

JMR-9230-S/S3  
JMR-9225-7X3/9X3/6X/9X/6XH  
JMR-9210-6X/6XH  
JMR-9272-S  
JMR-9282-S/SH  
JMR-7230-S/S3  
JMR-7225-7X3/9X3/6X/9X/6XH  
JMR-7210-6X/6XH  
JMR-7272-S  
JMR-7282-S/SH  
JAN-9201  
JAN-7201  
JAN-9202  
JAN-7202

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**MARINE RADAR EQUIPMENT  
ECDIS  
CONNING DISPLAY**

**FIELD SERVICE MANUAL**

**JRC** *Japan Radio Co., Ltd.*

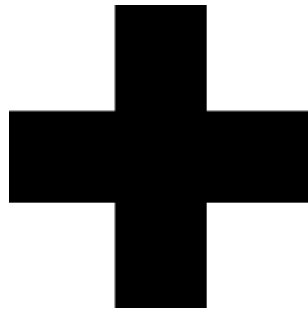


# PREFACE

This Field Service Manual describes the structure, I/O specifications and method for maintenance of JMR-7200/JMR-9200 series and JAN-7200/JAN-9200 series.

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

## ● Safety Cautions ●



### **Cautions for High Voltage**

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

High voltages on the order of tens of thousand 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.

## ● Emergency Measures ●

### Method of First-Aid Treatment

#### ☆Precautions for First-Aid Treatments

Whenever a person is struck by an electrical shock, give the patient artificial respiration immediately on the spot, unless it is absolutely necessary to move the patient for safety's sake. Once started, artificial respiration should be continued rhythmically.

- (1) Refrain from touching the patient carelessly as a result of 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 - Fig. 1

- (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


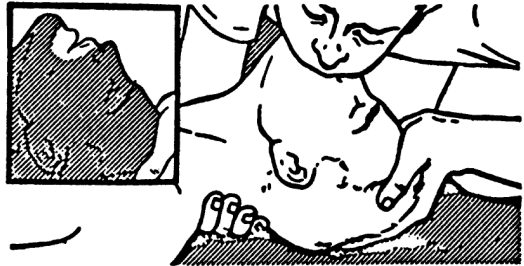
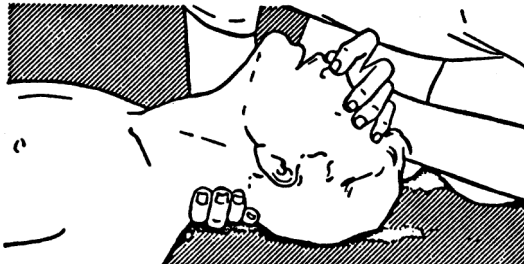
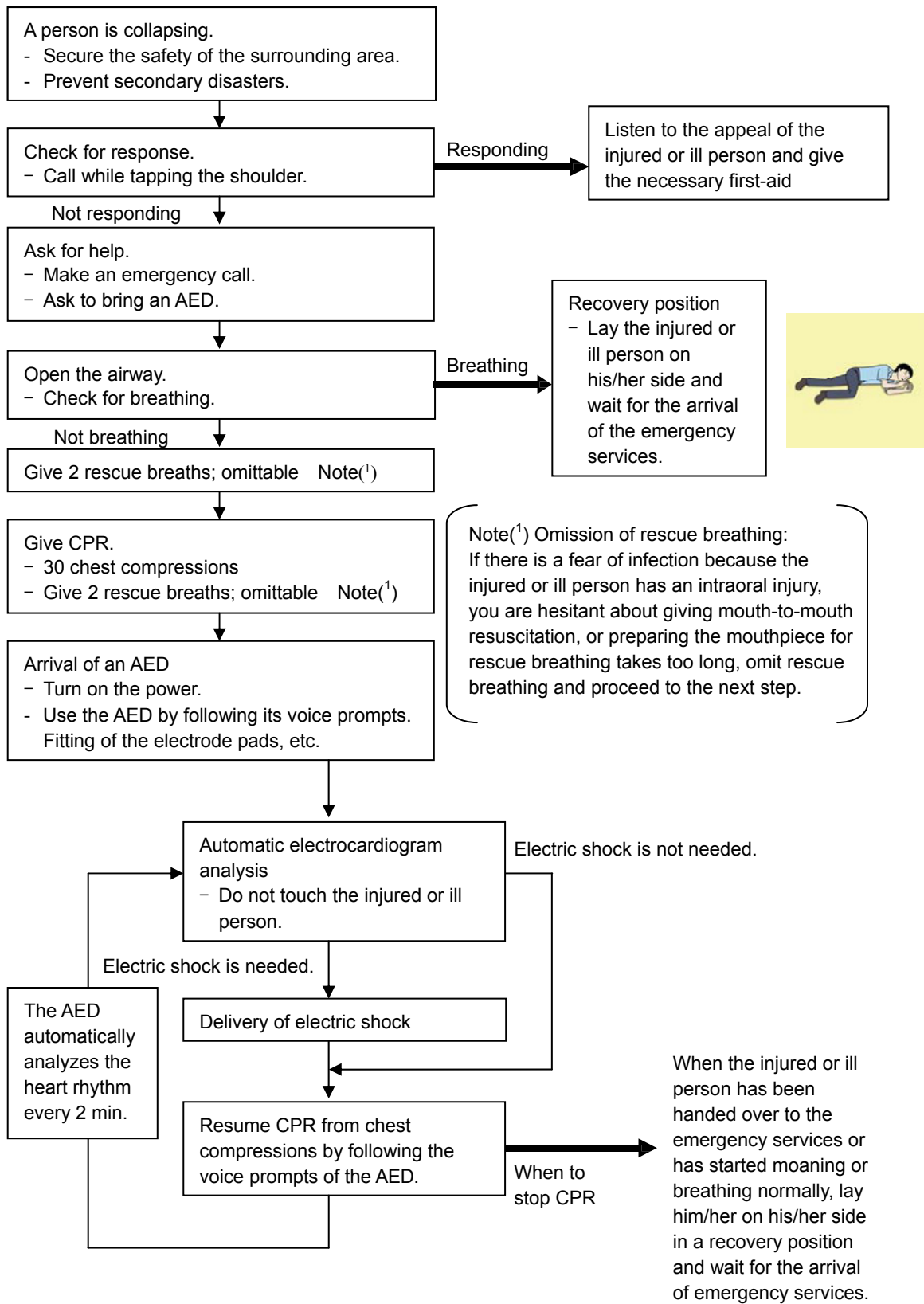
- [1] 
- (1) Lift the back part of the patient's head. Support the forehead with one of your hand and the neck with the other hand. → [1].  
Many patients will have their airways opened by lifting their head in this way to ease mouth-to-mouth artificial respiration.
- [2] 
- (2) Closing the patient's 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)



# 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

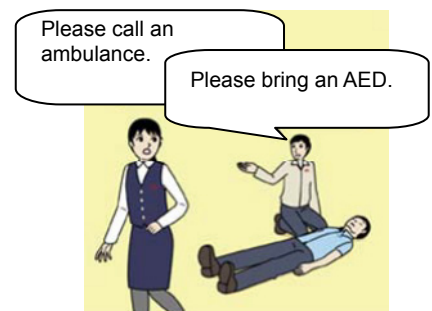
- a) Tap the shoulder of the injured or ill and shout in the ear saying, "Are you OK?"
- b) If the person opens his/her eyes or there is some response or gesture, determine it as "responding." But, if there is no response or gesture, determine it as "not responding."

