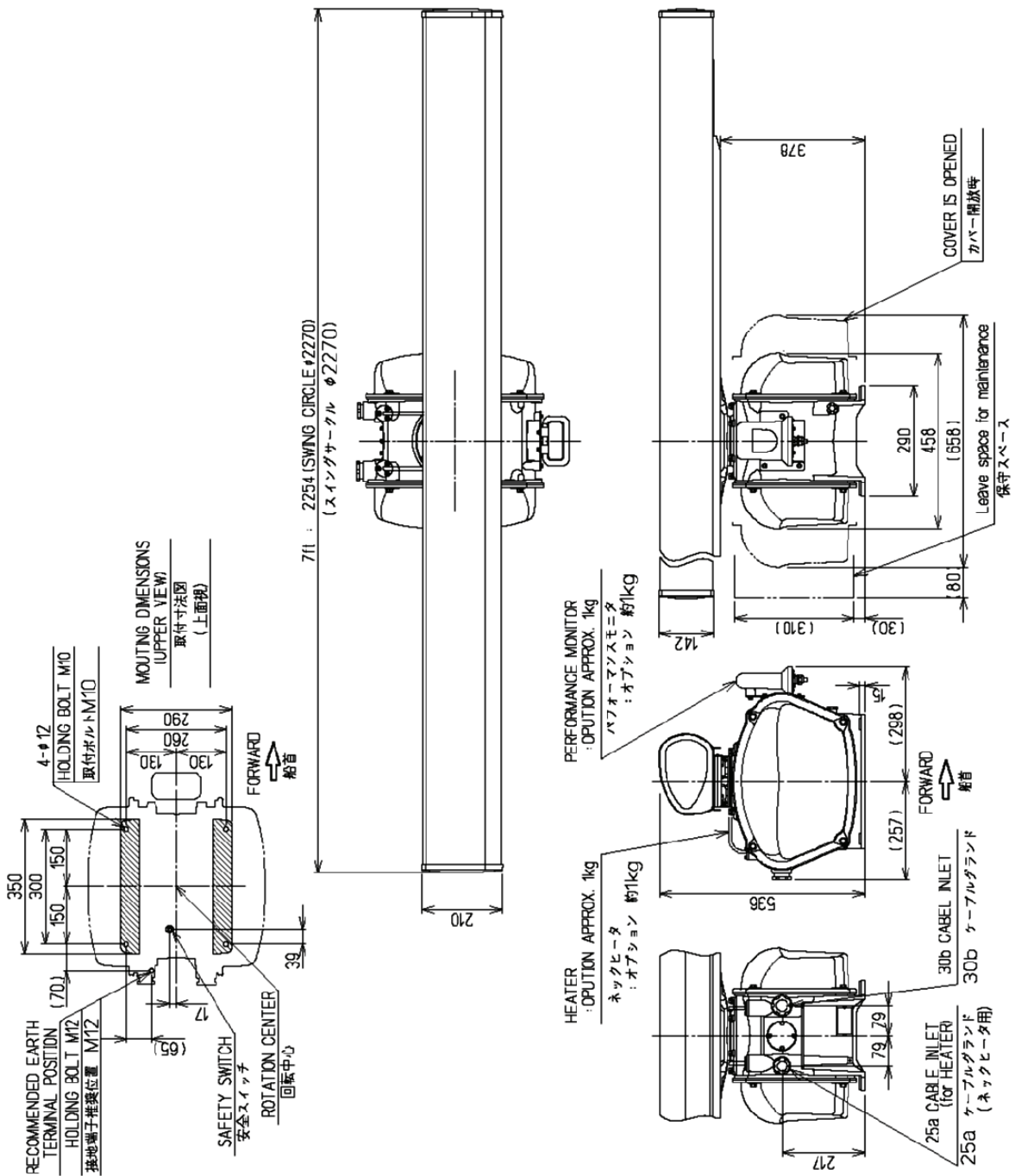


Fig. 1.1 Exterior Drawing of Scanner Unit, Type NKE-2103-6 / 6HS



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

外形寸法 おおよそ	以下	外形寸法 許容差	取付寸法 許容差
6	30	±1	±1
30	120	±1.5	±1.5
120	400	±2.5	±1
400	1000	±4	±2
1000	2000	±6	±2
2000	4000	±8	±3

MASS	APPROX. 58 kg (WITHOUT OPTION)
UNIT	mm
COLOR	ANTENNA WHITE
COLOR	PEDESTAL WHITE
質量	約 58 kg
単位	mm
色	輻射部 白
色	ベース 白

Fig. 1.2 Exterior Drawing of Scanner Unit, Type NKE-2254-7

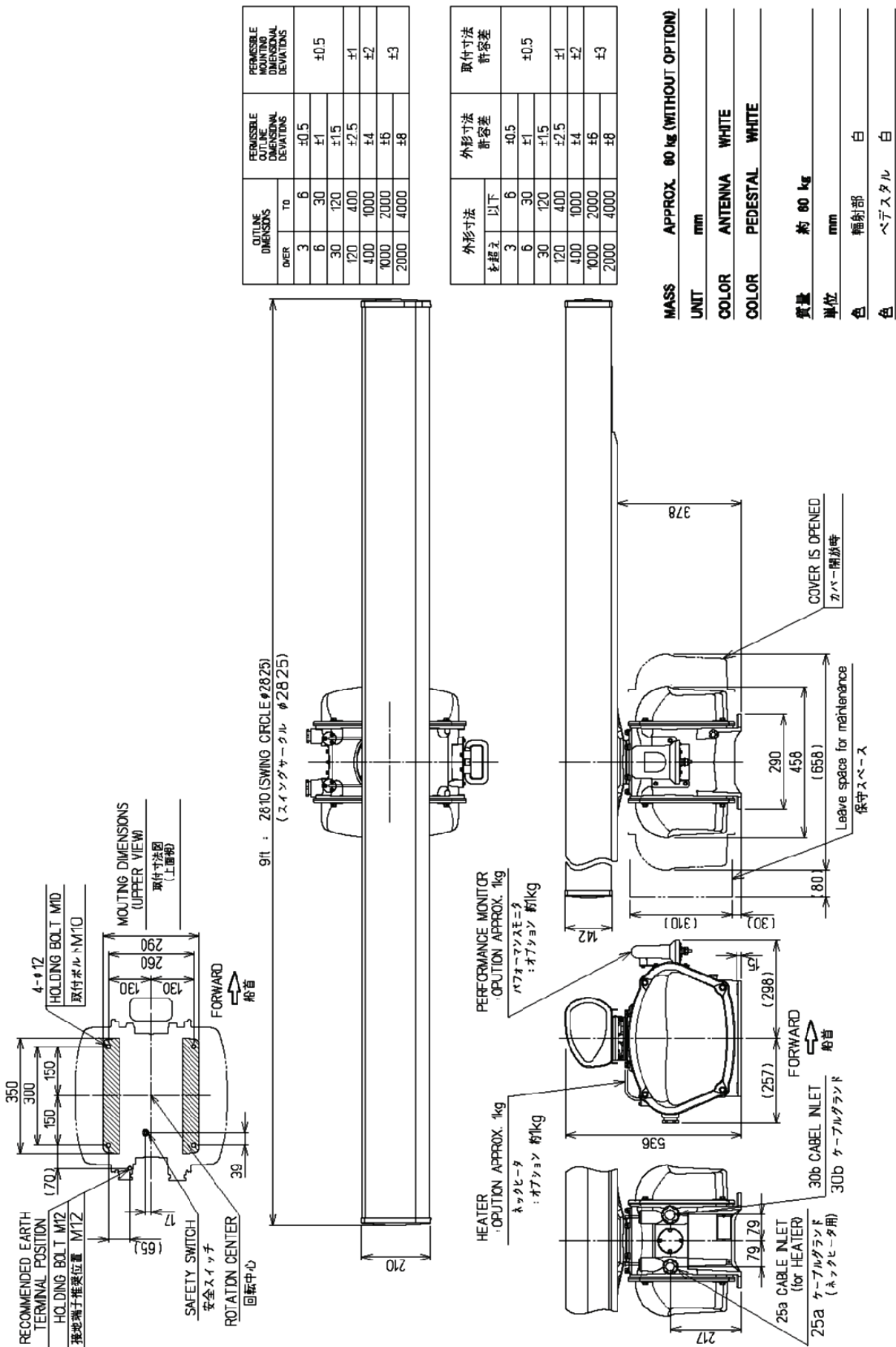
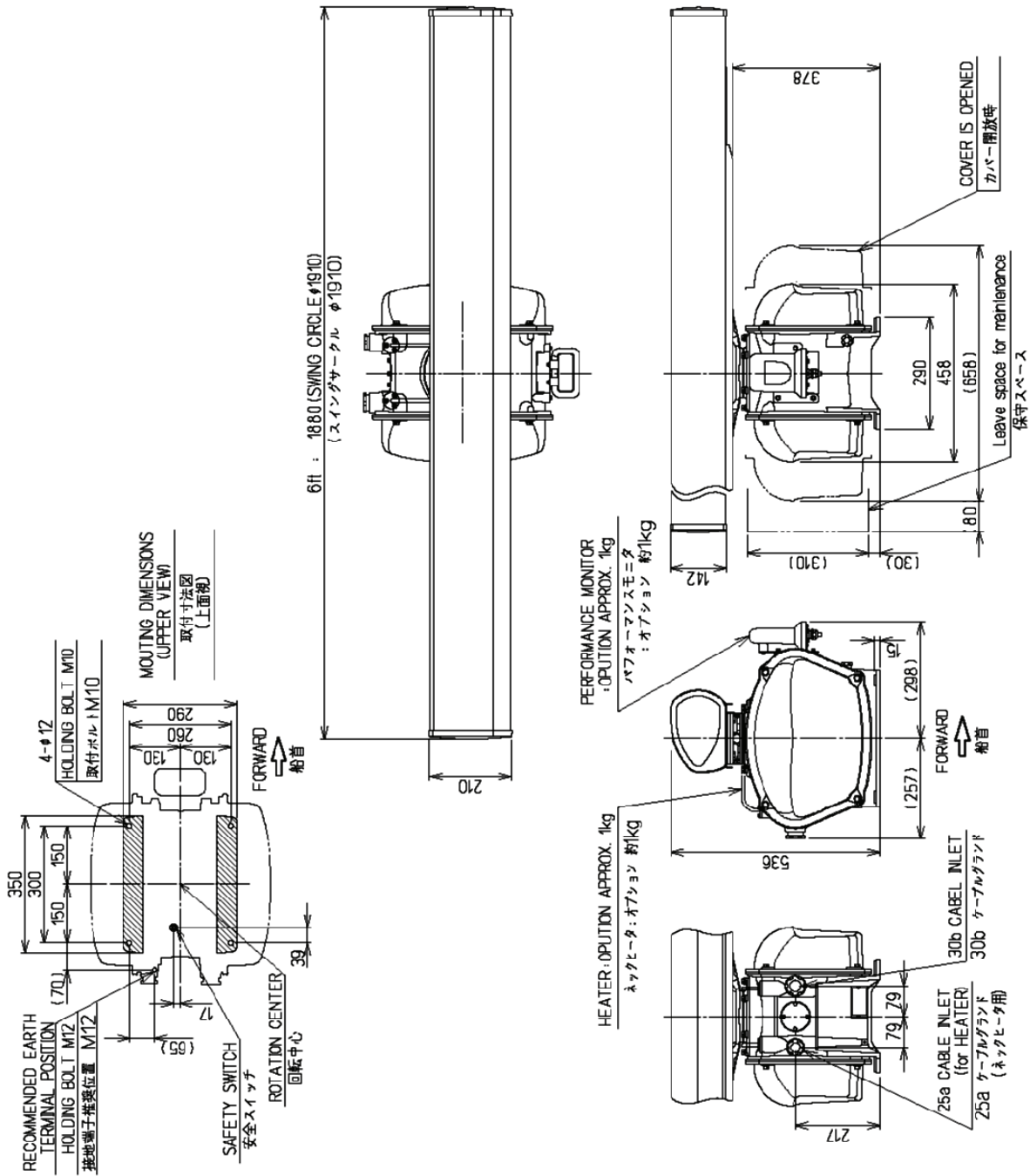


Fig. 1.3 Exterior Drawing of Scanner Unit, Type NKE-2254-9



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

外形寸法	外形寸法許容差		取付寸法許容差
	を超過	以下	
3	6	±0.5	±0.5
6	30	±1	
30	120	±1.5	±1
120	400	±2.5	
400	1000	±4	±2
1000	2000	±6	
2000	4000	±8	±3

MASS	APPROX. 55 kg (WITHOUT OPTION)
UNIT	mm
COLOR	ANTENNA WHITE
COLOR	PEDESTAL WHITE
質量	約 55 kg
単位	mm
色	幅射部 白
色	ペDESTアル 白

Fig. 1.4 Exterior Drawing of Scanner Unit, Type NKE-2254-6HS

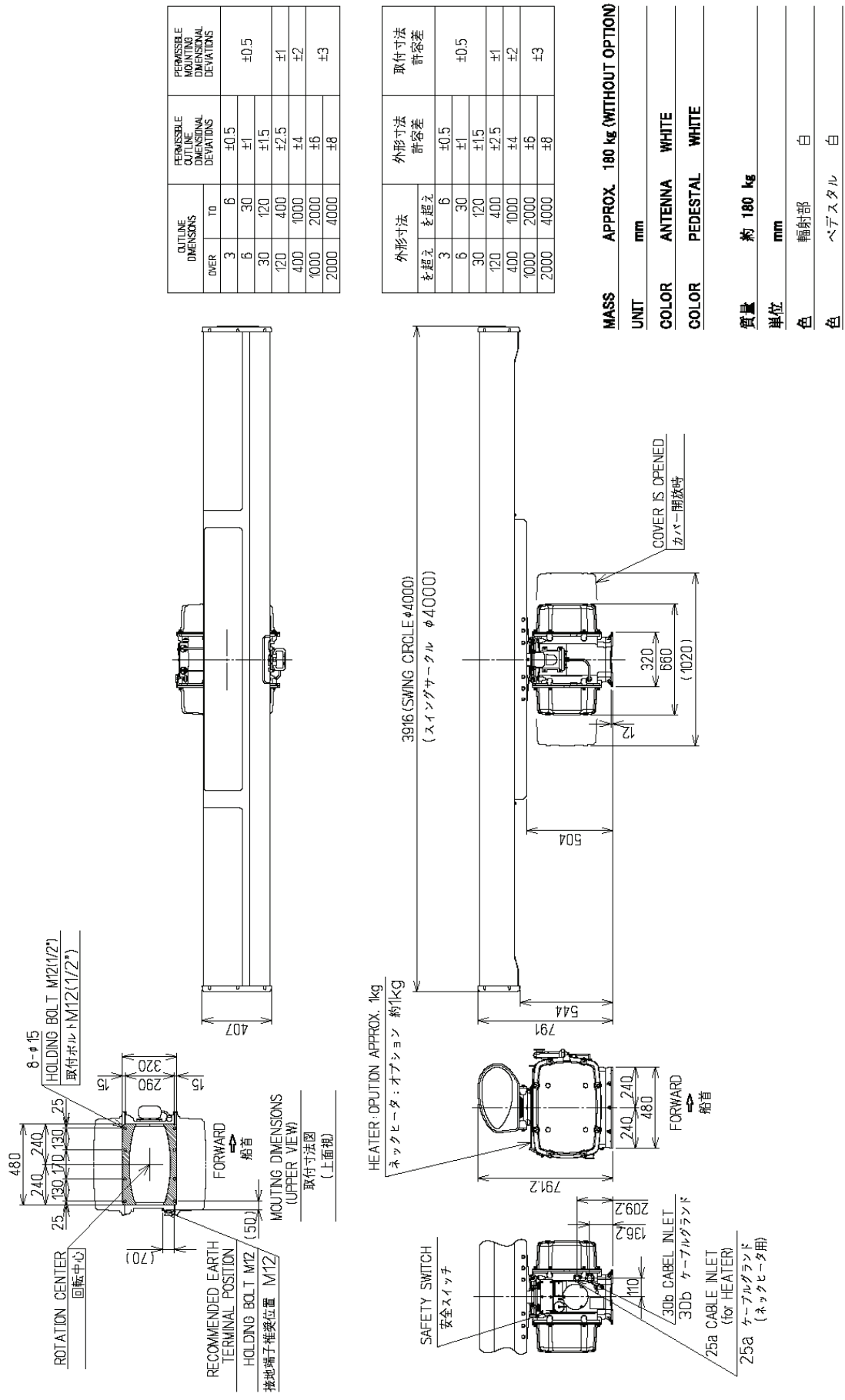


Fig. 1.5 Exterior Drawing of Scanner Unit, Type NKE-1130

OUTLINE DIMENSIONS		PERMISSIBLE OUTLINE MOUNTING DIMENSIONAL DEVIATIONS	PERMISSIBLE MOUNTING DIMENSIONAL DEVIATIONS
OVER	T0		
3	6	±0.5	±0.5
6	30	±1	
30	120	±1.5	±1
120	400	±2.5	±2
400	1000	±4	±3
1000	2000	±6	
2000	4000	±8	

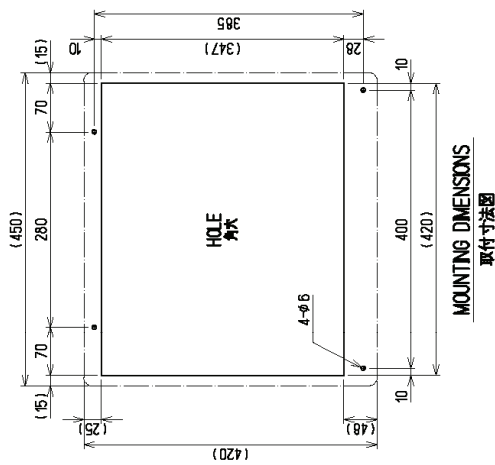
外形寸法		外形寸法 許容差	取付寸法 許容差
公差	以下		
3	6	±0.5	±0.5
6	30	±1	
30	120	±1.5	±1
120	400	±2.5	±2
400	1000	±4	±3
1000	2000	±6	
2000	4000	±8	

MASS APPROX. 7.7 kg

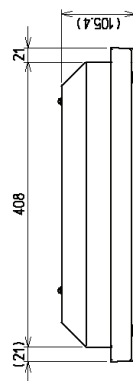
UNIT mm

質量 約 7.7 kg

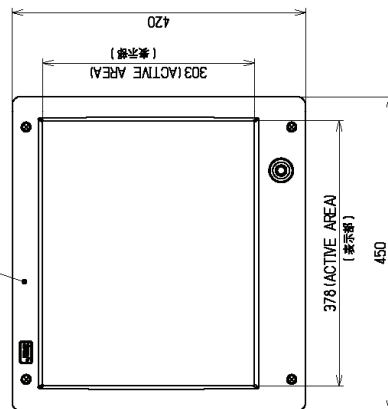
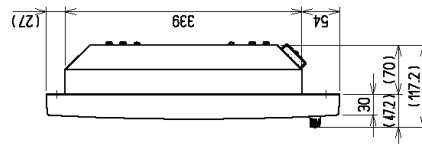
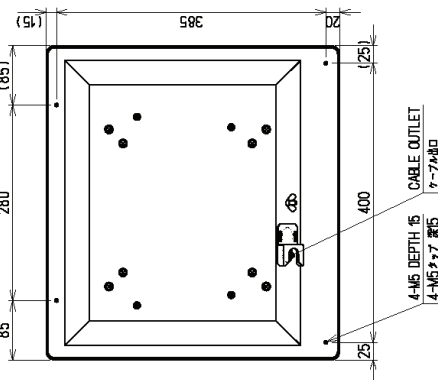
単位 mm



取付寸法図
MOUNTING DIMENSIONS



COLORNA SEMI-GLASS TEXTURE
OTHER COLOR NOT ACCEPTABLE
(画素色・パネル色NO.1(標準設定色))



