JMA-5104/5106/5110

MARINE RADAR EQUIPMENT

INSTRUCTION MANUAL

JRC Japan Radio Co., Ltd.

——ABOUT YOUR SAFETY——

Cautions for high voltage

High voltages from hundreds volts to tens of thousands volts are to be applied to the electronic equipment such radio and radar devices. You do not face any danger during normal operation, but sufficient cares are required for maintenance, inspection and adjustment of their internal components. (Authorized maintenance personnel alone are permitted to implement maintenance, check-ups or adjustment of internal components.)

High voltages of tens of thousands volts are so dangerous as to bring an instantaneous death from electric shock, but even voltages of hundreds volts may sometimes lead to a death from electric shock. To prevent such an accident, make it a rule to turn off the power button, discharge capacitors with a wire surely earthed on an end and 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.

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 certainly 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 his 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

(1) Tilt the victim's head back as far as this face looks back. (A pillow may be inserted under 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 minute (blocking his nostrils).

(4) Carefully watch that he has recovered his natural breathing and stop 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 to keep him warm and quiet. (Never give him alcoholic drinks.)

Method of mouth-to-mouth respiration by raising head

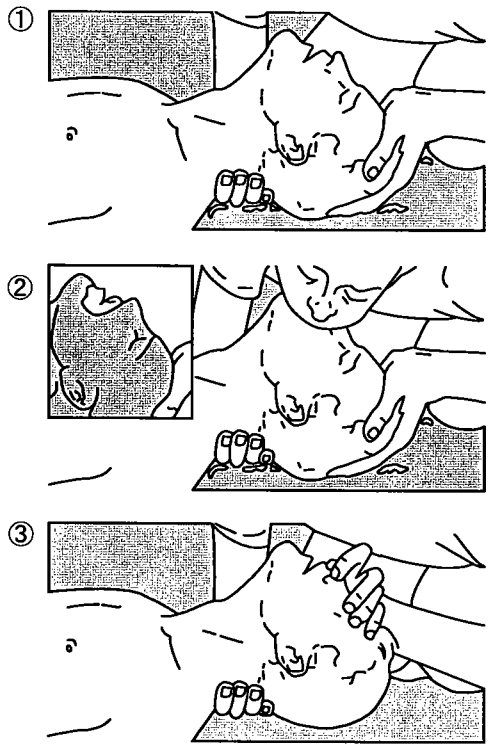


Fig.1 Mouth-to-mouth respiration

(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.

☆When both pulse and breathing have stopped

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 minute).
(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 blows into his mouth 2 times, and they shall repeat this combination.
(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 coffee or tea and keep him warm and calm while watching him carefully. Commit the victim to a medial specialist depending on his condition. To let him recover from the mental shock, it is necessary for persons concerned to understand his situations and the necessary treatments.

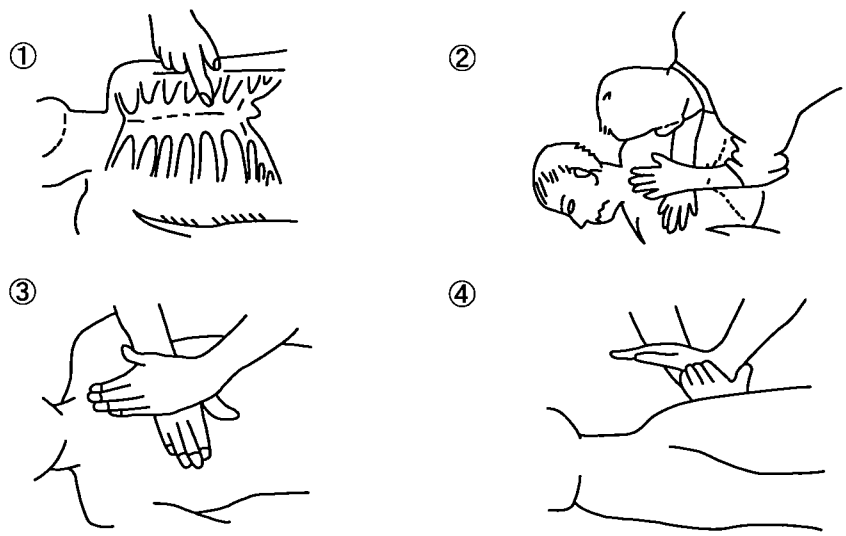


Fig.2 Cardiac massage

PREFACE

Thank you very much for purchasing the JRC marine radar equipment, JMA-5104, JMA-5106 and JMA-5110.
This equipment is a marine radar equipment designed to obtain safe operation of marine ships. The equipment consists of a radar signal transceiver 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 occur.

●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:

WARNING This indication is shown where any person is possibility 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 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

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

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

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

Warning label

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

●Cautions to be used during operation●

⚠DANGER

The customer should refrain from inspecting or repairing the internal parts of this equipment.
Inspection or repair other than by specialized service personnel may cause death or a serious injury of any person.
Please contact the sales department of Japan Radio Co., Ltd. or your local branch, outlet or sales office with respect to maintenance and repair.

When performing maintenance in increment weather, please be sure to shut the main power off.
If maintenance work is performed without shutting the main power off, there is a risk of dying or getting a serious injury of any person by electric shock.

When performing maintenance or inspection of the scanner unit, be sure to shut off the main power source.
If the scanner suddenly rotates and it hits the human body violently, there is a risk of dying or getting a serious injury of any person.

Be sure to shut off the main power source when approaching the scanner unit for the purposes of maintenance or inspection.
If exposured to electric waves at proximate distances, there is a risk of dying or getting a serious injury of any person.

High Voltage

Since some sections of the modulator (CME-322 or QME-323) generate a high voltage of about 4000V, no one except service engineers are allowed to touch inside of the modulator.
There is a risk of dying or getting a serious injury of any person by electric shock.

When the above setting is set to OFF, microwaves are radiated even if the scanner unit is not rotating, it may cause death or a serious injury of any person. Therefore, utmost care is necessary.
Make the setting is set ON after the required operation is completed.

⚠DANGER

Make sure that the main power is turned off before maintaining the equipment.
In particular, when a rectifier is used, a voltage is output from the rectifier even if the power of the display is turned off and the radar is stopped.
If maintenance work is performed without turning off the main power, there is a risk of equipments breaking down, and dying or getting a serious injury of any person by electric shock.

When checking a scanner unit for maintenance, make sure that the main power is turned off and the safety switch attached to the scanner unit is se to OFF.
If the power is not turned off, there is a risk of equipments breaking down, and dying or getting a serious injury of any person may occur by electric shock.
And if the rotating scanner unit is touched, there is a risk of equipments breaking down, and dying or getting a serious injury of any person by electric shock.

⚠WARNING

Do not touch the insides of the scanner unit, transceiver and display unit.
Touching any high voltage area, you will get an electric shock. For maintenance, inspection and adjustment of internal parts of these equipment, consult with our sales office or distributor in your district.

Since the scanner unit radiator rotates, do not approach it.
The scanner unit may start rotating suddenly, and consequently any person may be struck and be injured. We recommend you to install the scanner unit radiator on the roof of the wheel house, flying bridge, trestle, radar mast or any other high position so that no person can approach it. When servicing the scanner unit, set the scanner unit safety button to the OFF position.

Install the scanner unit at any place higher than any person.
If being exposed directly to electric wave at close range, you may suffer adverse influence.

When approaching the antenna for maintenance or inspection, set the power button of the display unit to the ST-BY position.
If being exposed directly to electric wave at close range, you may suffer adverse influence.

Before starting maintenance work or the like, stop power supply by turning off the power and disconnecting the power connector from the rectifier and the display.
Even if the power switch is turned off, there are live components in each unit. In this status, maintenance or inspection work causes an electric shock, system failure, or accident.

Immediately after switching the keyboards, the modes of the **[GAIN/PL]**, **[AUTO-TUNE]**, **[AUTO-SEA]** and **[AUTO-RAIN]** knobs may be different from what they were before switching. Sensitivity might also be lowered, and this could cause a collision.
Each time the active keyboard is switched, be sure to readjust the four knobs above so that they are at their optimum settings.

Before disposing of used lithium batteries, insulate by affixing tape to the positive and negative terminals or by other means.
Otherwise, short-circuiting may occur, resulting in heat generation, bursting or ignition.

⚠WARNING

Only specialized personnel shall perform installation work.
Installation work performed by personnel other than specialized personnel may cause breakdown of the equipment, poor performance, fire, severe elec-tric shock and other property and human damages.

This adjustment is a function of adjusting tune indication and peak of echo, it is already made at the factory.
The default value is 64.
The settings must not be changed on the spot.
When the tune indication and peak of echo shift, if the settings are carefully adjusted, you can not get the tuning.
The gain falles, a collision etc. may occur.

Do not change this adjustment unnecessarily.
An incorrect adjustment may erase the closest target and a collision may occur.

⚠CAUTION

Use these radar only as assisting devices for navigation.
Also, the officer should make the final decision for maneuvering by himself.
If you make the final decision of maneuvering only on the information which a radar display, it may become the cause of accidents, such as collision and stranding.

Do not set the rain/snow clutter function to too high a suppression level.
Otherwise, not only echoes from rain/snow but also the targets of ships or dangerous objects are suppressed, which may disturb the detection.
Set the best suppression level whenever you use the ran/snow clutter suppression function.

Do not set the sea clutter suppression function to a level at which it clears all sea clutters in short range.
Otherwise, not only echoes from waves but also the targets of ships or dangerous objects are suppressed, which may disturb the detection.
Set the best suppression level whenever you use the sea clutter suppression function.

The scanner unit shall be installed where there are not large obstacles in the direction of the ship's heading line in the same plane.
If there is a large impediment in the same plane as the scanner unit, this may cause the generation of folse echoes. In particular, if such folse echoes appear at the ship's heading line, monitoring will be difficult and this may cause inadequate forecasting of danger.

Do not install the scanner unit near chimney's or the exhaust of chimneys.
Soot will cause the performance of the radar to decrease and heat may cause breakdown.

Do not install direction antenna or VHF antenna in the vicinity of the scanner unit. Doing so may cause noise in the antenna reception.

Consideration should be given to separating the radar cable from the cables for the direction antenna and VHF antenna.
These cables should never be bundled into one. Doing so may cause noise in the antenna reception.

⚠CAUTION

If felt is not provided where the rope contacts the scanner, or if the scanner is supported near the both ends of the radiator, you may damage the unit.
Be sure to apply the rope to the antenna support.

When mounting the scanner unit, please check the maximum length of the holding bolts.
If the bolts are too long, it gives severe damage to inside of the scanner.
When mounting the scanner unit, please use the attached bolts.
The mounting base thickness must not exceed 15mm (0.6inch).

Provide a distance of 1m or more between a processing unit and a magnetic compass.
If a processing unit is installed in a position too close to a magnetic compass, it may affect the magnetic compass.

Install a processing unit in the location that is not affected by seawater.
The processing unit is not waterproof.

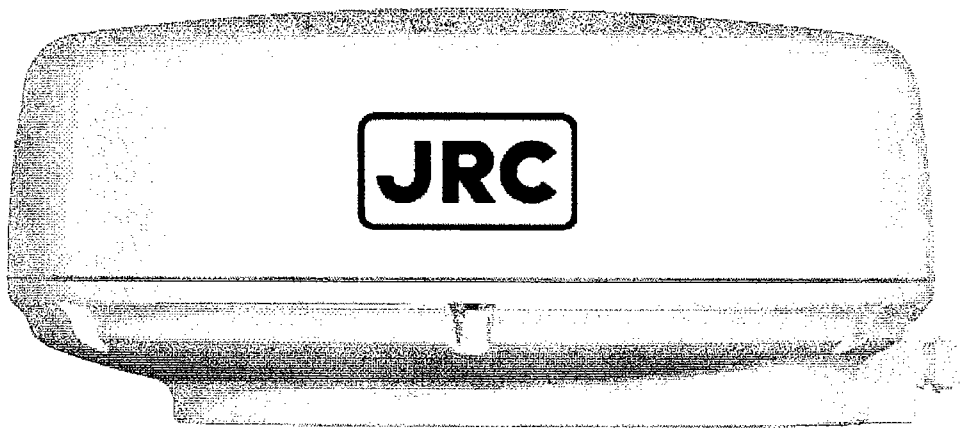
Use correct fuse ratings.
The use of incorrect ratings may cause an equipment failure.

The GPS compass JLR-10 of JRC always can output absolute azimuth without gyro setting.
Therefore, do not set a gyro value when connecting JLR-10.

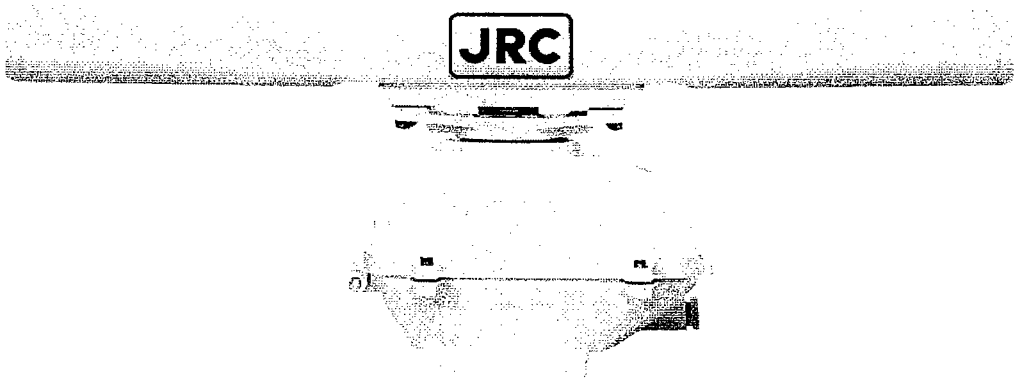
Since the modulation section contains a magnetron with stored magnetism, do not place a lock or a magnetic card close to the modulation section.
Otherwise, failures or data corruption may occur in such devices.

Do not use solvents such as thinner, gasoline, benzene, trichlene, and ketone.
These solvents cause discoloration or deterioration.