## 3. If responding

- a) Give first-aid treatment.

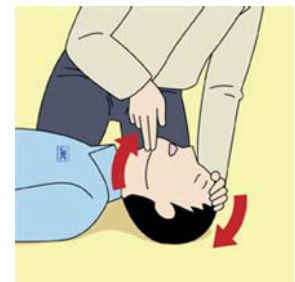
## 4. If not responding

- 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. Open the airway

- a) Touch the forehead with one hand. Lift the chin with the two fingers of the middle finger and forefinger of the other hand and push down on the forehead as you lift the jaw to bring the chin forward to open the airway. If neck injury is suspected, open the airway by lifting the lower jaw.



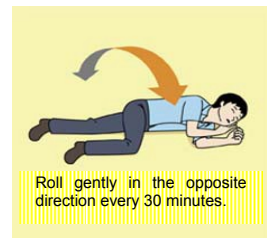
## 6. Check for breathing

- a) After opening the airway, check quickly for breathing for no more than 10 seconds. Put your cheek down by the mouth and nose area of the injured or ill person, look at his/her chest and abdomen, and check the following three points.
  - Look to see if the chest and abdomen are rising and falling.
  - Listen for breathing.
  - Feel for breath against your cheek.



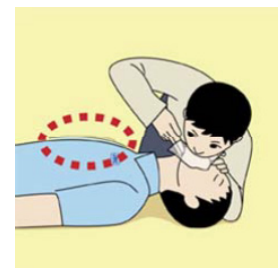


- b) If the injured or ill person is breathing, place him/her in the recovery position and wait for the arrival of the emergency services.
- Position the injured or ill person on his/her side, maintain a clear and open airway by pushing the head backward while positioning their mouth downward. To maintain proper blood circulation, roll him/her gently to position them in the recovery position in the opposite direction every 30 minutes.



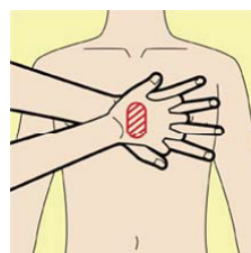
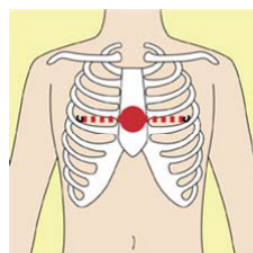
## 7. Give 2 rescue breaths (omittable)

- a) If opening the airway does not cause the injured or ill person to begin to breathe normally, give rescue breaths.
- b) If there is a fear of infection because the injured or ill person has an intraoral injury, you are hesitant about giving mouth-to-mouth resuscitation, or getting and preparing the mouthpiece for rescue breathing takes too long, omit rescue breathing and perform chest compressions.
- c) When performing rescue breathing, it is recommended to use a mouthpiece for rescue breathing and other protective devices to prevent infections.
- d) While maintaining an open airway, pinch the person's nose shut with your thumb and forefinger of the hand used to push down the forehead.
- e) Open your mouth widely to completely cover the mouth of the injured or ill person so that no air will escape. Give rescue breathing twice in about 1 second and check if the chest rises.



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

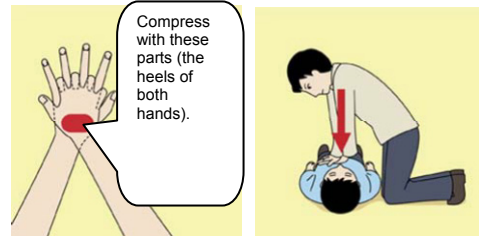
- a) Chest compressions
- 1) Position of chest compressions
- Position the heel of one hand in the center of the chest, approximately between the nipples, and place your other hand on top of the one that is in position.



## 2) Perform chest compressions

- Perform uninterrupted chest compressions of 30 at the rate of about 100 times per minute.

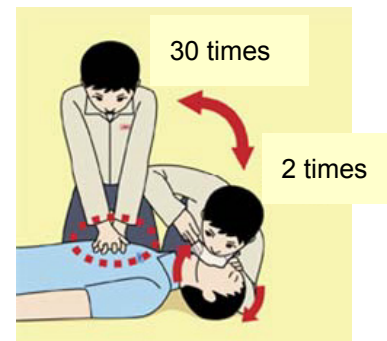
While locking your elbows positioning yourself vertically above your hands.



- With each compression, depress the chest wall to a depth of approximately 4 to 5 cm.

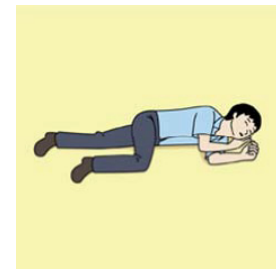
## b) Combination of 30 chest compressions and 2 rescue breaths

- 1) After performing 30 chest compressions, give 2 rescue breaths. If rescue breathing is omitted, perform only chest compressions.
- 2) Continuously perform the combination of 30 chest compressions and 2 rescue breaths without interruption.
- 3) If there are two or more first-aiders, alternate with each other approximately every two minutes (five cycles of compressions and ventilations at a ratio of 30:2) without interruption.



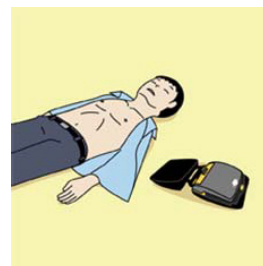
## 9. When to stop cardiopulmonary resuscitation (CPR)

- 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.



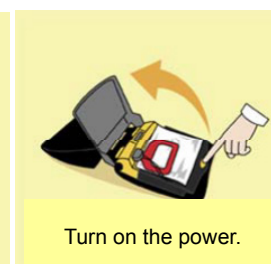
## 10. Arrival and preparation of an AED

- 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.

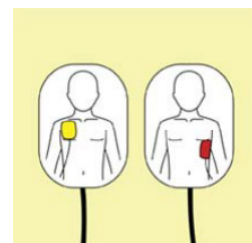
Depending on the model of the AED, you may have to push the power on button, or the AED automatically turns on when you open the cover.



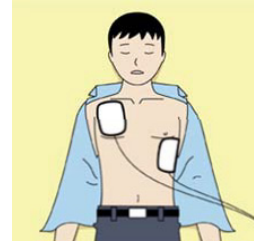
- c) Follow the voice prompts of the AED.

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

- a) Remove all clothing from the chest, abdomen, and arms (male or female).
- 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.

