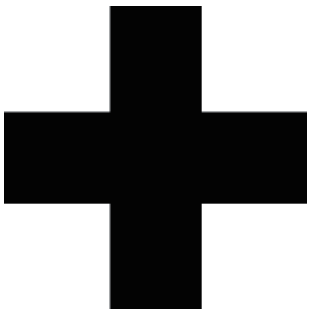
JMR-9230-S/S3
JMR-9225-7X3/9X3/6X/9X/6XH
JMR-9210-6X/6XH
JMR-9272-S
JMR-9282-S/SH
JMR-7230-S/S3
JMR-7225-7X3/9X3/6X/9X/6XH
JMR-7210-6X/6XH
JMR-7272-S
JMR-7282-S/SH
JAN-9201
JAN-7201
JAN-9202
JAN-7202

MARINE RADAR EQUIPMENT /ECDIS/CONNING

INSTALLATION MANUAL

JRC Japan Radio Co., Ltd.



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.

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.

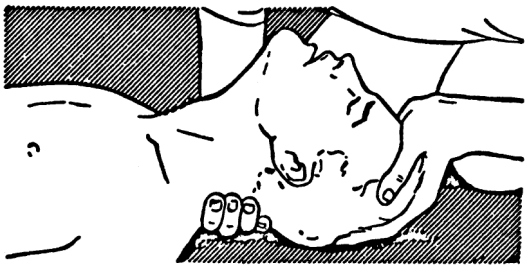
☆Treatment to Give When the Patient Has a Pulse Beating but Has Ceased to Breathe

∗ 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.

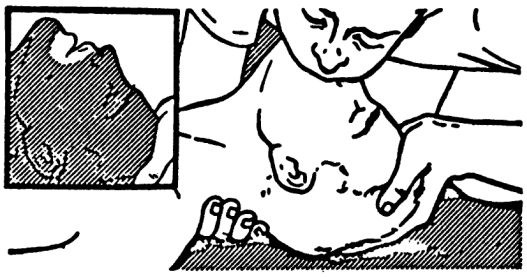
Mouth-to-mouth artificial respiration with the patient's head lifted

[1]



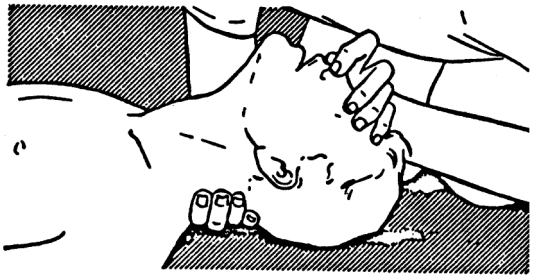
(1) Lift the back part of the patient's head. Support the forehead with one of your hand and the neck with the other hand.→[1].
Many patients will have their airways opened by lifting their head in this way to ease mouth-to-mouth artificial respiration.

[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

☆Treatment to Give When the Patient Has No Pulse Beating and Has Ceased to Breathe

∗ Performing cardiac massage - Fig. 2

If the patient has no pulse beating, with the pupils open and no heartbeat being heard, the patient has a cardiac arrest and requires immediate artificial respiration. Continue this until a medical specialist arrives, and follow his or her directions after that.

(1) Putting one hand on about the lower one third of the patient's ribs and the other hand over the back of the first, with your elbow fully stretched (with bended elbow, you can't press to the extent the patient's ribs are depressed), apply your body weight to the hands to press the patient's body until it is depressed about 2 cm (Repeat this about 50 times a minute). (Cardiac massage)

(2) If only one first-aider is available, perform a cardiac massage about 15 times and then give mouth-to-mouth artificial respiration 2 times. Repeat this sequence.
If two first-aiders are available, while one person performs a cardiac massage 15 times, the other should give mouth-to-mouth artificial respiration 2 times. Repeat this sequence. (Combined cardiac massage and mouth-to-mouth artificial respiration method)

(3) Check the patient's pupils and feel the pulse from time to time. When the pupils are restored to normal and the pulse begins to beat regularly, stop treating and keep the patient calm while giving him or her coffee, tea or any other hot drink to keep him or her warm while watching him or her carefully.

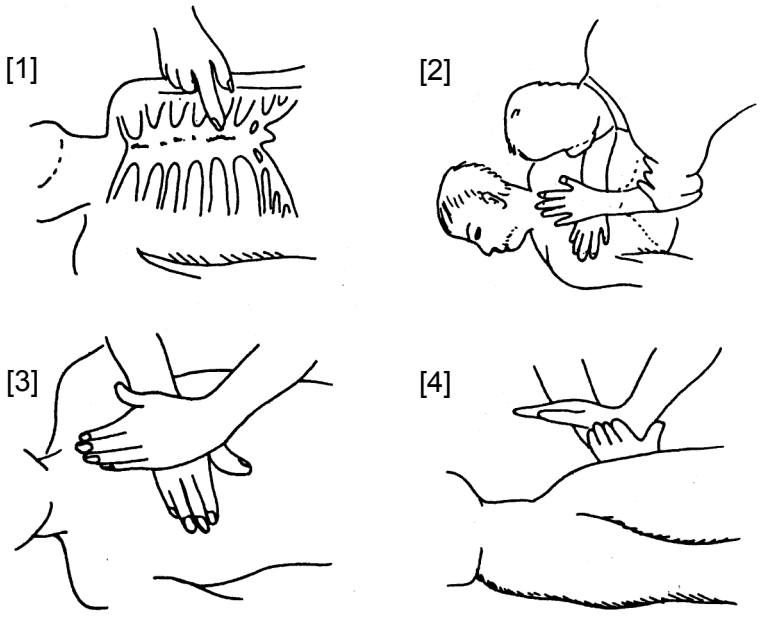


Fig. 2 Cardiac massage

Procedure for cardiopulmonary resuscitation (CPR) using the AED (Automated External Defibrillator)

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 ↓

Ask for help.
- Make an 119 emergency call.
- Ask to bring an AED.

↓

Open the airway.
- 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 ↓

Give 2 rescue breaths; omittable Note([1])

↓

Give CPR.
- 30 chest compressions
- Give 2 rescue breaths; omittable Note([1])

↓

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

Electric shock is needed. ↓

Delivery of electric shock

↓

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

The AED automatically analyzes the heart rhythm every 2 min.

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.

Note([1]) Omission of rescue breathing:
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 preparing the mouthpiece for rescue breathing takes too long, omit rescue breathing and proceed to the next step.

Procedure for Cardiopulmonary Resuscitation (CPR) Using the AED (Automated External Defibrillator)

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) It 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 119 call and bring an AED.

- Somebody has collapsed. Please help.
- Please call **119**.
- Please bring an **AED**.
- If there is nobody to help, call 119 yourself.

5. Open the airway

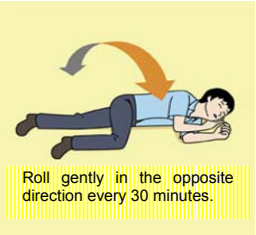
a) Touch the forehead with one hand. Lift the chin with the two fingers of the middle finger and forefinger of the other hand and push down on the forehead as you lift the jaw to bring the chin forward to open the airway. If neck injury is suspected, open the airway by lifting the lower jaw.

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.



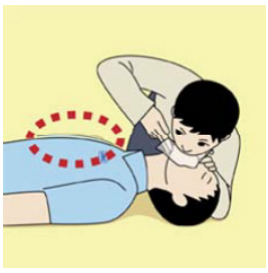
• Position the injured or ill person on his/her side, maintain a clear and open airway by pushing the head backward while positioning their mouth downward. To maintain proper blood circulation, roll him/her gently to position them in the recovery position in the opposite direction every 30 minutes.

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.

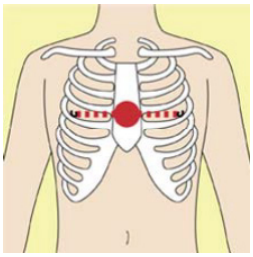
e) Open your mouth widely to completely cover the mouth of the injured or ill person so that no air will escape. Give rescue breathing twice in about 1 second and check if the chest rises.

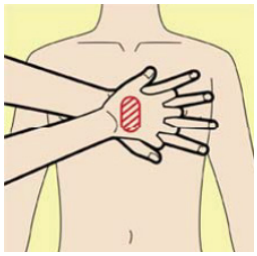
8. Cardiopulmonary resuscitation (CPR) (combination of chest compressions and rescue breaths)

a) Chest compressions

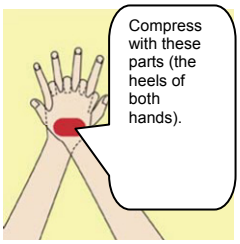
1) Position of chest compressions

• 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.



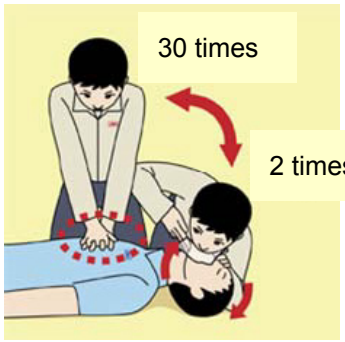


2) Perform chest compressions



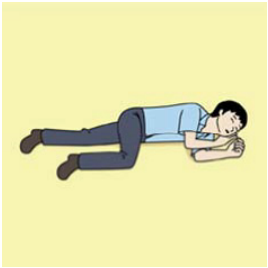
- Perform uninterrupted chest compressions of 30 at the rate of about 100 times per minute
- While locking your elbows positioning yourself vertically above your hands.
- With each compression, depress the chest wall to a depth of approximately 4 to 5 cm.

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)



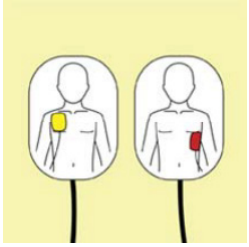
a) When the injured or ill person has been handed over to the emergency services
b) When the injured or ill person has started moaning or breathing normally, lay him/her on his/her side in a recovery position and wait for the arrival of emergency services.

10. Arrival and preparation of an AED

Turn on the power.

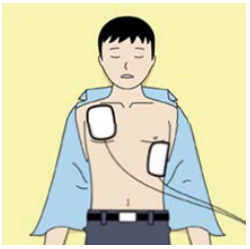
a) Place the AED at an easy-to-use position. If there are multiple first-aiders, continue CPR until the AED becomes ready.
b) Turn on the power to the AED unit. Depending on the model of the AED, you may have to push the power on button, or the AED automatically turns on when you open the cover.
c) Follow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



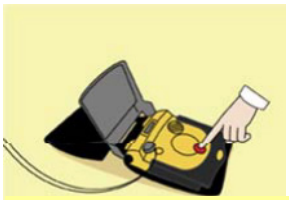
c) Some AED models require to connect a connector by following voice prompts.
d) Do not put child pads on adults (older than 8 years).

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.



Press the shock button.

14. Resume cardiopulmonary resuscitation (CPR).

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

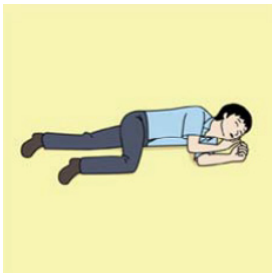
15. Automatic electrocardiogram analysis

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.



PREFACE

Thank you for purchasing the JRC Multi Function Display JMR-7200/9200 Series, JAN-7201/9201 and JAN-7202/9202.
This equipment meets the performance standards of the IMO (International Maritime Organization) and the IHO (International Hydro graphic Organization), and serves to improve safety, reduce fuel combustion, concentrate voyage information as the main device of the INS (Integrated Navigation System).

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

● Before Operation ●

Pictorial Indication

Various pictorial indications are included in this installation 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 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

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. When any work must be done on the radar antenna, make sure to turn the safety switch off.

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^2	20 W/m^2	2.5 W/m^2
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.

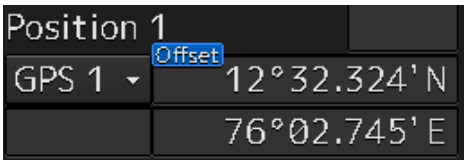
When cleaning the display screen, do not wipe it too strongly with a dry cloth. Also, do not use gasoline or thinner to clean the screen. Failure will result in damage to the screen surface.

⚠WARNING

	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 memory beforehand when reading and writing of the file by using USB memory device. Influences other equipment when the display unit is infected with the virus, and causes the breakdown.
	Do not leave the USB memory or the like in the USB port after use. Malfunctions may result.
	Do not remove USB device while the access lamp (in USB device) is flashing. Data is damage when the USB device is pulled out while accessing it, and it case the breakdown.
	Do not insert or remove the USB device while transmitting. The radar image becomes unstable by accessing the USB device not anticipated, and it causes the 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, strange smell or unusual 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.

⚠WARNING

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.



If the LCD module breaks and the liquid inside spills out to stick to your skin, wash it off immediately under running water for more than 15 minutes. If you find any skin problem afterwards, consult a doctor immediately. If the liquid gets in your eye, wash it off immediately under running water for more than 15 minutes, and then, consult a doctor as soon as possible.

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.

⚠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.
	When using the [AUTO SEA] function, never set the suppression level too high canceling out all image noises from the sea surface at close range. Detection of not only echoes from waves but also targets such as other ships or dangerous objects will become inhibited. When using the [AUTO SEA] function, make sure to choose the most appropriate image noise suppression level.
	When using the [AUTO RAIN] function, never set the suppression level too high. Detection of not only echoes from the rain or snow but also targets such as other ships or dangerous objects will become inhibited. When using the [AUTO RAIN] function, make sure to choose the most appropriate image noise suppression level.
	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

	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 target acquisition or target tracking function deteriorates, and this may lead to accidents.
	Do not use or leave the equipment under direct sunlight for a long time or in the temperatures above 55°C. Otherwise, a fire or a malfunction may occur.
	Do not block the ventilation opening of the equipment. Otherwise, heat may accumulate inside to cause a fire or a malfunction.

⚠CAUTION

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

- If no backup measures, such as using another EDIS 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 turn off the power during index creation by Chart Portfolio.
Otherwise, a malfunction may occur.

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

- Do not place any object on the operation panel.
  Avoid placing anything extremely hot, in particular, as this may deform the panel.
- Do not apply any undue shock on the operation panel, trackball and dials. Otherwise, a malfunction may result.
- Please do not press and hold the power button of the operation unit. It becomes the cause that prevents the normal start-up.

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.

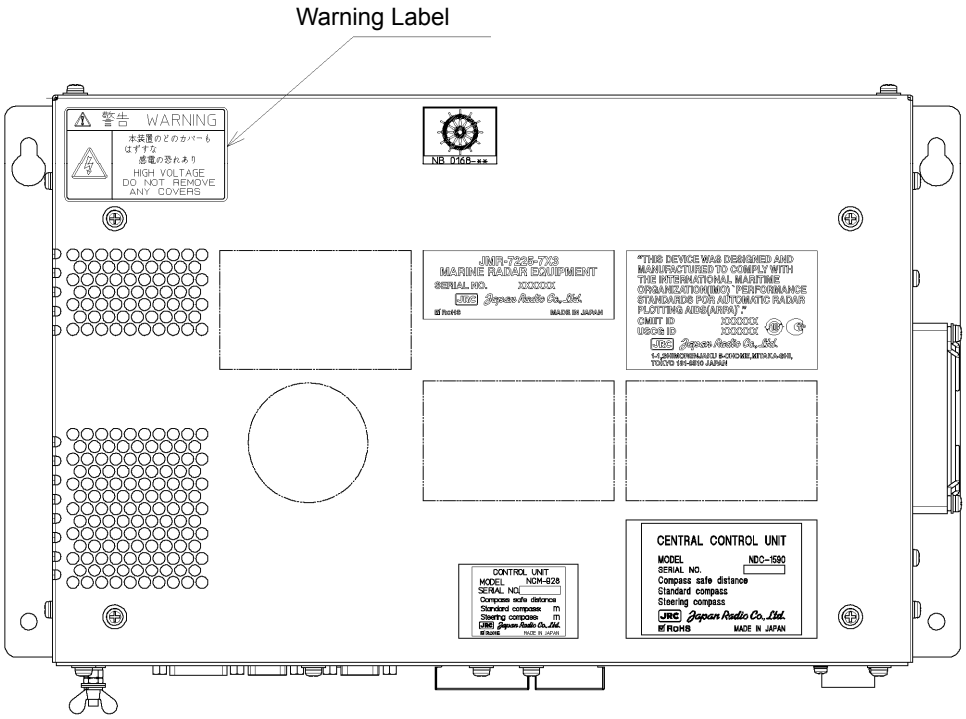
- If a fan alarm or CPU temperature rise alarm has occurred, immediately turn off the power.
  Keeping the equipment in operation under such condition may cause a fire or a malfunction.
  After turning off the power, contact our head office, or a nearby branch or local office to request servicing.

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

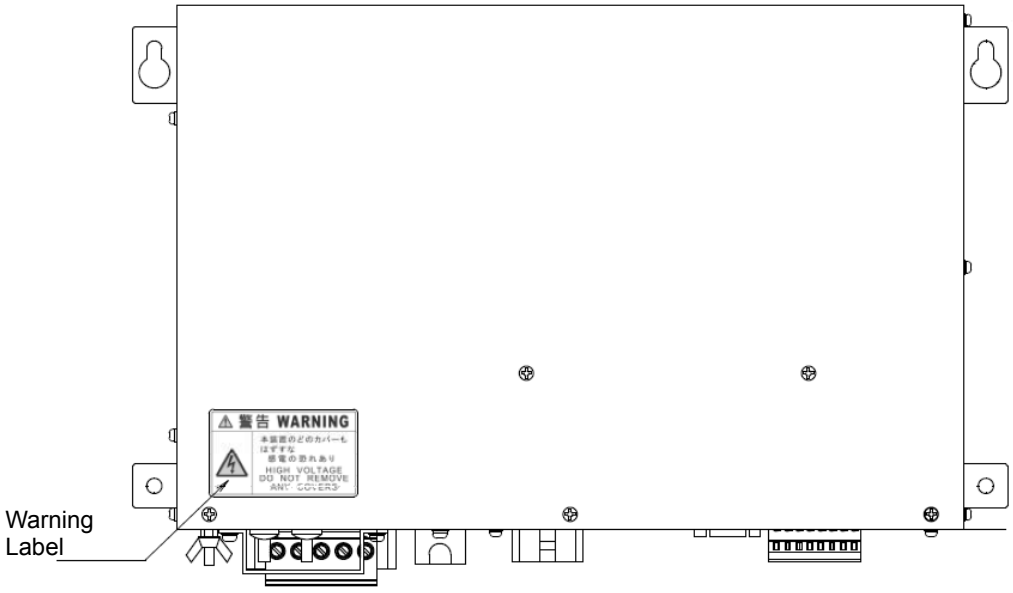
⚠CAUTION

	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 malfunction 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.
	In the case of turning on the power under the condition of low temperature, do pre-heat less than 30 minutes. Otherwise, the equipment may not start normally.
	The judgement of formal or informal about chart depends on the administration organization of the flag state. About the officially of the chart, please contact the administration organization.
	Please do not touch the LAN connector. May have to fail due to static electricity. When attaching and detaching the LAN connection equipment, please remove static electricity by touching the metal.