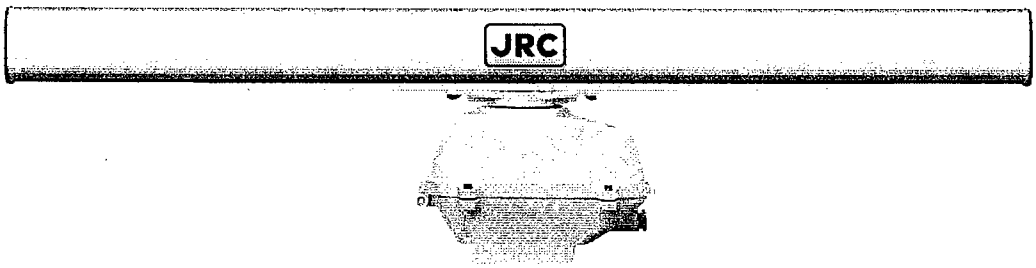
EQUIPMENT APPEARANCE



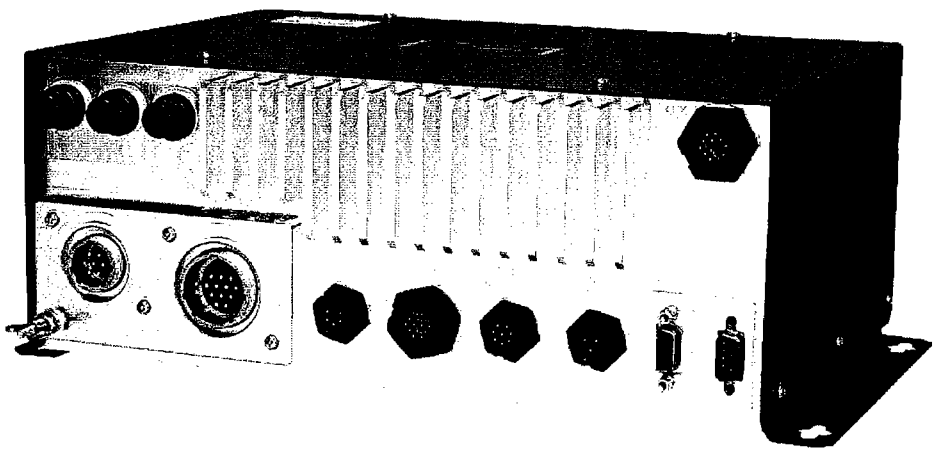
Scanner Unit Type NKE-2042 (2 feet)



Scanner Unit Type NKE-2062 (4 feet)



Scanner Unit Type NKE-2102 (6 feet)



Processing Unit Type NDC-1260

Display Unit Type NWZ-146 (Landscape) and Keyboard Unit NCE-7640

Display Unit Type NWZ-146 (Portrait) and Keyboard Unit NCE-7640

Contents

Attached Figures

Chapter 1 Introduction

1.1 Functions

This device is a marine radar device that utilizes a scanner unit including transmitter and receiver and 10.4 inch liquid crystal display unit and uses a compact raster scan method for achieving a fully semiconductor adopted (except for special electron tubes) system.
This equipment comprises radar as defined in the Wireless Telegraphy Act.

1.2 Features

Enhanced fundamental performance of the radar

Through switching among 4 steps in terms of pulse width/cycle switching of frequency and switching among 3 steps in receiver bandwidth, enhanced fundamental performance of the radar has been achieved towards display of clearer and high quality images. Moreover, through the incorporation of advanced digital signal processing, performance in target de-tection during increment weather has been improved.

Confirmation of the ship's position and identifying the waypoint at a glance

Through connecting to external navigation equipment such as GPS, the location of the ship (numerical values) or a mark on the waypoint may be displayed on the screen. This allows for confirmation of the difference between the waypoint and the ship's heading at a glance.

High operability

A jog dial has been incorporated for simple operation of menu selections, EBL/VRM.
The track ball may also be used to capture the MARPA target in a simple manner.
A system for the direct display of menu items that are frequently used with dedicated keys has been adopted.

1.3 Composition

Radar configuration and ship's power

Comprehensive model name	Scanner unit	Processing unit	Keyboard unit	Display unit	Ship's power supply
JMA-5104 JMA-5106 JMA-5110	NKE-2042 NKE-2062 NKE-2102	NDC-1260	NCE-7640	NWZ-146	DC (12V/24V/32V) DC (12V/24V/32V) DC (24V/32V)

When an optional rectifier unit is used: (AC100V/110V/115V/200V/220V/230V) 50/60Hz single phase

Rectifier unit model name (optional) : NBA-797

Note

When AC power supply is used, an optional rectifier unit is necessary.

The English presentation of the nameplate of each unit is as follows.

SCANNER UNIT
PROCESSING UNIT
KEYBOARD UNIT
DISPLAY UNIT
RECTIFIER UNIT

Attachments

Item name	Quantity	JRC code	Remarks
Instruction manual	1	7ZPRD0590	This manual (English)
Cable between a scanner unit and a processing unit	1	CFQ6912-20	19-core composite cable Standard length 20m
Power cable	1	CFQ-6911-5	5m

Spare parts

Spare parts are provided for each of the indicator unit and the scanner unit.
The following table lists spare parts for each unit.

Spare parts for the indicator unit (7ZRD0010) included in the same package as the processing unit

Item name	Quantity	JRC code	Remarks
Fuse (M60NR-10A)	3	5ZFAD00018	(Processing unit F1 : 10A)
6-pin connector	1	5JCDX00014	For NMEA data communication
8-pin connector	1	5JCDX00015	For NMEA data communication

Note

Only a 10A fuse is available for processing unit F1 (fuse for the indicator unit power) regardless of the input power voltage and transmission output.

NKE-2042 (spare parts for 4kw scanner unit) included in the same package as scanner unit 7ZXRD0012

	Item name (model name)	Quantity	JRC code	Remarks
12V input	Fuse (SM6.3)	4	5ZFAD00543	For modulator (processing unit F2 : 6.3A)
	Not required	–		For motor (processing unit F3:)
24/32V input	Fuse (SM3.15)	4	5ZFAD00359	For modulator (processing unit F2 : 3.15A)
	Not required	–		For motor (processing unit F3:)

Note

For the 4kw scanner unit, insertion of F3 in the processing unit (fuse for motor) is not required since the power supply is shared between the modulator and the motor. Therefore, there are no spare parts.

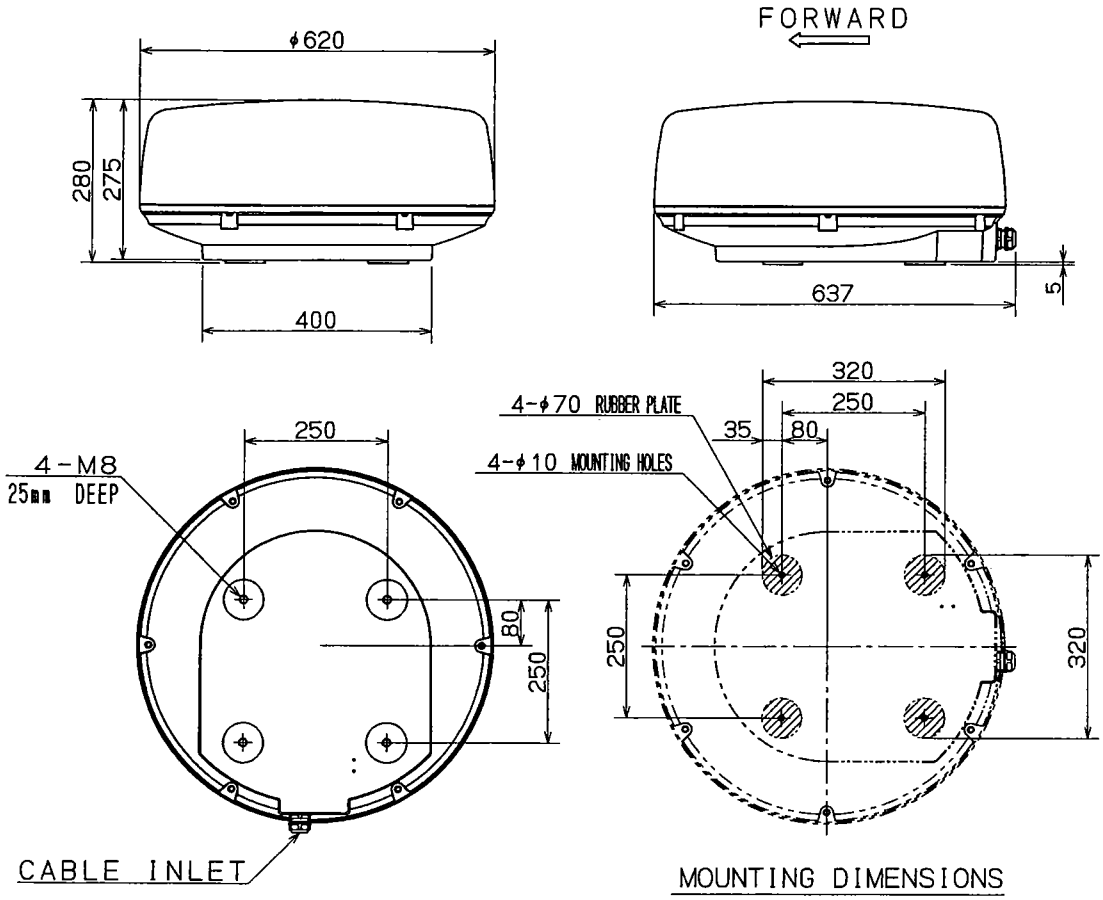
NKE-2062 (spare parts for 6kw scanner unit) included in the same package as scanner unit 7ZXRD0013

	Item name (model name)	Quantity	JRC code	Remarks
12V input	Fuse (SM6.3)	4	5ZFAD00543	For modulator (processing unit F2 : 6.3A)
	Fuse (SM5)	4	5ZFAD00393	For motor (processing unit F3 : 5A)
24/32V input	Fuse (SM3.15)	4	5ZFAD00359	For modulator (processing unit F2 : 3.15A)
	Fuse (SM5)	4	5ZFAD00393	For motor (processing unit F3 : 5A)

NKE-2102 (spare parts for 10kw scanner unit) included in the same package as scanner unit 7ZXRD0014

	Item name (model name)	Quantity	JRC code	Remarks
24/32V input	Fuse (SM5)	4	5ZFAD00393	For modulator (processing unit F2 : 5A)
	Fuse (SM8)	4	5ZFAD00544	For motor (processing unit F3 : 8A)