NWZ-173

19 INCH MONITOR UNIT

Fig. 1.6 Exterior Drawing of Display Unit, Type NWZ-173

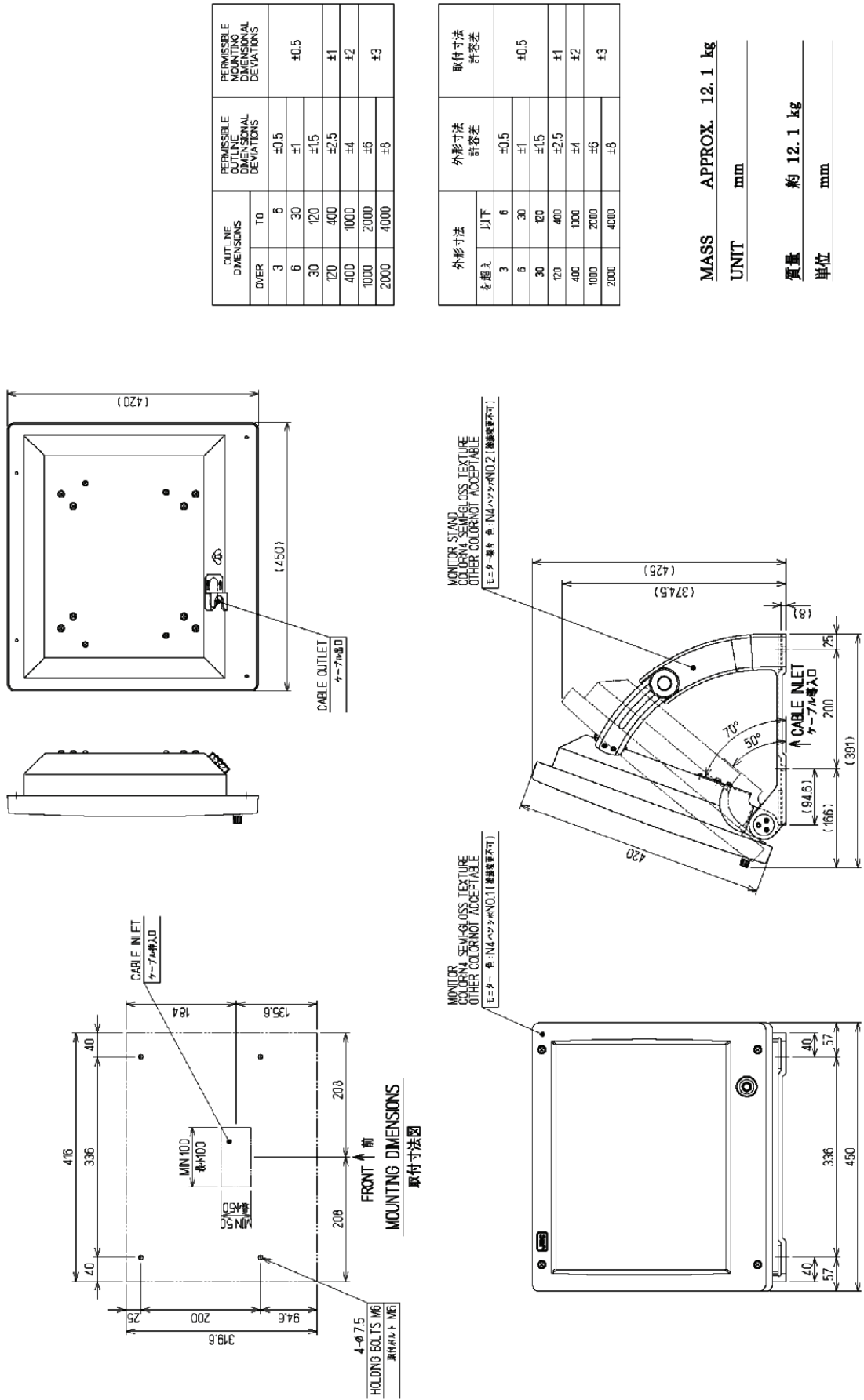


Fig. 1.7 Exterior Drawing of Display Unit, Type NWZ-173 with Stand MPBC42446 (option)

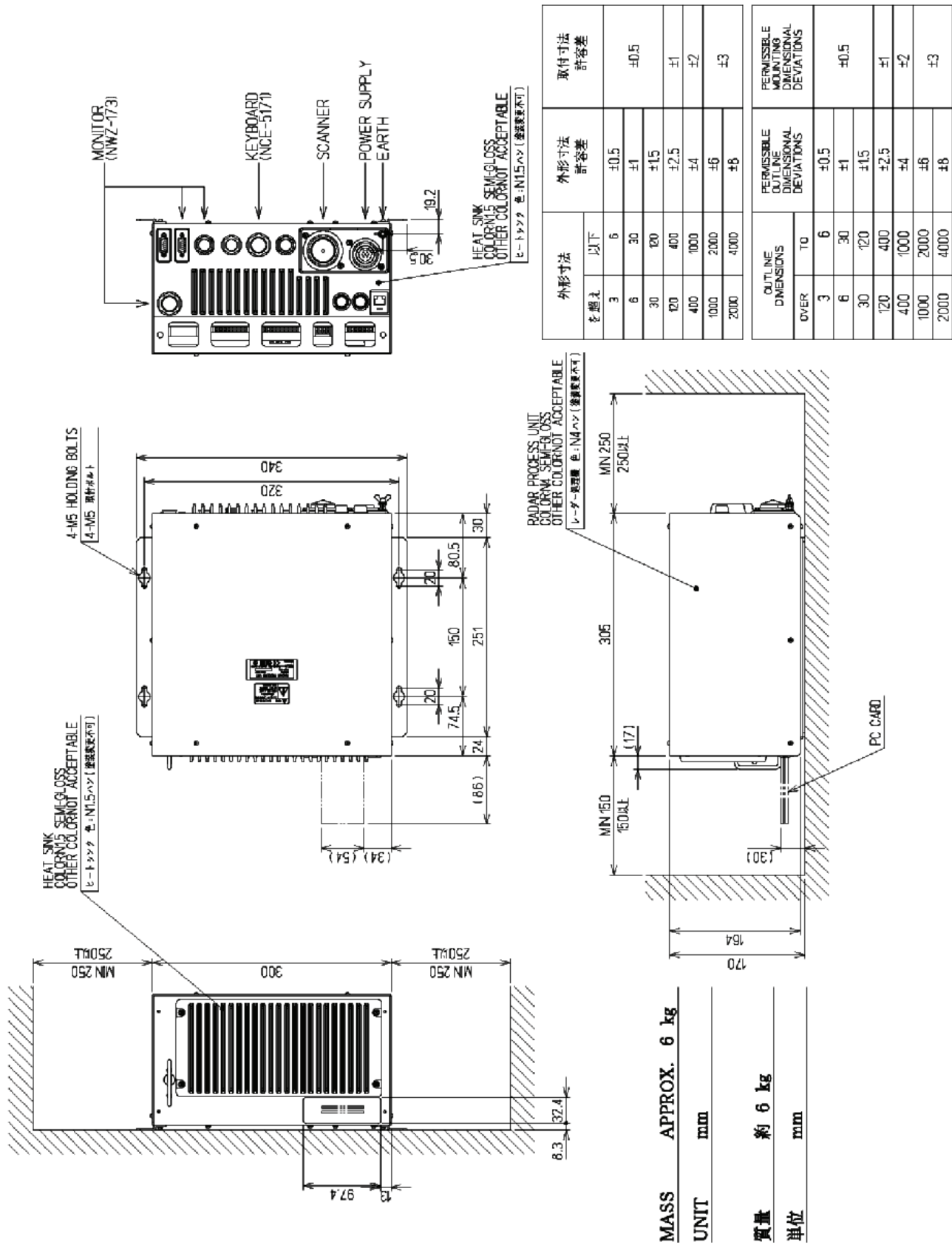
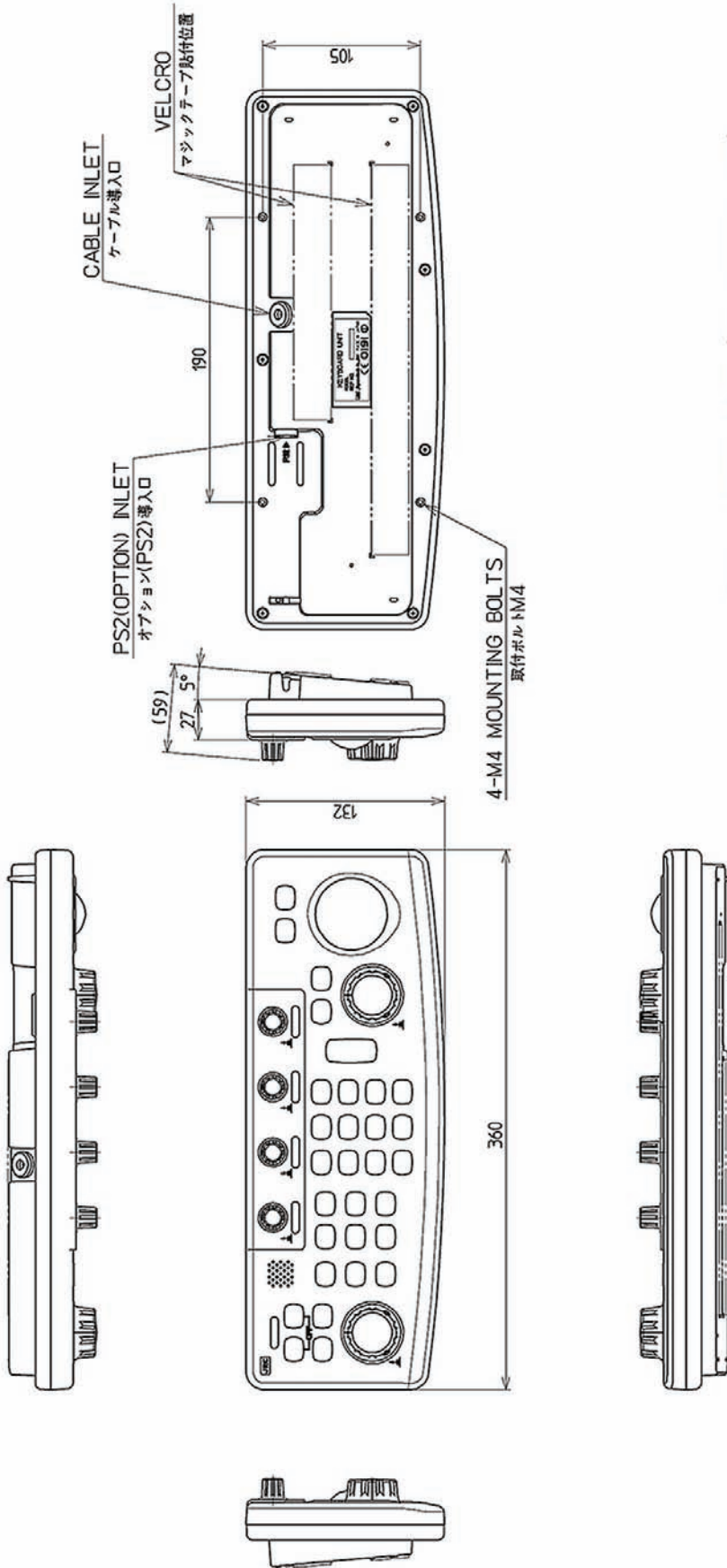


Fig. 1.8 Exterior Drawing of Radar Process Unit, Type NDC-1417



Mass : Approx. 1.3 kg (with Connected cable)

Unit : mm

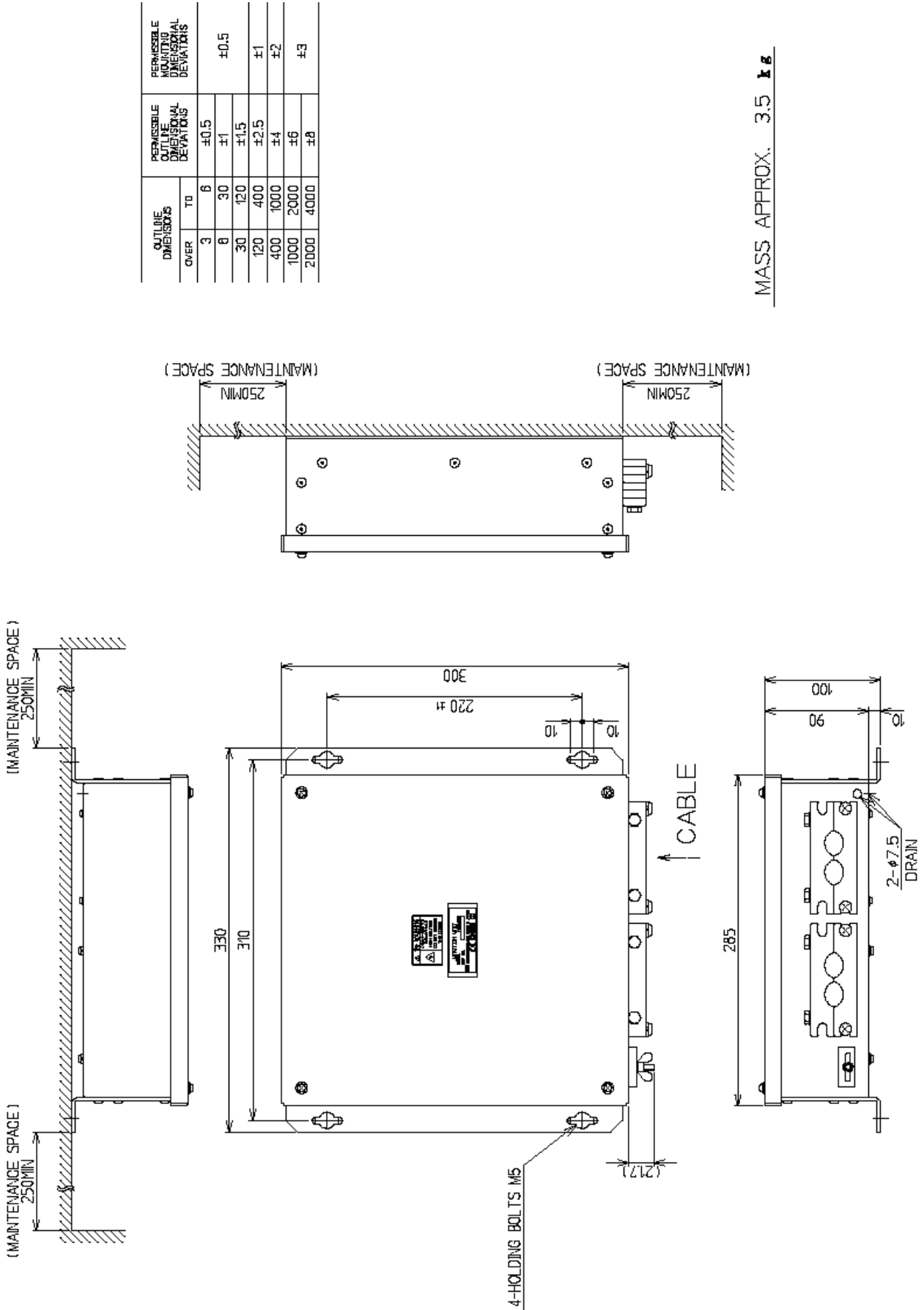
質量 : 約 1.3 kg (接続ケーブル含む)

単位 : mm

寸法区分 を越え	外形寸法 許容差		取付穴位置 寸法許容差
	以下		
3	6	±0.5	
6	30	±1	±0.5
30	120	±1.5	
120	400	±2.5	±1
400	1000	±4	±2
1000	2000	±6	
2000	4000	±8	±3

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

Fig. 1.9 Exterior Drawing of Operation Unit, Type NCE-5171



MASS APPROX. 3.5 kg

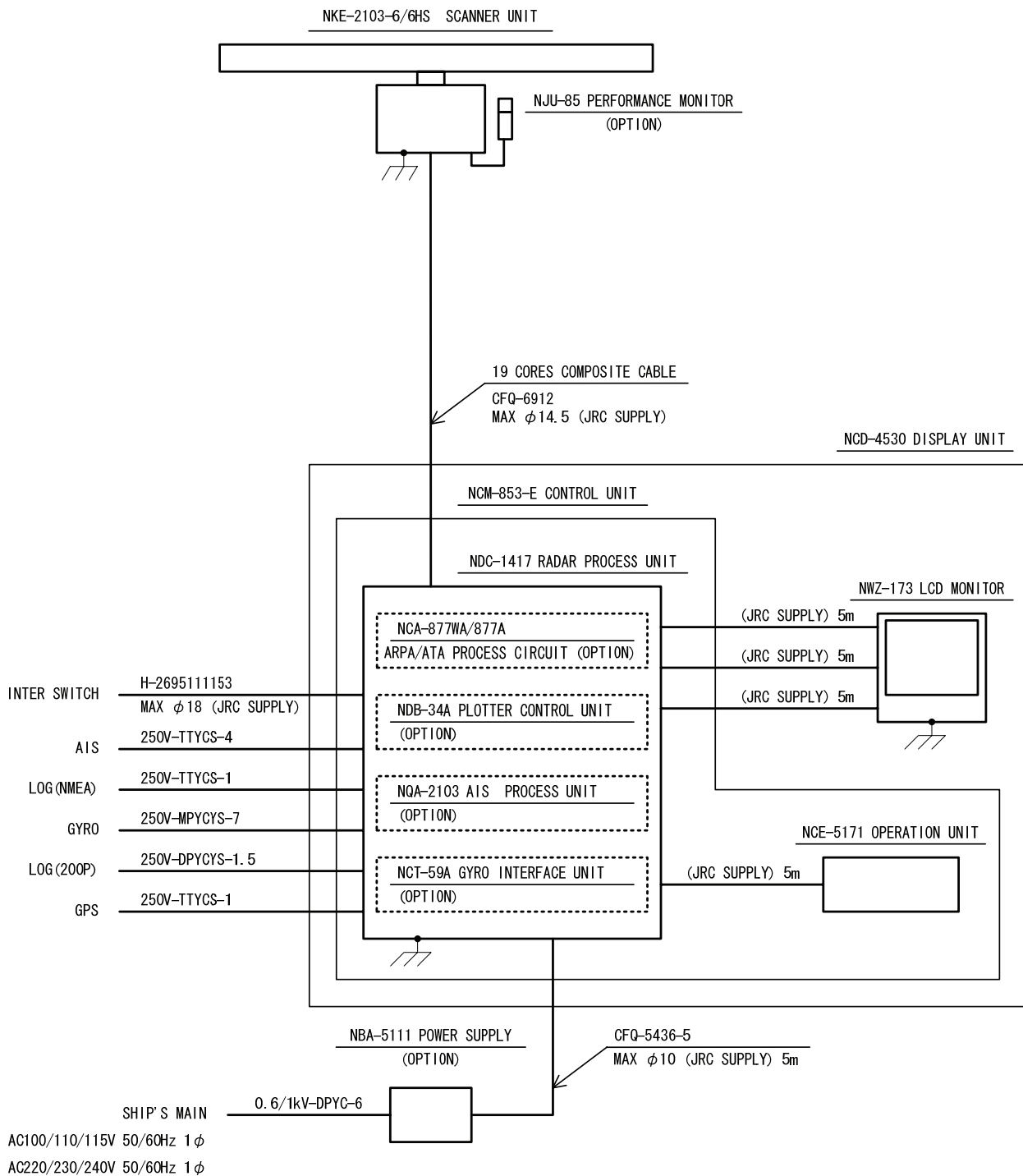
Fig. 1.10 Exterior Drawing of Junction Box, Type NQE-3151A