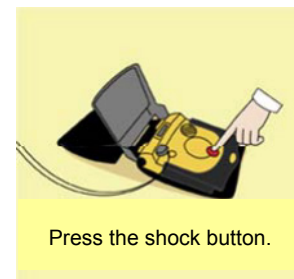
## 12. Electrocardiogram analysis

- 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.



## 13. 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, "Push 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.
- d) When electric shock is delivered, the body of the injured or ill person may jerk.



## 14. Resume cardiopulmonary resuscitation (CPR).

Resume CPR consisting of 30 chest compressions and 2 rescue breaths by following the voice prompts of the AED.

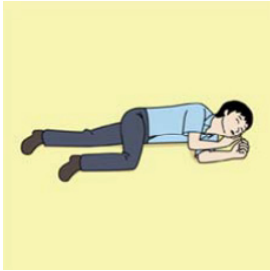


## 15. Automatic electrocardiogram analysis

- 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.

**16. 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.






# ● Pictorial Indication ●

## 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:

 <b>DANGER</b>	This indication is shown where incorrect equipment operation due to negligence may cause death or serious injuries.
 <b>WARNING</b>	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.
 <b>CAUTION</b>	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 upon Equipment Operation ●

# DANGER



Never attempt to check or repair the inside of the equipment.  
Checking or repair by an unqualified person may cause a fire or an electric shock.  
Contact our head office, or a nearby branch or local office to request servicing.



Never remove the cover of this equipment.  
Touching the high-voltage section inside will cause an electric shock.



Do not attempt to disassemble or tamper with this equipment.  
Otherwise, a fire, an electric shock, or a malfunction may occur.



When conducting maintenance, make sure to turn the main power off.  
Failure may result in electric shock.



Turn off 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 may result in equipment failure, or death or serious injury due to electric shock.



When conducting maintenance work on the radar antenna, make sure to turn its main power off.  
Failure may result in electric shock or injuries.



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

# **WARNING**



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



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



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



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

Microwave radiation level of the radar antenna

System	50 W/m <sup>2</sup>	20 W/m <sup>2</sup>	2.5 W/m <sup>2</sup>
NKE-2103	n/a	26 cm	123 cm
NKE-1125/1129/2254	5 cm	81 cm	162 cm
NKE-1130/1139	11 cm	76 cm	181 cm
NKE-2632	1.38cm	3.1cm	209.76cm
NKE-1632	1.45cm	3.25cm	128.37cm



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



When it is necessary to get close to the radar antenna for maintenance or inspection purposes, make sure to turn the power switch of the display unit to "OFF" or "STBY".  
Direct exposure to electromagnetic waves at close range will have adverse effects on the human body.



When conducting maintenance work, make sure to turn off the power so that the power supply to the equipment is completely cut off.  
Some equipment components can carry electrical current even after the power switch is turned off, and conducting maintenance work may result in electric shock, equipment failure, or accidents.

# **WARNING**



When cleaning the display screen, do not wipe it too strongly with a dry cloth. Also, do not use gasoline or thinner to clean the screen. Failure will result in damage to the screen surface.



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



Confirm computer virus does not exist in USB flash memory beforehand when reading and writing of the file by using USB flash memory. Influences other equipment when the display unit is infected with the virus, and it may cause a breakdown.



Do not remove USB flash memory while the access lamp (in USB flash drive) is flashing. Data may be damaged when the USB flash memory is inserted or removed while accessing it, and it may cause a breakdown.



Do not place a glass or cup containing water, etc., or a small metal object on this equipment. If water or such object gets inside, a fire, an electric shock, or a malfunction may occur.



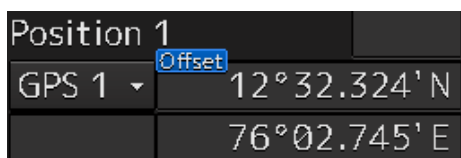
In case water or a metal object gets inside the equipment, turn off the power immediately, unplug the power supply cable from an electric outlet, and contact our head office, or a nearby branch or local office to request servicing. Keeping the equipment in operation under such condition may cause a fire, an electric shock or a malfunction.



In case you find smoke, unusual odor or extreme high heat coming from the equipment, turn off the power immediately, unplug the power supply cable from an electric outlet, and contact our head office, or a nearby branch or local office to request servicing. Keeping the equipment in operation under such condition may cause a fire or an electric shock.



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





# **WARNING**



Before starting automatic sailing, be sure to check the safety of the route and the safety when crossing safety contour.  
Otherwise, accidents may result.



If the own ship has arrived at the boundary of a WPT during automatic sailing, be sure to check the safety and perform turning manually by the operator him/herself.  
Otherwise, the ship keeps the course with the leg bearing, and accidents may result.



Input the ship's parameter accurately according to the specification of the ship.  
Otherwise, accidents may result.



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



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



Do not apply strong shock to the coaxial cable by striking it with a tool or hammering it.  
Otherwise, an open circuit failure may result.



Do not place anything heavy on the coaxial cable.  
Otherwise, an open circuit failure may result.



Do not twist or pull the coaxial cable.  
Otherwise, an open circuit failure may result.

# CAUTION



Use the radar only as a navigation aid.  
The final navigation decision must always be made by the operator him/herself.  
Making the final navigation decision based only on the radar display information may cause accidents such as collisions or running aground.



A malfunction as the screen is disordered or unshown may occur if the power in the ship is instantaneously interrupted during operation of the radar. In this case, the power should be turned on again.



Use Target Tracking (TT) function only as a navigation aid. The final navigation decision must always be made by the operator him/herself.  
Making the final navigation decision based only on tracking target information may cause accidents.  
Tracking target information such as vector, target numerical data, and alarms may contain some errors. Also, targets that are not detected by the radar cannot be acquired or tracked.  
Making the final navigation decision based only on the radar display may cause accidents such as collisions or running aground.



In the short distance range, do not set the sea clutter suppression function so that all reflections from the sea are suppressed. This suppresses not only the echo from waves, etc., but also the echo from floating objects such as ships or dangerous objects, etc., and obstructs their detection.  
When using the sea clutter suppression function, always make the best suppression setting.



Do not set the rain/snow clutter suppression setting to an excessive level, because not only the echo from rain or snow but also the echo from floating objects such as ships or dangerous objects, etc., and obstructs their detection.  
When using the rain/snow clutter suppression function, always make the best suppression setting.



When setting a guard zone, make sure to properly adjust gain, sea-surface reflection suppression level, and rain/snow reflection suppression level so that the optimal target images are always on the radar screen. The guard zone alarm will not be activated for targets undetected by the radar, and it may result in accidents such as collisions.



The simulation function is used exclusively for deciding whether or not target tracking is properly operating. Therefore, never use this function unless you wish to check target tracking operations.  
Note especially that, if this function is used during actual navigation, simulated targets are displayed and may become confused with other actual targets. Therefore, never use this function during actual navigation.