1.4 Configuration



COLOR	WHITE
MASS	APPROX. 10.5kg
UNIT	mm

Fig. 1.1 OUTLINE DRAWING OF SCANNER UNIT NKE-2042

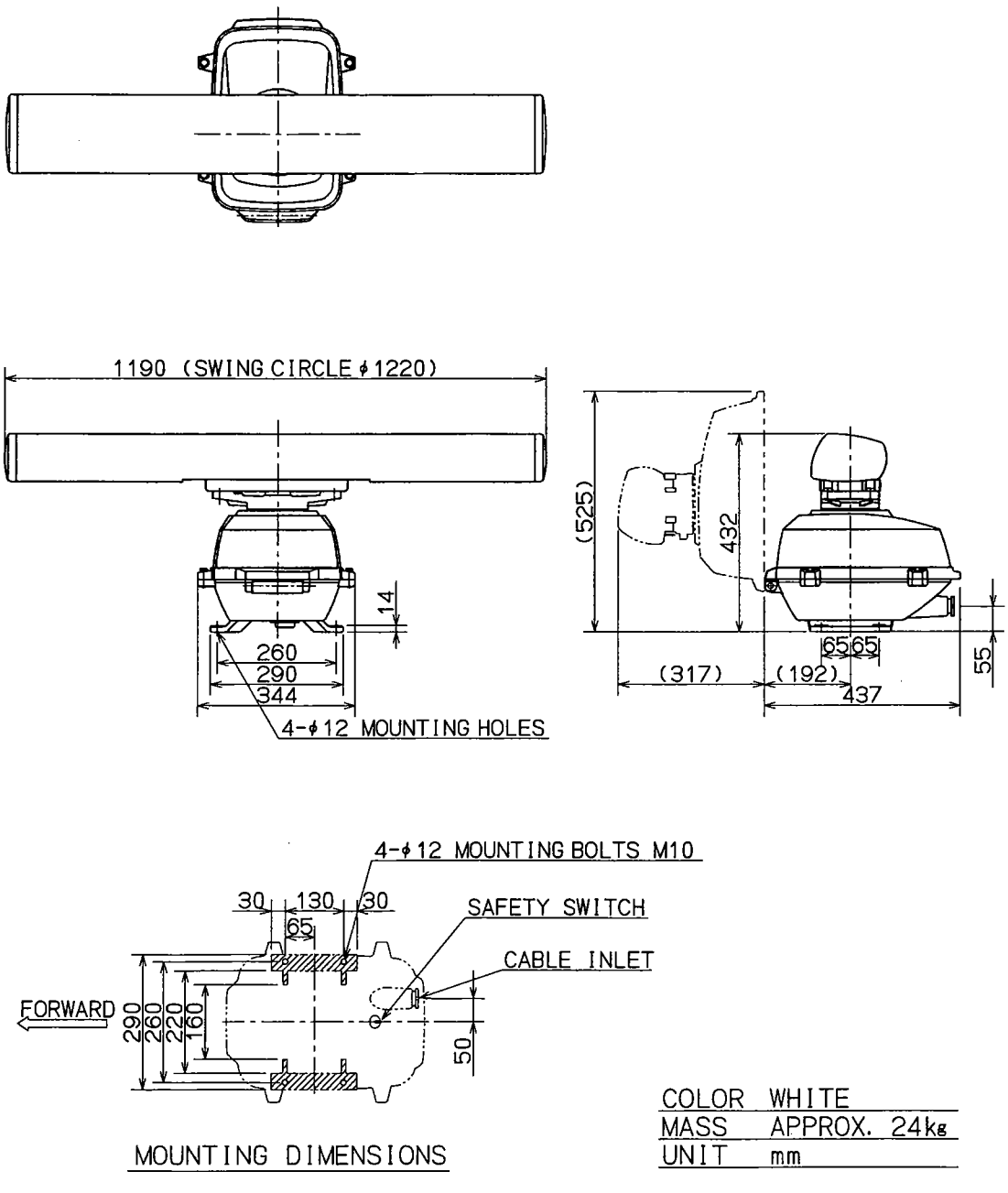


Fig. 1.2 OUTLINE DRAWING OF SCANNER UNIT NKE-2062

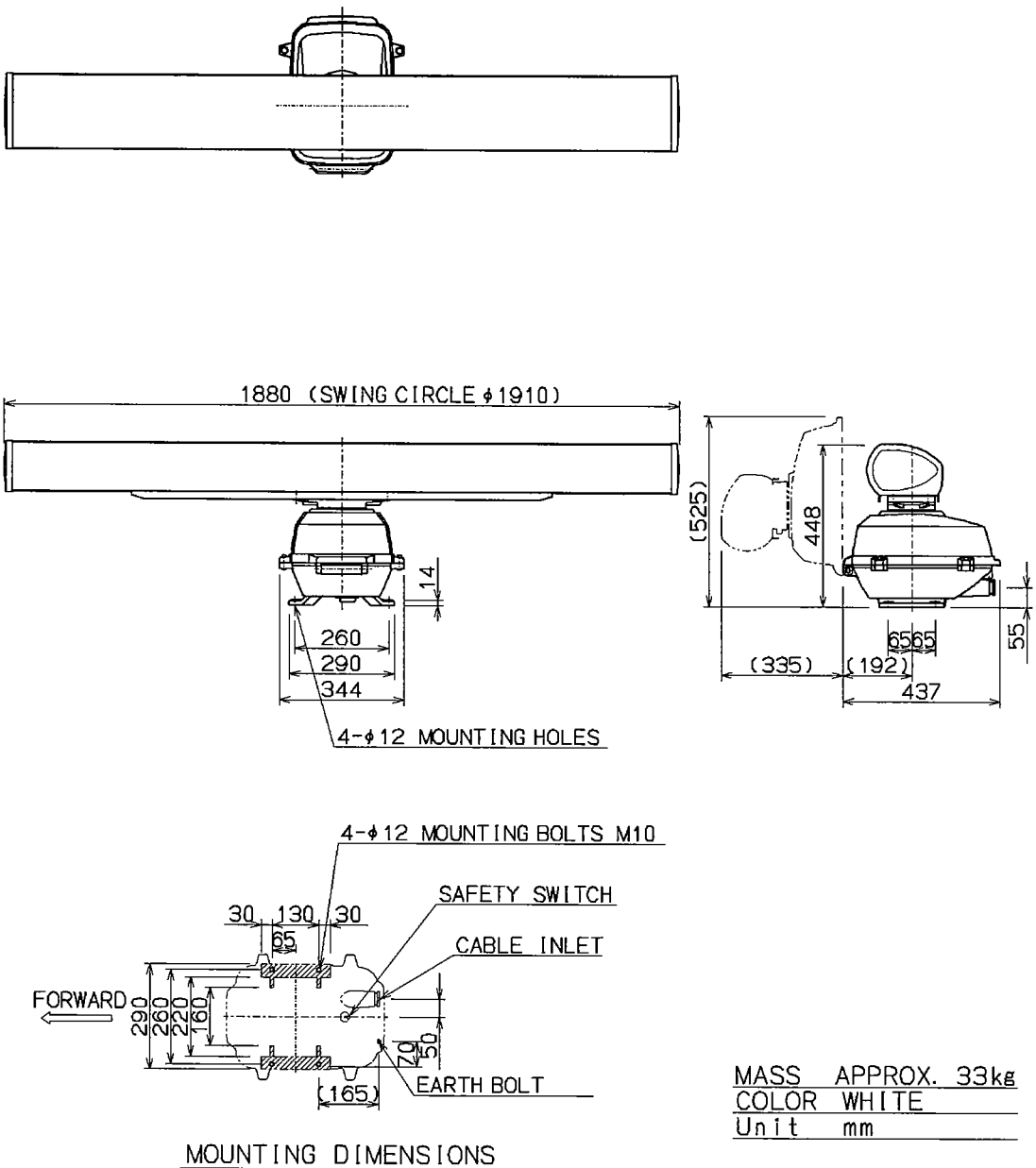
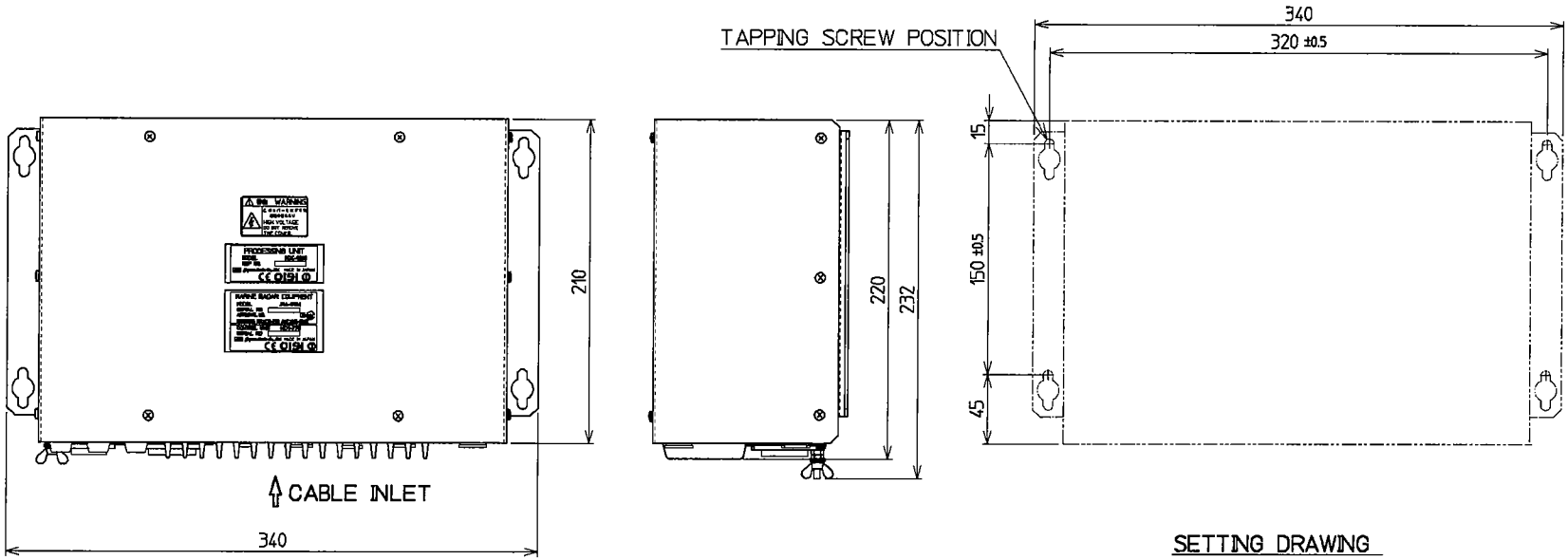
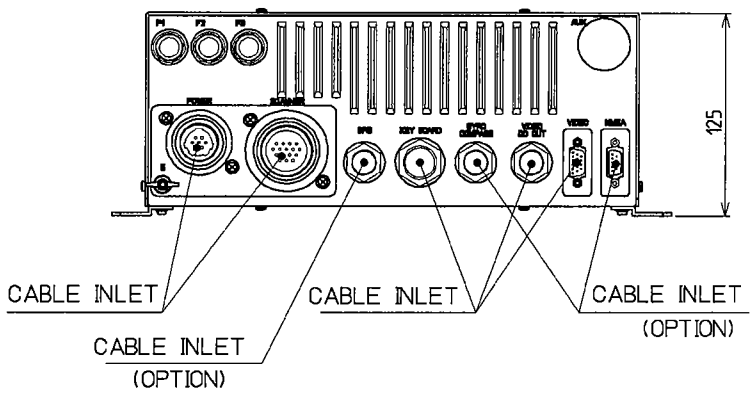


Fig. 1.3 OUTLINE DRAWING OF SCANNER UNIT NKE-2102



SETTING DRAWING



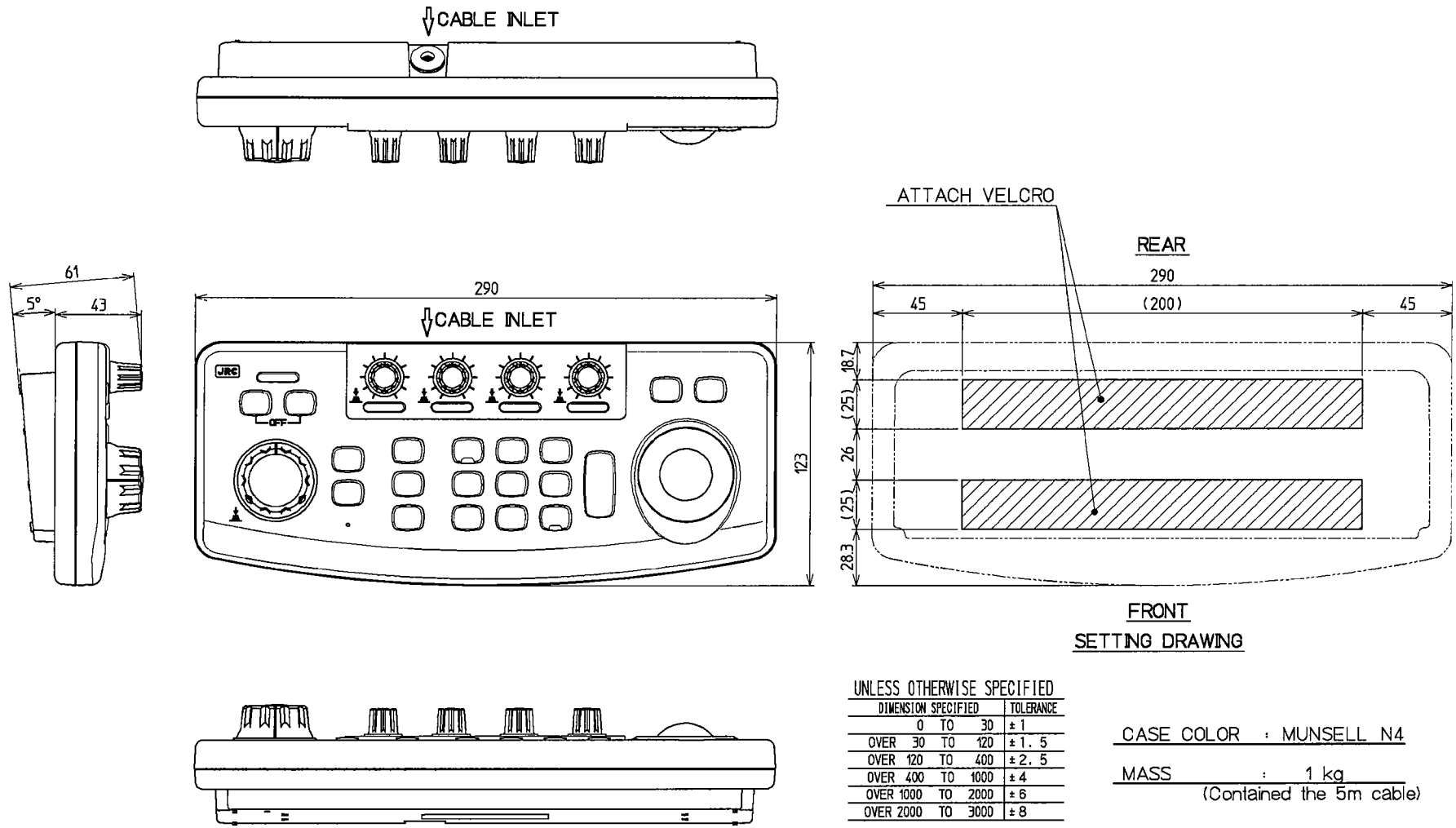
UNLESS OTHERWISE SPECIFIED

DIMENSION SPECIFIED				TOLERANCE
0	TO	30		± 1
OVER 30	TO	120		± 1. 5
OVER 120	TO	400		± 2. 5
OVER 400	TO	1000		± 4
OVER 1000	TO	2000		± 6
OVER 2000	TO	3000		± 8

CASE COLOR : MUNSELL N4

MASS : 2.4 kg

Fig. 1.4 OUTLINE DRAWING OF PROCESSING UNIT NDC-1260

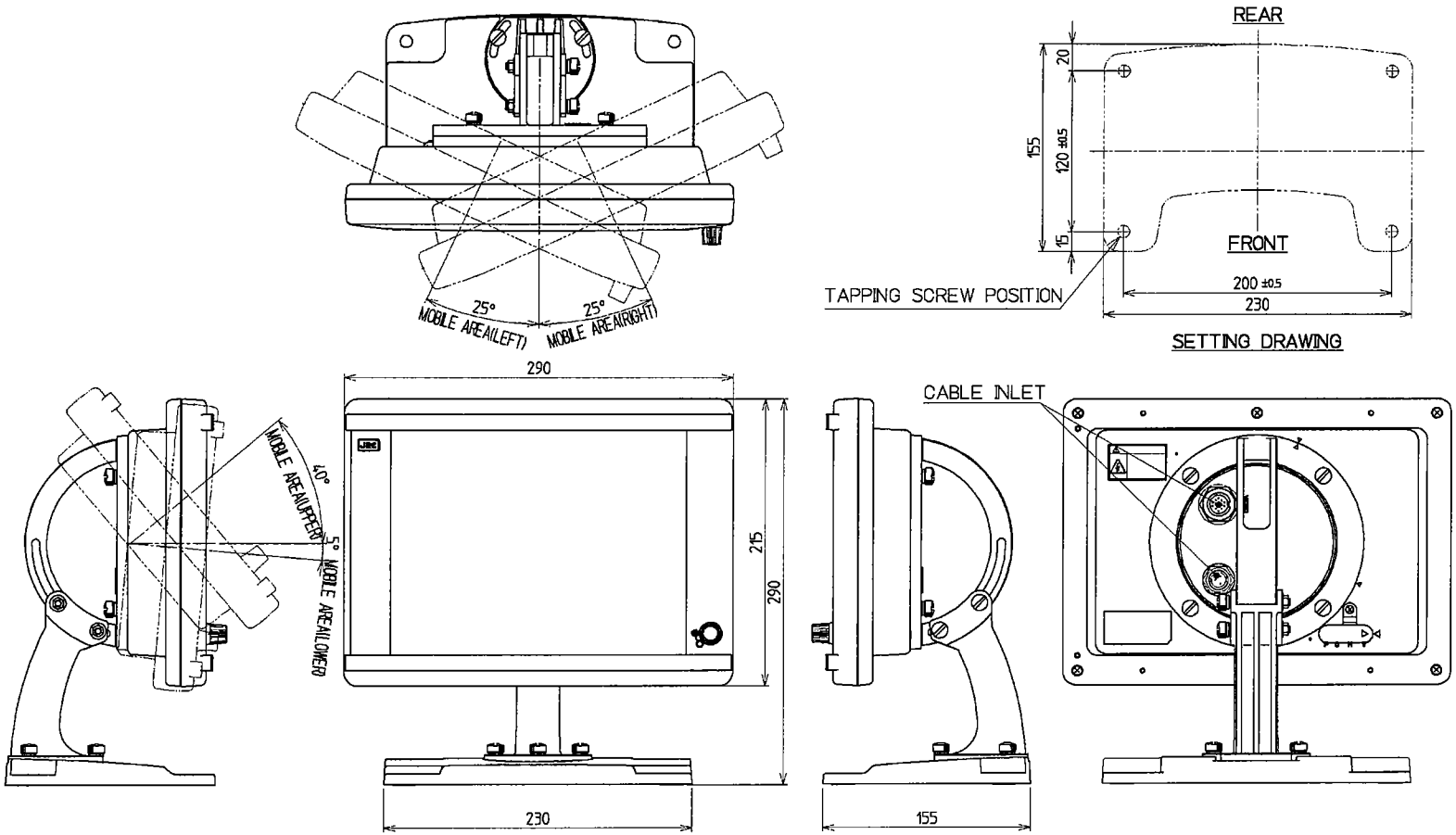


UNLESS OTHERWISE SPECIFIED	
DIMENSION SPECIFIED	TOLERANCE
0 TO 30	± 1
OVER 30 TO 120	± 1. 5
OVER 120 TO 400	± 2. 5
OVER 400 TO 1000	± 4
OVER 1000 TO 2000	± 6
OVER 2000 TO 3000	± 8