1.5 GENERAL SYSTEM DIAGRAMS

Fig. 1.10 General System Diagram of Radar, Type JMA-5312-6 /6HS

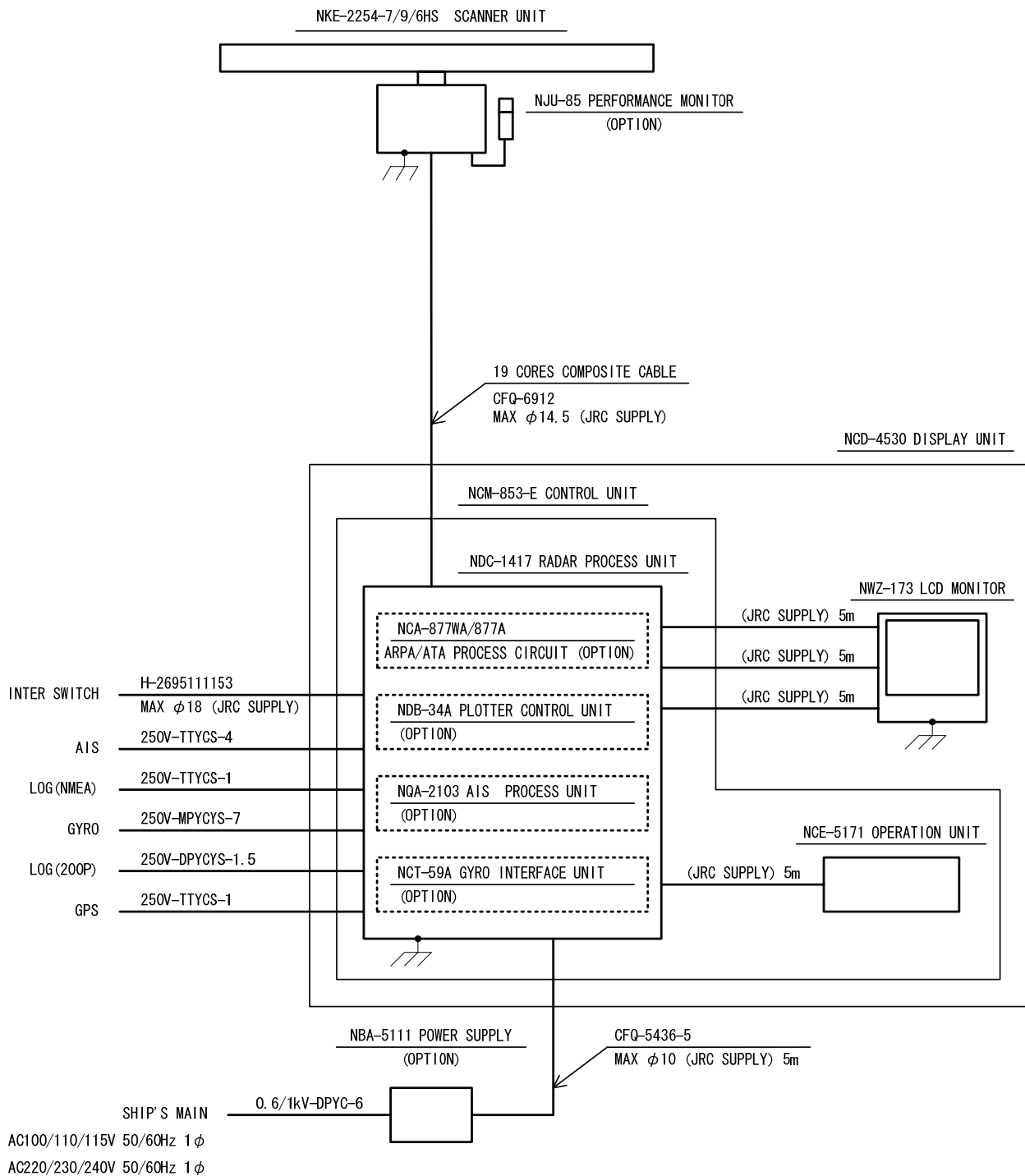
Fig. 1.11 General System Diagram of Radar, Type JMA-5322-7 / 9 6HS

Fig. 1.12 General System Diagram of Radar, Type JMA-5332-12



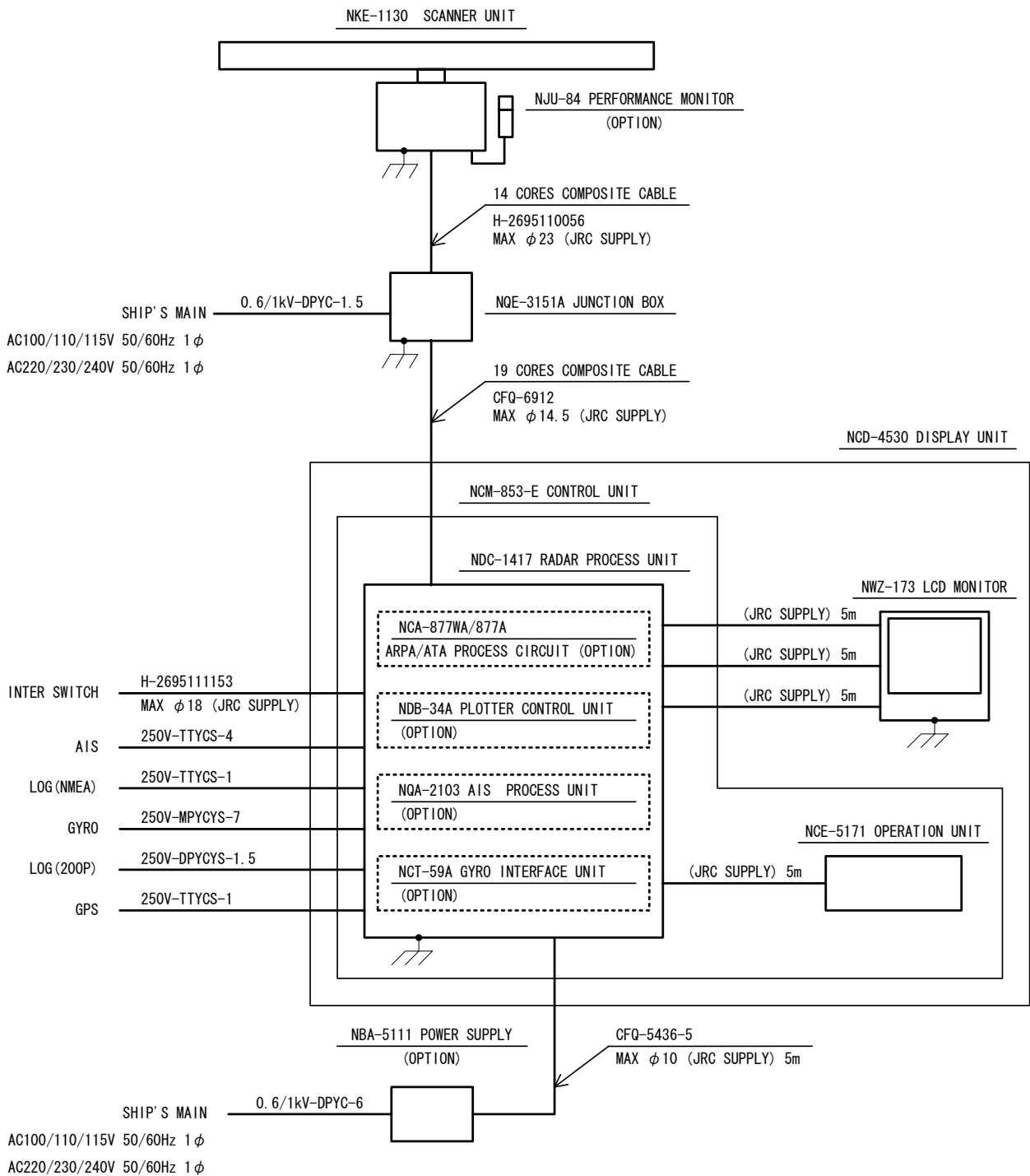
NOTE: Eliminating the interference on frequencies used for marine communications and navigation due to operation of the radar.
 All cables of the radar are to be run away from the cables of radio equipment.
 (Ex. Radiotelephone. Communications receiver and direction finder, etc.)
 Especially inter-wiring cables between scanner unit and display unit of the radar should not be run parallel with the cables of radio equipment.
 Performance monitor, ARPA/ATA Process Unit, AIS Process Unit and GYRO Interface Unit must be fitted on ships compliant to IMO.

Fig. 1.10 General System Diagram of Radar, Type JMA-5312-6 / 6HS



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.
 Performance monitor, ARPA/ATA Process Unit, AIS Process Unit and GYRO Interface Unit must be fitted on ships compliant to IMO.

Fig. 1.11 General System Diagram of Radar, Type JMA-5322-7 / 9 / 6HS



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.
 Performance monitor, ARPA/ATA Process Unit, AIS Process Unit and GYRO Interface Unit must be fitted on ships compliant to IMO.

Fig. 1.12 General System Diagram of Radar, Type JMA-5332-12

SECTION 2

NAMES AND FUNCTIONS OF CONTROL PANEL KEYS AND FUNCTIONS OF SOFTWARE BUTTONS

2.1	NAMES OF DISPLAY.....	2-1
2.2	NAMES AND FUNCTIONS OF CONTROL PANEL KEYS	2-10
2.3	FUNCTIONS OF SOFTWARE BUTTONS	2-15

2.1 NAMES OF DISPLAY

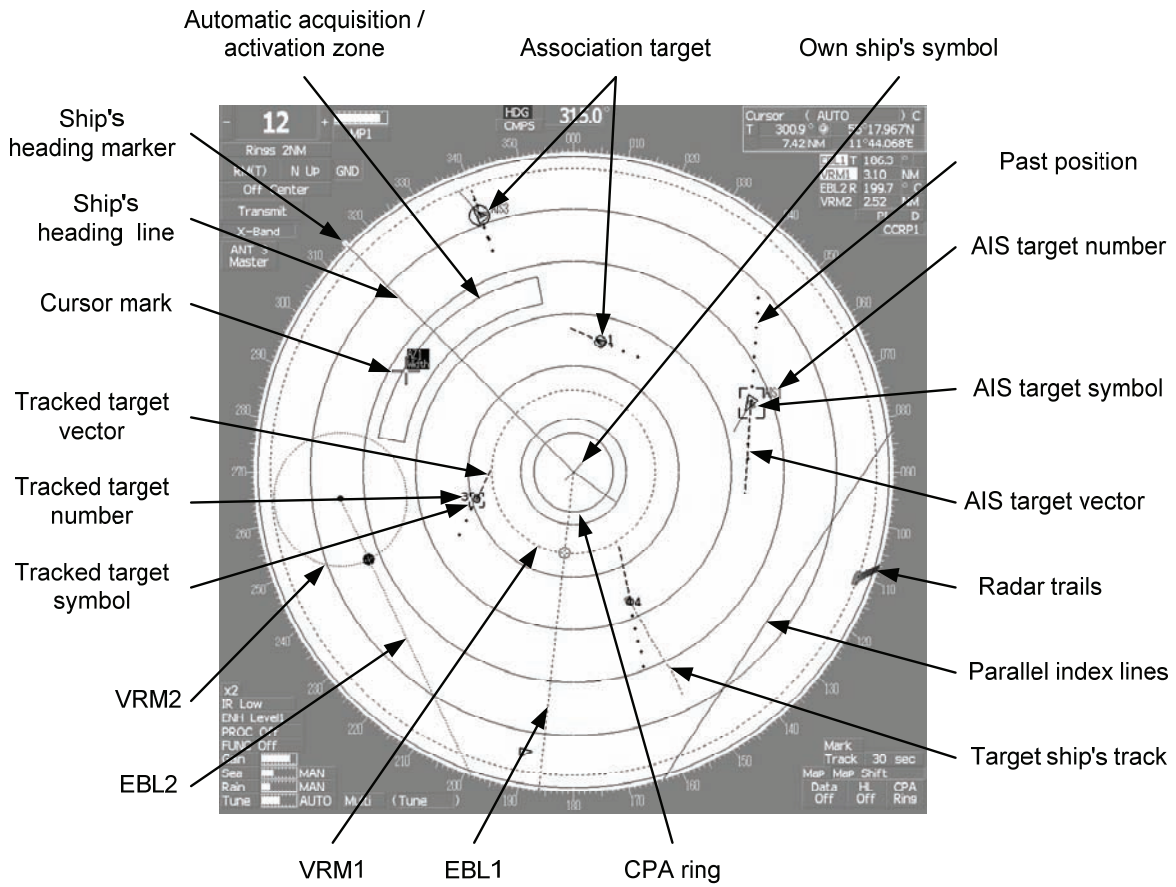
Example of screen display

In this example, the screen is divided into a number of areas and the names in each area are indicated.

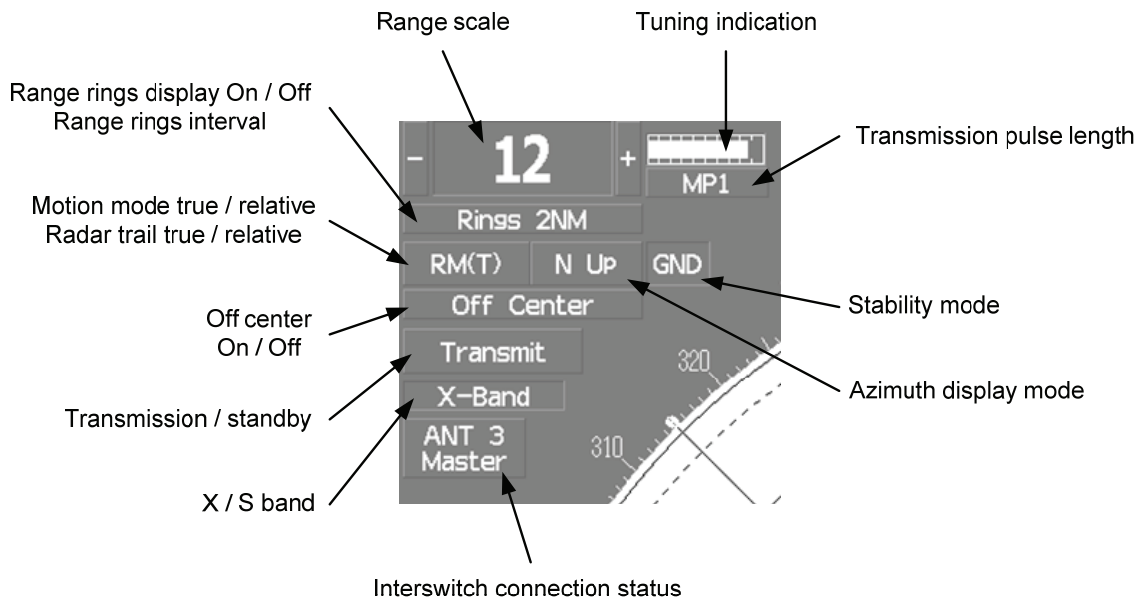
The diagram illustrates the layout of a ship's radar display, divided into several functional areas:

- Upper left of the display:** Contains radar control settings such as 'Rings 2NM', 'MP1', 'RMCT N Up', 'Off Center', 'Transmit', 'X-Band', and 'ANT 3 Master'.
- Upper right of the display:** Contains a 'Cursor (AUTO)' window showing coordinates (300.9, 55°17.967'N, 7.42NM, 11°44.068'E) and a 'Own Ship Information' panel with data like HDG 315.0, SPO 15.6 kn, COG 305.9, SOG 15.8 kn, and GPS coordinates.
- Center:** The Plan Position Indicator (PPI) showing radar returns and target tracks.
- Lower left of the display:** Contains radar control settings like 'x2', 'IR Low', 'ENH Level1', 'PROC Off', 'FLNC Off', 'Gain', 'Sea', 'Ran', and 'Tune'.
- Lower right of the display:** Contains target tracking controls like 'Mark Track 30 sec', 'Map Map Shift', 'Data Off', 'Hi Off', 'CPA Rms', and a 'Brilliance' menu with options for 'VID', 'TT', and 'Day2'.
- Right side (Data Panel):** Contains 'Target Information TT/AIS' with details like 'Vector R 6min', 'Limit 1.5NM 10min', 'Past POSN R 0.5 NM', 'AIS ID 1', 'Name MA-5300 MK2 SERIES', 'Call Sign JRCJ-MA', 'VMST 422459111', 'COG 210.0', 'SOG 30.2 kn', 'CPA 6.56NM', and 'TCPA 5.3 min'.

PPI



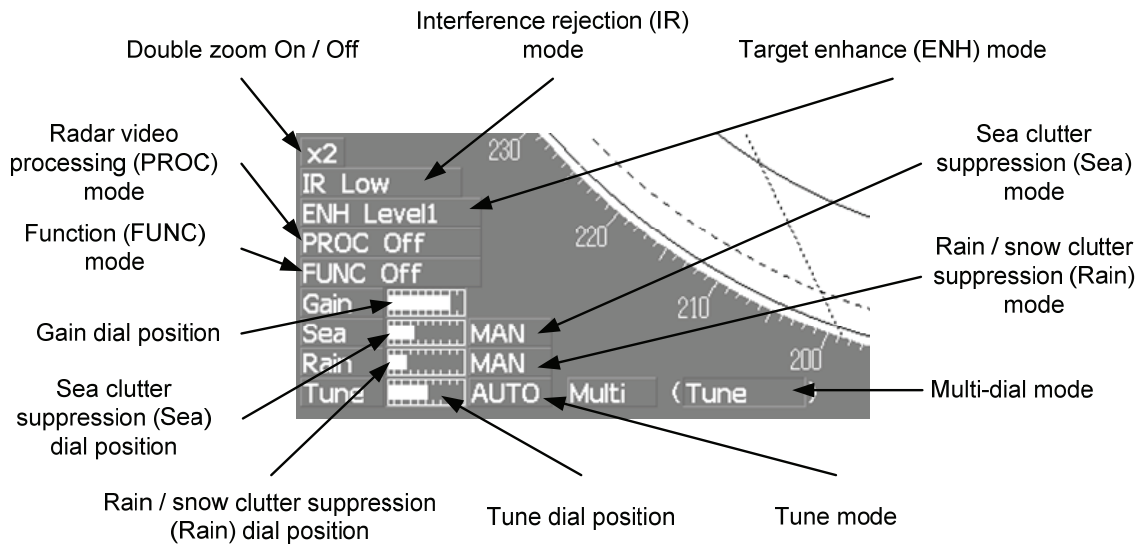
Upper left of the display



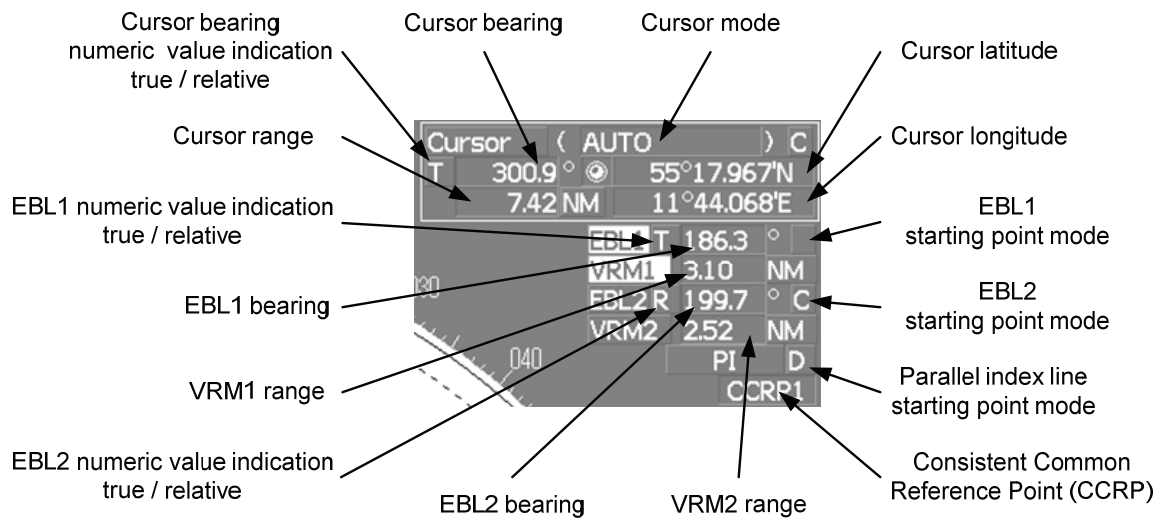
About ground and sea stabilization

- Speed sensor source is MAN, 1AXW, 2AXW
- If Set/Drift Setting menu is on : GND (Ground stabilization)
- If Set/Drift Setting menu is off : Sea (Sea stabilization)
- Speed sensor source is 2AXG, GPS : GND (Ground stabilization)