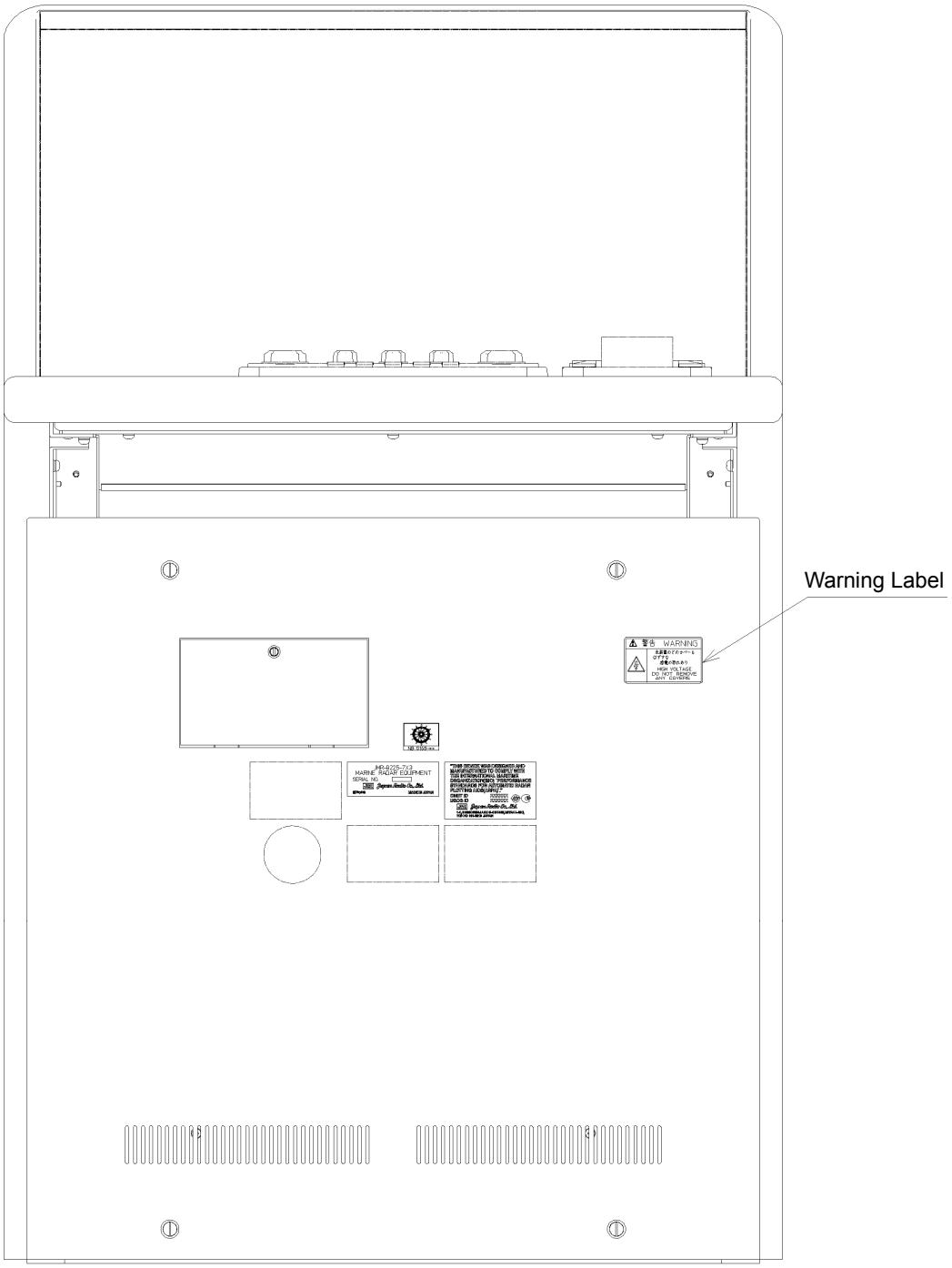
The Mounting Point of the Warning Label



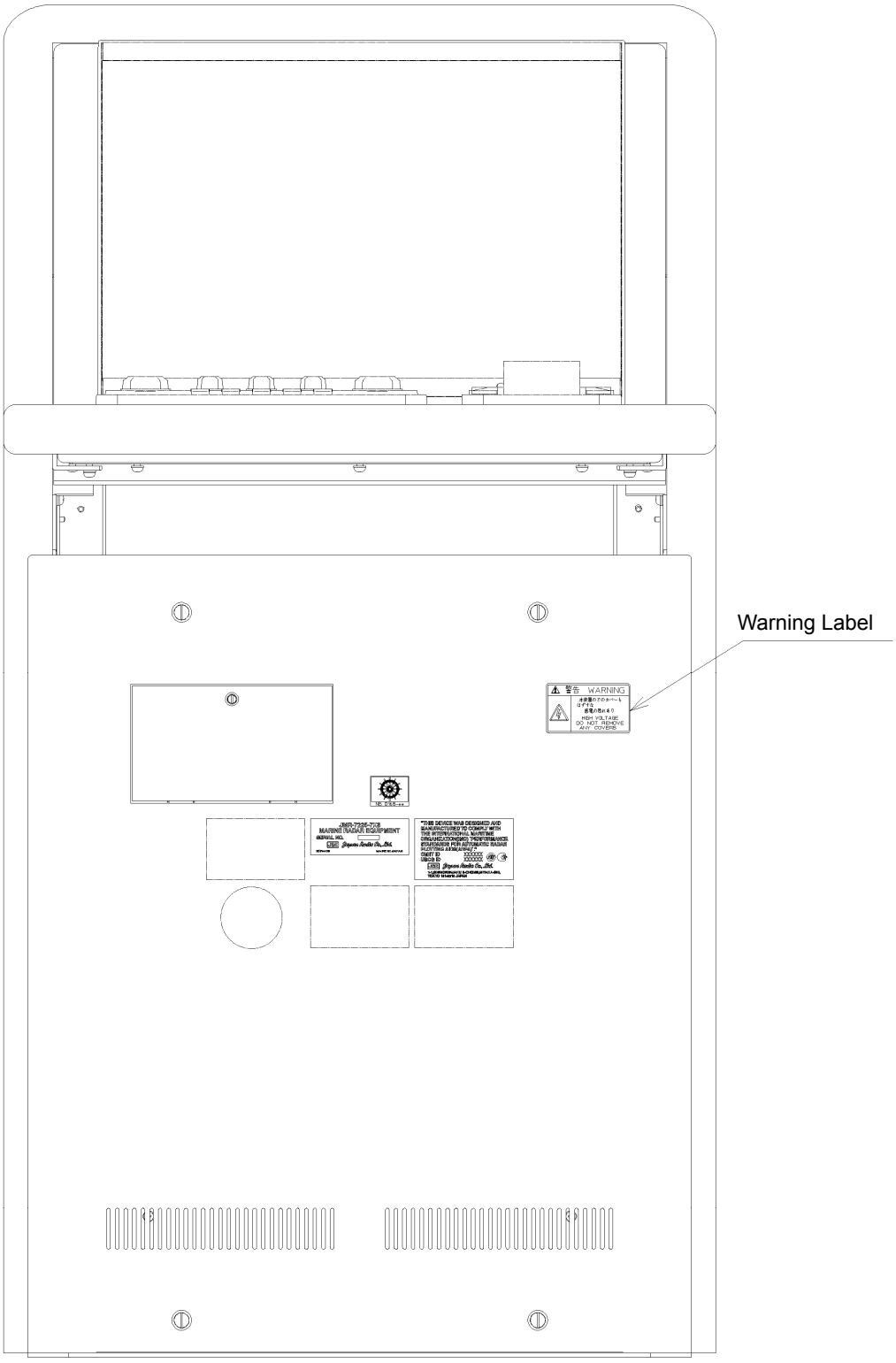
NDC-1590 Central Control Unit(CCU)



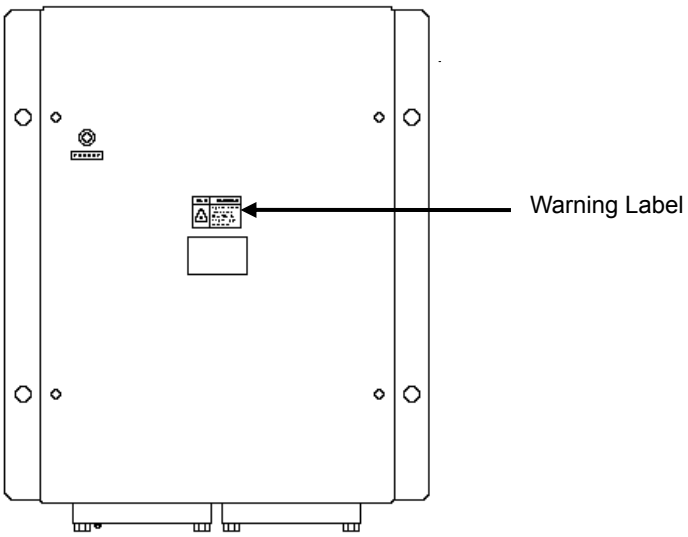
NBD-913 Power Supply Unit(PSU)



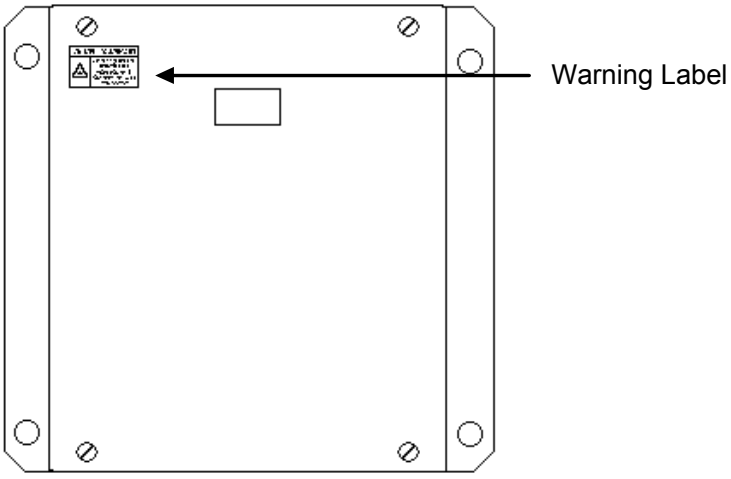
CWA-246 26inch Display Unit Mount Kit



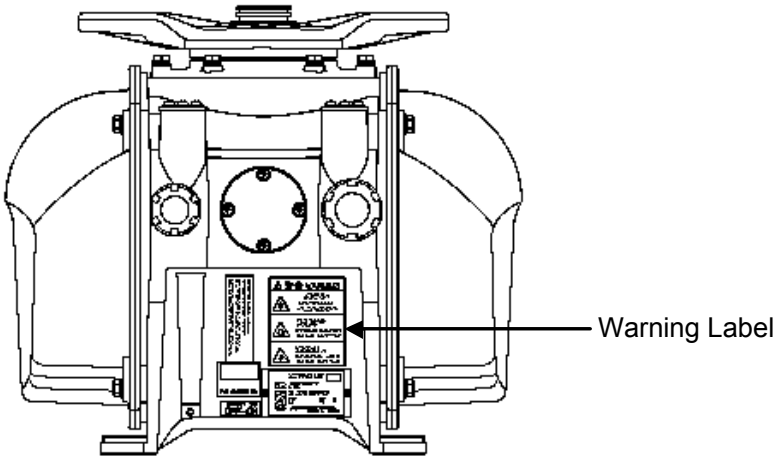
CWA-245 19inch Display Unit Mount Kit



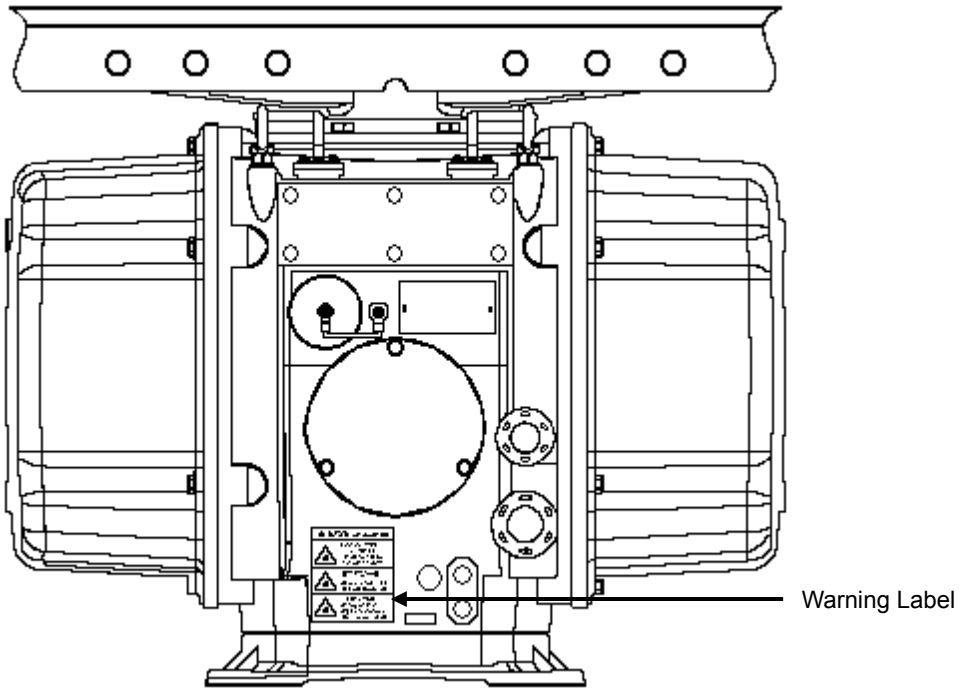
NQE-3141-4A/8A Inter Switch Unit(ISW)



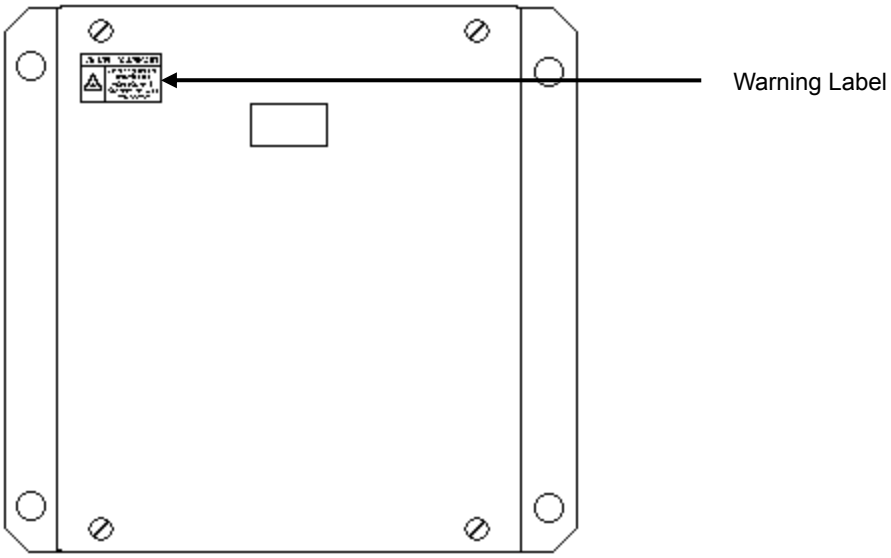
NQE-3167 Power Control Unit



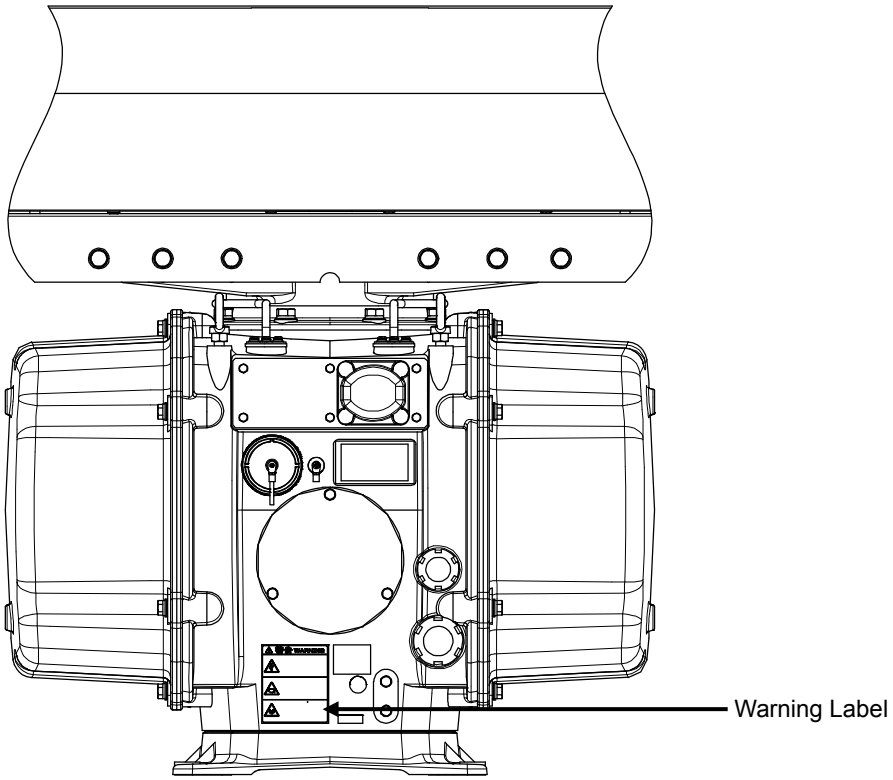
NKE-1129-7/9 Radar Antenna
NKE-1125-6/9 Radar Antenna



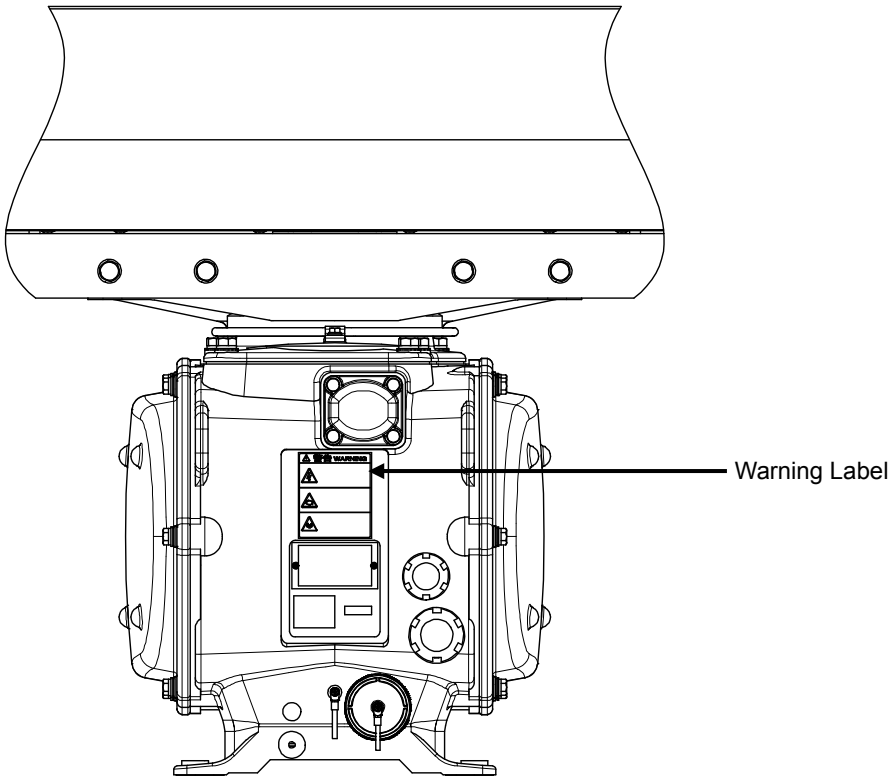
NKE-1139/1130 Radar Antenna



NTG-3230/3225 Transmitter-Receiver



NKE-1632 Radar Antenna

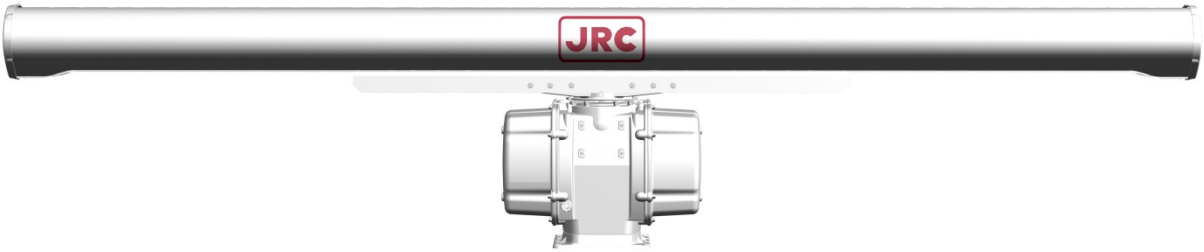


NKE-2632/2632-H Radar Antenna

EQUIPMENT APPEARANCE

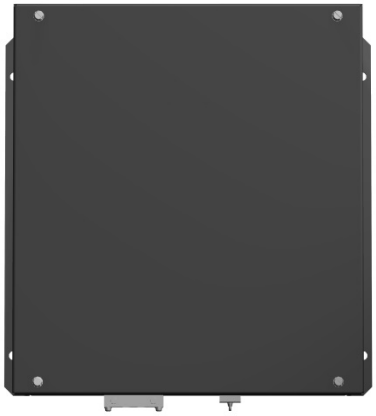
NKE-1139 Radar Antenna (12 feet)

NKE-1130 Radar Antenna (12 feet)

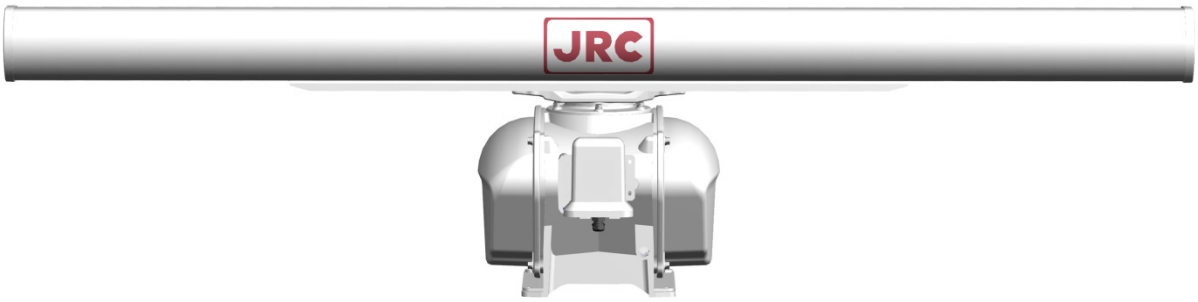


NKE-1632 Radar Antenna (12 feet)

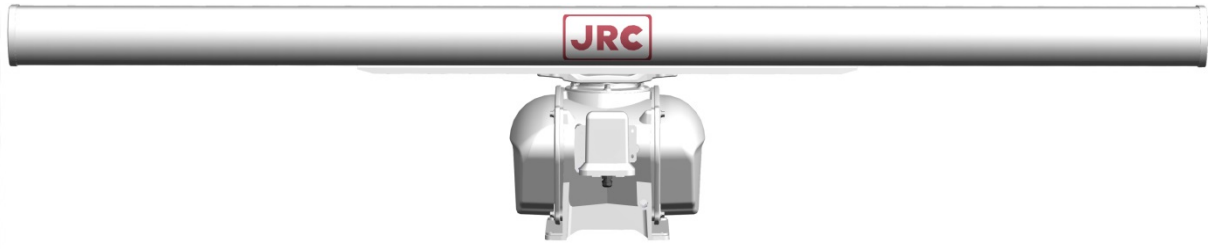
NKE-2632/2632-H Radar Antenna (8 feet)



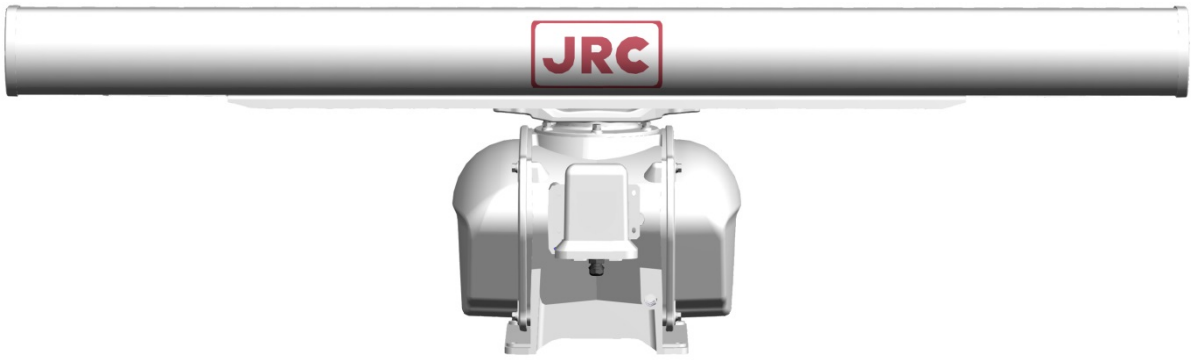
NTG-3230 Transmitter-Receiver (30 kW)



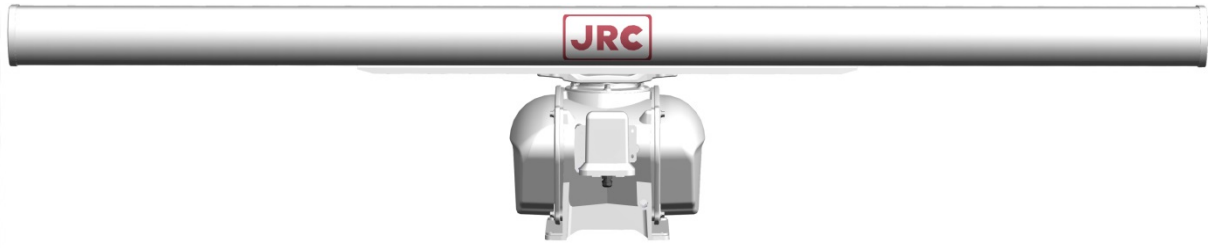
NKE-1129-7 Radar Antenna (7 feet)



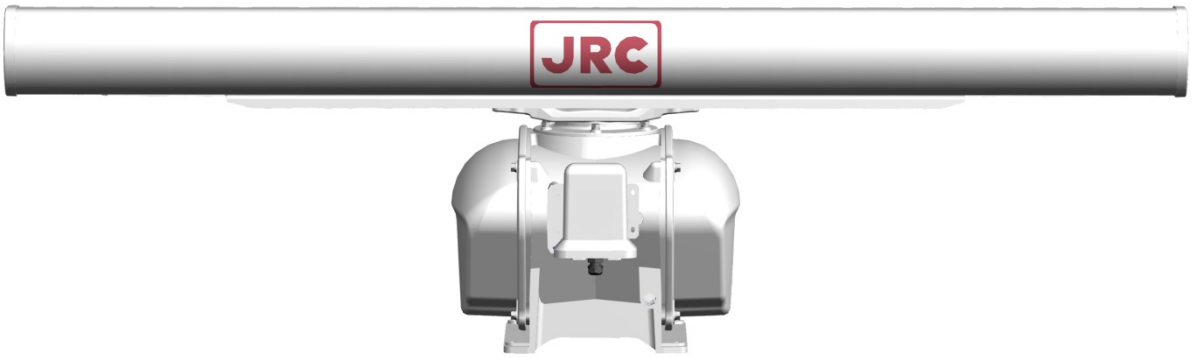
NKE-1129-9 Radar Antenna (9 feet)