CASE COLOR : MUNSELL N4

MASS : 1 kg
(Contained the 5m cable)

Fig. 1.5 OUTLINE DRAWING OF KEYBOARD UNIT NCE-7640

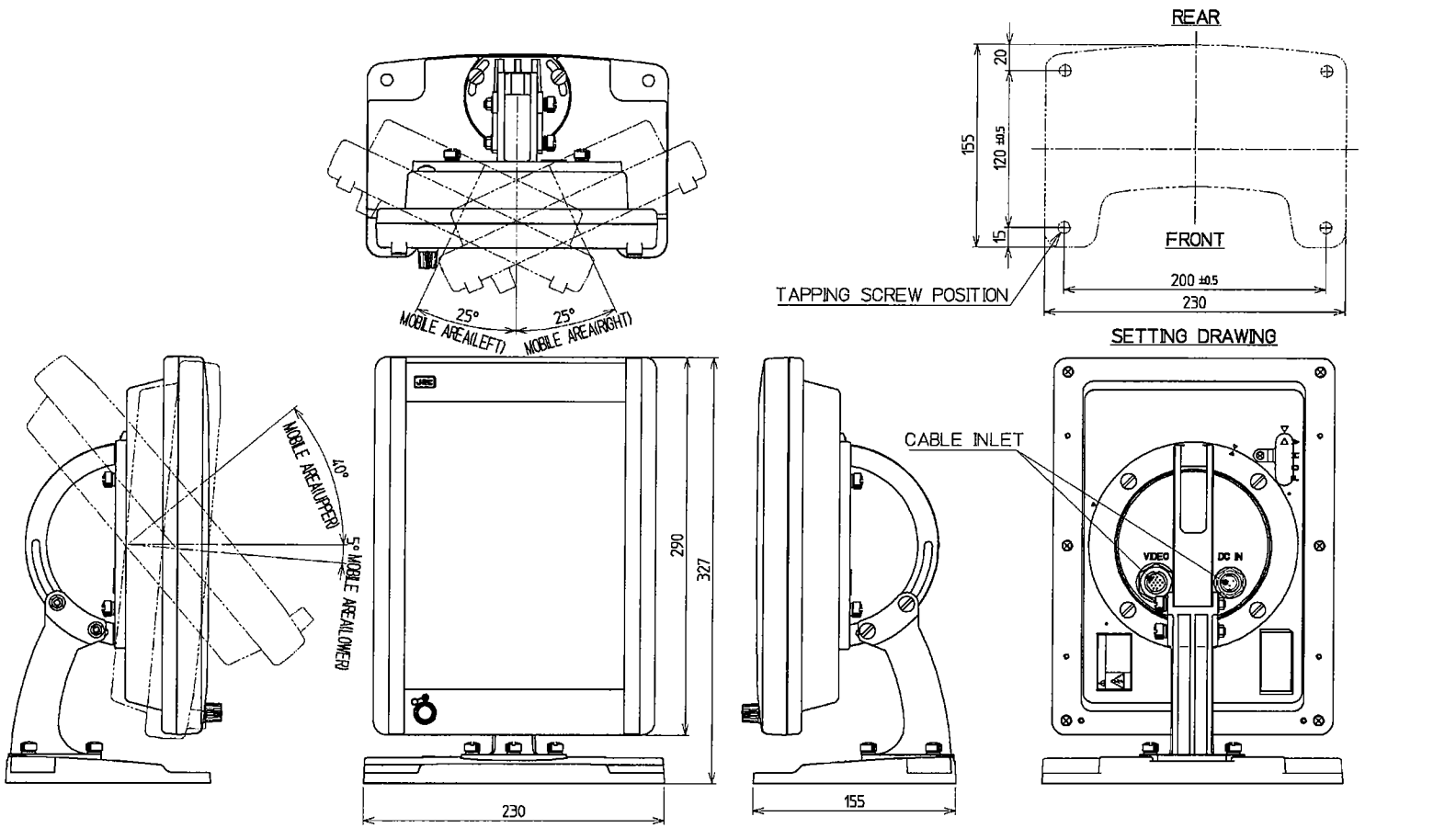


UNLESS OTHERWISE SPECIFIED			
DIMENSION SPECIFIED			TOLERANCE
0	TO	30	± 1
OVER 30	TO	120	± 1. 5
OVER 120	TO	400	± 2. 5
OVER 400	TO	1000	± 4
OVER 1000	TO	2000	± 6
OVER 2000	TO	3000	± 8

CASE COLOR : MUNSELL N4

MASS : 2.8 kg

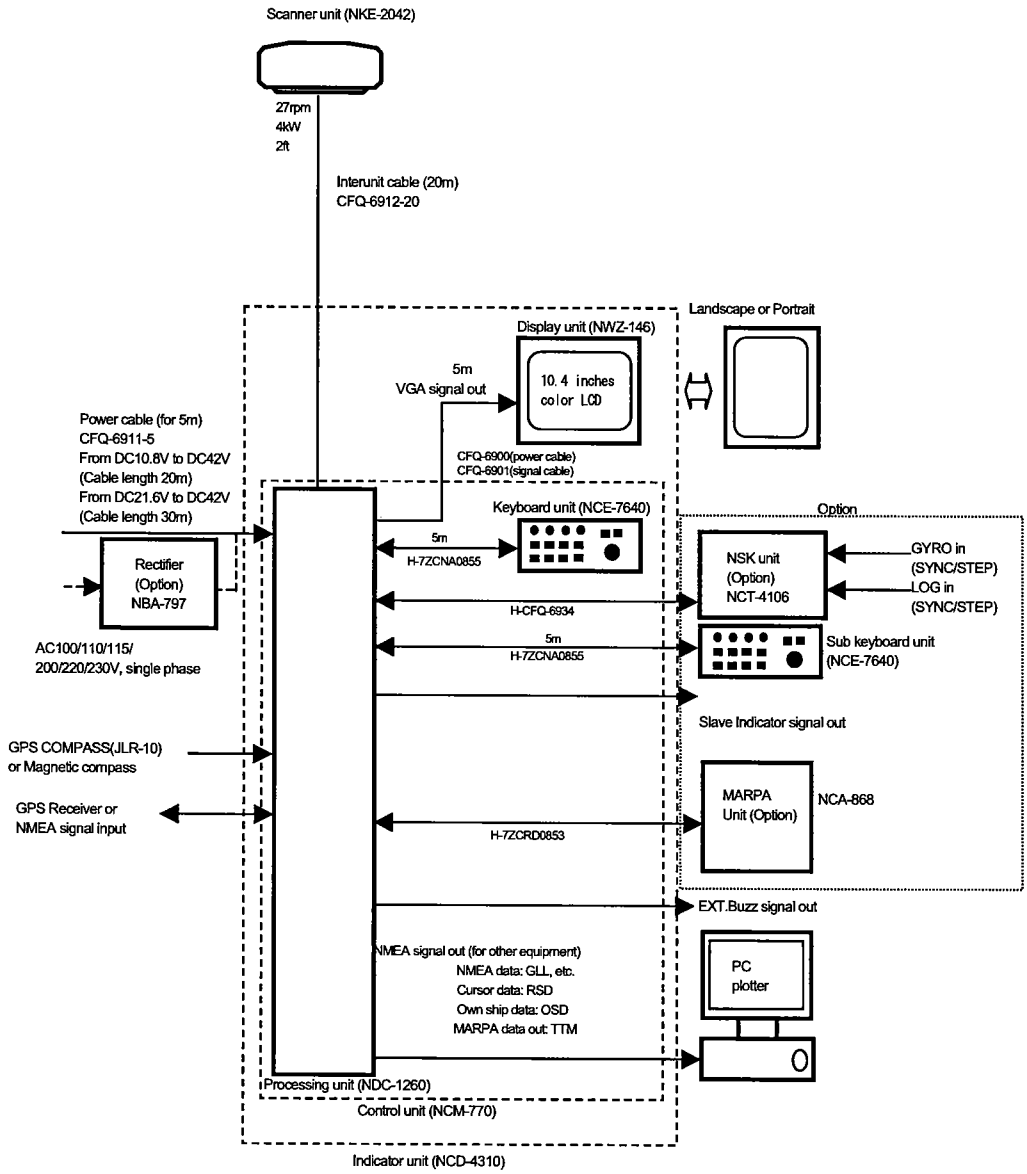
Fig. 1.6 OUTLINE DRAWING OF DISPLAY UNIT NWZ-146 (LANDSCAPE)



UNLESS OTHERWISE SPECIFIED	
DIMENSION SPECIFIED	TOLERANCE
0 TO 30	± 1
OVER 30 TO 120	± 1. 5
OVER 120 TO 400	± 2. 5
OVER 400 TO 1000	± 4
OVER 1000 TO 2000	± 6
OVER 2000 TO 3000	± 8

Fig. 1.7 OUTLINE DRAWING OF DISPLAY UNIT NWZ-146 (PORTRAIT)

1.5 General System Diagram



NOTES :

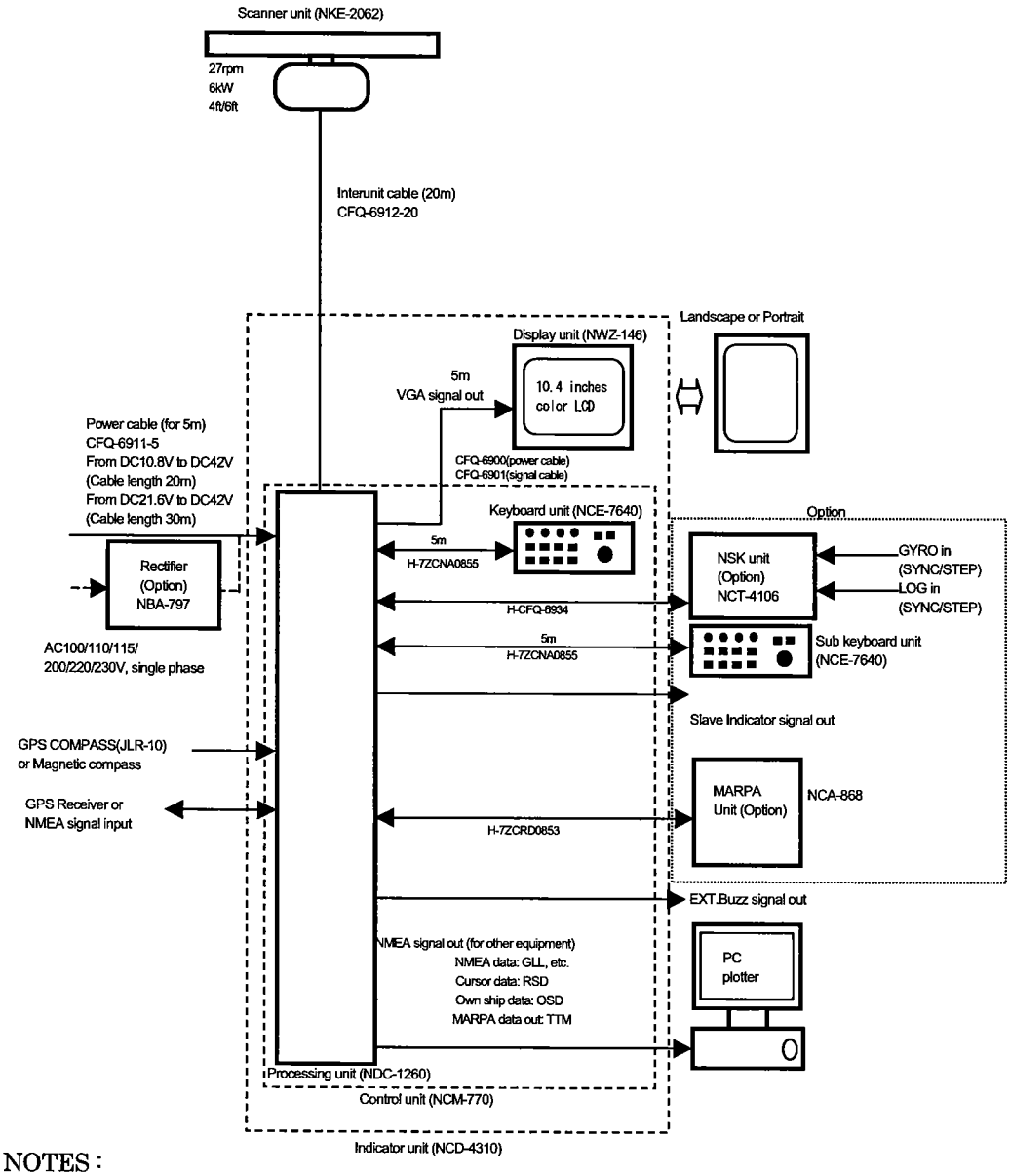
ELIMINATING THE INTERFERENCE ON FREQUENCIES USED FOR MARINE COMMUNICATIONS AND NAVIGATION DUE TO OPERATION OF THE RADAR.

ALL CABLES OF THE RADAR ARE TO BE RUN AWAY FROM THE CABLES OF RADIO EQUIPMENT.

(EX. RADIOTELEPHONE.COMMUNICAITONS RECEIVER AND DIRRECTION 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.