# CAUTION



Since these alarms may include some errors depending on the target tracking conditions, the navigation officer himself should make the final decision for ship operations such as collision avoidance.

Making the final navigation decision based only on the alarm may cause accidents such as collisions.



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



When replacing magnetrons, make sure to shut off the main power and let the equipment stand for more than 5 minutes to discharge the high-voltage circuit.

Failure may result in electric shock.



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

Failure may result in damage to the watch since the magnetron is a strong magnet.



Make sure that two or more staff member work together when replacing the LCD. If only one person attempts to replace the LCD, he/she may drop it and become injured.



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

Failure may result in electric shock.



Any adjustments must be made by specialized service personnel.

Incorrect settings may result in unstable operation, and this may lead to accidents or equipment failure.



Do not make any adjustments during navigation.

Failure may result in adverse effects on the radar function which may lead to accidents or equipment failure.



Do not change the quantization level settings unless absolutely necessary.

If set at an inappropriate value, the acquisition of target tracking function and the tracking function deteriorate, and this may lead to accidents.



Do not use or leave the equipment under direct sunlight for a long time or in the temperatures above 55°C.

Otherwise, a fire or a malfunction may occur.

# CAUTION



Do not block the ventilation opening of the equipment.  
Otherwise, heat may accumulate inside to cause a fire or a malfunction.



This equipment is intended for use as an aid to navigation only.

- If no backup measures, such as using another ECDIS unit for confirmation, are taken, be sure to use official marine charts together with this equipment to make any navigational decision.
- This equipment is not designed to assess the positional information automatically.  
The positional information should always be checked by the operator.  
Otherwise, accidents may result.



Do not touch the equipment with hands or gloves wet with water.  
Otherwise, an electric shock or a malfunction may occur.



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



- Do not place any object on the operation panel.  
In particular, if a hot object is placed on the operation panel, it can cause deformation of the surface of the operation panel.
- Do not apply any undue shock on the operation panel, trackball and dials.  
Otherwise, a malfunction may result.



Make sure that the main power is turned off before inspection or replacement of parts.  
Otherwise, an electric shock, a fire, or a malfunction may occur.



- If a fan alarm or CPU temperature rise alarm has occurred, immediately turn off the power.  
Keeping the equipment in operation under such condition may cause a fire or a malfunction.  
After turning off the power, contact our head office, or a nearby branch or local office to request servicing.



Edit routes in accordance with the world geodetic system (WGS-84).  
Use of routes edited with any other geodetic systems may cause accidents.

# CAUTION



During sailing, be sure to check the own ship's position and bearing as often as necessary, regardless of whether the automatic sailing is in operation or not.  
Otherwise, accidents may result.



Do not turn off the power during Backup/Restore.  
Otherwise, a function may fail, and an accident may occur.



Do not do the backup operation of data while sailing.  
The radar application should be ended to begin the data backup. It becomes impossible to observe using radar and this may lead to accidents.



Since the image within the previous observation range is displayed by expanding/contracting for the period from immediately after switching of the observation range from the next image updating, do not use this image for navigation.  
If this image is used for navigation, an accident may occur.



In the case of turning on the power under the condition of low temperature, do pre-heat more than 30 minutes.  
Otherwise, an operation failure may occur and an accident may occur.



Normally, use the automatic tuning mode.  
If you use the manual tuning mode, an accident may be caused by a transmission/reception problem.  
Use the manual tuning mode only when you cannot get the best tuning conditions in the automatic tuning mode.



Always keep the sensitivity adjusted to the best condition.  
If you raise the sensitivity excessively, the visibility of the target will be reduced by unwanted signals including receiver noise and pseudo image.  
This may cause an accident.  
If the sensitivity is reduced excessively, detection of a target such as a ship or hazardous material will be interrupted.



Adjust the preset of the observation scene according to the oceanographic condition, with the thorough understanding of the features of the radar signal processing setting. The optimum radar performance may not be able to be demonstrated due to the contents of the changed setting or the oceanographic condition at that time.

# Glossary

AIO	:	Admiralty Information Overlay. AIO is a digital dataset that is designed to provide additional information to the navigation published by United Kingdom Hydrographic Office (UKHO).
AIS	:	Automatic Identification System
ARCS	:	Admiralty Raster Chart Service. A raster chart published by UKHO
ARPA	:	Automatic Radar Plotting Aid
AUTO SAIL	:	The system automatically navigates to keep the scheduled route. Same as automatic sailing.
AZ	:	Acquisition/Activation zone
Anti-clutter rain	:	Rain/snow clutter suppression
Anti-clutter sea	:	Sea clutter suppression
AZI	:	AZimuth stabilization mode
Base CD	:	Chart CD containing a complete chart data
BCR/BCT	:	Bow Crossing Range/Bow Crossing Time
Cell Permit	:	A file containing an encryption key for S-63 chart. Supplied by UKHO, PRIMAR STAVANGER, and Hydrographic and Oceanographic Department of Japan Coast Guard.
Chart Maintenance	:	Software to manage the charts. Imports and updates the charts.
C-MAP Ed.3	:	C-MAP Edition 3. A digital chart format by Jeppesen (formerly, C-MAP, Norway)
C-MAP	:	Digital chart data by Jeppesen (formerly, C-MAP, Norway)
CTS	:	Course To Steer. Heading command.
COG	:	Course Over the Ground
C up	:	Course up. Own ship's course is pointed to the top center of the radar display.
CCRP	:	Consistent Common Reference Point. The own ship position, to which all horizontal measurements such as target range, bearing, relative course, relative speed, CPA or TCPA are referenced, typically the conning position of the bridge.

CORREL	:	CORRELation
CPA/TCPA	:	Distance to the Closest Point of Approach/Time to the Closest Point of Approach.
CTW	:	Course Through Water. The direction of the ship's movement through the water
Data Server	:	Organization providing S-63 chart
DIST	:	Distance
DR	:	Dead Reckoning
Dynamic License	:	Dynamic licensing of C-Map chart license by Jeppesen
DNV	:	Det Norske Veritas
DRIFT	:	The current velocity for manual correction or the current speed on the horizontal axis of the 2-axis log is displayed.
EBL	:	Electronic Bearing Line
ECDIS	:	Electronic Chart Display and Information System
ENC	:	Electronic Navigation Chart. Meaning S-57 and S-63.
ETA	:	Estimated Time of Arrival
ETD	:	Estimated Time of Departure
ENH	:	Enhance
F.ETA	:	Final Estimated Time of Arrival. Estimated time of arrival to the last WPT
GC	:	Great Circle
GPS	:	Global Positioning System
HDG	:	Heading. Ship's heading
HL	:	Heading Line
HSC	:	High Speed Craft. Vessels which comply with the definition in SOLAS for high speed craft
H up	:	Head up. Own ship's heading line is always pointed to the top center of the radar display.
IHO	:	International Hydrographic Office
IMO	:	International Maritime Organization