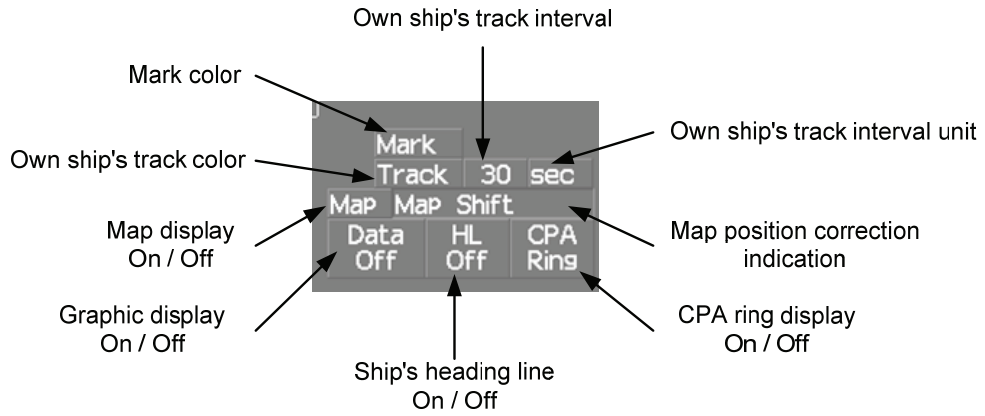
Lower left of the display



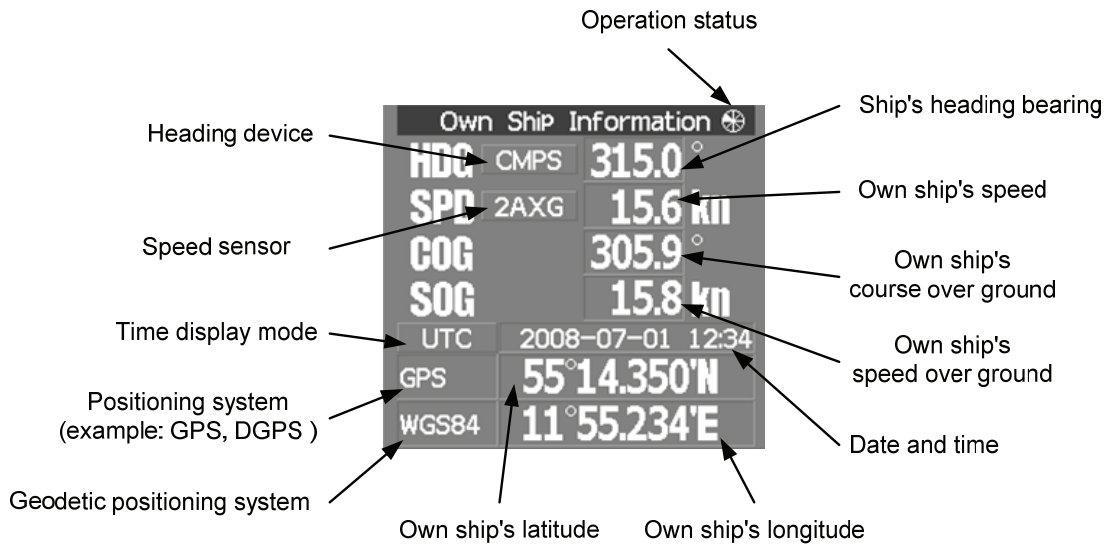
Upper right of the display



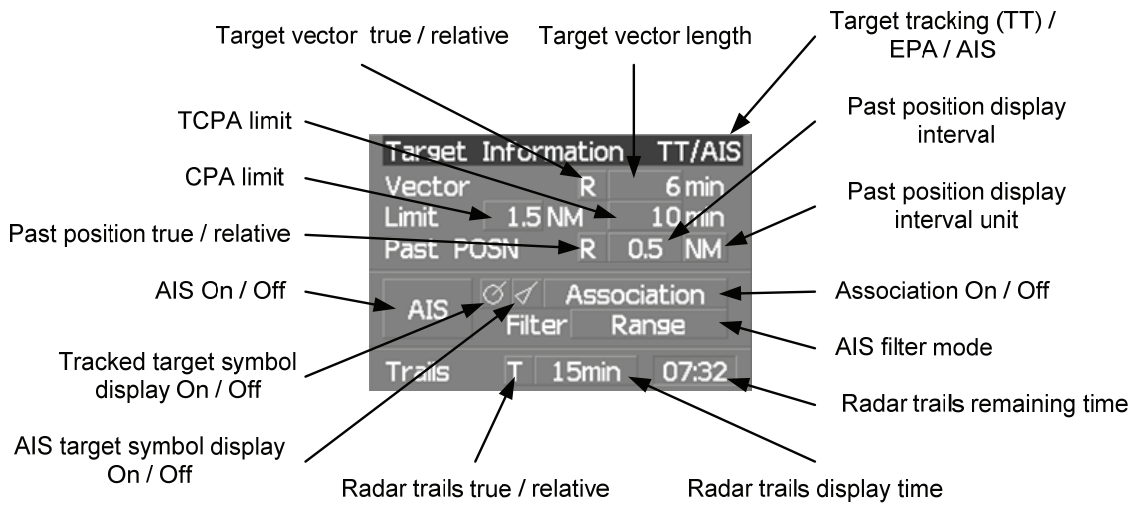
Lower right of the display



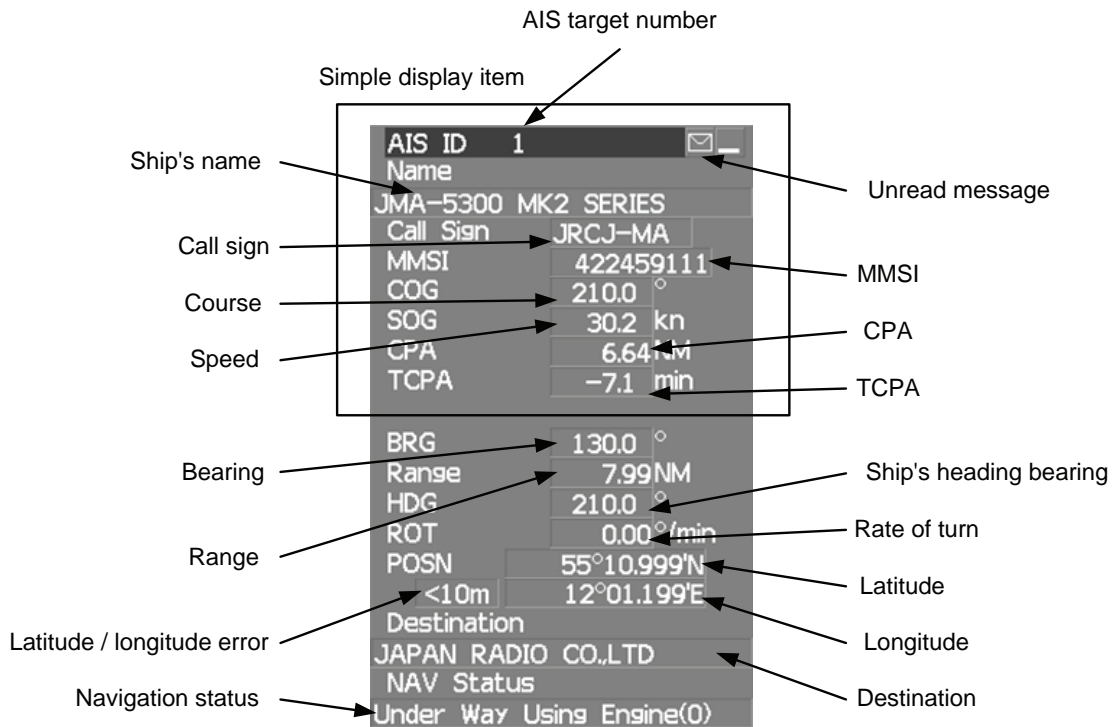
Own ship's information



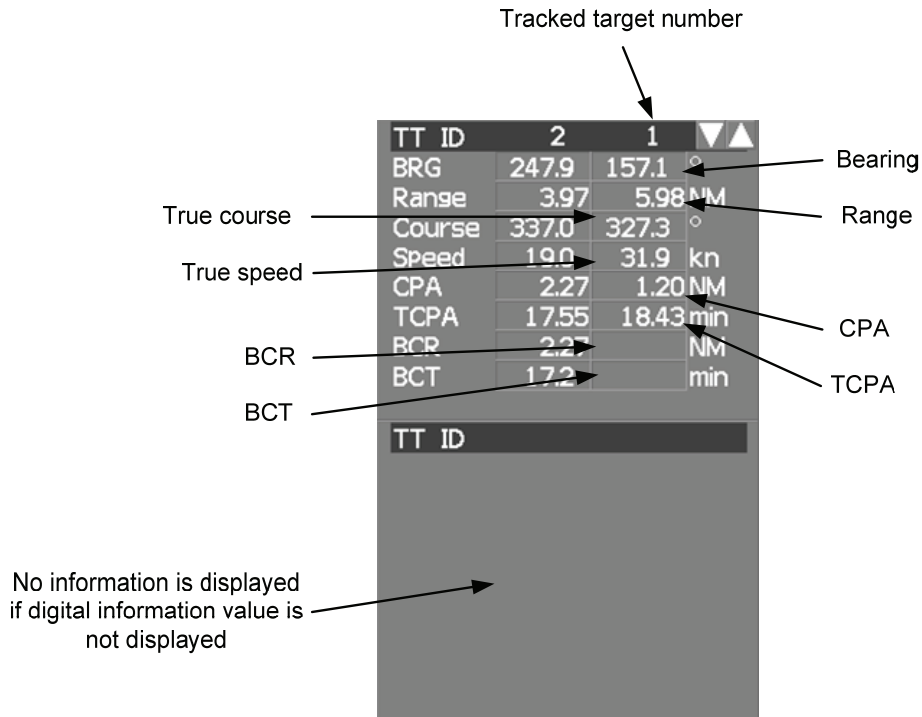
Target tracking (TT) / AIS information



Digital information: AIS target information

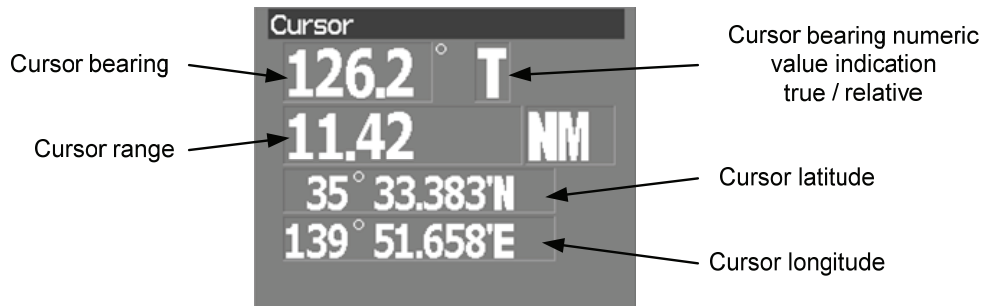


Digital information: Tracked target information

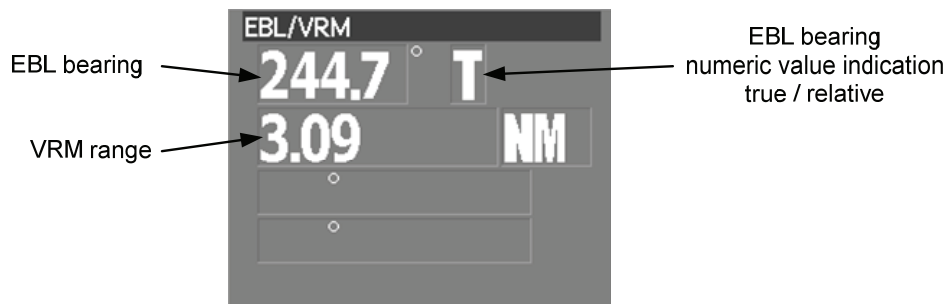


2

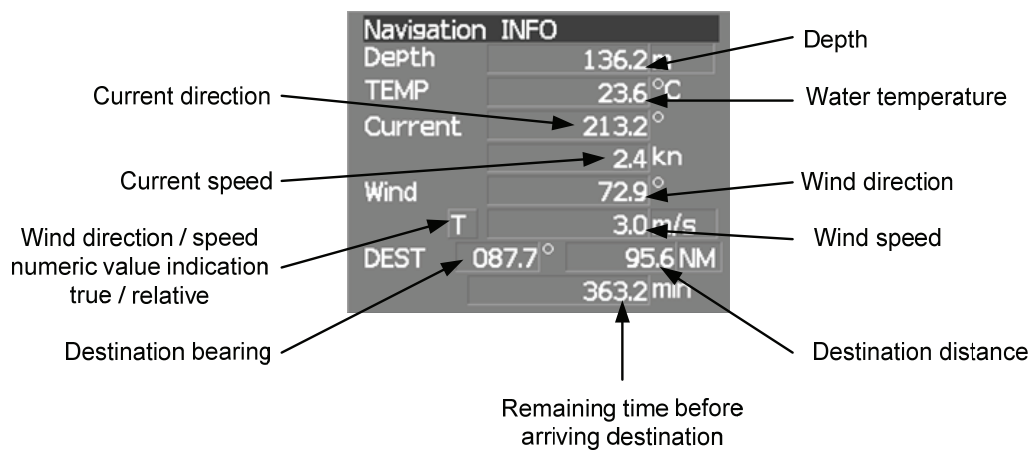
Digital information: Enhancement of cursor position numeric value indication



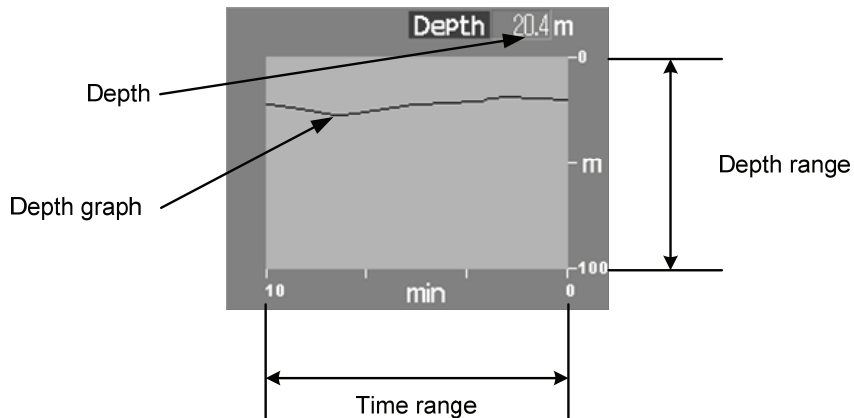
Digital information: Enhancement of EBL / VRM numeric value display



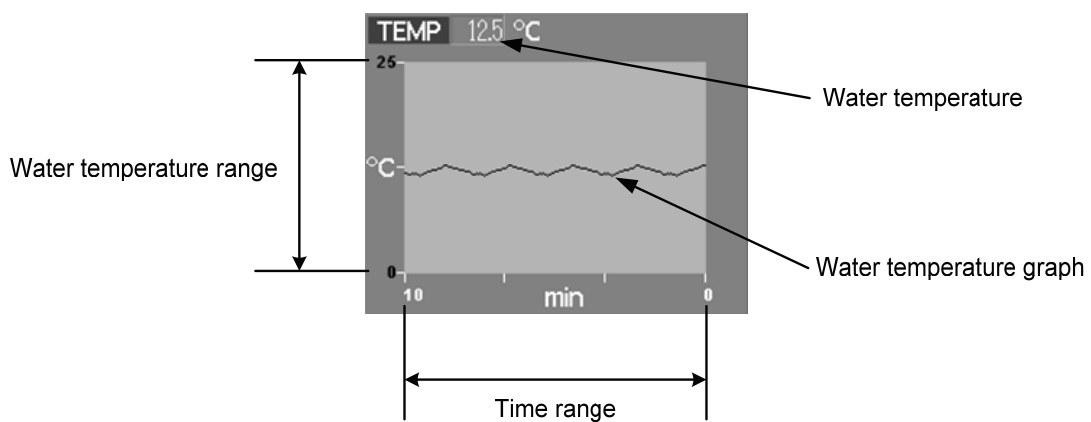
Digital information: Navigation information