Fig. 1.8 GENERAL SYSTEM DIAGRAM OF JMA-5104



NOTES :

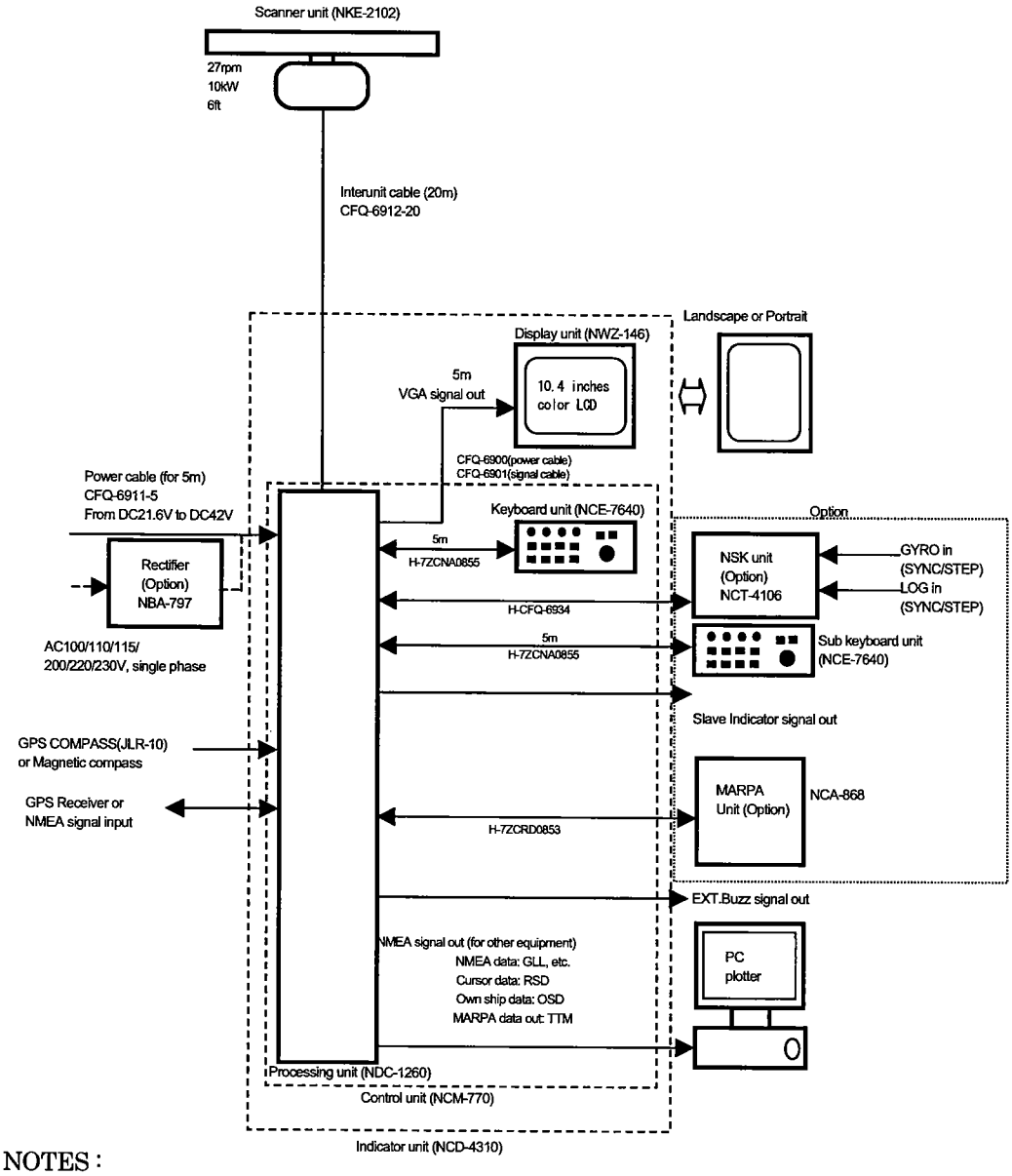
ELIMINATING THE INTERFERENCE ON FREQUENCIES USED FOR MARINE COMMUNICATIONS AND NAVIGATION DUE TO OPERATION OF THE RADAR.

ALL CABLES OF THE RADAR ARE TO BE RUN AWAY FROM THE CABLES OF RADIO EQUIPMENT.

(EX. RADIOTELEPHONE.COMMUNICAITONS RECEIVER AND DIRRECTION 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.

Fig. 1.9 GENERAL SYSTEM DIAGRAM OF JMA-5106



NOTES :

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.COMMUNICAITONS RECEIVER AND DIRRECTION 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.

Fig. 1.10 GENERAL SYSTEM DIAGRAM OF JMA-5110

Chapter 2 Names and Functions in the Keyboard Unit and the Menu Structure

2.1 Functions of the Keyboard

The normal operations of this radar equipment can be performed using the switches, volume knob, jog dial, and track ball on the keyboard unit.
The operations are simple, however it is important to understand that the function of each operation unit is to obtain the required information on the LCD screen of the display unit.

2.1.1 Outline of the keyboard functions

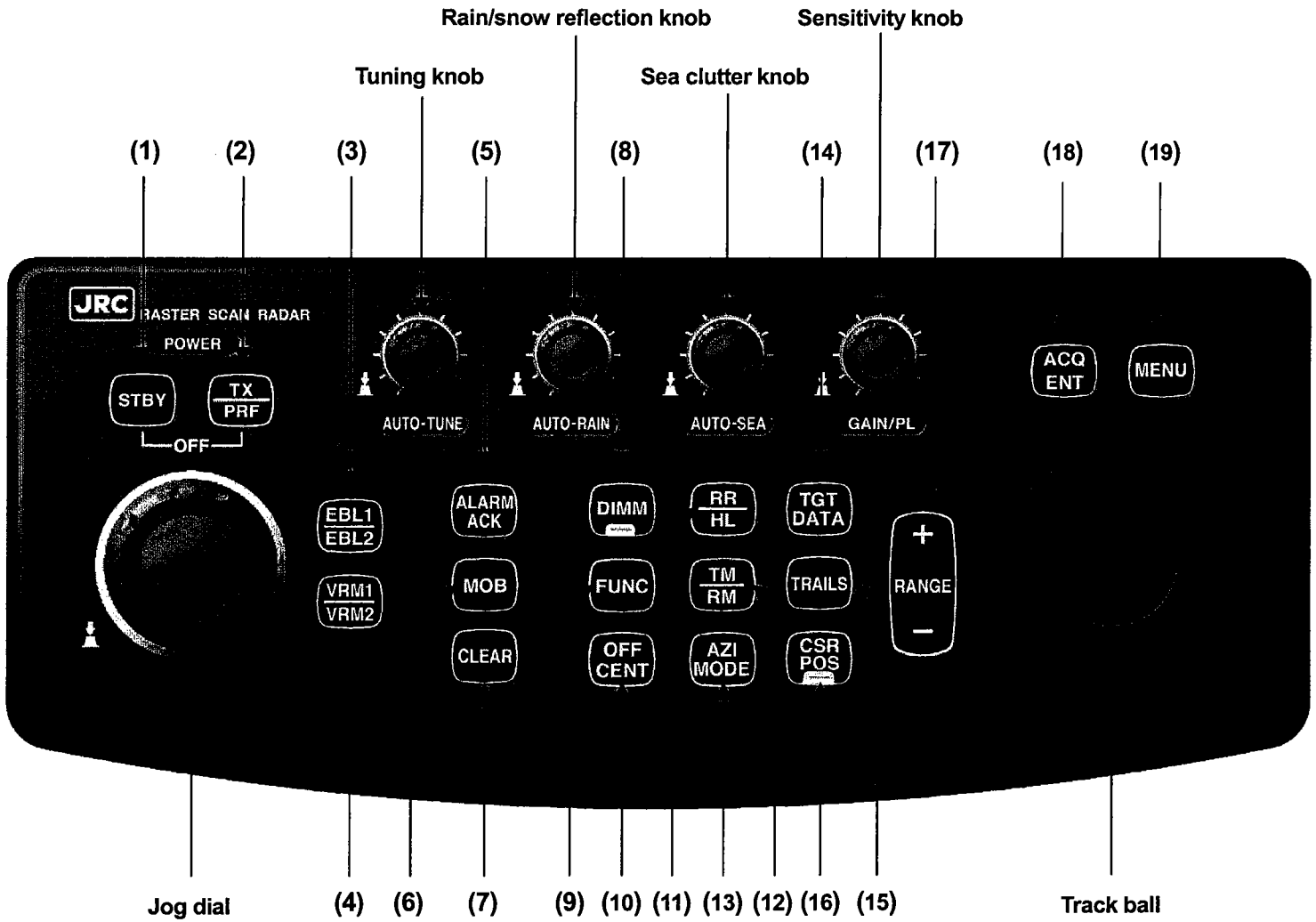
The keyboard unit consists of the following four main components.
[Key], **[Knob]**, **[Jog dial]**, and **[Track ball]**
Each of these components is described below.

The correspondence between the operation method and the function is described below.

The notation enclosed by brackets **[ ]** indicates a key, a knob, a jog dial, or a track ball on the keyboard.

Example of a key : **[CLEAR]**
Example of a knob : **[AUTO-SEA]**
Jog dial : **[JOG DIAL]**
Track call : **[Track Ball]**

A boxed notation (XXXX) indicates display of a menu item.
Example : BASIC


Rain/snow reflection knob
Sensitivity knob
Tuning knob
Sea clutter knob
(1)
(2)
(3)
(5)
(8)
(14)
(17)
(18)
(19)
JRC
RASTER SCAN RADAR
POWER
STBY
TX
PRF
OFF
AUTO-TUNE
AUTO-RAIN
AUTO-SEA
GAIN/PL
ACQ
ENT
MENU
EBL1
EBL2
VRM1
VRM2
ALARM
ACK
MOB
CLEAR
DIMM
FUNC
OFF
CENT
RR
HL
TM
RM
AZI
MODE
TGT
DATA
TRAILS
CSR
POS
RANGE
+
−
Jog dial
(4)
(6)
(7)
(9)
(10)
(11)
(13)
(12)
(16)
(15)
Track ball

2.1.2 Configuration and functions of the keys on keyboard

Nineteen keys on keyboard are available in total.
The keys on keyboard are classified into two major types based on the operation mode; keys in short mode and keys in long mode.

A short mode is mainly used for setting key functions to ON/OFF and a long mode is used for displaying detail menus related to the key functions.
This method enables users to set related key functions directly with fewer keys.
A short mode refers to the pressing of a key for short time and a long mode refers to the pressing of a key for two seconds or more continuously.

The functions of the keys in short mode and those in long mode are described below.

(1) [STBY] key
Short mode : Power ON
Long mode : The power is turned off when this key is pressed together with **[TX/PRF]** key in long mode.

(2) [TX/PRF] key
Short mode : When this key is pressed from a standby state, the equipment is set to a transmission state. When this key is pressed in a transmission state, the repetition frequency is changed.
Long mode : The power is turned off when this key is pressed together with the **[STBY]** key in long mode.

(3) [EBL1/EBL2] key
Short mode : EBL ON/OFF of EBL
Long mode : Switches EBL1/EBL2.

(4) [VRM1/VRM2] key
Short mode : VRM ON/OFF
Long mode : Switches VRM1/VRM2

(5) [ALARM ACK] key
Short mode : Stops alarm buzzer.
Long mode : Displays alarm detail setting/error log.

(6) [MOB] key
Short mode : Starts the MOB function.
Long mode : Stops the MOB function.

(7) [CLEAR] key
In short mode, the operation varies depending on whether it is during menu operation and other states, which are described later.

During menu operation

Short mode : During item selection on a menu, this key stops the current item selection. When item selection is completed, this key returns control to the menu one level above.

State other than menu operation

Short mode : When this key is pressed while the cursor overlaps with the ATA symbol, this operation erases the ATA symbol.
When the key is pressed while cursor does not overlap with the ATA symbol, the target of the symbol number that is selected by numeric display is erased.

Long mode : Erases the entire ATA symbol.

(8) [DIMM] key

Short mode : Changes the brightness of the key on the keyboard unit.

Long mode : Displays a day/night menu.

(9) [FUNC] key

Short mode : Switches the function setting.

Long mode : Displays a function setting menu.

(10) [OFF CENT] key

Short mode : Moves the center to the cursor position/returns to the center.

Long mode : Continuously moves the center.

(11) [RR/HL] key

Short mode : FIXM ON/OFF

Long mode : Sets the display of a highlighted line of the bow of the ship to OFF.

(12) [TM/RM] key

Short mode : Switches TM/RM/CTM (unlimited TM).

Long mode : Applies manual reset in TM mode.

(13) [AZI MODE] key

Short mode : Switches an azimuth mode (HUP/NUP/CUP).

Long mode : Displays a gyro setting menu.

(14) [TGT DATA] key

Short mode : Displays target information or the next target information.
(When a target is being displayed)

Long mode : Set ATA display to ON/OFF.
Switches the display when MOB/WPT is set to ON.
MOB → ATA → WPT → MOB

(15) [TRAILS] key

Short mode : Switches to time track/continuous track/time track + continuous track/non-display.

Long mode : Displays a track menu (track erase, track time setting change, and so on).

(16) [CSR POS] key

Short mode : Outputs the information of the bearing and distance from the current own ship's position to cursor position. It is output by the serial communication from the RS232C port.

Long mode : Outputs the information of the bearing and distance when the cursor is the own ship's position. It is output by the serial communication from the RS232C port. (Outputs "distance = 0NM", "bearing=0 degree").

(17) [+RANGE-] key

Short mode : Switches the range (+: range up, -: range down).

Long mode : Switches the continuous range (+: continuously range up, -: continuously range down)

* When the **[+RANGE-]** key is pressed while the zoom function is ON, the zoom function is automatically released.

(18) [ACQ/ENT] key

Short mode : Target capture

Long mode : ACQ mode menu

(19) [MENU] key

Short mode : Set a menu to ON/OFF.

Long mode : Set an initialization menu to ON/OFF

* Initialization refers to the settings made at installation.

2.1.3 Structure and the functions of knobs

Four knobs are available.

The knobs are classified into three main modes based on the operation. One type is a **knob operation mode** and other two are a **short mode** and a **long mode**, similar to the key operations.

In knob operation mode, the values change according to the rotation of the knob. The short mode and the long mode are the same operation as for the keys.

The function of each knob is described below.

[AUTO-TUNE] knob

Short mode :	Switches to automatic/manual.
Long mode :	When the power supply is set to ON while this key is pressed, horizontal orientation display is set (12 o'clock).
Knob operation :	The equipment is tuned when the knob is set to the center.

[AUTO-RAIN] knob

Short mode :	Switches to automatic/manual.
Long mode :	When the power supply is set to ON while this key is pressed, vertical clockwise rotation display is set (3 o'clock).
Knob operation :	The control function reaches the maximum when the knob is turned to the full position in the clockwise direction and the minimum when the knob is turned to the full position in the anti-clockwise direction.

[AUTO-SEA] knob

Short mode :	Switches to automatic/manual.
Long mode :	When the power supply is set to ON while this key is pressed, horizontal reverse orientation display is set (6 o'clock).
Knob operation :	When the knob is turned to the full position in clockwise direction, the control function reaches the maximum level and when the knob is turned to the full position in the anti-clockwise direction, the control function reaches the minimum level.

[GAIN/PL] knob

Short mode :	Switches a transmission pulse width.
Long mode :	Displays a panel 1/2 switching menu while the power is supplied. When the power is not supplied, vertical anti-clockwise rotation display is set if the power supply is set to ON (9 o'clock).
Knob operation :	When the knob is turned to the full position in the clockwise direction, the sensitivity reaches the maximum level and when the knob is turned to the full position in the anti-clockwise direction, the sensitivity reaches the minimum level.

2.1.4 Structure and functions of the jog dial

Two jog dial operation modes are available.
One mode is **roration mode**, and other mode is **short mode**.

Rotation mode : In this mode, items displayed on EBL/VRM/ATA display/menu changes when the jog dial is turned. The cursor on the bottom-right of the screen and the characters displayed on the right-hand side indicates which rotation mode is the current mode.

Rotation modes an mode display

Purpose	Mode name	Characters that are displayed on the bottom-right of the screen
EBL setting	EBL mode	JOG EBL1*
VRM setting	VRM mode	JOG VRM1*
Switching MARPA value data display	MARPA display mode	JOG ATA
Menu display	Menu selection mode	JOG MENU

*At operation 1 and 2, EBL1, EBL2, VRM1, and VRM2 are displayed respectively.