NKE-1125-6 Radar Antenna (6 feet)

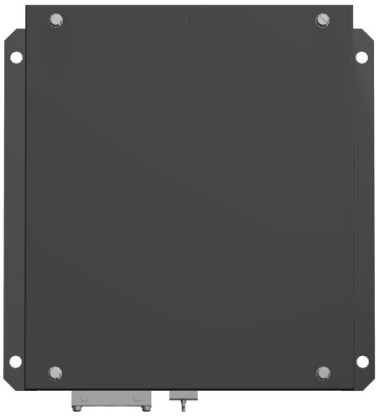


NKE-1125-9 Radar Antenna (9 feet)



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

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



NTG-3225 Transmitter-Receiver (25 kW)

CWA-245 Display Unit Mount Kit

CWA-246 Display Unit Mount Kit

NCE-5605 Trackball Operation Unit - TOPU

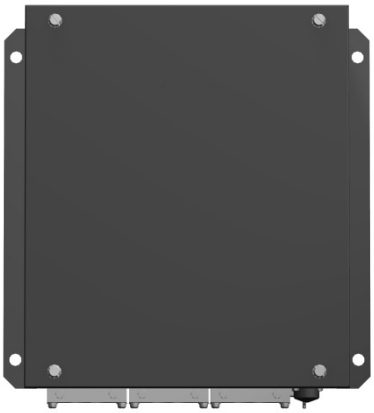
NCE-5625 Keyboard Operation Unit - KOPU

NDC-1590 Central Control Unit - CCU

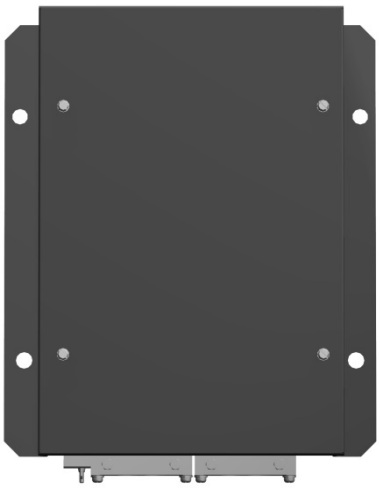
NBD-913 Power Supply Unit - PSU

NWZ-207 Monitor Unit(19inch)

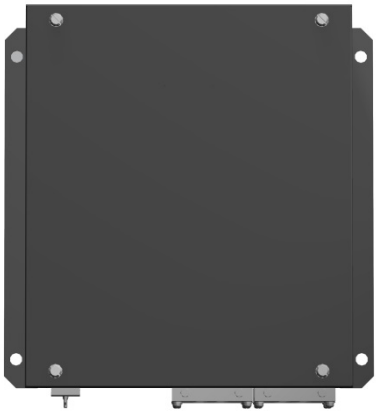
NWZ-208 Monitor Unit(26inch)



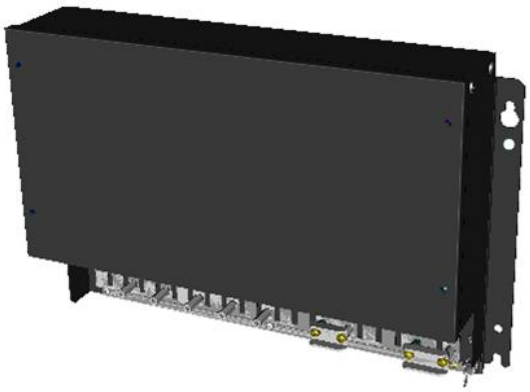
NQE-3167 Power Control Unit (Option)



NQE-3141-4A Interswitch Unit - ISW(Option)



NQE-3141-8A Power Control Unit (Option)



NQE-1143 Junction Box - JB(Option)

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
AOC	:	Analog Option Circuit(Option interface board in Junction Box)
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
CCU	:	Central Control Unit
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. Extimated time of arrival to the last WPT
GC	:	Great Circle
GPS	:	Global Positioning System
GIF	:	Gyro Interface Circuit(Option interface board in Junction Box)
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	:	Inter Switch unit
JB	:	Junction Box
KOPU	:	Keyboard Operation 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
TOPU	:	Trackball Operation Unit
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 Q0N 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.

RIF : Radar Interface Circuit(Option interface board in Junction Box)

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.

Contents

1. Overview

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
- IMO Resolution MSC252(83): Performance standards for Integrated Navigation System (INS)
- IMO Resolution MSC302(87): Bridge Alert Management

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

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

Any of the following task functions can be added to this equipment as the option, enabling the equipment to be used as a multi-function display.

- Radar
- ECDIS
- Conning Display

1.1.1 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[*1] (Option)

[*1]: 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

1.1.2 Main Functions of the 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 (when ECDIS is used with the optional radar interface board)
- True/Relative motion display
- North-up/Course-up/Head-up/Waypoint-up
- 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

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 hard-copy 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

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

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)

1.3 Components

A list of components and optional accessories is shown below.

Components of the Display Unit

Unit			Type name	Q'ty	Remarks
LCD monitor		(JMR-92XX/JAN-92XX)	NWZ-208	1	26inch LCD monitor
		(JMR-72XX/JAN-72XX)	NWZ-207		19inch LCD monitor
Touch Panel monitor		(JMR-92XX/JAN-92XX)	NWZ-208-TP		Option 26inch
		(JMR-72XX/JAN-72XX)	NWZ-207-TP		Option 19inch
Control Unit			NCM-928	1	Standard Equipment
	Power Supply Unit		NBD-913	1	Standard Equipment
	Central Control Unit		NDC-1590	1	Standard Equipment
		8GB System SSD	CDD-752	1	Included in the NDC-1590
		256GB Data SSD	CDD-753	1	
		DVD Drive	CDD-754	1	
		HASP	CYC-344	1	
		e-Token	CYC-735	1	
		Central Processing Circuit	CDC-1410	1	
		CCU Interface Circuit	CMH-2406	1	
		CCU Interface Terminal	CQD-2286	1	
		CCU Interconnection	CML-902	1	
		COM Express Board	CMC-1406	1	
		WES7P Licence	CYC-847	1	
		TMSL Licence	CYC-848	1	
	Trackball Operation Unit		NCE-5605	1	Standard Equipment
		Operation Circuit A	CCK-1050	1	Inclueded in the NCE-5605
		Trackball	CCK-1060	1	
		Operation Circuit SW	CCK-1069	1	
		Operation Circuit CN	CCK-1070	1	
		TOPU Interconnection	CMD-1103	1	
Keyboard Operation Unit			NCE-5625	1	Option(NCE-5625 or CWB-1593)
		Operation Circuit B	CCK-1059	1	Included in the NCE-5625
		Option Keyboard	CCK-1061	1	
		KOPU Interconnection	CMD-1106	1	
Large Tray			CWB-1593	1	Option(NCE-5625 or CWB-1593)
UPS		QUINT-PS/1AC/24DC/20	-	1	Option
		QUINT-BAT/24DC/3.4AH	-	1	
		QUINT-DC-UPS/24DC/20	-	1	
		ME-MAX-NEF/QUINT20	-	1	
Junction Box			NQE-1143	1	Option
		Serial LAN Circuit	CMH-2370	max 2	Option
		Analog Option Circuit	CMJ-560	1	Option
		Gyro Interface Circuit	CMJ-554	1	Option
		Radar Interface Circuit	CQD-2273	1	Option
		Scanner AC Power Cable	CML-836AC	1	Any one of these cables include to the CQD-2273
		Scanner AC Power Cable(F)	CML-836ACF		
		Scanner DC Power Cable	CML-836DC		
		Scanner DC Power Cable(F)	CML-836DCF		
Sensor LAN Switch Unit			NQA-2443	max 2	Option In case of standalone type 26inch:max 2 19inch:only 1
		16Port Switch HUB	CQL-221	1	Included in the NQA-2443
		Sensor LAN Switch Interconnection	CML-841	1	

Components of the Display Unit

Unit		Type name	Q'ty	Remarks
Stand-alone type Frame & Cables	26inch Display Mount Kit	CWA-246	1	For 26inch Monitor
	19inch Display Mount Kit	CWA-245		For 19inch Monitor
	Display Unit Interconnection	CML-901	1	Cables for stand-alone
	Relay Terminal	CQD-2312	1	For AC/DC Power distribution
	Touch Panel Interconnection	CML-839	1	Option
Desktop type Frame & Cables	26inch Desktop Frame	CWB-1595	1	For 26inch Monitor
	19inch Desktop Frame	CWB-1594		For 19inch Monitor
	OPU Desktop Frame	CWB-1596	1	For operation unit
	Display Unit Interconnection(F)	CML-901-F	1	Longer than CML-901
	Touch Panel Interconnection(F)	CML-839-F	1	Option
Flush-mount type Cables	Display Unit Interconnection(F)	CML-901-F	1	Longer than CML-901
	Touch Panel Interconnection(F)	CML-839-F	1	Option
Interswitch Unit	4ch	NQE-3141-4A	1	Option
	8ch	NQE-3141-8A	1	Option
Power Control Unit		NQE-3167	1	Option
Digital Signal Converter	32ch	NCT-82	1	Option
	64ch	NCT-83	1	Option
Buzzer Unit		CGC-25	1	Option TCS Buzzer
Remote monitor display connection	RGB Video Distribution Amplifier	VAC-2001HB-A	1	Option
	Monitor Extension Kit	CFQ-5957	1	Option
Cover	(JMR-92XX/JAN-92XX)	CWB-1621	1	Option
	(JMR-72XX/JAN-72XX)	CWB-1619		
Hood	(JMR-92XX/JAN-92XX)	CWB-1620	1	Option
	(JMR-72XX/JAN-72XX)	CWB-1618		Option
Accessory	CD Cleaner	7ZZNA0426B	1	Packing 1 box
Spare Parts	NBD-913 Spare Parts	7ZXNA4021	1	Packing 1 box
	CMH-2370 Spare Parts	7ZXNA4020	1	Option
	CMJ-554 Spare Parts	7ZXNA4022	1	Option
	7HPNA4003 Printer spare parts	7ZXNA4011	1	Option
	NCT-82/83 Spare Parts	7ZXNA4017	1	Option
Printer	Printer	7HPNA4003	1	Option
	L-Type Stopper(Printer fixture)	QL-58	1	

Manual list

Model	Title	Code	Remarks
JMR-7200/9200 Series	JMR-7200/9200 Series Marine Radar Equipment Instruction Manual <Basic Operation> (1/3) *English	7ZPNA4446*1	Standard Equipment
	JMR-7200/9200 Series Marine Radar Equipment Instruction Manual <Function> (2/3) *English	7ZPNA4447*1	Standard Equipment
	JMR-7200/9200 Series Marine Radar Equipment Instruction Manual <Reference> (3/3) *English	7ZPNA4448*1	Standard Equipment
	JMR-7200/9200 Series Marine Radar Equipment Quick Operation Guide *English	7ZPNA4395*1	Standard Equipment
	JMR-7200/9200 Series JAN-7201/9201 Marine Radar Equipment ECDIS Additional Manual for Chart Installation *English	7ZPNA4461*1	Option
	JMR-7200/9200 Series JAN-7201/9201 JAN-7202/9202 Marine Radar Equipment ECDIS Conning Display Installation Manual *English	7ZPNA4466*1	Option
	JMR-7200/9200 Series JAN-7201/9201 JAN-7202/9202 Marine Radar Equipment ECDIS Conning Display Field Service Manual *English	7ZPNA4467*1	Option
JAN-7201/9201	JAN-7201/9201 ECDIS Instruction Manual <Basic Operation> (1/3) *English	7ZPNA4449*1	Standard Equipment
	JAN-7201/9201 ECDIS Instruction Manual <Function> (2/3) *English	7ZPNA4450*1	Standard Equipment
	JAN-7201/9201 ECDIS Instruction Manual <Reference> (3/3) *English	7ZPNA4451*1	Standard Equipment
	JAN-7201/9201 ECDIS Quick Operation Guide *English	7ZPNA4405*1	Standard Equipment
	JMR-7200/9200 Series JAN-7201/9201 Marine Radar Equipment ECDIS Additional Manual for Chart Installation *English	7ZPNA4461*1	Option
	JAN-7201/9201 ECDIS Additional Manual for Automatic Sailing YOKOGAWA Autopilot PT500A TCS model Category B/C *English	7ZPNA4462*1	Option
	JAN-7201/9201 ECDIS Additional Manual for Automatic Sailing TOKYO KEIKI Autopilot PR-6000/9000 TCS model Category B/C *English	7ZPNA4463*1	Option
	JAN-7201/9201 ECDIS Type Specific ECDIS Training Reference for TCS *English	7ZPNA4464*1	Option
	JMR-7200/9200 Series JAN-7201/9201 JAN-7202/9202 Marine Radar Equipment ECDIS Conning Display Installation Manual *English	7ZPNA4466*1	Option
	JMR-7200/9200 Series JAN-7201/9201 JAN-7202/9202 Marine Radar Equipment ECDIS Conning Display Field Service Manual *English	7ZPNA4467*1	Option
JAN-7202/9202	JAN-7202/9202 Conning Display Instruction Manual *English	7ZPNA4452*1	Standard Equipment
	JMR-7200/9200 Series JAN-7201/9201 JAN-7202/9202 Marine Radar Equipment ECDIS Conning Display Installation Manual *English	7ZPNA4466*1	Option
	JMR-7200/9200 Series JAN-7201/9201 JAN-7202/9202 Marine Radar Equipment ECDIS Conning Display Field Service Manual *English	7ZPNA4467*1	Option

*1 Revision symbol(A,B,C..) is added to the end of each type name.

List of Radar Antenna Types and Specifications

Radar antenna type	Radio wave type	ft	Transmitter-receiver unit	Transmitting power	Band	Power supply	Rate of rotation	Category
NKE-1139	P0N	12	NTG-3230	30kW	S	AC	24rpm	CAT 1C
NKE-1130	P0N	12	-	30kW	S	AC	24rpm	CAT 1C
NKE-1632	P0N,Q0N	12	-	250W	S	AC	24rpm	CAT 1C
NKE-2632	P0N,Q0N	8	-	250W	S	AC	24rpm	CAT 1C
NKE-2632-H	P0N,Q0N	8	-	250W	S	AC	48rpm	CAT 1C
NKE-1129-7	P0N	7	NTG-3225	25kW	X	AC	24rpm	CAT 1C
NKE-1129-9	P0N	9	NTG-3225	25kW	X	AC	24rpm	CAT 1C
NKE-1125-6	P0N	6	-	25kW	X	AC	24rpm	CAT 1C
NKE-1125-9	P0N	9	-	25kW	X	AC	24rpm	CAT 1C
NKE-2254-6HS	P0N	6	-	25kW	X	DC	48rpm	CAT 1C
NKE-2103-6	P0N	6	-	10kW	X	DC	27rpm	CAT 1C
NKE-2103-6HS	P0N	6	-	10kW	X	DC	48rpm	CAT 1C

List of General Type Names

General type name	Model	Radar antenna	Transmitter-receiver unit	Display	Ship's mains
JMR-9230-S3	RADAR/MFD	NKE-1139	NTG-3230	26inch NWZ-208	100-115VAC 50/60Hz 1φ 220-240VAC 50/60Hz 1φ *Specify between the two when ordering. 24VDC (For backup)
JMR-9230-S		NKE-1130	-		
JMR-9272-S		NKE-1632	-		
JMR-9282-S		NKE-2632	-		
JMR-9282-SH		NKE-2632-H	-		
JMR-9225-7X3		NKE-1129-7	NTG-3225		
JMR-9225-9X3		NKE-1129-9	NTG-3225		
JMR-9225-6X		NKE-1125-6	-		
JMR-9225-9X		NKE-1125-9	-		
JMR-9225-6XH		NKE-2254-6HS	-		Wide range AC input 24VDC (For backup)
JMR-9210-6X		NKE-2103-6	-		
JMR-9210-6XH		NKE-2103-6HS	-		
JAN-9201	ECDIS	-	-		
JAN-9202	Conning	-	-		
JMR-7230-S3	RADAR/MFD	NKE-1139	NTG-3230	19inch NWZ-207	100-115VAC 50/60Hz 1φ 220-240VAC 50/60Hz 1φ *Specify between the two when ordering. 24VDC (For backup)
JMR-7230-S		NKE-1130	-		
JMR-7272-S		NKE-1632	-		
JMR-7282-S		NKE-2632	-		
JMR-7282-SH		NKE-2632-H	-		
JMR-7225-7X3		NKE-1129-7	NTG-3225		
JMR-7225-9X3		NKE-1129-9	NTG-3225		
JMR-7225-6X		NKE-1125-6	-		
JMR-7225-9X		NKE-1125-9	-		
JMR-7225-6XH		NKE-2254-6HS	-		Wide range AC input 24VDC (For backup)
JMR-7210-6X		NKE-2103-6	-		
JMR-7210-6XH		NKE-2103-6HS	-		
JAN-7201	ECDIS	-	-		
JAN-7202	Conning	-	-		

Option list of radar antenna

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

Note:

1. The drive motor for the radar antenna is available in 100-115VAC 50/60 Hz 1ϕ or 220-240VAC 50/60 Hz 1ϕ type for NKE-1632/2632/1139/1130/1129/1125/2254/2103 series. Please specify the power source type when ordering.
2. The radar antenna can be equipped with anti-icing system (neck heater) as an option, and '-D' shall be suffixed to the type name (not available for NKE-2013).

Reference:

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

(Example) NKE-1130-2D

D: Attached anti-icing system

1: Motor voltage 100-115V (50/60Hz)
2: Motor voltage 220-240V (50/60Hz)

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

Scanner Unit	SCANNER UNIT
Transmitter-receiver unit	TRANSMITTER-RECEIVER UNIT
Monitor Unit	MONITOR UNIT
Trackball operation unit	TRACKBALL OPERATION UNIT
Keyboard operation unit	KEYBOARD OPERATION UNIT
Central Control Unit	CENTRAL CONTROL UNIT
Power supply unit	POWER SUPPLY UNIT
Junction box	JUNCTION BOX
Sensor LAN switch unit	SENSOR LAN SWITCH UNIT
Display Unit Mount Kit	DISPLAY UNIT MOUNT KIT

5. In JMR-9225-9X3/JMR-9225-7X3 and JMR-7225-9X3/JMR-7225-7X3, the following type name of JRC is used for the waveguide between the transmitter-receiver unit and the radar antenna.

Waveguide	Length	Type name of JRC
FR-9	20MT	H-7AWRD0003
FR-9	30MT	H-7AWRD0004

6. In JMR-9230-S3 and JMR-7230-S3, the following type name of JRC is used for the coaxial cable between the transmitter-receiver unit and the radar antenna.

Coaxial cable	Length	Type name of JRC
HF-20D	30MT	HF-20D (30MT)

2. Installation of Scanner Unit

2.1 Equipment Cable

2.1.1 CFQ-6912-**

This is a 19-core shielded composite cable.

The cable length is indicated in the asterisks ** area in the model name, and the available cable lengths are 5, 10, 20, 30, 40, 50, and 65 meters.

This cable is used to connect an NKE-2103 type scanner or an NKE-2254 type scanner to the display unit.

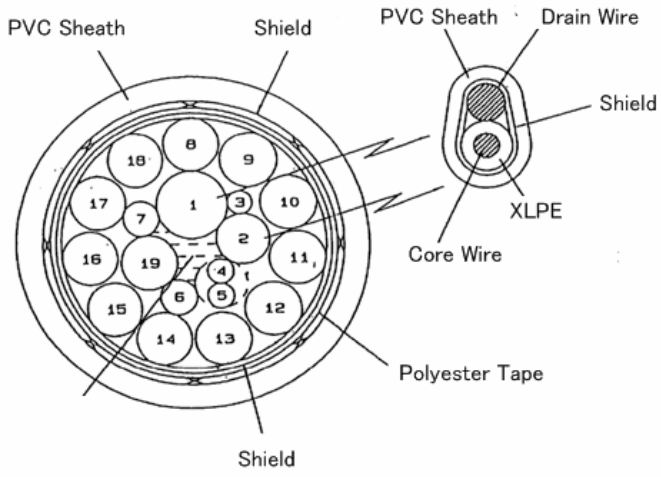


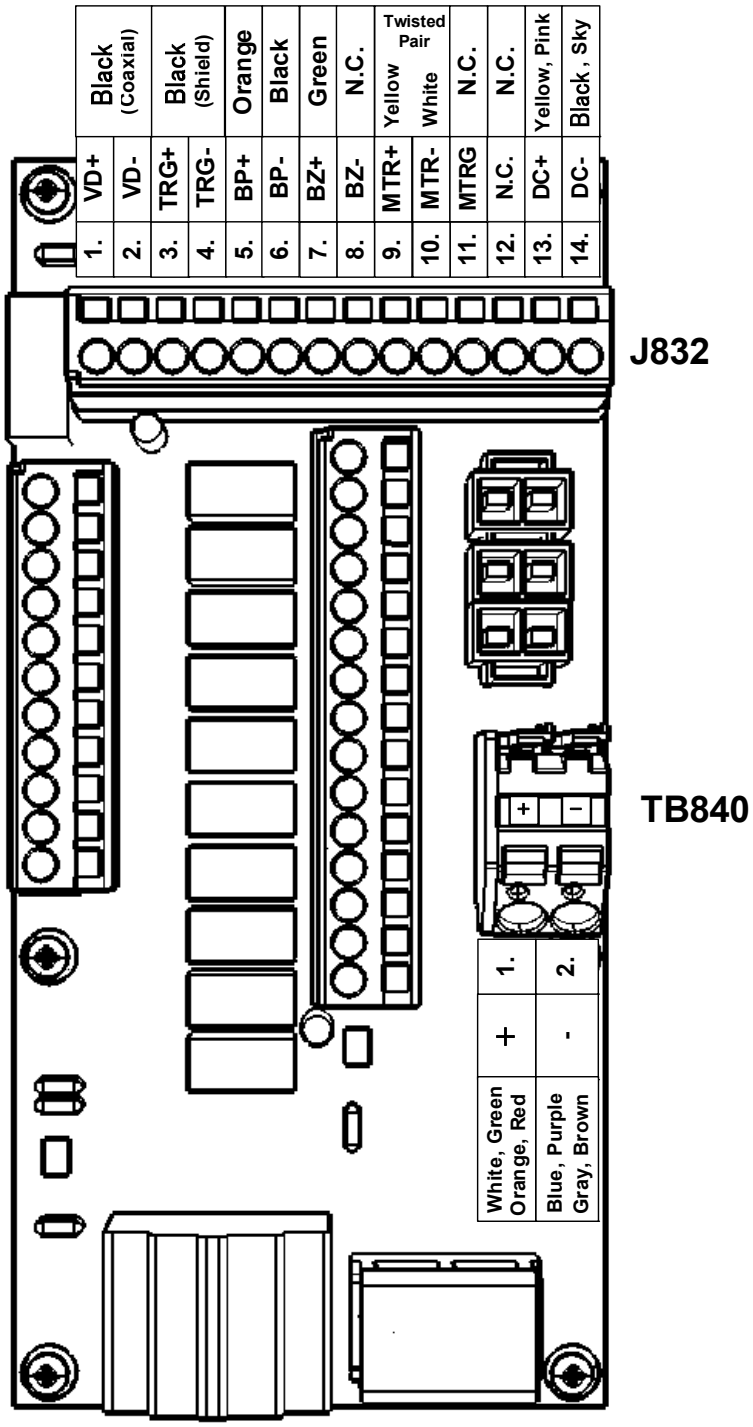
Fig 2-1 Cross-sectional drawing of CFQ-6912

Table 2-1 CFQ-6912 wire

Core (No.)	AWG	No. of Wire /φ	Color	Remarks	CQD-2273 Radar Interface Circuit	
1	AWG24	7/0.2T	Black	Coaxial	J832	Center Conductor: 1. VD+ Outer Conductor 2. VD-
2	AWG24	7/0.2T	Black	Shield	J832	3. TRG+ 4. TRG-
3	AWG24	7/0.2T	Green			7. BZ+
4	AWG24	7/0.2T	Yellow	Twisted Pair		9: MTR+
5	AWG24	7/0.2T	White			10: MTR-
6	AWG22	17/0.16T	Black			6. BP-
7	AWG22	17/0.16T	Orange			5. BP+
8	AWG16	50/0.18T	Blue		TB840	2. -
9	AWG16	50/0.18T	Gray			
10	AWG16	50/0.18T	Purple			
11	AWG16	50/0.18T	Brown			
12	AWG16	50/0.18T	White			1. +
13	AWG16	50/0.18T	Orange			
14	AWG16	50/0.18T	Red			
15	AWG16	50/0.18T	Green			
16	AWG16	50/0.18T	Yellow		J832	13. DC+
17	AWG16	50/0.18T	Black			14. DC-
18	AWG16	50/0.18T	Sky			
19	AWG16	50/0.18T	Pink			13. DC+

maximum diameter 14.5mm

Wiring to the Display Unit is shown below. Please refer to the **Chapter 3 Installation of Display Unit** for more information.