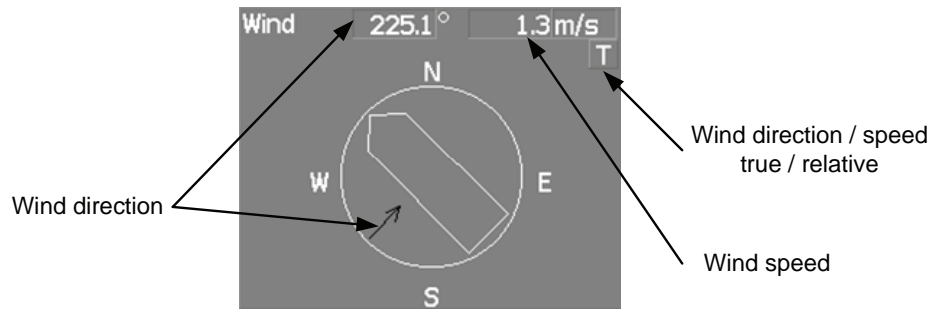
Digital information: Depth indication



Digital information: Water temperature indication

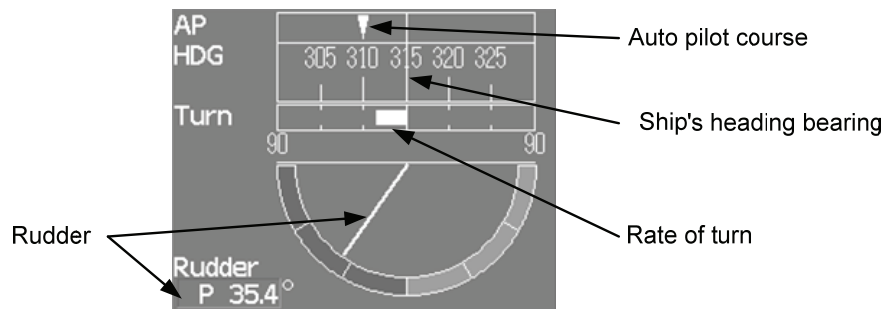


Digital information: Wind direction / speed

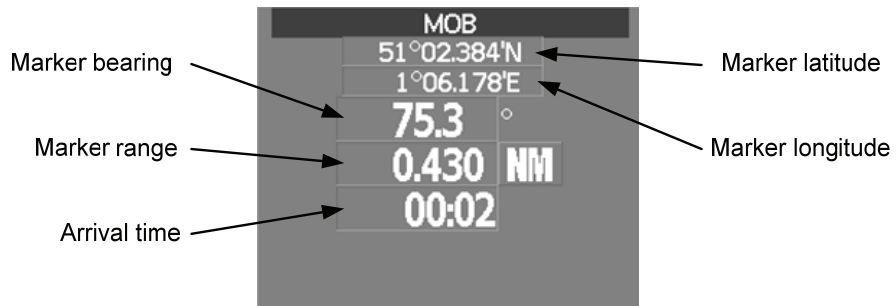


2

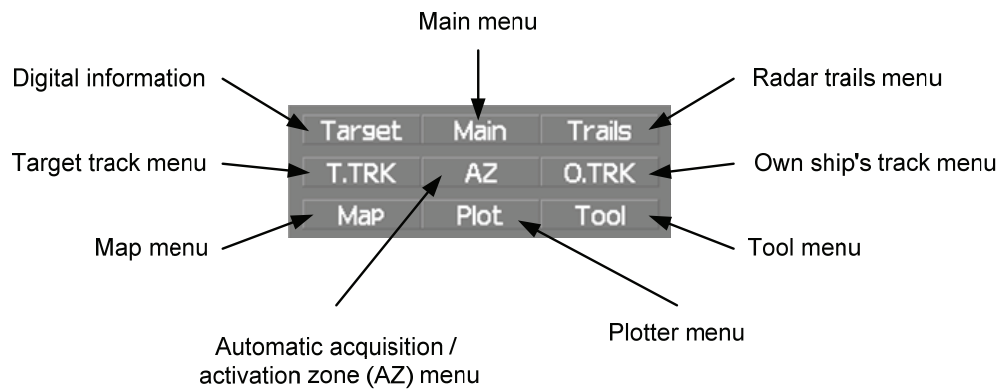
Digital information: Course bar



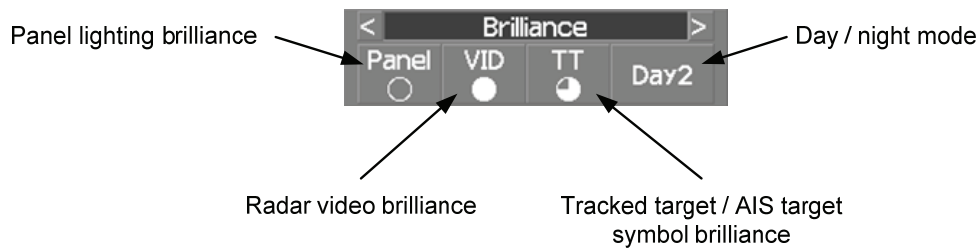
Digital information: Marker



Menu



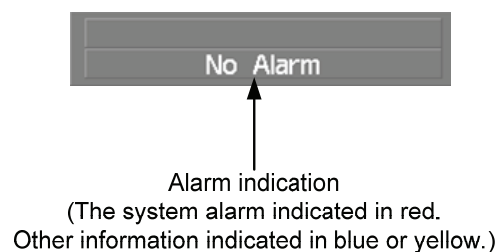
Brilliance



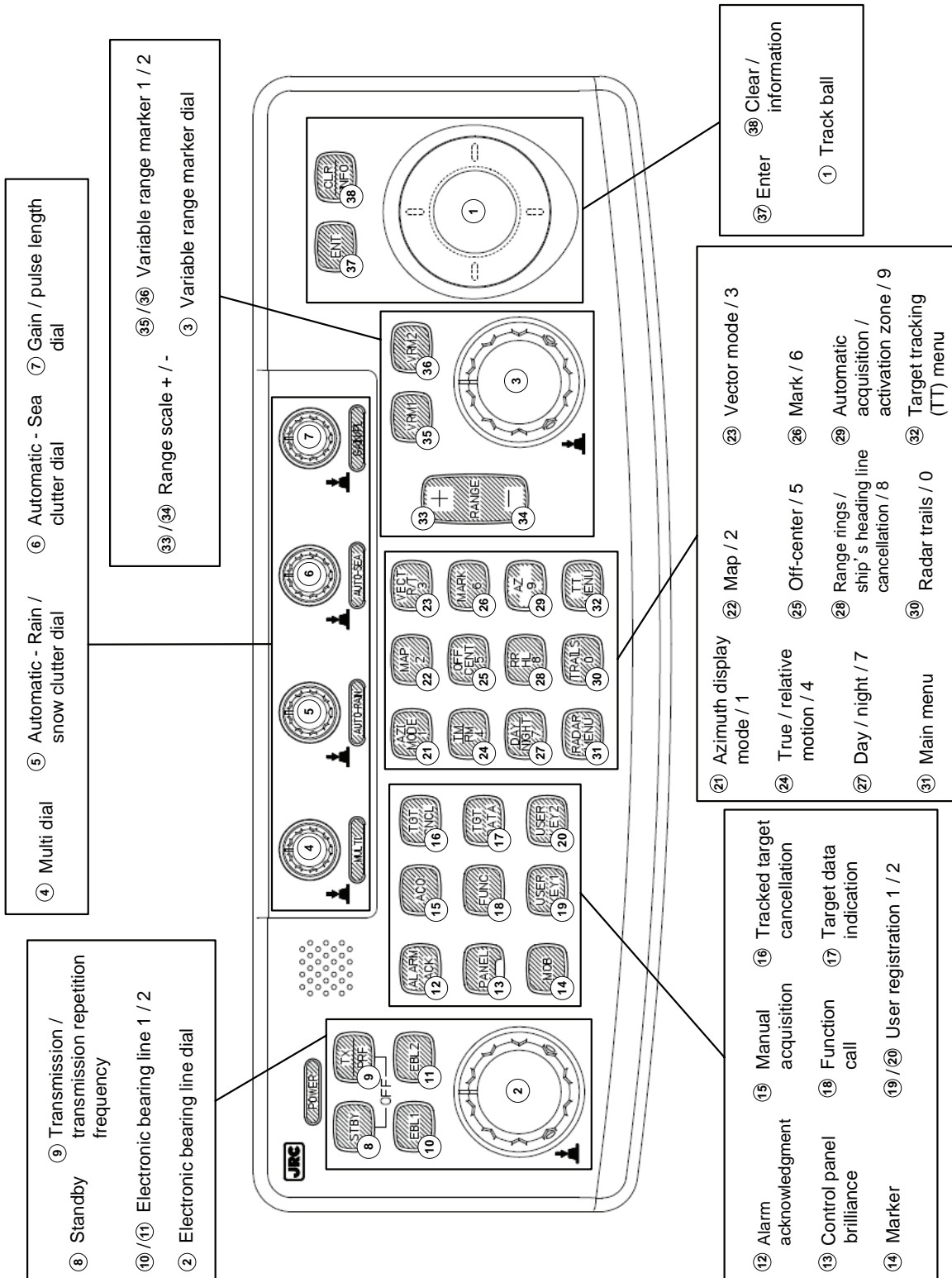
Display information



Alarm



2.2 NAMES AND FUNCTIONS OF CONTROL PANEL KEYS



The name of each button is described from the following page. See below.

① Track ball

Use the track ball to move the cursor mark to any position.

For example, use it for setting in each mode and specifying a floating EBL center position and off-center position.

② [EBL] (Electronic Bearing Line) dial

Turn the dial to rotate the bearing of the EBL.

By pressing the dial, the selected EBL can be switched.

(Center fixing) ⇒ C (Floating) ⇒ D (latitude / longitude fixing) ⇒

* D is enabled only when the navigator is connected.

③ [VRM] (Variable Range Marker) dial

Turn the dial to change the VRM range.

Press the dial to set the display of parallel index line (PI) to On / Off and open the PI Menu.

④ [MULTI] dial

Press the dial to switch the function that is registered in the multi-dial.

Vector ⇒ Trails ⇒ TGT No. ⇒ Course ⇒ Track ⇒ Mark
⇒ Tune ⇒ Vector

The function that is switched is displayed in multi-dial mode (lower left of the display on page 2-3)

If the dial is pressed for 2 seconds, the Multi Dial Setting menu is opened. If the dial is pressed again for 2 seconds, the setting menu is closed.

⑤ [AUTO-RAIN] (Automatic - Rain / Snow clutter suppression) dial

Turn the dial to suppress images by rain / snow clutter.

Turn the dial clockwise to increase the effect of suppression.

Press the dial to switch the mode to manual / automatic.

⑥ [AUTO-SEA] (Automatic - Sea clutter suppression) dial

Turn the dial to suppress images by sea clutter.

Turn the dial clockwise to increase the effect of suppression.

Press the dial to switch the mode to manual / automatic.

⑦ [GAIN / PL] (Gain / Pulse Length) dial

Turn the dial to adjust the reception gain of the radar.

Turn the dial clockwise to increase the gain.

Press the dial to switch the transmitting pulse length.

⑧ [STBY] (Standby) key

Use this key to turn on the power of the equipment.

Use this key also to switch the equipment from a transmitting state to a standby state.

The power can be turned off by pressing the [STBY] key and [TX / PRF] key concurrently while the power is On.

⑨ [TX / PRF] (Transmission / transmission repetition frequency) key

At expiration of the pre-heat time after the power is turned on, Preheat of the transmission / standby indication (Upper left of the display on page 2-2) changes to Standby.

If this key is pressed subsequently, transmission starts.

If this key is pressed during transmission, fine adjustments of the transmission repetition frequency are enabled.

By using the fine adjustments of the transmission repetition frequency and the interference removal function, the interference suppression effect can be improved.

⑩ / ⑪ [EBL1] / [EBL2] (Electronic Bearing Line 1 / 2) key

Use these keys to switch EBL1 / EBL2 to On / Off.

If the key is pressed for 2 seconds, the EBL / Cursor Setting menu is opened.

⑫ [ALARM ACK] (Alarm acknowledgment) key

Use this key to acknowledge the alarm such as a failure alarm and a collision alarm.

To stop the alarm, press this key while the alarm sound is emitted.

If multiple alarms occur, press this key same time as the alarms.

⑬ [PANEL] (Control panel brilliance) key

Use this key to adjust the brilliance of various keys and dials on the control panel.

⑭ [MOB] (Marker) key

A marker is set on the own ship's position latitude / longitude at that time. Use this key to store the own ship's position at the time in such a case that someone falls overboard from the ship.

The marker can be cleared by pressing the key for 2 seconds.

⑮ [ACQ] (Manual acquisition) key

Use this key to acquire a target of the cursor position manually.

⑯ [TGT CNCL] (Tracked target cancellation) key

Use this key to cancel the tracked target symbol / vector at the cursor position and stop tracking.

When this key is pressed for 2 seconds, all the tracked target symbols / vectors are cancelled and tracking is stopped.

⑰ [TGT DATA] (Target data indication) key

Use this key to check the digital information of the AIS target or the tracked target.

⑱ [FUNC] (Function call) key

Use this key to switch the original signal processing settings.

FUNC Off ⇒ **Coast** ⇒ **Deep Sea** ⇒ **Fishnet** ⇒ **Storm** ⇒ **FUNC Off**

If the key is pressed for 2 seconds, the User Function Setting menu is displayed.

⑲ / ⑳ [USER KEY 1 / 2] (User registration 1 / 2) key

Use this key to perform pre-registered operations.

If this key is pressed for 2 seconds while no operation is registered, the User Key Setting menu is opened.

㉑ [AZI MODE / 1] (Azimuth display mode / 1) key

Switch the azimuth display.

H Up (Head Up) ⇒ **N Up** (North Up) ⇒ **C Up** (Course Up) ⇒ **N Up**

During the menu operation, the key functions as a numeric key [1].

If this key is pressed for 2 seconds, GYRO setting menu is opened.

㉒ [MAP / 2] key

Use this key to switch the map display to On / Off such as marine chart, coastline, and depth contour.

During the menu operation, the key functions as a numeric key [2].

If this key is pressed for 2 seconds, the Map Setting menu is opened.

㉓ [VECT R / T / 3] (Vector mode / 3)

Use this key to switch vector indication **T** (true vector) / **R** (relative vector).

During the menu operation, the key functions as a numeric key [3].

②4 [TM / RM / 4] (True Motion / Relative Motion / 4) key

Use this key to switch the motion mode between **[TM]** (true motion) and **[RM]** (relative motion).
If the key is pressed for 2 seconds in **[TM]**, the own ship's position is reset.
During the menu operation, the key functions as a numeric key **[4]**.

②5 [OFF CENT / 5] (Off-center / 5) key

By pressing this key, moving the cursor, and pressing the **[ENT]** key, the ship's position can be moved to the cursor position. The moving range is about 66% of the radius.
If the key is pressed for 2 seconds, the off-center is set to Off and the ship's position is returned to the center of the screen.
During the menu operation, the key functions as a numeric key **[5]**.

②6 [MARK / 6] (Mark / 6) key

Use this key to display a mark in any screen position. This key can also be used for clearing the mark that is currently displayed.
If the key is pressed for 2 seconds, the Mark Setting menu is opened.
During the menu operation, the key functions as a numeric key **[6]**.

②7 [DAY / NIGHT / 7] (Day / night mode / 7) key

Use this key to switch the color and brightness of the screen that have been set in advance.
If the key is pressed for 2 seconds, the Display Color Setting menu is opened.
During the menu operation, the key functions as a numeric key **[7]**.

②8 [RR / HL / 8] (Range Rings / ship's heading line off / 8) key

Use this key to set the range rings marker to On / Off.
If the key is pressed for 2 seconds, the ship's heading line is cleared while the key is pressed.
During the menu operation, the key functions as a numeric key **[8]**.

②9 [AZ / 9] (Automatic Acquisition / Activation Zone / 9) key

Use this key to set automatic acquisition / activation zone.
If the key is pressed for 2 seconds, the AZ Menu (automatic acquisition / activation zone menu) is opened.
During the menu operation, the key functions as a numeric key **[9]**.

③0 [TRAILS / 0] (Radar trails / 0) key

Use this key to switch the length of the radar trail period.
If the key is pressed for 2 seconds, the RADAR Trails setting menu is opened.
If this key is pressed for 5 seconds, the radar trail is cleared.
During the menu operation, the key functions as a numeric key **[0]**.

③1 [RADAR Menu] (Main menu) key

Use this key to open the Main Menu.

③2 [TT Menu] key

Use this key to open the TT Menu (target tracking menu).

③3 / ③4 [RANGE + / -] key

Press the **[+]** key to increase the observation range and the **[-]** key to reduce the observation range.

③5 / ③6 [VRM 1 / 2] (Variable Range Marker 1 / 2) key

Use this key to set the display of VRM1 / VRM2 to On / Off and acquire the operation right.

③⑦ **[ENT] (Enter) key**

Use this key to confirm menu selection and input of numeric values.
This key is equivalent to the clicking of the left button of the track ball.

③⑧ **[CLR / INFO] (Clear / information) key**

Use this key to cancel menu selection or numeric value input.
This key is equivalent to the clicking of the right button of the track ball.

2.3 FUNCTIONS OF SOFTWARE BUTTONS

In this radar, the frequently used functions can be directly set from the screen without opening the menu by using the software buttons on the screen for quick handling. The screen is divided into a number of areas and each area is named.

Upper left of the display

Upper right of the display

PPI

Lower left of the display

Lower right of the display

Own ship's information

Target tracking (TT) / AIS information

Digital information

Menu

Brilliance / Display information

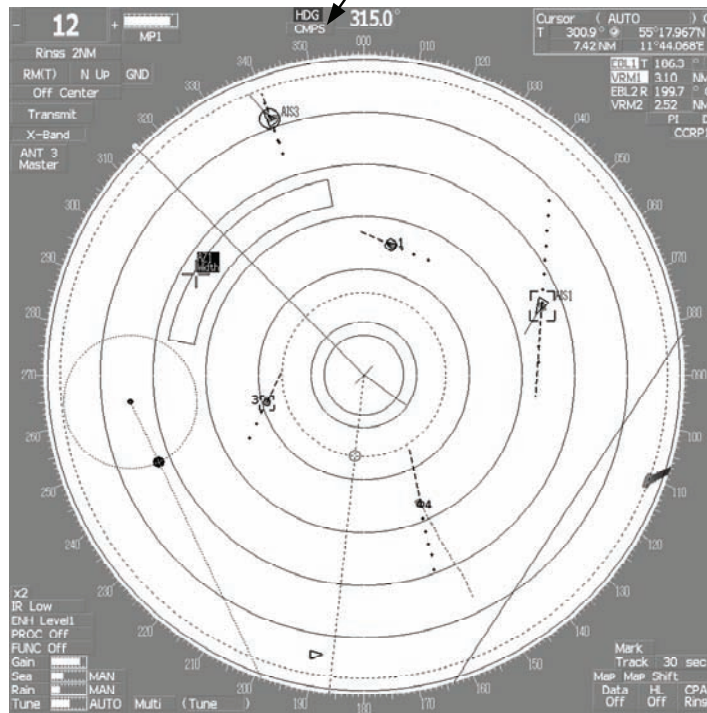
Alarm

The name of each button is described from the next page. The function can be used by pressing (clicking) the [ENT] key while setting the arrow cursor on the button position.

PPI



① Heading device switching

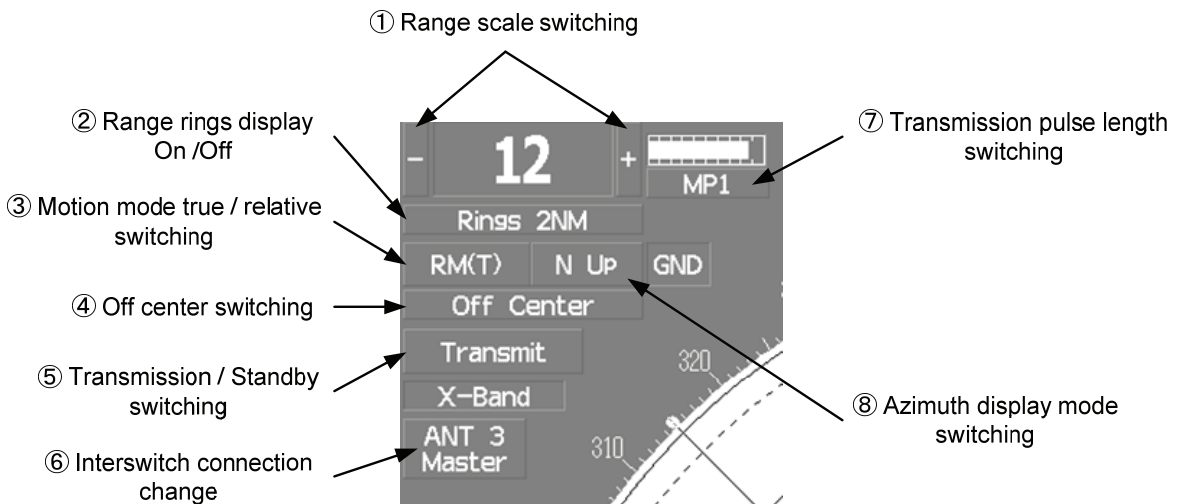


① : Heading device switching

This function switches the heading device.

GYRO (GYRO) ⇒ **CMPS** (Electronic compass) ⇒ **G.COM** (GPS compass) ⇒ **GYRO**
 If the selected heading device is not connected to the equipment, an alarm is issued.

Upper left of the display



① : Range scale switching

To increase the observation range scale (maximum 96NM), click and to reduce the range (minimum 0.125NM), click .

② : Range rings display On / Off

The display of range rings are set to On / Off whenever this button is clicked.
When the display is set to On, the interval of the fixed range marker is displayed.

③ : Motion mode true / relative switching

The screen motion mode is switched whenever the button is clicked.

(true motion) ⇒ (relative motion) ⇒

indicates that the radar trails is a relative trail.

indicates that the radar trails is a true trail.

④ : Off center switching

If this button is clicked, the cursor is moved, and the [ENT] key is pressed, the ship's position can be moved to the cursor position. The moving range is within 66% of the radius.

If the button is clicked for 2 seconds, the off-center is set to Off and the ship's position is returned to the center of the screen.

⑤ : Transmission / standby switching

At expiration of the pre-heat time after the power is turned on, changes to .

: Indicates a standby state. If this button is clicked in this state, the equipment is set to a transmission state.

: Indicates a transmission state. If this button is clicked in this state, the equipment is set to a standby state.

⑥ : Interswitch connection change

This button is displayed when the interswitch is connected. This button indicates the connection status of the scanner unit that is connected to the indicator.

If the button is clicked in the transmission standby state, the menu for changing the connection state between the scanner unit and the indicator is displayed. The connection state of the scanner unit and indicator cannot be changed unless the master indicator is in a standby state.

→Refer to the Interswitch (Optional) Instruction Manual that is attached for the setting method. This button is not displayed if the interswitch is not connected.

⑦ : Transmission pulse length switching

The transmission pulse length is switched whenever this button is clicked. Three types of pulses are available, short pulse (SP), middle pulse (MP), and long pulse (LP). The pulse length and repetition frequency vary even for the same short pulse, according to the range that is used and it is displayed as

, .

