JMR-611

RIVER RADAR EQUIPMENT

INSTRUCTION MANUAL

JRC Japan Radio Co., Ltd.

PREFACE

Thank you very much for purchasing the JRC river radar equipment, JMR-611.
This equipment is a river radar equipment designed to obtain safe operation of ships. This equipment consists of a radar signal processing 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.
- Keep this manual in a convenient place for future reference.
  Make use of this manual when experiencing operation difficulties.
- The LCD of this equipment uses thin film transistors (TFT). If some pixels on the screen are not clear, the color is different, or the screen is brighter than usual, it is not because of defect, instead it is because of inherent characteristic of the TFT display technology.
- The information in this manual is subject to change without notice at any time.

Refer to this manual when any inconvenience or defect occurs.

● BEFORE OPERATION ●

Meanings of Pictorial Indication

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

DANGER	This indication is shown where incorrect equipment operation due to negligence may cause death or serious injuries.
WARNING	This indication is shown where any person is supposed to be in danger of being killed or seriously injured if this indication is neglected and 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 △ mark represents CAUTION (including DANGER and WARNING).
Detailed contents of CAUTION ("Electric Shock" in the example on the left) is shown in the mark.

Disassembling Prohibited

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

Disconnect the power plug

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

Warning Label

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

●PRECAUTIONS●

⚠ 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 antenna, make sure to turn its main power off.
Failure to comply may result in electrocution or injuries.

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

⚠WARNING

FCC RF EXPOSURE STATEMENT

THIS UNIT COMPLIES WITH FCC RF EXPOSURE LIMITS FOR AN UNCONTROLLED ENVIRONMENT. TO COMPLY WITH FCC RF EXPOSURE LIMIT REQUIREMENTS, ANTENNAS MUST BE OPERATED MORE THAN AT A MINIMUM DISTANCE. KEEP TO MORE THAN THE MINIMUM DISTANCE WHICH IS BETWEEN THE RADIATOR AND ANY PERSON'S BODY. THE MIMIMUM DISTANCE IS FOLLOWING.

RADIATOR TYPE	LENGTH	MIMIMUM DISTANCE
NAX-16R-6	6ft	308.4 cm
NAX-16R-7	7ft	322.9cm
NAX-16R-9	9ft	379.4cm

⚠WARNING

	When conducting maintenance work, make sure to turn off the power and unplug the power line of the processor 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.
	Never carry out internal inspection or repair work of the equipment by users. Inspection or repair work by unauthorized personnel may result in fire hazard or electric shock. Ask the nearest branch, business office or a dealer for inspection and repair.
	Turn off the main power before maintenance work. Otherwise, an electric shock may result.
	Turn off the main power before cleaning the equipment. Especially, make sure to turn off the indicator if a rectifier is used. Otherwise, equipment failure, or death or serious injury due to electric shock may result, because voltage is outputted from the rectifier even when the radar is not operating.
	Turn off the main power source before starting maintenance. Otherwise, an electric shock or injury may be caused.
	Turn off the main power if you need to be near the scanner unit for maintenance or inspection purposes. Direct exposure to electromagnetic waves at close range in death or serious injury.
	Set the safety switch for stopping the scanner unit to the OFF position. Otherwise, an accidental contact with the rotating scanner unit may cause injury.
	When cleaning the screen, do not wipe it too strongly with a dry cloth. Also, do not use gasoline or thinner to clean the screen. Otherwise the screen surface may be damaged.
	Never carry out internal inspection or repair work of the equipment by users. Inspection or repair work by unauthorized personnel may result in fire hazard or electric shock. Ask the nearest branch, business office or a dealer for inspection and repair.
	Turn off the main power before maintenance work. Otherwise, an electric shock may result.

⚠WARNING

	Turn off the main power before cleaning the equipment. Especially, make sure to turn off the indicator if a rectifier is used. Otherwise, equipment failure, or death or serious injury due to electric shock may result, because voltage is outputted from the rectifier even when the radar is not operating.
	Turn off the main power source before starting maintenance. Otherwise, an electric shock or injury may be caused.
	Turn off the main power if you need to be near the scanner unit for maintenance or inspection purposes. Direct exposure to electromagnetic waves at close range in death or serious injury.
	Set the safety switch for stopping the scanner unit to the OFF position. Otherwise, an accidental contact with the rotating scanner unit may cause injury.
	When disposing of used lithium batteries, be sure to insulate the batteries by taping ⊕ and ⊖ terminals. Otherwise, heat generation, explosion or a fire may occur.

⚠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.
	Normally, use the automatic tune mode. Use the manual tune mode only when best tuning is not possible in the automatic tune mode due to deterioration of magnetron.
	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.
	When using the [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 [SEA] function, make sure to choose the most appropriate image noise suppression level.
	When using the [RAIN] function, never set the suppression level too high canceling out all image noises from the rain or snow at the 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 [RAIN] function, make sure to choose the most appropriate image noise suppression level.
	The accuracy from the vectors are depending on the accuracy from the (D)GPS sensors. With longer vectors, the accuracy will be lower. The vectors are calculated with the situation at that time. When there will be some changed influence from wind, water current etc., are not shown before the vessel is influenced by this.
	Do not turn the system off while the display shows “Copying” in a message area on the bottom center of the screen in order not to make a flash memory card damaged.
	Do not put watches, clocks, or magnetic cards close to the modulator unit since this unit holds magnetrons having strong magnetic force. Failure or data destruction of the above devices may result.
	Turn off the main power source before replacing parts. Otherwise, an electric shock or trouble may be caused.
	Before replacing the magnetron, turn off the main power source and wait for 5 minutes or more until the high voltage circuits are discharged. Otherwise, an electric shock may be caused.

⚠CAUTION

Take off your wrist watch when bringing your hands close to the magnetron.
Otherwise, your watch may be damaged because the magnetron is a strong magnet.

Two or more persons shall replace the liquid crystal monitor.
If only one person does this work, he may drop the LCD, resulting in injury.

Even after the main power source is turned off, some high voltages remain for a while.
Do not contact the inverter circuit in the LCD with bare hands.
Otherwise, an electric shock may be caused.

Never changes or modifications the equipment by user with not expressly approved method. Otherwise, the party responsible for compliance could void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

IC RSS-GEN, Sec 8.4 Warning Statement –

(Required for license-exempt devices)

ENGLISH:
This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

FRENCH:
Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

● Safety Cautions ●

Cautions for High Voltage

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

High voltages on the order of tens of thousands volts are most likely to cause instant deaths from electrical shocks. At times, even voltages on the order of several hundred volts could lead to electrocution. To defend against electrical shock hazards, don't put your hand into the inside of apparatus. When you put in a hand unavoidably in case of urgent, it is strongly suggested to turn off the power switch and allow the capacitors, etc. to discharge with a wire having its one end positively grounded to remove residual charges. Before you put your hand into the inside of apparatus, make sure that internal parts are no longer charged. Extra protection is ensured by wearing dry cotton gloves at this time. Another important precaution to observe is to keep one hand in your pocket at a time, instead of using both hands at the same time.

It is also important to select a secure footing to work on, as the secondary effects of electrical shock hazards can be more serious. In the event of electrical shocks, disinfect the burnt site completely and obtain medical care immediately.

Precautions for Rescue of Victim of Electric Shock

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

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

Method of First-Aid Treatment

☆Precautions for First-Aid Treatments

Apply artificial respiration to the person who collapsed, minimising moving as much as possible avoiding risks. Once started, artificial respiration should be continued rhythmically.

(1) Refrain from touching the patient carelessly as a resultof the accident; the first-aider could suffer from electrical shocks by himself or herself.

(2) Turn off the power calmly and certainly, and move the patient apart from the cable gently.

(3) Call or send for a physician or ambulance immediately, or ask someone to call doctor.

(4) Lay the patient on the back, loosening the necktie, clothes, belts and so on.

(5) (a) Feel the patient's pulse.
(b) Check the heartbeat by bringing your ear close to the patient's heart.
(c) Check for respiration by bringing your face or the back of your hand to the patient's face.
(d) Check the size of patient's pupils.

(6) Opening the patient's mouth, remove artificial teeth, cigarettes, chewing gum, etc. if any. With the patient's mouth open, stretch the tongue and insert a towel or the like into the mouth to prevent the tongue from being withdrawn into the throat. (If the patient clenches the teeth so tight that the mouth won't open, use a screwdriver or the like to force the mouth open and then insert a towel or the like into the mouth.)

(7) Wipe off the mouth to prevent foaming mucus and saliva from accumulating.

☆Treatment to Give When the Patient Has a Pulse Beating but Has Ceased to Breathe

∗ Performing mouth-to-mouth artificial respiration

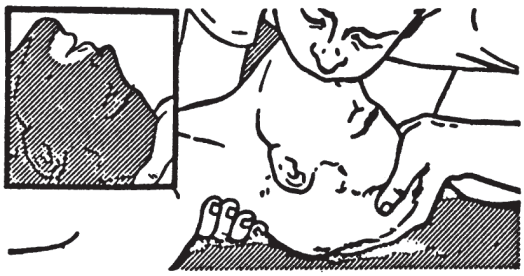
(1) Bend the patient's face backward until it is directed to look back. (A pillow may be placed under the neck.)
(2) Pull up the lower jaw to open up the airway. (To spread the airway)
(3) Pinching the patient's nose, breathe deeply and blow your breath into the patient's mouth strongly, with care to close it completely. Then, move your mouth away and take a deep breath, and blow into his or her mouth. Repeat blowing at 10 to 15 times a minute (always with the patient's nostrils closed).
(4) Continue artificial respiration until natural respiration is restored.
(5) If the patient's mouth won't open easily, insert a pipe, such as one made of rubber or vinyl, into either nostril. Then, take a deep breath and blow into the nostril through the pipe, with the other nostril and the mouth completely closed.
(6) The patient may stand up abruptly upon recovering consciousness. Keep the patient lying calmly, giving him or her coffee, tea or any other hot drink (but not alcoholic drink) to keep him or her warm.

Mouth-to-mouth artificial respiration with the patient's head lifted

[1]

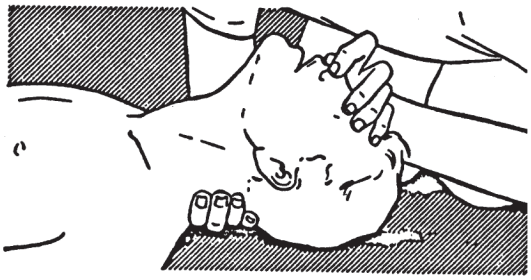
(1) Lift the back part of the patient's head. Support the forehead with one of your hand and the neck with the other hand.→ [1].
Many patients will have their airways opened by lifting their head in this way to ease mouth-to-mouth artificial respiration.

[2]



(2) Closing the patient's mouth with your mouth, press your cheek against the patient's nose→ [2].
Alternatively, hold the patient's nose with your finger to prevent air leak → [3].

[3]



(3) Blowing air into the patient's lungs. Blow air into the patient's lungs until chest is seen to rise. The first 10 breaths must be blown as fast as possible.

Fig. 1 Mouth-to-mouth artificial respiration

Flow of Cardiopulmonary Resuscitation (CPR)

A person is collapsing.
- Secure the safety of the surrounding area.
- Prevent secondary disasters.

Check for response.
- Call while tapping the shoulder.

Responding → Listen to the appeal of the injured or ill person and give the necessary first-aid treatment.

Not responding or indeterminate state

Ask for help.
- Make an emergency call.
- Ask to bring an AED.

If you call an ambulance, you can get instructions regarding how to judge cardiac arrest and how to do cardiopulmonary resuscitation (CPR).

Check for breathing and judge for cardiac arrest.
- Check for breathing.

Breathing → Recovery position
- Lay the injured or ill person on his/her side and wait for the arrival of the emergency services.

Not breathing or indeterminate state

Chest compressions
- With each compression, depress the chest wall to a depth of approximately 5 cm.
- Perform compressions at the rate of about 100 - 120 times per minute.

Combination of chest compressions and rescue breaths Note(1)
- If the first-aiders is not trained in rescue breaths, he/she should perform only chest compressions. See Note(1) for the details.

Note(1) Combination of chest compressions and rescue breaths
- If the first-aider is not trained in rescue breaths, he/she should perform only chest compressions.
- If the first-aider is trained in rescue breath, and has the skill and will to do it, he/she should perform the combination of chest compressions and rescue breaths at the ratio of 30:2. If there is a fear of infection, he/she should use a personal protective equipment (mouthpiece for rescue breathing).

Arrival of an AED
- Turn on the power.
- Use the AED by following its voice prompts. Fitting of the electrode pads, etc.

Automatic electrocardiogram analysis
- Do not touch the injured or ill person.

Electric shock is not needed.

Electric shock is needed.

Delivery of electric shock

The AED automatically analyzes the heart rhythm every 2 min.

Resume CPR from chest compressions by following the voice prompts of the AED.

When to stop CPR → When the injured or ill person has been handed over to the emergency services or has started moaning or breathing normally, lay him/her on his/her side in a recovery position and wait for the arrival of emergency services.

Specific Procedures for Cardiopulmonary Resuscitation (CPR)

1. Check the scene for safety to prevent secondary disasters

a) Do not touch the injured or ill person in panic when an accident has occurred. (Doing so may cause electric shock to the first-aiders.)

b) Do not panic and be sure to turn off the power. Then, gently move the injured or ill person to a safe place away from the electrical circuit.

2. Check for responsiveness

a) Tap the shoulder of the injured or ill and shout in the ear saying, "Are you OK?"

b) If the person opens his/her eyes or there is some response or gesture, determine it as "responding." But, if there is no response or gesture, determine it as "not responding."

3. If responding

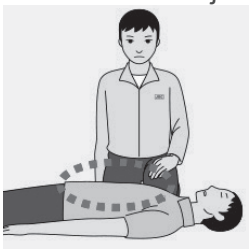
a) Give first-aid treatment.

4. If not responding

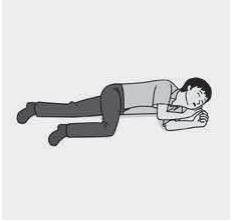
a) Ask for help loudly. Ask somebody to make an emergency call and bring an AED.
- Somebody has collapsed. Please help.
- Please call an ambulance.
- Please bring an AED.
- If there is nobody to help, call an ambulance yourself.

5. Check for breathing

a) Look to see if the chest and abdomen of the injured or ill person are rising and falling.



b) If the injured or ill person is breathing, place him/her in the recovery position and wait for the arrival of the emergency services.
- Position the injured or ill person on his/her side.

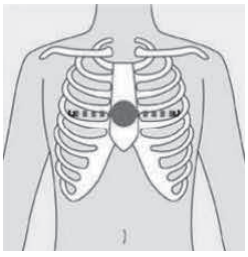


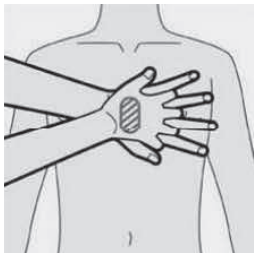
6. Cardiopulmonary resuscitation (CPR) (combination of chest compressions and rescue breaths)

a) Chest compressions

1) Position of chest compressions

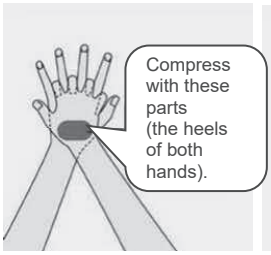
- Position the heel of one hand in the center of the chest, approximately between the nipples, and place your other hand on top of the one that is in position.

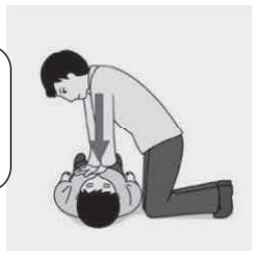




2) Perform chest compressions

- Perform 30 times uninterrupted chest compressions at the rate of about 100 - 120 times per minute, while locking your elbows positioning yourself vertically above your hands.
- With each compression, depress the chest wall to a depth of approximately 5 cm.

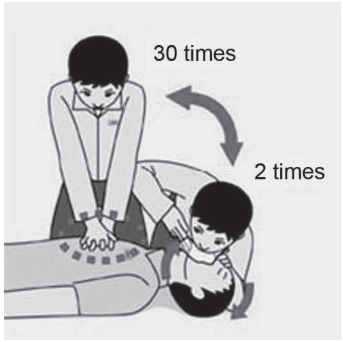




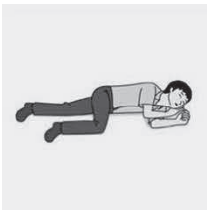
b) Combination of 30 times chest compressions and 2 times rescue breaths

1) If the first-aider is not trained in rescue breaths, he/she should perform only chest compressions.
2) If the first-aider is trained in rescue breath, and has the skill and will to do it, he/she should perform 30 chest compressions, then give 2 rescue breaths.
3) If there is a fear of infection, he/she should use a personal protective equipment (mouthpiece for rescue breathing).
4) Continuously perform the combination of 30 chest compressions and 2 rescue breaths without interruption.
5) If there are two or more first-aiders, alternate with each other approximately every two minutes (five cycles) without interruption.

Mouthpiece for rescue breathing



7. When to stop cardiopulmonary resuscitation (CPR)

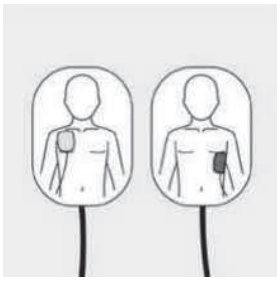


a) When the injured or ill person has been handed over to the emergency services
b) When the injured or ill person has started moaning or breathing normally, lay him/her on his/her side in a recovery position and wait for the arrival of emergency services.

8. Arrival and preparation of an AED

a) Place the AED at an easy-to-use position. If there are multiple first-aiders, continue CPR until the AED becomes ready.
b) Turn on the power to the AED unit. Depending on the model of the AED, you may have to push the power on button, or the AED automatically turns on when you open the cover.
c) Follow the voice prompts of the AED.

9. Attach the electrode pads to the injured or ill person's bare chest



a) Remove all clothing from the chest, abdomen, and arms.
b) Open the package of electrode pads, peel the pads off and securely place them on the chest of the injured or ill person, with the adhesive side facing the chest. If the pads are not securely attached to the chest, the AED may not function. Paste the pads exactly at the positions indicated on the pads, If the chest is wet with water, wipe dry with a dry towel and the like, and then paste the pads. If there is a pacemaker or implantable cardioverter defibrillator (ICD), paste the pads at least 3cm away from them. If a medical patch or plaster is present, peel it off and then paste the pads. If the injured or ill person's chest hair is thick, paste the pads on the chest hair once, peel them off to remove the chest hair, and then paste new pads.
c) Some AED models require to connect a connector by following voice prompts.
d) The electrode pads for small children should not be used for children over the age of 8 and for adults.

10. Electrocardiogram analysis

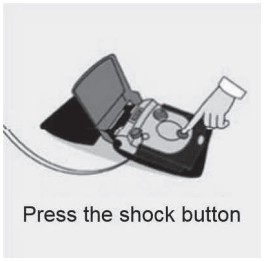
a) The AED automatically analyzes electrocardiograms. Follow the voice prompts of the AED and ensure that nobody is touching the injured or ill person while you are operating the AED.
b) On some AED models, you may need to push a button to analyze the heart rhythm.

11. Electric shock (defibrillation)

a) If the AED determines that electric shock is needed, the voice prompt saying, "Shock is needed" is issued and charging starts automatically.

b) When charging is completed, the voice prompt saying, "Press the shock button" is issued and the shock button flashes.

c) The first-aider must get away from the injured or ill person, make sure that no one is touching him/her, and then press the shock button.



Press the shock button

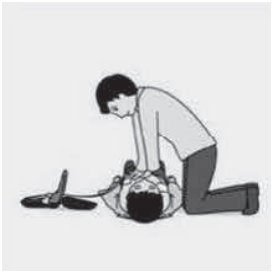
d) When electric shock is delivered, the body of the injured or ill person may jerk.

12. Resume chest compressions

a) Resume chest compressions by following the voice prompts of the AED.

・With each compression, depress the chest wall to a depth of approximately 5 cm.

・Perform compressions at the rate of about 100 - 120 times per minute.



13. Automatic electrocardiogram analysis

a) When 2 minutes have elapsed since you resumed cardiopulmonary resuscitation (CPR), the AED automatically analyzes the electrocardiogram.

b) If you suspended CPR by following voice prompts and AED voice prompt informs you that shock is needed, give electric shock again by following the voice prompts.
If AED voice prompt informs you that no shock is needed, immediately resume CPR.

14. When to stop CPR (Keep the electrode pads on.)

a) When the injured or ill person has been handed over to the emergency services

b) When the injured or ill person has started moaning or breathing normally, lay him/her on his/her side in a recovery position and wait for the arrival of emergency services.

Glossary

Anti-clutter rain (FTC) : Rain/snow clutter suppression.

Anti-clutter sea (STC) : Sea clutter suppression.

AZI MODE (Azimuth Stabilization MODE)

: Bearing display mode.

BRG : Bearing.

COG (Course Over Ground)

: Course relative to the ground.

CUP (Course-Up) : Own ship's course is pointed to the top center of the radar display.

EBL (Electronic Bearing Line)

: An electronic bearing line originated from own ship's position.

ENH (Enhance) : A target can be enlarged.

GND : Stabilization relative to the ground.

GPS (Global Positioning System)

: The position of a GPS receiver can be determined by the signals from GPS satellites.

HDG (Heading) : Own ship's heading bearing. The display ranges from 000 to 360 degrees as scanned clockwise.

HL (Heading Line) : Ship's heading line.

HUP (Head-Up) : Own ship's heading line is always pointed to the top center of the radar display.

IR (Interference Rejector) : Radar interference rejector.

MRK (Mark) : Reflection plot.

NM (Nautical Mile) : 1NM = 1852m.

NUP (North-Up) : The north is always pointed to the top center of the radar display.

PIN : Information set by the user (personal code).

RCS (Radar Cross Section)

: Radar reflection sectional area.

Relative Vector : A target's movement predicted relative to own ship.

RM (Relative Motion) : Relative motion presentation. Own ship's position is fixed and other targets move relative to own ship.

RR (Range Rings) : Fixed range ring.

SCANNER : Antenna.

SEA	:	Sea clutter suppression.
SOG (Speed Over Ground)	:	Speed relative to the ground.
TM (True Motion)	:	True motion presentation. A presentation in which own ship and any other target move depending on their individual movements.
TRAILS	:	Function of displaying tracks of other ships.
True Vector	:	A target's true movement predicted as the result of entering own ship's direction and speed.
VRM	:	Variable Range Marker.

CONTENTS

4. MEASUREMENT OF RANGE AND BEARING

5. TRUE AND FALSE ECHOES ON DISPLAY

6. MAINTENANCE

7. TROUBLE SHOOTING

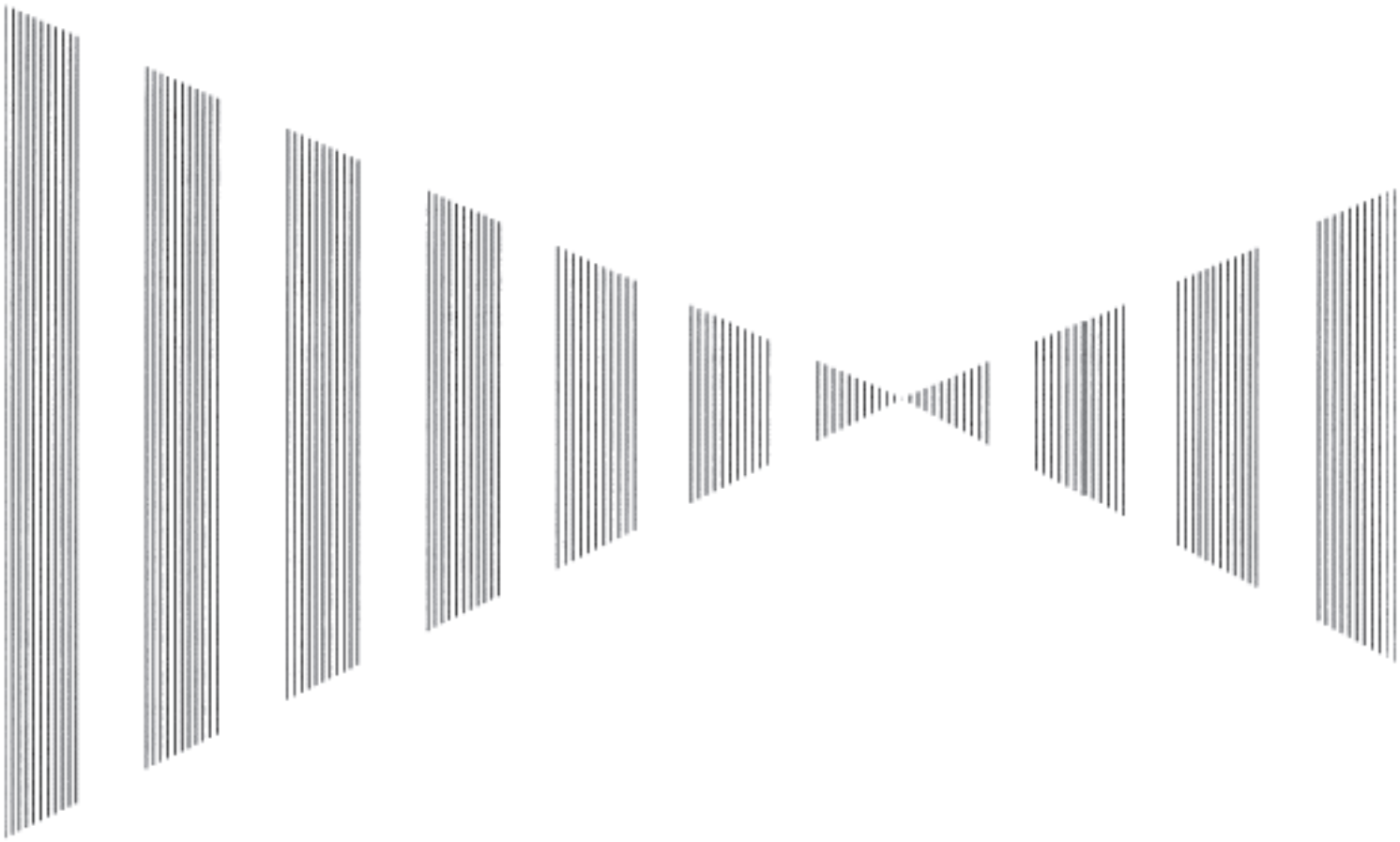
8. AFTER-SALES SERVICE

9. DISPOSAL

10. SPECIFICATIONS

APPENDIX

SECTION 1
GENERAL AND EQUIPMENT COMPOSITION



1.1 FOREWORD

Please read the safety information and operating instructions in this manual carefully before operating the device or performing any maintenance work on it. Your radar will only work optimally if the correct procedures for operation and maintenance are followed.

The JMR-611 series is a color radar system. It consists a scanner unit and a control unit which can output DVI and RGB to a high-resolution color LCD display unit. (The control unit is consisting of a radar process unit and an operation unit.)

JMR-611 meets the requirements of ETSI EN 302 194-1 V1.1.2 (2006-10) and ES-TRIN 2019 and has a type approval e-01-024.

1.1.1 Function of This System

The main functions include:

- sensitivity adjustment
- sea clutter and rain/snow clutter suppression
- interference reflector
- bearing and range measurement using a cursor, fixed/variable range markers, and electronic bearing line
- targets expansion
- trails display
- receiving inland AIS sentence
- display of AIS label (vessel name) while pushing the button when the AIS sentence is being received
- delivery of echo's screen by LAN
- display of user map
- controlling almost function of the radar by USB mouse which user connected
- saving the radar screen to the inside or the external memory (Screen capture function)
- making the own mark coupled condition

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 270 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.

Easy Operation with GUI

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

Improved Day/Night Mode

Each background color can be reproduced to be suit with 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 display.

Compact Design and Low Power Consumption

Since an LCD has been implemented as the display device, the weight of the display is greatly reduced, and the power consumption is lowered in comparison with the conventional radar equipment.

1.3 CONFIGURATION

Scanner and Transmitted Output Power

SCANNER TYPE		TRANSMITTED OUTPUT POWER	BAND
JMR-611	7 FT SLOT ANTENNA	4.9 kW	X

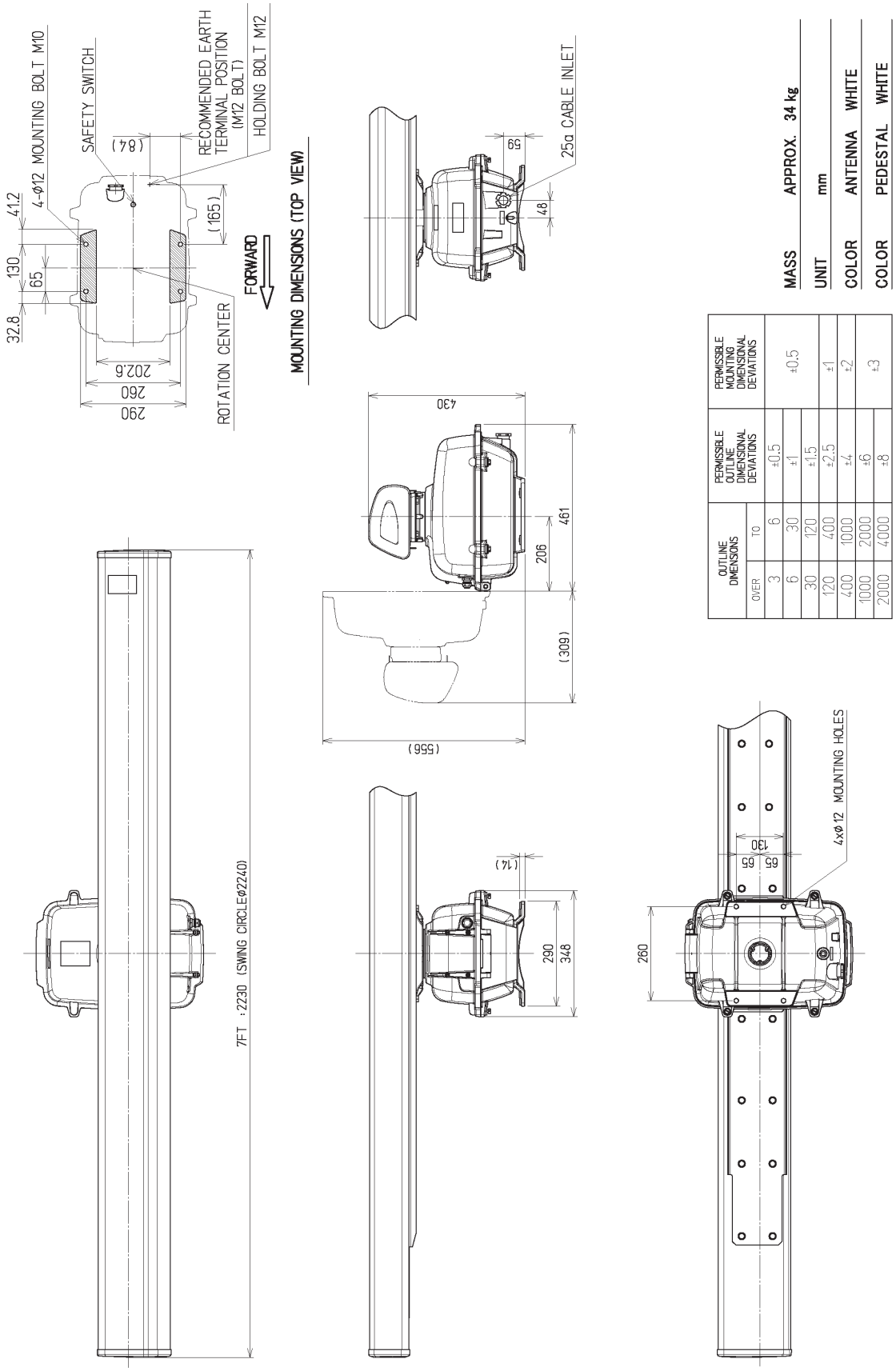
Radar Configuration and Ship's Mains

RADAR MODEL	SCANNER UNIT	CONTROL UNIT	SHIP'S MAINS
JMR-611	NKE-387	NCM-994	24 VDC

Notes:

1. An optional rectifier is necessary for using Ship's Mains 100/110/115/200/220/230 VAC.
2. The control unit NCM-994 has a separate structure consisting of the following:
   Radar process unit NDC-1774
   Operation unit NCE-5923

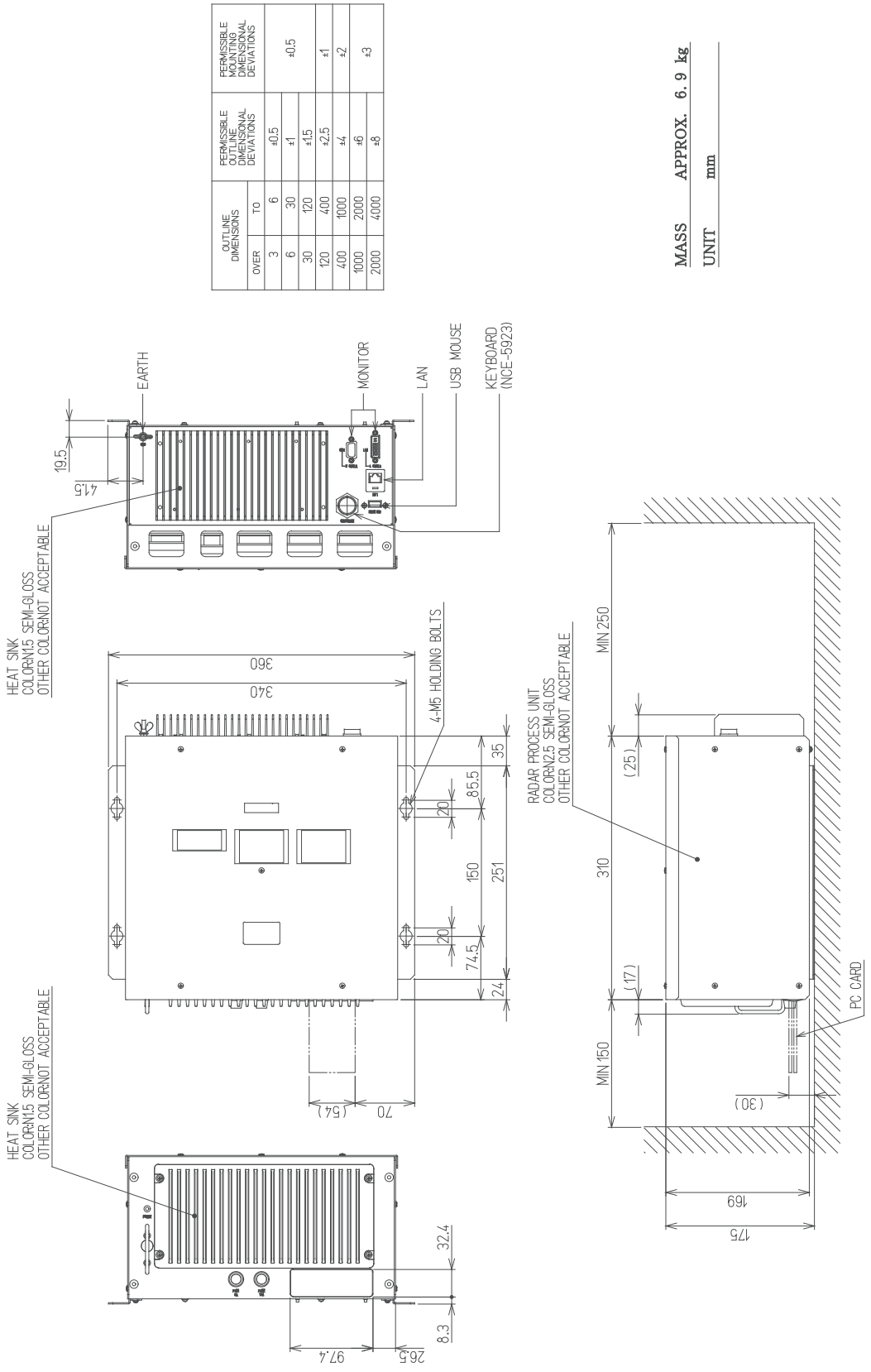
1.4 EXTERIOR DRAWINGS



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	±3
2000	4000	±8	

Unit mm

Fig. 1.1 Exterior Drawing of Scanner Unit, Type NKE-387



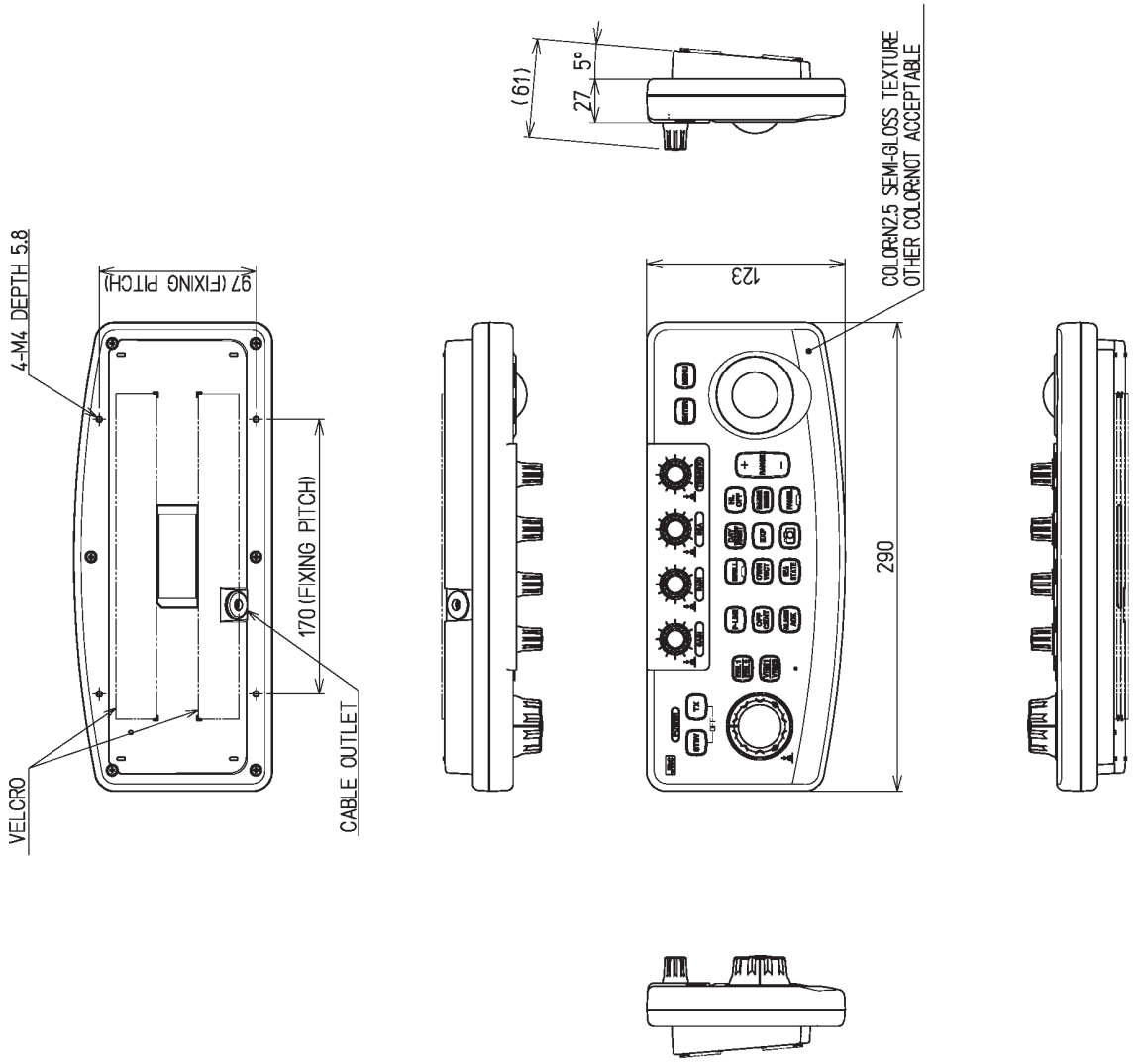
Unit mm

Fig. 1.2 Exterior Drawing of Processing Unit, Type NDC-1774

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	
120	400	±2.5	±1
400	1000	±4	±2
1000	2000	±6	±3
2000	4000	±8	