CQD-2273 Radar Interface Circuit

2.1.2 2695110056

This is a 14-core shielded composite cable.

This cable is used to connect a NKE-1125 type scanner, a NKE-1130 type scanner, a NKE-1632 type scanner, a NKE-2632 type scanner, a NTG-3225 type transmitter-receiver or a NTG-3230 type transmitter-receiver to the display unit.

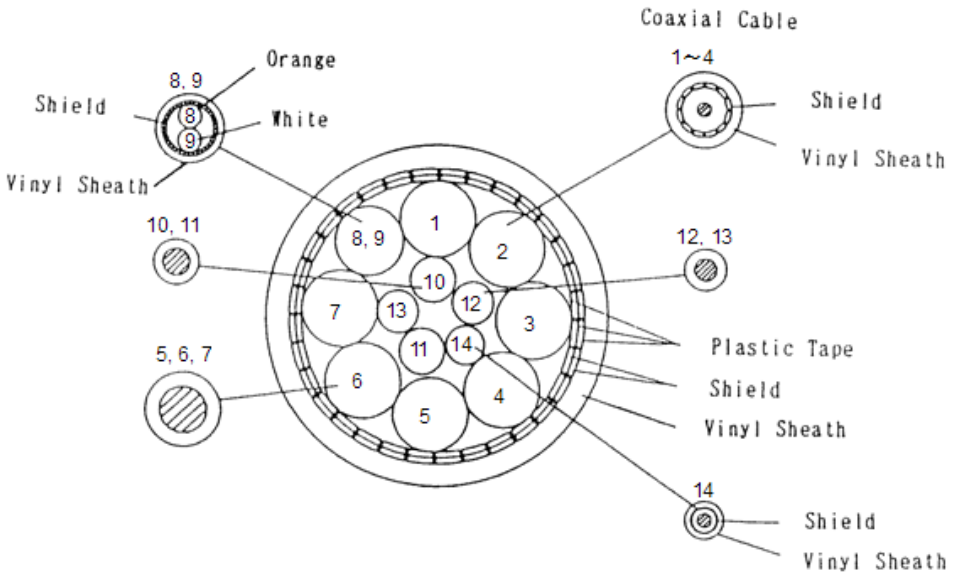


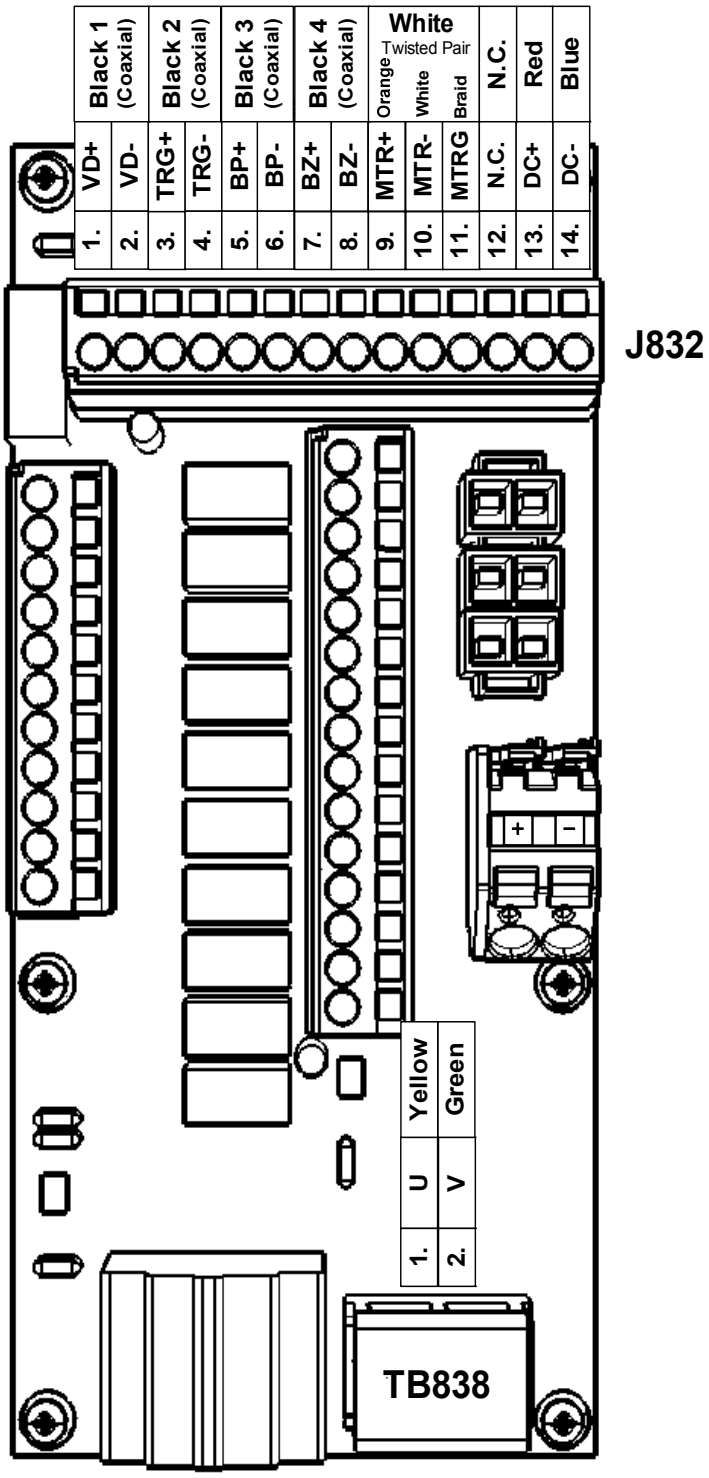
Fig 2-2 Cross-sectional drawing of 2695110056

Table 2-2 2695110056 wire

Core (No.)	Cross Section (mm^2)	No. of wire / φ	Color	Remarks	CQD-2273 Radar Interface Circuit	
1	0.5	19 / 0.18	Black 1	Coaxial Cable	J832	Center Conductor: 1. VD+ Outer Conductor: 2. VD-
2	0.5	19 / 0.18	Black 2	Coaxial Cable		Center Conductor: 3. TRG+ Outer Conductor: 4. TRG-
3	0.5	19 / 0.18	Black 3	Coaxial Cable		Center Conductor: 5. BP+ Outer Conductor: 6. BP-
4	0.5	19 / 0.18	Black 4	Coaxial Cable		Center Conductor: 7. BZ+ Outer Conductor : 8. BZ-
5	5.5	35 / 0.45	Yellow		TB838	1. U
6	5.5	35 / 0.45	Green			2. V
7	5.5	35 / 0.45	Brown		–	–
8	0.3	12 / 0.18	White	Twisted pair cable with Shield sheath white	J832	Orange : 9. MTR+ White: 10. MTR- Braid: 11.MTRG
9	0.3	12 / 0.18	Orange		–	-
10	2	37 / 0.26	Red		J832	13. DC+
11	2	37 / 0.26	Blue		J832	14. DC-
12	1.25	50 / 0.18	Black		–	–
13	1.25	50 / 0.18	Purple		–	–
14	0.5	1 / 0.18	Gray		–	–

maximum diameter 23.0mm

Wiring to the Display Unit is shown below. Please refer to the **Chapter 3 Installation of Display Unit** for more information.



CQD-2273 Radar Interface Circuit

2.1.3 2695111153

This is an 18-core shielded composite cable. This cable is used to connect an interswitch to the display unit.

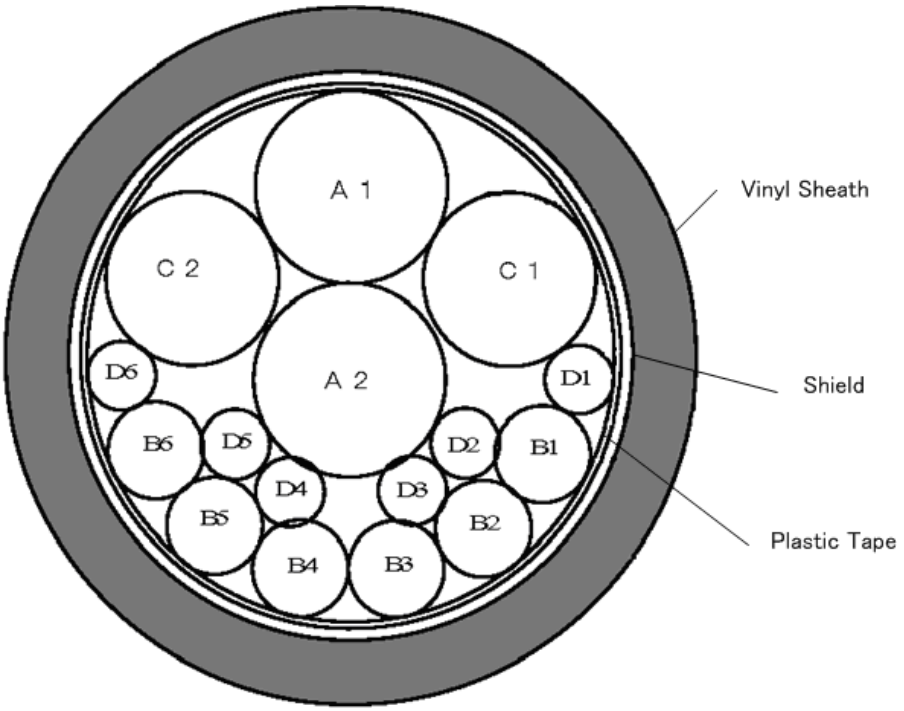


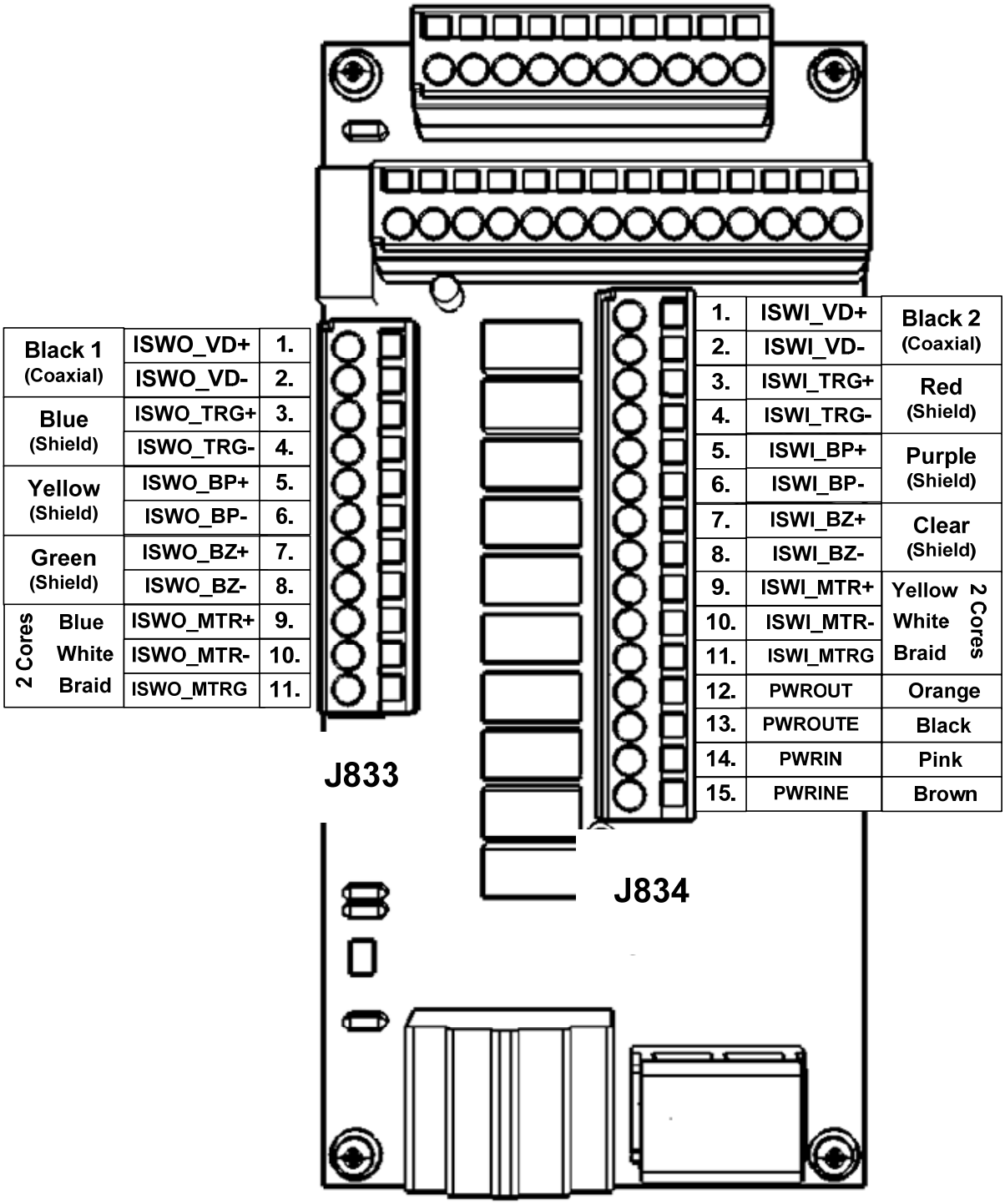
Fig 2-3 Cross-sectional drawing of 2695111153

Table 2-3 2695111153 wire

Wire NO.	Cross Section (mm^2)	No. of wire / φ	Color	Remarks	CQD-2273 Radar Interface Circuit	
A1	0.5	19 / 0.18	Black 1	Coaxial	J833	Center Conductor: 1. ISWO_VD+ Outer Conductor: 2. ISWO_VD-
A2	0.5	19 / 0.18	Black 2	Coaxial	J834	Center Conductor: 1. ISWI_VD+ Outer Conductor: 2. ISWI_VD-
B1	0.5	19 / 0.18	Blue	Shield	J833	Center Conductor: 3. ISWO_TRG+ Braid: 4. ISWO_TRG-
B2	0.5	19 / 0.18	Yellow	Shield		Center Conductor: 5. ISWO_BP+ Braid: 6. ISWO_BP-
B3	0.5	19 / 0.18	Green	Shield		Center Conductor: 7. ISWO_BZ+ Braid: 8. ISWO_BZ-
B4	0.5	19 / 0.18	Red	Shield	J834	Center Conductor: 3. ISWI_TRG+ Braid: 4. ISWI_TRG-
B5	0.5	19 / 0.18	Purple	Shield		Center Conductor: 5. ISWI_BP+ Braid: 6. ISWI_BP-
B6	0.5	19 / 0.18	Clear	Shield		Center Conductor: 7. ISWI_BZ+ Braid: 8. ISWI_BZ-
C1	0.3	12 / 0.18	Blue	2 Cores Shield	J833	9. ISWO_MTR+
	0.3		White			10. ISWO_MTR-
	–		Braid			11. ISWO_MTRG
C2	0.3	12 / 0.18	Yellow	2 Cores Shield	J834	9. ISWI_MTR+
	0.3		White			10. ISWI_MTR-
	–		Braid			11. ISWI_MTRG
D1	0.5	19 / 0.18	Brown			15. PWRINE
D2	0.5	19 / 0.18	Black			13. PWROUTE
D3	0.5	19 / 0.18	Orange			12. PWROUT
D4	0.5	19 / 0.18	Gray		–	–
D5	0.5	19 / 0.18	Pink		J834	14. PWRIN
D6	0.5	19 / 0.18	SkyBlue		–	–

maximum diameter 18.0mm

Wiring to the Display Unit is shown below. Please refer to the **3 Installation of Display Unit** for more information.



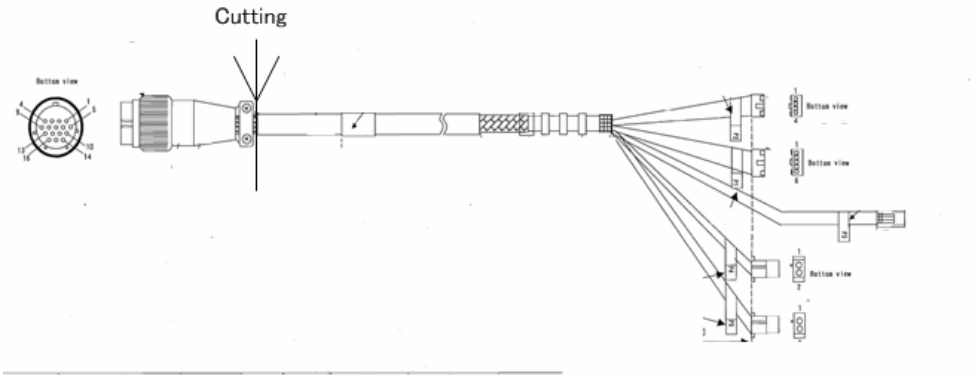
CQD-2273 Radar Interface Circuit

2.1.4 Cable end processing method

Allow for sufficient cable length so that maintenance, inspection, and repair work can be easily executed. Ensure a place to store the cable.

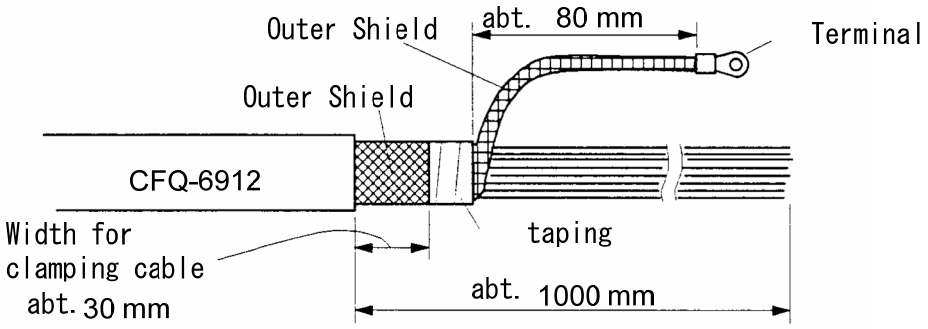
1) CFQ-6912

Cut off the metal shell connector.



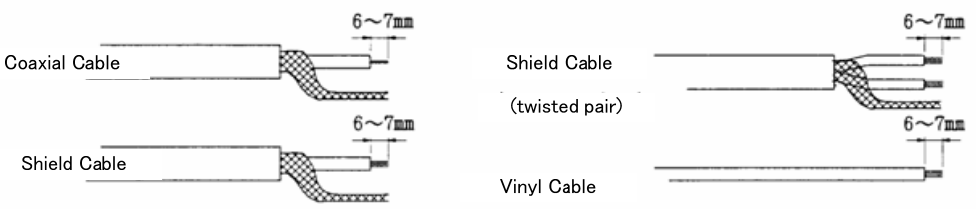
CFQ-6912 Cutting position

Remove about one meter of the outer skin, and then process the double braided shield according to the procedures shown below.



CFQ-6912 Processing of braided shield

Process each cable end according to the procedures shown below.



CFQ-6912

End processing of each wire

Twist each pair of the following colored wires and clamp them to the crimp pin terminal. (V5.5 is recommended.)

- RED.T/GRN.T → + terminal
- WHT.T/ORN.T → + terminal
- PUR.T/BRN.T → - terminal
- BLU.T/GRY.T → - terminal

After that, insert each crimp pin terminal into TB840 of RADAR INTERFACE CIRCUIT CQD-2273 according to the procedures shown below. (A slotted screwdriver is required.)

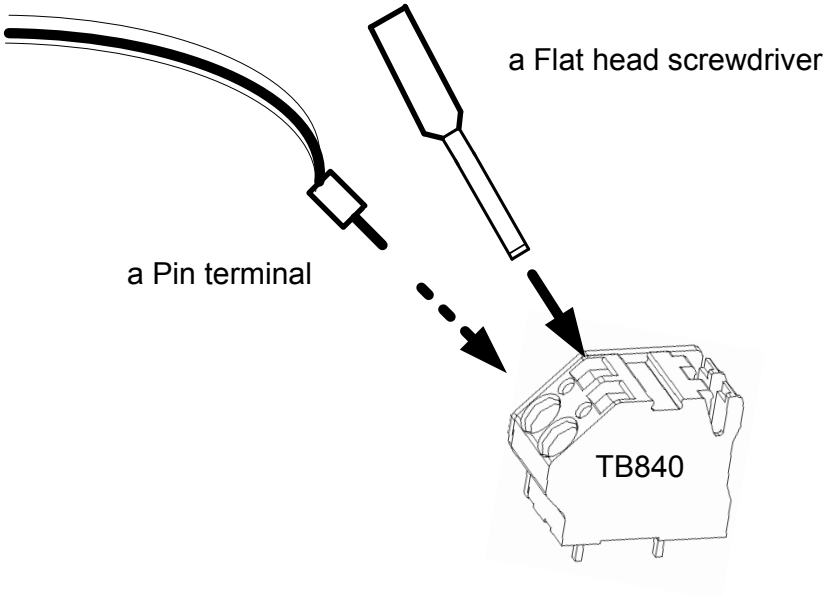
●How to insert the pin terminals into TB840:

(i) Insert your flat head screwdriver into the upper slot of TB840.

The cable slot (lower slot) will open.

(ii) Insert the crimp pin terminal into the cable slot (lower slot).

(iii) Pull out your flat head screwdriver and the pin terminal will be fixed.