IR	:	Radar Interference Rejecter
ISW	:	InterSWitch unit
LMT	:	Local Mean Time
LON	:	Longitude
LAT	:	Latitude
LP	:	Long Pulse
MED	:	Marine Equipment Directive. Request standard for standardization of marine equipment within the EU region
MFD	:	Abbreviation of this equipment name. The formal name is Multi Function Display. The navigation support functions such as radar, ECDIS, CID, and AMS with this equipment can be executed by switching.
MMSI	:	Maritime Mobile Service Identity
MOB	:	Man Over Board
MON	:	Performance MOnitor
MP	:	Medium Pulse
NM	:	Nautical Mile 1 NM=1852 m
N up	:	The north is always pointed to the top center of the radar display. (North up)
P0N	:	Unmodulated pulse, which is a type of transmission radio wave. While it is a type of radio wave usually used by radars equipped with magnetrons, radio waves with a short pulse length are used also by solid-state radars for short-range detection.
PRIMAR STAVENGER	:	A Norwegian company supplying charts. Publisher of encrypted charts, S-63
PI	:	Parallel Index line
Past positions	:	Equally time-spaced past position marks of a tracked or AIS target and the own ship.
POSN	:	POSitioN
PRF	:	Pulse Repetition Frequency. The number of radar pulses transmitted each second.
PROC	:	PROCeSS. Radar signal processing function



Q0N	:	A type of radio wave with intra-pulse frequency modulation. It is used for solid-state pulse compression radars.
RL	:	Rhumb Line
RR	:	Range Rings
Relative vector	:	A predicted movement of a target relative to own ship's motion
RM	:	Relative Motion. A display on which the position of own ship remains fixed, and all targets move relative to own ship.
RM(R)	:	Relative Motion. Relative Trails
RM(T)	:	Relative Motion. True Trails
ROT	:	Rate Of Turn. Change of heading per time unit
Route	:	A set of waypoints
S-57	:	IHO Transfer Standard for Digital Hydrographic Data
S-63	:	IHO Data Protection Scheme
SA Certificate file	:	An electronic file certifying the supplier of S-63 chart. Required for import/ update of S-63 chart.
SENC	:	System Electronic Navigational Chart
SOG	:	Speed Over the Ground
SART	:	Search And Rescue Transponder
SET	:	The current direction for manual correction or the current speed on the horizontal axis of the 2-axis log is displayed.
SP	:	Short Pulse
STAB	:	STABILization
STW	:	Speed Through Water
TCS	:	Track Control Systems
TCPA	:	Time to Closest Point of Approach to own ship
TM	:	True Motion. A display across which the own ship and targets move with their own true motions.
To WPT	:	To Waypoint
Trails	:	Tracks displayed by the radar echoes of targets in the form of an afterglow

Trial maneuver	:	A graphical simulation facility used to assist the operator to perform a proposed maneuver for navigation and collision avoidance purposes
True vector	:	A vector representing the predicted true motion of a target, as a result of input of the course and speed of the own ship
TT	:	Target Tracking
TTG	:	Time To Go. Time to next waypoint.
TXRX	:	Transmitter-Receiver Unit
UKHO	:	United Kingdom Hydrographic Office
Update CD	:	Chart CD containing the chart data updated from Base CD. This can be used when Base CD data has been imported.
USER CODE	:	A user-specific code assigned by JRC. Required in using ARCS and S-63 charts.
UTC	:	Universal Time, Coordinated
VRM	:	Variable Range Marker
VDR	:	Voyage Data Recorder
WOL	:	Wheel Over Line
WOP	:	Wheel Over Point
WPT	:	Waypoint
WPT-WPT	:	The division of the leg specified by two points. Displays data between two consecutive waypoints.
XTD	:	Cross Track Distance
XTL	:	Cross Track Limit
Activated target	:	A target representing the automatic or manual activation of a sleeping AIS target for the display of additional information
Associated target	:	A target simultaneously representing a tracked target and a AIS target which are decided as the same
Chirp	:	A type of transmission waveform with intra-pulse frequency modulation used by solid-state radars. Its radio wave type is classified as Q0N.
Clutter	:	Unwanted reflections on a radar screen, from sea surface, rain or snow.

Display	:	Screen displayed on the LCD
Frequency deviation range	:	The range of variation of the QON frequency used for transmission waves of a solid-state radar. Generally, the greater the frequency deviation range, the higher the resolution in the range direction.
Hydrographic and Oceanographic Department	:	
		Hydrographic and Oceanographic Department of Japan Coast Guard. Publisher of ENC
Import (Chart Maintenance)	:	A procedure of enabling the chart supplied by Base CD to be displayed on ECDIS
Interswitch Unit	:	A device to switch over two or more radar display units and two or more radar antennas
Leg	:	Line between two consecutive waypoints
Lost AIS target	:	A target symbol representing the last valid position of an AIS target before the reception of its data was lost, or its last dead-reckoned position.
Lost tracked target	:	One for which target information is no longer available due to poor, lost or obscured signals.
Power amplifier	:	A radio frequency amplifier circuit consisting of semiconductor elements used for solid-state radars. It employs a high frequency, high power FET.
Primary	:	Main positioning sensor
Pulse compression	:	Correlation processing performed when a transmitted chirp signal is received by a solid-state radar after reflecting off the target. This processing gain enables the radar to have necessary detection capability even when a transmission power is low.
Radar beacon	:	A navigation aid which responds to the radar transmission and generates radio wave
Range	:	An area of the chart displayed on the screen. Represented by one half of the length of the chart display screen.
Reference target	:	A fixed target specified to calculate the speed over the ground
Report	:	User report to be issued periodically for using the Dynamic License method of Jeppesen continuously
Rubber band	:	Border that indicates the selected range.
Scale	:	The display scale

- Sea state : Status of the sea condition due to the weather environment, expressed as a sea state 0 for flat conditions with minimal wind, to sea state 8 for very rough sea conditions.
- Ship-avoiding operation : To operate the ship in order to avoid obstacles during automatic navigation, regardless of the scheduled route
- Sleeping AIS target : A target indicating the presence and orientation of a vessel equipped with AIS
- Spot depth : Numeric representation of depth
- SSR: Solid State Radar : Radar that uses semiconductor elements instead of magnetron, which requires periodic replacement. It is built with a system that ensures necessary detection capability even when a transmission output is low, by using chirp signals with a long pulse length upon transmission and performing pulse compression upon reception
- Update (Chart Maintenance): A procedure of reflecting the update data supplied by Update CD on the imported chart.