MASS APPROX. 1 kg

UNIT mm



Unit mm

Fig. 1.3 Exterior Drawing of Operating Unit, Type NCE-5923

1.5 GENERAL SYSTEM DIAGRAMS

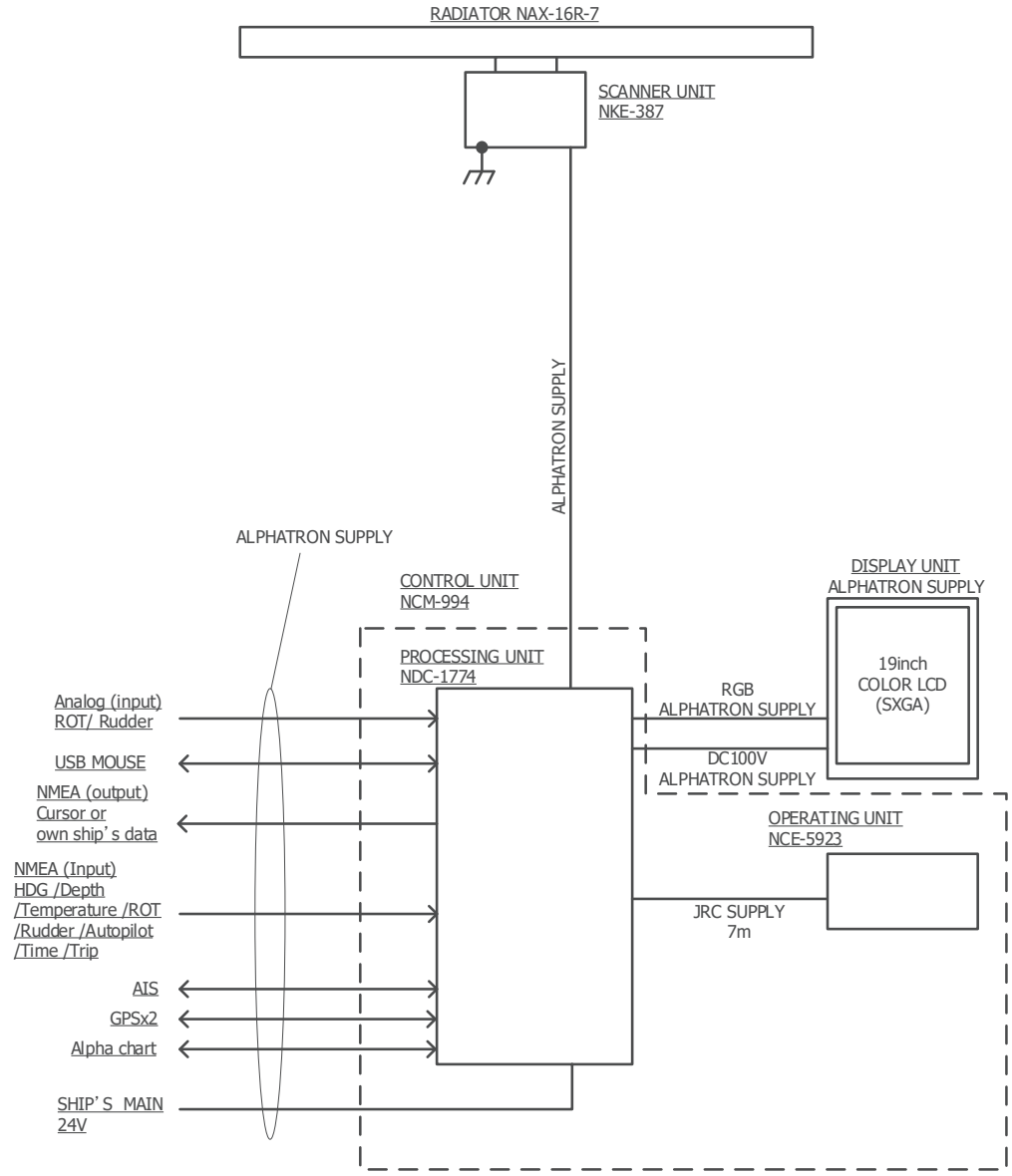
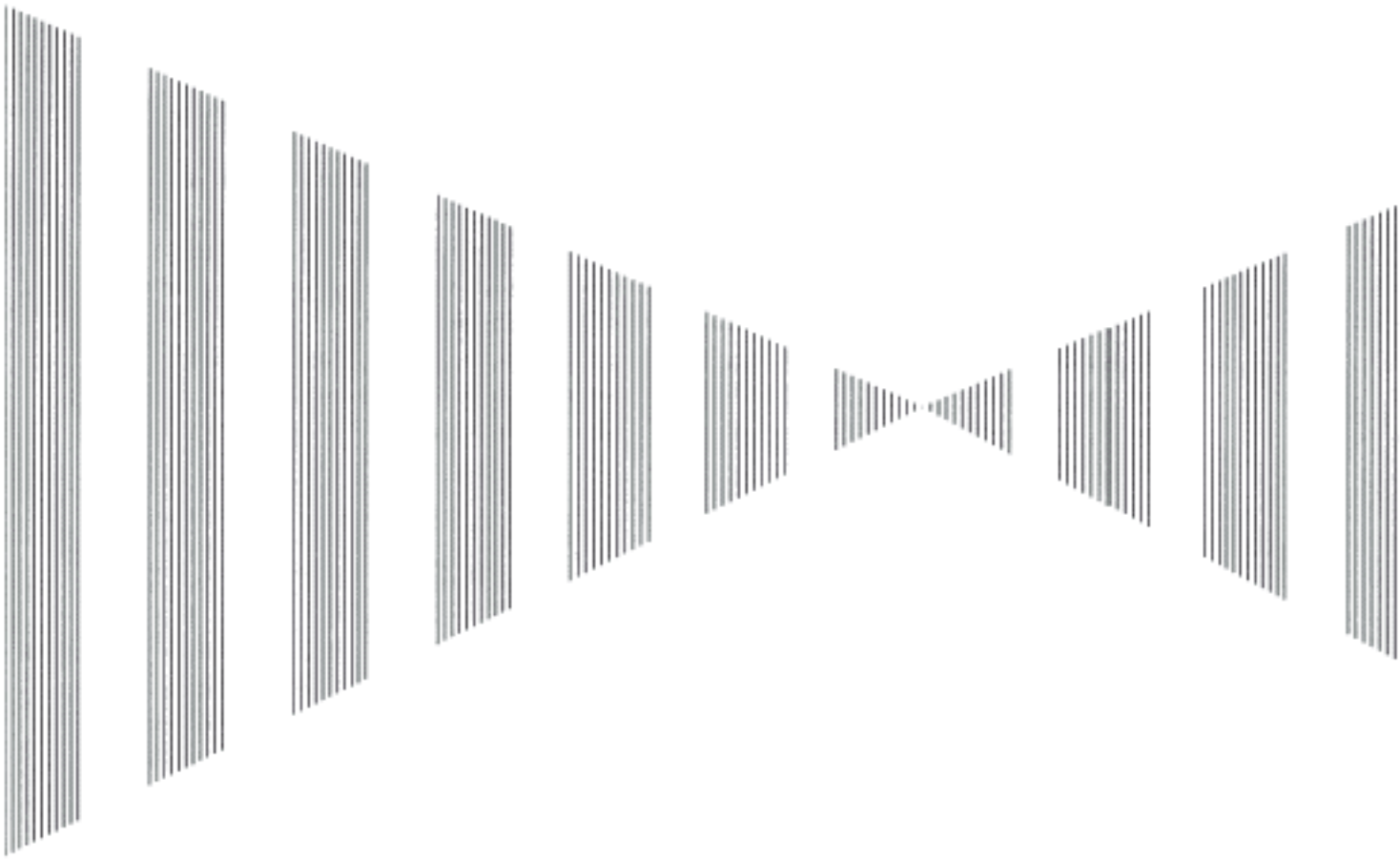


Fig. 1.4 General System Diagram of Radar, Type JMR-611

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.

SECTION 2
NAMES AND FUNCTIONS OF CONTROL PANEL SWITCHES AND FUNCTIONS OF SOFTWARE BUTTONS



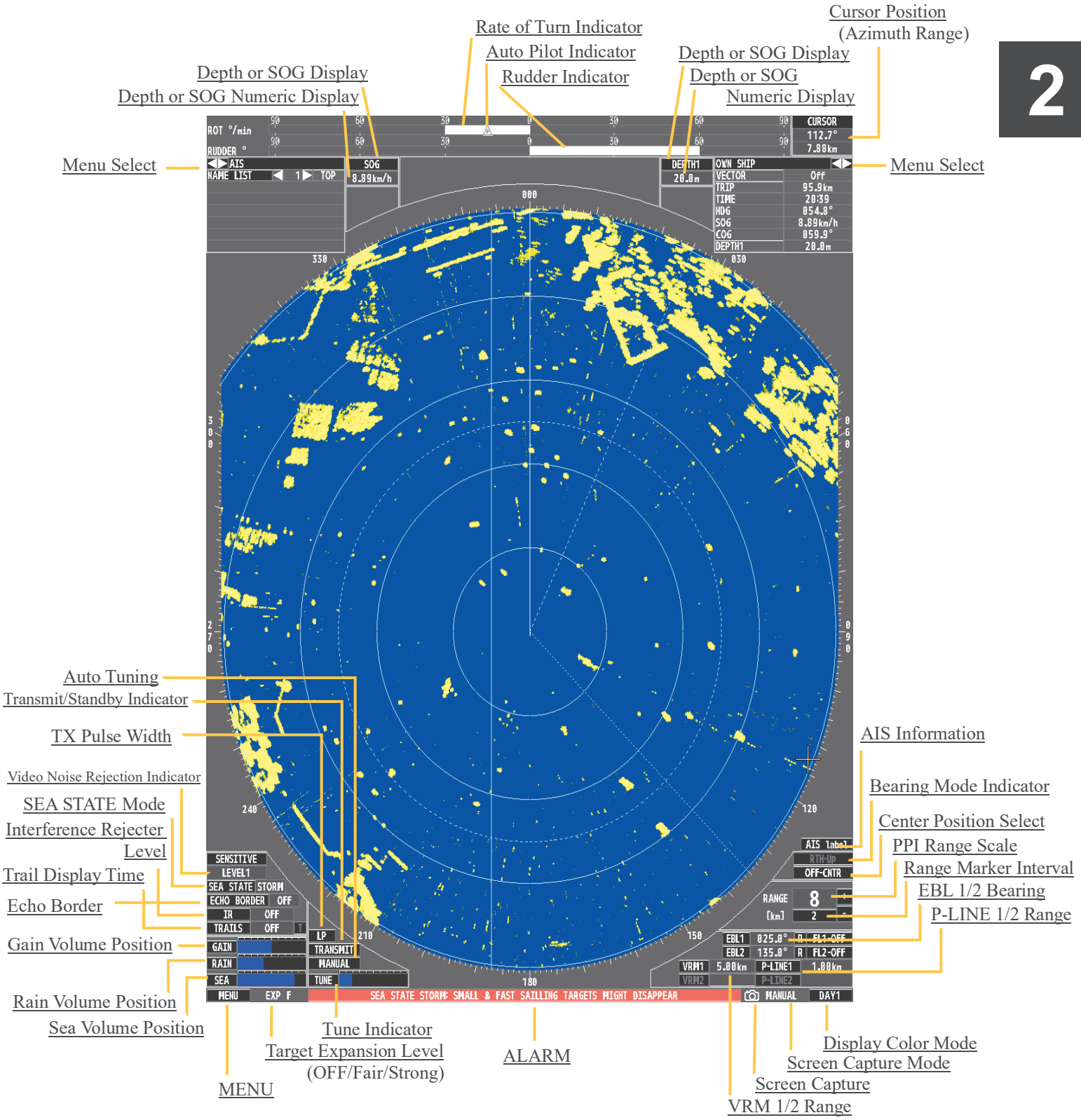
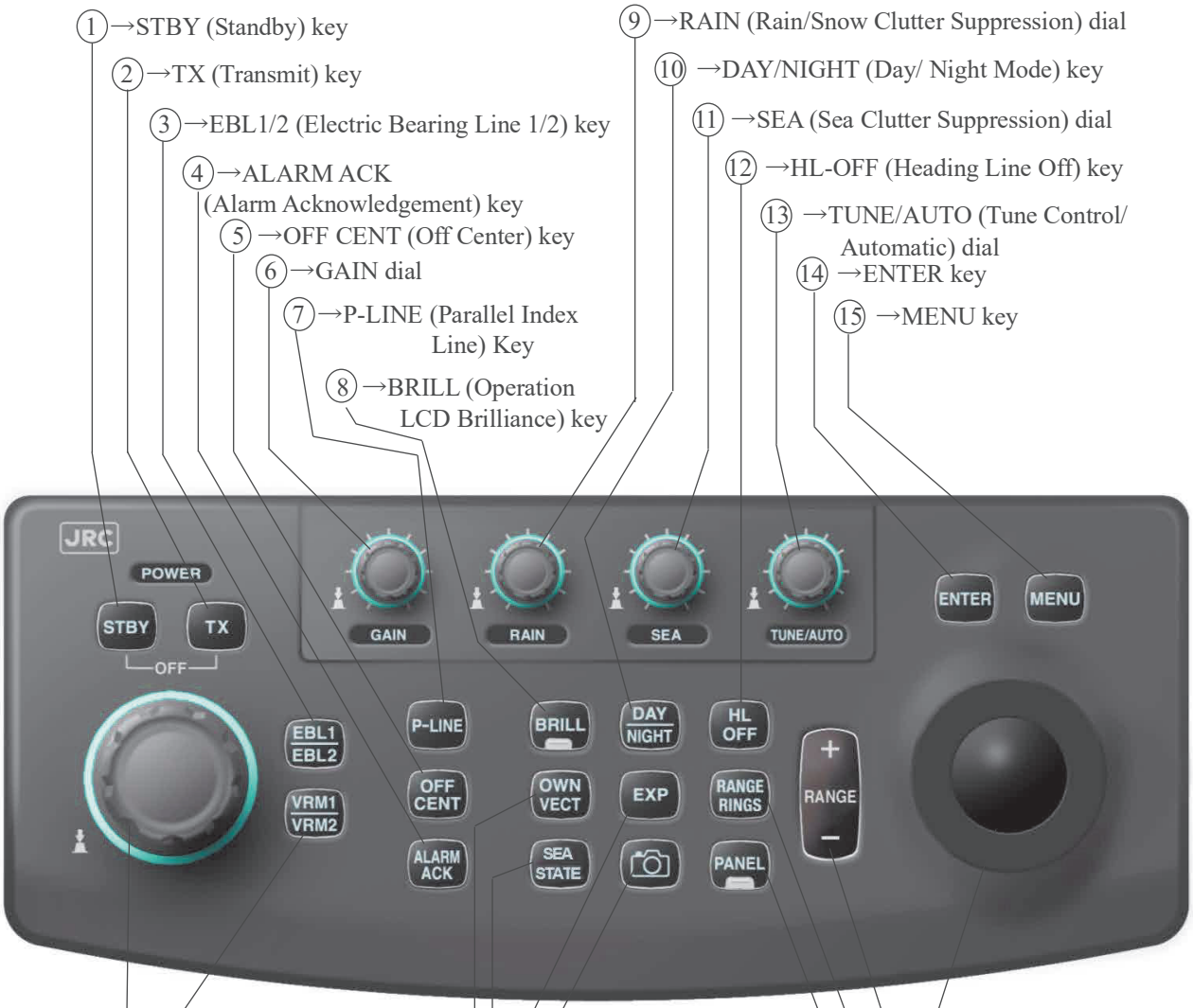


FIG 2.1 DISPLAY & READOUTS

2.1 NAMES AND FUNCTIONS OF CONTROL PANEL SWITCHES

Names and Functions of Control Panel Switches



1 →STBY (Standby) key
2 →TX (Transmit) key
3 →EBL1/2 (Electric Bearing Line 1/2) key
4 →ALARM ACK (Alarm Acknowledgement) key
5 →OFF CENT (Off Center) key
6 →GAIN dial
7 →P-LINE (Parallel Index Line) Key
8 →BRILL (Operation LCD Brilliance) key
9 →RAIN (Rain/Snow Clutter Suppression) dial
10 →DAY/NIGHT (Day/ Night Mode) key
11 →SEA (Sea Clutter Suppression) dial
12 →HL-OFF (Heading Line Off) key
13 →TUNE/AUTO (Tune Control/ Automatic) dial
14 →ENTER key
15 →MENU key
16 →VRM1/2 (Variable Range Marker 1/2) key
17 →Jog dial
18 →Photoshot ® (Screen Capture) key
19 →EXP (Echo Expansion) key
20 →SEA STATE key
21 →OWN VECT (Own Ship's Vector) key
22 →Track ball
23 →+RANGE- (Range Scale) key
24 →RANGE RINGS (Fixed Range Marker) key
25 →PANEL (Operation Panel Brilliance) key

Simple explanation is described from next page.

Fig 2.2 CONTROL PANEL

① [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 standby state.
The power can be turned off by pressing the **[STBY]** key and **[TX]** key concurrently while the power is On.

② [TX](Transmission) key

At expiration of the pre-heat time after the power is turned on, Preheat of the transmit / standby indicator (Upper left of the display on page 2-1) changes to Standby.
If this key is pressed subsequently, transmission starts.

③ [EBL1/EBL2] (Electric Bearing Line 1/2) key

Use this key to display and select EBL1/2. If the key is pressed for several seconds, the EBL will disappear.

④ [ALARM ACK] (Alarm Acknowledgement) key

Use this key to acknowledge a failure 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.

⑤ [OFF CENT] (Off Center) key

Use this key to shift the own ship's position.

⑥ [GAIN] (Gain) dial

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

⑦ [P-LINE] (Parallel Index Line) key

Use this key to display and select P-line 1/2. If the key is pressed for several seconds, the P-line will disappear.

⑧ [BRILL] (LCD Brilliance) key

Use this key to adjust the brilliance of Alpha-screen (LCD monitor).

⑨ [RAIN] (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.

⑩ [DAY/NIGHT] (DAY/NIGHT MODE) key

Use this key to switch the color and brightness of the screen that have been set in advance.

⑪ [SEA] (Sea clutter Suppression) dial

Turn the dial to suppress images by sea clutter.
Turn the dial clockwise to increase the effect of suppression.

⑫ [HL OFF] (Heading Line Off) key

Use this key to clear the Ship's heading line while this key is pressed.

⑬ [TUNE/AUTO] (Tune Control/Automatic) dial

Turn the dial to take tune.
Press the dial for several seconds to switch the mode to manual/ automatic.

⑭ **[ENTER] (Enter) key**

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

⑮ **[MENU] (Menu) key**

Use this key to open the menu.

⑯ **[VRM1/VRM2] (Variable Range Marker 1/2) key**

Use this key to display and select VRM 1/2. If the key is pressed for several seconds, the VRM will disappear.

⑰ **Jog Dial**

Use this dial to change the bearing of EBL1/2, the range of VRM1/2 and P-Line 1/2 .

⑱ **[Photoshot ®] (Screen Capture) key**

Use this key to save current screen to CF card in “manual capture mode”.
Use this key to save from internal memory to a flash memory card captured data in internal memory in “auto-2 capture mode”.

⑲ **[EXP] (Echo Expansion) key**

Use this key to expand the radar echo.

⑳ **[SEA STATE] (Sea State) key**

Use this key to change sea state.

㉑ **[OWN VECT] (Vector Length) key**

Use this key to display the own ship’s vector and AIS target’s vector.
Use this key also to change the length of vectors.

㉒ **Trackball**

Use the trackball to move the cursor mark to any position. The trackball can be used for setting in each mode.

㉓ **[+RANGE-] (Range Scale) key**

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

㉔ **[RANGE RINGS] (Fixed Range Marker) key**

Use this key to display the fixed range marker.

㉕ **[PANEL] (Operation Panel Brilliance) key**

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

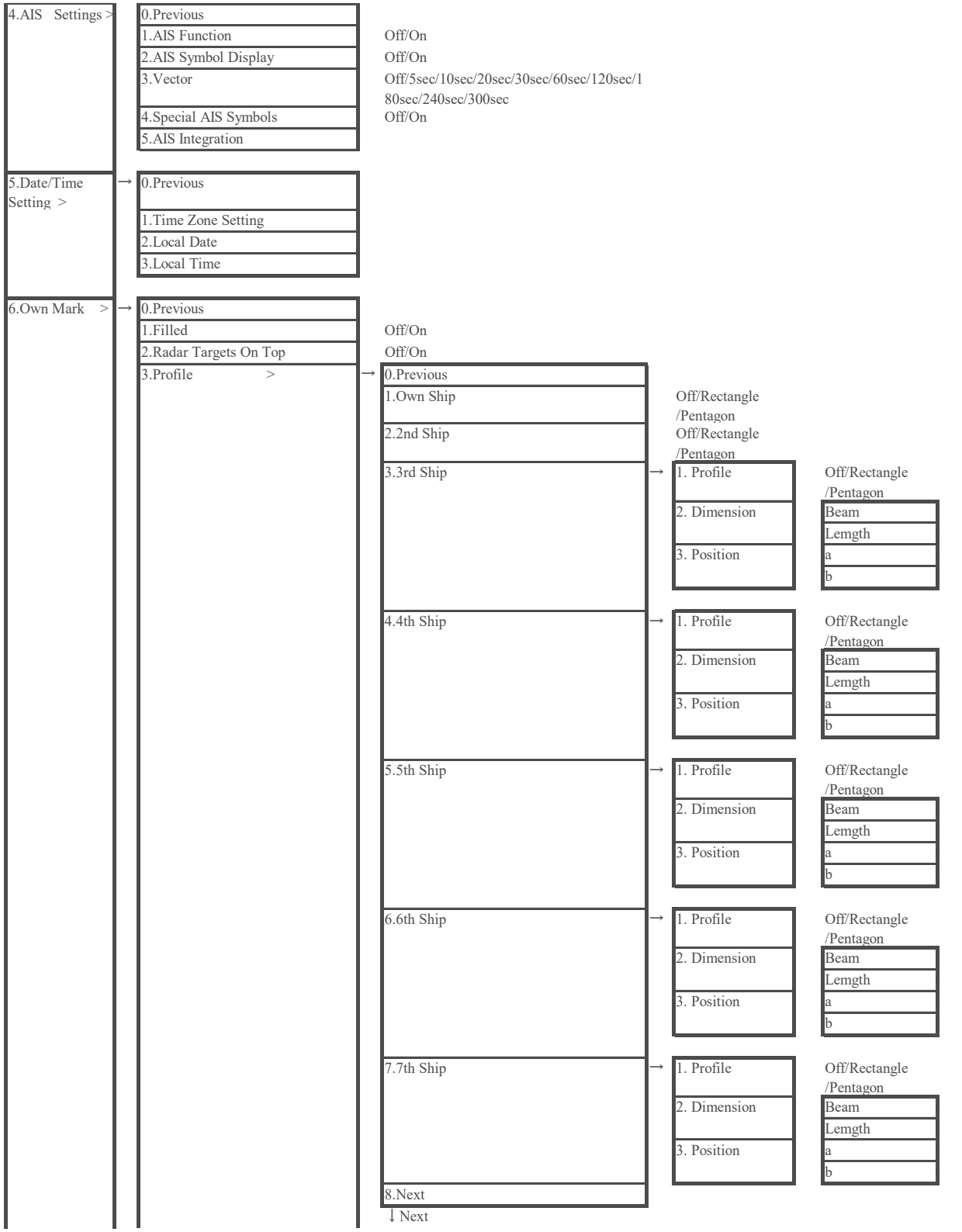
2.2 MENU LIST

This radar has 2 kinds of menu as following.

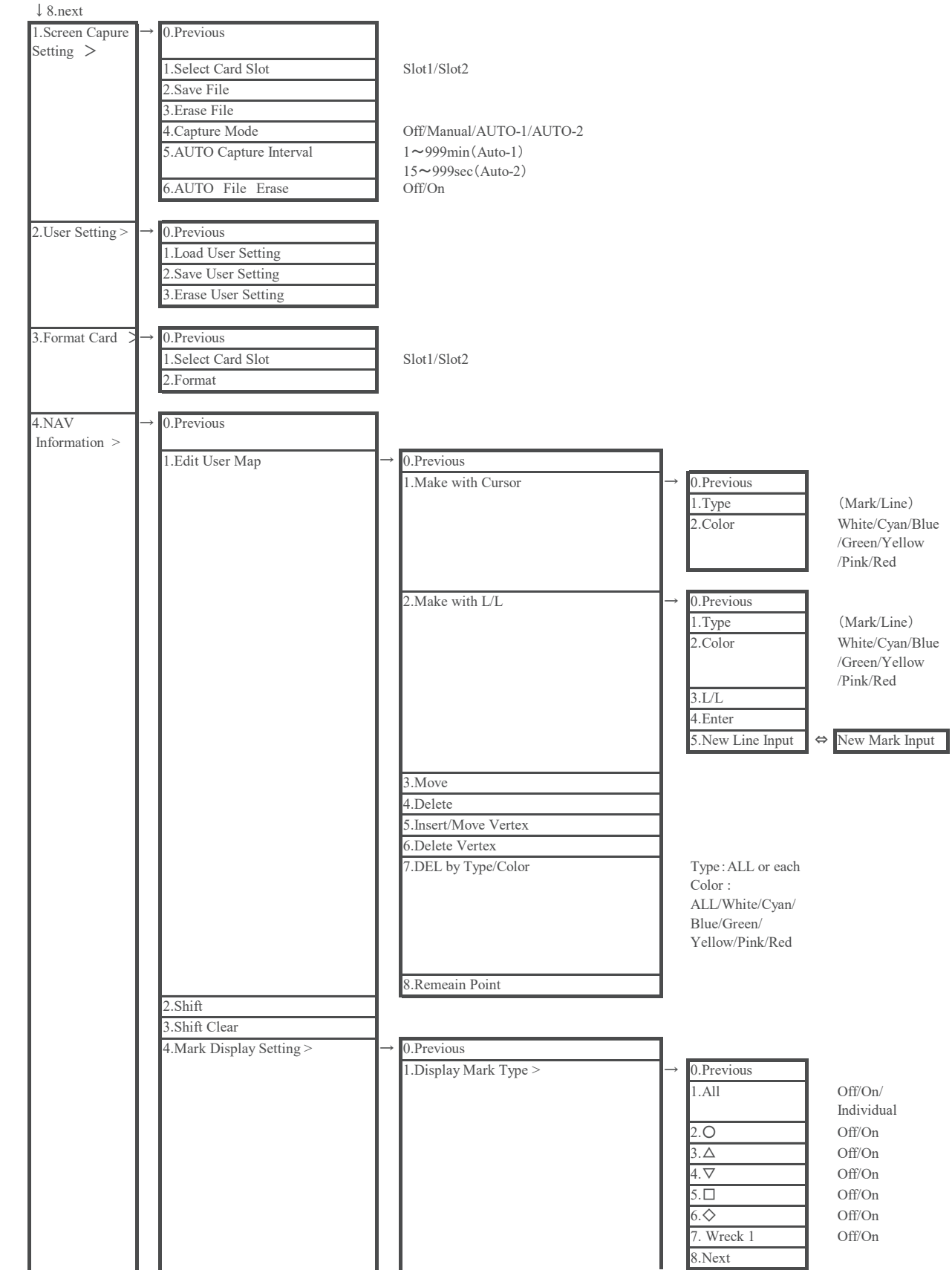
Main Menu : This menu is for all users.

Service Menu : This menu is for initial setting of JMR-611 at installation

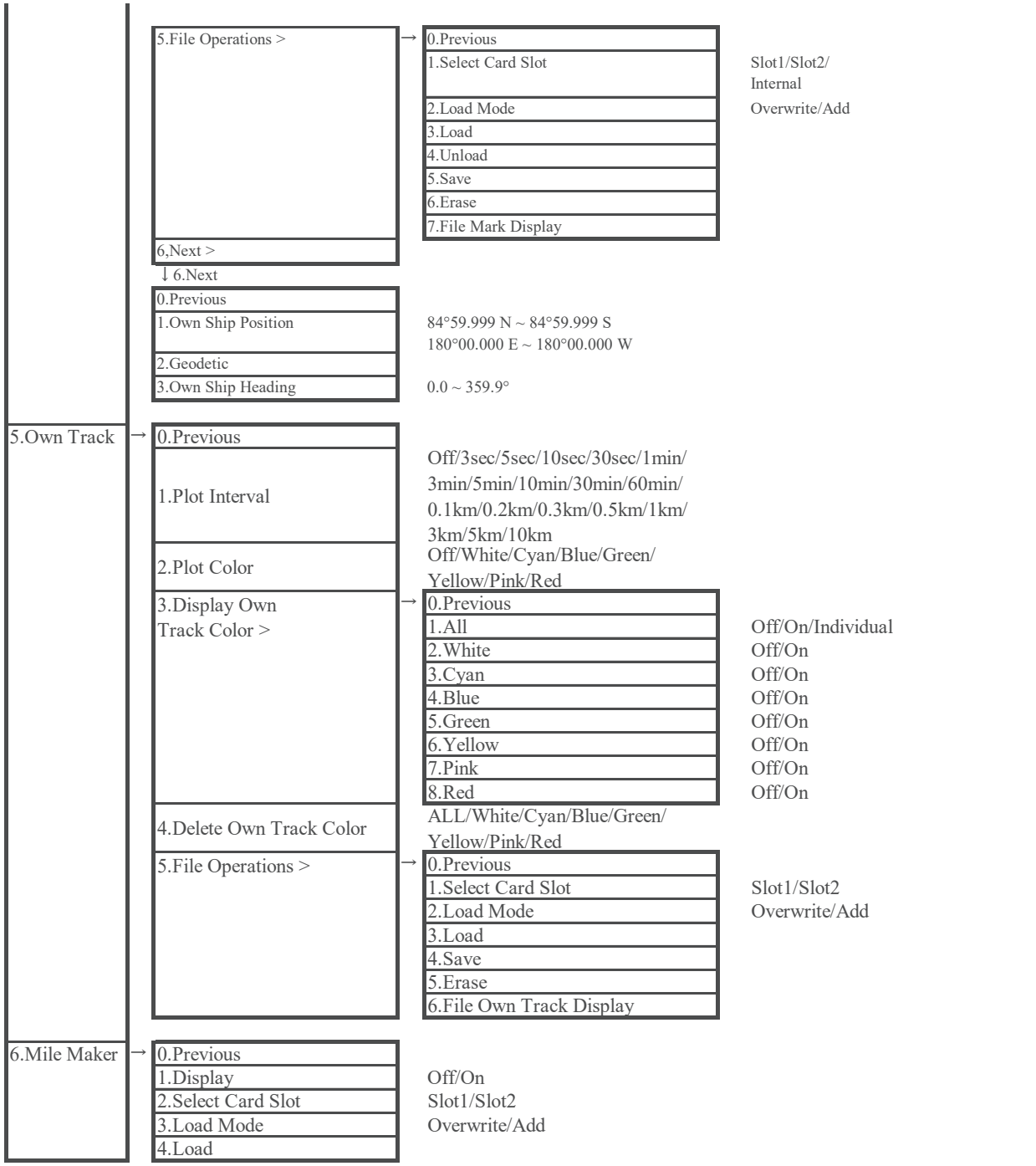
Main Menu			
0.Exit			
1.Brilliance >	→	0.Previous	
		1.SHM	1/2/3/4
		2.Range Rings	1/2/3/4
		3.VRM	1/2/3/4
		4.EBL/P-Line	1/2/3/4
		5.Bearing Scale	0/1/2/3/4
		6.Character	1/2/3/4
		7.AIS/Vector	1/2/3/4
		8.Next	
		↓Next	
		0.Previous	
		1.Own Mark	1/2/3/4
		2.RADAR Video/Trails	1/2/3/4
		3.Mark/Line	1/2/3/4
2.Color >	→	0.Previous	
		1.Echo	Yellow/Green/Amber/White
		2.Trails	Green/White/BR_Blue/Yellow/Amber
		3.Echo Back Ground	Black/Blue/Dark_Grey
		4.Data Back Ground	Black/Grey/Dark_Grey/BR_Blue
		5.ROT Bar	Green/Pink/White/Yellow
		6.Pilot	Green/Pink/White/Yellow
		7.Rudder Bar	Green/Pink/White/Yellow
		8.Next	
		↓Next	
		0.Previous	
		1.Others	Green/Amber/White/Yellow
		2.Own Mark	Cyan/Grey/Magenta/Green/White
		3.AIS/Vector	White/Magenta/Cyan/BR_Blue
		4.VRM	Cyan/Green
		5.EchoIndex	0-15
		6.EchoColor	0-FFFFFF
3.Setting >	→	0.Previous	
		1.Buzzer Level	Off/1/2/3
		2.Rate Of Turn	30-0-30/90-0-90/300-0-300
		3.Expansion	Off/Fair/Strong
		4. STC Curve	River/Ocean
		5.Process	PROC Off/3Scan CORREL/4Scan CORREL/5Scan CORREL/Remain/Peak
		6.Echo Border	Off/On
		7. TransparentPPI	Off/On