Short mode : When menu display is not set, the mode is switched to EBL/VRM/ATA operation mode whenever the jog dial is pressed.
This mode determines the menu of the line that was selected when a menu is displayed.
(Same operation as **[ACQ/ENT]**)

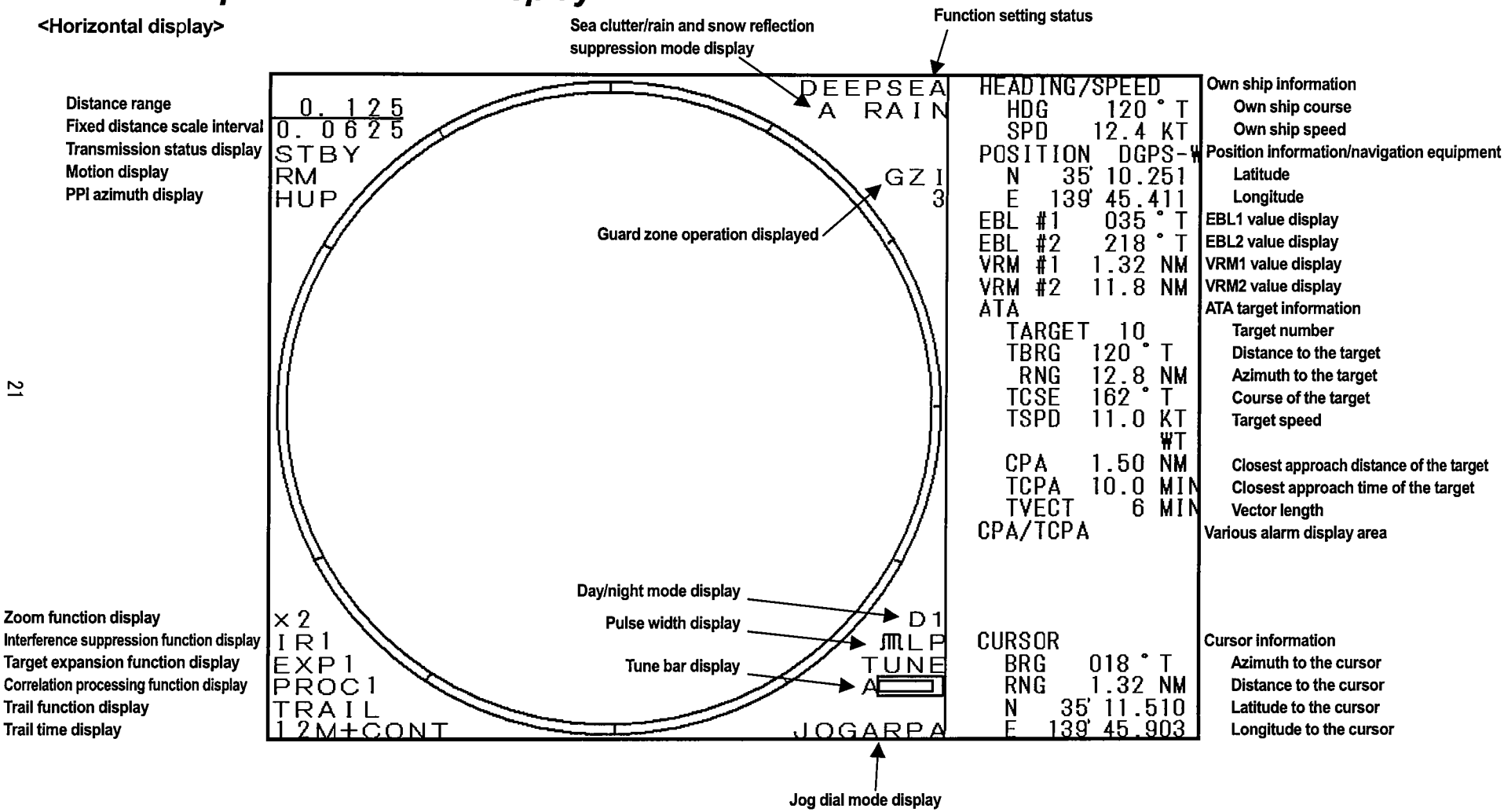
2.1.5 Structure and functions of the track ball

Normally **[TRACK BALL]** is used for operating a cross cursor.
When **[TRACK BALL]** is moved, the distance from own ship and the azimuth are displayed at the bottom-left corner of the screen. When navigation equipment is connected, the latitude and longitude are also displayed. When a MARPA function is attached, a required target can be captured by moving the cross cursor by operating **[TRACK BALL]** to the target.

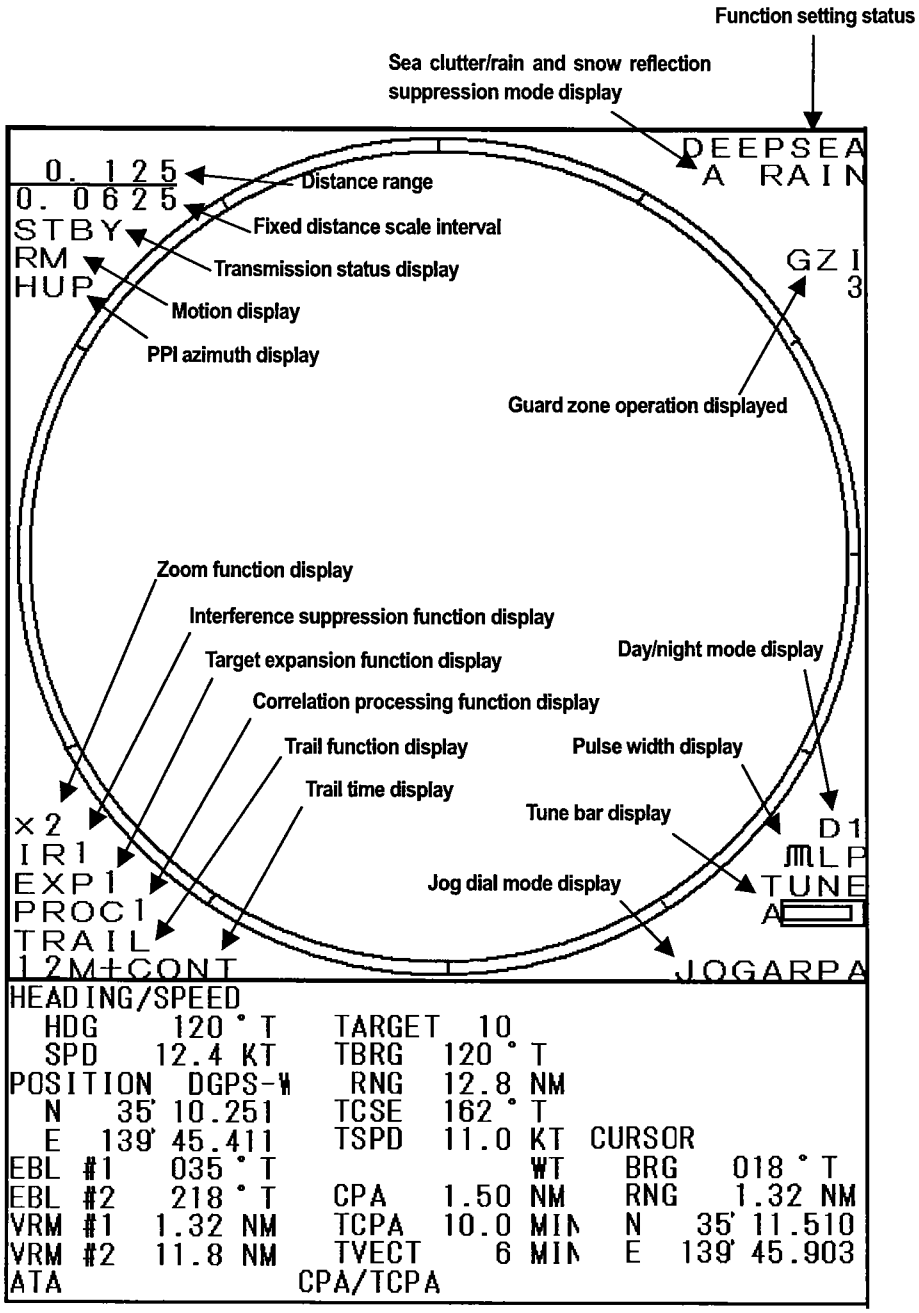
By pressing the **[OFF CENT]** key, the center of PPI can be moved to the cross cursor position.
By moving **[TRACK BALL]** while pressing the **[OFF CENT]** key in long mode, the center of PPI can be moved to the position of **[TRACK BALL]** consecutively.

2.2 Description of Screen Display

<Horizontal display>



<Vertical display>



Own ship information
- Own ship course
- Own ship speed

Position information/navigation equipment
- Latitude
- Longitude

EBL1 value display
EBL2 value display
VRM1 value display
VRM2 value display

ATA target information
- Target number
- Distance to the target
- Azimuth to the target
- Course of the target
- Target speed

Closest approach distance of the target
Closest approach time of the target
Vector length

Various alarm display area

Cursor information
- Azimuth to the cursor
- Distance to the cursor
- Latitude to the cursor
- Longitude to the cursor

2.3 Menu Functions

This radar equipment has the functions available through menus in addition to the functions available on the keyboard unit and volume knobs. This section describes the structure of the menus, the functions, and the setting method.

2.3.1 Menu structure

This radar equipment can display information in Japanese, English, and other languages (French, Spanish, Italian, Danish, and Norwegian) on the screen by switching.

● **See 3.3.3, "Switching the display language [DIMM]" for switching a display language.**

Opening a menu

Press the **[MENU]** key to display a menu.

Closing a menu

To close a menu, press the **[MENU]** key or keep pressing the **[CLEAR]** key until the menu is closed.

Moving to a menu at a lower level

Menus are organized in a hierarchical structure. To move control to a menu at a lower level, select the characters of a required menu item using **[JOG DIAL]** and press the **[JOG DIAL]** or **[ACQ/ENT]** key. Consequently, the menu at the lower level is displayed.

Moving to a menu at an upper level

To return control to a menu at the immediate upper level, press the **[CLEAR]** key. The menu at the immediate upper level is displayed.

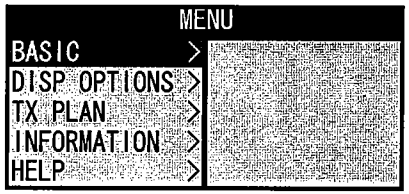
Determining an item

To determine an item after changing the value using **[TRACK BALL]** or displaying the setting item in reverse video, press the **[JOG DIAL]** or **[ACQ/ENT]** key.

Menu lists are described below.
Menus are classified into general function setting menus that are displayed by pressing a key in short mode and setting menus at installation that are displayed by pressing a key in long mode.

General menu [MENU] (1/1 page)

1st level

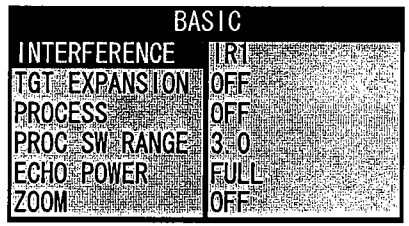


↑

Display method

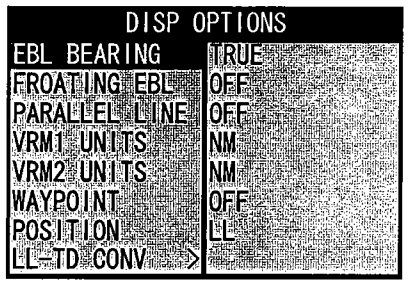
Press **[MENU]** in short mode.

2nd level



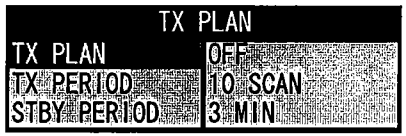
→ **BASIC (3rd level menu available)**

Sets operation and processing mainly related to radar images.



→ **DISP OPTIONS (3rd and 4th level menus are available)**

Sets markers that are displayed in graphic mode and functions that display data from navigation equipment.

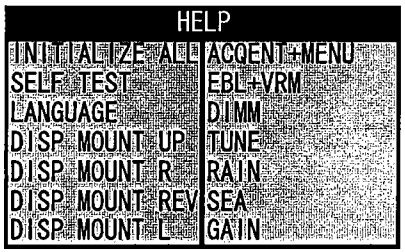


→ **TX PLAN (3rd level menu available)**

Sets an intermittent transmission mode and detail operation.

→ **INFORMATION (3rd level menu available)**

Displays the software version and operation status of the connected equipment.

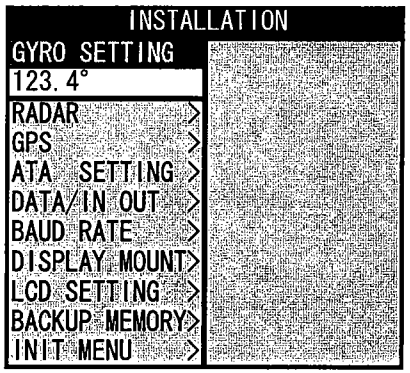


→ **HELP**

Displays explanation of keys and menu operation.

Installation setting menu [MENU] (1/3 pages)

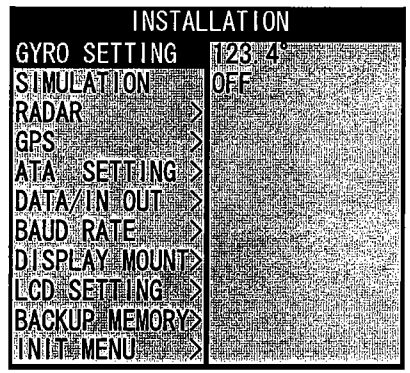
1st level **2nd level**



↑

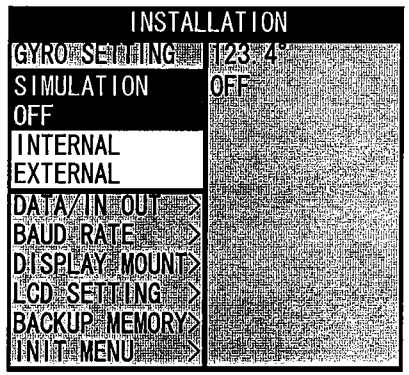
Display method

Press **[MENU]** in long mode.



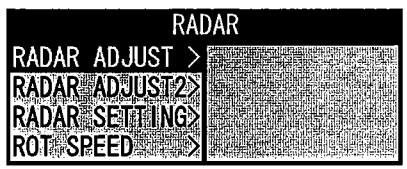
→ **GYRO SETTING**

Sets gyro data.



→ **SIMULATION**

Switches between a simulator mode and a normal mode alternately.