# How to Use This Manual

## Structure of this manual

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

Item	Contents
Preface	Describes the purposes of using this equipment.
Safety Cautions Emergency Measures	Describes the cautions for a high voltage, precautions for rescue of victims of an electric shock, and the method of First-Aid treatment.
Pictorial Indication Precautions Upon Equipment Operation	Describes the safety precautions and warning on this equipment.
Glossary	Describes the special terminologies and equipment-specific terminologies that are used in this manual.
How to use this manual	This page.
System Overview (Chapter 1)	Describes the common functions of RADAR / ECDIS / MFD.
System Configuration (Chapter 2)	Describes the System Configuration of Scanner Units and Display Units.
Repair Parts (Chapter 3)	Describes the Repair Parts.
Replacement Procedure (Chapter 4)	Describes the Replacement Procedure.
Program Update (Chapter 5)	Describes the Program Update Procedure.
Connection Settings with External Equipment (Chapter 6)	Describes the Connection Settings with External Equipment.
Trouble Shooting (Chapter 7)	Describes the Trouble Shooting and passwords.
Appendix (Chapter 8)	Drawings of Display units and Scanner units.



## Notations

### Operation notations

Track ball operations on the operation panel are expressed as follows.

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

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

Button type	Notation
Button with button name indicated	Example:  →[ AUTO] button
Button with an indication other than the button name such as an icon	Shown as follows. Example:  →Task switching button

A series menu selection operations is expressed as follows.

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

### Touch panel operation

In this manual, the use of a track ball is applied as the precondition of the operation explanation. When the optional touch panel is used, read the notations in this manual as follows.

Track ball operation	Touch panel operation
(Left) click	Single tap
Double-click	Double tap
Right click	Long tap

For the operations that can be executed by touch panel operations, refer to the section “3.16 Touch Panel (Option)”.

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# **1. System Overview**





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# Chapter 1 System Overview

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## 1.1 Functions

Multi Function Display (referred to as "this equipment" or "MFD" in this manual) is navigation equipment that satisfies the following IMO performance standards.

- IMO Resolution MSC192(79): Performance standards for radar equipment
- IMO Resolution MSC232(82): Performance standards for electronic chart display and information systems (ECDIS)
- IMO Resolution MSC191(79): Performance standards for the presentation of navigation related information on shipborne navigational displays
- IMO Resolution MSC74(69) Annex 2: TCS performance standards
- IMO Resolution A.694(17): General requirements for shipborne radio equipment

This equipment has the following functions for "securement of navigation safety" and "navigation energy saving", as the core equipment of INS (Integrated Navigation System) and IBS (Integrated Bridge System), which can also support a one-man bridge.

- RADAR
- ECDIS
- CID (Conning Information Display)
- AMS (Alert Management System), etc.

### Main functions of the RADAR mode

- Sensitivity adjustment, sea clutter and rain/snow clutter suppression
- Interference rejection
- Bearing and range measurement using a cursor, fixed/variable range markers, and electronic bearing line
- Colored own track display
- User map creation and display
- TM (True Motion) presentation
- Self-diagnostic facilities
- Radar performance monitoring (Performance Monitor)
- Target tracking functions (manual/automatic target acquisition and tracking, vector and trail displays and alarm displays)
- 8-unit switchover (Inter-switch) function (Option)
- Electronic navigational chart display<sup>\*1</sup> (Option)

<sup>\*1</sup>: The following databases can be displayed (ARCS cannot be displayed.)

- S-57 Ed3.0/3.1
- S-63
- C-Map Ed3.0 Professional/Professional+
- C-Map ENC
- Jeppesen PRIMAR ECDIS Service

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## Main functions of ECDIS mode

- The following databases can be displayed.
  - S-57 Ed3.0/3.1
  - S-63
  - C-Map Ed3.0 Professional/Professional+
  - C-Map ENC
  - Jeppesen PRIMAR ECDIS Service
  - ARCS
- Own ship's track display and planned-route display on the electronic chart
- Automatic checking of the safety contours and dangerous areas of the own ship (not available for ARCS)
- TT target display and AIS target display on the electronic chart
- Overlay of radar echo on the electronic chart
- True/Relative motion display
- North-up/Course-up/Head-up/Waypoint-up display
- Display of route information such as latitude/longitude at destinations, bearings/ranges up to waypoints, and planned arrival time
- Availability of two EBLs/VRMs
- Writing of memos with alphabetic characters into the electronic chart
- Display of information such as the date/time, current position, heading, and ship's speed
- Selection of colors (conforming to the IMO/IHO) suitable for the daytime, nighttime, dawn and evening
- Editing of route information
  - Addition, deletion, and modification of WPTs on the electronic chart or the list
  - Calculation of the distance between WPTs, bearings, and planned arrival time
  - Up to 512 WPTs per route
  - Checking on the crossing of the safety contours and dangerous areas on created routes
- Route tracking (option)
- Course change
- Safety contours crossing alarm
- Dangerous areas approaching warning
- Waypoint arrival warning
- Off-track warning
- Logging of navigation information onto the SSD
- Own ship's playback using logged data

### Note

This manual describes the methods of handling the RADAR mode and the ECDIS mode, however, this manual does not describe the handling method of the Conning mode. For the handling of the conning mode, refer to the "JAN-7202/9202 Conning Display Instruction Manual".

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## 1.2 Features

This MFD has the following features:

### **Common functions:**

#### **Utilization of an icon menu**

**Intuitive operation system based on the workflow**

**High-resolution large screen**

#### **Message reception notification function**

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

#### **Utilization of a common information window**

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

#### **Display of chart information read results by grouping**

Enables immediate access to the required information.

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

#### **Equipped with the Help function**

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

#### **Visual highlight of target symbols**

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

#### **Wave analysis function (option)**

Analyzes and displays information on the surrounding waves (height, length, cycle, and direction of waves) and enables monitoring of dangerous waves for ships.

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

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## **RADAR function:**

### **Realized a clear large screen with its high resolution.**

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

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

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

### **Target tracking (TT) function by utilizing the latest technology**

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

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

### **Background tracking function (Full-screen acquisition function)**

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

### **Top screen with strictly selected information**

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

### **Sortable TT/AIS list**

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

### **Dual PPI display**

Capable of monitoring of near-range images and far-range images concurrently with one radar (JMR-9200 Series only).

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

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

### **Improved Day/Night function**

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

### **Built-in self-diagnosis program**

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

#### **Performance monitor function**

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

#### **Interswitch function (Option)**

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

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

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

### **ECDIS function:**

**This function minimizes the information that is displayed constantly and expands the chart display area.**

- Can display vector charts (ENC and C-MAP) and raster chart (ARCS).
- Realizes safer sailing through the safety contour line and crossing and approaching danger zone monitoring function. (Excluding ARCS)
- Realizes high operability through high-speed drawing and high-speed processing.
- Facilitates creation of user charts.
- Applies a multi-display screen that can display two charts concurrently. (ARCS and C-MAP Ed.3 cannot be displayed concurrently with a chart of a different type)
- Enables a course plan with multi-view.
- Can display a wide view screen while a single chart or multi-view is displayed.
- Enables creation of a route plan with the table editing function and the graphic editing function.
- Can create an alternative route while sailing.
- Automatic sailing is enabled by connecting with Auto Pilot. (option)
- The playback function enables checking of the sailed routes.
- The S-57 chart can be updated. (Chart Maintenance)