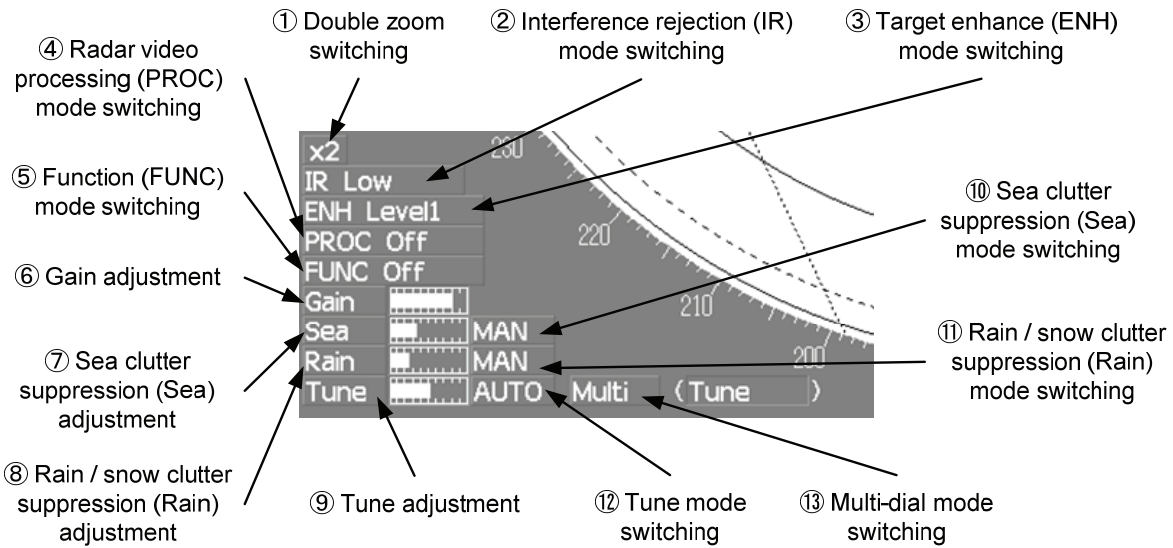
⑧ : Azimuth display mode switching

The azimuth display is switched whenever this button is clicked.

(Head Up) ⇒ (North Up) ⇒ (Course Up) ⇒

If the button is clicked for 2 seconds, the GYTO Setting menu is displayed.

Lower left of the display



① : Double zoom switching

Use this function to enlarge to double the size the display screen of the position specified by the cursor. If this button is clicked, the zoom mode is set. When the cursor is moved to the radar screen and the [ENT] key is pressed, the screen is enlarged to double the size so that the middle of the cursor and the own ship's position is set to the center of the screen. This function cannot be used when the range is 0.125NM.

② : Interference rejection (IR) mode switching

The interference rejection mode is switched whenever this button is clicked.

[IR Off] ⇒ [IR Low] ⇒ [IR Medium] ⇒ [IR High] ⇒ [IR Off]

③ : Target enhance (ENH) mode switching

The target enhance mode is switched whenever this button is clicked.

[ENH Off] ⇒ [ENH Level1] ⇒ [ENH Level2] ⇒ [ENH Level3] ⇒ [ENH Off]

④ : Radar video processing (PROC) mode switching

The radar video processing mode is switched whenever this button is clicked.

[PROC Off] ⇒ [3Scan CORREL] ⇒ [4Scan CORREL] ⇒ [5Scan CORREL] ⇒
⇒ [Remain] ⇒ [Peak Hold] ⇒ [PROC Off]

⑤ : Function (FUNC) mode switching

The function mode is switched whenever this button is clicked.

[FUNC Off] ⇒ [Coast] ⇒ [Deep Sea] ⇒ [Fishnet] ⇒ [Storm] ⇒ [FUNC Off]

If the button is clicked for 2 seconds, the function registration menu (User Function Setting) is opened.

⑥, ⑦, ⑧, and ⑨ : Gain, Sea clutter suppression (Sea), Rain / snow clutter suppression (Rain), Tune adjustment

Adjust the gain, sea clutter suppression, rain and snow clutter suppression and tune using the track ball. If the button is clicked on, the adjustment value is shown at the upper-right of the cursor. Make adjustments by moving the track ball to the left and right. Determine the adjustment by pressing the [ENT] key.

⑩, ⑪, and ⑫ : **Sea clutter suppression (Sea) mode, Rain / snow clutter suppression (Rain) mode, and Tune mode switching**

Use these functions to switch to the manual or automatic mode of sea clutter suppression, rain / snow clutter suppression and tune. The bar on the left side indicates the position of the dial.

The mode is switched to **MAN** (manual) / **AUTO** (automatic) whenever the button is clicked. If rain / snow clutter suppression is switched to an automatic mode, sea clutter suppression is switched to an automatic mode also.

⑬ : **Multi-dial mode switching**

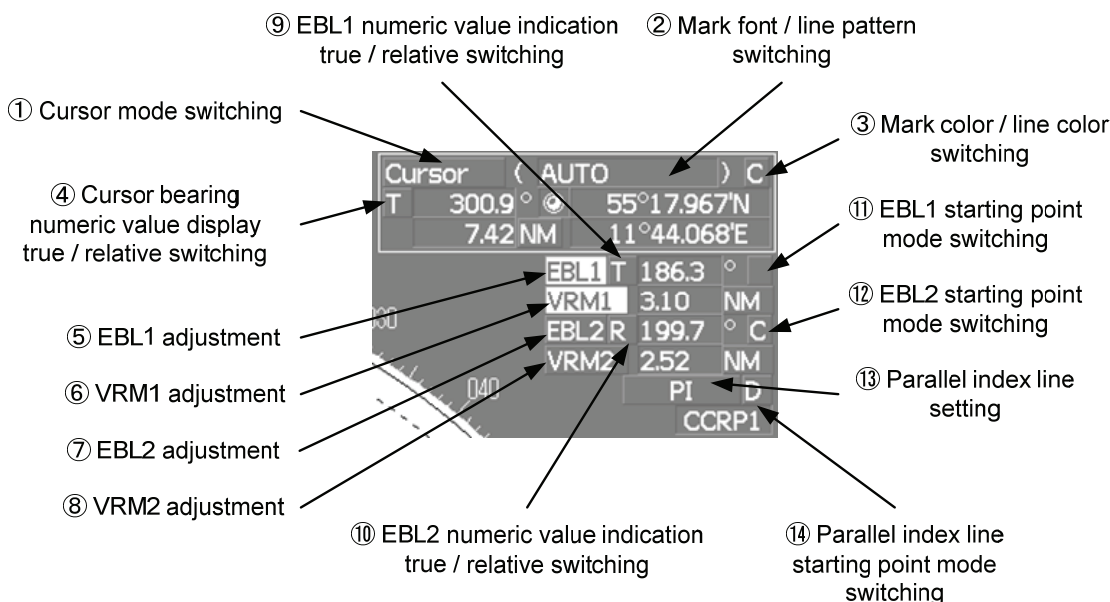
The function that is registered in the multi-dial is switched whenever the button is clicked.

Vector ⇒ **Trails** ⇒ **TGT No.** ⇒ **Course** ⇒ **Track** ⇒ **Mark** ⇒
 ⇒ **Tune** ⇒ **Vector**

The switched function is displayed in ().

If the button is clicked for 2 seconds, the Multi Dial Setting menu is opened. If this button is clicked again for 2 seconds, this setting menu is closed.

Upper right of the display



① : **Cursor mode switching**

The mode of the function that uses the cursor is switched whenever this button is pressed.

AUTO ⇒ **ACQ TT** ⇒ **ACT AIS** ⇒ **TGT DATA** ⇒ **CNCL TT** ⇒
 ⇒ **DEACT AIS** ⇒ **CNCL Data** ⇒ (Mark) ⇒ **-----** (Line) ⇒
 ⇒ **Property** ⇒ **AUTO**

② : **Mark font / line pattern switching**

This function switches a mark font / line pattern. If this button is clicked while the cursor mode is

(mark) or **-----** (line), the mark font / line pattern is changed.

③ : Mark color / line color switching

This function switches a mark color / line color. If this button is clicked while the cursor mode is

(mark) or (line), the mark color / line color is changed.

④ : Cursor bearing numeric value display true / relative switching

The bearing numeric value display (true bearing) / (relative bearing) of the cursor is switched whenever this button is clicked.

⑤, ⑥, ⑦, and ⑧ : EBL1 / 2 and VRM1 / 2 adjustment

These functions set the , , , and displays to On / Off and acquire the operation right.

If the button is clicked on, the operation right is acquired. Make adjustments by moving the track ball to the left and right Determine the adjustment by pressing the **[ENT]** key.

⑨ and ⑩ : EBL1, EBL2 numeric value true / relative switching

The EBL1 / 2 bearing numeric value display (true bearing) / (relative bearing) is switched whenever the button is clicked.

If the button is clicked for 2 seconds, the EBL / Cursor Setting menu is displayed.

⑪ and ⑫ : EBL1 / EBL2 starting point mode switching

The EBL starting point is set to CCRP or any position on the radar screen whenever this button is clicked.

⇒ ⇒ ⇒

: Center :The starting point is fixed to the CCRP position.

: Screen Fix :The starting point is set to the cursor position. If the **[ENT]** key is pressed subsequently, the starting position is fixed to the cursor position.

: L/L Fix :The starting point is set to the cursor position. If **[ENT]** key is pressed subsequently, the starting position is fixed to the latitude / longitude of the cursor. (Connection of a navigator is necessary.)

If the starting point is moved outside of the screen, the operation is reset automatically and the starting point returns to the CCRP position.

* is enabled only when a navigator is connected.

⑬ : Parallel index line setting

This function sets the parallel index line display to On / Off and acquires the operation right.

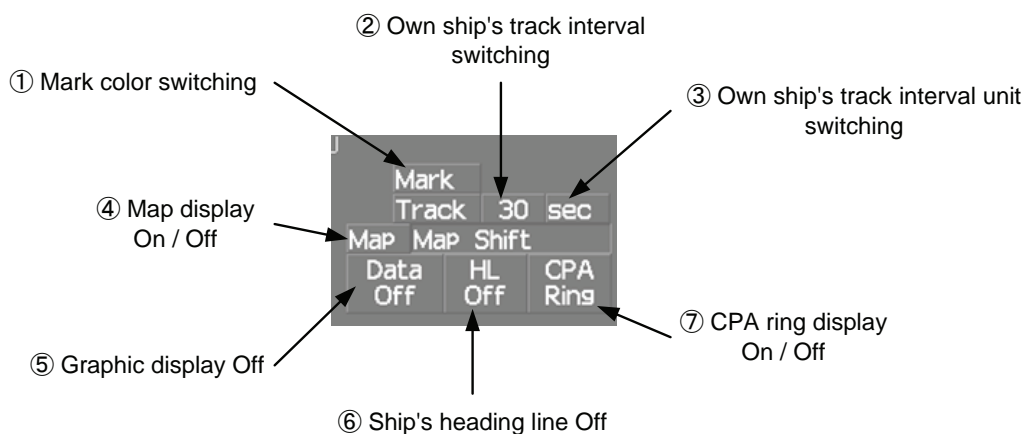
If this button is clicked, the operation right is acquired and the menu is opened. After setting, determine the setting by pressing the **[ENT]** key.

⑭ : Parallel index line starting point mode switching

The parallel index line starting point is set to CCRP or any position on the radar screen whenever this button is clicked.

In the same way as for the EBL starting point, three options are available, : Center, : Screen Fix, and : L/L Fix.

Lower right of the display



① : Mark color switching

The color of the mark is switched whenever this button is clicked.
If the button is clicked for 2 seconds, the Mark Setting menu is opened.

② : Own ship's track interval switching

The own ship's track interval is switched whenever this button is clicked.

③ : Own ship's track interval unit switching

The unit of the own ship's track interval is switched whenever this button is clicked.

⇒ ⇒ ⇒

④ : Map display On / Off

The map display is set to On / Off whenever this button is clicked.
Map information must be inserted in the card slot of the radar process unit in advance.
If the button is clicked for 2 seconds, the Map Setting menu is opened.

⑤ : Graphic display Off

While the button is clicked, the graphic display other than VRM, EBL, HL, a cursor, and range rings on the radar screen is cleared temporarily.

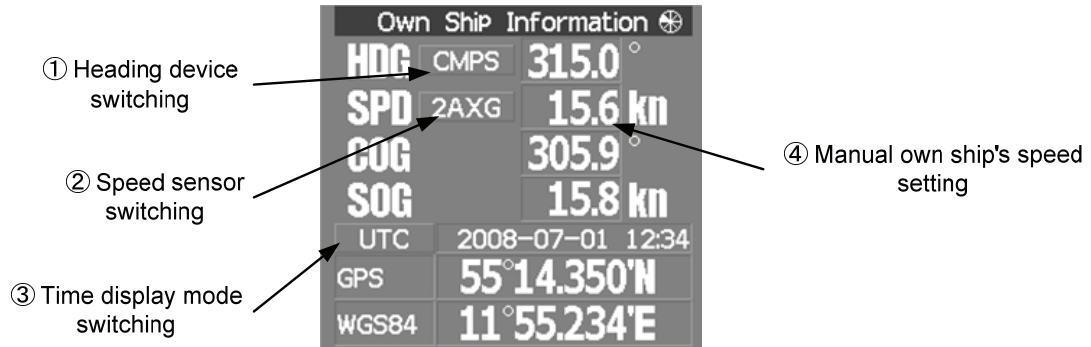
⑥ : Ship's heading line Off

The ship's heading line (HL) display is set to Off while this button is clicked.
Since the ship's heading line is cleared while the button is clicked, the target in the ship's heading bearing can be clearly seen.

⑦ : CPA ring display On / Off

The CPA ring display is switched to On / Off whenever the button is clicked.
When the target vector display mode is (true vector), the CPA ring cannot be set to On.

Own ship's information



① : Heading device switching

The heading device is switched whenever this button is clicked.

GYRO ⇒ **CMPS** (Electronic compass) ⇒ **GCOM** (GPS compass) ⇒ **GYRO**

When the selected heading device is not connected to the equipment, an alarm is issued.

② : Speed sensor switching

The speed sensor is switched whenever the button is clicked.

MAN (Manual) ⇒ **LOG** (Single-axis water log) ⇒ **2AXW** (Dual-axis water log)
⇒ **2AXG** (Dual-axis ground log) ⇒ **GPS** ⇒ **MAN**

When the selected speed device is not connected to the equipment, an alarm is issued.

③ : Time display mode switching

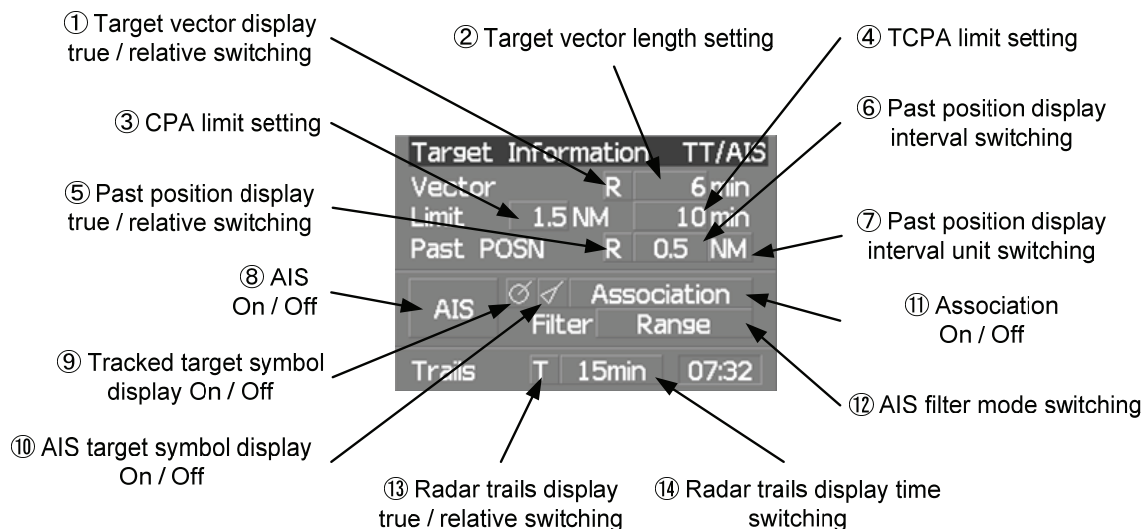
The time display mode **UTC** (universal time clock) / **LMT** (local mean time) is switched whenever this button is clicked.

④ : Manual own ship's speed setting

When selection of the speed sensor is set to **MAN**, enter the own ship's speed manually.

If this button is clicked, the numeric value input screen is opened. After setting a value, determine the entry by clicking **ENT**.

Target tracking (TT) / AIS information



① : Target vector display true / relative switching

The tracked target / AIS target vector display is switched to **T** (true vector) / **R** (relative vector) whenever this button is clicked.

This setting is switched together with the past position display true / relative switching.

② : Target vector length setting

Set a vector length of the tracked target / AIS target.

If this button is clicked, the numeric value input screen is opened. After setting the length, determine the setting by clicking **ENT**.

③ : CPA limit setting

Set a CPA limit.

If this button is clicked, the numeric value input screen is opened. After setting the limit, determine the setting by clicking **ENT**.

④ : TCPA limit setting

Set a TCPA limit.

If this button is clicked, the numeric value input screen is opened. After setting the limit, determine the setting by clicking **ENT**.

⑤ : Past position display true / relative switching

The tracked target / AIS target past position display is switched to **T** (true past position) / **R** (relative past position) whenever the button is clicked.

This setting is switched together with the target vector display true / relative switching.

⑥ : Past position display interval switching

The past position display interval is switched whenever the button is clicked.

⑦ : Past position display interval unit switching

The past position display interval unit is switched whenever the button is clicked.

min ⇒ **NM** ⇒ **min**

⑧ : AIS On / Off

The AIS display is switched to On / Off whenever the button is clicked.

⑨ : Tracked target symbol display On / Off

The tracked target symbol display is switched to On / Off whenever the button is clicked. Use this function to avoid confusion with the AIS symbol.

⑩ : AIS target symbol display On / Off

The AIS target symbol display is switched to On / Off whenever the button is clicked. Use this function to avoid confusion with the tracked target symbol.

⑪ : Association On / Off

The tracked target / AIS target association is switched to On / Off whenever the button is clicked.

⑫ : AIS filter mode switching

The AIS filter is switched whenever the button is clicked.

⇒ ⇒ ⇒

⑬ : Radar trails display true / relative switching

Radar trails are switched to (true motion trail) / (relative motion trail) whenever this button is clicked.

This setting is restricted by the radar display motion mode.

In relative motion display mode (RM), switching to / is possible.

In true motion display mode (TM), only can be set.

⑭ : Radar trails display time switching

The radar trails display time is switched whenever the button is clicked.

If the time does not reach the radar trails time that was set, the remaining time is displayed on the right-hand side.

If the button is clicked for 2 seconds, the RADAR Trails Setting menu is opened.

Digital information: AIS target information

Simple display item

The screenshot shows a detailed AIS target information display. At the top, there is a header bar with 'AIS ID 1' and a small envelope icon. Below this, the target's name 'JMA-5300 MK2 SERIES' is shown. The main data is organized into two columns: 'Call Sign' (JRCJ-MA), 'MMSI' (422459111), 'COG' (210.0°), 'SOG' (30.2 kn), 'CPA' (6.64 NM), and 'TCPA' (-7.1 min) in the first column; and 'BRG' (130.0°), 'Range' (7.99 NM), 'HDG' (210.0°), 'ROT' (0.00°/min), 'POSN' (55°10.999'N, <10m 12°01.199'E), 'Destination' (JAPAN RADIO CO.,LTD), 'NAV Status' (Under Way Using Engine(0)), and 'Under Way Using Engine(0)'. Two callout arrows point to the envelope icon: one labeled '① Detail / simple display switching' and another labeled '② Unread message display'.

AIS ID	1	✉
Name	JMA-5300 MK2 SERIES	
Call Sign	JRCJ-MA	
MMSI	422459111	
COG	210.0°	
SOG	30.2 kn	
CPA	6.64 NM	
TCPA	-7.1 min	
BRG	130.0°	
Range	7.99 NM	
HDG	210.0°	
ROT	0.00°/min	
POSN	55°10.999'N	
<10m	12°01.199'E	
Destination	JAPAN RADIO CO.,LTD	
NAV Status	Under Way Using Engine(0)	
Under Way Using Engine(0)		

① : Detail / simple display switching

This function switches the display mode to detail / simple display when AIS target information is displayed.