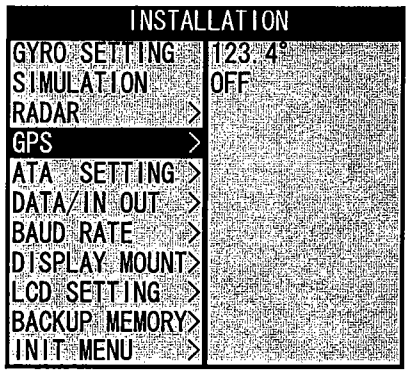


→ **RADAR ADJUST (3rd and 4th level menus available)**

Sets basic information at installation of radar equipment such as tuning, distance, and azimuth.

Installation setting menu [MENU] continued (2/3 pages)

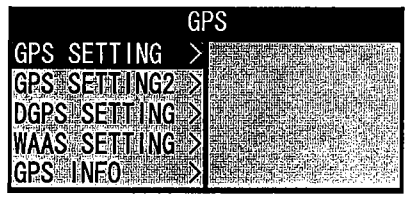
1st level **2nd level**



↑

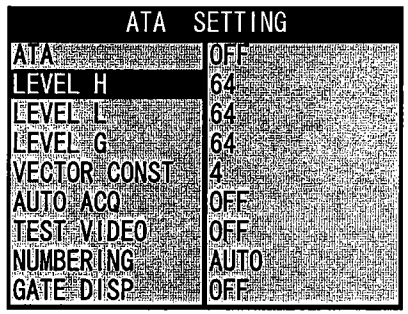
Display method

Press **[MENU]** in long mode.



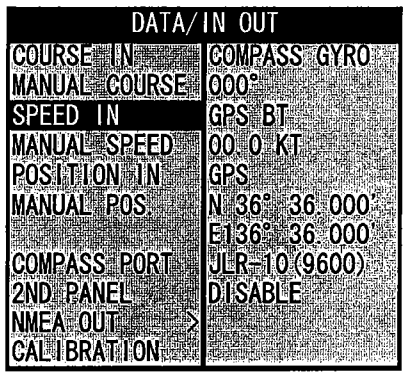
→ **GPS SETTIGN (3rd and 4th level menus available)**

Sets initial values in the GPS receiver.



→ **ATA SETTING (3rd level menu available)**

Initializes the optional MARPA.



→ **DATA/IN OUT (3rd and 4th level menus)**

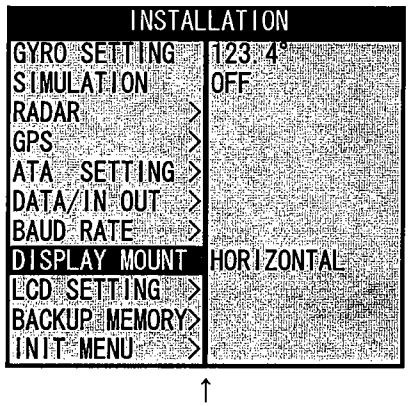
Sets information for receiving data from a sensor such as speed, course, and position.

→ **BAUD RATE (3rd level menu available)**

Sets a communication speed with a personal computer.

Installation setting menu [MENU] Continued (3/3 pages)

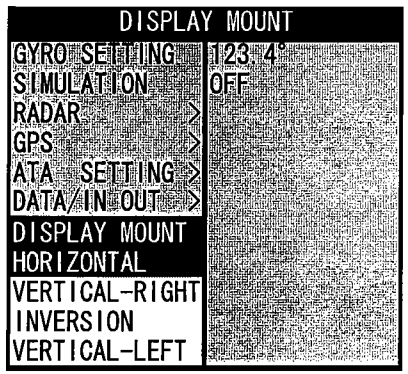
1st level **2nd level**



↑

Display method

Press **[MENU]** in long mode.

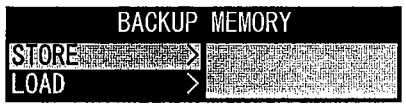


→ **DISPLAY MOUNT**

Sets a display orientation of the display unit.

→ **LCD SETTING (3rd level menu available)**

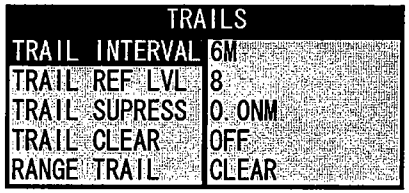
Sets a display position of the LCD.



→ **BACKUP MEMORY**

Menu by a direct key [TRAILS] (1/1 page)

1st level

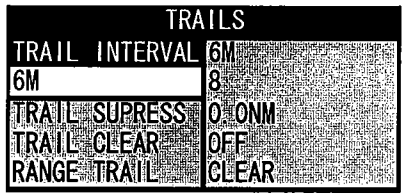


↑

Display method

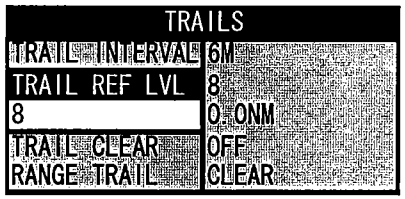
Press the **[TRAILS]** key in long mode

2nd level



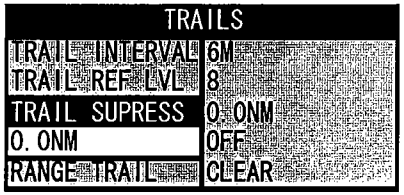
→ **TRAIL INTERVAL**

Sets a time interval of time trail.



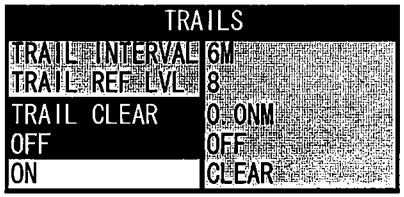
→ **TRAIL REF LVL**

Sets a threshold value for determining whether trail information is stored.



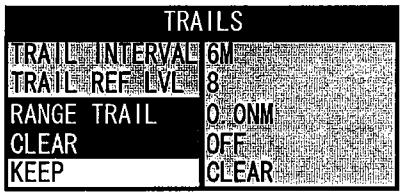
→ **TRAIL SUPPRESS**

Sets the range for suppressing the trail from own ship.



→ **TRAIL CLEAR**

Clears the trail information from the memory.

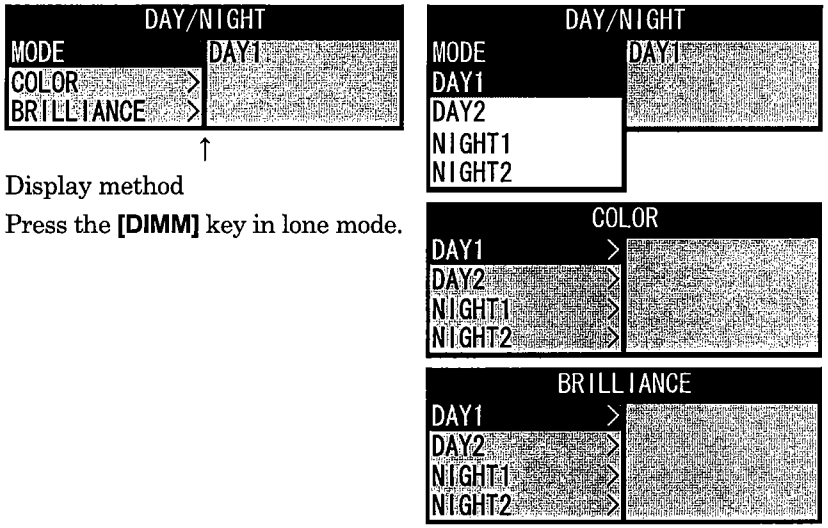


→ **RANGE TRAIL**

Sets that trail information is not cleared even if the range is changed.

Menu by a direct key [DIMM] : Setting day/night mode and color and brightness of the selected screen

1st level **2nd level**



Display method

Press the **[DIMM]** key in lone mode.

→ **DAY/NIGHT**

Select one of the four day/night modes.

→ **COLOR (3rd and 4th levels available)**

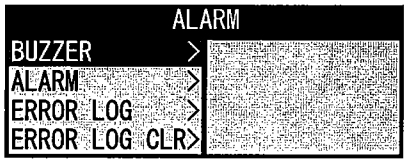
Sets the color of the selected mode and screen.

→ **BRILLIANCE (3rd and 4th levels available)**

Sets the brightness of the selected mode and screen.

Menu by a direct key [ALARM ACK] : Setting various alarm functions

1st level **2nd level**



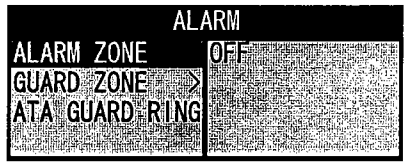
↑

Display method

Press the **[ALARM ACK]** key in long mode.

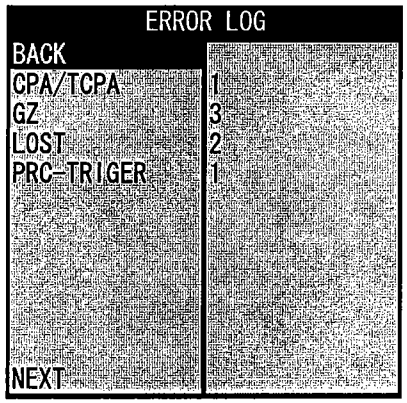
→ **BUZZER**

Sets a buzzer volume.



→ **ALARM**

Sets various alarms. (3rd level available)



→ **ERROR LOG (several pages are available for the 2nd page)**

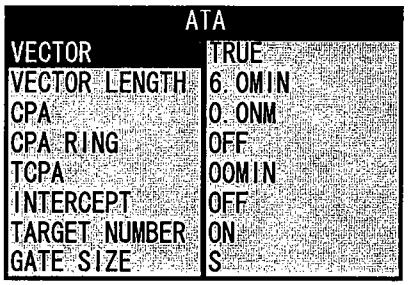
Displays various types of error log.

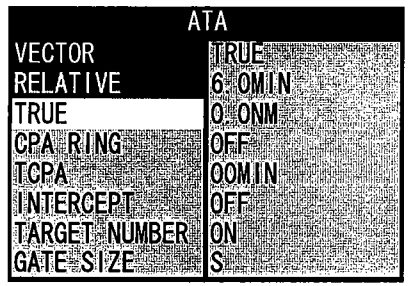
→ **ERROR LOG CLR**

Clears the error log.

Menu by a direct key [ATA] (1/3 pages) : Setting functions : This menu is displayed at installation of the option only.

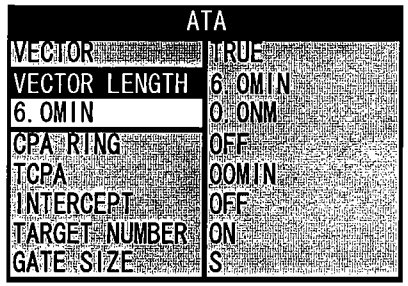
1st level **2nd level**





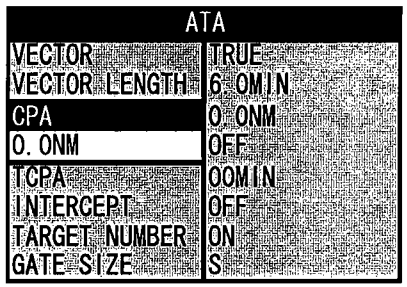
→ **VECTOR**

Sets a vector.



→ **VECTOR LENGTH**

Sets a vector length.

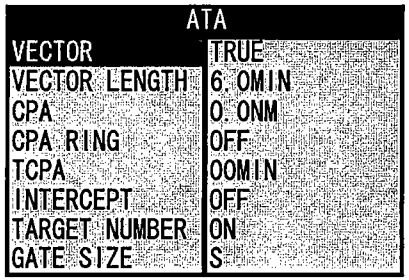


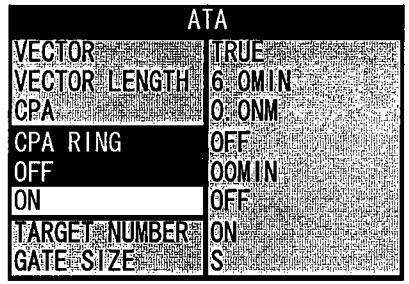
→ **CPA**

Sets CPA.

Menu by a direct key [ATA] (2/3 pages) : Setting functions : **This menu is displayed at installation of the option only.**

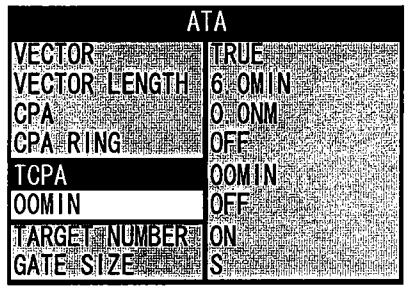
1st level **2nd level**





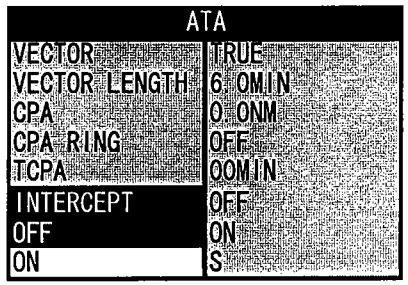
→ **CPA RING**

Sets a CPA ring.



→ **TCPA**

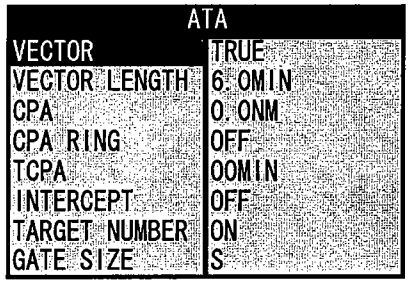
Sets TCPA

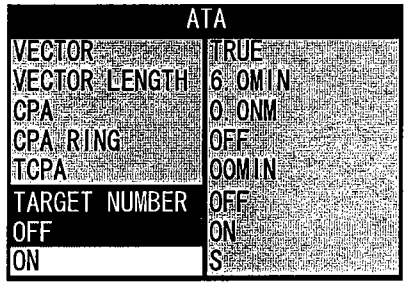


→ **INTERCEPT**

Menu by a direct key [ATA] (3/3 pages) : Setting functions : **This menu is displayed at installation of the option only.**

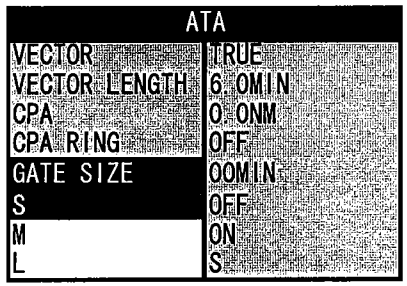
1st level **2nd level**





→ **TARGET NUMBER**

Sets a display method of a target number.

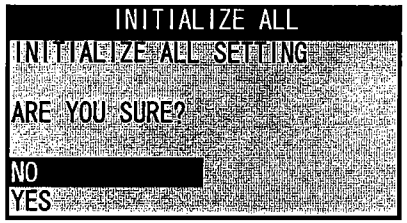


→ **GATE SIZE**

Sets a tracking gate size.