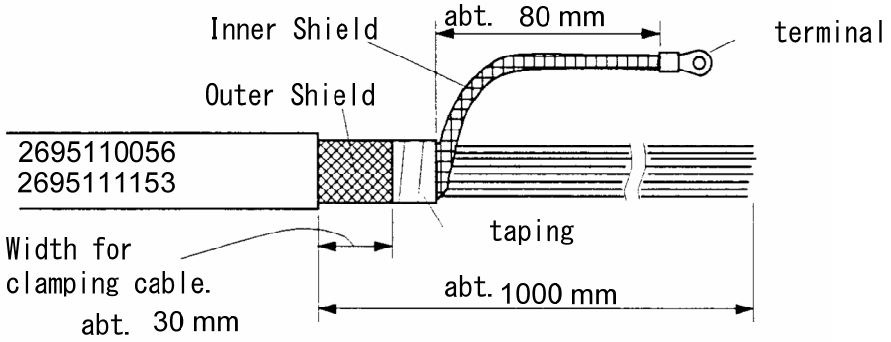


Twist each pair of the following colored wires and connect them to the J832 of RADAR INTERFACE CIRCUIT CQD-2273.

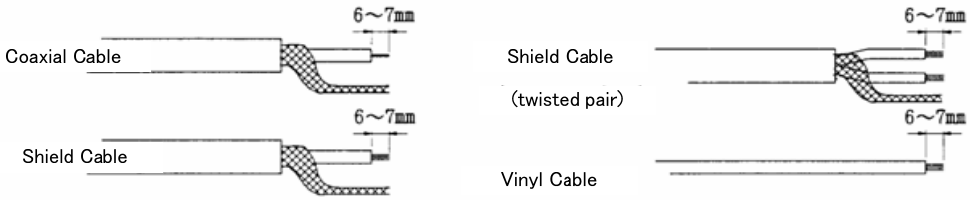
- YEL.T/PNK.T → J832(DC+)
- BLK.T/SKY.T → J832(DC-)

2) 2695110056, 2695111153

Remove about one meter of the outer skin, and then process the double braided shield according to the procedures shown below.



Processing of braided shield (269511056, 2695111153)

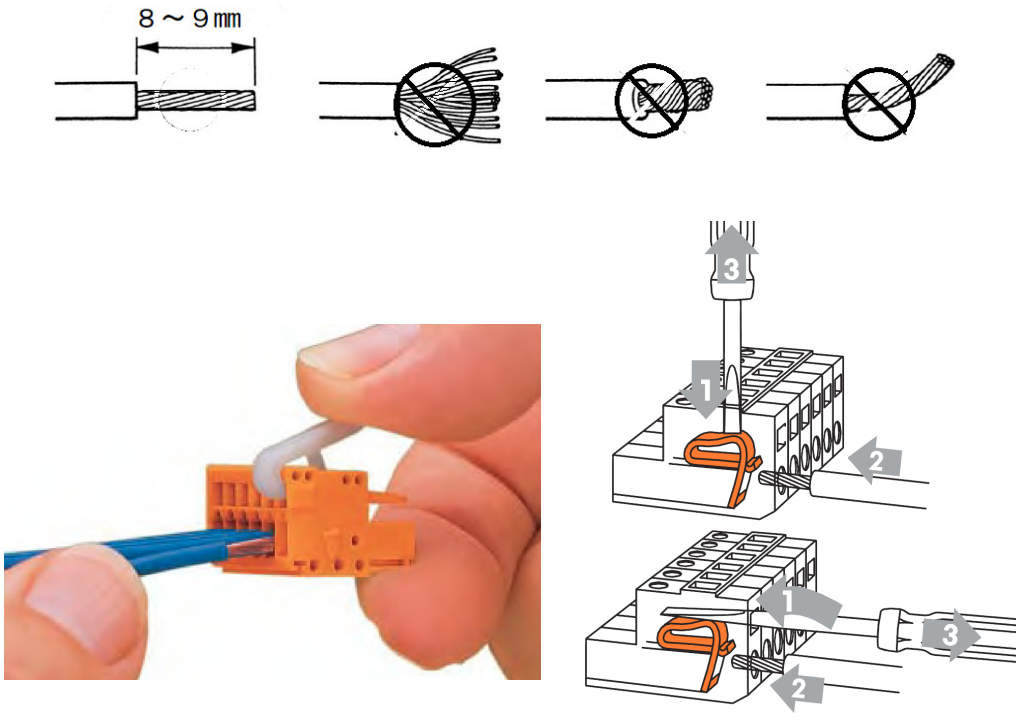


End processing of each wire (269511056, 2695111153)

2.1.5 Connection to the display-unit side terminal block

The terminal blocks of the junction box are pluggable type connectors. Connection procedures are described below.

1) Use an attached lever or a flat-head screw driver, to press the control so as to open the cable inlet.
2) Strip 8 to 9 mm of insulation off wire. Check the strip length and then insert the wire until the end comes in contact.
3) Release the tool from the terminal block and tighten the cable.
4) After the cable has been connected, gently tug at the cable to ensure that it is securely fastened.



Terminal block connection method

In order to connect the AC power lines that are Green and Yellow wires of 2695110056 to the Junction Box, the Faston terminals are required.

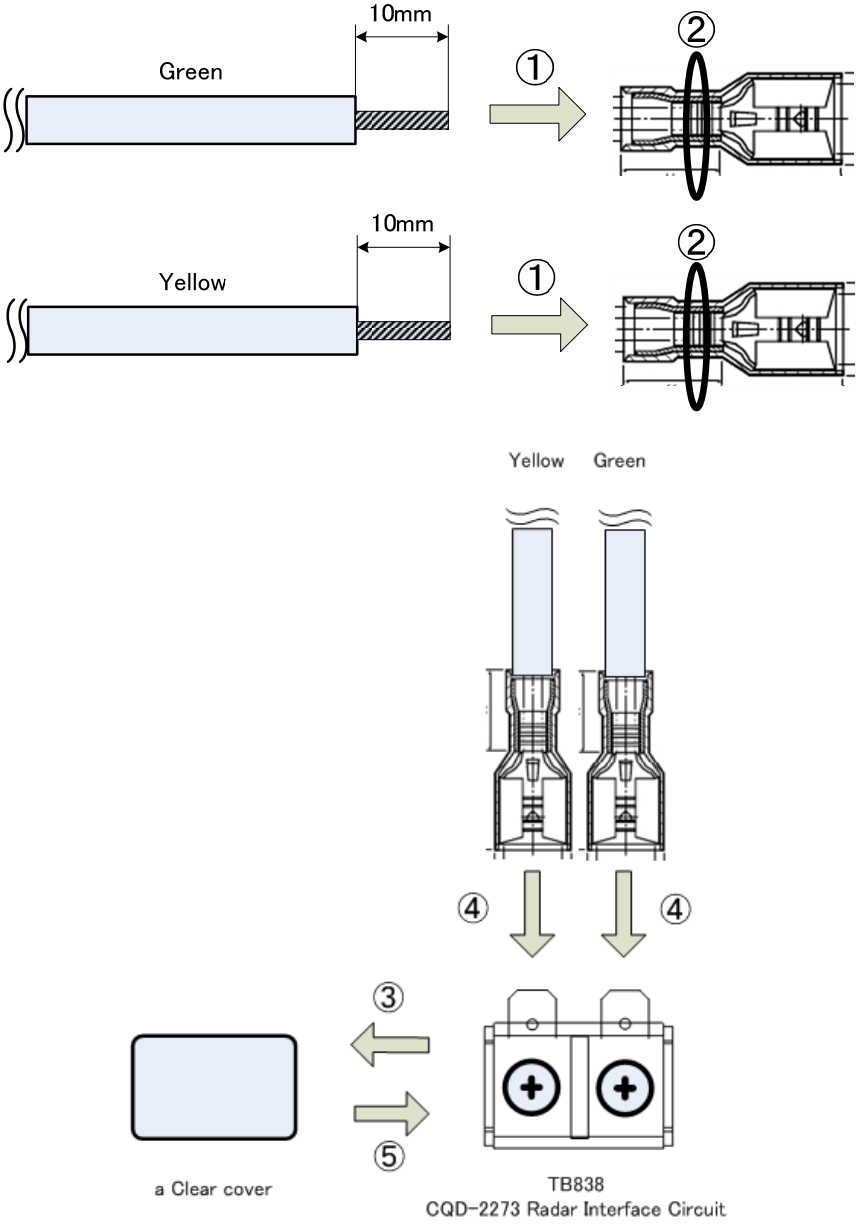
1) Insert the Green or Yellow wire into the Faston terminal.

2) Crimp the wire.

3) Remove the clear cover of TB838 on CQD-2273 Radar Interface Circuit.

4) Connect the Green or Yellow wires with Faston terminal to TB838 surely.

5) Return the clear cover surely.



2.2 Installation for the specified scanner model

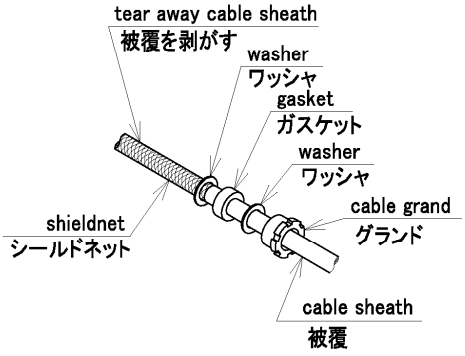
2.2.1 NKE-2103 type scanner unit

Instruction for Equipment

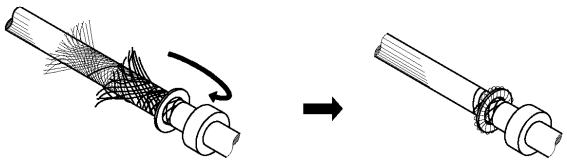
NKE-2103

装備要領

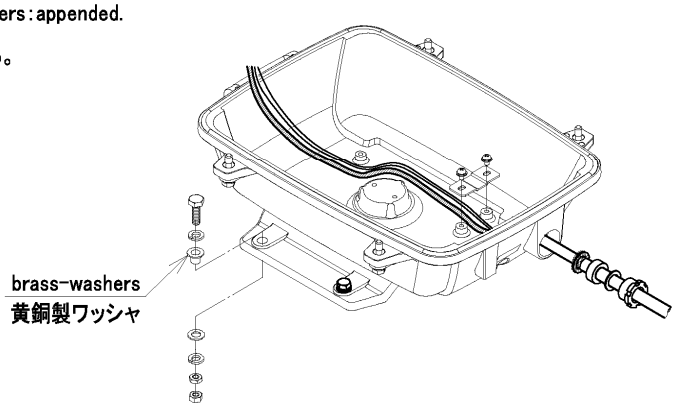
1. Put the cable into cable grand, washers and gasket.
   Tear the tape.
   ケーブルをワッシャ、ガスケット、グランドに通し、
   テープを剥がす。



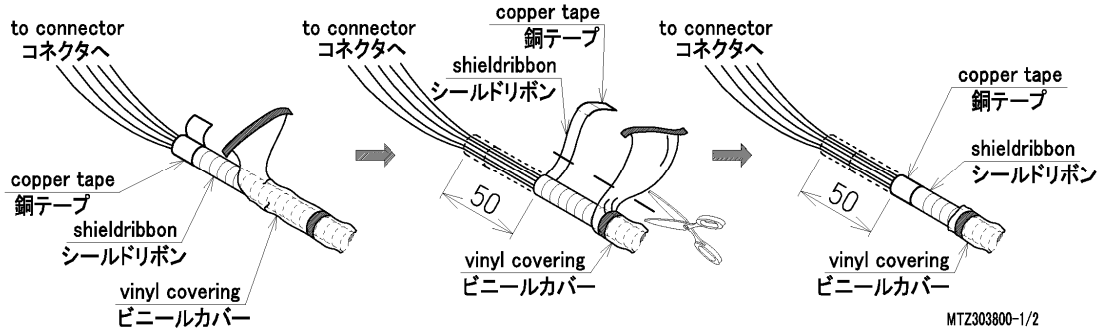
2. Unknit shield net and wrap it around a washer.
   シールドネットをほどき、ワッシャに巻き付ける。



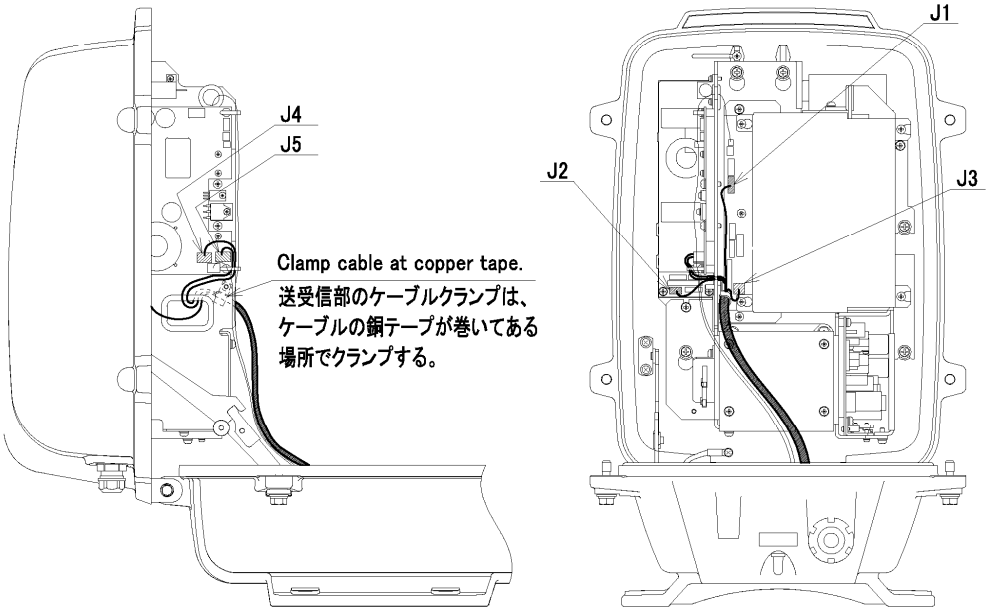
3. Equip the scanner unit with brass-washers : appended.
   黄銅製ワッシャを用い、空中線を装備する。



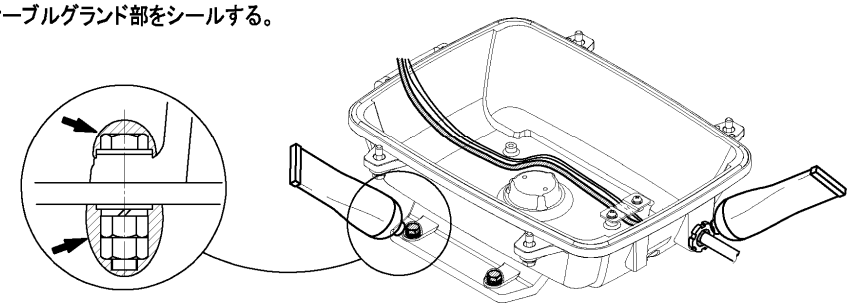
4. Cut the shield ribbon and the vinyl covering from current position to 50mm lower part
   and then put the copper tape again.
   既存の位置から50mmシールドリボンとビニールカバーを剥いて切断し、銅テープを貼り直してください。



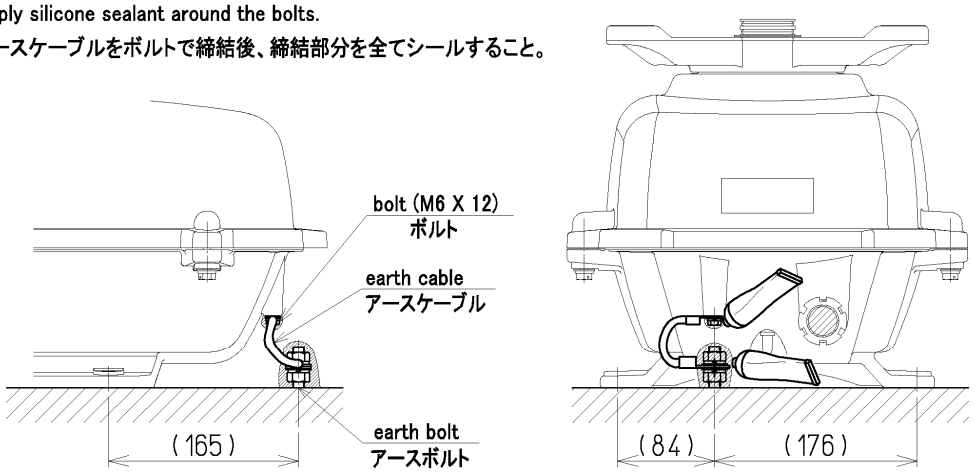
5. Clamp the cable, connect 5 terminals and connecter.
ケーブルを各部でクランプし、端子とコネクタを接続する。



6. Apply silicone sealant around the bolts and into the cable inlet.
ボルトの周辺部とケーブルグランド部をシールする。



7. Bolt the earth cable to mountbase and scanner.
Apply silicone sealant around the bolts.
アースケーブルをボルトで締結後、締結部分を全てシールすること。



MTZ303800-2/2

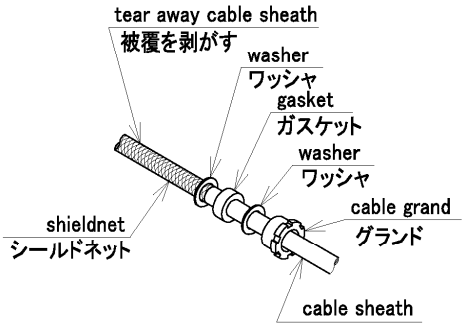
2.2.2 NKE-2254-6HS type scanner unit

Instruction for Equipment

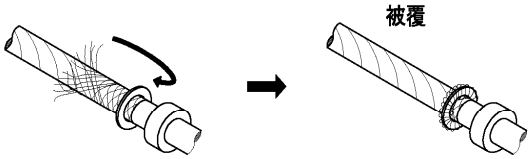
NKE-2254

装備要領

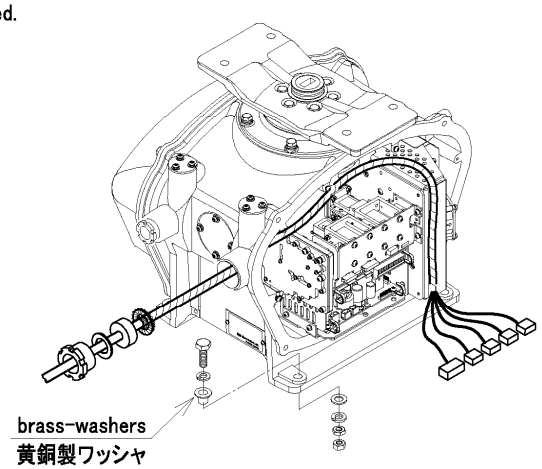
1. Put the cable into cable grand, washers and gasket.
   Tear the tape.
   ケーブルをワッシャ、ガスケット、グランドに通し、
   テープを剥がす。



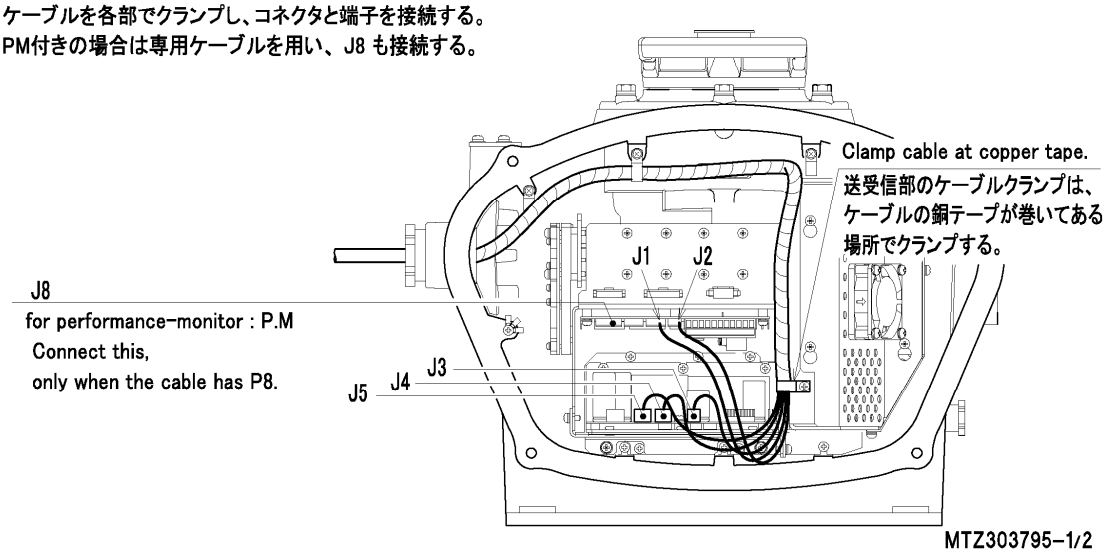
2. Unknit shield net and wrap it around a washer.
   シールドネットをほどき、ワッシャに巻き付ける。



3. Equip the scanner unit with brass-washers:appended.
   黄銅製ワッシャを用い、空中線を装備する。

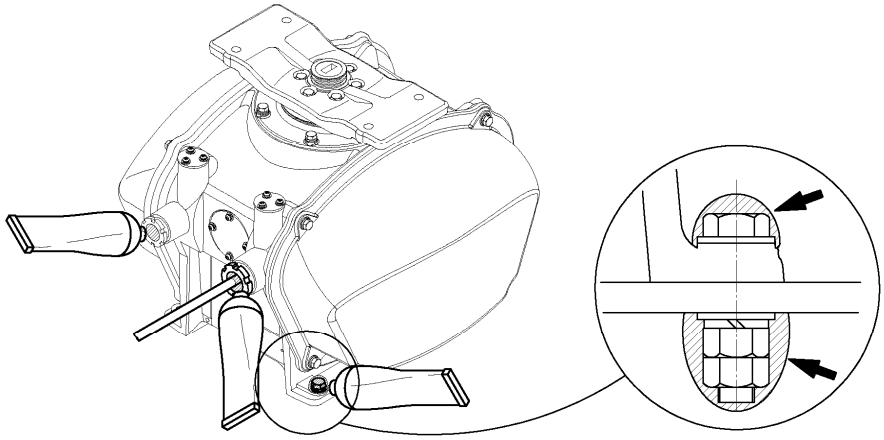


4. Clamp the cable,connect 5 connecters.
   ケーブルを各部でクランプし、コネクタと端子を接続する。
   PM付きの場合は専用ケーブルを用い、J8 も接続する。

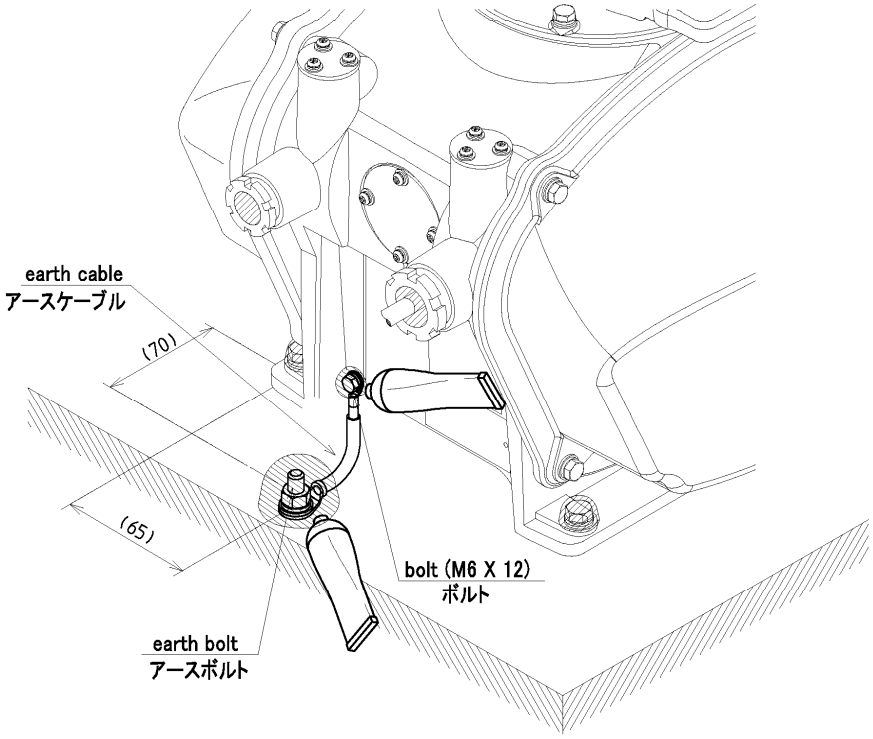


MTZ303795-1/2

5. Apply silicone sealant around the bolts and into the cable inlet.
ボルトの周辺部とケーブルグランド部をシールする。



6. Bolt the earth cable to mountbase and scanner.
Apply silicone sealant around the bolts.
アースケーブルをボルトで締結後、締結部分を全てシールすること。