4.AIS Settings >
0.Previous
1.AIS Function
Off/On
2.AIS Symbol Display
Off/On
3.Vector
Off/5sec/10sec/20sec/30sec/60sec/120sec/180sec/240sec/300sec
4.Special AIS Symbols
Off/On
5.AIS Integration
5.Date/Time Setting >
0.Previous
1.Time Zone Setting
2.Local Date
3.Local Time
6.Own Mark >
0.Previous
1.Filled
Off/On
2.Radar Targets On Top
Off/On
3.Profile >
0.Previous
1.Own Ship
Off/Rectangle /Pentagon
2.2nd Ship
Off/Rectangle /Pentagon
3.3rd Ship
4.4th Ship
5.5th Ship
6.6th Ship
7.7th Ship
1. Profile
2. Dimension
3. Position
Off/Rectangle /Pentagon
Beam
Lemgth
a
b
8.Next
↓ Next

		↓ Next			
		0.Previous			
		1.8th Ship	→	1. Profile	Off/Rectangle/ Pentagon
				2. Dimension	Beam
					Length
				3. Position	a
					b
		2.9th Ship	→	1. Profile	Off/Rectangle/ Pentagon
				2. Dimension	Beam
					Length
				3. Position	a
					b
		3.10th Ship	→	1. Profile	Off/Rectangle/ Pentagon
				2. Dimension	Beam
					Length
				3. Position	a
					b
	4.Ship Dimension >	→	1.Own Ship	→	Dimension Beam
					Length
					RADAR Antenna
					X
					Y
					GPS1
					X
					Y
					GPS2
					X
					Y
			2.2nd Ship	→	Dimension Beam
					Length
					RADAR Antenna
					X
					Y
					GPS1
					X
					Y
					GPS2
					X
					Y
					Position a
					b
7.Ship Config	Off/Situation 1/Situation2/ Situation 3/Situation 4/Situation 5				
8.Next >					


↓8.next
1.Screen Capure Setting >
0.Previous
1.Select Card Slot
Slot1/Slot2
2.Save File
3.Erase File
4.Capture Mode
Off/Manual/AUTO-1/AUTO-2
5.AUTO Capture Interval
1～999min（Auto-1）
15～999sec（Auto-2）
6.AUTO File Erase
Off/On
2.User Setting >
0.Previous
1.Load User Setting
2.Save User Setting
3.Erase User Setting
3.Format Card >
0.Previous
1.Select Card Slot
Slot1/Slot2
2.Format
4.NAV Information >
0.Previous
1.Edit User Map
0.Previous
1.Make with Cursor
0.Previous
1.Type
（Mark/Line）
2.Color
White/Cyan/Blue /Green/Yellow /Pink/Red
2.Make with L/L
0.Previous
1.Type
（Mark/Line）
2.Color
White/Cyan/Blue /Green/Yellow /Pink/Red
3.L/L
4.Enter
5.New Line Input
⇔ New Mark Input
3.Move
4.Delete
5.Insert/Move Vertex
6.Delete Vertex
7.DEL by Type/Color
Type：ALL or each
Color : ALL/White/Cyan/ Blue/Green/ Yellow/Pink/Red
8.Remeain Point
2.Shift
3.Shift Clear
4.Mark Display Setting >
0.Previous
1.Display Mark Type >
0.Previous
1.All
Off/On/ Individual
2.○
Off/On
3.△
Off/On
4.▽
Off/On
5.□
Off/On
6.◇
Off/On
7. Wreck 1
Off/On
8.Next

		↓ 8.NEXT	
		0.Previous	
		1.△△	Off/On
		2.▽▽	Off/On
		3.△▽	Off/On
		4.▽△	Off/On
		5.＋	Off/On
		6.×	Off/On
		7.Y	Off/On
		8.Next	
		↓ 8.NEXT	
		0.Previous	
		1.drum	Off/On
		2.lighthouse	Off/On
		3.trapezoid1	Off/On
		4.trapezoid2	Off/On
		5.hat	Off/On
		6.●●	Off/On
		7.●	Off/On
		8.Next	
		↓ 8.NEXT	
		0.Previous	Off/On
		1.triangle	Off/On
		2. !	Off/On
		3.anchor	Off/On
		4.anchor prohibited	Off/On
		5.dotted-circle	Off/On
		6.Wreck2	Off/On
		7.dot2	Off/On
		8.Next	
		↓ 8.NEXT	
		0.Previous	
		1.dot3	Off/On
		2.dot1	Off/On
		3.dotted-line	Off/On
		4.solid line	Off/On
		5.chain line	Off/On
	2.Display Mark Color >	→ 0.Previous	
		1.All	Off/On/ Individual
		2.White	Off/On
		3.Cyan	Off/On
		4.Blue	Off/On
		5.Green	Off/On
		6.Yellow	Off/On
		7.Pink	Off/On
		8.Red	Off/On
	3.Mark Size	Normal/Small	


5.File Operations >
0.Previous
1.Select Card Slot
Slot1/Slot2/
Internal
2.Load Mode
Overwrite/Add
3.Load
4.Unload
5.Save
6.Erase
7.File Mark Display
6,Next >
↓ 6.Next
0.Previous
1.Own Ship Position
84°59.999 N ~ 84°59.999 S
180°00.000 E ~ 180°00.000 W
2.Geodetic
3.Own Ship Heading
0.0 ~ 359.9°
5.Own Track
0.Previous
1.Plot Interval
Off/3sec/5sec/10sec/30sec/1min/
3min/5min/10min/30min/60min/
0.1km/0.2km/0.3km/0.5km/1km/
3km/5km/10km
2.Plot Color
Off/White/Cyan/Blue/Green/
Yellow/Pink/Red
3.Display Own
Track Color >
0.Previous
1.All
Off/On/Individual
2.White
Off/On
3.Cyan
Off/On
4.Blue
Off/On
5.Green
Off/On
6.Yellow
Off/On
7.Pink
Off/On
8.Red
Off/On
4.Delete Own Track Color
ALL/White/Cyan/Blue/Green/
Yellow/Pink/Red
5.File Operations >
0.Previous
1.Select Card Slot
Slot1/Slot2
2.Load Mode
Overwrite/Add
3.Load
4.Save
5.Erase
6.File Own Track Display
6.Mile Maker
0.Previous
1.Display
Off/On
2.Select Card Slot
Slot1/Slot2
3.Load Mode
Overwrite/Add
4.Load

2.3 NAMES AND FUNCTIONS OF ON-SCREEN CONTROLS

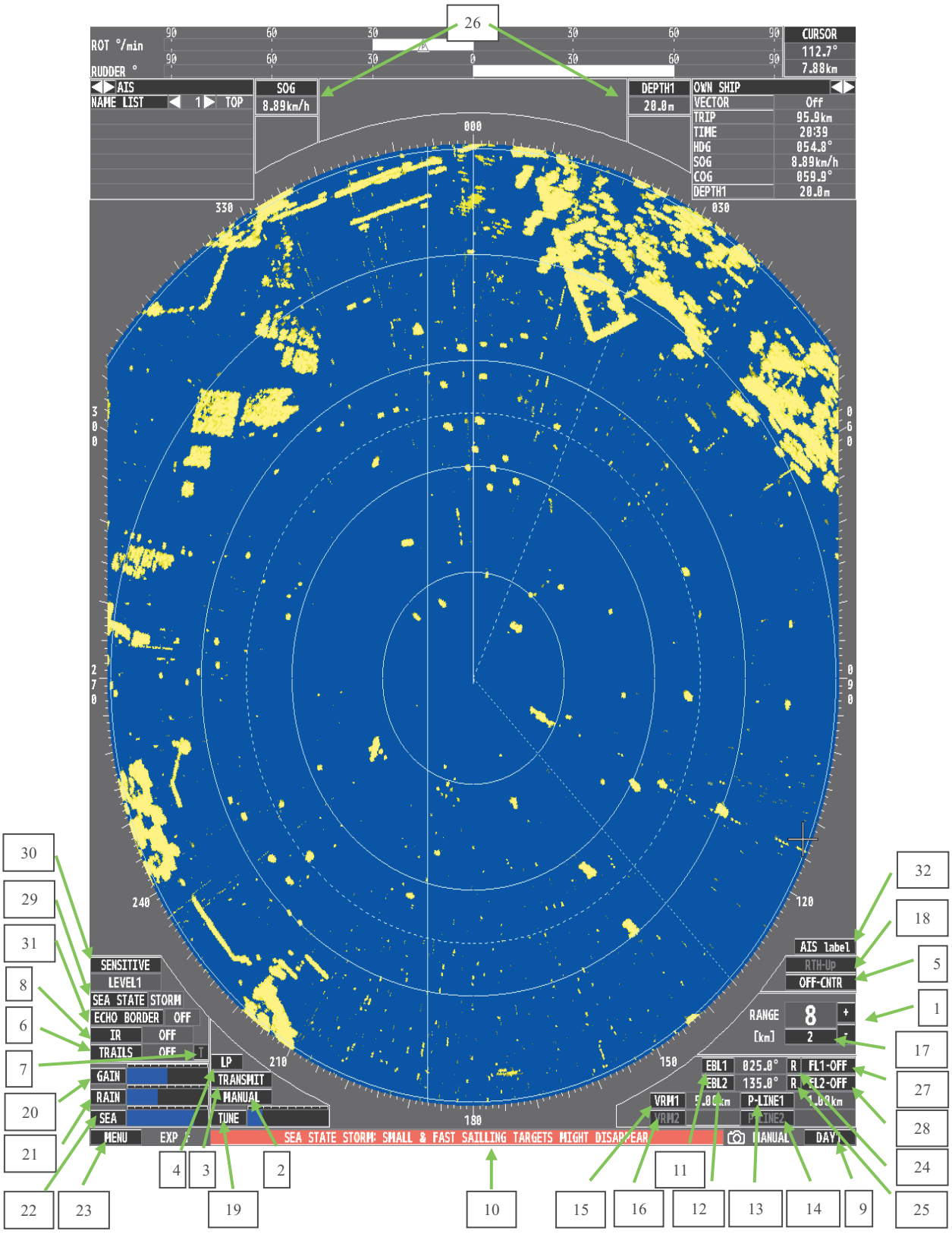


Fig 2.3 On-screen controls

1 【RANGE】

To increase the observation range scale (maximum 32km), click [+] and to reduce the range (minimum 0.1km), click [-].

2 【AUTO TUNE】

The mode is switched to [M] (manual) / [A] (automatic) whenever the button is clicked.

3 【TX/STBY】

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

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

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

If this button is held down a few second while the scanner is preheating, you can forcibly end preheat and changes to [Standby].

4 【PULSE LENGTH】

The pulse length is switched whenever the button is clicked only in 2/4/8 km range.

5 【OFF-CENTER】

Own ship's position is moved as follow whenever the button is clicked.

[OFF-CNTR] ⇨ [CENTER1] ⇨ [CENTER2] ⇨ [CENTER4] ⇨ [OFF-CNTR]

6 【LENGTH OF TRAILS】

The length of trails is switched as follow whenever the button is clicked.

[OFF] ⇨ [2Scan] ⇨ [15sec] ⇨ [30sec] ⇨ [1min] ⇨ [2min] ⇨ [3min]

⇨ [4min] ⇨ [5min] ⇨ [6min] ⇨ [OFF]

If this button is held down more than 2seconds, "length of trails" will be [OFF] automatically.

7 【MODE OF THE TRAILS】

The mode of trails is switched to [R] (Relative)/ [T] (True) whenever the button is clicked.

8 【INTERFERENCE REJECTION】

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

[OFF] ⇨ [IR LOW] ⇨ [IR MEDIUM] ⇨ [IR HIGH] ⇨ [OFF]

9 【DAY/NIGHT】

The DAY/NIGHT mode is switched as follow whenever this button is clicked.

[DAY1] ⇨ [DAY2] ⇨ [DAY3] ⇨ [DAY4] ⇨ [NIGHT1]

⇨ [NIGHT2] ⇨ [NIGHT3] ⇨ [NIGHT4] ⇨ [DAY1]

10 【Alarm Ack】

If this button is clicked, the displayed failure alarm is acknowledged.

11 12 【EBL】

If this button is clicked, operation of EBL is acquired. Make adjustment by moving [JOG DIAL] or [TRACK BALL]. Determine the adjustment by click this button again.
If this button is held down more than 2seconds, EBL will disappear.

13 14 【P-LINE】

If this button is clicked, operation of P-LINE is acquired. Make adjustment by moving [JOG DIAL] or [TRACK BALL]. Determine the adjustment by click this button again.
If this button is held down more than 2seconds, P-LINE will disappear.

15 16 【VRM】

If this button is clicked, operation of VRM is acquired. Make adjustment by moving [JOG DIAL] or [TRACK BALL]. Determine the adjustment by click this button again.
If this button is held down more than 2seconds, VRM will disappear.

17 【RANGE RINGS】

Range rings will be switched to on or off, whenever this button is clicked.

18 【AZIMUTH】

The mode is switched to N-UP (North-up)/ H-UP (Head-up) or RTH-UP (Real Time Head-up) whenever this button is clicked. (You can set N-UP only when Service Menu – Equipment Setup – Heading Mode SEL = On.)

19 【TUNE】

To adjust the tune level, click TUNE and adjust by [JOG DIAL] or [TRACK BALL] and press [ENTER] key. (Only when Service Menu – Equipment Setup – GSFT Soft Key = On.)

20 【GAIN LEVEL】

To adjust the gain level, click GAIN and adjust by [JOG DIAL] or [TRACK BALL] and press [ENTER] key. (Only when Service Menu – Equipment Setup – GSFT Soft Key = On.)

21 【RAIN CLUTTER SUPPRESSION LEVEL】

To adjust the FTC level, click RAIN and adjust by [JOG DIAL] or [TRACK BALL] and press [ENTER] key. (Only when Service Menu – Equipment Setup – GSFT Soft Key = On.)

22 【SEA CLUTTER SUPPRESSION LEVEL】

To adjust the STC level, click SEA and adjust by [JOG DIAL] or [TRACK BALL] and press [ENTER] key. (Only when Service Menu – Equipment Setup – GSFT Soft Key = On.)

23 【MENU】

If this button is clicked, MAIN MENU will appear. To open SERVICE MENU, you need to enter CODE MENU first. Hold down MENU more than 5 seconds, CODE MENU will appear. Then press “0”, SERVICE MENU will appear.

24 25 【MODE OF THE EBL】

The mode of the EBL is switched to R (Relative)/ T (True) whenever the button is clicked.

26 【SOG/DEPTH1/DEPTH2】

The mode is switched to SOG (Speed Over the Ground)/ DEPTH1 / DEPTH2 whenever the button is clicked.

27 28 【FLOATING MODE】

The mode of the floating is switched to EBL / VRM whenever the button is clicked. (Only for USA Mode.)

29 【SEA STATE】

The mode is switched as follow whenever the button is clicked. (Only when system is receiving GPS and heading data is received at intervals of 100 ms or less.)

30 【SENSITIVE】

The mode is switched to LEVEL1 / LEVEL2 / LEVEL3 whenever the button is clicked.

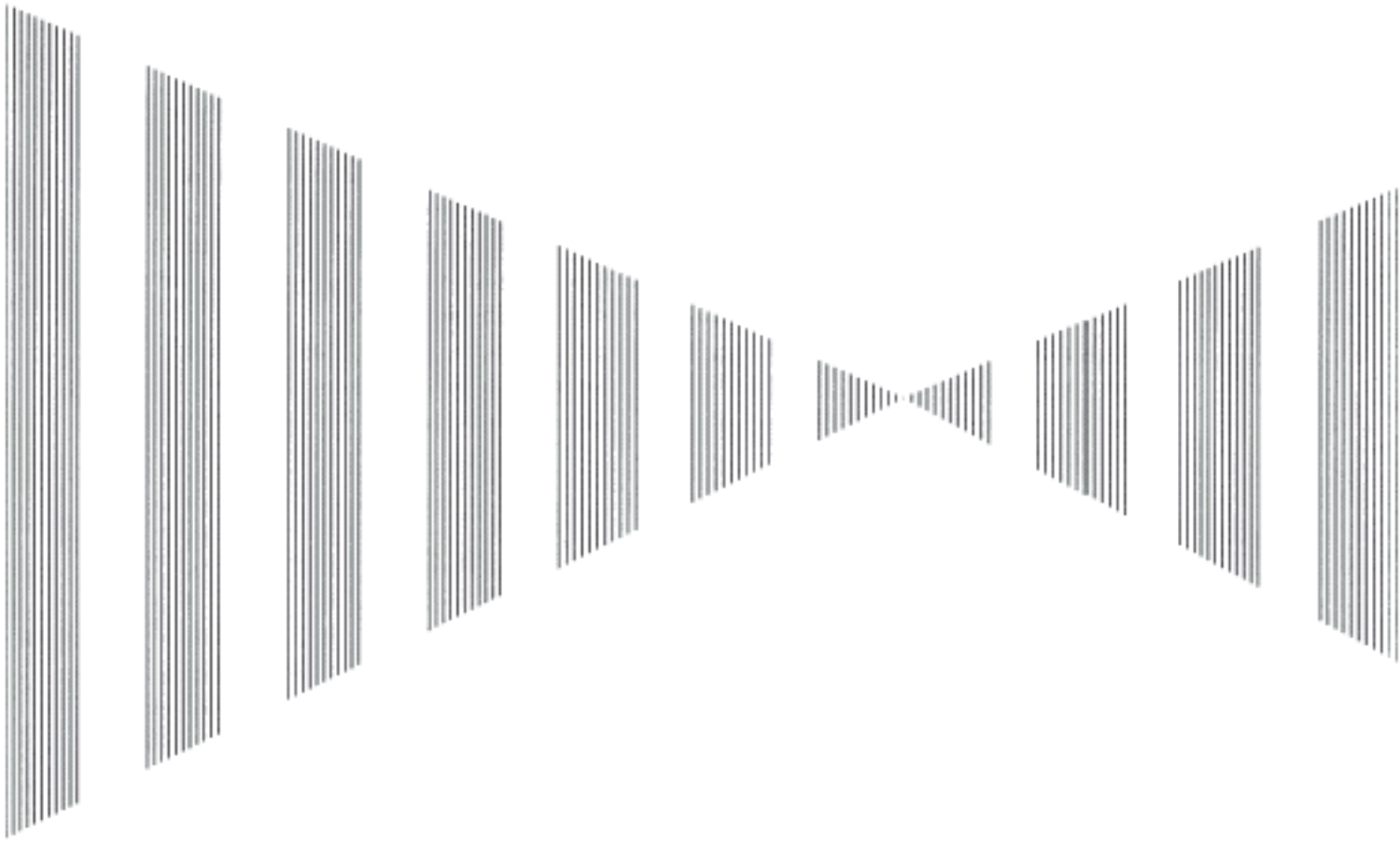
31 【ECHO BORDER】

The mode is switched to show an outline around the radar echoes.

32 【AIS label】

If this button is held down, vessel's name will appear beside AIS symbols. When the button is released, name will disappear.

SECTION 3
BASIC OPERATION

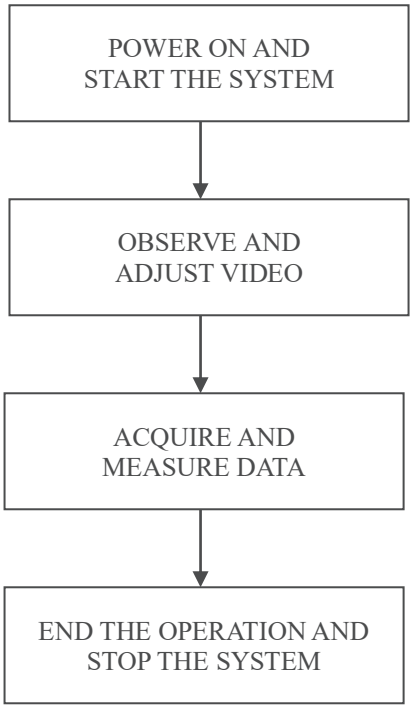


3.1 FLOW OPERATION

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.

Attention

- **Wait for about 2 seconds before turning on the power again.**
- **At start of the system after the radar is installed, it has not been used for a long time, or 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 keep 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 [STBY] key.

The system is turned on, and the preheating time is displayed.
Preheat is indicated at the lower left of the screen.

3 Wait until the preheating time is over.

When the preheating time is over, the preheating time screen disappears, and Preheat at the lower left of the screen changes to Standby.

4 Press [TX] key.

The radar will start transmission and the antenna will start rotating.
Standby at the lower left of the screen changes to Transmit.

Note: The radar does not start transmission if you press [TX] key while Preheat is indicated.

3.1.2 Observe and Adjust Video

Procedures

1 Press [+RANGE-] key to set the range to the scale required for target observation.

2 Turn the dials [GAIN], [SEA], and [RAIN] to obtain the clearest targets.

Refer to
[GAIN] → Chapter 3.4.5
[SEA] → Chapter 3.4.6
[RAIN] → Chapter 3.4.7

3.1.3 Acquire and Measure Data

For details on how to acquire data and measure, refer to Section 3.4 "BASIC OPERATIONS" and Section 4 "MEASUREMENT OF RANGE AND BEARING."

3.1.4 End the Operation and Stop the System

Exit

1 Press [STBY] key.

The radar will stop transmission and the antenna will stop rotating.
Transmit at lower left of the screen changes to Standby.

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

2 Press the [STBY] key and the [TX] key together.

The system will be turned off.

⚠WARNING
When conducting maintenance work, make sure to turn off the power and unplug the power line of the processor 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 BASIC MENU OPERATION

To open the menu :
Press **[MENU]** key.

To close the menu :
Press **[MENU]** key again.

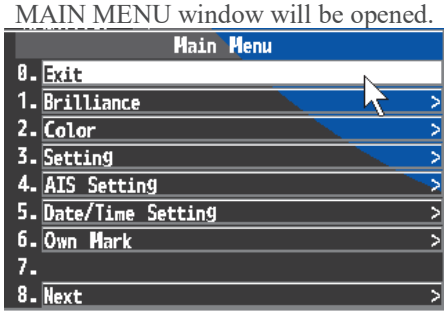
To determine the selected item :
Put the cursor on the item with trackball and press **[ENTER]** key.

For example, the procedures to change the brilliance of VRM is as follows.

Procedures

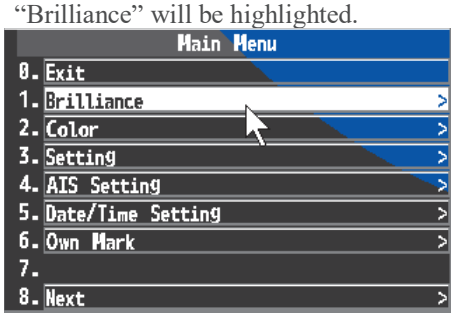
1 Press [MENU] key or put the cursor on Menu at the bottom left of the screen and press [ENTER] key.

MAIN MENU window will be opened.



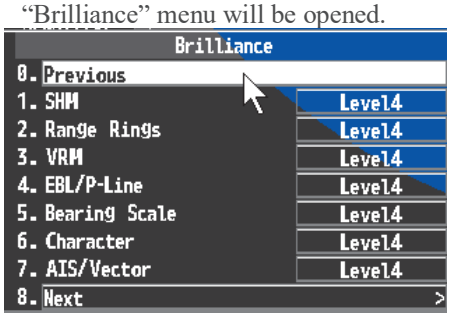
2 Put the cursor on [1.Brilliance].

"Brilliance" will be highlighted.



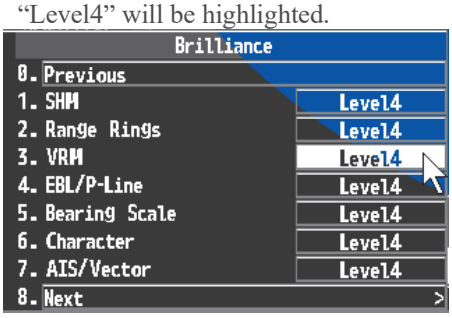
3 Press [ENTER] key.

"Brilliance" menu will be opened.



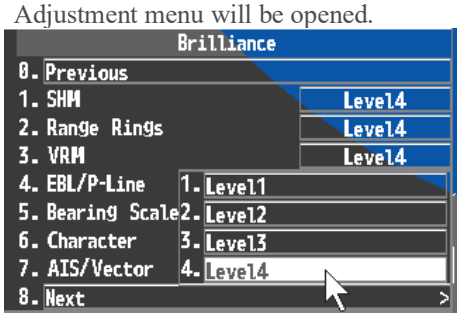
4 Put the cursor on [Level4] displayed at the right of “3.VRM”.

“Level4” will be highlighted.



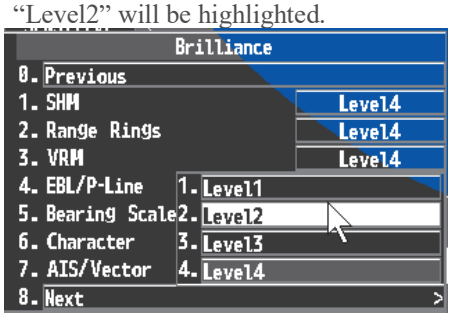
5 Press [ENTER] key.

Adjustment menu will be opened.



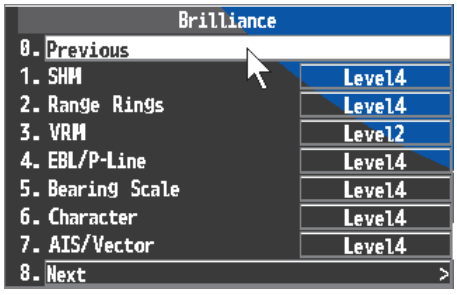
6 Put the cursor on [2.Level2].

“Level2” will be highlighted.



7 Press [ENTER] key.

The brilliance of VRM will be set to “Level2”.



8 Press [MENU] key.

Menu window will be closed.

3.3 PREPARATION

3.3.1 Adjust Display Brilliance [BRILL]

Procedures

1 Press [BRILL] key.

2 Set the brilliance value with the [JOG DIAL] or [TRACKBALL] to obtain the best-to-see display with optimum brilliance.

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

3 Press [BRILL] key.

End the adjustment of display brilliance.

3.3.2 Adjust Operation Panel Brilliance [PANEL]

Adjust brilliance of the operation panel according to the ambient lighting condition.

Procedures

1 Press [PANEL] key.

In consideration of the ambient brightness, adjust panel brilliance that is high enough to read the characters on the operation panel but does not glare.
The **[PANEL]** key lamp lights up irrespective of panel brilliance adjustment.

3.3.3 Switch Day/Night Mode [DAY/NIGHT]

Several combinations of the display color and brilliance according to the ambient lighting conditions are provided. The display color setting is easily changed.

Procedures

1 Press [DAY/NIGHT] key.

The Day / Night modes are switched as follows.
The current mode is indicated at the bottom right of the screen.

DAY1 ⇨ DAY2 ⇨ DAY3 ⇨ DAY4 ⇨ NIGHT1
⇨ NIGHT2 ⇨ NIGHT3 ⇨ NIGHT4 ⇨ DAY1

The brilliance level and the display color in accordance with the selected mode are saved.

3.3.4 Adjust Brilliance of Information on Radar Display (Brilliance Setting)

Brilliance can be adjusted for each item of information (shown below) on the radar display by operating the menu.
SHM, RANGE RINGS, VRM, EBL & P-LINE, BEARING SCALE, CHARACTER, AIS SYMBOL & VECTOR, OWN MARK, RADAR VIDEO & TRAILS, MARK & LINE

Procedures

1 Press [MENU] key.

Put the cursor on [1.BRILLIANCE] and press [ENTER] key.

The Brilliance Setting menu will appear.

2 Put the cursor on the item to be adjusted and press [ENTER] key.

The brilliance levels menu will appear.

3 Select the level to be set and press the [ENTER] key.

The selected brilliance level will be set.

Exit

1 Press [MENU] key.

The menu will be closed.

Note: The brilliance levels set here are saved in accordance with the day/night mode.

3.3.5 Adjust Sound Volume (Buzzer Volume)

Procedures

1 Press [MENU] key .
Put the cursor on [3.SETTING] and press [ENTER] key.

The setting menu will appear.

2 Put the cursor on [1.BUZZER LEVEL] and press [ENTER] key.

The buzzer level's menu will appear.

3 Select the volume number to be set, and press [ENTER] key.

The selected volume level will be set.

Exit

1 Press [MENU] key.

The menu will be closed.

3.3.6 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 switch for each alarm indication.) The alarm stops buzzing, but the alarm indication does not disappear.

Procedures

1 Press [ALARM ACK] key.

The alarm will stop buzzing.

3.3.7 Set Display Color

Color can be changed for each item of information (shown below) on the screen by operating the menu.

1.ECHO	Change the colors of radar echoes.
2.TRAILS	Change the colors of radar trails.
3.ECHO BACK GROUND	Change the background color inside the bearing scale.
4.DATA BACK GROUND	Change the background color outside the bearing scale.
5.ROT BAR	Change the colors of ROT bar.
6.PILOT	Change the colors of the symbol of pilot.
7.RUDDER BAR	Change the colors of rudder bar.
8.OTHERS	Change the colors of characters etc.
9. OWN MARK	Change the colors of own ship mark.
10.AIS/VECTOR	Change the colors of the symbol of AIS and own ship's vector.
11.VRM	Change the colors of VRM.

Procedures

1 Press [MENU] key .

Put the cursor on [2.COLOR] and press [ENTER] key.

The color-setting menu will appear.

2 Put the cursor on the item to be changed and press [ENTER] key.

The kinds of color menu will appear.

Select the color to be set, and press [ENTER] key.

The selected color will be set.

Exit

1 Press [MENU] key.

The menu will be closed.

Note: The display color set here are saved in accordance with the day/night mode.

3.4 BASIC OPERATIONS

3.4.1 Start Transmission [TX]

Procedures **1 Press [TX] key.**

The radar will start transmission and the antenna will start rotating.
STANDBY at the lower left of the screen changes to TRANSMIT.

Note: The radar does not start transmission if you press **[TX]** key while PREHEAT is indicated.

3.4.2 Stop Transmission [STBY]

Procedures **1 Press [STBY] key.**

The radar will stop transmission and the antenna will stop rotating.
TRANSMIT at the lower left of the screen changes to STANDBY.

3.4.3 Change Range (Observation Range Scale) [+RANGE-]

Procedures **1 When increasing the observation range, Press [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 [RANGE-] key.

Decreasing the observation range will enable the vicinity of own ship to be enlarged.
However, caution must be taken because video image of the area beyond the observation range cannot be displayed.

3.4.4 Tune

⚠CAUTION

Normally, use the automatic tune mode.

Use the manual tune mode only when best tuning is not possible in the automatic tune mode due to deterioration of magnetron.

This radar system provides the automatic tune mode and the manual tune mode. The automatic tune mode automatically adjusts the tuning of 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 button at the lower left of the screen. (Fig2.3-②)

When using the automatic tune mode

Procedures

1 Continue pressing [TUNE] dial until the character on the upper of the tuning bar changes to "AUTO".

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 Continue pressing [TUNE] dial until the character on the upper of the tuning bar changes to "MANUAL".

The automatic tune mode will be cancelled.

2 Turn [TUNE] dial to adjust tune.

Adjust so that the tuning indication (lower left of the display) indicates the maximum.

3.4.5 Control Sensitivity [GAIN]

⚠CAUTION

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] dial until targets can be easily observed.

Turning **[GAIN]** dial clockwise increases gain.
Turning **[GAIN]** 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.

3.4.6 Sea Clutter Suppression[SEA]

⚠CAUTION

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

Procedures

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

Turning **[SEA]** dial clockwise suppresses sea clutter returns.
Turning **[SEA]** dial counterclockwise intensifies sea clutter returns.

The sea clutter suppression function suppresses sea clutter returns by decreasing the receiving sensitivity on a short range.
Turning the **[SEA]** control 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.

3.4.7 Rain/Snow Clutter Suppression[RAIN]

⚠CAUTION

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

Procedures

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

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

When the **[RAIN]** dial control 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 on the radar 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 **[RAIN]** dial is used with the **[SEA]** dial.
In general, turn the **[RAIN]** dial fully to the left.

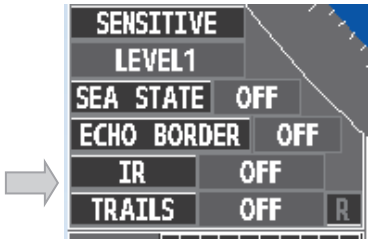
3.4.8 Interference Rejection [IR]

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 IR at the lower left of the screen and press [ENTER] key.**



The interference rejection modes are switched.

IR OFF ⇨ IR LOW ⇨ IR MEDIUM ⇨ IR HIGH ⇨ IR OFF

Rejection levels of the interference rejection
IR OFF: Interference rejection off
IR LOW: Interference rejection level - low
IR MEDIUM: 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.

3.4.9 Hide/Display Range Rings [RANGE RINGS]

Procedures **1 Press [RANGE RINGS] key.**

The range rings are switched to On or Off.

3.4.10 Hide Ship's Heading Line (HL OFF)

Procedures **1 Hold down [HL OFF] key.**

The ship's heading line is hidden while **[HL OFF]** key is held down.

The ship's heading line (HL) that presents the course of own ship is always shown on the radar display. The heading line is hidden while **[HL OFF]** key is held down, so the targets below the heading line can observed easily.

3.4.11 Sea State (SEA STATE)

⚠WARNING

Be careful when using the sea state function. By enabling this function, small fast-moving objects will not be shown. If these small fast-moving objects come to a standstill, they will be displayed again. This function should be used on open sea.

Additionally, a warning message will be displayed at the bottom of the radar screen once this feature is enabled.

Sea State: WINDY (Yellow)

SEA STATE WINDY: SMALL & FAST SAILLING TARGETS MIGHT DISAPPEAR

Sea State: ROUGH (Orange)

SEA STATE ROUGH: SMALL & FAST SAILLING TARGETS MIGHT DISAPPEAR

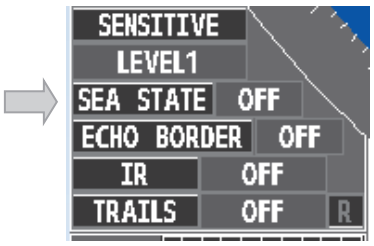
Sea State: STORM (Red)

SEA STATE STORM: SMALL & FAST SAILLING TARGETS MIGHT DISAPPEAR

One of the unique functions in the JMR-611 radar is the ability to very well suppress annoying waves on open water if a GPS compass is connected. The GPS compass information must be provided in a specific way or this function cannot be activated.

Procedures

1 Put the cursor on SEA STATE at the lower left of the screen and press [ENTER] key.



The sea state modes are switched.

OFF ⇨ WINDY ⇨ ROUGH ⇨ STORM ⇨ OFF

3.5 GENERAL OPERATIONS

3.5.1 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 and bearing between own ship and the cross-cursor mark [+] at the top right of the screen, and the degrees of latitude and longitude are digitally indicated in the information window at the upper left or right of the screen when “GPS” is selected for the window.

NOTE: The display of degrees of latitude and longitude needs the connection of GPS and heading sensor.

Operation outside Radar Video PPI

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

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

3.5.2 Use EBLs (Electronic Bearing Lines) [EBL1/EBL2]

EBLs (Electronic Bearing Lines) are indispensable to the measurement of bearings.
Operators must be familiar with the operation of EBLs beforehand.

EBL1 Operation

If EBL2 is selected or EBL1 is not displayed, press **[EBL1/EBL2]** key to select EBL1 before starting operation.
(The currently selected EBL is highlighted at the lower right of the screen.)

Procedures

1 Press [EBL1/EBL2] key to select EBL1.

EBL1 at the lower right of the radar display will be highlighted, and EBL1 becomes operable.

2 Adjust the bearing of EBL1 with [JOG DIAL] or [TRACKBALL].

3 Press [ENTER] key.

The bearing of EBL1 is fixed .

EBL2 Operation

If EBL1 is selected or EBL2 is not displayed, press **[EBL1/EBL2]** key to select EBL2 before starting operation.
(The currently selected EBL is highlighted at the lower right of the screen.)

Procedures

1 Press [EBL1/EBL2] key to select EBL2.

EBL2 at the lower right of the screen will be highlighted, and EBL2 becomes operable.

2 Adjust the bearing of EBL2 with [JOG DIAL] or [TRACKBALL].

3 Press [ENTER] key.

The bearing of EBL2 is fixed.

Clearing EBL

Procedures

1 Hold down [EBL1/EBL2] key.

The EBL (current selected EBL) display will disappear.

Or put the cursor on EBL1 / EBL2 and hold down **[ENTER]** key.

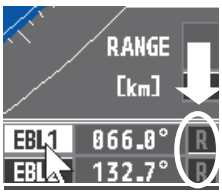
Setting EBL display

Select either true bearing or relative bearing.

Procedures

1 Put the cursor on the button at the lower right as following figure. Press [ENTER] key.

The bearing mode is switched to true or relative.



3.5.3 Use VRMs (Variable Range Markers) [VRM1/VRM2]

This function is to display and select variable range markers (VRMs). Two VRMs are available: VRM1 is represented as a broken line, and VRM2 as a dotted line.