② : Unread message display

When there is an unread message from the AIS target that is displayed, the message is displayed. If this button is clicked, the message is displayed.

Digital information: Tracked target information

TT ID	2	1	▼▲
BRG	247.9	157.1	°
Range	3.97	5.98	NM
Course	337.0	327.3	°
Speed	19.0	31.9	kn
CPA	2.27	1.20	NM
TCPA	17.55	18.43	min
BCR	2.27		NM
BCT	17.2		min

① Tracked target numeric value indication scroll

① : Tracked target numeric value indication scroll

This function scrolls the target numbers that are indicated in the tracked target information.

Digital information: Navigation information

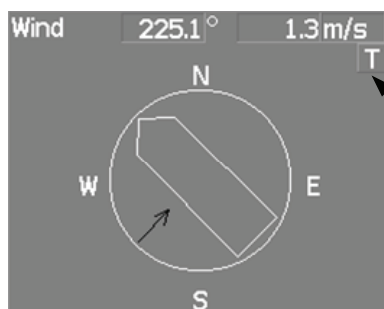
Navigation INFO	
Depth	136.2 m
TEMP	23.6 °C
Current	213.2 °
	2.4 kn
Wind	72.9 °
	T 3.0 m/s
DEST	087.7 ° 95.6 NM
	363.2 min

① Wind direction / speed numeric value indication true / relative switching

① : Wind direction / speed numeric value indication true / relative switching

The wind direction / speed numeric value indication is switched to **T** (true) / **R** (relative) whenever this button is clicked.

Digital information: Wind direction / speed

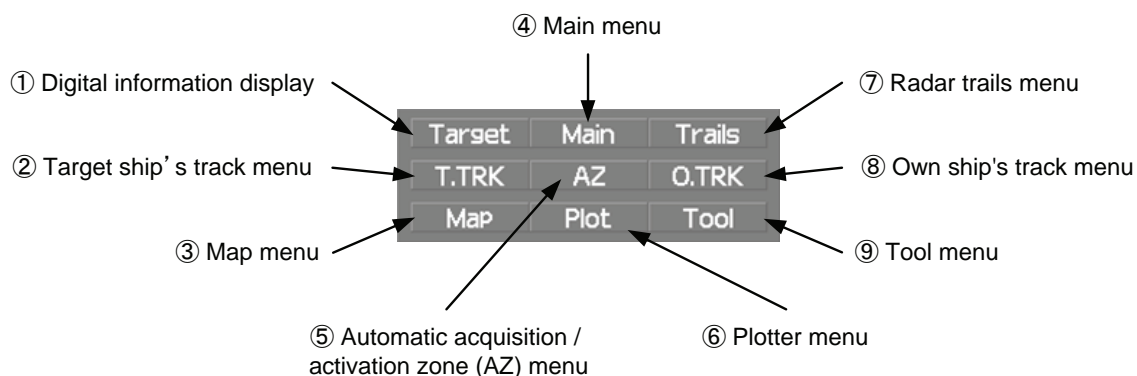


① Wind direction / speed numeric value indication true / relative switching

① : Wind direction / speed numeric value indication true / relative switching

The wind direction / speed numeric value indication is switched to **T** (true) / **R** (relative) whenever this button is clicked.

Menu



① : Digital information display

If this button is clicked while the menu screen is open, the menu is closed and control returns to the digital information display.

This function switches between the tracked target / AIS target display and navigation information or the course bar, and so on.

② : Target ship's track menu

If this button is clicked, the Target Track Setting menu is opened.

③ : Map menu

If the button is clicked, the Map Setting menu is opened.

④ : Main menu

If this button is clicked, the Main Menu is opened.

⑤ : Automatic acquisition / activation zone (AZ) menu

If this button is clicked, the AZ Menu is opened.

⑥ : **Plotter menu**

If this button is clicked, the Plot Menu is opened.

⑦ : **Radar trails menu**

If this button is clicked, the RADAR Trails Setting menu is opened.

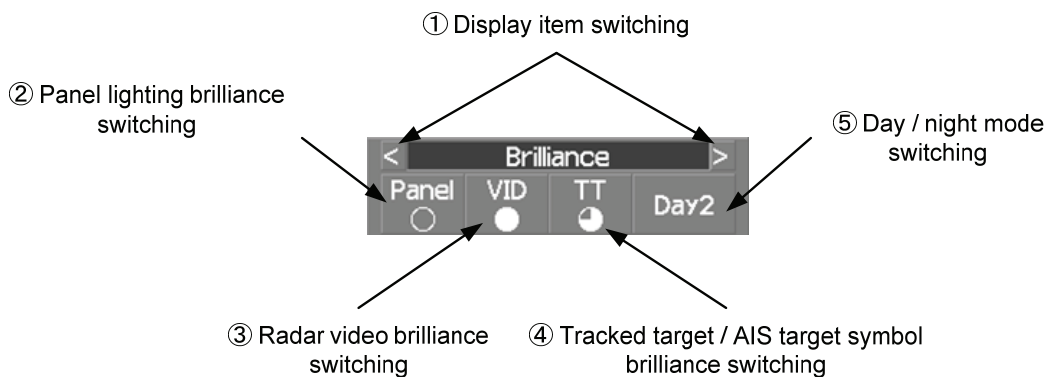
⑧ : **Own ship's track menu**

If this button is clicked, the Own Track Menu is opened.

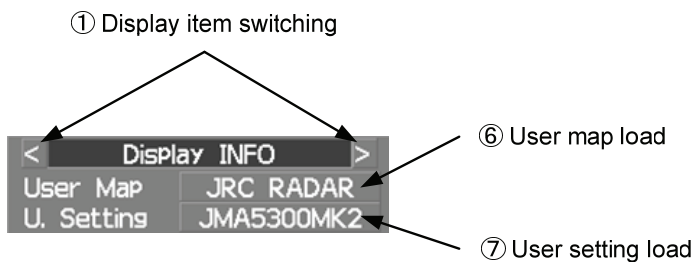
⑨ : **Tool menu**

If this button is clicked, the Tool Menu is opened.

Brilliance



Display information



① : **Display item switching**

The brilliance adjustment screen and display information setting screen interchange whenever this button is clicked.



② : Panel lighting brilliance switching

This function enables the setting of the brilliance of the lighting of the control panel.
The brilliance changes whenever this button is clicked. Five levels of settings are available.

③ : Radar video brilliance switching

Adjust the brightness of the radar video (echo).
The brilliance changes whenever this button is clicked. Four levels of settings are available.

④ : Tracked target / AIS target symbol brilliance switching

Use this function to adjust the brilliance of the tracked target / AIS target symbol.
The brilliance changes whenever this button is clicked. Five levels of settings are available.

⑤ : Day / night mode switching

The day / night mode is switched whenever this button is clicked.

Day1 ⇒ Day2 ⇒ Day3 ⇒ Dusk ⇒ Night ⇒ Day1

⑥ : User map load

If this button is clicked, the user created map read menu is opened.

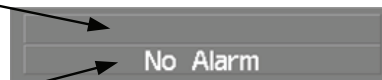
⑦ : User setting load

If this button is clicked, the user setting read menu is opened.

Alarm

① Alarm acknowledgement

② Error log display



① : Alarm acknowledgment

If this button is clicked, the buzzer sound of the alarm that is currently issued is stopped and the alarm lamp stops blinking. If multiple alarms are issued, the next alarm to be acknowledged is displayed.
If the button is clicked, the alarm displayed on the top is acknowledged.
The alarms that are currently issued are displayed at the bottom one by one.

② : Error log display

If this button is clicked, the error log is displayed.

SECTION 3

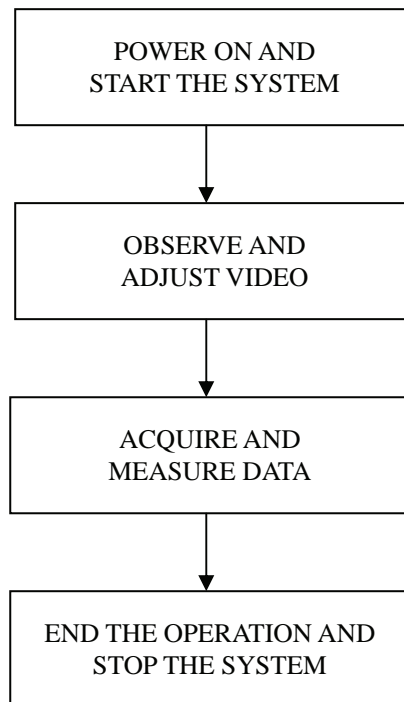
BASIC OPERATION

3.1	OPERATION FLOW.....	3-1
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3.3	OPERATION PROCEDURES.....	3-11
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3.1 OPERATION FLOW

Attention

- **Do not put anything on the operation panel.
If you put anything hot on it, it may be deformed.**
- **Do not give any impact to the operation panel,
trackball, or controls.
Otherwise, any failure or damage may result.**



Each operation is described in detail below.

3.1.1 Power ON and Start the System



CAUTION



A malfunction 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.

3

Attention

- 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 longer 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 is stabilized.

Procedures

- 1 Check that the ship's mains are turned on.
- 2 Press the [STBY] key.

The system is turned on, and the preheating time is displayed.
[Preheat] is indicated upper left of the display.

- 3 Wait until the preheating time is over.

When the preheating time is over, the preheating time screen disappears, and [Preheat] upper left of the display changes to [Standby].

- 4 Press the [TX / PRF] key.

The radar will start transmission and the antenna will start rotating.
[Standby] upper left of the display changes to [Transmit].

Note: The radar does not start transmission if you Press the [TX / PRF] key while [Preheat] is indicated.

3.1.2 Observe and Adjust Video

Procedures

- 1 Press the [RANGE+] key or [RANGE-] key to set the range to the scale required for target observation.
- 2 Turn the dials [GAIN / PL], [AUTO-SEA], and [AUTO-RAIN] to obtain the clearest targets.

Refer to
[GAIN/PL]→3-7P
[AUTO-SEA]→3-7P
[AUTO-RAIN]→3-9P
for how to use each dial.

For how to adjust video, see Chapter 3.2.

3.1.3 Acquire and Measure Data

For details on how to acquire data and measure, see Section 4 "Measurement of range and bearing."

3.1.4 Display and Measure with Reference to CCRP

The radar video, range, bearing, Target Tracking and AIS data display etc... are displayed with reference to CCRP (Consistent Common Reference Point).

If scanner is switched, these data are measured from CCRP.

If some kind of functions set scanner position to outside of the PPI range, these data except Target Tracking and AIS data are displayed with reference to scanner position.

For how to setting CCRP, see the section 7.1.9.

3.1.5 End the Operation and Stop the System

Exit

- 1 Press the [STBY] key.

The radar will stop transmission and the antenna will stop rotating.
[Transmit] upper left of the display changes to [Standby].

(Maintain the standby state if radar observation is restarted in a relatively short time.
Only pressing the [TX / PRF] key starts observation.)

- 2 Press the [STBY] key and the [TX / PRF] key together.

The system will be turned off.



WARNING



When conducting maintenance work, make sure to turn off the power and unplug the power connector J1 of the radar process unit 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 without unplugging the power connector may result in electrocution, equipment failure, or accidents.

3.2 OBSERVE AND ADJUST VIDEO

3.2.1 Adjust Monitor Brilliance [BRILL]

Procedures

- 1 Obtain the best-to-see display with optimum brilliance by turning the [BRILL] dial at the lower right of the LCD monitor.**

Turning the **[BRILL]** dial clockwise increases the brilliance of the entire display. Conversely, turning the **[BRILL]** dial counterclockwise decreases the brilliance of the entire display.

In consideration of the ambient brightness, adjust display brilliance that is high enough to easily observe the radar display but does not glare.

3.2.2 Change Observation Range [RANGE + / -]

Procedures

- 1 When increasing the observation range, press the [RANGE+] key.**



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.

- 2 When decreasing the observation range, press the [RANGE-] key.**

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.



3.2.3 Tune

 <h1 style="margin: 0;">CAUTION</h1>	
	<p>Normally, use the automatic tune mode.</p> <p>Use the manual tune mode only when best tuning is not possible in the automatic tune mode due to deterioration of magnetron.</p>

3

This radar system provides the automatic tune mode and the manual tune mode. The automatic tune mode automatically adjusts the tuning of the transmitting frequency and the receiving frequency, and the manual tune mode enables tuning to be adjusted by using the dial located on the operation unit. The tune mode currently being used is displayed in the tune mode switching (lower left of the display ⑫ on page 2-18).

When using the automatic tune mode

Procedures

- 1 Put the cursor on the tune mode switching (lower left of the display ⑫ on page 2-18) and press the [ENT] key.

The automatic tune mode is selected and **AUTO** is displayed in the tune mode field. Tune adjustment is automatically conducted. Tune is adjusted at the start of transmission, at the change of the range or pulse length. Tune adjustment is completed within several seconds.

When using the manual tune mode

Procedures

- 1 Put the cursor on the tune mode switching (lower left of the display ⑫ on page 2-18) and press the [ENT] key to set the manual tune mode.

The automatic tune mode is cancelled, and **MAN** is displayed in the tune mode field.

- 2 Press the [MULTI] dial to set the **(Tune)** mode.

Tune is displayed in the multi-dial mode (lower left of the display on page 2-3).

- 3 Turn the [MULTI] dial to adjust tune.

Make adjustments so that the tuning indication (upper left of the display on page 2-2) indicates the maximum.

3.2.4 Adjust Gain [GAIN / PL]



If the gain is too high, unnecessary signals including receiver noise and false video increase resulting in reduction of visibility of targets. On the contrary, if the gain is too low, targets including ships and dangerous objects may not be clearly indicated.

Procedures

- 1 Adjust noise of the display by turning the [GAIN / PL] dial until targets can be easily observed.**

Turning [GAIN / PL] dial clockwise increases gain.

Turning [GAIN / PL] dial counterclockwise decreases gain.

By increasing receiving gain, the range to observe radar video is widened.

To observe densely crowded targets or short-range targets, reducing the receiving gain will enable the targets to be easily observed.



3.2.5 Suppress Sea Clutter [AUTO-SEA]



CAUTION



When using the sea clutter suppression function, never set the suppression level too high canceling out all image noises from the sea surface at close range.

Detection of not only echoes from waves but also targets such as other ships or dangerous objects will become inhibited.

When using the sea clutter suppression function, make sure to choose the most appropriate image noise suppression level.

3

Using the manual sea clutter suppression mode

Procedures

- 1 Adjust the sea clutter returns of the display by turning the [AUTO-SEA] dial until targets can be easily observed.

Turning [AUTO-SEA] dial clockwise suppresses sea clutter returns.

Turning [AUTO-SEA] dial counterclockwise intensifies sea clutter returns.

The sea clutter suppression function suppresses sea clutter returns by decreasing the receiving gain on a short range.

Turning the [AUTO-SEA] dial clockwise heightens the effect of sea clutter suppression.

However, be careful that excessive suppression causes low signal-strength targets such as buoys and boats to disappear from the radar display.

Using the 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.

Procedures

1 Press the [AUTO-SEA] dial.

The automatic sea clutter suppression mode is selected, and **AUTO** is displayed in sea clutter suppression (Sea) mode switching (lower left of the display ⑩ on page 2-18).

2 Make adjustments by turning the [AUTO-SEA] dial.

Even when the automatic sea clutter suppression mode is selected, turning the [AUTO-SEA] dial can make fine adjustments manually.



Note: When the automatic sea clutter suppression mode is selected, the automatic rain/snow suppression mode is switched to the manual mode.
To select both the sea clutter suppression function and the rain/snow suppression function in the automatic mode, use the automatic rain/snow suppression mode.

Cancellation

1 Press the [AUTO-SEA] dial.

The automatic sea clutter suppression mode is cancelled, and **MAN** is displayed in the sea clutter suppression (Sea) mode field.

3.2.6 Suppress Rain / Snow Clutter [AUTO-RAIN]

 CAUTION	
	<p>When using the rain clutter suppression function, never set the suppression level too high canceling out all image noises from the rain or snow at the close range.</p> <p>Detection of not only echoes from the rain or snow but also targets such as other ships or dangerous objects will become inhibited.</p> <p>When using the rain clutter suppression function, make sure to choose the most appropriate image noise suppression level.</p>



Using the manual rain / snow clutter suppression mode

Procedures

- 1 **Adjust the rain / snow clutter returns of the display by turning the [AUTO-RAIN] dial until targets can be easily observed.**

Turning [AUTO-RAIN] dial clockwise suppresses rain / snow clutter returns.
Turning [AUTO-RAIN] dial counterclockwise intensifies rain / snow clutter returns.

When the [AUTO-RAIN] dial is turned clockwise, the rain / snow clutter suppression function suppresses rain / snow clutter returns and gets targets hidden by rain / snow clutter returns to appear of the display. However, be careful that excessive suppression may cause small targets to be overlooked. Since the rain / snow clutter suppression function also has the effect of suppressing sea clutter, the suppression efficiency improves when the [AUTO-RAIN] dial is used with the [AUTO-SEA] dial. In general, turn the [AUTO-RAIN] dial fully to the left.

3

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.

Procedures

- 1 **Press the [AUTO-RAIN] dial.**

The automatic rain / snow clutter suppression mode is selected, and **AUTO** is displayed in the sea clutter suppression (Sea) mode switching and the rain / snow clutter suppression (Rain) mode switching (lower left on the display ⑩ and ⑪ on page 2-18)

- 2 **Make adjustments by turning the [AUTO-RAIN] dial and the [AUTO-SEA] dial.**

Even when the automatic rain / snow clutter suppression mode is selected, turning the [AUTO-RAIN] dial and the [AUTO-SEA] dial can make fine adjustments manually.

Note: When the automatic rain / snow clutter suppression mode is selected, the automatic sea clutter suppression mode is also activated.

It is not possible to set only the rain / snow clutter suppression function to the automatic mode.

Cancellation

- 1 **Press the [RAIN] dial.**

The automatic rain / snow clutter suppression mode is cancelled, and **AUTO** is changed to **MAN** in the sea clutter suppression (Sea) mode field and the rain / snow clutter suppression (Rain) mode field.

3.2.7 Reset Alarm Buzzer [ALARM ACK]

When an audible alarm is issued, use [ALARM ACK] to acknowledge the alarm information, stop the alarm buzzing, and stop the alarm lamp flashing. (If more than one alarm has occurred, press the key for each alarm indication.) The alarm stops buzzing, but the alarm indication does not disappear.

Procedures



- 1 **Press the [ALARM ACK] key.**

The alarm will stop buzzing.

3.3

OPERATION PROCEDURES

3.3.1 Move Cross Cursor Mark by Trackball

The cross cursor mark  is used for position designation and other purposes in various operating procedures. The cross cursor mark  moves in coupling with the trackball. If the trackball is rotated up and down or right and left, the cross cursor mark follows the move of the trackball. Operators must be familiar with trackball operation before running the system.

Operation inside Radar Video PPI

The cross cursor mark as shown at right is displayed inside the radar video PPI.



- 1) The distance, bearing, and latitude / longitude are digitally indicated in the cursor bearing, range, latitude, and longitude (upper right of the display on page 2-3).
- 2) When moving the current center position, use the cross cursor mark to designate a new center position.
- 3) Use the cross cursor mark to create marks and lines.
- 4) Use the cross cursor mark to designate a target in the target tracking (TT) function and the AIS display function.
- 5) Use the cross cursor mark to adjust EBL, VRM, automatic acquisition and activation zone (AZ), radar alarm zone (RA), parallel index line (PI), and AIS filter.

Operation outside Radar Video PPI

As shown at right, the cursor mark changes into the cursor outside the radar video PPI.



- 1) Use the cursor to operate software buttons.
- 2) Use the cursor to select menu items.

* The EBL / VRM dial is available for operating the cursor mark. Pressing the EBL dial for 2 seconds can perform switching to the trackball operation. For details, refer to Section 3.8.4.