MTZ303795-2/2

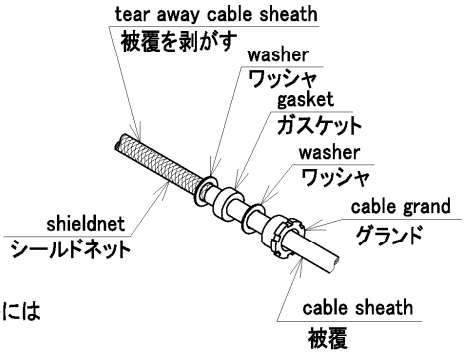
2.2.3 NKE-1125 type scanner unit

Instruction for Equipment

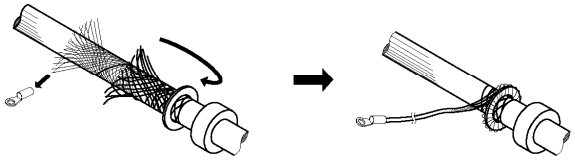
NKE-1125PM

装備要領

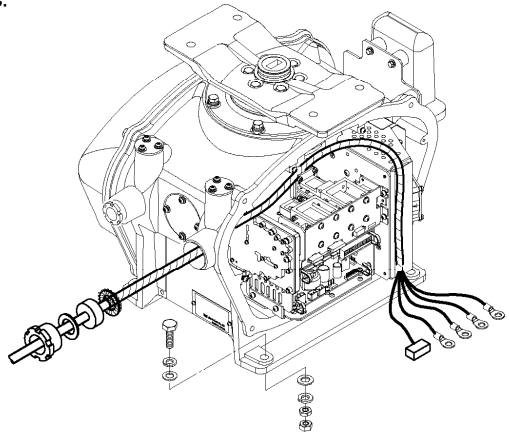
1. Put the cable into cable grand, washers and gasket.
   Tear away the cable sheath.
   ケーブルをワッシャ、ガスケット、グランドに通し、
   被覆を剥がす。



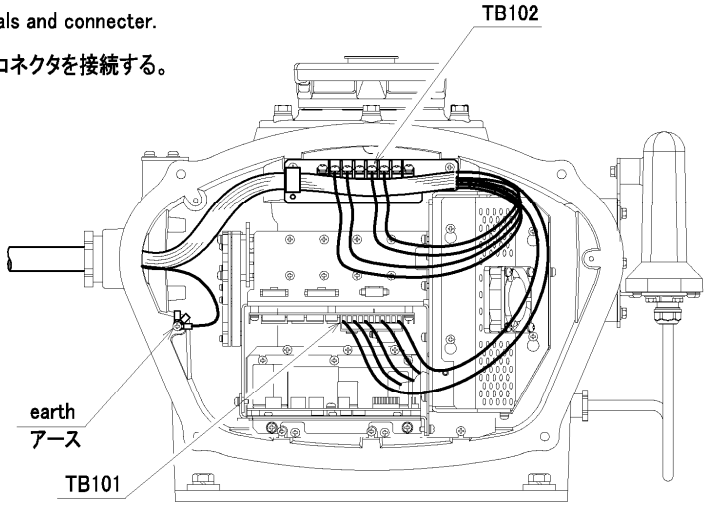
2. Unknit outer shield net and wrap it around a washer.
   Connect a solderless terminal (for a ground) to an inner shield net.
   外側のシールドネットをほどき、座金に巻きつけ、内側のシールドネットには
   丸型圧着端子(アース)を取付ける。



3. Equip the scanner unit with bolts and washers.
   ボルト、ワッシャを用いて、空中線を装備する。

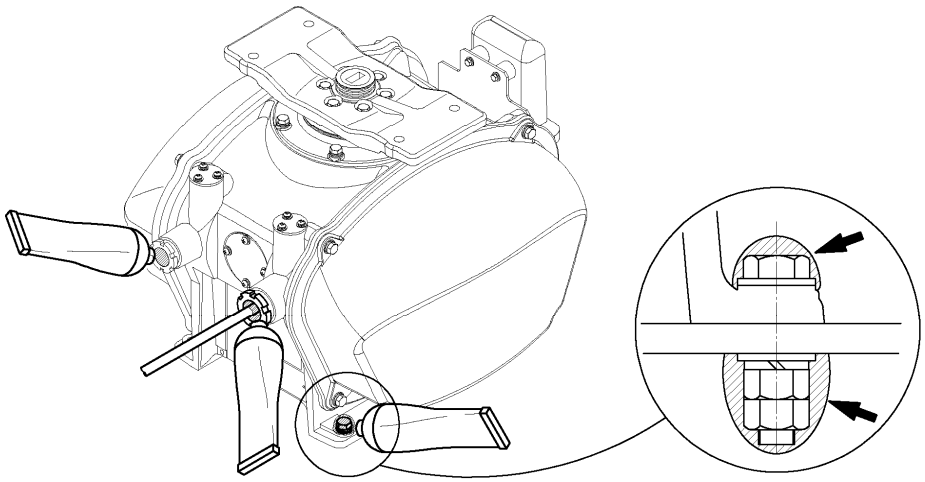


4. Clamp the cable, connect 6 terminals and connecter.
   ケーブルを各部でクランプし、端子とコネクタを接続する。

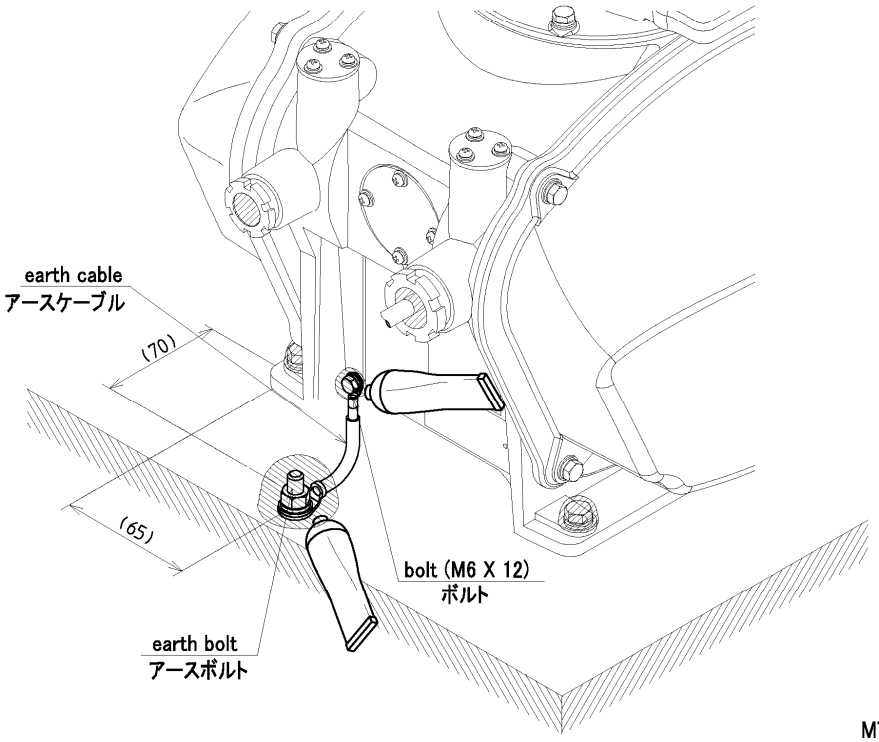


MTZ303794-1/2

5. Apply silicone sealant around the bolts and into the cable inlet.
ボルトの周辺部とケーブルグランド部をシールする。



6. Bolt the earth cable to mountbase and scanner.
Apply silicone sealant around the bolts.
アースケーブルをボルトで締結後、締結部分を全てシールすること。



MTZ303794-2/2

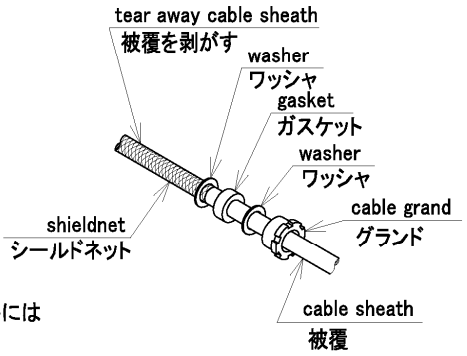
2.2.4 NKE-1129 type scanner unit

Instruction for Equipment

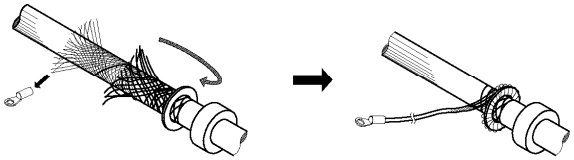
NKE-1129PM

装備要領

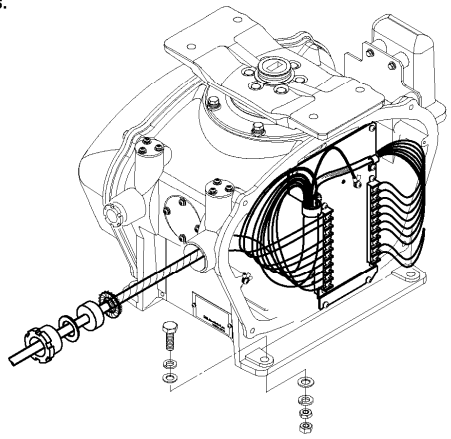
1. Put the cable into cable grand, washers and gasket.
   Tear away the cable sheath.
   ケーブルをワッシャ、ガスケット、グランドに通し、
   被覆を剥がす。



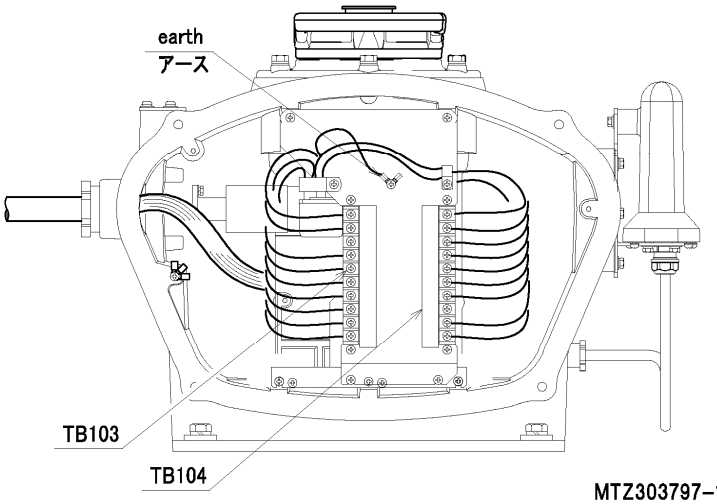
2. Unknit outer shield net and wrap it around a washer.
   Connect a solderless terminal (for a ground) to an inner shield net.
   外側のシールドネットをほどき、座金に巻きつけ、内側のシールドネットには
   丸型圧着端子(アース)を取付ける。



3. Equip the scanner unit with bolts and washers.
   ボルト、ワッシャを用いて、空中線を装備する。

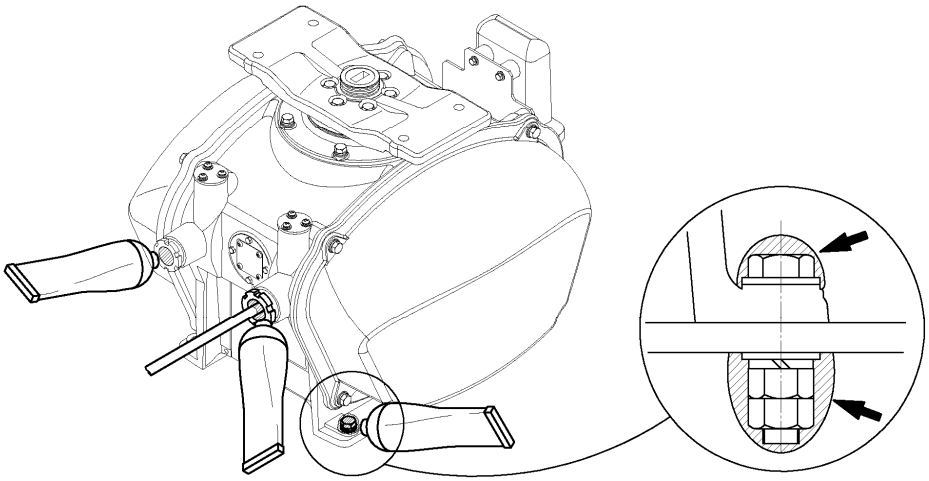


4. Clamp the cable, connect terminals.
   ケーブルを各部でクランプし、端子を接続する。

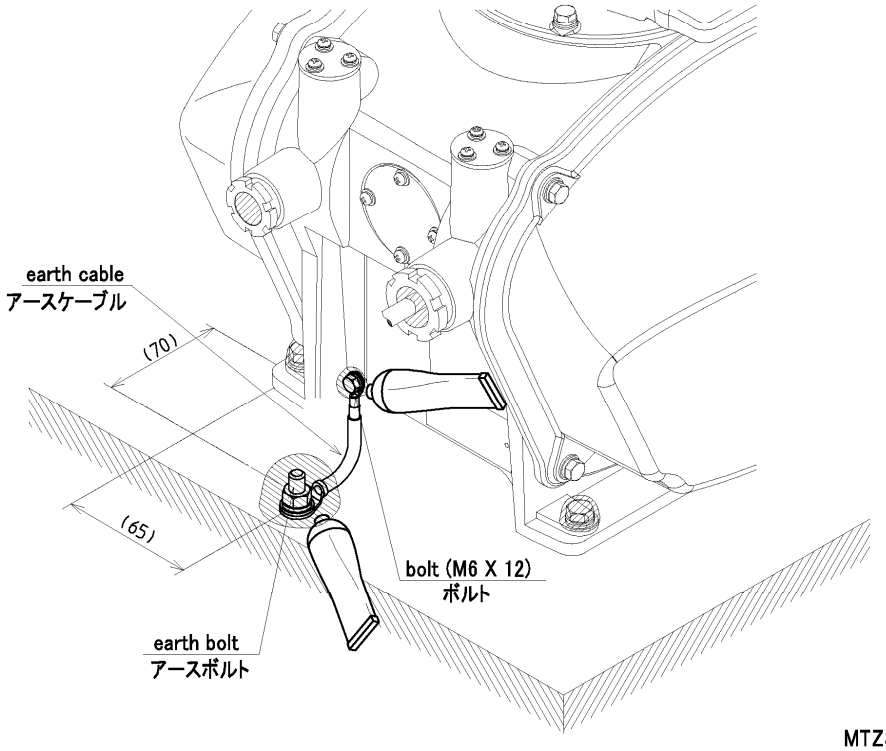


MTZ303797-1/2

5. Apply silicone sealant around the bolts and into the cable inlet.
ボルトの周辺部とケーブルグランド部をシールする。



6. Bolt the earth cable to mountbase and scanner.
Apply silicone sealant around the bolts.
アースケーブルをボルトで締結後、締結部分を全てシールすること。



MTZ303797-2/2

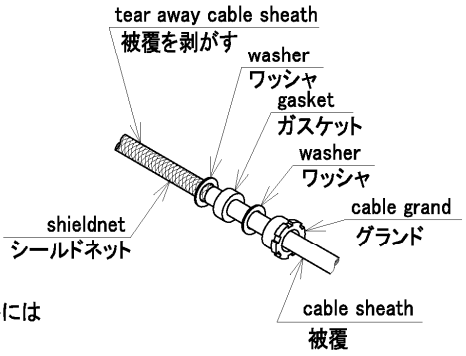
2.2.5 NKE-1130 type scanner unit

Instruction for Equipment

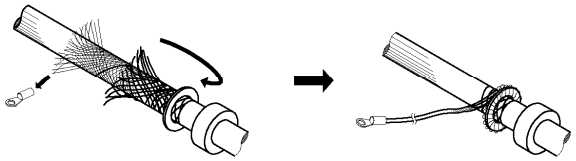
NKE-1130PM

装備要領

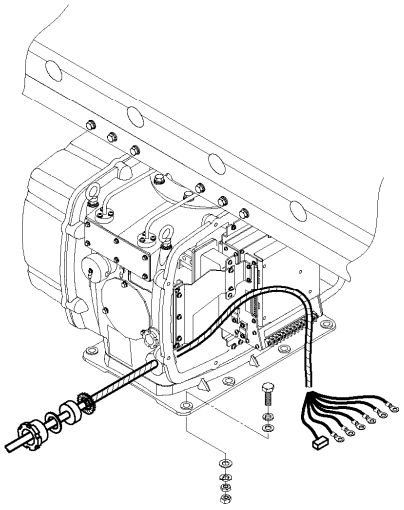
1. Put the cable into cable grand, washers and gasket.
   Tear away the cable sheath.
   ケーブルをワッシャ、ガスケット、グランドに通し、
   被覆を剥がす。



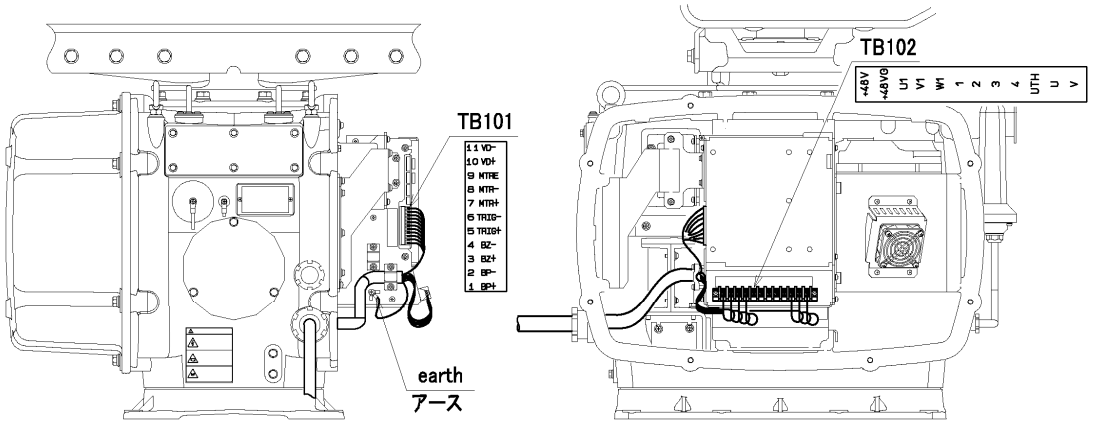
2. Unknit outer shield net and wrap it around a washer.
   Connect a solderless terminal (for a ground) to an inner shield net.
   外側のシールドネットをほどき、座金に巻きつけ、内側のシールドネットには
   丸型圧着端子(アース)を取付ける。



3. Equip the scanner unit with bolts and washers.
   Pass the cable into unit and fix it.
   ボルト、ワッシャを用いて、空中線を装備する。
   ケーブルを機内に引き込み固定して下さい。

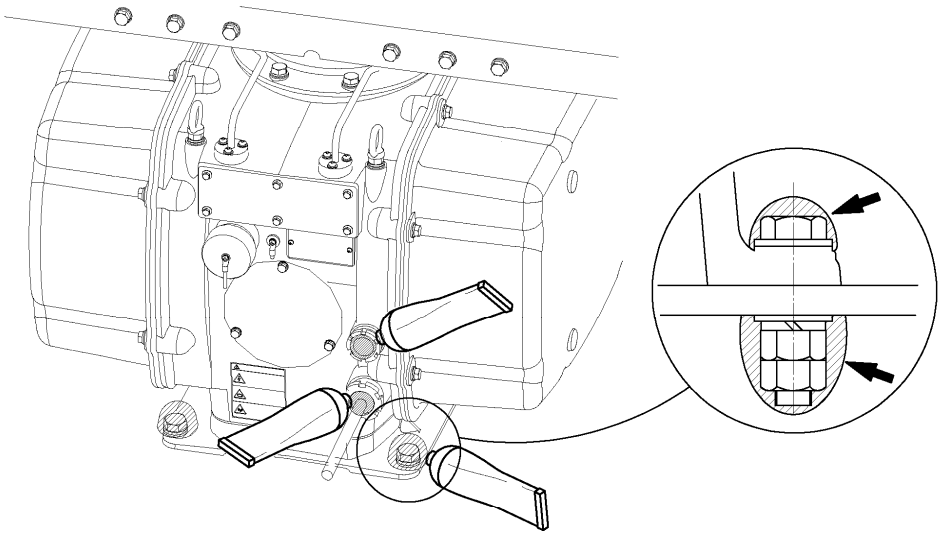


4. Clamp the cable, connect 6 terminals and connecter.
   ケーブルを各部でクランプし、端子とコネクタを接続する。

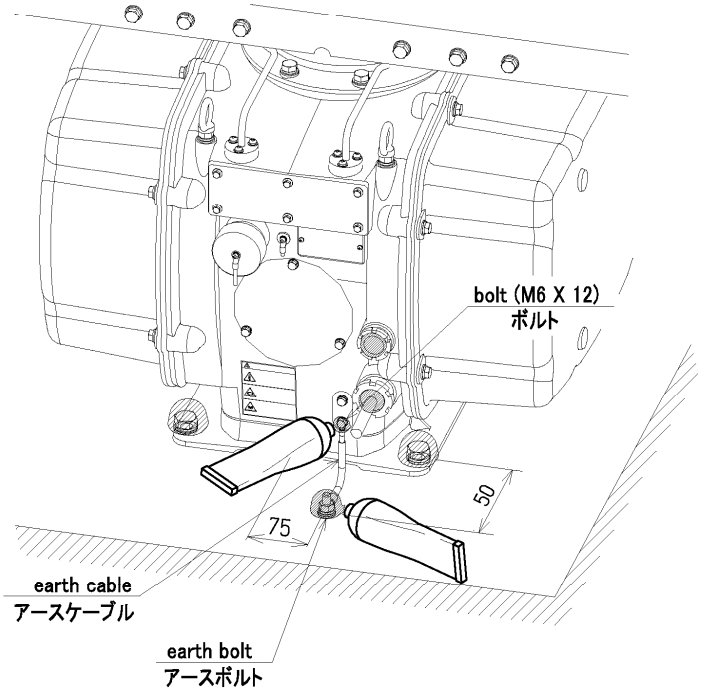


MTZ303822-1/2

5. Apply silicone sealant around the bolts and into the cable inlet.
ボルトの周辺部とケーブルグランド部をシールする。



6. Bolt the earth cable to mountbase and scanner.
Apply silicone sealant around the bolts.
アースケーブルをボルトで締結後、締結部分を全てシールすること。