Menu initialization by pressing a key at Power ON

1st level



→ **INITIALIZE ALL**

Performs initialization operation.

↑

Display method

Set the power to ON by pressing the **[ACQ/ENT]** key and **[MENU]** together.

Setting menu language by pressing a key at Power ON

1st level

→ **LANGUAGE SELECTION**

Sets a language.

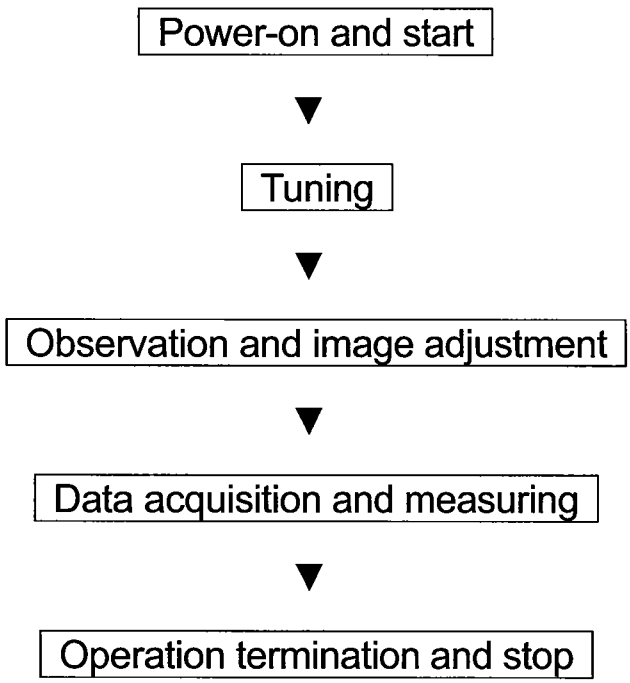
↑

Display method

Set the power to ON by pressing the **[DIMM]** key.

Chapter 3 Operation Procedures

3.1 Operation Flow



This chapter explains operations roughly divided into the following:

- **Power-on operation**
- **Basic operation**
- **General operation**
- **Function key operation**

Power-on operation must be set before this radar is turned on/off or the equipment is operated.

Basic operation is the minimum operation for operating the radar.

General operation is necessary for customizing the settings used with basic operation to best suit your needs or for using more useful functions.

Function key operation is necessary for storing the settings determined through general operation by the user or for implementing more advanced usage.

The following explains each basic operation:

3.2 Power-on Operation

3.2.1 Power-on and start

1. Turning on the power [STBY]

To turn on the power, press the **[STBY]** key.

When the power is turned on, the countdown timer is displayed on the screen, and the standby state is placed after 1 minute and 30 seconds.

The total duty time and total transmitting time are displayed. Refer to the time display when carrying out maintenance work. The time display includes a slight error.

2. Transmitting [TX/PRF]

To transmit data from the standby state, press the **[TX/PRF]** key.

To change the transmitting state back to the standby state, press the **[STBY]** key.

3.2.2 Tuning [AUTO-TUNE]

This radar can be tuned manually or automatically. To switch between manual tuning and automatic tuning, press the **[AUTO-TUNE]** control key. When automatic tuning is selected, "A" is displayed to the left of the tuning indicator at the right bottom of the screen.

1. Switching the tuning mode

If manual tuning is currently selected, pressing the **[AUTO-TUNE]** control key changes to automatic tuning. If automatic tuning is currently selected, pressing the key changes to manual turning. The **automatic tuning mode** and **manual tuning mode** are switched back and forth each time the key is pressed.

2. Turning the tuning control [AUTO-TUNE]

If manual tuning is currently selected, enlarge the image by turning the tuning control on the keyboard. The tuning indicator serves as a rule of thumb for manual tuning. Adjust the image so that the pointer of the indicator reads the maximum value.

Automatic tuning does not need the turning of the tuning control.

If no image appears, turn the sensitivity control on the keyboard fully to the right, and turn the sea clutter control and the rain/snow clutter control fully to the left.

3.2.3 Observation and image adjustment [+RANGE-]

Display the optimum image by turning the tuning control (if manual tuning is selected), sensitivity control, sea clutter control, and rain/snow clutter control on the keyboard.

The image observation range can be changed by pressing the **[+RANGE-]** key.

The currently selected range is displayed at the upper left of the screen. (See 2.2, "Description of Screen Display.")

3.2.4 Data acquisition and measuring

For each operation, see 3.4, "Basic Operation" and Chapter 4, "Interpret the PPI Screen."

3.2.5 Operation termination and stop [STBY], [TX/PRF]

1. Canceling transmission [STBY]

Press the **[STBY]** key.

Transmission is canceled and the screen enters the standby state.

2. Turning off the power

Press the **[STBY]** key and **[TX/PRF]** key at the same time.

The radar enters the stopped state and all the functions stop.

⚠WARNING

Before starting maintenance work or the like, stop power supply by turning off the power and disconnecting the power connector from the rectifier and the display. Even if the power switch is turned off, there are live components in each unit. In this status, maintenance or inspection work causes an electric shock, system failure, or accident.

3.3 Preparation for Observation

3.3.1 Changing the brightness of the LCD

(a) Turning the BRILL control of the display clockwise increases the brightness. Turning it counterclockwise decreases the brightness. Use the BRILL control to change the brightness of the overall LCD.

3.3.2 Changing the brightness of the keyboard [DIMM]

(a) Pressing the **[DIMM]** key changes the brightness of the keyboard.
Each time the **[DIMM]** key is pressed, the value indicating the brightness changes 1 → 2 → 3 → 4 ... 7 → 8 , 8 → 7 → 6 → ... 2 → 1 , 1 → 2 → 3. As a greater value is selected, the brightness increases.
When the key is pressed again at the brightness level 8 or 1, the buzzer sounds indicating the maximum or minimum brightness.

Caution

- **The brightness set by the [DIMM] key does not change even if the brightness is set to the minimum by another switch.**

3.3.3 Switching the display language [DIMM]

The following can be selected as a display language:

- Japanese
- English
- Norwegian
- French
- Spanish
- Italian
- Danish

(a) Turn on the power while pressing the **[DIMM]** key. The menu below is displayed.
(Continue pressing the **[DIMM]** key until the following menu is displayed, since it will take about 10 seconds before the menu is displayed.)

(b) When the language selection menu is displayed, select the target language using **[JOG DIAL]**, and then press the **[JOG DIAL]** or **[ACQ/ENT]** key. The message is displayed asking if you want the selected language. If the selected language is the right one, press the **[JOG DIAL]** or **[ACQ/ENT]** key again. The system starts with the selected language.

3.3.4 Setting the volume of the buzzer [ALARM ACK]

Set the volume of sound emitted when the key is pressed or an alarm is issued.

(a) Hold down the **[ALARM ACK]** key to display the ALARM menu.

(b) Select BUZZER, and then press the **[JOG DIAL]** or **[ACQ/ENT]** key.

(c) The menu below is displayed. Set a volume with a value 0 to 255 by turning **[JOG DIAL]**, and then press the **[JOG DIAL]** or **[ACQ/ENT]** key.

Caution

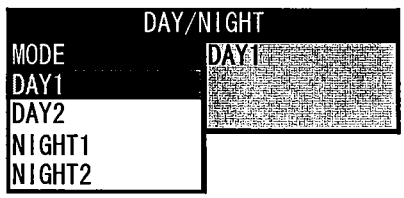
● **Be careful that if the volume of the buzzer is set to 0 or a value not high enough, you may not hear the buzzer when an alarm is issued.**

3.3.5 Switching the day/night mode [DIMM]

This radar permits the settings of four patterns of the screen brightness and display colors.
The four patterns are day 1, day 2, night 1, and night 2.
The switching of the above four patterns instantaneously selects the mode that can choose the screen brightness and display color.
Thus, this function enables more than one person to set the color and brightness according to their usage.

1. Switching the day/night mode [DIMM]

(a) Hold down the **[DIMM]** key to display the [DAY/NIGHT] menu.
(b) Operate **[JOG DIAL]** to select [MODE], and then press the **[JOG DIAL]** or **[ACQ/ENT]** key.
(c) The menu below is displayed. Select the [DAY1], [DAY2], [NIGHT1], or [NIGHT2] mode you want, and then press the **[JOG DIAL]** or **[ACQ/ENT]** key to determine the selection.



2. Switching the display color [DIMM]

The display color can be changed only for screens for which it is selectable.
The table below shows the screens for which a display color can be selected.

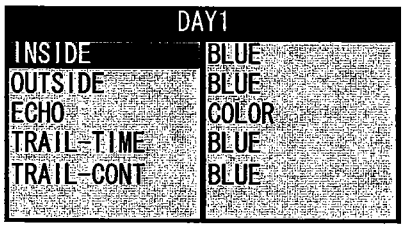
Color-selectable screens and display colors

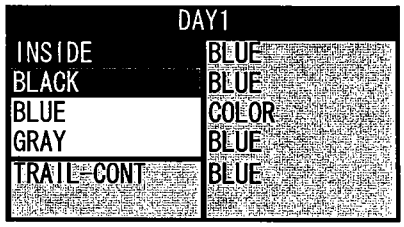
Color-selectable screen	Color 1	Color 2	Color 3	Color 4
Background color inside PPI	BLACK	BLUE	GRAY	–
Background color outside PPI	BLACK	BLUE	GRAY	–
Color of echo	YELLOW	ORANGE	GREEN	COLOR
Color of timing trail	SKY	WHTIE	GREEN	–
Color of continuous trail	SKY	WHTIE	GREEN	–

Take the following steps to select the display color:

(a) Hold down the **[DIMM]** key to display the [DAY/NIGHT] menu.
(b) Operate **[JOG DIAL]** to select [COLOR], and then press the **[JOG DIAL]** or **[ACQ/ENT]** key to determine the selection.
(c) Select the [DAY1], [DAY2], [NIGHT1], or [NIGHT2] mode you want, and then press the **[JOG DIAL]** or **[ACQ/ENT]** key to determine the mode.
(This operation determines that the color of which pattern of the four is selected.)
(d) The left menu below is displayed. Select the [INSIDE], [OUTSIDE], [ECHO], [TRAIL-TIME], or [TRAIL-CONT] screen for which you want to set the color, and then press the **[JOG DIAL]** or **[ACQ/ENT]** key to determine the selection.

(e) Subsequently, the right menu below is displayed. Operate **[JOG DIAL]** to select the color to be set, and then press the **[JOG DIAL]** or **[ACQ/ENT]** key to determine the selection.





3. Switching the brightness of the screen [DIMM]

The brightness of the screen can be changed only for screens for which it is selectable.
The brightness of the screen is selectable for ten screens of the five PPI system screens and five graphic system screens below.

PPI screens (related to radar images)

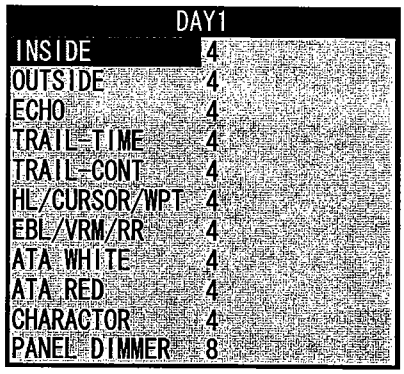
<1> Background color inside PPI
<2> Background color outside PPI
<3> Echo
<4> Timing trail
<5> Continuous trail

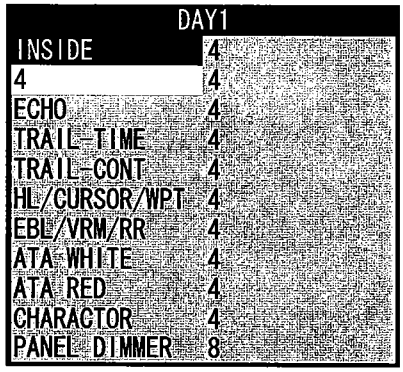
Graphic screens (related to markers and symbols)

<6> (SHM/cursor/WAYPOINT)
<7> (EBL, VRM, fixed marker)
<8> White symbol of MARPA
<9> Red symbol of MARPA
<10> Numeric value display

Take the following steps to change the brightness of the screen:

(a) Hold down the **[DIMM]** key to display the [DAY/NIGHT] menu.
(b) Operate **[JOG DIAL]** to select [BRILLIANCE], and then press the **[JOG DIAL]** or **[ACQ/ENT]** key to determine the selection.
(c) Operate **[JOG DIAL]** to select the [DAY1], [DAY2], [NIGHT1], or [NIGHT2] mode you want, and then press the **[JOG DIAL]** or **[ACQ/ENT]** key to determine the mode.
(This operation determines that the brightness of which pattern of the four is selected.)
(d) The left menu below is displayed. Operate **[JOG DIAL]** to select one of the following screen on which you want to set the brightness, and then press the **[JOG DIAL]** or **[ACQ/ENT]** key:
[INSIDE], [OUTSIDE], [ECHO], [TRAIL-TIME], [TRAIL-CONT], [HL/CURSOR/WPT], [EBL/VRM/RR], [ATA WHITE], [ATA RED], [CHARACTER], and [PANEL DIMMER]
(e) Finally, the right menu below is displayed. Operate **[JOG DIAL]** to select the value as the brightness to be set, and then press the **[JOG DIAL]** or **[ACQ/ENT]** key to determine the selection.





Note

Brightness can be set by the lowest line PANEL DIMMER *of this menu as well as the description of 3.3.2 "Changing the brightness of the keyboard [DIMM]".*

3.4 Basic Operation

3.4.1 Transmitting [TX/PRF]

(a) Press the **[TX/PRF]** key.
The standby state is changed to the transmitting state.

3.4.2 Halting transmission [STBY]

(a) Press the **[STBY]** key.
The transmitting state is changed to the standby state. The screen displays "STBY."

3.4.3 Changing the range [+RANGE-]

(a) Press the **[+RANGE-]** key.
Pressing the key on the + side increases the range.
Pressing the key on the - side decreases the range.

3.4.4 Erasing/displaying the fixed range marker [RR/HL]

(a) The fixed range marker is turned on/off each time the **[RR/HL]** key is pressed.

3.4.5 Erasing the ship's heading marker [RR/HL]

(a) The ship's heading marker is not displayed while the **[RR/HL]** key is held down.

3.4.6 Tuning

See 3.2.2, "Tuning [AUTO-TUNE]."

3.4.7 Adjusting sensitivity [GAIN/PL]

(a) Sensitivity adjustment (**[GAIN/PL]** control) is not necessary for general use.
The **[GAIN/PL]** control is always set to the maximum (turned fully to the right).
However, if many noises appear on the screen, turn the **[GAIN/PL]** control to set sensitivity for easy observation.

Caution

- **If the set sensitivity is too low, the target of a dangerous object or ship may not be displayed.**
- **In some cases, if the set sensitivity is too high, the receiver noise on the radar screen increases and interferes with the observation.**