VRM1 Operation

If VRM2 is selected or VRM1 is not displayed, press **[VRM1/VRM2]** key to select VRM1 before starting operation.
(The currently selected VRM is highlighted at the lower right of the screen.)

Procedures

1 Press [VRM1/VRM2] key to select VRM1.

VRM1 at the lower right of the screen will be highlighted, and VRM1 becomes operable.

2 Adjust the range of VRM1 with [JOG DIAL] or [TRACKBALL].

3 Press [ENTER] key .

The range of VRM1 is fixed .

VRM2 Operation

If VRM1 is selected or VRM2 is not displayed, press **[VRM1/VRM2]** key to select VRM2 before starting operation.
(The currently selected VRM is highlighted at the lower right of the screen.)

Procedures

1 Press [VRM1/VRM2] key to select VRM2.

VRM2 at the lower right of the screen will be highlighted, and VRM2 becomes operable.

2 Adjust the range of VRM2 with [JOG DIAL] or [TRACKBALL].

3 Press [ENTER] key .

The range of VRM2 is fixed.

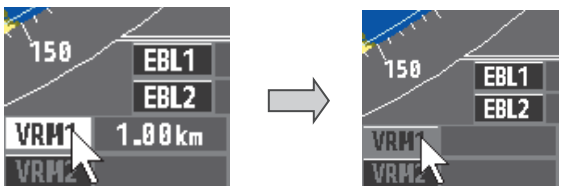
Clearing VRM

Procedures

1 Hold down [VRM1/VRM2] key.

The VRM (current selected VRM) display will disappear.

Or put the cursor on VRM1 / VRML2 and hold down **[ENTER]** key.



3.5.4 Use P-LINEs (Parallel Index Lines) [P-LINE]

P-LINE1 Operation

If P-LINE2 is selected or P-LINE1 is not displayed, press **[P-LINE]** key to select P-LINE1 before starting operation.
(The currently selected P-LINE is highlighted at the lower right of the screen.)

Procedures

1 Press [P-LINE] key to select P-LINE1.

P-LINE1 at the lower right of the screen will be highlighted, and P-LINE1 becomes operable.

2 Adjust the range from own ship's position of P-LINE1 with [JOG DIAL] or [TRACKBALL].

3 Press [ENTER] key.

The range of P-LINE1 is fixed.

P-LINE2 Operation

If P-LINE1 is selected or P-LINE2 is not displayed, press **[P-LINE]** key to select P-LINE2 before starting operation.
(The currently selected P-LINE2 is highlighted at the lower right of the screen.)

Procedures

1 Press [P-LINE] key to select P-LINE2.

P-LINE2 at the lower right of the screen will be highlighted, and P-LINE2 becomes operable.

2 Adjust the bearing of EBL1 with [JOG DIAL] or [TRACKBALL].

3 Press [P-LINE] key.

The range of P-LINE2 is fixed.

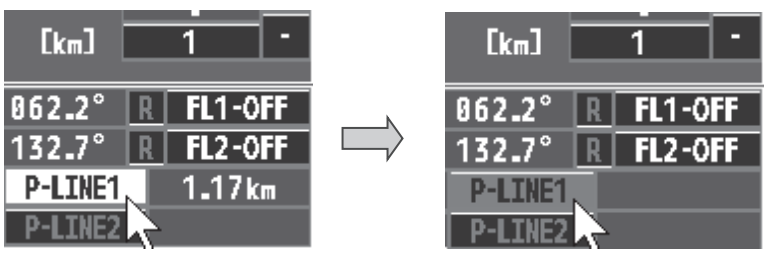
CLEARING P-LINE

Procedures

1 Hold down [P-LINE] key.

The P-LINE (current selected P-LINE) display will disappear.

Or put the cursor on P-Line1 / P-Line2 and hold down [ENTER] key.

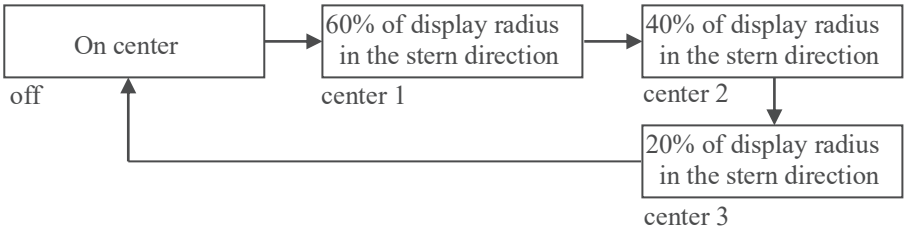


3.5.5 Move Own Ship's Display Position [OFF CENT]

The own ship's position can be moved from the display center to stern or bow direction.

Procedures **1 Press [OFF CENT] key.**

The display at the lower right of the screen (Fig.2.3-⑥) will be changed.
The own ship's position will be moved from the display center as following each time the [OFF CENT] key is pressed:



3.5.6 Display Other Ships' Trails [TRAILS]

Other ships' movements and speeds can be monitored from the lengths and directions of their trails, serving for collision avoidance.

Procedures **1 Put the cursor on TRAILS at the lower left of the screen and press [ENTER] key .**

Trails length will be changed as following sequence .
Trails length will be switched as following each time TRAILS is pressed.

OFF ⇨ 2Scan ⇨ 15sec ⇨ 30sec ⇨ 1min ⇨ 2min ⇨ 3min
⇨ 4min ⇨ 5min ⇨ 6min ⇨ OFF

Erasing Trails Data

Procedures **1 Put the cursor on TRAILS and hold down more than 2seconds.**

All the stored trails data will be erased.

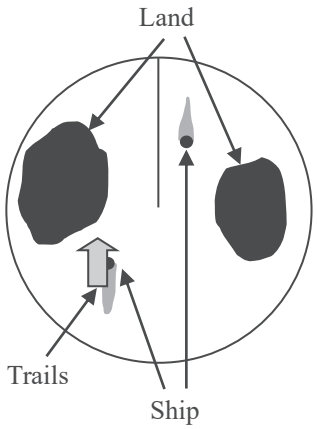
Trails Motion Mode

There are two types of trails: relative motion trails and true motion trails.

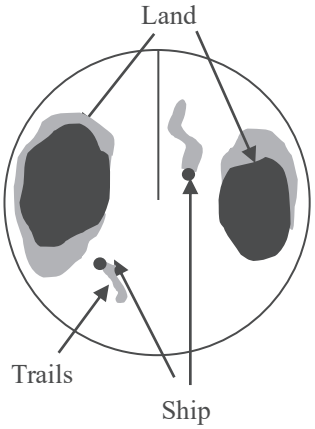
Relative motion trails: The system plots the trails of a target at a position relative to the own ship. The operator can easily judge whether the target is approaching the own ship.
While the own ship is moving, the system also plots the trails of land and other fixed targets.

True motion trails: The system plots the absolute motion trails of a target, irrespective of the own ship's position.
The operator can easily judge the course and speed of the target.
The system does not plot the trails of land and other fixed targets.

NOTE : Accurate true bearing signals and speed signals are necessary for using the true motion trails mode.



True Motion Trails



Relative Motion Trails

Changing Motion Mode of Trails (Trails mode)

Procedures

1 Place the cursor over the position at the lower left as following figure. Press [ENTER] key.

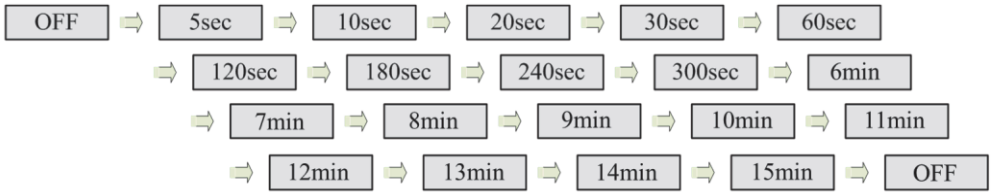
The motion mode of trails is switched to true or relative.

3.5.7 Display Own Vector [OWN VECT]

NOTE: The display of own vector needs the connection of the GPS and the heading sensor. And it is necessary to set the dimension of own ship and the position of GPS sensor in service menu to display the vector correctly (refer to 3.5.8).

Procedures **1 Press [OWN VECT] key.**

The vector length currently being selected is displayed in the information window at the upper right or left of the screen only when the kind of information is “OWN SHIP”.
If other information (GPS/ DOCKING/ AIS/ WIND or OFF) is selected, put the cursor on the button (Fig2.3-11 or 21) and press [ENTER] key.



There are shown 2 vectors, one drawn from the bow and the other one from the stern. The vector will be straight when the vessel doesn’t turn and curved when the vessel turns.

⚠CAUTION

The accuracy from the vectors are depending on the accuracy from the (D)GPS sensors.

With longer vectors, the accuracy will be lower.

The vectors are calculated with the situation at that time. When there will be some changed influence from wind, water current etc., are not shown before the vessel is influenced by this.

3.5.8 Own Mark

Editing Own Mark Dimension

Procedures

1 Press [MENU] key.

Main menu will appear.

2 Put the cursor on [6.OWN MARK] and press [ENTER] key.

3 Put the cursor on [4.Ship Dimension] and press [ENTER] key.

4 Put the cursor on [1.Own ship] and press [ENTER] key.

Set the "Beam"/"Length" of own ship, the position of RADAR antenna, and the position of GPS1/2's sensor if you installed two sensors.

5 If there is 2nd ship (for example barge) connected to own ship, put the cursor on [2. 2nd ship] and press [ENTER] key.

Set the items. If RADAR antenna or GPS sensor is not installed on 2nd ship, set only the dimension.

6 Press [MENU] key.

Menu will be closed.

NOTE: Correct setting is necessary to display the vector correctly.

Display Own Mark or 2nd Ship

Procedures

1 Press [MENU] key .

Main menu will appear.

2 Put the cursor on [6.OWN MARK] and press [ENTER] key.

3 Put the cursor on [3.Profile] and press [ENTER] key.

4 Put the cursor on [1.Own Ship] or [2.2nd Ship] and press [ENTER] key.

Select the shape (Rectangle or Pentagon) or OFF. Rectangle or Pentagon is selected, own mark or 2nd ship's mark will be appeared.

5 Press [MENU] key.

Menu will be closed.

This RADAR can display ten marks or less. For addition of more ships mark display, set from [3. 3rd Ship] to [10th Ship].

Paint Ship's Mark

Procedures

1 Press [MENU] key.

Main menu will appear.

2 Put the cursor on 6.OWN MARK and press [ENTER] key.

3 Put the cursor on 1.Filled and press [ENTER] key.

If On is selected, all ship's mark will be painted.

4 Press [MENU] key.

Menu will be closed.

Change the Priority of Echo and Ship's Mark

Procedures

1 Press [MENU] key .

MAIN MENU will appear.

2 Put the cursor on 6.OWN MARK and press [ENTER] key.

3 Put the cursor on 2.RADAR Targets on Top and press [ENTER] key.

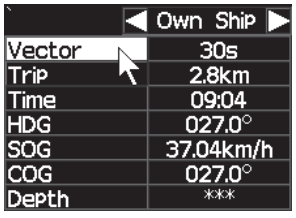
If On is selected, RADAR targets will be displayed over all ship's mark.

4 Press [MENU] key.

Menu will be closed.

3.5.9 Time Setting

Time is displayed in the information window at the upper right or left of the screen only when the kind of information is "OWN SHIP".
If other information (GPS/ DOCKING/ AIS/ WIND or OFF) is selected, put the cursor on the button (Fig2.3-11 or 21) and press [ENTER] key.



If GPS is connected to this RADAR, the information about time is inputted with NMEA sentence.

- In the case that NMEA sentence includes ZDA -
The setting of all is not necessary. "Time" is displayed correctly.

- In the case that NMEA sentence includes RMC but without ZDA -
The setting of only "Time Zone Setting" is necessary. After setting, "Time" is displayed correctly.

- In the case that NMEA sentence includes GGA but without ZDA/ RMC -
The setting of “Time Zone Setting” and “Local Date” is necessary. After setting, “Time” is displayed correctly.

- In the case that GPS is not connected to this RADAR -
The settings of "Time Zone", "Local Date", and "Local time" are necessary.
After setting, "Time" is displayed correctly by calculation with inner counter.

Set the Time Zone

Procedures

1 Press [MENU] key.

MAIN MENU will appear.

2 Put the cursor on 5.Date/Time Setting and press [ENTER] key.

SETTING MENU will appear.

3 Put the cursor on 1.TIME ZONE SETTING and press [ENTER] key.

TIME ZONE SETTING MENU will appear.

4 Adjust the time with [JOG DIAL] or trackball and press [ENTER] key.

5 Press [MENU] key.

Menu will be closed.

Set Local Date

Procedures

1 Press [MENU] key.

MAIN MENU will appear.

2 Put the cursor on 5.Date/Time Setting and press [ENTER] key.

SETTING MENU will appear.

3 Put the cursor on 2.Local Date and press [ENTER] key.

LOCAL DATE SETTING MENU will appear.

4 Adjust the time with [JOG DIAL] or trackball and press [ENTER] key.

5 Press [MENU] key.

Menu will be closed.

Set Local Time

Procedures

1 Press [MENU] key.

MAIN MENU will appear.

2 Put the cursor on 5.Date/Time Setting and press [ENTER] key.

SETTING MENU will appear.

3 **Put the cursor on 3.Local Time and press [ENTER] key.**

LOCAL TIME SETTING MENU will appear.

4 **Adjust the time with [JOG DIAL] or trackball and press [ENTER] key.**

5 **Press [MENU] key.**

Menu will be closed.

3.5.10 Change the Unit of "Rate of Turn"

The unit of "Rate of Turn" indicator can be changed.
This indicator is displayed at the upper center of the screen (Turn Rate).

Procedures

1 **Press [MENU] key.**

MAIN MENU will appear.

2 **Put the cursor on 3.Setting and press [ENTER] key.**

SETTING MENU will appear.

3 **Put the cursor on 2.Rate of Turn and then press [ENTER] key.**

The unit of RATE OF TURN will appear.

4 **Select the unit and then press [ENTER] key.**

The unit of RATE OF TURN will be changed.

5 **Press [MENU] key.**

Menu will be closed.

3.5.11 Expansion

The dimension of video display is enlarged to enhance a target. This setting is also switched by **[EXP]** key.

Procedures

1 **Press [MENU] key.**

MAIN MENU will appear.

2 **Put the cursor on 3.Setting and press [ENTER] key.**

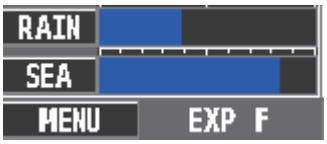
SETTING MENU will appear.

3 **Put the cursor on 3.Expansion and press [ENTER] key.**

EXPANSION SETTING MENU will appear.

4 **Select mode and press [ENTER] key.**

The mode of expansion will be changed, and current mode is displayed next to MENU of the screen.



5 Press [MENU] key.

Menu will be closed.

Effect of target enlargement
Off : Select this mode particularly when resolution is required.
Fair : Radar echoes are expanded by 1 scale in all directions.
Strong : Radar echoes are expanded by 2 scales in all directions on the display.

3.5.12 STC Curve

This RADAR has two kinds of STC characteristics. One is for sailing in the river, and other one is for sailing in the sea.

Procedures

1 Press [MENU] key.

MAIN MENU will appear.

2 Put the cursor on 3.Setting and press [ENTER] key.

SETTING MENU will appear.

3 Put the cursor on 4.STC Curve and press [ENTER] key.

STC CURVE SETTING MENU will appear.

4 Select mode and press [ENTER] key.

STC characteristic will be changed.

5 Press [MENU] key.

Menu will be closed.

3.6 DISPLAY USER MAP

Navigation information such as a maximum of 256 points of NAV lines, coastlines, depth contours, and NAV marks can be displayed, created, read, saved, corrected, and deleted. (This function is available only when navigation equipment is connected to this radar system.)

Marks that can be used	: 29 types
Lines that can be used	: 3 types (solid, broken, and dashed-dotted line)
Color of mark and line that can be used	: 7 colors

If radar video is poor visibility caused by user map function, turn the map displays temporarily off.

3.6.1 Create User Map (Mark/ Line)

In this system, when the radar is in the transmission state, the user map is displayed all the time.
However, valid latitude / longitude data and true bearing data must be entered into the system.
The user map can be created and edited by performing the following operation.

Plotting a Mark

Procedures

1 Press [MENU] key .
Select 8.Next and press [ENTER] key.
Select 4.NAV Information and press [ENTER] key.
Select 1.Edit User Map and press [ENTER] key.
Select 1.Make with cursor and press [ENTER] key.

It is possible to make with latitude / longitude by selecting 2.Make with L/L.

2 Set the type of mark with 1.Type and press [ENTER] key.

3 Set the color of mark with 2.Color and press [ENTER] key.

4 Put the cursor on a location of the display at which you want to plot the mark, and press [ENTER] key.

The specified mark is displayed in the specified shape and color.
To create another mark, repeat the above procedures.

5 Press [MENU] key.

Menu will be closed.

Plotting a Line

Procedures

1 Press [MENU] key .
Select [8.Next] and press [ENTER] key.
Select [4.NAV Information] and press [ENTER] key.
Select [1.Edit User Map] and press [ENTER] key.
Select [1.Make with cursor] and press [ENTER] key.

2 Select type of line with [1. Type] and press [ENTER] key.

3 Select color of line with [2.Color] and press [ENTER] key.

4 Put the cursor on a location of the display at which you want to start plotting a line, and press [ENTER] key.

The start point of the specified line will be displayed.

5 Move the cursor to a location of the display at which you want to finish plotting the line, and press [ENTER] key.

A line is plotted between the previous point and the end point.
Repeat this procedure so that sequential lines can be plotted.

6 When you want to finish plotting the line, press [ENTER] key two times at the same point.

7 Press [MENU] key.

Menu will be closed.

Plotting a Mark / Line Make with Latitude and Longitude

Procedures

1 Press [MENU] key.
Select [8.Next] and press [ENTER] key.
Select [4.NAV Information] and press [ENTER] key.
Select [1.Edit User Map] and press [ENTER] key.

2 Select [2.Make with L/L] and press [ENTER] key.

The Make with L/L menu will appear.

3 Set the color with [2.Color].

4 Select Mark or Line with [5.New Line/Mark Input] and press ENTER.

If [5.New Line Input] is displayed, the kinds in [1.Type] will be marks.
If [5.New Mark Input] is displayed, the kinds in [1.Type] will be lines.

5 Select [1.Type] and select the kind of mark or line to be created.

In the case to make a line,
To add a line, select [--O--].
To edit newly, select [O----].

6 Select [3.L/L] to input the latitude / longitude and press [ENTER] key.

7 Select [4.Enter] and press [ENTER] key.

To create another mark or line, repeat the above procedures.

8 Press [MENU] key.

Menu will be closed.

3.6.2 Correct Position on User Map (Shift).

If the display position on the user map is different from an actual position, it can be changed to the correct position in manual mode.

Correcting the Display Position on the User Map (Shift).

Procedures

1 Press [MENU] key.
Select [8.Next] and press [ENTER] key.
Select [4.NAV Information] and press [ENTER] key.

2 Select [2.Shift] and press [ENTER] key

3 Put the cursor on a mark or end of a line, and press [ENTER] key.

Cursor mark will be changed.

4 Put the cursor on the point to be corrected, and press [ENTER] key.

Positions of all marks and lines currently displayed will be corrected.

5 Press [MENU] key.

Menu will be closed.

3.6.3 Correct Position on User Map (Shift Clear).

Clearing the Corrected User Map to Its Original State (Shift Clear)

Procedures

1 Press [MENU] key.
Select [8.Next] and press [ENTER] key.
Select [4.NAV Information] and press [ENTER] key.

2 Select [3.Shift Clear] and press [ENTER] key.

3 Press [MENU] key.

Menu will be closed.

3.6.4 Set User Map Display (Mark Display Setting)

The user map can be individually displayed (on) or hidden (off).
Setting by type : Setting can be made by mark font and line pattern.
Setting by color : Setting can be made by color of mark or line.

The mark font display size can be selected.
Normal : The mark is displayed in normal size.
Small : The mark is displayed in a size smaller than usual.

Setting Display by Type

Procedures

1 Press [MENU] key.
Select [8.Next] and press [ENTER] key.
Select [4.NAV Information] and press [ENTER] key.
Select [4.Mark Display Setting] and press [ENTER] key.

2 Select [1.Display Mark Type] and press [ENTER] key.

3 Set about each mark font / line pattern and press [ENTER].

[On] : Displayed.
[Off] : Not Displayed.

About setting of [All],
[Off] : All types are not displayed even if all other settings are “On”.
[On] : All types are displayed even if all other settings are “Off”.
[Individual] : Setting by type is activated.

4 Press [MENU] key.

Menu will be closed.

Setting Display by Color

Procedures

1 Press [MENU] key.
Select [8.Next] and press [ENTER] key.
Select [4.NAV Information] and press [ENTER] key.
Select [4.Mark Display Setting] and press [ENTER] key.

2 Select [2.Display Mark Color] and press [ENTER] key.

3 Set about each colors and press [ENTER] key.

[On] : Displayed.
[Off] : Not Displayed.
About setting of [All],
[Off] : All color's marks and lines are not displayed even if all other settings are "On".
[On] : All color's marks and lines are displayed even if all other settings are "Off".
[Individual] : Setting by type is activated.

4 Press [MENU] key.

Menu will be closed.

Setting the Mark Font Size

Procedures

1 Press [MENU] key.
Select [8.Next] and press [ENTER] key.
Select [4.NAV Information] and press [ENTER] key.
Select [4.Mark Display Setting] and press [ENTER] key.

2 Select [3.Mark Size] and press [MENU] key.

[Normal] : The mark is displayed in normal size.
[Small] : The mark is displayed in a size smaller than usual.

3 Press [MENU] key.

Menu will be closed.

Manually Entering the Own Ship Position (Own Ship Position)

Use this function when editing navigation data for a location different from the own ship position.

Procedures

1 Press [MENU] key.
Select 8.Next and press [ENTER] key.
Select 4.NAV Information and press [ENTER] key.
Select 6.Next and press [ENTER] key.
Select 1.Own Ship Position and press [ENTER] key.

2 Enter a latitude / longitude value.

The own ship position latitude / longitude value is determined.

Note: The own ship's position manually entered by using the function above is valid only in the navigation data setting menu. After closing the menu, the manually entered position data is invalidated.

Manually Entering the Own Ship Heading (Own Ship Heading)

Use this function when editing navigation data for a heading different from the current own ship heading.

Procedures

1 Press [MENU] key.
Select 8.Next and press [ENTER] key.
Select 4.NAV Information and press [ENTER] key.
Select 6.Next and press [ENTER] key.
Select 3.Own Ship Heading and press [ENTER] key.

2 Enter a heading value.

The own ship heading value is determined.

Note: The own ship's heading manually entered by using the function above is valid only in the navigation data setting menu. After closing the menu, the manually entered heading data is invalidated.

Setting the Geodetic System for Navigation Data to be Saved (Geodetic)

To create navigation information, set the geodetic system that is used with the connected navigation equipment. When navigation information is loaded, the geodetic system used when the navigation information was saved, is displayed. Make sure that the displayed geodetic system is identical to the one used with the navigation equipment. If the two geodetic systems are different, the positions of navigation information of the display will be shifted. Therefore, it is important to set the geodetic system of the navigation equipment.

Procedures

1 Press [MENU] key.
Select 8.Next and press [ENTER] key.
Select 4.NAV Information and press [ENTER] key.
Select 6.Next and press [ENTER] key.
Select 2.Geodetic and press [ENTER] key.

2 Enter the desired geodetic system number. (See the next list)

The geodetic system is determined.

Geodetic System List

Number	Name
0	WGS-84
1	WGS-72
2	Japan
3	North American 1927(U.S)
4	North American 1927(Canada & Alaska)
5	European 1950 (Europe)
6	Australian geodetic 1966 (Australia)
7	Ordnance Survey of Great Britain (England)
8	NAD-83
9	- (No Use)
10	- (No Use)
11	ADINDAN (Ethiopia & Sudan)
12	ARC 1950 (Botswana)
13	AUSTRALIAN GEODETIC 1984 (Australia)
14	BERMUDA 1957 (Bermuda Islands)
15	BOGOTA OBSERVATORY (Colombia)
16	CAMPO INCHAUSPE (Argentine)
17	CHATHAM 1971 (Chatham Islands)
18	CHUA ASTRO (Paraguay)
19	CORREGO ALEGRE (Brazil)
20	DJAKARTA (VATAVIA) (Sumatra)
21	EUROPEAN 1979 (Europe)
22	GEODETIC DATUM 1949 (New Zealand)
23	GUAM 1963 (Guam)
24	HAYFORD 1910 (Finland)
25	HJORSEY 1955 (Iceland)
26	INDIAN (India & Nepal)
27	IRELAND1965 (Ireland)
28	KERTAU 1948 (West Malaysia)
29	L.C.5 ASTRO (Cayman Brac Island)
30	LIBERIA 1964 (Liberia)
31	LUZON (Philippines)
32	MERCHICH (Morocco)
33	MINNA (Nigeria)
34	NAHRWAN (Oman)
35	NAPARIMA, BWI (Trinidad & Tobago)
36	OLD EGYPTIAN (Egypt)
37	OLD HAWAIIAN (Hawaii)
38	PICO DE LAS NIEVES (Canary Islands)
39	PROVISIONAL SOUTH AMERICAN 1956 (South America)
40	PROVISIONAL SOUTH CHILEAN 1963 (South Chile)
41	PUERTO RICO (Puerto Rico & Virgin Islands)
42	QORNOQ (South Greenland)
43	RT90 (Sweden)
44	SANTA BRAZ (San Miguel Island & Santa Maria Islands)
45	SOUTH AMERICAN 1969 (South America)
46	SOUTHWEST BASE (Faial & Sao Jorge & Pico & Graciosa & Terceira Island)
47	TIMBALAI 1948 (Brunei & East Malaysia)
48	- (No Use)
49	- (No Use)

Deleting Mark / Line Data (Delete)

A mark or line is deleted individually for the created user map.

Procedures

1 Press [MENU] key.
Select 8.Next and press [ENTER] key.
Select 4.NAV Information and press [ENTER] key.
Select 1.Edit User Map and press [ENTER] key.
Select 4.Delete and press [ENTER] key.

2 Put the cursor on a location where you want to delete line or mark and press [ENTER] key.

3 Select 1.Yes and press [ENTER] key.

The mark / line data is deleted.
To delete another mark or line, repeat procedures 2 and 3.

4 Press [MENU] key.

Menu will be closed.

Moving a Mark or Line (Move)

A mark or line is moved individually for the created user map.

Procedures

1 Press [MENU] key.
Select 8.Next and press [ENTER] key.
Select 4.NAV Information and press [ENTER] key.
Select 1.Edit User Map and press [ENTER] key.
Select 3.Move and press [ENTER] key.

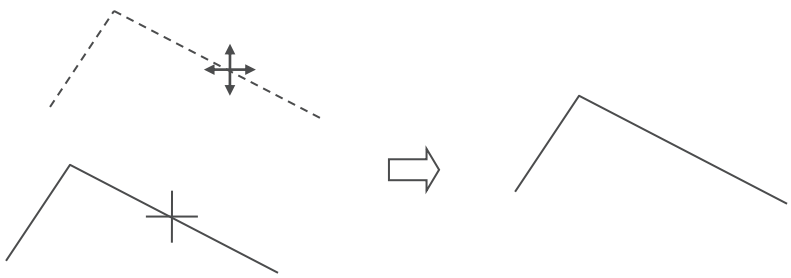
2 Put the cursor on a mark or line, and press [ENTER] key.
When a mark or line to be moved is selected, the cross-cursor mark will appear.

3 Move the cursor mark to the new position, and press [ENTER] key.
To move another mark or line, repeat procedures 2 and 3.

4 Press [MENU] key.

Menu will be closed.

(Example)



Inserting a Vertex into a Line (Insert / Move Vertex)

A vertex is inserted into a line for the created user map.

Procedures

1 Press [MENU] key.
Select [8.Next] and press [ENTER] key.
Select [4.NAV Information] and press [ENTER] key.
Select [1.Edit User Map] and press [ENTER] key.
Select [5.Insert/Move Vertex] and press [ENTER] key.

2 Put the cursor to a side line into which a vertex will be inserted and press the [ENTER] key.

A vertex is inserted into the selected line, and the cross-cursor mark will be displayed.

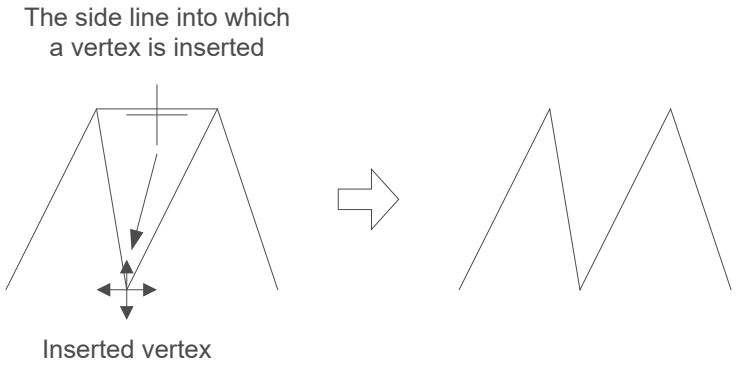
3 Move the cross-cursor mark to the newly inserted vertex, and press [ENTER] key.

To insert another vertex, repeat procedures 2 and 3.

4 Press [MENU] key.

Menu will be closed.

(Example)



Correcting the Mark or Vertex of a Line (Insert / Move Vertex)

A mark or line is corrected for the user map.

Procedures

1 Press [MENU] key.
Select [8.Next] and press [ENTER] key.
Select [4.NAV Information] and press [ENTER] key.
Select [1.Edit User Map] and press [ENTER] key.
Select [5.Insert/Move Vertex] and press [ENTER] key.

2 Put the cursor on the mark or vertex of a line, and press [ENTER] key.

When the mark or vertex of a line to be corrected is selected, the cross-cursor mark will appear.

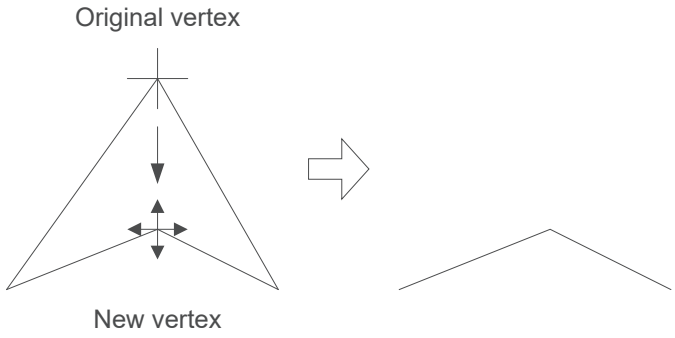
3 Move the cross-cursor mark to the destination, and press [ENTER] key.

The vertex of the selected mark or vertex of a line is moved to the destination.
To correct another mark or vertex of a line, repeat procedures 2 and 3.

4 Press [MENU] key.

Menu will be closed.

(Example)



Deleting a Mark or Vertex of a Line (Delete Vertex)

A vertex is deleted individually from a mark or line for the created user map.

Procedures

1 Press [MENU] key.
Select 8.Next and press [ENTER] key.
Select 4.NAV Information and press [ENTER] key.
Select 1.Edit User Map and press [ENTER] key.
Select 6.Delete Vertex and press [ENTER] key.

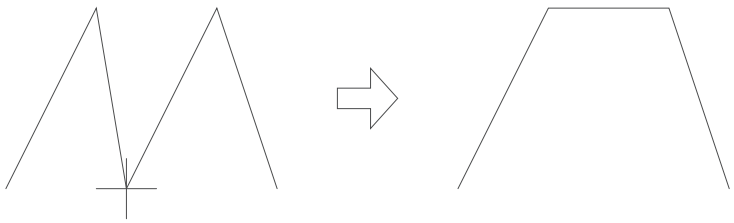
2 Put the cursor on the mark or vertex of a line, and press [ENTER] key.

The vertex of the selected mark or vertex of a line is deleted.
All the lines drawn by joining two points are deleted.
To delete another mark or vertex of a line, repeat procedure 2.

3 Press [MENU] key.

Menu will be closed.

(Example)



Clearing Marks or Lines at a Time(Clear by Type / Color)

Marks or lines are cleared by type or by color at a time for the created user map.

Procedures

1 Press [MENU] key.
Select [8.Next] and press [ENTER] key.
Select [4.NAV Information] and press [ENTER] key.
Select [1.Edit User Map] and press [ENTER] key.
Select [7.Del by Type/Col] and press [ENTER] key.

Select the type of marks or lines to be deleted.
To select all types, select [All].
For example, to delete "red ○" marks, select [○].

2 Select the color of the marks or lines to be deleted.

Select the color of marks or lines to be deleted.
To select all colors, select [All].
For example, to clear "red ○" marks, select [Red].
After the items have been selected, Confirmation Window will appear.

3 Press [ENTER] key.

All selected marks or lines will be cleared at a time.

4 Press [MENU] key.

Menu will be closed.

Note: If data is not copied on the flash memory card (CF card), the data is not be reloaded. The flash memory card is an option.

3.6.5 Operate User Map File (File Operations)

[I] Loading Navigation Data (Load User Map)

Procedures

1 Insert a flash memory card into the card slot.

In the case of loading the data from internal memory, a card is not necessary.

2 Press [MENU] key.
Select [8.Next] and press [ENTER] key.
Select [4.NAV Information] and press [ENTER] key.
Select [5.File Operations] and press [ENTER] key.

3 Select [1.Select Card Slot] and press [ENTER] key.

4 Select the slot number which you inserted a flash memory card or [3.Internal] and press [ENTER] key.

5 Select [2. Load Mode] and select [Add] or [Overwrite] and press [ENTER] key.

[Add] and [Overwrite] of the Load Mode items are switched.
When [Add] is selected, new data is added to the saved data. When [Overwrite] is selected, the saved data is overwritten.

6 Select [3.Load] and press [ENTER] key.

The list of navigation data saved in the system will be displayed.

7 Select numeric icon corresponding to the file to be loaded.

Confirmation Window will appear.

8 Select [1.Yes] and press [ENTER] key.

The selected navigation data will be loaded and displayed of the display.

9 Press [MENU] key.

Menu will be closed.

[II] Discarding Navigation Data (Unload).

Procedures

1 Press [MENU] key.
Select 8.Next and press [ENTER] key.
Select 4.NAV Information and press [ENTER] key.
Select 5.File Operations and press [ENTER] key.

2 Select 4.Unload and press [ENTER] key.

Confirmation Window will appear.

3 Select 1.Yes and press [ENTER] key.

The saved navigation data will be discarded.

4 Press [MENU] key.

Menu will be closed.

[III] Saving Navigation Data (Save).

Navigation data can be saved when navigation equipment is connected, or the own ship position on the user map is entered in the manual mode.

Procedures

1 Insert a flash memory card into the card slot.

In the case of saving data to internal memory, a card is not necessary.

2 Press [MENU] key.
Select 8.Next and press [ENTER] key.
Select 4.NAV Information and press [ENTER] key.
Select 5.File Operations and press [ENTER] key.

3 Select 1.Select Card Slot and press [ENTER] key.

4 Select the slot number which you inserted a flash memory card or 3.Internal and press [ENTER] key.

5 Select 5.Save and press [ENTER] key.

The Input File Name menu will appear.

6 Enter the file name to be saved.

Up to 10 characters can be entered.
After the data has been entered, Confirmation Window will appear.

7 Press [MENU] key.

Menu will be closed.

[IV] Clearing the Saved Navigation Data (Erase)

Procedures

1 Insert a flash memory card into the card slot.

In the case of erasing the data from internal memory, a card is not necessary.

2 Press [MENU] key.
Select [8.Next] and press [ENTER] key.
Select [4.NAV Information] and press [ENTER] key.
Select [5.File Operations] and press [ENTER] key.

3 Select [1.Select Card Slot] and press [ENTER] key.

4 Select the slot number which you inserted a flash memory card or [3.Internal] and press [ENTER] key.

5 Select [6.Erase] and press [ENTER] key.

The Erase screen will appear.
The list of navigation data saved in the card will be displayed.

6 Select the number of the file to be erased and press [ENTER]key.

Confirmation Window will appear.

7 Select [1.Yes] and press [ENTER] key.

The selected navigation data is erased, and the name of the file is deleted from the list.

8 Press [MENU] key.

Menu will be closed.

[V] Displaying Saved Navigation Data (File Mark Display)

Procedures

1 Insert a flash memory card into the card slot.

In the case of display the data of internal memory, a card is not necessary.

2 Press [MENU] key.
Select 8.Next and press [ENTER] key.
Select 4.NAV Information and press [ENTER] key.
Select 5.File Operations and press [ENTER] key.

3 Select 1.Select Card Slot and press [ENTER] key.

4 Select the slot number which you inserted a flash memory card or 3.Internal and press [ENTER] key.

5 Select 7.File Mark Display and press [ENTER] key.

The Card Mark Display menu will appear.