MTZ303822-2/2

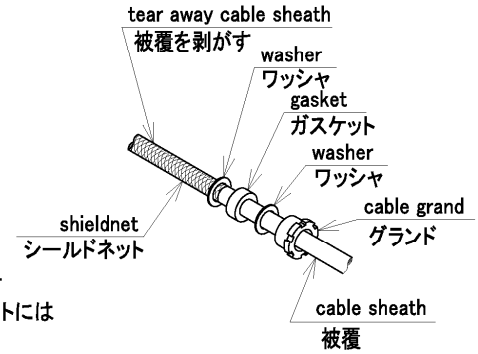
2.2.6 NKE-1139 type scanner unit

Instruction for Equipment

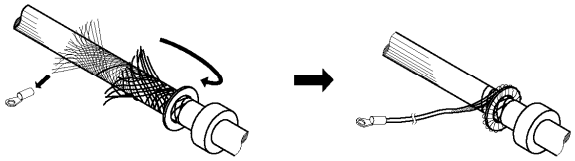
NKE-1139PM

装備要領

1. Put the cable into cable grand, washers and gasket.
   Tear away the cable sheath.
   ケーブルをワッシャ、ガスケット、グランドに通し、
   被覆を剥がす。

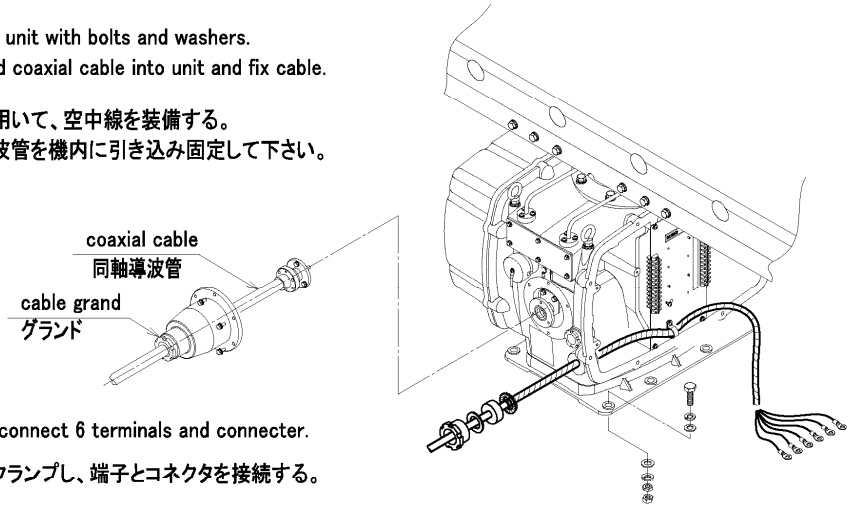


2. Unknit outer shield net and wrap it around a washer.
   Connect a solderless terminal (for a ground) to an inner shield net.
   外側のシールドネットをほどき、座金に巻きつけ、内側のシールドネットには
   丸型圧着端子(アース)を取付ける。



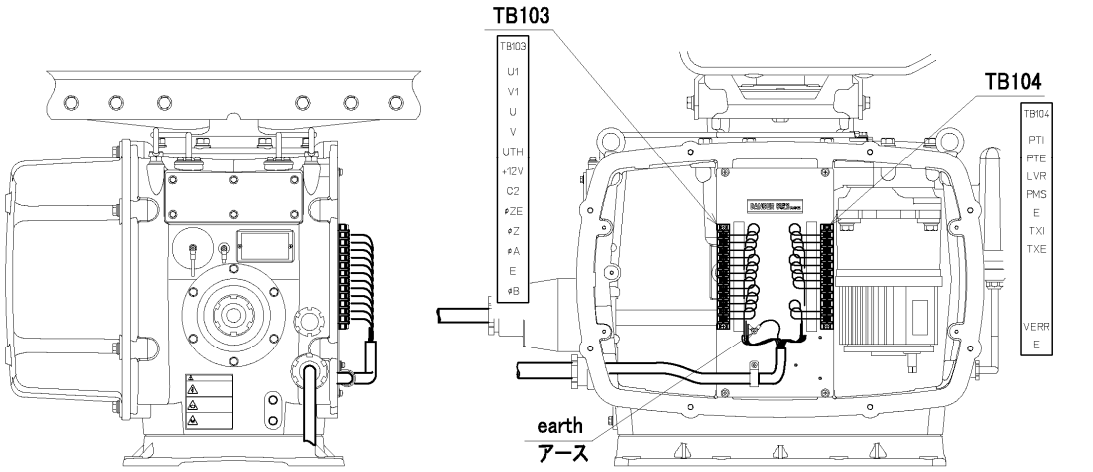
3. Equip the scanner unit with bolts and washers.
   Pass the cable and coaxial cable into unit and fix cable.

   ボルト、ワッシャを用いて、空中線を装備する。
   ケーブルと同軸導波管を機内に引き込み固定して下さい。



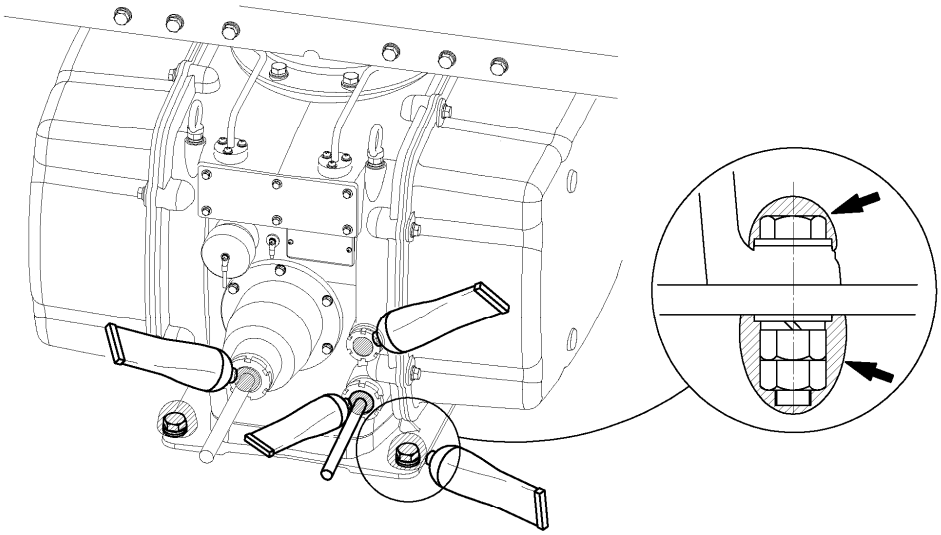
4. Clamp the cable, connect 6 terminals and connecter.

   ケーブルを各部でクランプし、端子とコネクタを接続する。

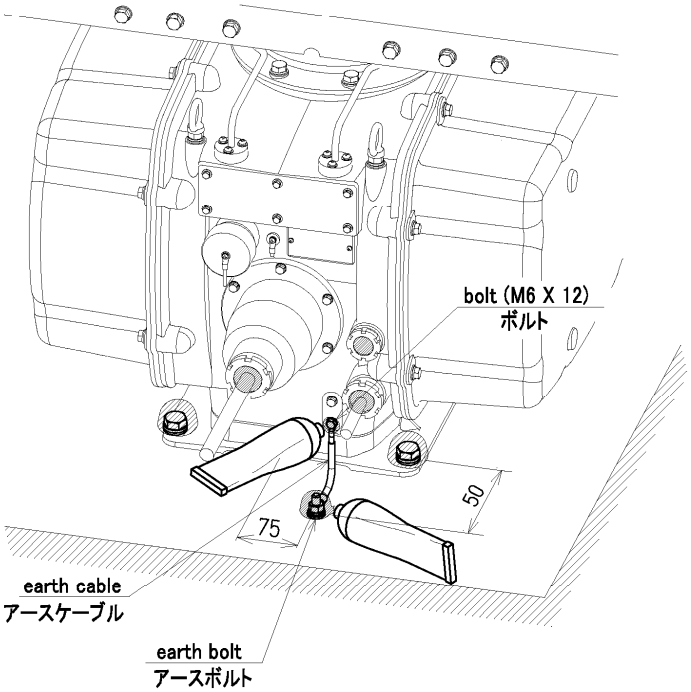


MTZ303823-1/2

5. Apply silicone sealant around the bolts and into the cable inlet.
ボルトの周辺部とケーブルグランド部をシールする。



6. Bolt the earth cable to mountbase and scanner.
Apply silicone sealant around the bolts.
アースケーブルをボルトで締結後、締結部分を全てシールすること。



MTZ303823-2/2

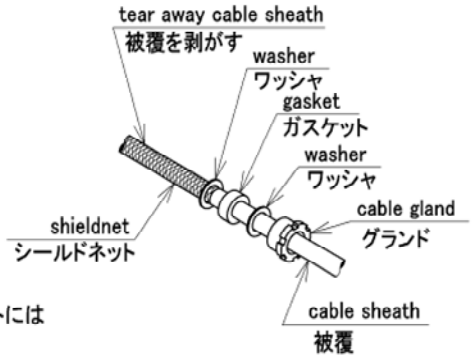
2.2.7 NKE-1632 type scanner unit

Instruction for Equipment

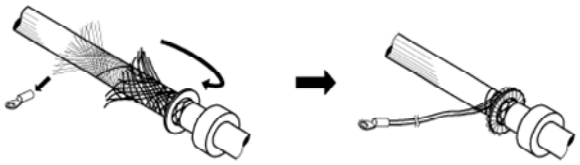
NKE-1632

装備要領

1. Put the cable into cable gland, washers and gasket.
   Tear away the cable sheath.
   ケーブルをワッシャ、ガスケット、グランドに通し、
   被覆を剥がす。

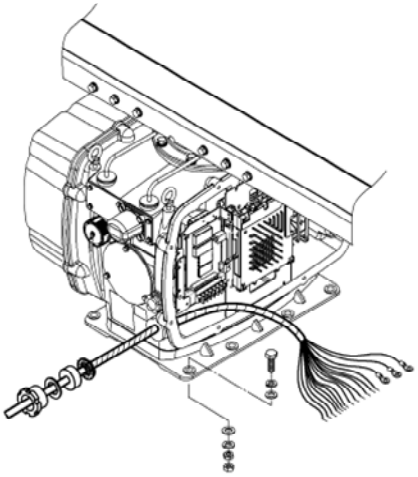


2. Unknit outer shield net and wrap it around a washer.
   Connect a solderless terminal (for a ground) to an inner shield net.
   外側のシールドネットをほどき、座金に巻きつけ、内側のシールドネットには
   丸型圧着端子(アース)を取付ける。



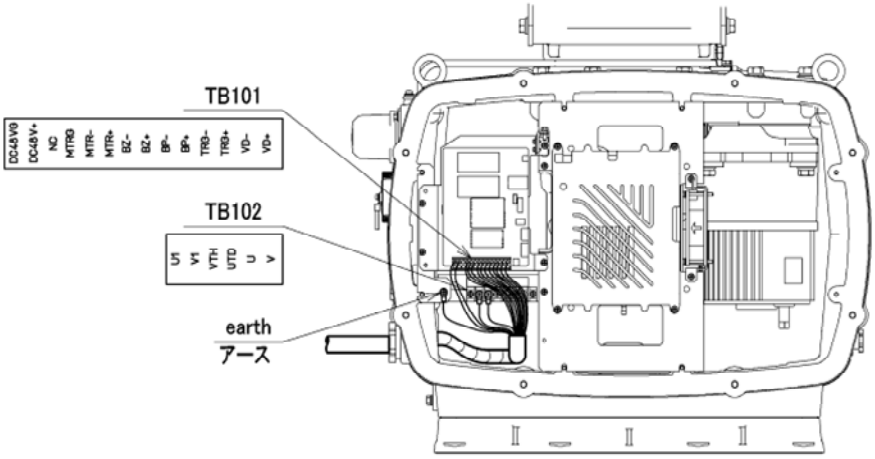
3. Equip the scanner unit with bolts and washers.
   Pass the cable into unit and fix it.

   ボルト、ワッシャを用いて、空中線を装備する。
   ケーブルを機内に引き込み固定して下さい。



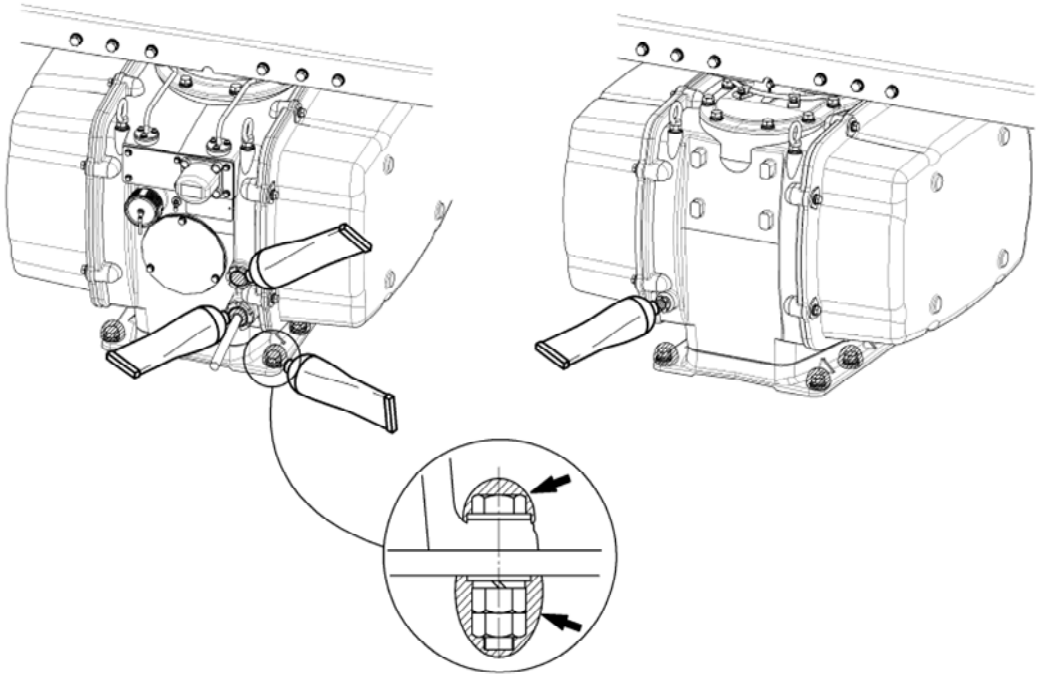
4. Connect 2 terminals and 13 cables and the earth terminal.

   2個の端子と13本のケーブルとアース端子を接続する。

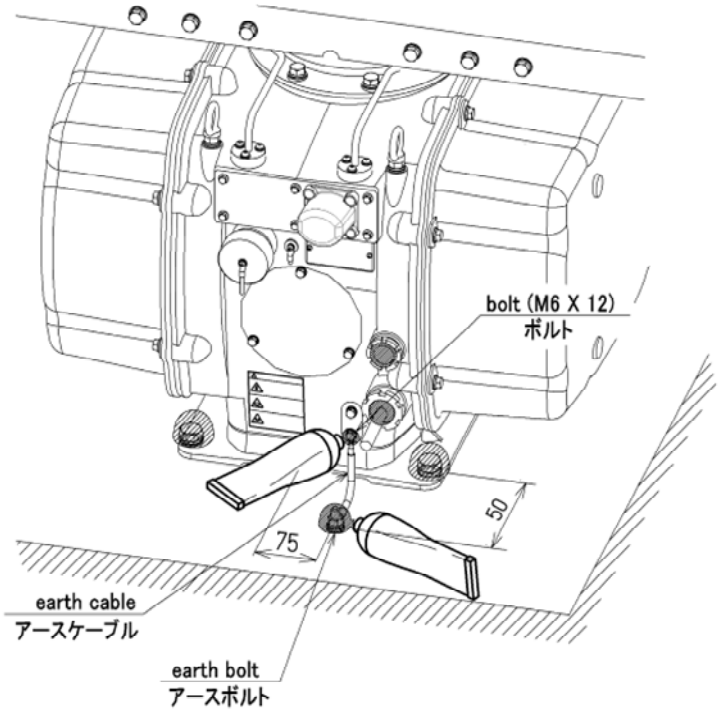


MTZ304749-1/2-③

5. Apply silicone sealant around the bolts and into the cable inlet.
ボルトの周辺部とケーブルグランド部をシールする。



6. Bolt the earth cable to mountbase and scanner.
Apply silicone sealant around the bolts.
アースケーブルをボルトで締結後、締結部分を全てシールすること。



MTZ304749-2/2-③

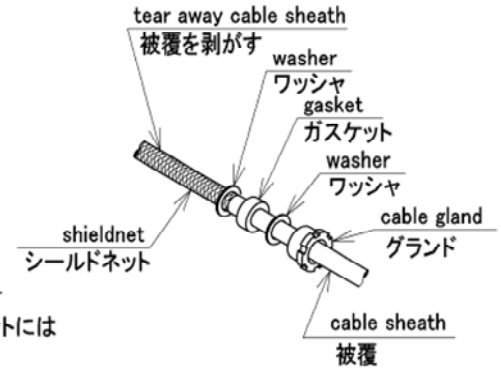
2.2.8 NKE-2632 type scanner unit

Instruction for Equipment

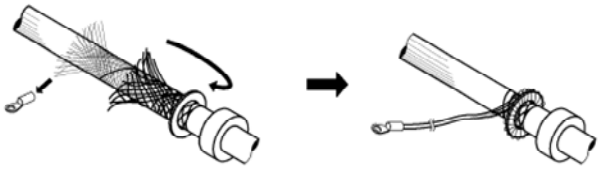
NKE-2632

装備要領

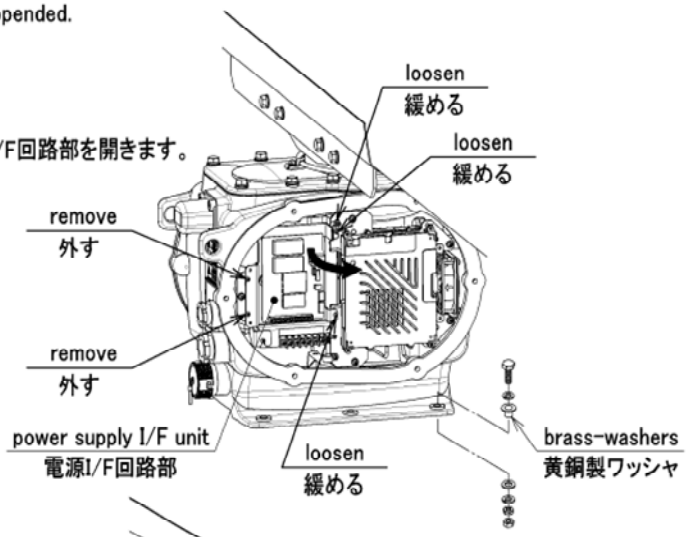
1. Put the cable into cable gland, washers and gasket.
   Tear away the cable sheath.
   ケーブルをワッシャ、ガスケット、グランドに通し、
   被覆を剥がす。



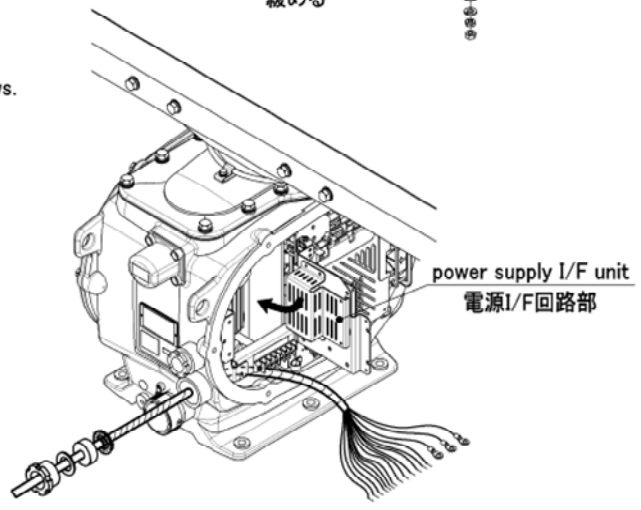
2. Unknit outer shield net and wrap it around a washer.
   Connect a solderless terminal (for a ground) to an inner shield net.
   外側のシールドネットをほどき、座金に巻きつけ、内側のシールドネットには
   丸型圧着端子(アース)を取付ける。



3. Equip the scanner unit with brass-washers:appended.
   Loosen 3 screws and remove 2 screws.
   Open a power supply I/F unit after that.
   黄銅製ワッシャを用い、空中線を装備する。
   3個のねじを緩め、2個のねじを外した後に電源I/F回路部を開きます。



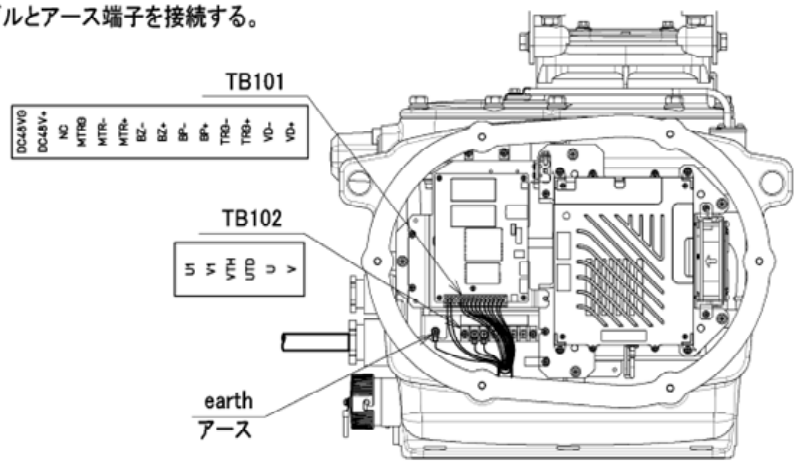
4. Pass the cable into unit and fix it.
   Close a power supply I/F unit and tighten 5 screws.
   ケーブルを機内に引き込み固定する。
   電源I/F回路部を閉じて、5個のねじを締めます。



MTZ304750-1/2-③

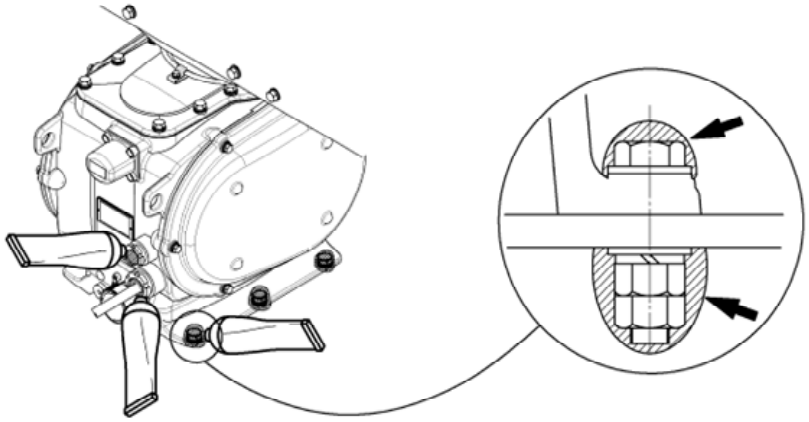
5. Connect 2 terminals and 13 cables and the earth terminal.