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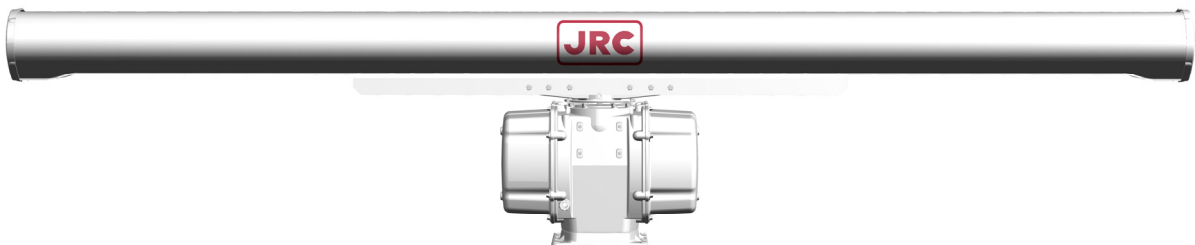
## 1.3 Scanner Units



S-band Magnetron 30kW 3units 12ft. Scanner Unit: NKE-1139



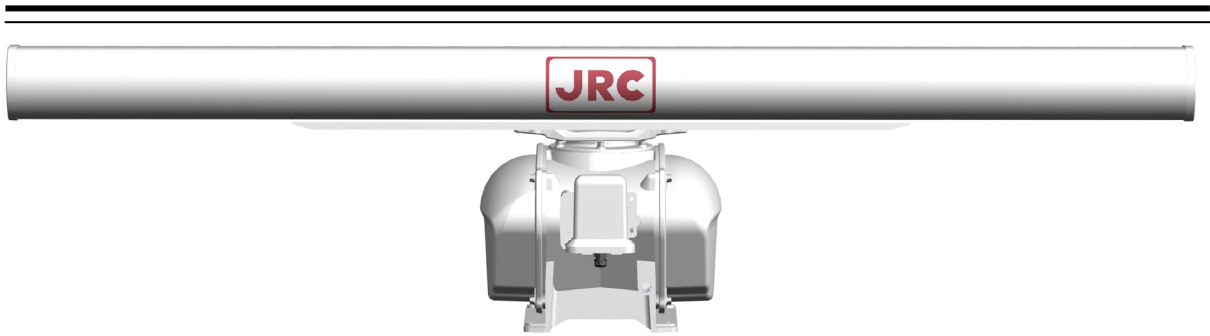
S-band Magnetron 30kW 2units 12ft. Scanner Unit: NKE-1130



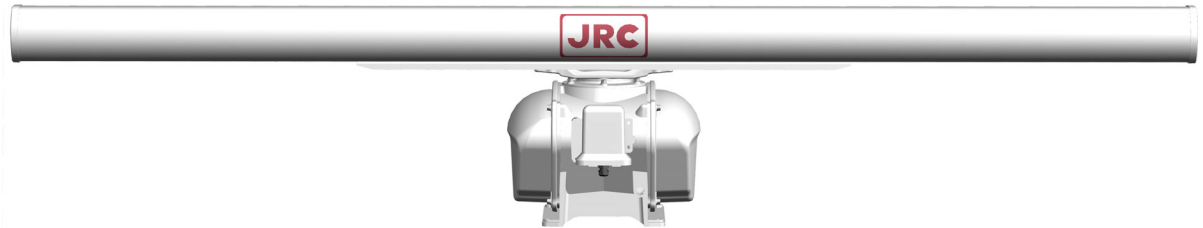
S-band Solid State 250W 2units 12ft. Scanner Unit: NKE-1632



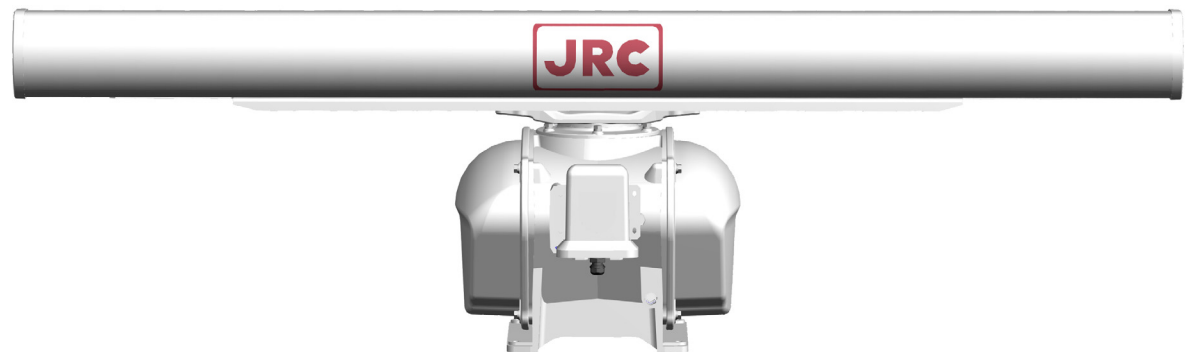
S-band Solid State 250W 2units 8ft. Scanner Unit: NKE-2632  
S-band Solid State 250W 2units 8ft. High Speed Scanner Unit: NKE-2632-H



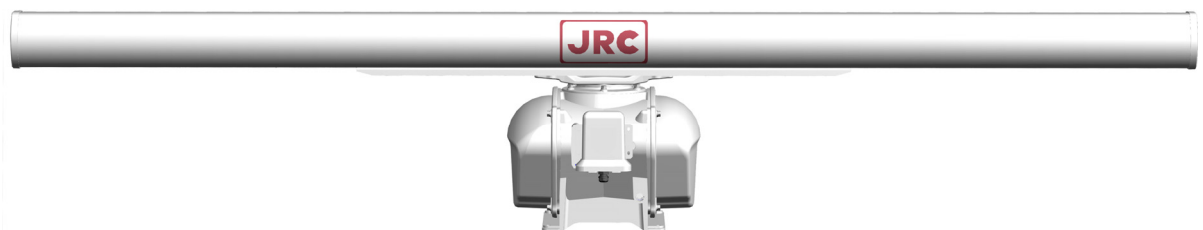
X-band Magnetron 25kW 3units 7ft. Scanner Unit: NKE-1129-7