6 Select the number of the file to be displayed and press [ENTER]key.

Confirmation Window will appear.

7 Select 1.Yes and press [ENTER] key.

The selected navigation data is displayed.

8 Press [MENU] key.

Menu will be closed.

3.7 SCREEN CAPTURE

⚠CAUTION

Do not turn the system off while the display shows “Copying” in a message area on the bottom center of the screen in order not to make a flash memory card damaged.

3.7.1 Screen Capture Setting (Select Card Slot)

Flash memory card (CF card) is necessary for screen capture function (Save, Erase, Capture). This system has two card slots, and this setting is to select which slot is used for this function.

Procedures

1 Insert a flash memory card into the card slot.

Flash memory card is necessary.
For the insertion and removal of the card, see HOW TO INSERT AND REMOVE A CARD in the appendix.

2 Press [MENU] key.
Select [8.Next] and press [ENTER] key.
Select [1.Screen Capture Setting] and press [ENTER] key.

3 Select [1.Select Card Slot] and press [ENTER] key.

Slot1 and Slot2 of the Select Card Slot items are switched.

4 Select [1.Slot1] or [2.Slot2] and press [ENTER] key.

3.7.2 Screen Capture Setting (Save File)

Only when "4.Capture Mode" setting is "Auto-2", capture data is saved in internal memory. But these data are deleted when the system is turned off. Therefore, the data must be moved from internal memory to a flash memory card before turning off in "Auto-2" mode.
(In the case of "Manual" or "Auto-1", capture data is saved to a flash memory card automatically.)

Procedures

1 Insert a flash memory card into the card slot.

2 Press [MENU] key.
Select [8.Next] and press [ENTER] key.
Select [1.Screen Capture Setting] and press [ENTER] key.

3 Select [2.Save File] and press [ENTER] key.

The folder is created automatically, and the data is saved in the folder.
Folder is created in each one hour.
Folder name : YYYYMMDD_hhmm
Data name : YYYYMMDD_hhmmss
YYYY : "year" when folder or data is created.
MM : "month" when folder or data created.
DD : "day" when folder or data is created.
hh : "hour" when folder or data is created.
mm : "minute" when folder or data is created.
ss : "second" when data is created.

3.7.3 Screen Capture Setting (Erase File)

Erasing of a capture data in a flash memory card is possible.

Procedures

1 Insert a flash memory card into the card slot.

2 Press [MENU] key.
Select [8.Next] and press [ENTER] key.
Select [1.Screen Capture Setting] and press [ENTER] key.

3 Select [3.Erase File] and press [ENTER] key.

4 Select folder name in which data to be erased is saved and press [ENTER] key.

5 Select file name to be erased and press [ENTER] key.

Confirmation Window will appear.

6 Select [1.Yes] and press [ENTER] key.

The capture data is erased.

3.7.4 Screen Capture Setting (Capture Mode)

There are four modes in screen capture function.

Off : Capture function is off.

Manual : Manual mode. In this mode, screen capture data is saved in a flash memory card whenever the key (refer to Fig2.2-18) on the operational unit or button on the screen (refer to Fig2.3-20) is pressed.

Auto-1 : In this mode, screen capture data is saved in a flash memory card automatically with the interval which is set in 5.AUTO Capture Interval.

Auto-2 : In this mode, screen capture data is saved in an internal memory automatically with the interval which is set in 5.AUTO Capture Interval. This data is deleted when this system is turned off. Therefore, moving the data from internal memory to a flash memory card is necessary. (Refer to 3.7.2)
The captured data in internal memory can be saved from internal memory to a flash memory card whenever the key (refer to Fig2.2-18) on the operational unit or button on the screen (refer to Fig2.3-20) is pressed.

Note: Please don't remove the flash memory card in "Auto-1" mode. Because you can not know when the system saves data in the card. Before remove the card, turn off the system or set this setting to off, Manual, or Auto-2.

Procedures

1 Press [MENU] key.
Select 8.Next and press [ENTER] key.
Select 1.Screen Capture Setting and press [ENTER] key.

2 Select 4.Capture Mode and press [ENTER] key.

3.7.5 Screen Capture Setting (AUTO Capture Interval)

This setting is to determine the interval in Auot-1 or Auto-2 mode.

Procedures

1 Press [MENU] key.
Select 8.Next and press [ENTER] key.
Select 1.Screen Capture Setting and press [ENTER] key.

2 Select 5.AUTO Capture Interval and press [ENTER] key.

3 Input interval time and press [ENTER] key.

Auto-1 mode : 1-999min
Auto-2 mode : 15-999sec

3.7.6 Screen Capture Setting (AUTO File Erase)

In the case that the capacity of flash memory card is full, this setting is to select whether the system overwrites or not.
AUTO File Erase=Off : The system stops screen capture when the capacity is full.
AUTO File Erase=On : The system overwrites data when the capacity is full.

Procedures

1 Press [MENU] key.
Select [8.Next] and press [ENTER] key.
Select [1.Screen Capture Setting] and press [ENTER] key.

2 Select [6.AUTO File Erase] and press [ENTER] key.

3 Select [1.Off] or [2.On] and press [ENTER] key.

3.8 USER SETTING

The operation status of the radar is recorded. If the system is operated by more than one operator, the operators can register operation status as suitable for them and call the status. Operation status for up to five operations can be registered, and a name be assigned to each status. (Up to 10 alphanumeric characters)

The status is saved in an internal memory. Therefore, a flash memory card is not necessary for this function.

<Data saved by the "User Setting">

- Display Color and Brilliance Setting menu
- Buzzer Volume
- EBL / VRM Control CURS

3.8.1 User Setting (Load User Setting)

The operating state saved in the system can be loaded by performing the operation below. When the operating state is loaded, the previous operating state is discarded. Therefore, if you do not want to discard the operating state data, save the operating state by performing the operation described in Section 3.8.2.

Procedures

1 Press [MENU] key.
Select [8.Next] and press [ENTER] key.
Select [2.User Setting] and press [ENTER] key.

2 Select [1.Load User Setting] and press [ENTER] key.

3 Select "user setting file" and press [ENTER] key.

Confirmation Window will appear.

4 Select [1.Yes] and press [ENTER] key.

The operating state data will be loaded.

3.8.2 User Setting (Save User Setting)

The system's current operating state can be saved in the system by performing the operation below.

Procedures

1 Press [MENU] key.
Select [8.Next] and press [ENTER] key.
Select [2.User Setting] and press [ENTER] key.

2 Select [2.Save User Setting] and press [ENTER] key.
Select file number and press [ENTER] key.
Input the "file name", select [Enter] and press [ENTER] key.

Confirmation Window will appear.

3 Select [1.Yes] and press [ENTER] key.

The operating state data will be saved.

3.8.3 User Setting (Erase User Setting)

The operating state saved in the system can be deleted by performing the operation below. Use this function to delete unnecessary operating state data.

Procedures

1 Press [MENU] key.
Select [8.Next] and press [ENTER] key.
Select [2.User Setting] and press [ENTER] key.

2 Select [3.Erase User Setting] and Press [MENU] key.

3 Select "user setting file" and press [ENTER] key.

Confirmation Window will appear.

4 Select [1.Yes] and press [ENTER] key.

The operating state data will be deleted.

3.9 FORMAT CARD

This radar has two card slots. Inserting a flash memory card into a card slot, you can save the screen capture data (refer to Chapter 3.7) and mark/ line data (refer to Chapter 3.6). This function is for deleting all these files. Therefore, other data (for example, the data saved with PC) is not deleted by this function.

Procedures

1 Press [MENU] key.
Select [8.Next] and press [ENTER] key.
Select [3.Format Card] and press [ENTER] key.

2 Select [1.Select Card Slot] and press [ENTER] key.

Select slot number which a flash memory card is inserted into.

3 Select [2.Format] and press [ENTER] key.

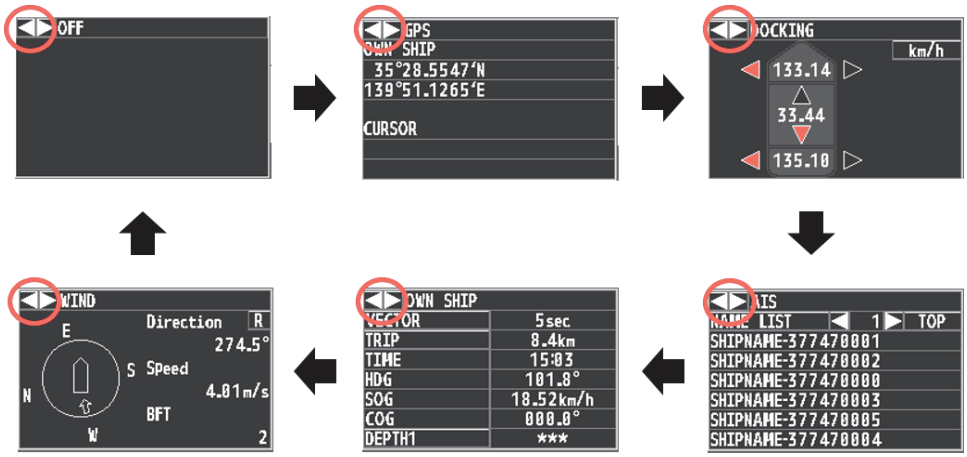
Confirmation Window will appear.

4 Select [1.Yes] and press [ENTER] key.

Screen capture data and mark/ line data will be deleted.

3.10 AIS FUNCTION

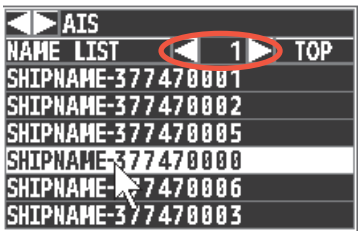
When an AIS transceiver, a (D)GPS, and heading sensor are connected to the radar, AIS target will be drawn on the screen on the position of this target. Also, there will be a name list at the upper left and right-side of the screen.
The information in windows at the upper left and right-side of the screen can be selected from “OFF”, “GPS”, “Docking”, “AIS information”, “Own Ship Data”, and “Wind data” as follow.



By pressing on the arrow button, the information in window will be changed.

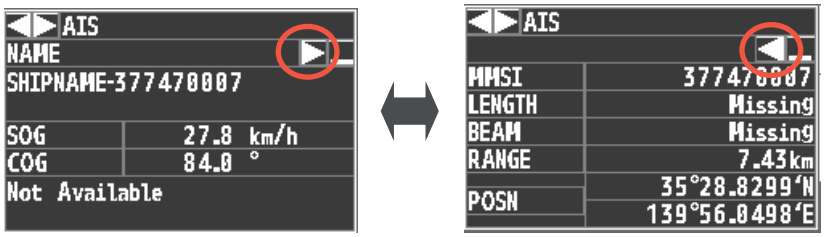
3.10.1 Vessel Name List

The list is sorted according to the distance from the target, and the vessel on the top of the list is nearest to the own vessel. By pressing on the arrow button, the user can scroll through the name list. When a name is selected in the list, the target will be highlighted on the screen.



3.10.2 Vessel Information

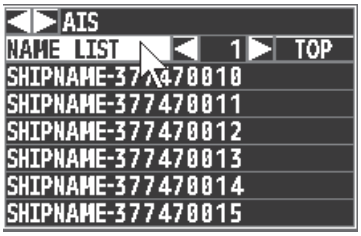
When an AIS symbol is selected on the screen, extra information from this vessel will be shown at the window.



By pressing on the arrow button, the user can change the information.

3.10.3 Display the Vessel Names on the Screen

While pressing NAME LIST at the window, the vessel names will be displayed beside the AIS symbol on the screen.



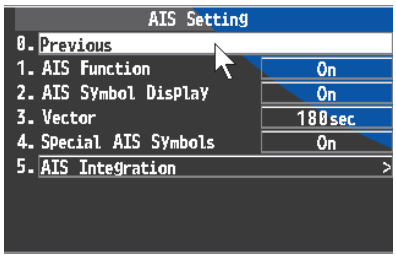
Example of vessel name displaying

3.10.4 AIS Setting Menu

Procedures

1 Press [MENU] key.

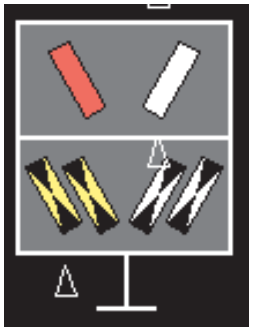
2 Select 4.AIS Setting and press [ENTER] key.



1. AIS Function
   On : AIS function is effective.
   Off : AIS function is invalid.
2. AIS Symbol Display
   On : AIS symbols are displayed on the screen.
   Off : AIS symbols are not displayed on the screen.
3. Vector
   Change the length of AIS vectors as follow.

OFF ⇨ 5sec ⇨ 10sec ⇨ 20sec ⇨ 30sec
⇨ 60sec ⇨ 120sec ⇨ 180sec ⇨ 240sec ⇨ 300sec

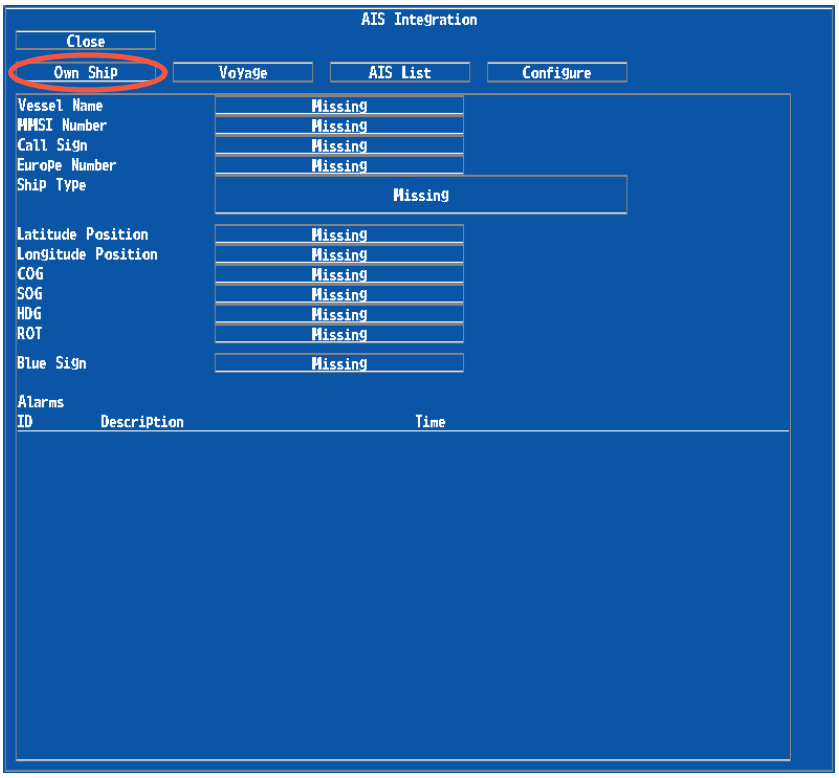
4. Special AIS Symbols (Signal Symbols)
   On : AIS signal symbol is displayed on the screen.
   Off : AIS signal symbol is not displayed on the screen.



Example of AIS signal symbol

5. AIS Integration
   Display AIS information.There are 4 types of following dialogs.

[Own Ship]
Display own ship information and alarm information.



1 【Vessel Name】
The received vessel name is displayed. If there is no valid value, "Missing" is displayed.

2 【MMSI Number】
The received MMSI number is displayed. If there is no valid value, "Missing" is displayed.

3 【Call Sign】
The received call sign is displayed. If there is no valid value, "Missing" is displayed.

4 【Europe Number】
The received Europe number is displayed. If there is no valid value, "Missing" is displayed.

5 【Ship Type】
The received ship type is displayed. If there is no valid value, "Missing" is displayed.

6 【Latitude Position】
The received latitude is displayed with up to 4 decimal places. If there is no valid value, "Missing" is displayed.

7 【Longitude Position】
The received longitude is displayed with up to 4 decimal places. If there is no valid value, "Missing" is displayed.

8 【COG】
The received COG(course over ground) is displayed with up to 1 decimal place. If there is no valid value, "Missing" is displayed.

9 【SOG】

The received SOG(speed over ground) is displayed with up to 1 decimal place. If there is no valid value, "Missing" is displayed.

10 【HDG】

The received true heading is displayed. If there is no valid value, "Missing" is displayed.

11 【ROT】

The received rate of turn is displayed with up to 1 decimal place. If there is no valid value, "Missing" is displayed.

12 【Blue Sign】

The received blue sign information is displayed. If there is no valid value, "Missing" is displayed.

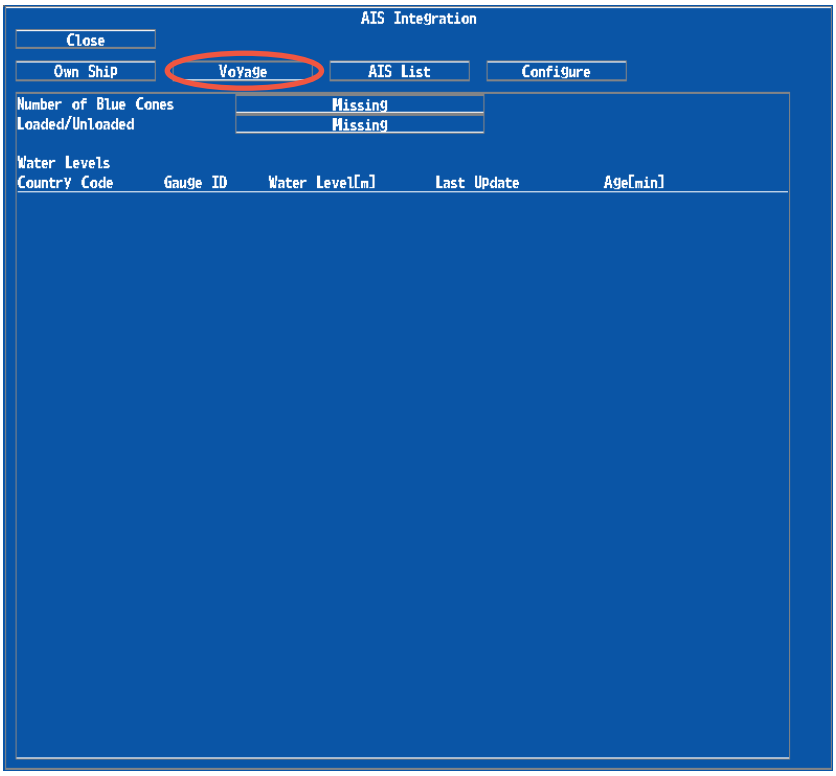
13 【Alarms】

The received alarm is displayed.

ID : Alarm ID Number
Description : Description text of alarm
Time : Time of alarm condition change, UTC

[Voyage]

Display blue corn, cargo loading, arrival request time and water level.



1 【Number of Blue Cones】

The received information of hazardous cargo is displayed. If there is no valid value, "Missing" is displayed.

2 【Loaded/Unloaded】

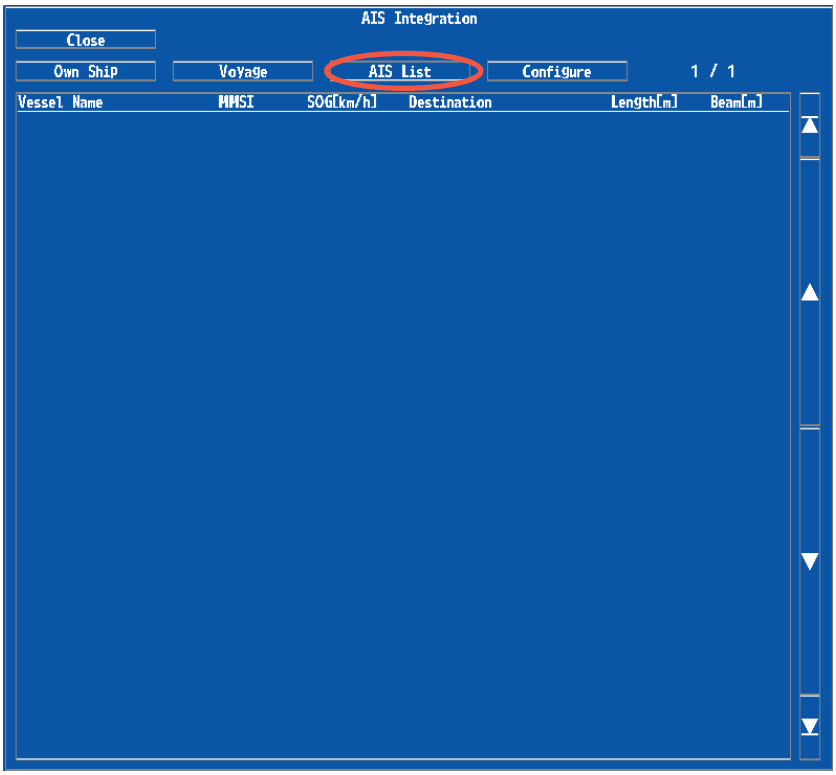
The received information of loaded cargo is displayed. If there is no valid value, "Missing" is displayed.

3 【Water levels】

The received information of country code, guage ID and water level is displayed. In addition, the reception time(last Update) and the reception elapsed time(Age) are also displayed. The elapsed reception time is displayed up to a maximum of 999 minutes, and if it is longer than that, it is displayed as "Over".

[AIS List]

Display other ship information up to 100 in order of increasing distance from own ship.



1 【Vessel Name】

The vessel name is displayed up to 20 letters. If there is no valid value, A blank is displayed.

2 【MMSI】

The MMSI number is displayed.

3 【SOG】

The received speed of ground is displayed with up to 1 decimal place. If there is no valid value, "Missing" is displayed.

4 【Destination】

The destination is displayed up to 20 letters. If there is no valid value, A blank is displayed.

5 【Length】

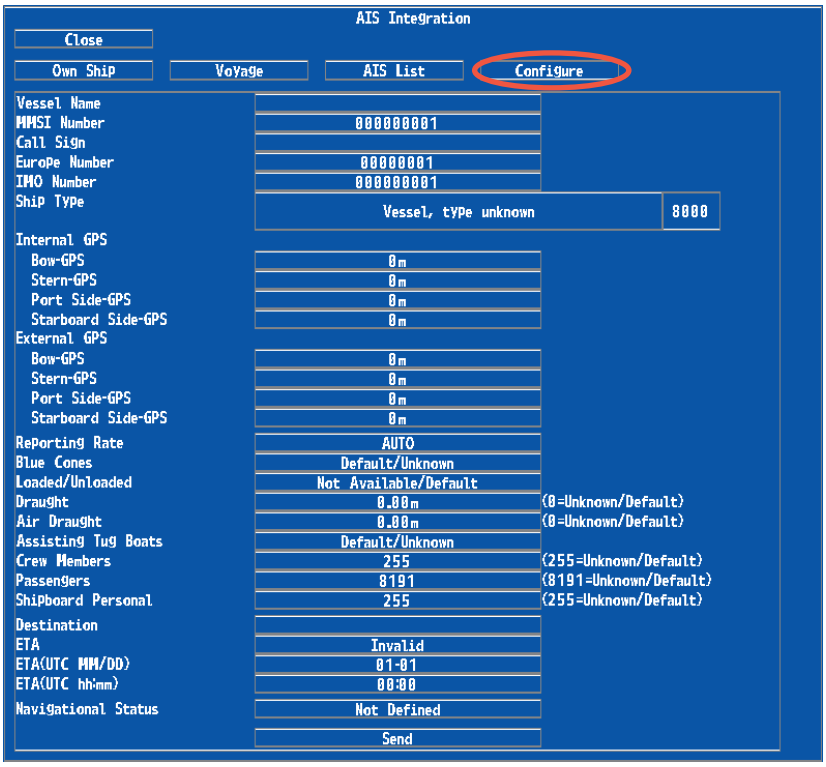
The received kength of ship is displayed. If there is no valid value, "Missing" is displayed.

6 【Beam】

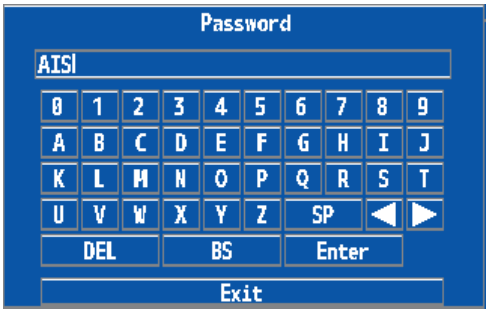
The received beam of ship is displayed. If there is no valid value, "Missing" is displayed.

[Configure]

Edit the information of own ship. Send the changed information to the AIS transponder.



When you press the "configure" button, the password input screen is displayed. Enter the password "AIS".



1 **【Vessel Name】**

The vessel name is changed. You can enter up to 20 letters.

2 **【MMSI Number】**

The MMSI number is changed.

3 **【Call Sign】**

The call sign is changed. You can enter up to 7 letters.

4 **【Europe Number】**

The Europe number is changed.

5 **【IMO Number】**

The IMO number is changed.

6 **【Ship Type】**

The type of own ship is changed.

7 【Internal GPS】

The AIS(internal GPS device) equipment setting position is changed.

Bow-GPS :	Distance from AIS equipment setting position to bow
Stern-GPS :	Distance from AIS equipment setting position to stern
Port Side-GPS :	Distance from AIS equipment setting position to port side
Starboad Side-GPS :	Distance from AIS equipment setting position to starboard side

8 【External GPS】

The GPS equipment setting position is changed.

Bow-GPS :	Distance from GPS equipment setting position to bow
Stern-GPS :	Distance from GPS equipment setting position to stern
Port Side-GPS :	Distance from GPS equipment setting position to port side
Starboad Side-GPS :	Distance from GPS equipment setting position to starboard side

9 【Reporting Rate】

The interval for reporting own ship information is changed.

10 【Blue Cones】

The information of hazardous cargo is changed.

11 【Loaded/Unloaded】

The information of loaded cargo is changed.

12 【Draught】

The static draught of own ship is changed.

13 【Air Draught】

The air draught of own ship is changed.

14 【Assisting Tug Boats】

The number of assisting tugboat is changed.

15 【Crew Members】

The number of crew members on board is changed.

16 【Passengers】

The number of passengers on board is changed.

17 【Shipboard Personal】

The number of shipboard personnel on board is changed.

18 【Destination】

The destination is changed up to 20 letters.

19 【ETA】

The state of ETA value is changed.

20 【ETA(UTC MM/DD)】

The date of ETA is changed.

21 【ETA(UTC hh:mm)】

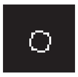
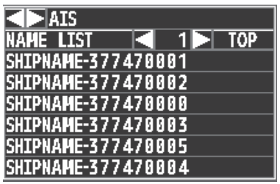
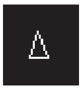
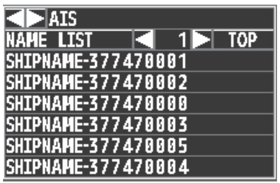
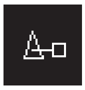
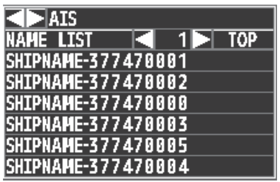
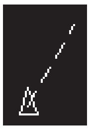
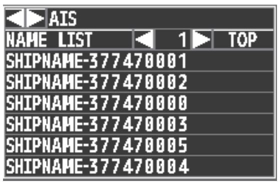
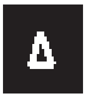
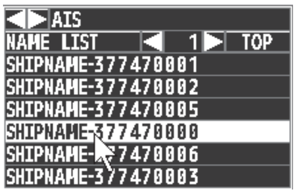
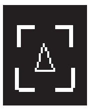
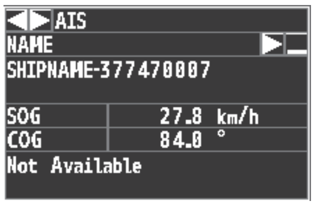
The time of ETA is changed.

22 【Navigational Status】

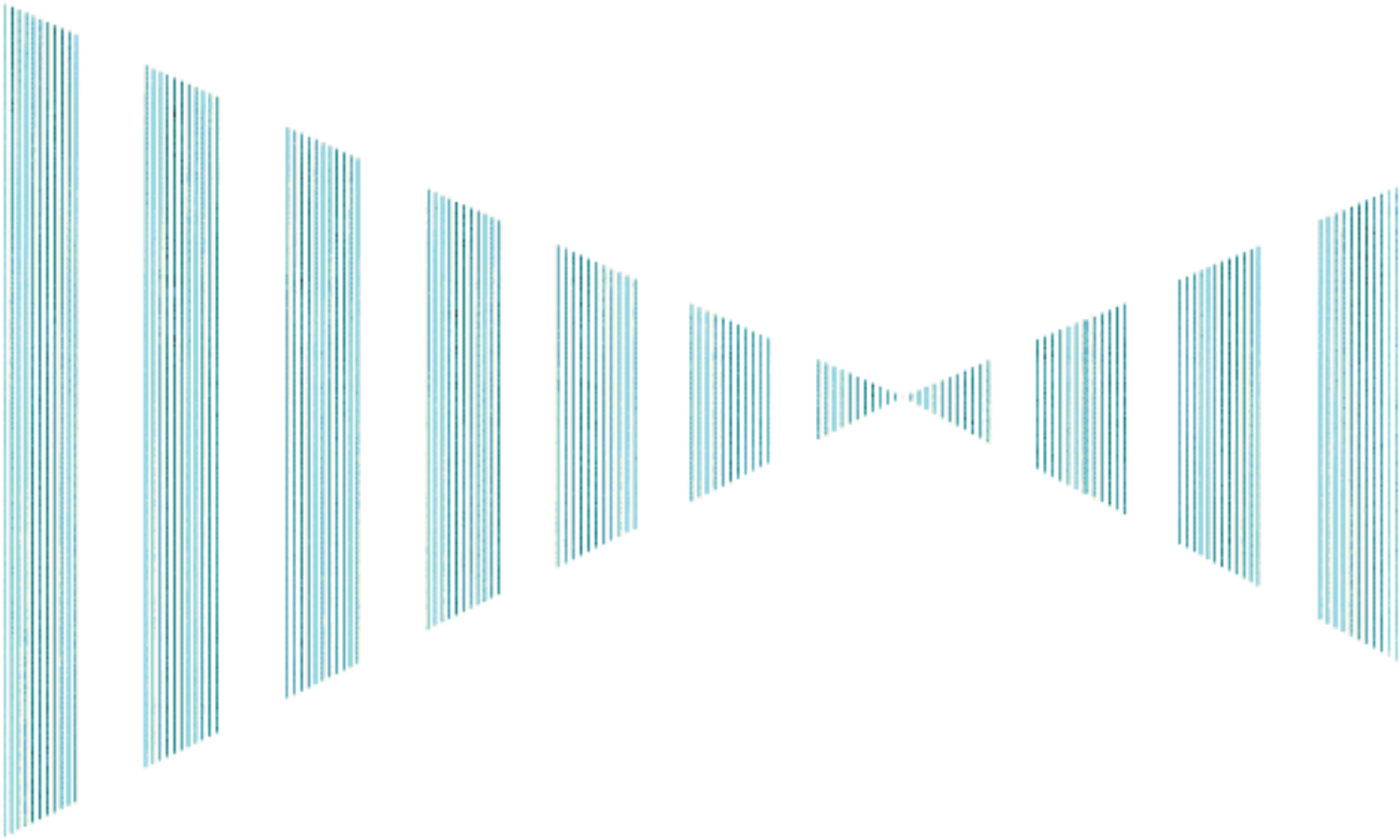
The navigational status of own ship is changed.

3.10.5 AIS SYMBOL

On the screen, the following symbols can be found:

Description	Symbol	AIS information window
AIS target without heading		
AIS target		
AIS target with blue sign		
AIS target with speed		
AIS target which is selected in the left or right top side window		
AIS target which is selected on the screen		

SECTION 4
MEASUREMENT OF RANGE AND BEARING



4.1 MEASUREMENT BY TRACKBALL

Procedures

1 Make sure of the target echoes on the radar display.

2 Move the CURSOR mark to a target by the trackball.

The CURSOR on the radar display indicates the bearing and range of the target. The range is a distance from own ship's position.

45.0°: True bearing of the cursor relative to own ship
3km: Range between the cursor and own ship

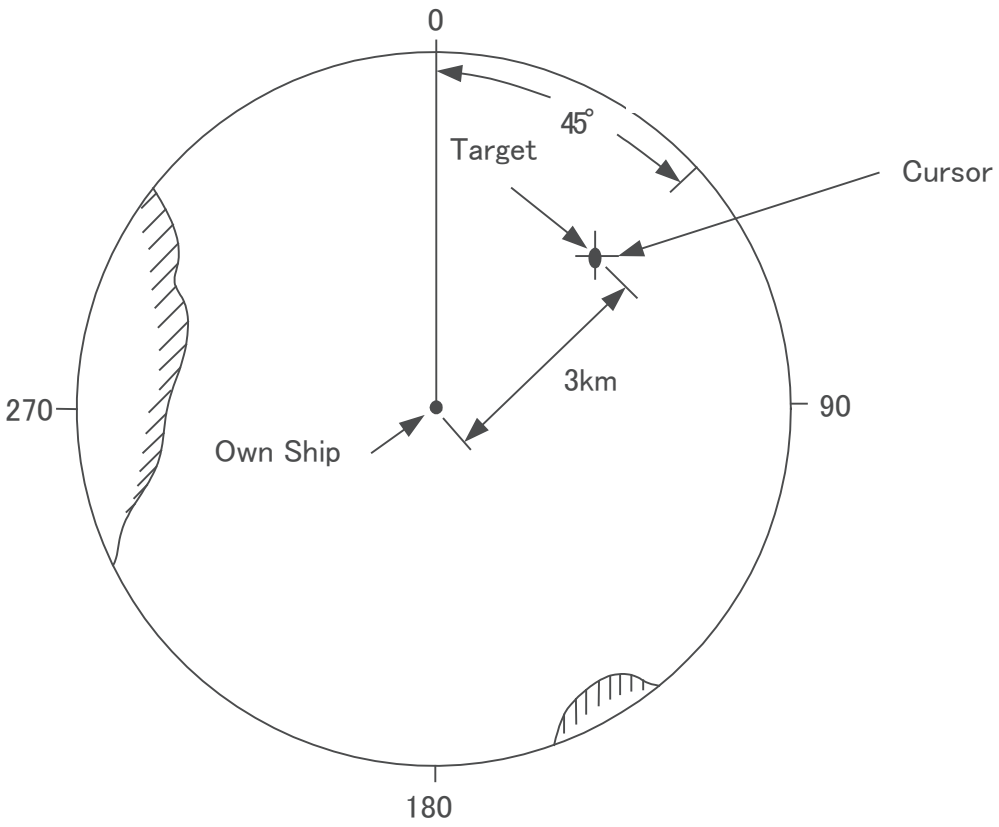


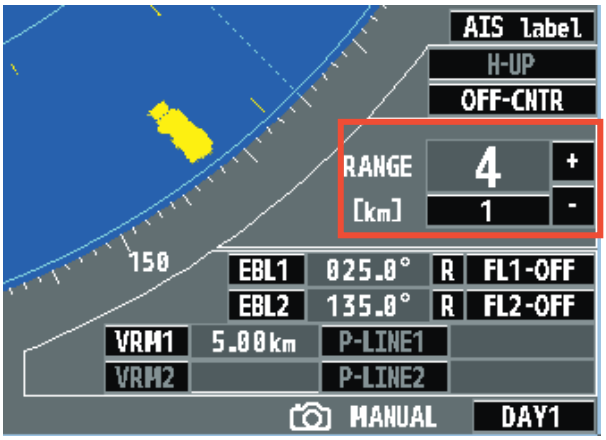
Figure 4.1

4.2 MEASUREMENT BY RANGE RINGS

Procedures

1 Press [RANGE RINGS] key.

The Range Rings will appear on the radar display.
The range between the target and own ships can be determined by visually measuring the target's position that lies between two range rings.



In this case, the distance interval of The Range Rings is 1km.