3.3.2 Operate Software Buttons

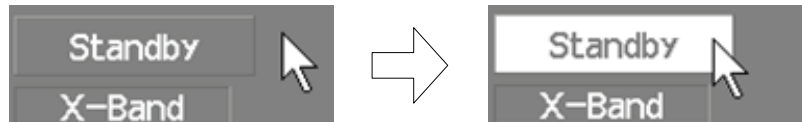
Software buttons are provided of the display so as to easily switch functions without operating menu items.

For software buttons that can be operated and their locations, see Chapter 2.

Procedures

1 Put the pointer on the software button of the display.

The software button indicated by the cursor will be shown in reverse video, which indicates that the button is specified.



2 Press the [ENT] key.

The operating state changes according to the function of the software button.

On / off settings

Each time the [ENT] key is pressed, the operating state switches as follows:

On ⇒ Off ⇒ On ⇒ Off

Multiple settings

For example, each time the [ENT] key is pressed, the operating state switches as follows:

IR Off ⇒ IR Low ⇒ IR Middle ⇒ IR High ⇒ IR Off

3.3.3 Basic Menu Operation

To open the menu:

Put the cursor on main menu **Main** (Menu ④ on page 2-27) and press the **[ENT]** key, and the main menu will open. Alternatively, press the **[RADAR MENU]** key.

By putting the cursor on **Target**, **Map**, or **AZ** adjacent to **Main** and pressing the **[ENT]** key, the menu exclusive for the function will open.

For the arrangement of software buttons, see Chapter 2.

To close the menu:

Put the cursor on digital information display **Target** (Menu ① on page 2-27) and press the **[ENT]** key, and the menu will close and the digital information display screen will appear.

Alternatively, press the **[0]** key until the menu will close.

To move to a lower level of the menu:

The menu is in hierarchical structure. Put the cursor on the desired menu item and press the **[ENT]** key, and control will move to the lower level. Alternatively, Press numeric keys corresponding to the desired menu item number, and the **>** mark will appear at the right end of a menu item having a lower level.

To move to a higher level of the menu:

Put the cursor on **0. Exit** located lower of the menu when the menu is open. Control will return to the higher level. Alternatively, press the **[0]** key.

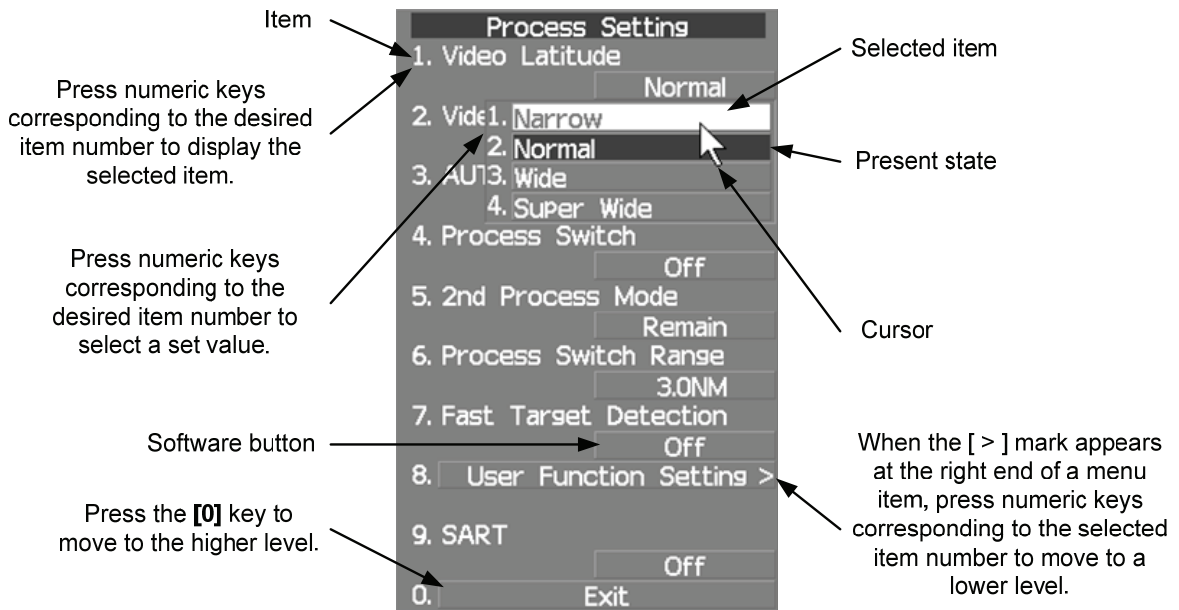
To determine an item:

Put the cursor on the menu item you want to change and press the **[ENT]** key. The selected item will be displayed. Alternatively, Press numeric keys corresponding to the desired item number.

To determine the selected item:

Put the cursor on the desired item and then press the **[ENT]** key. The selected item will be determined. Alternatively, Press numeric keys corresponding to the selected item number.

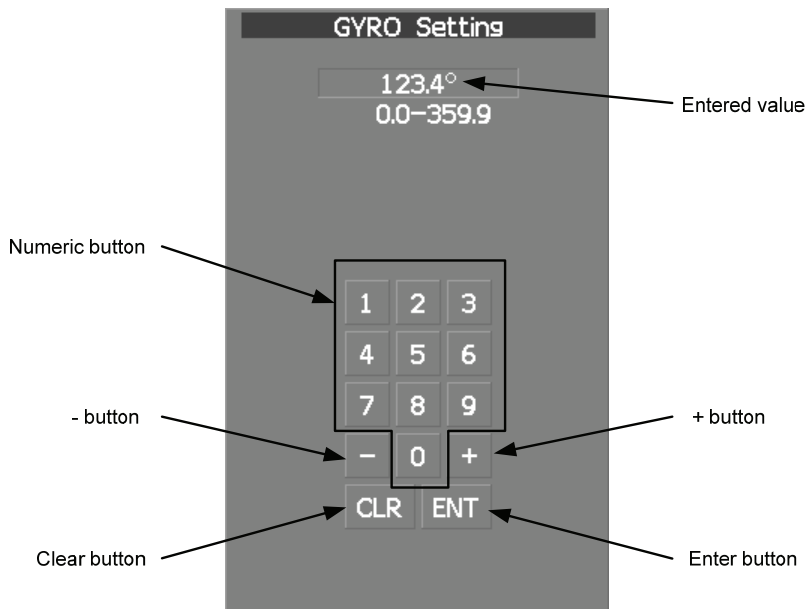
If you do not change the setting of the selected item, press the **[CLR / INFO]** key. The selected item will be closed without changing the settings.

Example of menu display

3.3.4 Operation on Numeric Value, Latitude / Longitude and Character Input menu

When a numeric value, latitude / longitude, or character must be entered during operation, the input screen will appear. Enter a numeric value, latitude / longitude, or character according to the procedures below.

Numeric value input menu



Directly entering a numeric value

Procedures

- 1 On the numeric value input menu, sequentially press numeric keys to enter a desired numeric value.

For example, when entering 123.4° for a bearing value, sequentially press the keys as follows:

[1] → [2] → [3] → [4]

- 2 Make sure that the entered value is correct, put the cursor on **ENT**, and then press the [ENT] key.

The set value is reflected to the operating state.

- 3 To cancel input, put the cursor on **CLR**, and then press the [ENT] key.

The numeric value input menu will close without reflecting the set value to the operating state.

Increasing or decreasing a numeric value

Procedures

- 1 On the numeric value input menu, put the cursor on **+** or **-**, and then press the **[ENT]** key to increase or decrease numeric value so as to change to the desired numeric value.

For example, to change bearing value of 123.0° to 123.4°, put the cursor sequentially on **+** located on the software numeric value input menu, and then press the **[ENT]** key four times.

* Turning the **[MULTI]** dial will conduct the same operation.

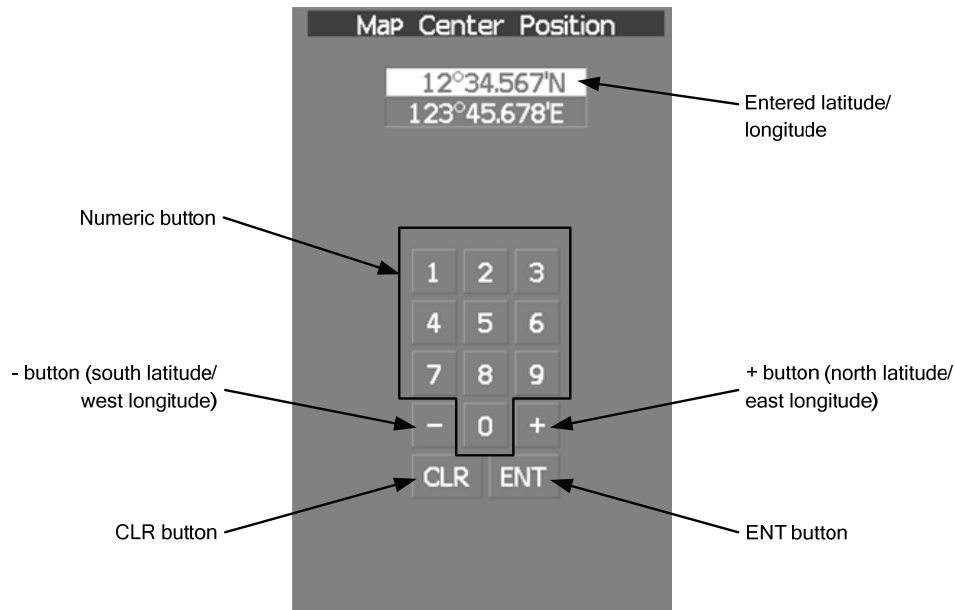
- 2 Make sure that the entered value is correct, put the cursor on **ENT**, and then press the **[ENT]** key.

The set value is reflected to the operating state.

- 3 To cancel input, put the cursor on **CLR**, and then press the **[ENT]** key.

The numeric value input menu will close without reflecting the set value to the operating state.

Latitude / longitude input screen



Entering latitude / longitude

Procedures

- 1 **On the latitude / longitude input menu, sequentially press numeric keys to enter latitude (XX°XX. XXX').**

For example, to enter 12°34.567', sequentially press numeric keys as follows.
[1] → [2] → [3] → [4] → [5] → [6] → [7]

- 2 **To make change between north latitude and south latitude, use and .**

North latitude: Put the cursor on and then press the [ENT] key.

South latitude: Put the cursor on and then press the [ENT] key.

- 3 **Put the cursor on and then press the [ENT] key.**

The manually entered latitude value is determined. Then, enter the longitude value.

- 4 **Sequentially press numeric keys to enter longitude (XXX°XX. XXX').**

- 5 **To make change between east longitude and west longitude, use and .**

East longitude: Put the cursor on and then press the [ENT] key.

West longitude: Put the cursor on and then press the [ENT] key.

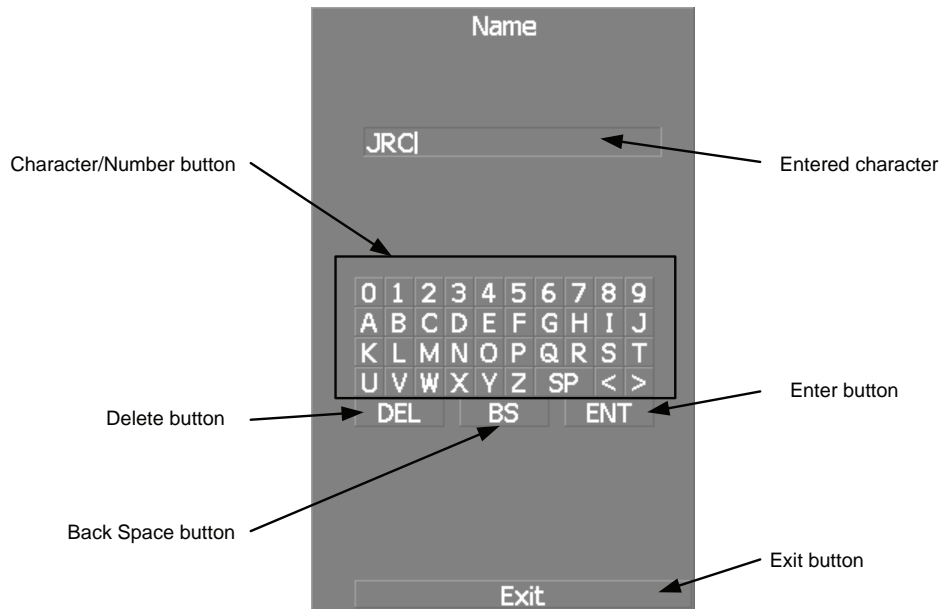
- 6 **Put the cursor on and then press the [ENT] key.**

The manually entered longitude value is determined.

- 7 To cancel input, put the cursor on **CLR** and then press the [ENT] key.

The latitude / longitude input menu will close without reflecting the set value to the operating state.

Character input screen



3

Entering a character

Procedures

- 1 On the character input menu, use trackball to select alphabet from A to Z, numbers from 0 to 9, or symbols (only comments for mark / line), and then press the [ENT] key to enter one character of the name to be inputted.

For example, JRC for a name, click button as follows:

J → **R** → **C**

- 2 Make sure that the entered character is correct, put the cursor on **ENT**, and then press the [ENT] key.

The character has been entered.

- 3 To cancel input, put the cursor on **Exit**, and press the [ENT] key.

The character input menu will be closed without entering the character.

3.3.5 Overview of Menu Structure

The menu structure of this radar system consists of seven frequently used function menus, one main menu, and one service man menu used for the installation settings.

Software buttons for opening those menus are displayed in the menu area.

For each menu item and structure, see the menu list in the appendix.

To prevent incorrect use, enter the special code to open the service man menu. For operating the service man menu, see Chapter 7.

Frequently used functions

Trails	Used for operating and setting the radar trails function.
T.TRK	Used for operating and setting the target track function.
AZ	Used for operating and setting the automatic acquisition / activation function.
O.TRK	Used for operating and setting the own ship track function.
Map	Used for operating and setting the map function.
Plot	Used for operating and setting the plotter function.
Tool	Used for operating and setting the navigation tool functions.

Main menu

Main Used for operating and setting the functions other than the above.

Service man menu

This menu is used for operation and settings when a system is installed.

It is not used during normal operation.

The special code must be entered to open the service man menu.

3.3.6 Operate Multi-Dial [MULTI]

The [MULTI] dial is provided to change the settings of parameters such as the length of radar trails. Radar operation is simplified by using the [MULTI] dial.

[I] Initial Setting (Multi Dial Setting)

Set parameters that can be operated with the multi-dial.

Procedures

- 1 Press the [MULTI] dial for 2 seconds.

The Multi Dial Setting menu will appear.



2 Press numeric keys corresponding to the desired item number.

On and off functions of the item are switched.

On : Operation is conducted by the [MULTI] dial.

Off : Operation is not conducted by the [MULTI] dial.

Items set to On can be opened by pressing the [MULTI] dial.

Item overview

Vector Length : The vector length of tracked target and activate AIS target is adjusted.

Trails Length : The radar trails length is adjusted.

TT Display No. : The target numbers of tracked target to be displayed are switched.

C-Up Angle : The course in the course up mode is adjusted.

Mark/Line Color : Mark / line colors are switched.

Manual Tune : Tune in the manual tune mode is adjusted.

III Using Multi-dial

Procedures

1 Press the [MULTI] dial to select the parameter whose setting is to be changed.

The multi-dial modes are switched.

Vector ⇒ Trails ⇒ TGT No. ⇒ Course ⇒ Mark ⇒
⇒ Tune ⇒ Vector

The selected item is displayed in the multi-dial mode (lower left of the display on page 2-3).

For example, when three items, 1/2/3, are set to On at the initial setting, the multi-dial modes switch as shown below every time the [MULTI] dial is pressed.

Vector ⇒ Trails ⇒ TGT No. ⇒ Vector

2 Turn the [MULTI] dial to change the setting.

The preset values of the selected parameter will change sequentially. Stop turning the dial when the desired value appears.

3.4 GENERAL RADAR OPERATION

3.4.1 Interference Rejection (IR)

Interference by other radars is rejected.

Attention

- When viewing a radar beacon or SART signal, select IR Off (Interference Rejection Off) because IR processing suppresses the video.

Procedures

- 1 Put the cursor on interference rejection (IR) mode switching **IR** (② lower left of the display on page 2-18) and press the [ENT] key.

The interference rejection modes are switched.

IR Off ⇒ **IR Low** ⇒ **IR Middle** ⇒ **IR High** ⇒ **IR Off**

Rejection levels of the interference rejection

IR Off	: Interference rejection off
IR Low	: Interference rejection level - low
IR Middle	: Interference rejection level - middle
IR High	: Interference rejection level - high

When a high interference rejection level is selected, the radar's ability of detecting small targets such as buoys and small boats lowers.

In general, **IR Low** should be selected.

3.4.2 Switch Transmitter Pulse Length [GAIN / PL]

Procedures

1 Press the [GAIN / PL] dial.

Values of the transmitter pulse length are switched.

Example ⇒ ⇒ ⇒ ⇒

Effects of transmitter pulse length

With selected:

The transmitter pulse becomes shorter, and the range resolution improves.

The effect of suppressing sea clutter returns and rain / snow clutter returns heightens.

Recommended condition for selection:

In bays / harbors where targets are densely crowded

Rough sea state due to torrential rain or stormy weather

With selected:

The normal transmitter pulse length is set.

Both range resolution and gain are appropriately set.

Recommended condition for selection:

General navigation

With selected:

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.

Recommended condition for selection:

Detection of small targets in good weather conditions

Usable transmitter pulse length differs according to the type of scanner unit being used and the observation range being used. For usable pulse length, see Chapter 11.

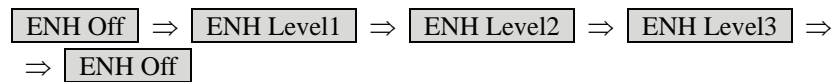
3.4.3 Target Enhance (ENH)

The dimension of video display is enlarged to enhance a target.

Procedures

- 1 Put the cursor on target enlarge (ENH) mode switching **ENH** (lower left of the display ③ on page 2-18) and press the [ENT] key.

The target enlargement levels are switched.



Effect of target enlargement

ENH Off	Enhance off	: Select this mode particularly when resolution is required.
ENH Level1	Enhance - small	: Select this mode in general. Radar echoes are expanded by 1 scale in all directions.
ENH Level2	Enhance - medium	: Select this mode to easily view the radar video. Radar echoes are expanded by 2 scales in all directions on the display.
ENH Level3	Enhance - large	: Select this mode to detect small targets such as buoys. The expansion near a screen center is added to ENH Level2.

Note: When ENH Level3 is selected, sea clutter returns and rain / snow clutter returns are apt to be expanded. When using this expansion mode, operate [AUTO-SEA] dial and [AUTO-RAIN] dial to suppress sea clutter returns and rain / snow clutter returns. In general, ENH Level1 or ENH Level2 should be selected.

3.4.4 Use Video Processing (PROC)

This function reduces unnecessary noise to highlight targets.

Attention

- When viewing a radar beacon, SART signal, or fast moving target on the radar display, select PROC Off (video processing off).
- If video processing mode is set to **CORREL**, it may be difficult to detect high speed target.

3

Procedures

- 1 Put the cursor on radar video processing (PROC) mode switching **PROC** (lower left of the display ④ on page 2-18) and press the [ENT] key.

The video processing modes are switched.

PROC Off ⇒ 3Scan CORREL ⇒ 4Scan CORREL ⇒ 5Scan CORREL
 ⇒ Remain ⇒ Peak Hold ⇒ PROC Off

Video process modes

PROC Off	: Select this mode in general.
3Scan CORREL	: Select this mode when many rain / snow clutter returns are detected.
4Scan CORREL	: Select this mode to highlight targets while suppressing sea clutter returns.
5Scan CORREL	: Select this mode to detect small targets hidden by sea clutter returns.
Remain	: Select this mode when own ship yaws wildly.
Peak Hold	: Select this mode to detect small targets of which detection probability is low.