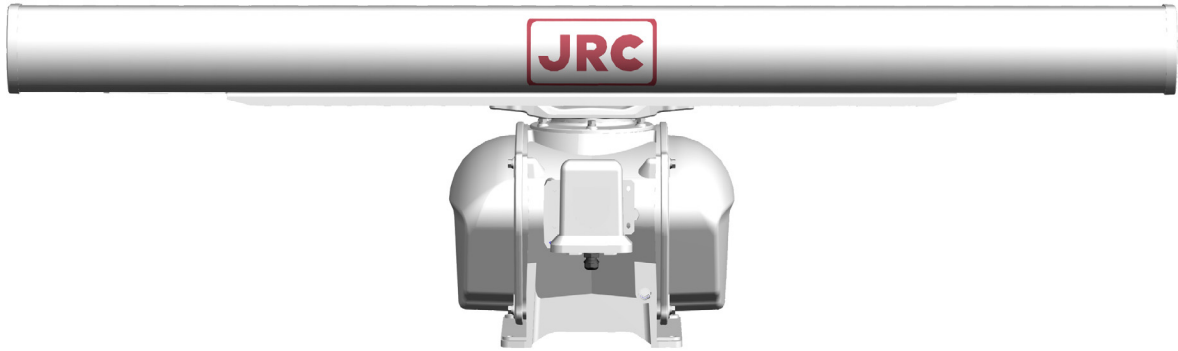
X-band Magnetron 25kW 3units 9ft. Scanner Unit: NKE-1129-9



X-band Magnetron 25kW 2units 6ft. Scanner Unit: NKE-1125-6



X-band Magnetron 25kW 2units 9ft. Scanner Unit: NKE-1125-9



X-band Magnetron 25kW 2units 6ft. High Speed Scanner Unit: NKE-2254-6HS



X-band Magnetron 10kW 2units 6ft. Scanner Unit: NKE-2103-6  
X-band Magnetron 10kW 2units 6ft. High Speed Scanner Unit: NKE-2103-6HS



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## 1.4 Transmitter Receiver Units

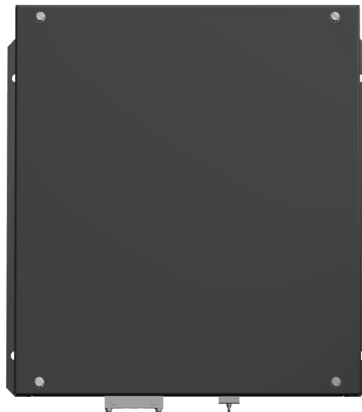
The transmitter-receiver unit generates radar signals for transmission, amplifies and demodulates received signals. It sends the radar video signals to the display unit along with the transmission timing signals and antenna rotation signals.

Four types of transmitter-receiver units are available, which are suited to different uses:

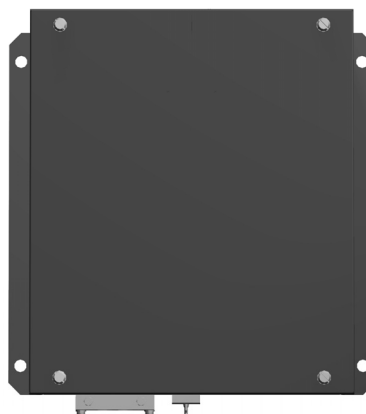
- 1) X band Magnetron 10 kW type: Compact and lightweight
- 2) X band Magnetron 25 kW type: High resolution, high sensitivity
- 3) S band Magnetron 30 kW type: All-weather type
- 4) S band Solid State 250 W type: All-weather, high durability

The X band 25 kW type and the S band 30 kW type are available as either a 2-unit type, in which the transmitter-receiver unit is built into the scanner unit, or a 3-unit type, which has a separate transmitter-receiver unit to be installed inside the cabin. The S band solid state 250W type and X band 10 kW type are only available as a 2-unit type.

For the 3-unit types, radio wave signals are fed between the indoor transmitter-receiver unit and the outdoor scanner unit through a waveguide for the X band types or a coaxial tube for the S band type.



S-band Magnetron 30kW Transmitter-Receiver Unit: NTG-3230 (for NKE-1139 Scanner Unit)



X-band Magnetron 25kW Transmitter-Receiver Unit: NTG-3225 (for NKE-1129 Scanner Unit)

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## 1.5 Display Units

19-inch and 26-inch display units are available:

- 1) 19-inch type (effective size: 250 mm or more) : JMR-7200/JAN-7200 Series
- 2) 26-inch wide type (effective size: 320 mm or more): JMR-9200/JAN-9200 Series

JMR-7200/9200 series represents the RADAR or MFD.

JAN-7200/9200 series represents the ECDIS or Conning display.



JMR-7200/JAN-7200 Series display unit



JMR-9200/JAN-9200 Series display unit



Trackball Operation Unit: TOPU NCE-5605



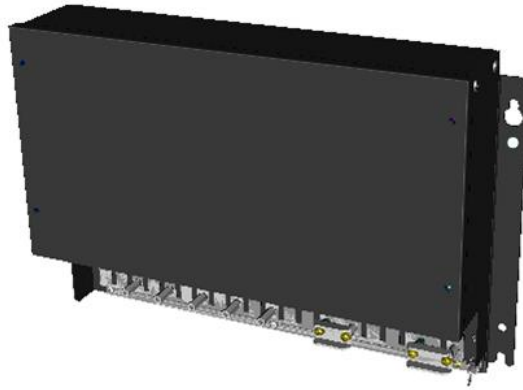
Keyboard Operation Unit: KOPU NCE-5625 (Option)



Central Control Unit: CCU NDC-1590



Power Supply Unit: PSU NBD-913



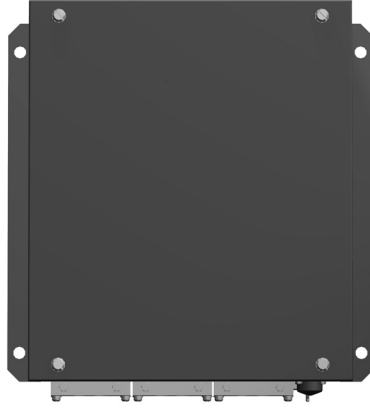
Junction Box: JB NQE-1143 (Option)



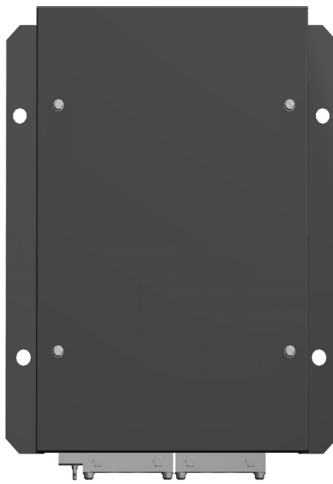
19 inch Monitor Unit: MNU NWZ-207



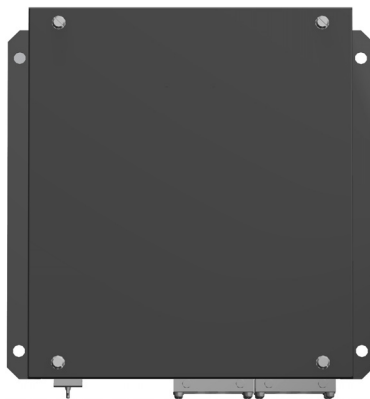
26 inch Monitor Unit: MNU NWZ-208



Power Control Unit: NQE-3167 (Option)



4ch. Inter Switch Unit: NQE-3141-4A (Option)



8ch. Inter Switch Unit: NQE-3141-8A (Option)