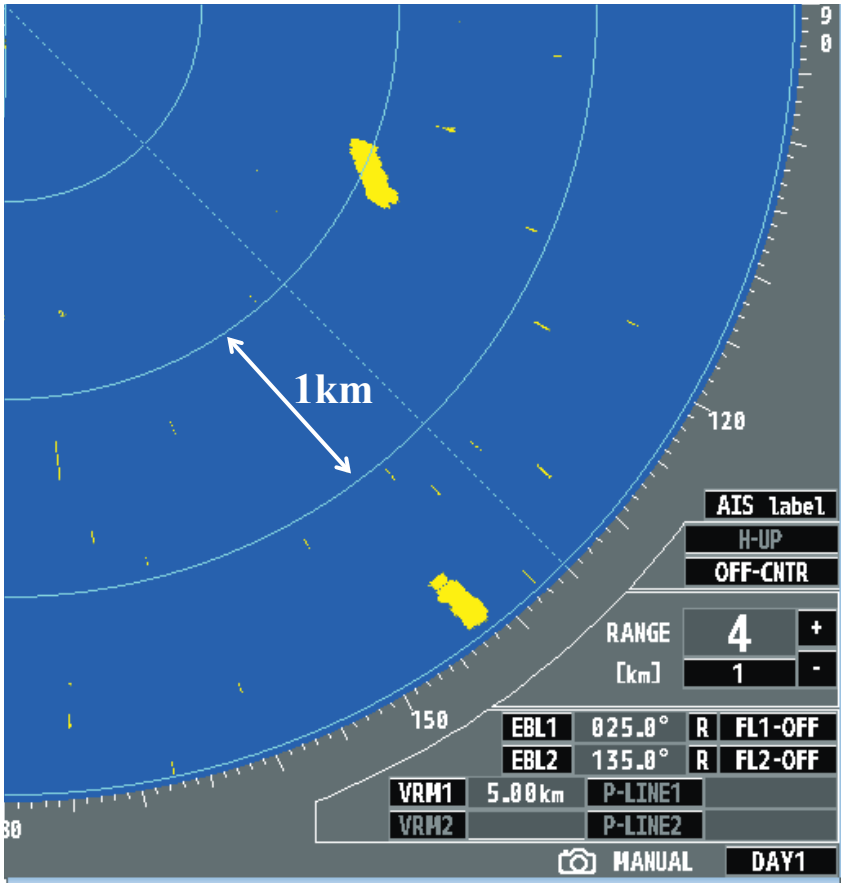


Figure 4.2

For change of the brilliance of range rings, refer to Section 3.3.4 "Adjust Brilliance of Information on Radar Display".

4.3 MEASUREMENT BY EBLS AND VRMS

Procedures

1 Press [EBL1/EBL2] key to select EBL1 display and operation.

The EBL1 button at the lower left of the radar display will be highlighted and the EBL1 will appear as a broken-line on the PPI display.

2 Turn the [JOG DIAL] to put EBL1 on a target.

The bearing of the EBL1 will appear at the lower left of the radar display. The EBL1 bearing represents the target's bearing.

3 Press [VRM1/VRM2] key to select VRM1 display and operation.

The VRM1 button at the lower right of the radar display will be highlighted and the VRM1 will appear as a broken-line circle on the PPI display.

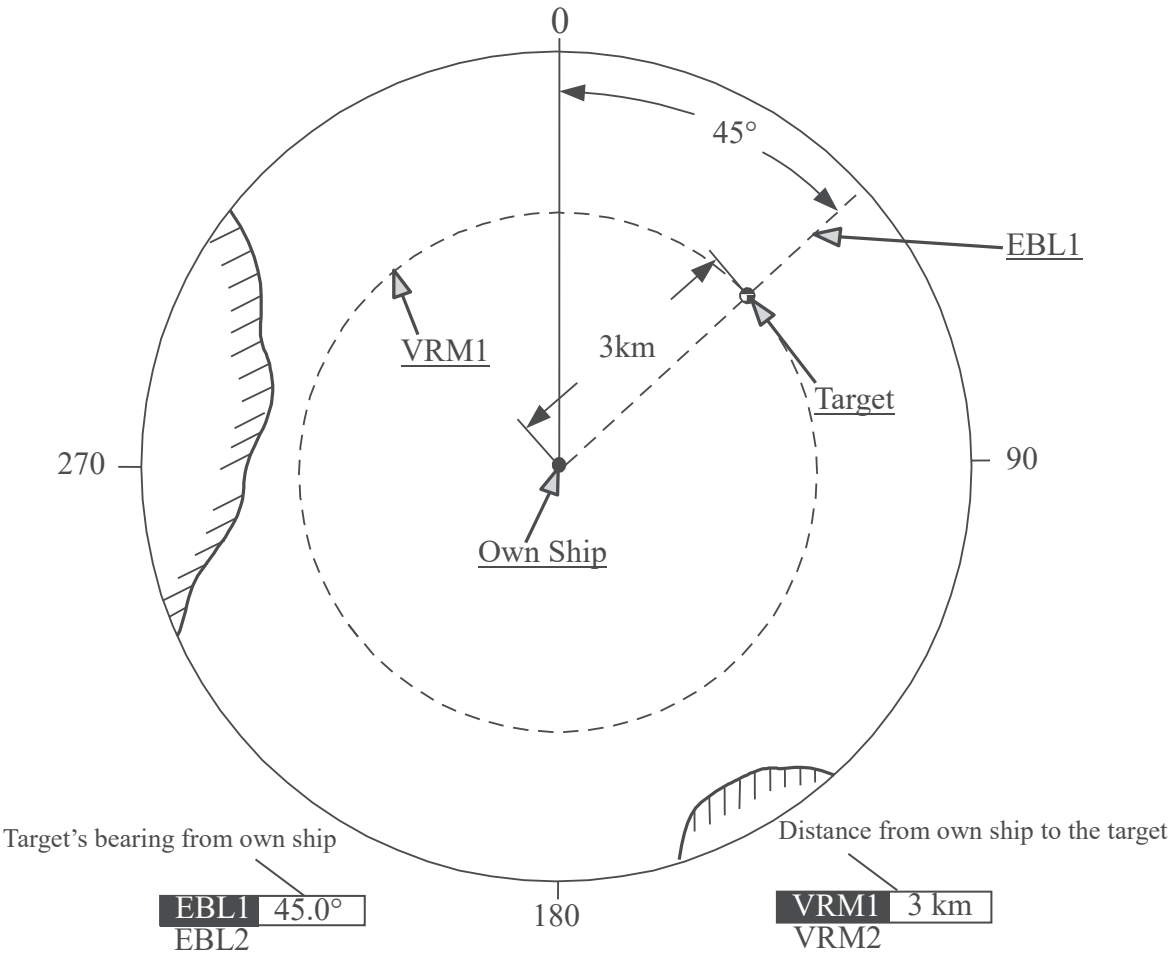
4 Move the broken-line VRM1 to the target by using the [JOG DIAL] control.

The range of the VRM1 from own ship will appear at the lower right of the radar display. The range of VRM1 indicates a distance between the target and own ship.

Refer to **Figure 4.3** in the next page.
In this Figure 4.3, the range and bearing are;
Range: 3km
Bearing: 45.0°

Important information

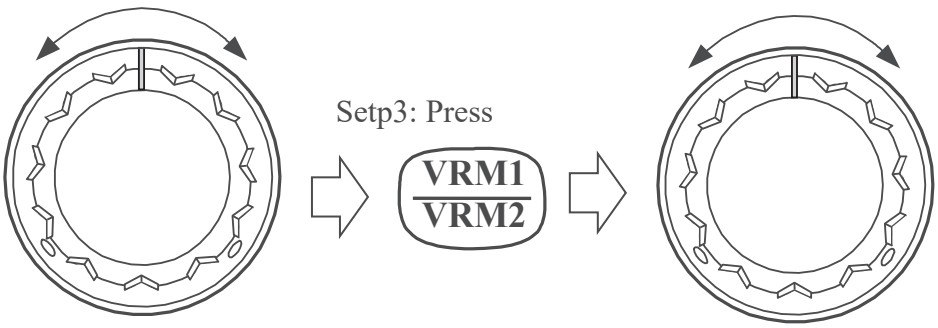
EBL or VRM of JOG DIAL operation can be also operated by Trackball. If you operated EBL or VRM at the last time, you must fix the position of EBL or VRM by pressing ENTER key. Otherwise, the position that you decided is moved by JOG DIAL or Trackball.



<Operation>

Setp1: Press **EBL1/EBL2**

（Note：EBL and VRM use the same JOG DIAL）



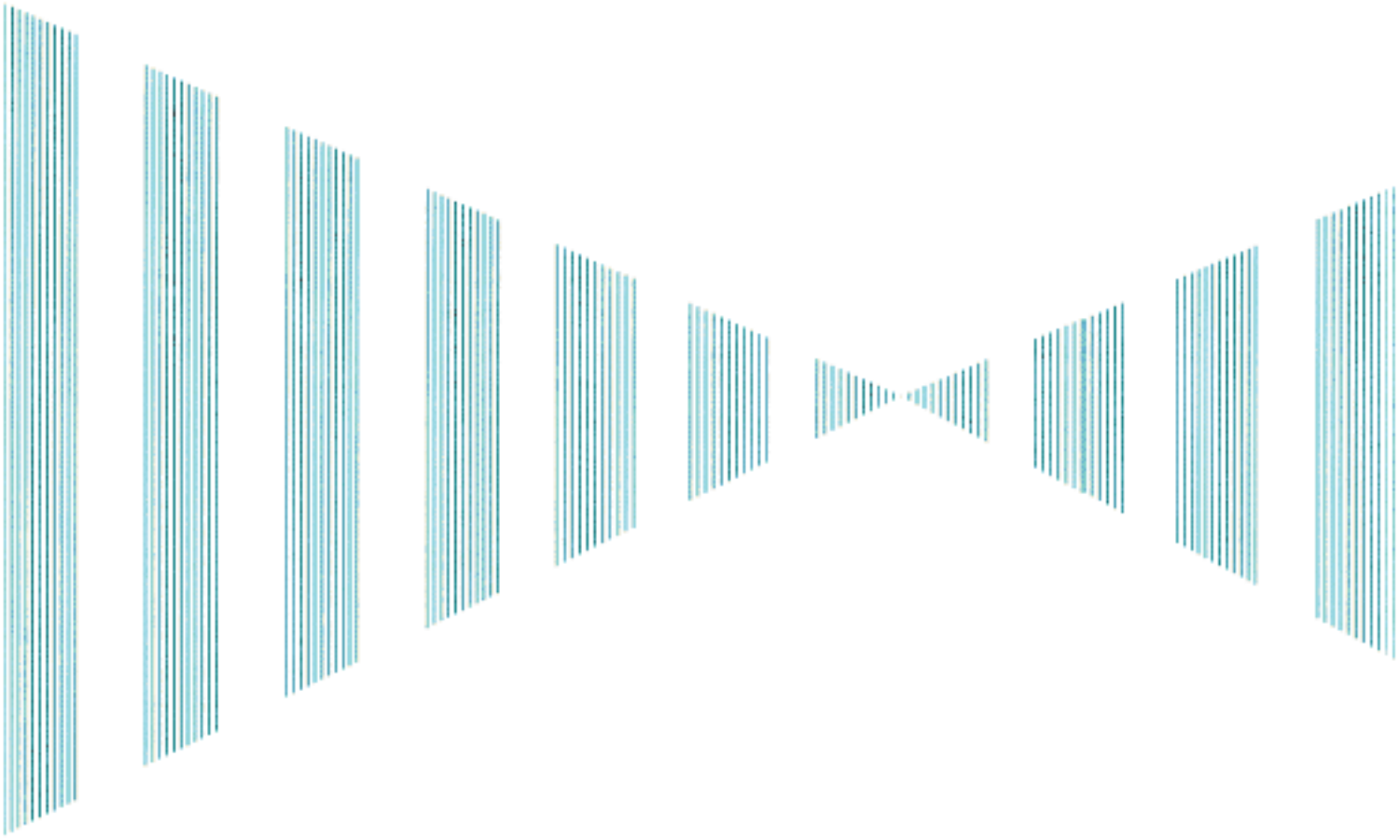
Step2: EBL Control by JOG DIAL

Setp3: Press **VRM1/VRM2**

Step4: VRM Control by JOG DIAL

Figure 4.3

SECTION 5
TRUE AND FALSE ECHOES ON DISPLAY



The radar operator has a role of interpreting the radar displays to provide his best aid in maneuvering the ship. For this purpose, the operator has to observe the radar displays after fully understanding the advantages and disadvantages that the radar has. For better interpretation of radar display, it is important to gain more experiences by operating the radar equipment in fair weathers and comparing the target ships watched with the naked eyes and their echoes on the radar display.
The radar is mainly used to monitor the courses of own ship and other ships in open seas, to check buoys and other nautical marks when entering a port, to measure own ship's position in the coastal waters relative to the bearings and ranges of the shore or islands using a chart, and to monitor the position and movement of a heavy rain if it appears on the radar display.
Various types of radar display will be explained below.

5.1 RADAR WAVE WITH THE HORIZON

Radar beam radiation has the nature of propagating nearly along the curved surface of the earth.
The propagation varies with the property of the air layer through which the radar beam propagates.
In the normal propagation, the distance (D) of the radar wave to the horizon is approximately 10% longer than the distance to the optical horizon. The distance (D) is given by the following formula:

$$D=2.23(\sqrt{h1}+\sqrt{h2})(nm)$$

h1: Height (m) of radar scanner above sea level
h2: Height (m) of a target above sea level

Figure 5. is a diagram for determining the maximum detection range of a target that is limited by the curve of the earth surface in the normal propagation.

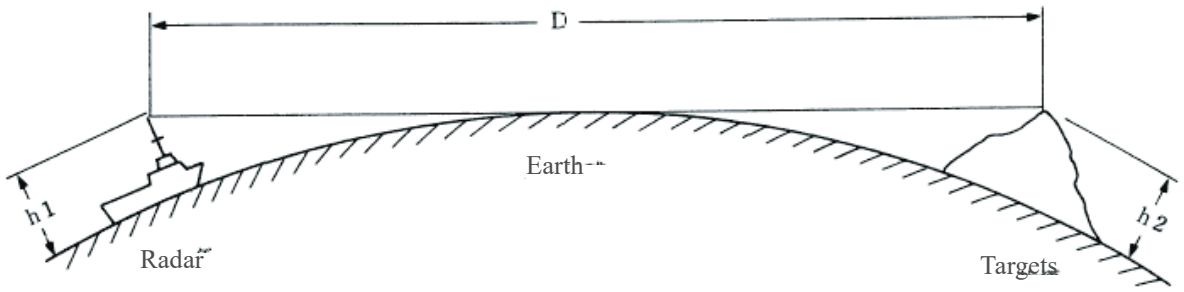


Figure 5.1

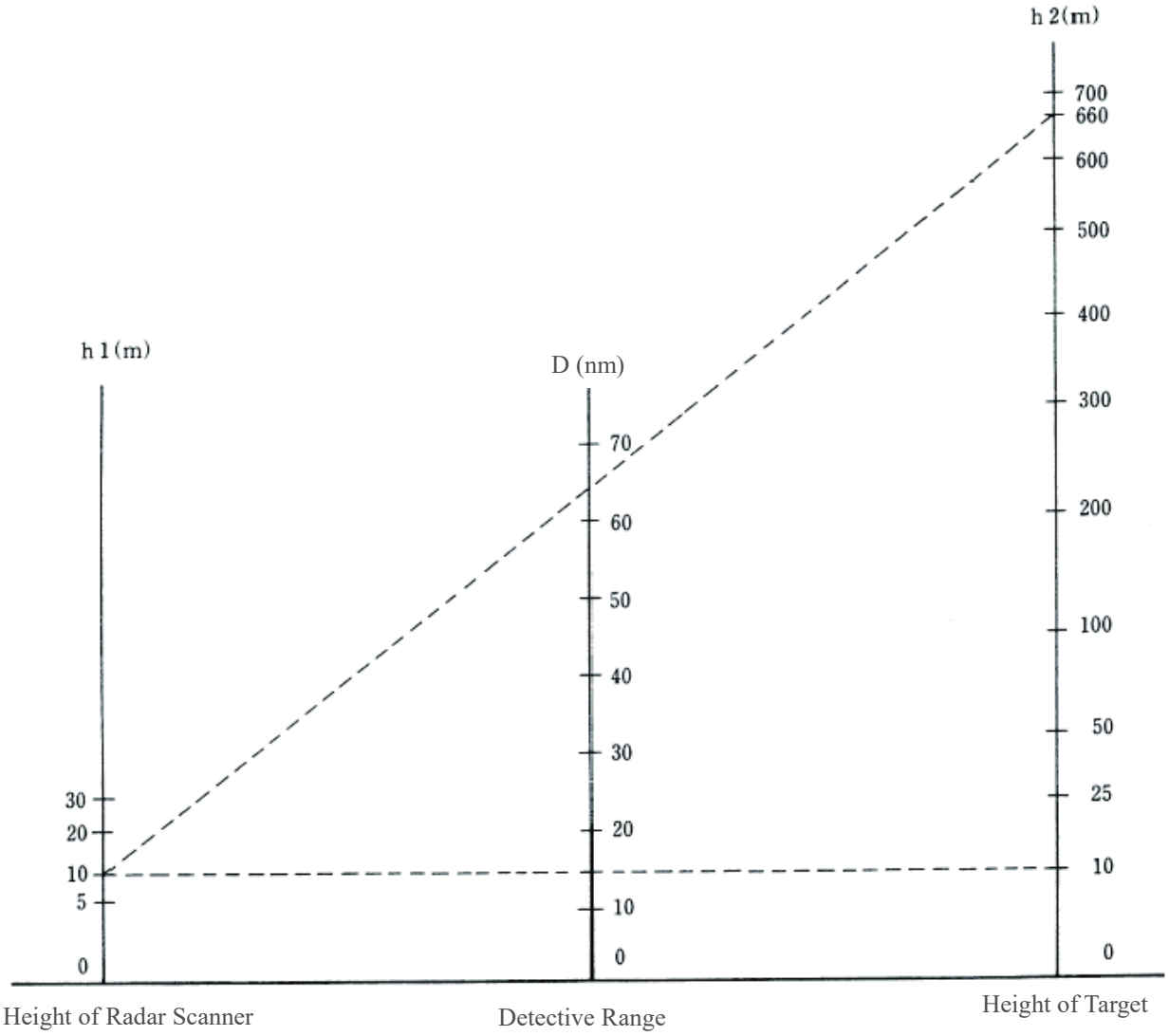


Figure 5.2

When the height of own ship's scanner is 10 m for instance,

(a) A target that can be detected at the radar range of 64 nm on the radar display is required to have a height of 660 m or more.

(b) If the height of a target is 10 m, the radar range has to be approx. 15 nm. However, the maximum radar range at which a target can be detected on the radar display depends upon the size of the target and the weather conditions, that is, the radar range may increase or decrease depending upon those conditions.

5.2 STRENGTH OF REFLECTION FROM THE TARGET

The signal intensity reflected from a target depends not only on the height and size of the target but also on its material and shape. The echo intensity from a higher and larger target is not always higher in general.
In particular, the echo from a coast line is affected by the geographic conditions of the coast.
If the coast has a very gentle slop, the echo from a mountain of the inland appears on the radar display.
Therefore, the distance to the coast line should be measured carefully.

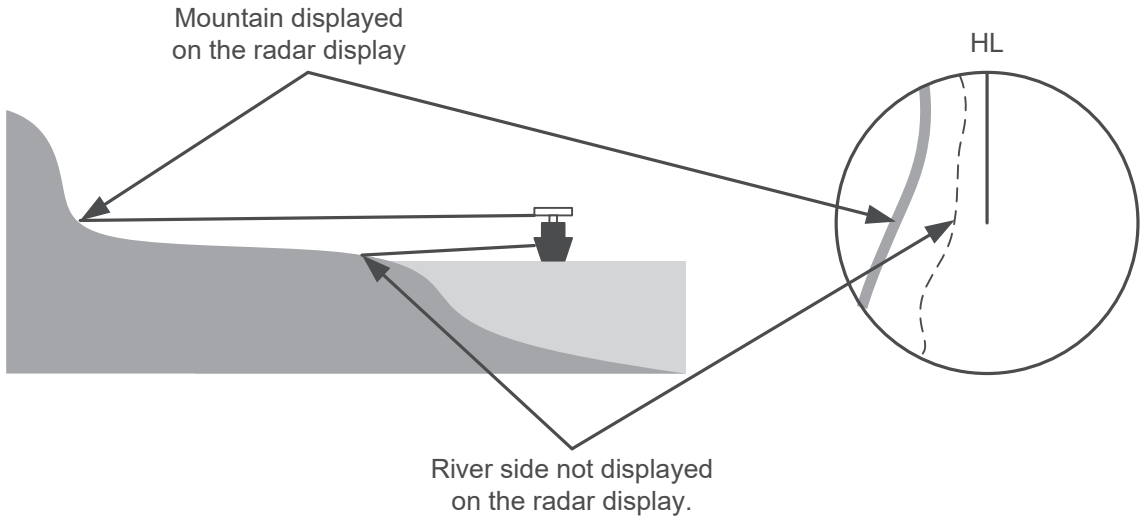


Figure 5.3

5.3 SEA CLUTTERS

In addition to the echo required for observing ships and land radar video image also includes unnecessary echo, such as reflection from waves on the sea surface and reflection from rain and snow. Reflection from the sea surface is called "sea clutter," and reflection from rain and snow is called "rain and snow clutter," and those spurious waves must be eliminated by the clutter rejection function.

[I] Sea clutter

Sea clutter appears as an image radiating outwardly from the center of the radar display and changing depending on the size and the shape of waves. Generally, as waves become larger, image level of the sea clutter is intensified and the clutter far away is also displayed. When waves are large and the sea clutter level is high, it is difficult to distinguish sea clutter from a small boat whose reflection intensity is weak. Accordingly, it is necessary to properly adjust the sea clutter rejection function. Table 5.1 shows the relation between the sea state (SS) showing the size of waves generated by wind and the radar's detection probability.

Table 5.1 Sea state and probability of target detection

RCS	SS1 to 2	SS2 to 3	SS3 to 4	SS4 to 5
1m^2	V-M	M-NV		
5 m^2	V	V-M	M-NV	
10 m^2	V	V	V	V-M

(Probability to detect a target at a distance of 0.7 NM)

V: Detection probability of 80 %
M: Detection probability of 50 %
NV: Detection probability of less than 50 %

As shown in Table5.2, the number of SS increases as the wind speed becomes high and the waves become large. Table 5.1 reveals that detection probability decreases from V (80 %) to NV (less than 50 %) as the number of SS increases. Therefore, even if the sea state is calm and a target clearly appears on the radar display, when the sea state becomes rough, target detection probability decreases resulting in difficulty of target detection by the radar.

Table 5.2 Relation between Douglas sea state and average wind speed and significant wave height

Sea State	Average wind speed (kn)	Significant wave height (m)
0	<4	<0.2
1	5-7	0.6
2	7-11	0.9
3	12-16	1.2
4	17-19	2.0
5	20-25	3.0
6	26-33	4.0

Significant wave height: an average of top N/3 higher waves when the number of waves detected within a constant time duration is N

When observing 5m^2 target in the sea state (SS3) in which significant wave height exceeds 1.2 meters, detection probability is M-NV, as shown in Table5.1, which indicates 50 % or less.

[II] Rain and snow clutter

Rain and snow clutter is a video image that appears in a location where rain or snow is falling. The image changes according to the amount of rain (or the amount of snowfall). As precipitation increases, the image of rain and snow clutter becomes intensified on the radar display, and in the case of localized heavy rain, an image similar to the image indicating land is displayed in some cases. Furthermore, because radio waves tend to attenuate due to rain and snow, the ability to detect a target in the rain and snow clutter or a target beyond the rain and snow clutter may decrease. The amount of attenuation depends on the transmission frequency, antenna beam width, and the pulse length. Figure 5.4 shows examples in which detection distance is reduced due to the influence of precipitation. Because of this, a target, which clearly appeared up to 10 NM (pulse width of 0.8 μs) when it was not raining, may become dimly visible up to 5 NM when the amount of rain becomes 4 millimeters per hour.

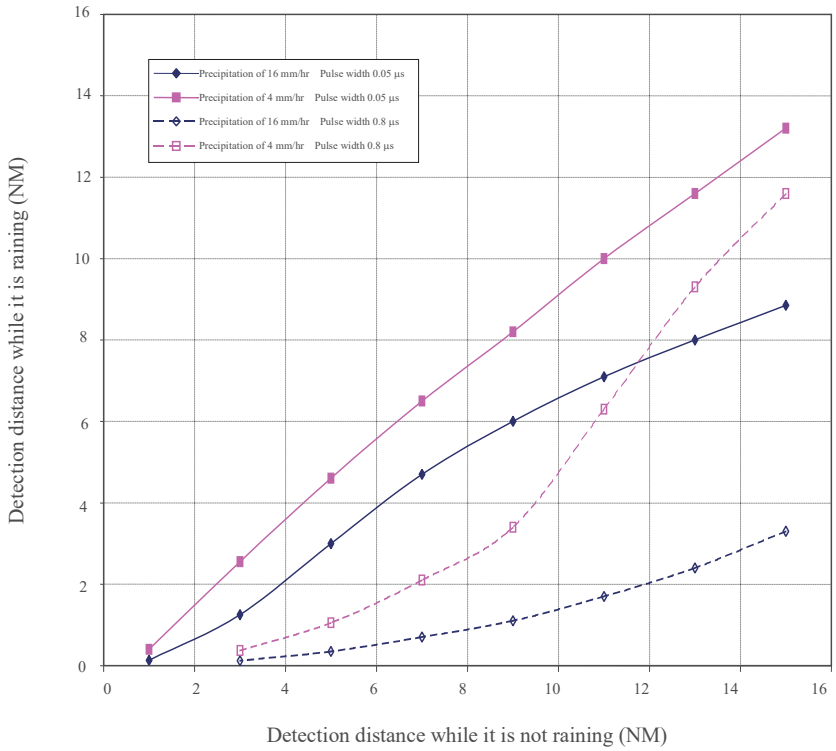


Figure 5.4 Decreased target detection distance due to precipitation

5.4 FALSE ECHOES

The radar observer may be embarrassed with some echoes that do not exist actually. These false echoes appear by the following causes that are well known:

[I] Shadow

When the radar scanner is installed near a funnel or mast, the echo of a target that exists in the direction of the funnel or mast cannot appear on the radar display because the radar beam is reflected on the funnel or mast. Whether there are some false echoes due to shadows can be checked monitoring the sea clutter returns, in which there may be a part of weak or no returns.
Such shadows appear always in the same directions, which the operator should have in mind in radar operation.

[II] Side Lobe Effect

A broken-line circular arc may appear at the same range as the main lobe of the radar beam on the radar display. This type of false echo can easily be discriminated when a target echo appears isolated. (See Figure 5.5)

Figure 5.5

[III] False Echo by Secondary Reflection

When a target exists near own ship, two echoes from the single target may appear on the radar display.
One of those echoes is the direct echo return from the target and the other is the secondary reflection return from a mast or funnel that stands in the same direction as shown in Figure 5.6.

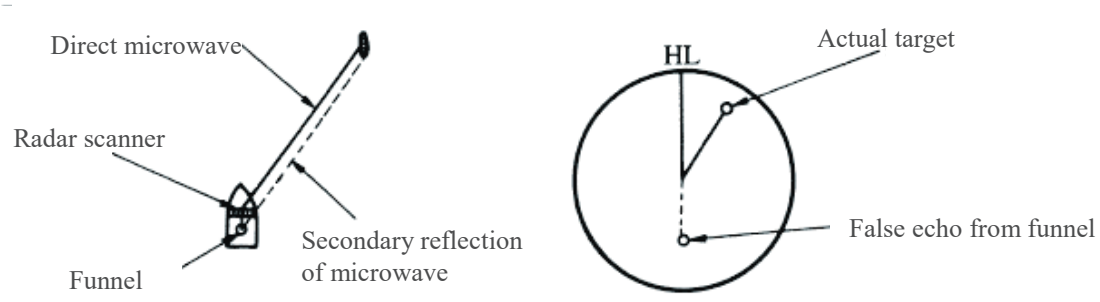


Figure 5.6

[IV] False Echo by Multiple Reflection

When there is a large structure or ship with a high vertical surface near own ship as shown in Figure5.7, multiple refection returns may appear on the radar display. These echoes appear in the same intervals, of which the nearest echo is the true echo of the target.

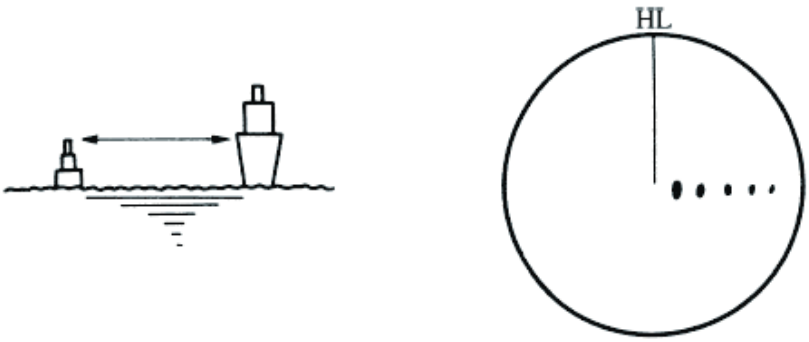


Figure 5.7

[V] Abnormal Propagation

The maximum radar detection range depends upon the height of the scanner and the height of a target as described in the section of “The Horizon for Radar Beam Radiation”. If a so-called “duct” occurs on the sea surface due to a certain weather condition, however, the radar beam may propagate for an abnormally long distance, at which a target may be detected by the radar.

For instance, assuming that the radar range is 4 km (on the repetition frequency of 4000 Hz), the first pulse is reflected from a target at about 37.5 km or more and received during the next pulse repetition time. In this case, a false echo appears at a position that is about 37.5 km shorter than the actual distance.

If the false echo appears at 5 NM on the radar display, the true distance of the target is 2+37.5=39.5 km.

This type of false echo can be discriminated by changing over the range scale (the repetition frequency), because the distance of the target changes accordingly.

[VI] Radar Interference

When another radar equipment using the same frequency band as that on own ship is near own ship, a radar interference pattern may appear on the radar display. This interference pattern consists of a number of spots which appear in various forms. In many cases, these spots do not always appear at the same places, so that they can be discriminated from the target echoes. (See Figure 5.8)

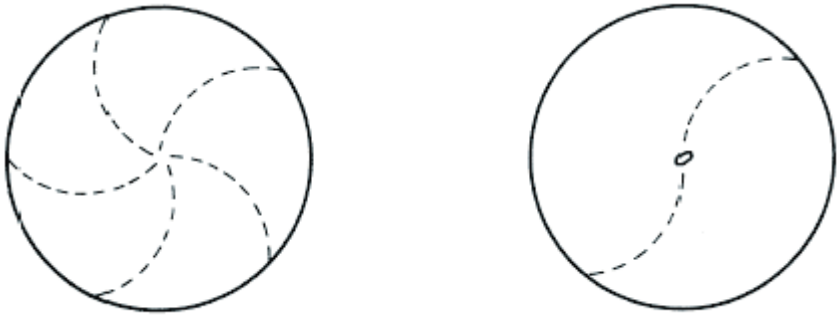


Figure 5.8

If radar equipment causing an interference pattern and this radar are of the same model, their transmitting repetition frequency is nearly the same. As a result, interference patterns may be displayed concentrically.

In this case, the interference patterns cannot be eliminated by using only the interference reflector function, so press **[TX/PRF]** several times to fine-tune the transmitting repetition frequency.

An interference suppressing effect can be heightened by applying a different transmitting repetition frequency to the interference pattern source radar and this radar.

5.5 DISPLAY OF RADAR TRANSPONDER (SART)

The SART (Search and rescue Radar Transponder) is a survival device authorized by the GMDSS (Global Maritime Distress and Safety System), which is used for locating survivors in case that a distress accident occurs at sea. The SART is designed to operate in the 9 GHz frequency band.
When receiving the 9 GHz radar signal (interrogating signal) transmitted from the radar equipment on a rescue ship or search aircraft, the SART transmit a series of response signals to inform the distress position to the rescue and search party.

The setting for SART signal reception

(1)	Sea clutter control:	Minimum (Most counterclockwise)
(2)	Rain and Snow Clutter Control (RAIN):	Minimum (Most counterclockwise)
(3)	TUNE control:	No tuning (to weaken clutter echoes)
(4)	Interference rejecter (IR):	OFF

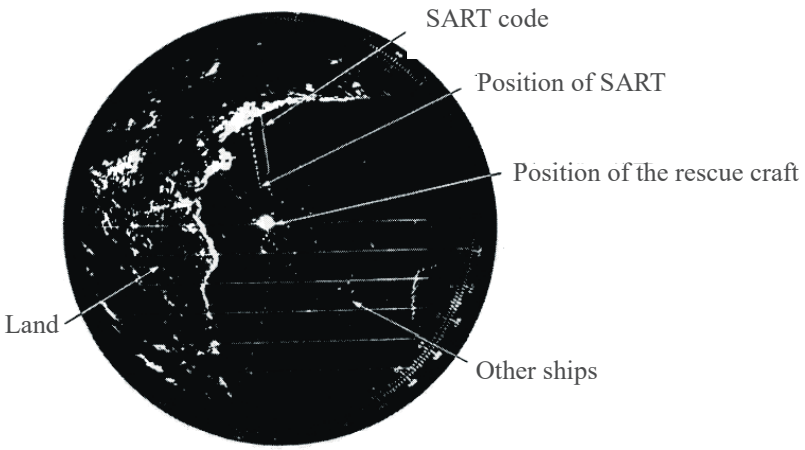
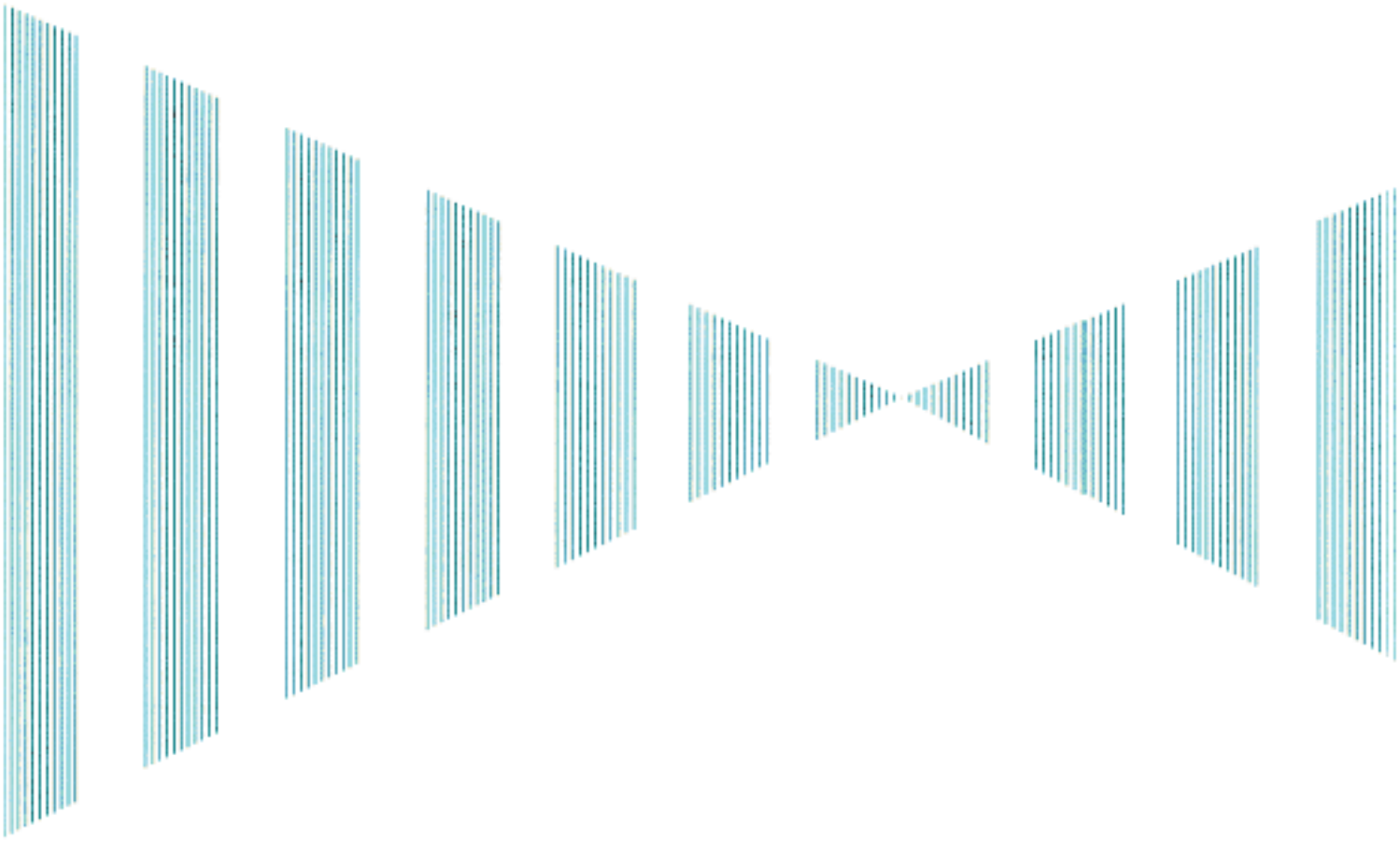


Figure 5.8 [Example of Display]

Attention

- **When you set the radar to detect the SART signal, small targets around own ship will disappear from the radar display. So it is necessary to exercise full surveillance over the conditions around own ship by visual watch in order to avoid any collision or stranding.**
  If two or more sets of radar equipment are installed in own ship, use one set of 9 GHz band radar for detection of the SART signal and operate others as normal radars for avoiding collision and stranding, monitoring targets around own ship, and checking on own ship's position.
  After end of detecting the START signal, adjust the radar normally again. Then the radar returns normally to the nautical mode.

SECTION 6
MAINTENANCE



6.1 ROUTINE MAINTENANCE

WARNING

Never carry out internal inspection or repair work of the equipment by users.

Inspection or repair work by unauthorized personnel may result in fire hazard or electric shock.

Ask the nearest branch, business office or a dealer for inspection and repair.

Turn off the main power before maintenance work. Otherwise, an electric shock may result.

Turn off the main power before cleaning the equipment. Especially, make sure to turn off the indicator if a rectifier is used. Otherwise, equipment failure, or death or serious injury due to electric shock may result, because voltage is outputted from the rectifier even when the radar is not operating.

For operating the radar equipment in the good conditions, it is necessary to make the maintenance work as described below. If maintenance is made properly, troubles will reduce. It is recommended to make regular maintenance work.
Common point of maintenance for each unit is as follows:

Clean the equipment.

Remove the dust, dirt, and sea water rest on the equipment cabinet with a piece of dry cloth.
Especially, clean the air vents with a brush for good ventilation.

6.2 MAINTENANCE ON EACH UNIT

Scanner Unit NKE-387

⚠ WARNING

Turn off the main power source before starting maintenance.

Otherwise, an electric shock or injury may be caused.

Turn off the main power if you need to be near the scanner unit for maintenance or inspection purposes. Direct exposure to electromagnetic waves at close range result in death or serious injury.

Set the safety switch for stopping the scanner unit to the OFF position.

Otherwise, an accidental contact with the rotating scanner unit may cause injury.

CAUTION

Do not put watches, clocks, or magnetic cards close to the modulator unit since this unit holds magnetrons having strong magnetic force. Failure or data destruction of the above devices may result.

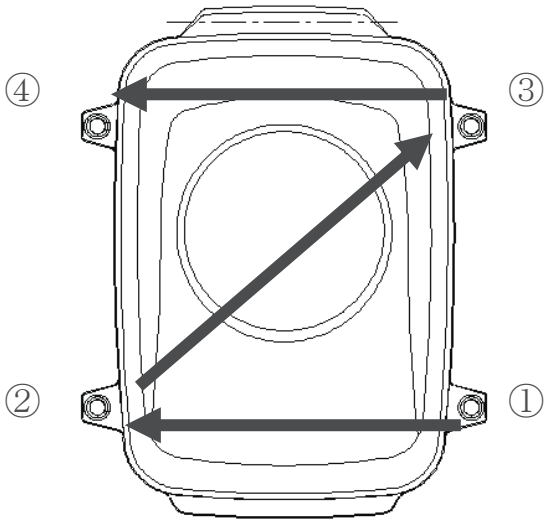
After finishing the maintenance work, turn "ON" the safety switch of scanner unit.

Precautions in Mounting the Cover

When the cover is removed for regular checkup and replacement of parts and refitted after such work, the procedures of fastening bolts shall be taken with the following precautions:

(a) The proper fastening torque of the fitting bolts (M8) is 1176 to 1470 N•cm (120 to 150kgf•cm) (which makes the inside water-tight and protects the packing against permanent compressive strain).
The packing starts being produced from a torque of approximately 1470N•cm (150kgf•cm) on the cover.
Do not fasten the bolts with a torque exceeding the specified value. Otherwise, the screws may be broken.
(b) Use an offset wrench of 11 mm × 13 mm or a double-ended wrench of 13 mm × 17 mm (not longer than 200 mm).
(c) Screw all the bolts by hand first to prevent them playing, then fasten them evenly in order not to cause one-sided fastening. (Fasten the bolts with 25% of the required torque at the first step.)

*: Fasten the bolts in the diagonal order.



Top View of NKE-387
Figure 6.1 Bolt Tightening Procedure of NKE-387 Cover

(1) Radiator

Attention

- **If the radiator front face (radiation plane) is soiled with smoke, salt, dust, paint or birds' droppings, wipe it with a piece of soft cloth wetted with alcohol or water and try to keep it clean at all times. Otherwise, radar beam radiation may attenuate or reflect on it, resulting in deterioration of radar performance.**
- **Never use solvents of gasoline, benzine, trichloroethylene and ketone for cleaning. Otherwise, the radiation plane may deteriorate.**

Check up and clean the radiator.

(2) Rotating section

(a) Supply Oil Seal
When there is not a grease nipple, the replenishment of grease oil is unnecessary.
Remove the cap on the grease nipple located on the side of the X band radar or on the front of S band radar at which the radiator is supported, and grease with a grease gun.
Make the oiling every six months. The oil quantity shall be approximately 100 g, which is as much as the grease comes out of the oil seal. Use the grease of Mobilux 2 of Mobil Oil.

(b) Oiling gears
Apply grease evenly to the tooth surfaces of the main shaft drive gear and the encoder drive gear with a spreader or brush. Oiling in short intervals is more effective to prevent the gears from wear and tear and extend their service life, but oil at least every six months.
Use Mobilux2 of Mobile Oil.

(c) Mounting legs
Check the mounting legs and mounting bolts of the scanner unit case for corrosion at intervals and maintain them to prevent danger. Apply paint to them once a half year because painting is the best measure against corrosion.

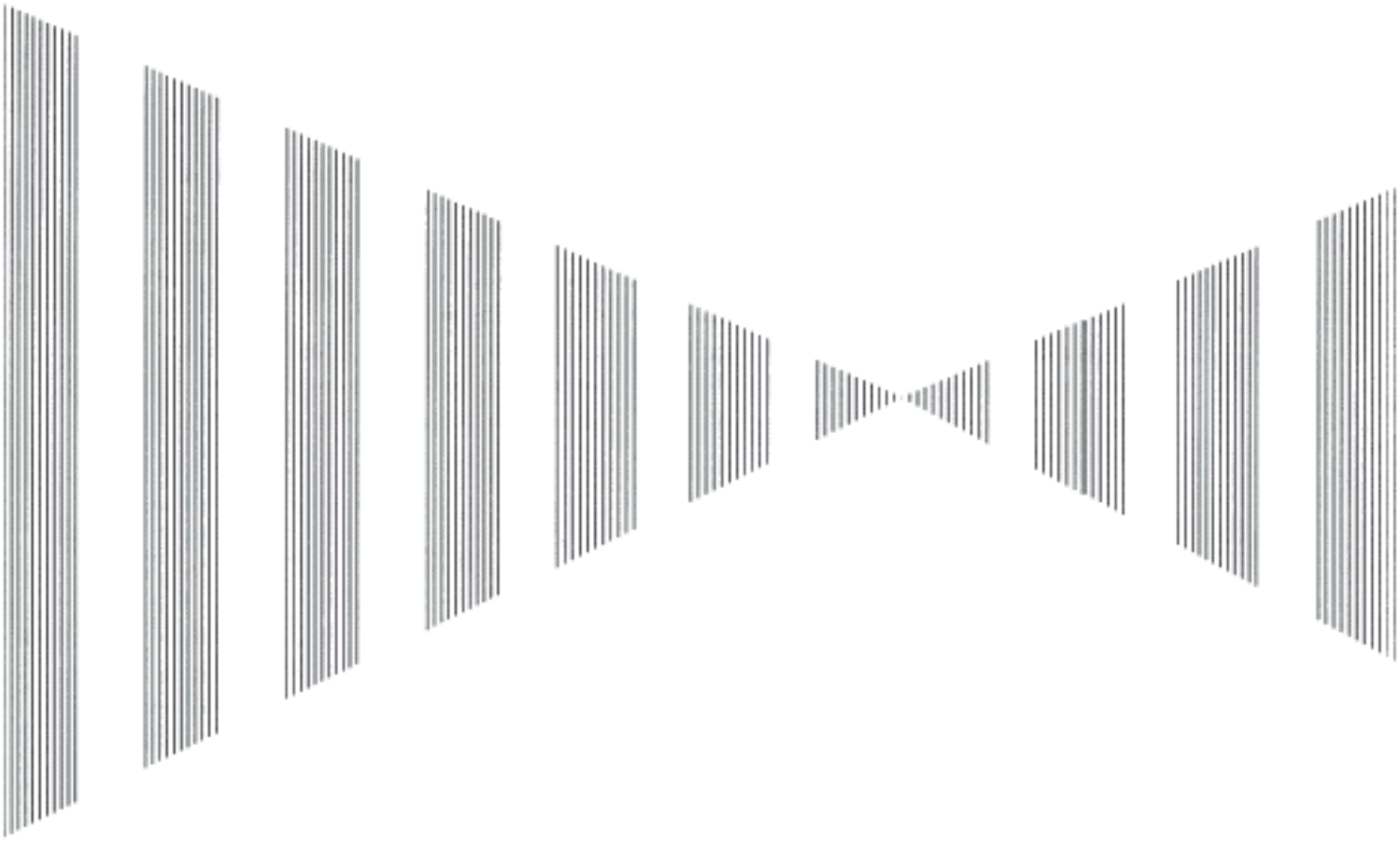
Display Unit (Alpha-screen)

WARNING

When cleaning the screen, do not wipe it too strongly with a dry cloth. Also, do not use gasoline or thinner to clean the screen. Otherwise the screen surface may be damaged.

Dust accumulated on the screen will reduce clarity and darken the video. For cleaning it, wipe it with a piece of soft cloth (flannel or cotton). Do not wipe it strongly with a piece of dry cloth nor use gasoline or thinner.

SECTION 7
TROUBLE SHOOTING



⚠ WARNING

Never carry out internal inspection or repair work of the equipment by users.

Inspection or repair work by unauthorized personnel may result in fire hazard or electric shock.

Ask the nearest branch, business office or a dealer for inspection and repair.

Turn off the main power before maintenance work. Otherwise, an electric shock may result.

Turn off the main power before cleaning the equipment. Especially, make sure to turn off the indicator if a rectifier is used. Otherwise, equipment failure, or death or serious injury due to electric shock may result, because voltage is outputted from the rectifier even when the radar is not operating.

For operating the radar equipment in the good conditions, it is necessary to make the maintenance work as described below. If maintenance is made properly, troubles will reduce. It is recommended to make regular maintenance work.
Common point of maintenance for each unit is as follows:

Clean the equipment.

Remove the dust, dirt, and sea water rest on the equipment cabinet with a piece of dry cloth.
Especially, clean the air vents with a brush for good ventilation.

⚠ WARNING

Turn off the main power source before starting maintenance.

Otherwise, an electric shock or injury may be caused.

Turn off the main power if you need to be near the scanner unit for maintenance or inspection purposes. Direct exposure to electromagnetic waves at close range result in death or serious injury.

Set the safety switch for stopping the scanner unit to the OFF position.

Otherwise, an accidental contact with the rotating scanner unit may cause injury.

7.1 FAULT FINDING

In case of semiconductor circuits, it is deemed that there are few cases in which the used semiconductor devices have inferior quality or performance deterioration except due to insufficient design or inspection or by other external and artificial causes. In general, the relatively many causes are disconnection in a high-value resistor due to moisture, a defective variable resistor and poor contact of a switch or relay.
Some troubles are caused by defective parts, imperfect adjustment (such as tuning adjustment) or insufficient service (such as poor cable contact). It will also be effective to check and readjust these points.
Melted fuses are caused by clear cause. When a fuse is replaced, it is necessary to check the related circuits even if there is no trouble. In checking, note that there is some dispersion in the fusing characteristics.
Table 7-1, 2 shows a list of alarm message displayed on the screen.

Table 7-1 Alarm message list (SYSTEM FAILURE)

ALARM TYPE	MASSAGE	Description
SYSTEM FAILURE	TXRX(SSW Off)	Scanner: Safety switch OFF.
	TXRX(AZI)	Scanner: Azimuth error.
	TXRX(MHV)	Scanner: Modulator's high voltage alarm.
	TXRX(Trigger)	Scanner: TRIGGER error.
	TXRX(HL)	Scanner: HL (antenna directional standard signal) error.
	TXRX(Data)	Scanner: No communication, communication mismatched, checksum error, or collision
	TXRX(Heater)	Scanner: Magnetron heater voltage error.
	TXRX(Reverse)	Scanner: Reverse rotation.
	TXRX(Video)	Scanner: VIDEO error.
	Keyboard(Data)	Operation unit: Communication error or checksum error.
	GPS(Status)	GPS status error.
	GPS(LAT/LON)	Latitude/ Longitude (GPS): No communication or data error.
	GPS(Date/Time)	Date/ Time (GPS): No communication or data error.
	GPS(Speed)	Speed(GPS): No communication or data error.
	PROC(Interrupt)	Process unit: Interrupt error.
	PROC(AZI)	Process unit: Azimuth error.
	PROC(HL)	Process unit: HL (antenna directional standard signal) error.
	PROC(Video)	Process unit: VIDEO error.
	PROC(Trigger)	Process unit: TRIGGER error.
	AIS(Data)	AIS: No communication or data error.
	AIS Alarm ***	Process unit: AIS equipment error.
	Heading(Data)	Heading: No communication or data error.
	Depth 1	Water depth: No communication or data error.
	Depth 2	Water depth: No communication or data error.
	Turn(Data)	Rate of turn: No communication or data error.
	Rudder(Data)	Rudder: No communication or data error.
	Pilot(Data)	Auto-pilot: No communication or data error.
	TRIP(Data)	TRIP: No communication or data error.
	Out of Bounds	Own ship's latitude is over 85° N or 85° S.
	I/F Controller(Data)	Process unit: No communication or data error with I/F circuit

Table 7-2 Alarm message list (GENERAL WARNING)

ALARM TYPE	MASSAGE	Description
GENERAL WARNING	MAX Point	Tried to enter navigation information beyond the specified.
	No Heading Data	N-up selection when bearing data is invalid.
	Invalid Data	Tried to enter any data beyond its range.
	No Position Data	Mark or line input when the latitude and longitude is invalid.
	AIS MAX Target	Maximum number of AIS targets.
	Not Allowed	General operation error.
	POSN Reset	Change the latitude and longitude sentence.
	No Card	Card: Not detected yet.
	Card Full	Card: Run out of free space.
	Invalid Card	Card: Invalid card.
	Read Failed	Card: Read failure.
	Write Failed	Card: Write failure.
	Erase Failed	Card: Erase failure.
	Format Failed	Card: Unformatted card.
	Copying	Displayed-image is capturing to file.
	Slave Mode	Operation of a menu for the scanner unit when the slave mode is active.
	TXRX Standby	Scanner unit completes pre-heat.
	Situation Change	Under changing the Situation Pattern.
	Situation Restore	Complete setting of the Situation Pattern.
	Battery Low	The battery is weakening.
	Battery Dead	The battery is dead.

Table 7-3 shows a list of fuses used in the equipment.

Table 7-3 Fuse List

Location	Parts No.	Current Rating	Protection Circuit	Type
Process Unit	F401	5A	Scanner unit without motor	ST4-5AN1
Process Unit	F402	10A	Motor (CBP-202)	ST6-10AN1

7.2 TROUBLE SHOOTING

As this radar equipment includes complicated circuits, it is necessary to request a specialist engineer for repair or instructions for remedy if any circuit is defective.
There are also troubles by the following causes, which should be referred to in checking or repair work.

1 Poor Contact in Terminal Board of Inter-Unit Cables

a) Poor contact in terminal board
b) The cable end is not fully connected, that it, contacted with earthed another terminal.
c) Disconnected cable wire

2 Poor Contact of Connector within Unit

Reference: This radar equipment is provided with standard spares which include two kinds of fuses. Refer to table 7-4.

Table 7-4 Spare Fuses (for NCM-994)

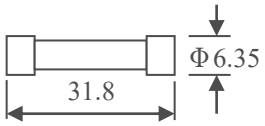
Name	Type/Code	Shape (mm)	In use	Spare	Parts No.	Location
Fuse	ST4-5AN1 (5ZFCA00050)		1	3	F401	Inside processing unit
Fuse	ST6-10AN1 (5ZFCA00053)		1	3	F402	Inside processing unit

Table 7-5 Special Parts (for NKE-387)

Parts No.	Name	Type	Manufacturer	Location	Code
V101	Magnetron	MAF1562R	New JRC	Scanner	5VMAA00116
A101 / A102	Circulator	FCX68R	Orient Microwave	Scanner	5AJIX00027
A103	Termination	NJC4002	New JRC	Scanner	5ANDF00001
A104	Spurious Filter	NJC9952	New JRC	Scanner	5AWAX00002
A301	Diode Limiter	NJS6930	New JRC	Scanner	5ATBT00006

Table 7-6 Circuit Block to be Repaired (for JMR-611)

Location	Circuit Block	Type	Remarks
Scanner unit	Motor	CBP-202	DC brush less motor
Scanner unit	Transmitter circuit	CPA-276	Excluding Magnetron
Scanner unit	Receiver unit	NRG-237B	Including Front-end module
Scanner unit	Power supply circuit	CBD-1783	
Scanner unit	Motor drive circuit	CCB-705	
Scanner unit	Break circuit	CFA-252	Only resistance(10ohm/30W) with cable
Scanner unit	Mag filter circuit	CFR-234G	
Scanner unit	BP circuit	CHT-81	
Scanner unit	Control circuit	CMC-1474	
Processing unit	Radar process circuit	CDC-1513/A	
Processing unit	Terminal board circuit	CQD-2353/A	
Processing unit	Power supply circuit	CBD-1655A	
Processing unit	DC/DC convertor	CBD-1701	For Alpha-screen
Operating unit	Operation circuit	CCK-892A	
Operating unit	Track ball	CHG-198	

7.3 REPLACEMENT OF MAJOR PARTS

⚠ CAUTION

Turn off the main power source before replacing parts. Otherwise, an electric shock or trouble may be caused.

Before replacing the magnetron, turn off the main power source and wait for 5 minutes or more until the high voltage circuits are discharged.

Otherwise, an electric shock may be caused.

Take off your wrist watch when bringing your hands close to the magnetron.

Otherwise, your watch may be damaged because the magnetron is a strong magnet.

Two or more persons shall replace the liquid crystal monitor.

If only one person does this work, he may drop the LCD, resulting in injury.

Even after the main power source is turned off, some high voltages remain for a while.

Do not contact the inverter circuit in the LCD with bare hands. Otherwise, an electric shock may be caused.

Guaranteed term

The guaranteed term is for one year from after the receipt of the product to the customer, but against the magnetron refers to below.

Part name	Type/code	Guaranteed term
Magnetron	MAF1562R / 5VMAA00116	for 4000 hours

Magnetron guarantee condition :
Only for the radar has sensitivity remarkable decrease, another case is without guaranteed term.

Exchange standard of a regular change parts

In this radar there are parts that recommend a regular exchange. Before the parts are increasingly consumed and don't work, the exchange is recommended.
A standard exchange interval of each part is as follows.
Remark) 1. The life of parts changes by the using system environment.
2. The following standard exchange interval is not guaranteed value.

Part name	Standard exchange interval	Type/code	The occurrence of phenomenon when parts were consumed
Scanner Motor	20000 hours	CBP-202 / CBP-202	Allophone generation and rotation stop.
Fan motor in NDC-1774	40000 hours	109R0812H4D01 / 5BFAB00687	Shortening the service life of the circuit in control unit.
Backup battery in CDC-1513	5 years	CR2032 / 5ZBCJ00012	Stopping of built in clock in the radar process circuit.

The radar performance decreases though the parts can work even if the following parts pass the exchange standard interval.

Part name	Standard exchange interval	Type/code	The occurrence of phenomenon when parts were consumed
Magnetron	12 months (Available time of average is from about 6000 to 8,000hours.)	MAF1562R / 5VMAA00116	The radar sensitivity decreases, and it becomes difficult to take the tune.

Important information :

When the product is used under the following environments, the parts life time might become remarkably short.

Part name	Environment of the product using
Scanner Motor	Vibration of radar mast more than product standard. Or continuous driving under strong wind.
Fan motor in NDC-1774	Installation of process unit(NDC-1774) to space that becomes high temperature sealed.

Replacement of magnetron (V101)

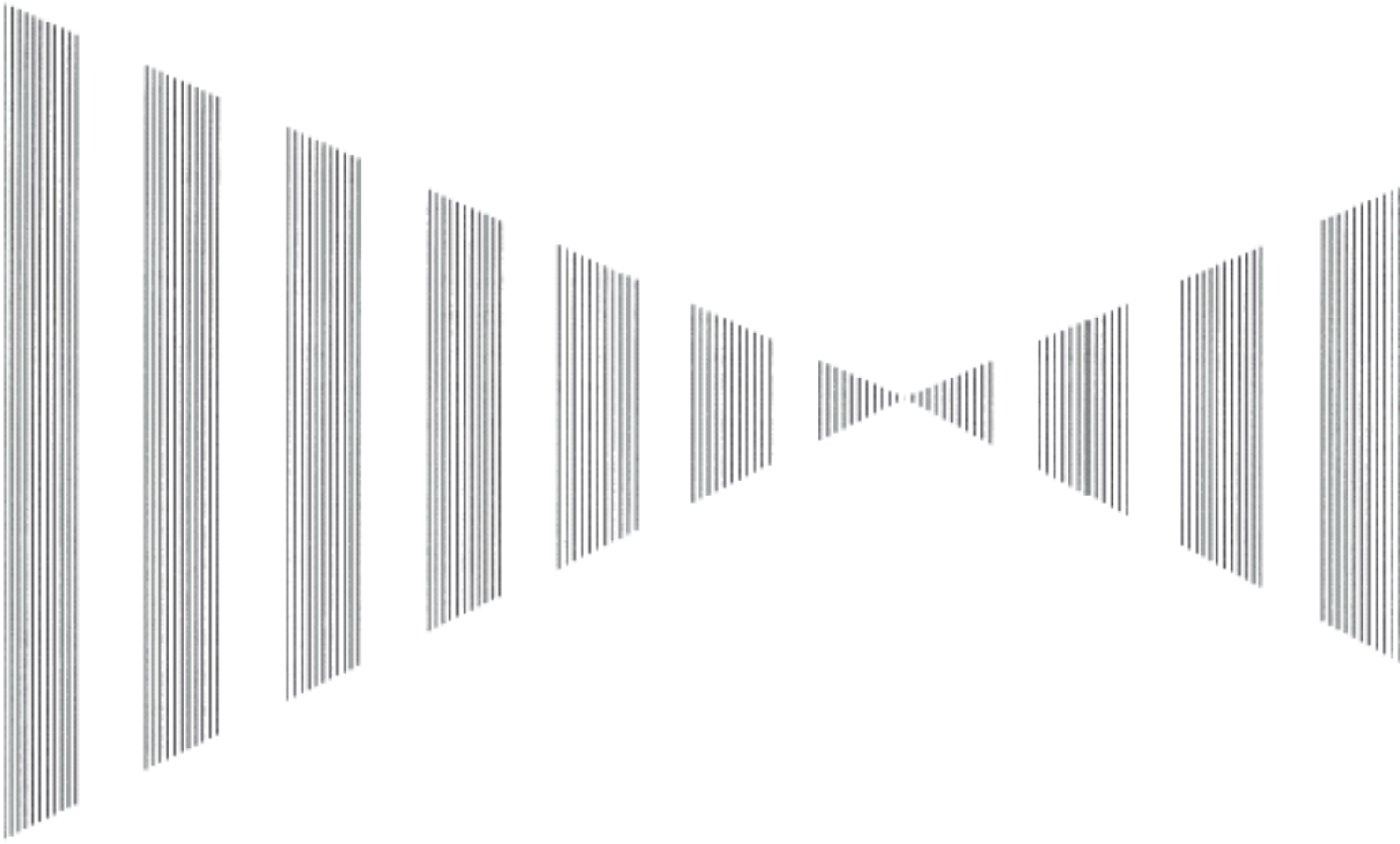
Remove the shield cover of the modulator and check that no charge remains in the high-voltage modulator circuit. Then, disconnect the lead wire of the magnetron. The magnetron can be demounted by removing the screws fixing it. When mounting a new magnetron, do not touch the magnet with a screwdriver or put it on an iron plate. After replacement, connect the lead wire correctly.

Handling of Magnetron under Long-Time Storage

The magnetron that has been kept in storage for a long time may cause sparks and operate unstably when its operation is started. Perform the aging in the following procedures:

(1) Warm up the cathode for a longer time than usually. (20 to 30 minutes in the STBY state.)
(2) Start the operation from the short pulse range and shift it gradually to the longer pulse ranges. If the operation becomes unstable during this process, return it to the standby mode immediately. Keep the state for 5 to 10 minutes until the operation is restarted.

SECTION 8
AFTER-SALES SERVICE



When you Request for Repair

If you suppose the product may be out of order, read the description in Section 8 carefully and check the suspected point again.
If it is still out of order, you are recommended to stop operation of the equipment and consult with the dealer from whom you purchased the product, our branch office in your country or district, or the sales department in our main office in Tokyo.

- Repair within the Warranty Period

  If any failure occurs in the product during its normal operation in accordance with the instruction manual, the dealer or JRC will repair free of charge. In case that any failure is caused due to misuse, faulty operation, negligence or force major such as natural disaster and fire, the product will be repaired with charges.

- Repair after the Warranty Period

  If any defective function of the product is recoverable by repair, the repair of it will be made at your own charge upon your request.

- Necessary Information for Repair

  ☆ Product name, model, manufacturing date and serial number
  ☆ Trouble conditions (as detailed as possible. Refer to "Radar Failure Check List" in page 8-2.)
  ☆ Name of company/organization, address and telephone number

Recommended Maintenance

The performance of the product may deteriorate due to the secular change of the parts used in it, though such deterioration depends upon the conditions of operation.
Thus, checkup and maintenance is recommendable for the product in addition to your daily care.
For maintenance, consult with the near-by dealer or our sales department.
Such maintenance will be made with charges.

For further details of after-sale service, contact the JRC Offices in the list at the end of this manual.

Radar Failure Check List

When placing an order for repair of the product, it is requested that you could confirm the check items and fill the results and sent the sheet to our contact.
If there is any unclear items, contact the ship on which the product is installed, and give the correct information on the product.

Ship name:_____Phone:_____Fax:_____
Radar general model name: JMR-_____Serial No. :_____
(Write the full model name correctly)

(1) Check the following items in the order of the number, and circle the applicable answer between YES or NO. If the item cannot be determined as YES or NO, explain in detail in the item (18), others.
(2) If any of the items (1) to (5) is marked as NO, check the fuse of the NDC-1774.
(3) Check the items (4) to (15) while the transmission (TX) is ON.

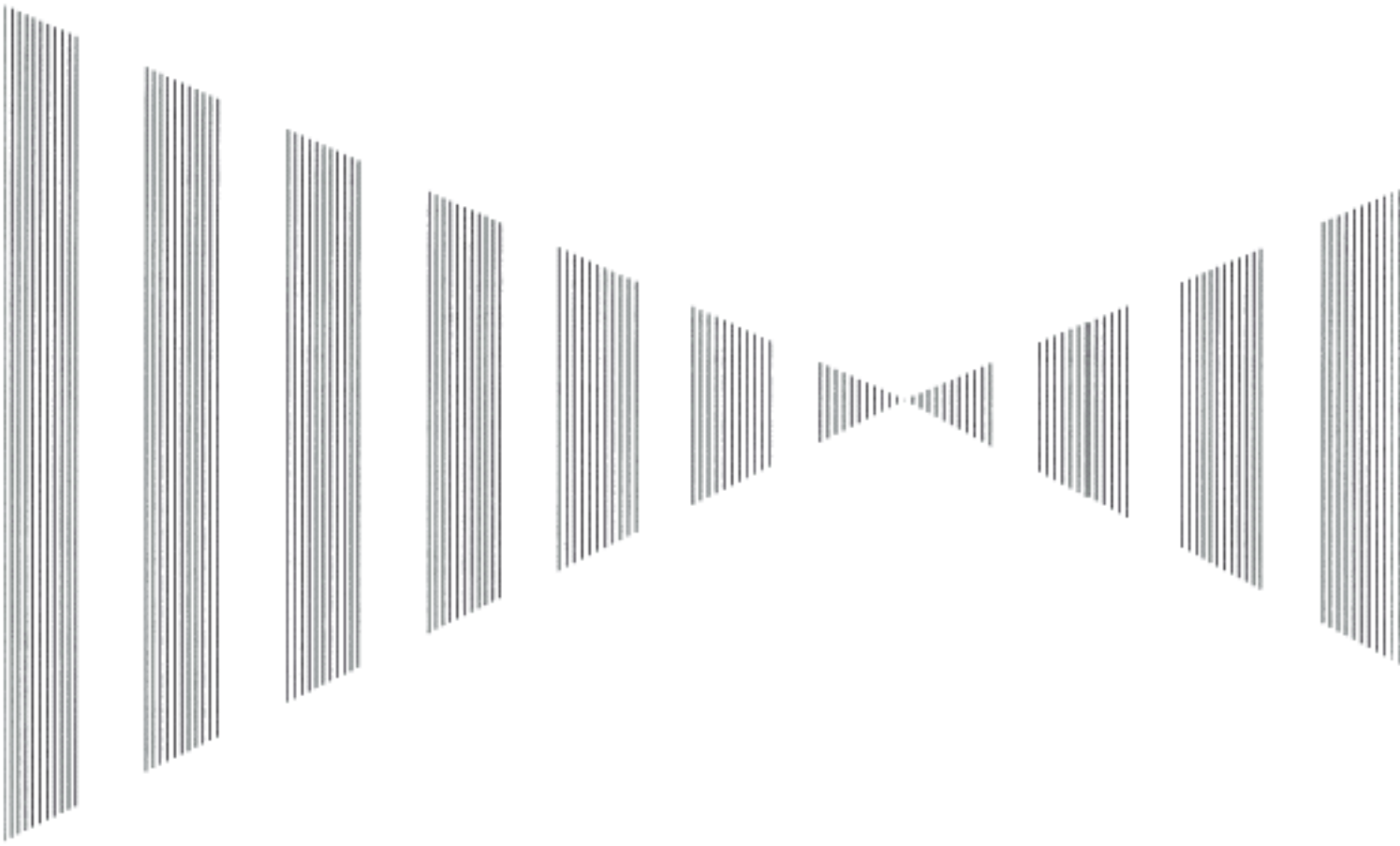
* Functions mentioned in the items (14), and (15) may be optional, answer is not necessary.

No.	Check Item	Result	
(1)	Power can be turned on. (The lamp on the operation panel is lit)	YES	NO
(2)	A few minutes after powering-on, it will become standby status (TX Ready).	YES	NO
(3)	When powering-on (or TX ON), LCD displays something (LCD is lit).	YES	NO
(4)	The scanner rotates at the transmission (TX) ON. (Check the following items while transmission is ON)	YES	NO
(5)	Current is supplied to the magnetron. (Refer to the instruction manual)	YES	NO
(6)	Tuning is enabled. (Check with the range of 8 km or more)	YES	NO
(7)	Fixed marker is displayed.	YES	NO
(8)	VRM is displayed.	YES	NO
(9)	While noise is displayed while set at STC and FTC minimum, GAIN maximum, IR-OFF and range 32km.	YES	NO
(10)	Target reflection echo is displayed.	YES	NO
(11)	Sensitivity of reflection echo is normal.	YES	NO
(12)	EBL is displayed.	YES	NO
(13)	Cursor mark moves.	YES	NO
*(14)	GYRO course can be set and normally displayed.	YES	NO
*(15)	LOG speed can be normally displayed.	YES	NO

(16) Others (Error message, etc.)_____

_____

SECTION 9
DISPOSAL



DISPOSAL

9.1 DISPOSAL OF THE UNIT

When disposing of this unit, be sure to follow the local laws and regulations for the place of disposal.

9.2 DISPOSAL OF USED BATTERIES

WARNING

When disposing of used lithium batteries, be sure to insulate the batteries by taping the ⊕ and ⊖ terminals.
Otherwise, heat generation, explosion or a fire may occur.

In this unit, Lithium batteries are used for the following parts:
Radar Process circuit (CDC-1513): BT300 (Panasonic Corporation Energy Company: CR2032)

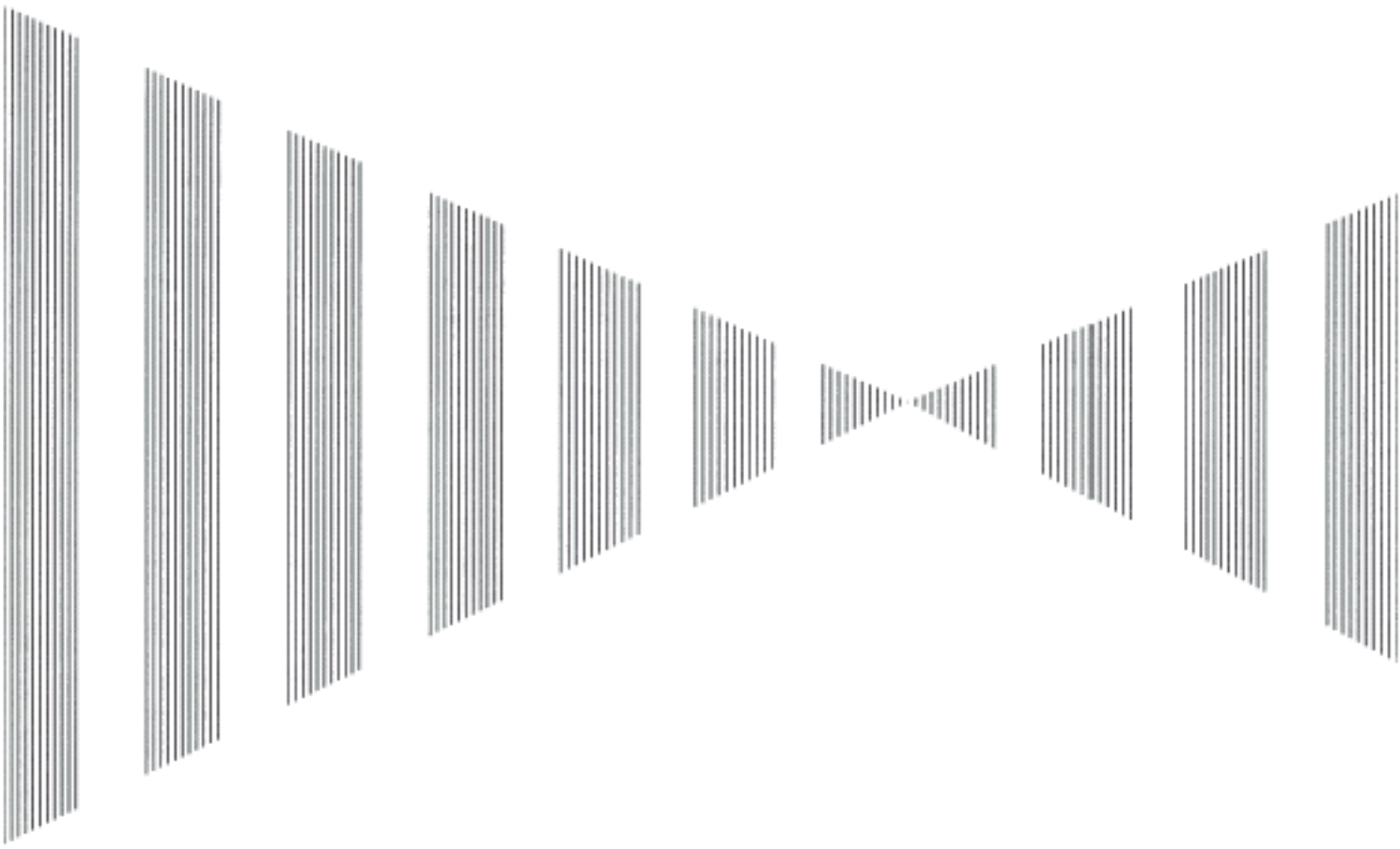
- Do not store used lithium batteries. Dispose of them in accordance with regulations of local government.
- When disposing of used lithium batteries be sure to insulate the batteries by taping the ⊕ and ⊖ terminals. For disposal of batteries, be sure to follow the local laws and regulations.
  For detail, consult with the dealer you purchased the product our business office, or local government.

9.3 DISPOSAL OF USED MAGNETRON

Magnetron is used in the Scanner （NKE-387）

- When the magnetron is replaced with a new one, return the used magnetron to our dealer or business office.
  For detail, consult with our dealer or business office.

SECTION 10
SPECIFICATIONS



10.1 JMR-611 TYPE RADAR

(1)	Type of Emission	P0N
(2)	Display type	PPI method, vertically long display
(3)	Display panel	Radar video effective diameter of 270mm (min)
(4)	Range Scale	0.1, 0.2, 0.3, 0.4, 0.5, 0.8, 1.2, 1.6, 2, 4, 8, 16 and 32km
(5)	Range Resolution	Less than 15m
(6)	Minimum Detective Range	Less than 15m
(7)	Range Accuracy	Within ±1.5% of range in use or ±5m
(8)	Bearing Accuracy	Less than 1°
(9)	Bearing Indication	Relative Motion mode: Head-up/North-up
(10)	Ambient Condition	According to IEC60945 Temperature Scanner: -25 to +55℃ (Storage Temperature:+70℃) Other Unit except Scanner: -15 to +55℃ Relative Humidity 93% at +40℃ Vibration 2 to 13.2Hz, amplitude ±1mm ±10% 13.2 to 100Hz, Gravity acceleration 0.7m/s^2 Velocity of the wind 27.8m/s(54kt)
(11)	Power Supply Input	+24VDC (Display Unit) +24VDC (Scanner) * Display Unit and Scanner correspond to 100VAC/220VAC when use NBA-5111.
(12)	Power Consumption	Approx. 400W (In maximum wind velocity)
(13)	Power Supply Voltage Fluctuation	+24VDC –10/+30% (Display Unit) +24VDC –10/+30% (Scanner Unit)
(14)	Pre-heating Time	Approx. Within 1min30sec

10.2 SCANNER (NKE-387)

(1)	Dimensions	Height 427mm×Swing Circle 2230mm	
(2)	Mass	Approx. 34kg	
(3)	Polarization	Horizontal Polarization	
(4)	Directional Characteristic	Horizontal Beam Width:	1.0° (-3dB width)
		Vertical Beam Width:	29° (-3dB width)
		Sidelobe Level: Horizontal	Below –26dB (within ±10°)
			Below –32dB (outside ±10°)
		Vertical	Below -25dB
(5)	Revolution	Approx. 24/36/48 rpm	
(6)	Peak Power	4.9kW	
(7)	Transmitting Frequency	9410 ±30MHz	
(8)	Transmitting Tube	MAF1562R	
(9)	Pulse width/Repetition Frequency		

0.1km	0.05μS/4000Hz	
0.2km	0.05μS/4000Hz	
0.3km	0.05μS/4000Hz	
0.4km	0.05μS/4000Hz	
0.5km	0.05μS/4000Hz	
0.8km	0.05μS/4000Hz	
1.2km	0.05μS/4000Hz	
1.6km	0.05μS/4000Hz	
2km	0.05μS/4000Hz	0.1μS/2000Hz
4km	0.1μS/2000Hz	0.3μS/2000Hz
8km	0.3μS/2000Hz	0.6μS/1000Hz
16km	0.6μS/1000Hz	
32km	0.6μS/1000Hz	
64km	0.6μS/1000Hz	

(10)	Duplexer	Circulator + Diode Limiter
(11)	Mixer	MIC Front End
(12)	Intermediate Frequency Amplifier	Intermediate Frequency: 60MHz Receiver characteristic = Logarithmic receiver
(13)	Overall Noise Figure	7.5 dB (Average)

10.3 CONTROL UNIT(NCM-994)

(1) Mounting	Table mounting													
(2) Video Output	RGB, H-sync and V-sync (SXGA)													
(3) Range Scale	0.1	0.2	0.3	0.4	0.5	0.8	1.2	1.6	2	4	8	16	32km	
(4) Range Ring	0.025	0.05	0.1	0.1	0.1	0.2	0.2	0.4	0.4	1	2	4	8km	
(5) Variable range marker	Digital read-out on the screen (4 characters) 2 kinds of VRM													
(6) EBL	Digital read-out on the screen (4 characters) 2 kinds of EBL													
(7) Cursor	Range, Bearing, and Lat./Lon.													

(8) Dimension

	Processing	Keyboard
Height:	approx. 170mm	45mm
Width:	approx. 360mm	290mm
Depth:	approx. 340mm	123mm

(9) Mass

Processing	Keyboard
approx. 6.9kg	1.0kg

(10) Tune mode — Auto/manual mode

(11) STC — only manual mode

(12) FTC — only manual mode

(13) IR — 3 levels

(14) Bearing scale — 360° scale graduate at intervals of 1°

(15) Ship's heading marker — Electric flash line suppressible while pushing key
Ship's stern marker can be displayed.

(16) P-Line — 2 Parallel line

(17) Off center — 3steps +60%,40%,20% of effective radius.

(18) Trails — Relative trails / True trails
Trails length: OFF/2 scans/15/30sec/1/2/3/4/5/6min and continuation.
Any time possible to select the said article.

(19) Pulse length — short/long (2, 4, 8km)

(20) Expansion — OFF/FAIR/STRONG

(21) display color — Radar echo: 16 level (yellow, green, amber, white)
Background (PPI): black, blue, dark gray
Background (outside of PPI): black, gray, dark gray, bright blue
Trails: 16 level (yellow, amber, white, bright blue, green)
Character/Dial: green, amber, white, yellow,
VRM1/VRM2: cyan, green
Own ship mark/ other ship mark: cyan, gray, magenta, green, white

10.4 INPUT SIGNAL

(1) Navigation equipment
IEC61162-1/2

L./L:	GGA>RMC>RMA>GNS>GLL
COG/SOG:	VTG>RMC>RMA
TIME:	ZDA
TRIOP:	VLW
ROT:	ROT
RUDDER:	RSA
AUTOPILOT:	APB

(2)	signal for bearing	HEADING:	THS>HDT>HDG>HDM>VHW
(3)	Depth	DPT>DBS>DBK>DBT	
(4)	AIS	ALR,VDM INLAND AIS sentence	
(5)	Rate of turn	ROT 20mV/degrees: 30-0-30, 90-0-90. 300-0-300	
(6)	Rudder	RSA 20mV/degrees: 90-0-90	
(7)	Transmit Trigger	low impedance	
(8)	RADAR video	50 ohm matching	
(9)	Bearing pulse	Open collector	
(10)	Ship’s heading signal	Open collector	

10.5 OUTPUT SIGNAL

(1)	The signal for Slave Display	TIY, VD, BP (2048 pulse), BZ
(2)	Navigation information	RADAR system data: RSD Own ship data: OSD
(3)	External alarm	Point-of-contact signal normal close. Max current : 200mA.
(4)	2ND monitor	Analog RGB HD 15pin connector 1pcs (DVI connector 1pcs.)
(5)	AIS	ACK.
(6)	LAN	100Mbps(100BACE-TX) Radar screen UDP/IP Multi cast. Sweep/quadrant /full screen/block Radar control TCP/IP Uni cast. All the operation except power on/off.

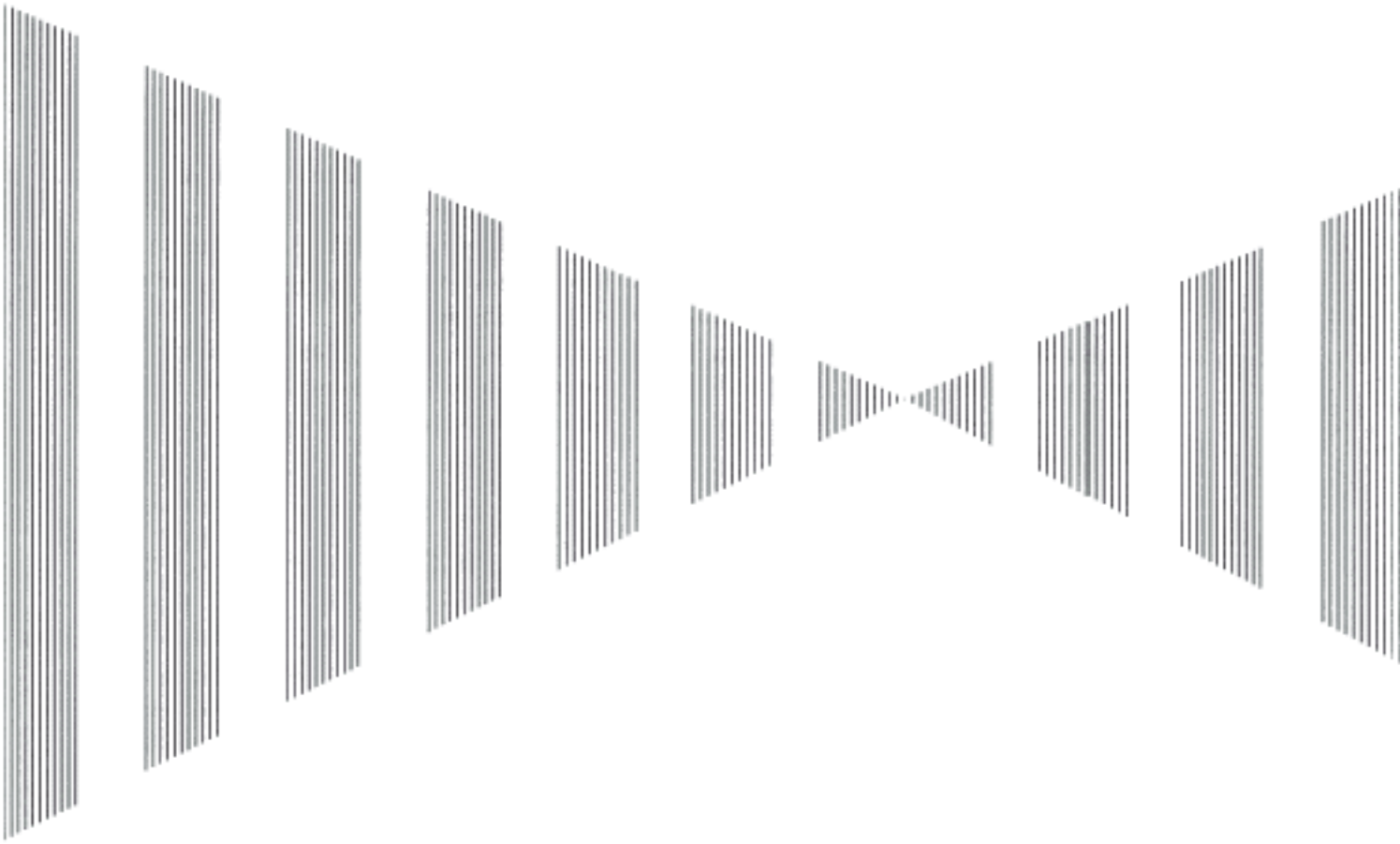
10.6 STANDARD EQUIPMENT COMPOSITION

Scanner unit: 1
Process unit: 1
Operation unit: 1
Spare parts: 1
Instruction manual:1

10.7 DISTANCE BETWEEN UNITS

	Standard
Monitor-processor unit	5m
Keyboard-processor unit	7m
Scanner-processor unit	20m

APPENDIX



APPENDIX

- HOW TO INSERT AND REMOVE A CARD
- Fig.1 Block Diagram of JMR-611
- Fig.2 Terminal Diagram of JMR-611
- Fig.3 Primary Power Supply Block Diagram of JMR-611
- Fig.4 Internal Connection Diagram of Scanner Unit NKE-387
- Fig.5 Internal Connection Diagram of Control Unit NCM-994

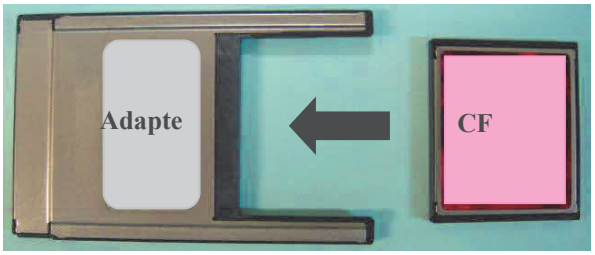
HOW TO INSERT AND REMOVE A CARD

This system has two card slots and can save the screen capture data (refer to Chapter 3.7) and user map data (refer to Chapter 3.6) to the memory card.
Insert memory card according to the procedures below.
This system accepts only CF (Compact Flash) card. And an adapter which converts to PC card is necessary.

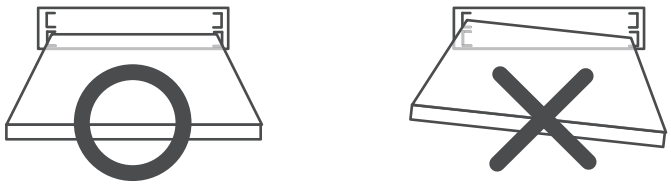
The Compact Flash cards of the major manufacturers have been confirmed to work with this system. However, some cards do not work. Given the large number of Compact Flash card manufacturers, it is not possible to confirm the compatibility of all available products. The manufacturers of cards that have been confirmed to be compatible are shown below. The use of these cards is recommended.

Manufacturer	Storage Capacity
SanDisk	512MB / 1GB / 2GB / 4GB
Lexer Media	512MB / 1GB / 2GB
Transcend	2GB
HAGIWARA SYS-COM	4GB
IO DATA	512MB / 1GB / 2GB
BUFFALO	512MB / 1GB / 2GB

Note: The file formats of the memory card can be used **FAT16** and **FAT32**. The other formats cannot be used.



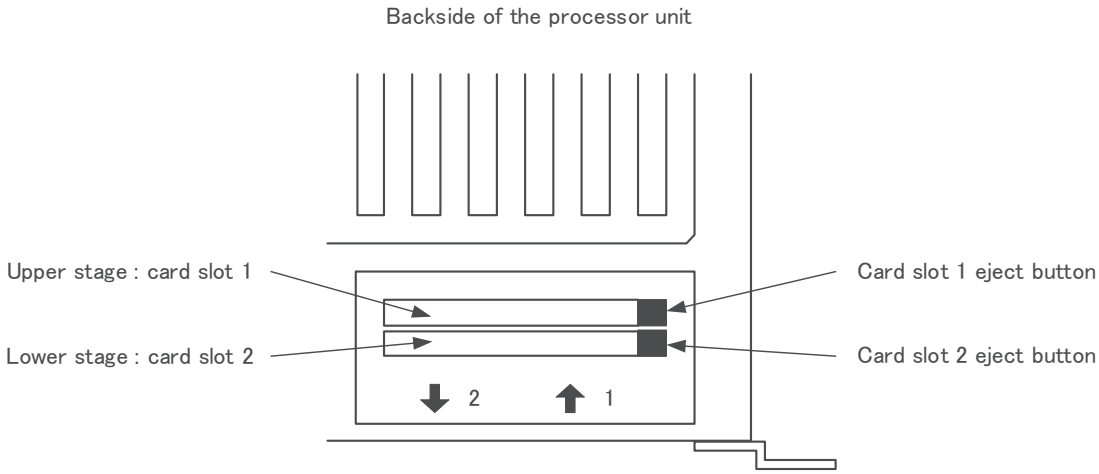
Note: Keep a card horizontal when inserting it into a card slot. An inclined card causes a failure.



Insert a card into processor unit

Procedures

1 **Remove the rubber packing located at the backside of the processing unit cabinet, and expose the card slot.**



2 **Insert the card.**

3 **Insert the card until the card slot's eject button protrudes and complete the installation of a card.**

Eject a card from processor unit

Procedures

1 **Push the eject button corresponding to the desired card slot.**

2 **remove a card from processor unit**

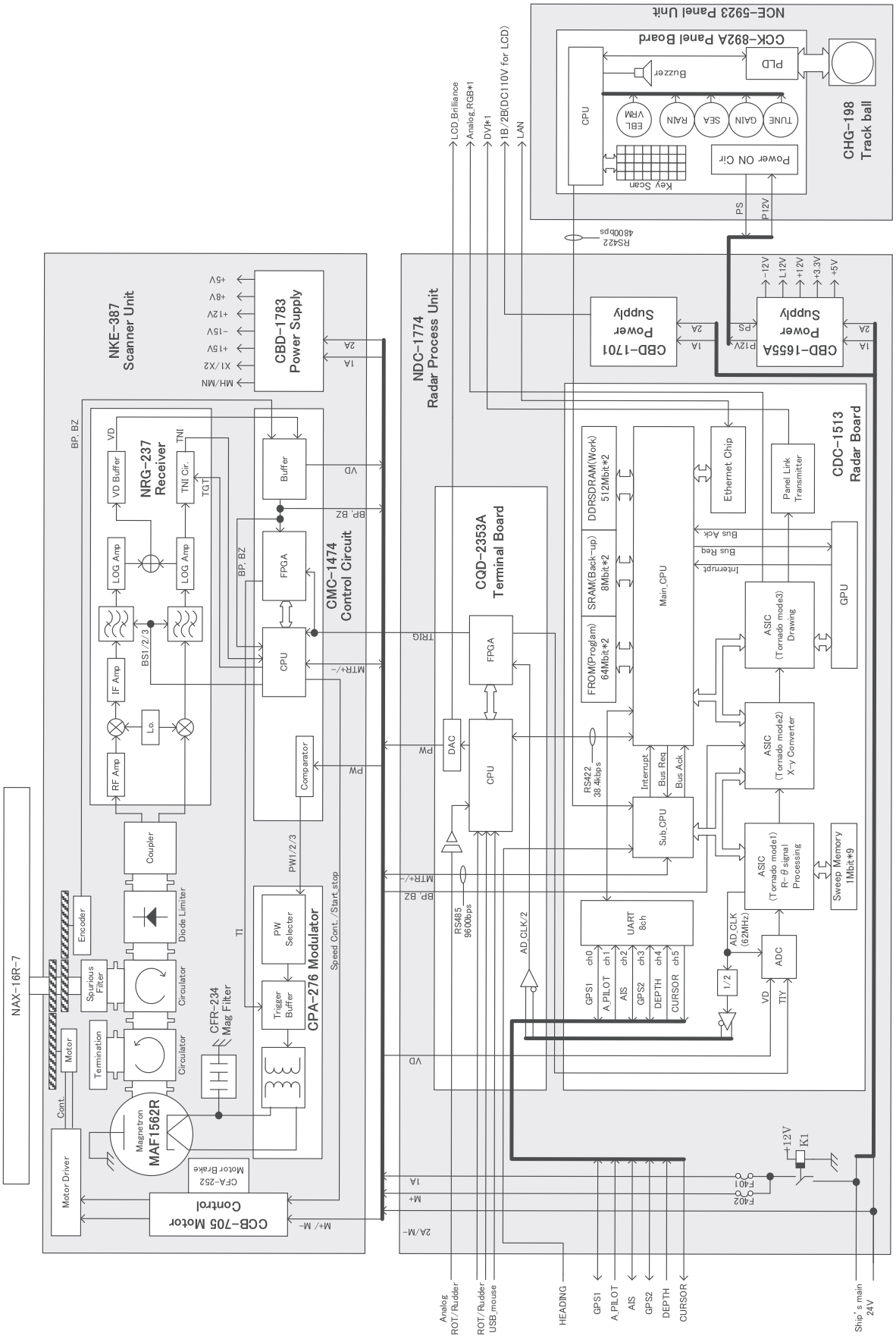


Fig.1 Block Diagram of JMR-611

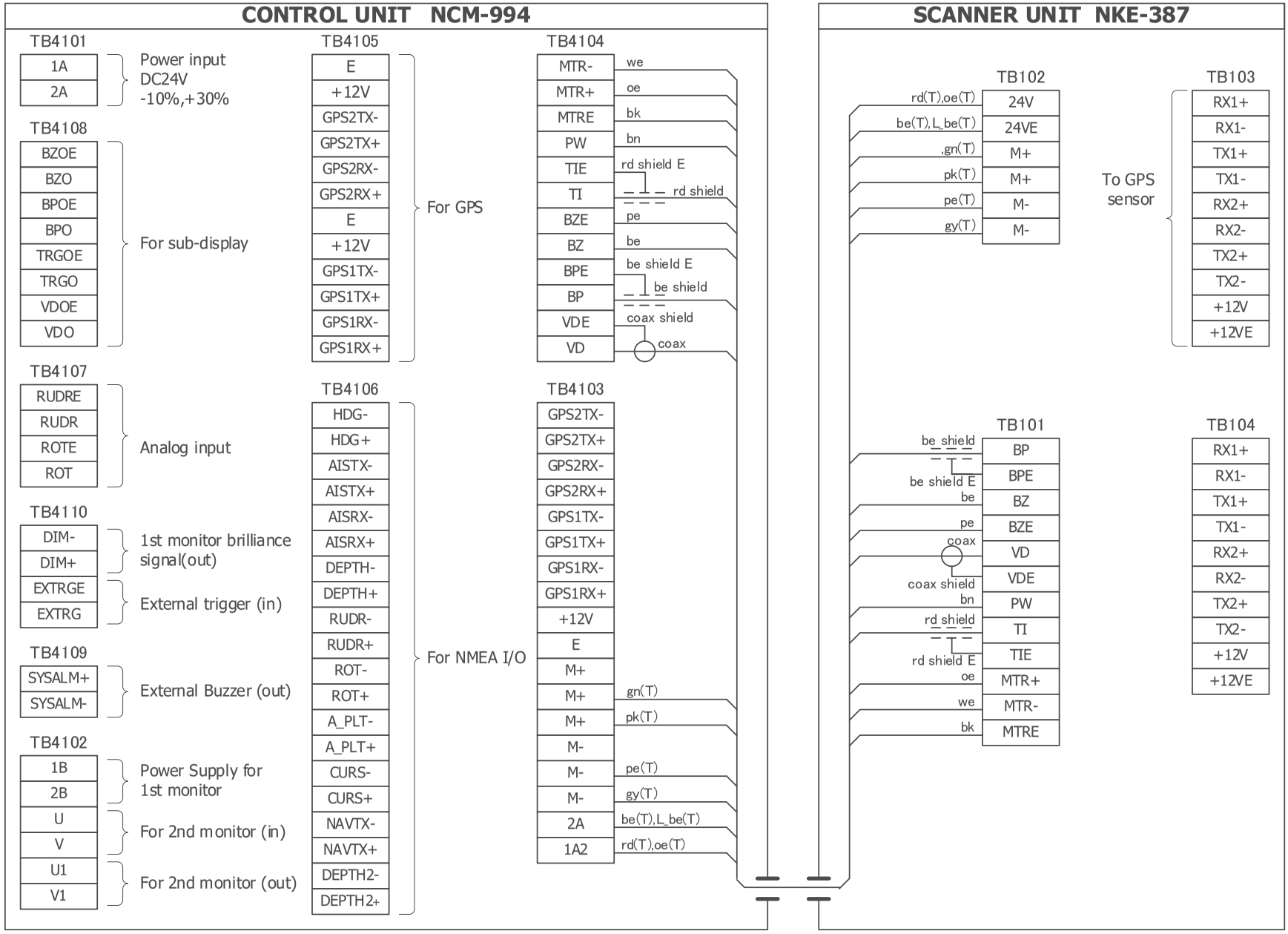


Fig.2 Terminal Diagram of JMR-611

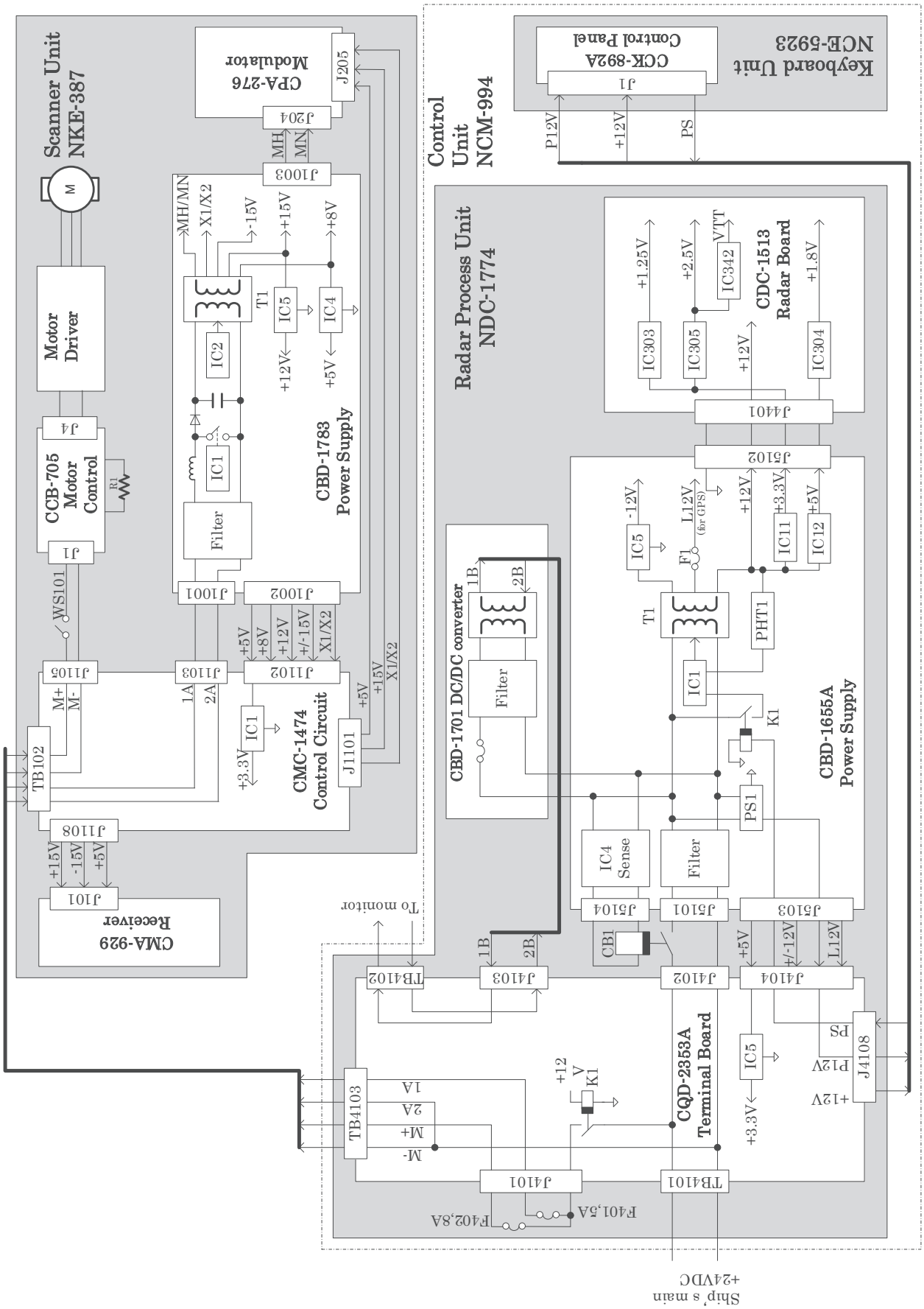


Fig.3 Primary Power Supply Block Diagram of JMR-611

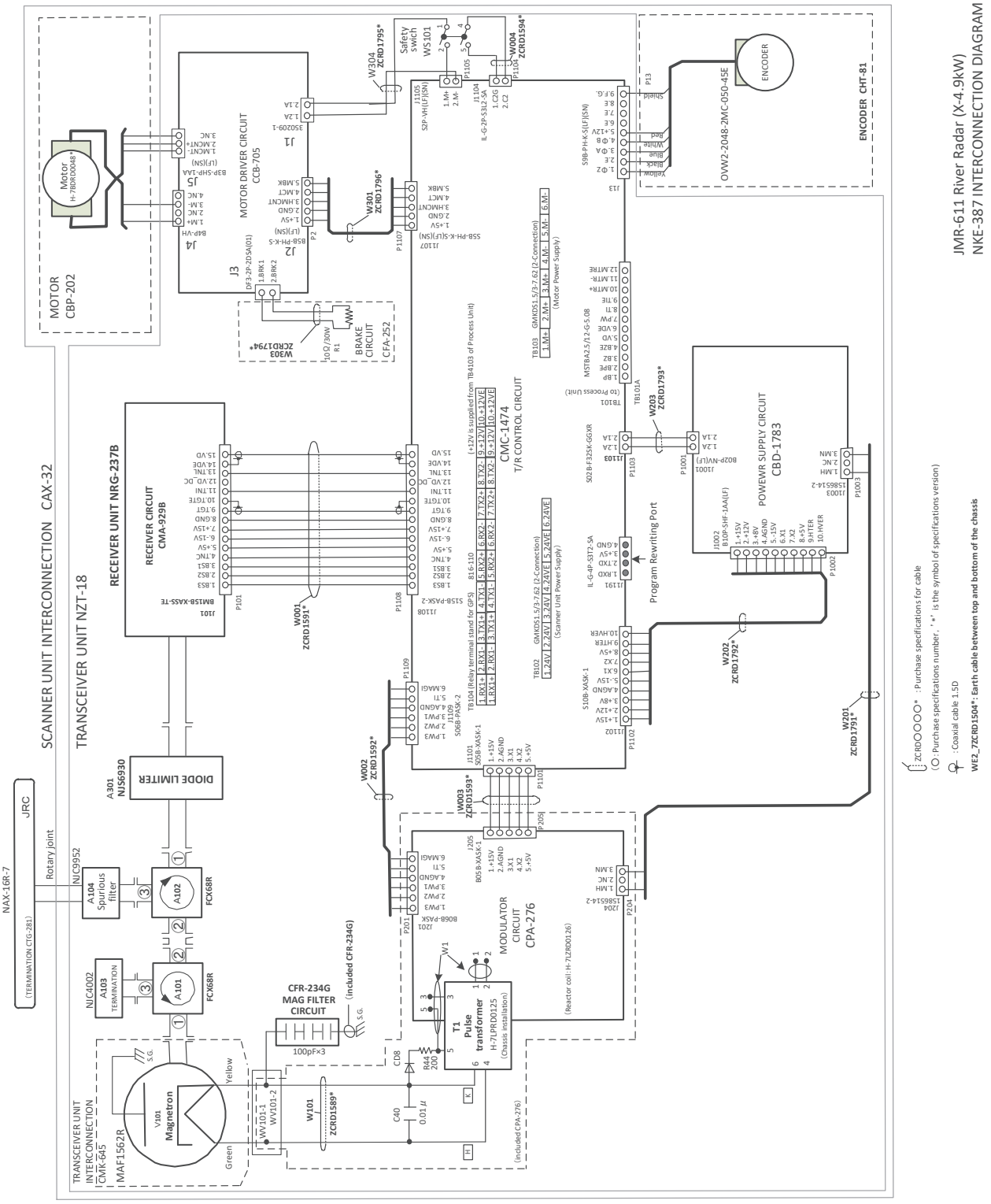


Fig.4 Internal Connection Diagram of Scanner Unit NKE-387

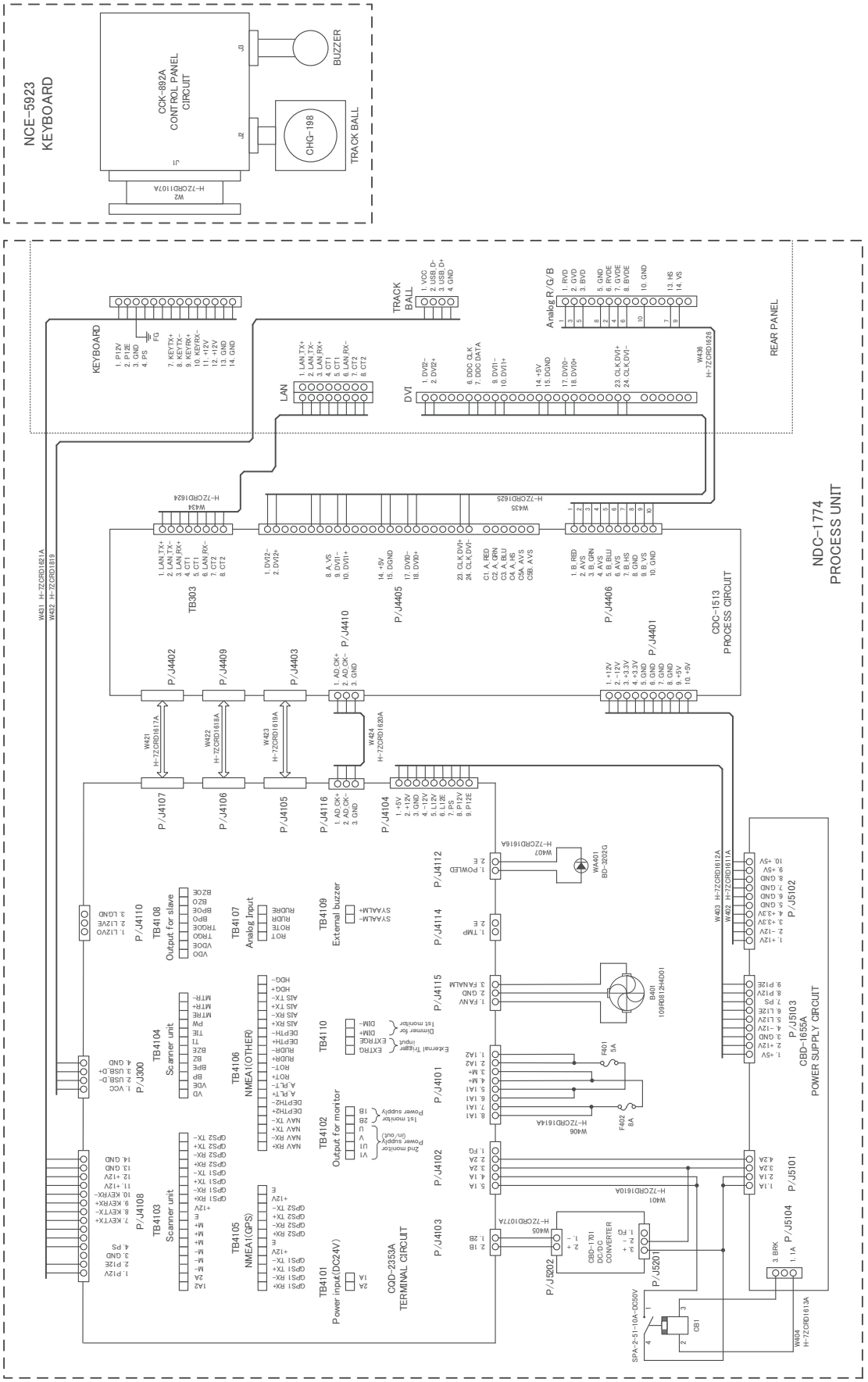


Fig.5 Internal Connection Diagram of Control Unit NCM-994

APPENDIX

EU Declaration of Conformity

01) Apparatus Product/Model:
Product: River Radar.
Model: JMR-611

02) Name & Address of the Manufacturer:
Japan Radio Co., Ltd.,
21-11, Mure 6-chome, Mitaka-shi, Tokyo 181-0002 Japan.

03) This declaration of conformity is issued under the sole responsibility of the manufacturer.

04) Object of the declaration – identification of apparatus allowing traceability:
Marine Radar, Japan Radio Co., Ltd manufactured model JMR-611.

05) The object of the declaration described above is in conformity with the relevant EU harmonization legislation:
Radio Equipment Directive (RED): 2014/53/EU.

06) References to the relevant harmonized standards used, including the date of the standard, or references to other technical specifications, including the date of the specification, in relation to which conformity is declared:

- ETSI EN 302 194-1 V1.1.2 (2006-10) Electromagnetic compatibility and Radio spectrum Matters (ERM); Navigation radar used on inland waterways: Part 1: Technical characteristics and methods of measurement
- ETSI EN 302 194 V2.1.1 (2017-02) Navigation radar used on inland waterways; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU
- IEC62368-1 :2018 Audio/video, information and communication technology equipment - Part 1: Safety requirements

07) Notified Body involved:
Not applicable.

08) Description of accessories and components, including software:

Scanner unit NKE-387	Peak power 4.9 kW (Magnetron MAF1562R)	Software version V1.13
Radiator NAX-16R-7	7ft open array antenna 6ft (NAX-16R-6) and 9ft (NAX-16R-9) are optional	N/A
Control unit NCM-994	It consists of Radar process unit NDC-1774 and operation unit NCE-5923.	V01.00.000 V01.01.00 (keyboard)
JMR-611 AL radar display G-007676	19" LCD display	N/A

09) Additional Information:

Signed for and on behalf of: Japan Radio Co., Ltd., Tokyo, Japan.

Place and date of issue:
Nagano-shi, Nagano ,Japan Dated 4th August 2020
Navigation Group, Quality Assurance Department/Marine Electronics

Name/function: Koji Ogawa / Manager

K. Ogawa

Signed: ……..……..

Code: 7ZPRD1021

Declaration of conformity

We: Japan Radio Company Limited
4-10-1, Nakano, Nakano Central Park East 3F
Nakano-ku, Tokyo 164-0001
Japan

declare under our sole responsibility that the product
JMR-611

to which this declaration is in conformity with the following standard.
ES-TRIN 2019

JRC declares that according to ES-TRIN, Annex 5, Section 1, Article 9, that JRC confirms and accepts, that any modification made to equipment already approved will cause the type-approval to be forfeit and that whenever modifications are planned, details will be sent in writing to the competent technical service.

JRC declares that according to ES-TRIN, Annex 5, Section 1, Article 8, the present device is identical with the one that has been type tested during type-approval process with no modifications and that each unit of equipment will be accompanied by this declaration.

Signed: M. Kawaguchi Dated: 27th August 2020

Mr. Masaru Kawaguchi
Manager of Marine Radar Group
Marine Electronics Engineering Department

JRC Japan Radio Co., Ltd.

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Not use the asbestos

For further information,contact:

JRC Japan Radio Co., Ltd.
Since 1915

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ISO 9001, ISO 14001 Certified

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