2個の端子と13本のケーブルとアース端子を接続する。



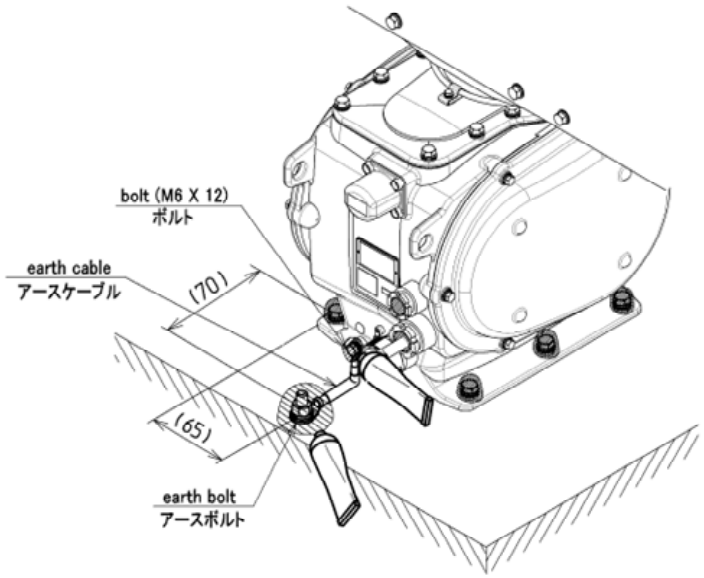
6. Apply silicone sealant around the bolts and into the cable inlet.

ボルトの周辺部とケーブルグランド部をシールする。



7. Bolt the earth cable to mountbase and scanner.
Apply silicone sealant around the bolts.

アースケーブルをボルトで締結後、締結部分を全てシールすること。



MTZ304750-2/2-③

2.3 Installation of Transmitter Receiver

2.3.1 NTG-3225 type transmitter receiver unit

Instruction for Equipment

装備要領

1. Equip the transmitter with nuts and washers.

ナット、ワッシャを用いて、送受信機を装備する。

2. Clumpt a flexible waveguide terminal with bolts.

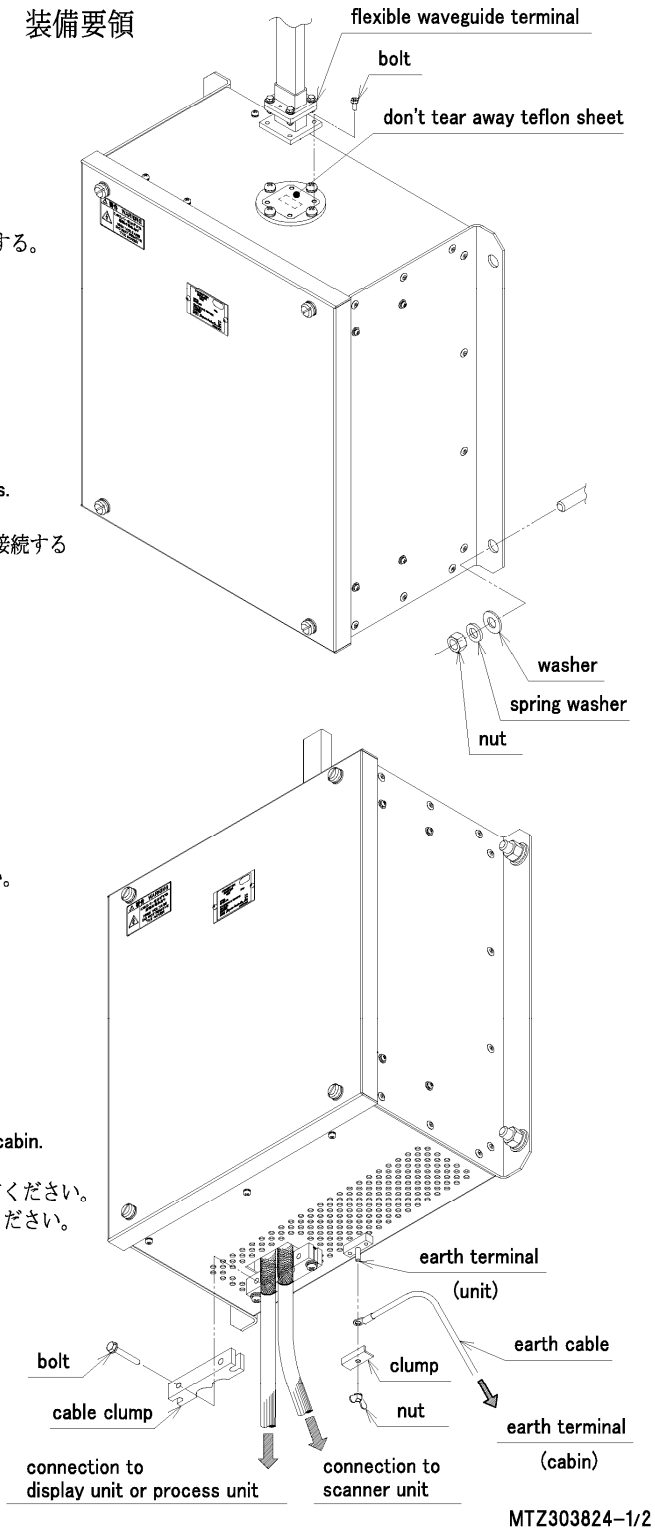
ボルトを用いて、フレキシブル導波管端子を接続する

3. Pass the cables into unit and clump them.

ケーブルを機内に引き込み、固定してください。

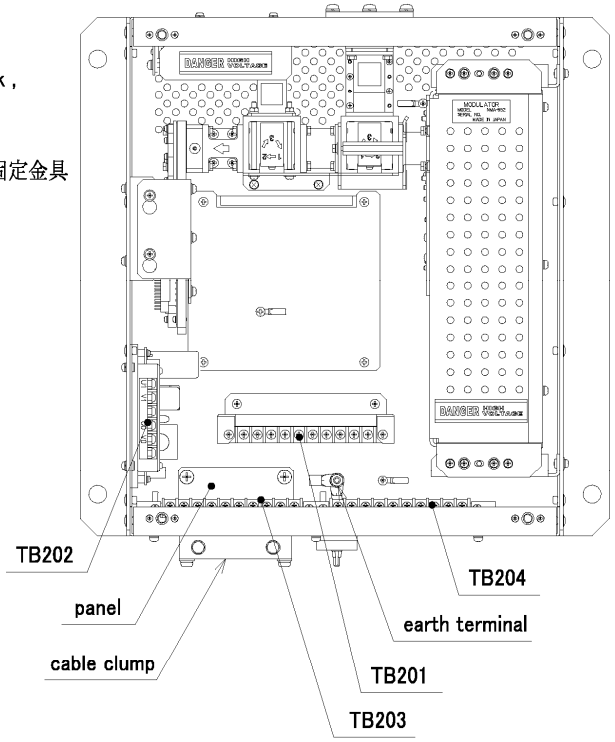
4. Connect earth cable to earth terminal of unit.
Another terminal connect to earth terminal of cabin.

アースケーブルは機器のアース端子に接続してください。
もう一方の端末は船内アース端子に接続してください。



※ In case of passing the cables into unit from back , replace cable clump with panel and clump them.

背面よりケーブルを引き込む場合は、ケーブル固定金具とパネルを置き換えて固定してください。

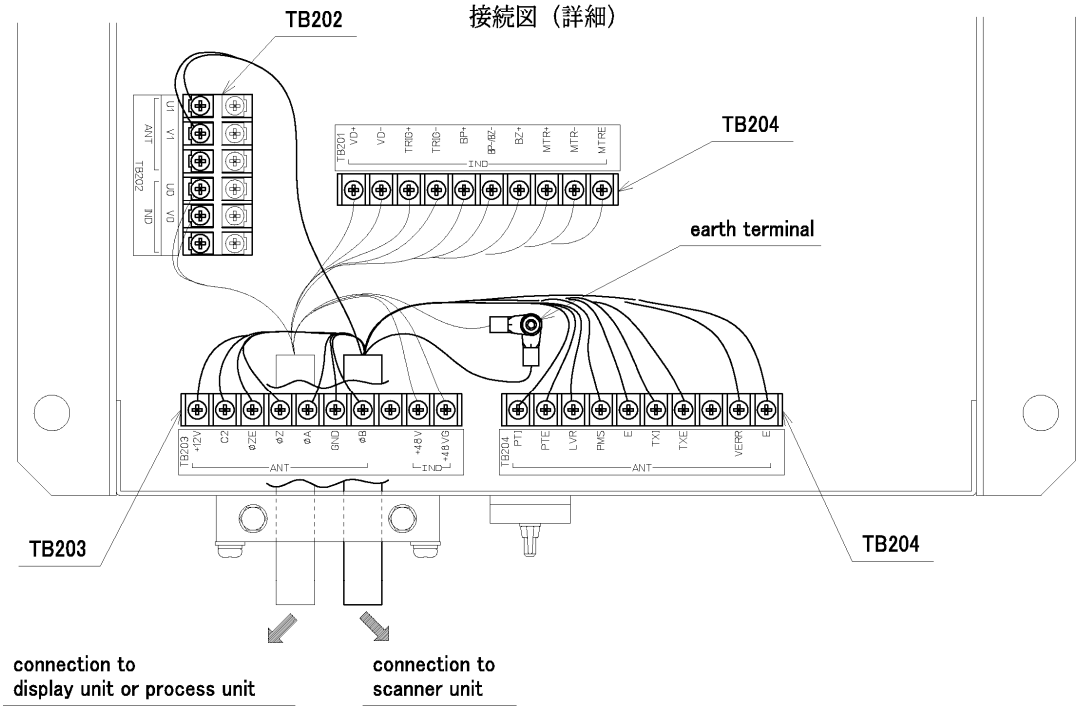


5. Connect the cables to each terminal.

ケーブルの端末を各部に接続してください。

Connected chart

接続図（詳細）

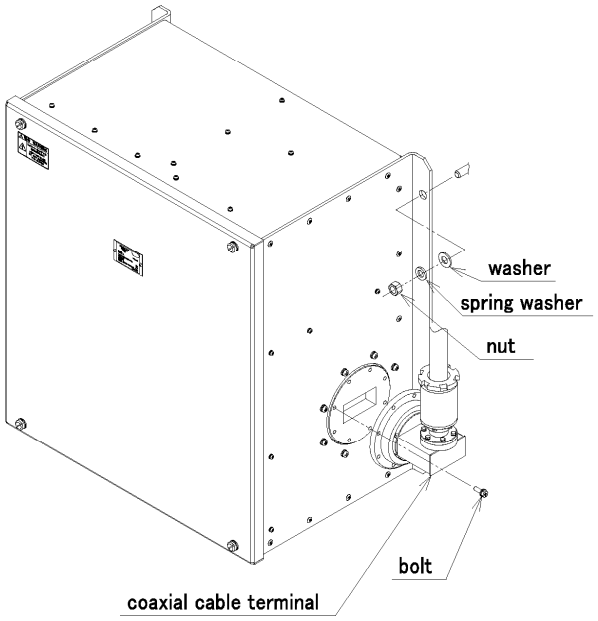


MTZ303824-2/2

2.3.2 NTG-3230 type transmitter receiver unit

Instruction for Equipment
装備要領

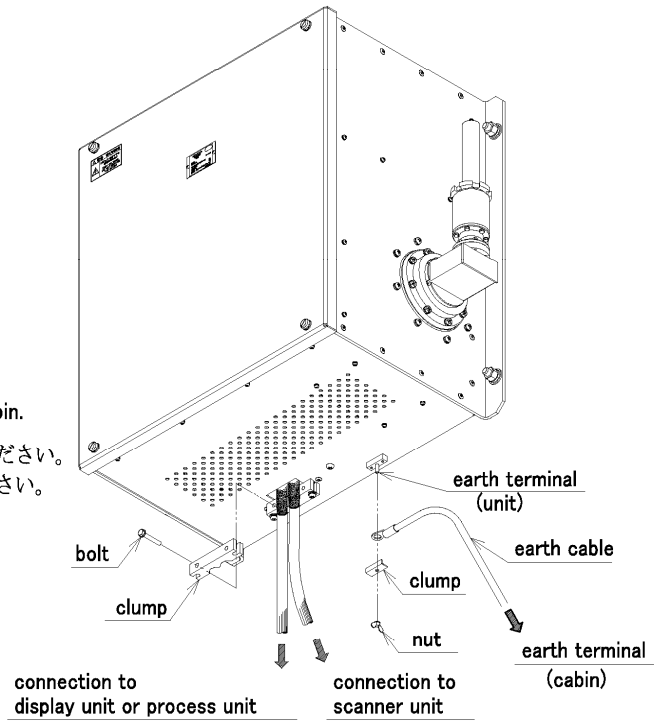
1. Equip the transmitter with nuts and washers.
ナット、ワッシャを用いて、送受信機を装備する。



2. Clumpt a coaxial cable terminal with bolts.
ボルトを用いて、同軸導波管端子を接続する

3. Pass the cables into unit and clump them.
ケーブルを機内に引き込み、固定してください。

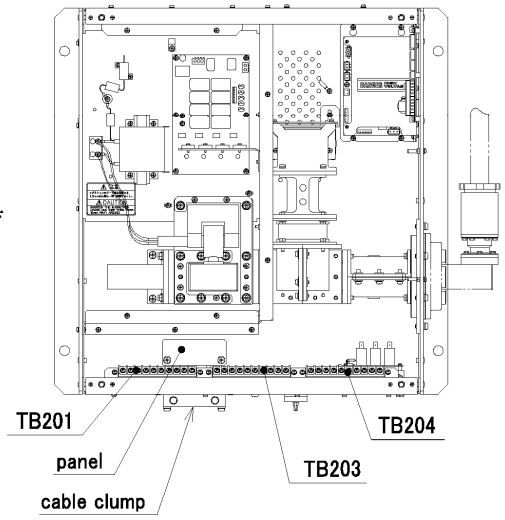
4. Connect earth cable to earth terminal of unit.
Another terminal connect to earth terminal of cabin.
アースケーブルは機器のアース端子に接続してください。
もう一方の端末は船内アース端子に接続してください。



MTZ303825-1/2

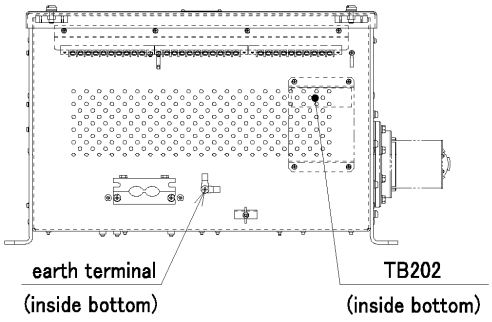
※ In case of passing the cables into unit from back , replace cable clump with panel and clump them.

背面よりケーブルを引き込む場合は、ケーブル固定金具とパネルを置き換えて固定してください。

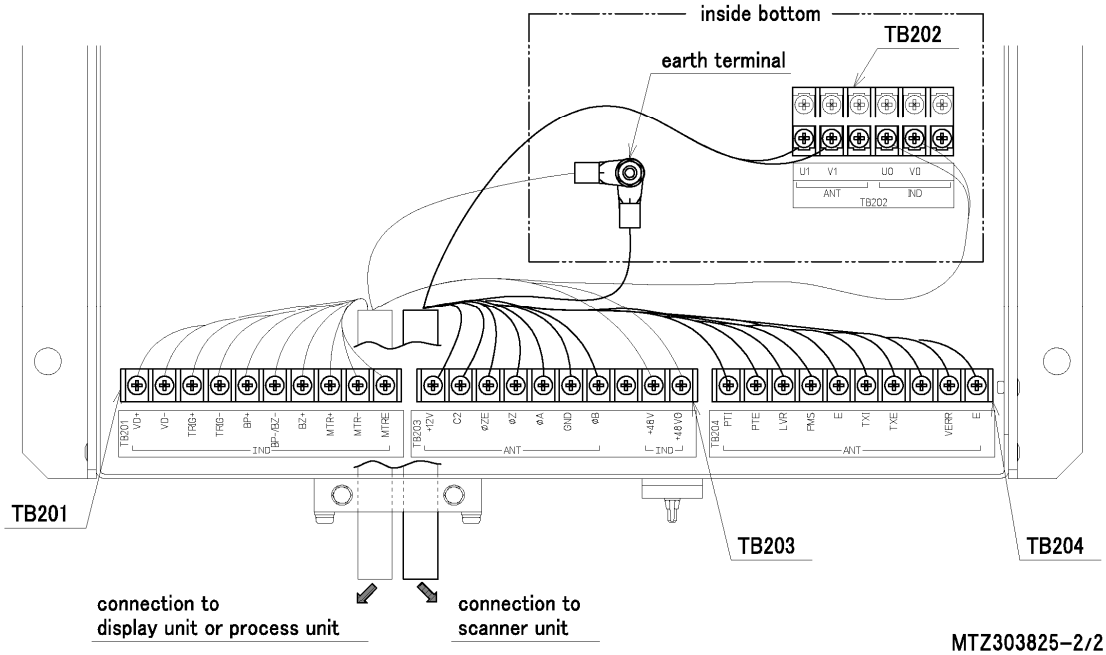


5. Connect the cables to each terminal.

ケーブルの端末を各部に接続してください。



Connected chart
接続図（詳細）



MTZ303825-2/2

2.4 PRECAUTIONS

WARNING

Microwave radiation level:

Keep away from a scanner when it is transmitting.

The high level of microwave is radiated from the front face of the scanner specified below. The microwave exposure at close range could result in injuries (especially of the eyes).

Microwave radiation level

System	50 W/m^2	10 W/m^2	2.5 W/m^2
NKE-2103	n/a	26cm	123cm
NKE-1125/1129/2254	5cm	81cm	162cm
NKE-1130/1139	11cm	76cm	181cm
NKE-2632	1.38cm	3.1cm	209.76cm
NKE-1632	1.45cm	3.25cm	128.37cm

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

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

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

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

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

2.4.1 Installation of scanner unit

1) Precautions for transporting and storing the scanner

- A scanner is a heavy load. Be very careful about handling it.
- Do not allow the scanner fall on its side while it is stored or being installed.
- Do not apply rope to the scanner in the way that squeezes or deforms the radiating section.
- When hoisting the scanner by a crane, do not hoist it by attaching a belt or a rope only to the scanner's radiating section as shown in **Fig 2-4 Improper way to hoist**.
- **When lifting the S-band scanner (Improper way to hoist)**:

  When lifting the scanner with the radiator by a crane, attach a rope (or belt/wire) to four hoisting eyebolts attached to the scanner's chassis, and then lift the scanner so that a protector attached on the radiator will be located between the rope and radiator.

  Use suitable rope in length so that the distance from the crane's hook to the hoisting eyebolts will be 2.5m or more.

  Use the protector attached on the radiator in factory, an additional protector should be not used. Because excessive protector will cause damage to the radiator's radome. After installation of the scanner, remove the protector from the radiator.

  If the lifting rope is attached to the scanner's support section located at the bottom of the radiator, a load is imposed to the joint between the radiator and the chassis, then this will cause damage.

  On lifting the scanner, if the lifting rope (or belt/wire) is short, or a protector is not used, it will scratch the radiator's radome.

  And then, if a thick protector on the radome is used, it causes damage to the radome.
- **When lifting the X-band scanner** (**Fig 2-6 X-band**):

  Wrap a cloth around the scanner's support section located at the bottom of the radiator, and then attach a belt to it to lift the scanner.

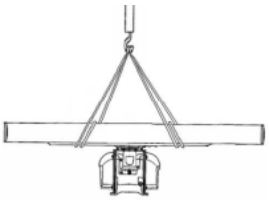


Fig 2-4 Improper way to hoist

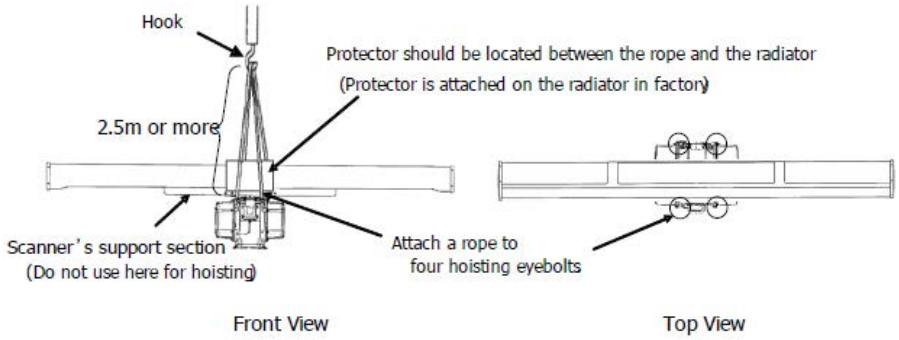


Fig 2-5 S-band

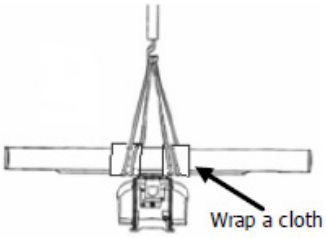


Fig 2-6 X-band

2) Installation procedures

a. Maintain a flat level surface on which to install the scanner.

- Use sufficiently thick steel material and reinforcement material for the scanner's installation surface (mount base) to reduce vibration and impact. Keep the mount base flat and smooth.
- If there is a partial gap between the mount base and the scanner chassis's legs, work on the installation surface so that it becomes flat and smooth. If a gap exists and the scanner is tightly clamped, the chassis will distort and become damaged by vibration.

b. Avoid using vibration-proof rubber and resin

- Do not insert an elastic body, such as vibration-proof rubber or resin, between the mount base and the scanner chassis' legs. If rubber or resin is inserted, the amplitude of vibration increases, resulting in the possibility of damage to the scanner. Furthermore, if installation bolts become loose due to deterioration of rubber or resin, the scanner may be damaged or fall from its mount.

3) Installation and clamping method

a. Installation direction

- Installation should be done so that the cable gland is oriented toward the stern.

b. Bolts, nuts and tightening torque to be used

- Use stainless steel bolts for the scanner and uniformly tighten all of the bolts using double nuts for each bolt so that the scanner will not become loose (**Table 2-4 Length of scanner mounting bolts and tightening torque**).
- Although the length of the bolt will differ according to the thickness of the mount base, use a bolt long enough so that more than 4 millimeters of thread protrudes beyond the double nuts after the double nuts have been tightened.

Table 2-4 Length of scanner mounting bolts and tightening torque

	Thickness of Mount Base(mm)	Bolt	Torque(N-m)
S-band	19	M12×65(mm) SUS304	65
X-band	12	M10×55(mm) SUS304	40

c. Use of washer and corrosion-resistant measures

- At the location where a bolt's head or nut comes in contact with the scanner chassis' legs and the mount base, insert a plain washer which fits the bolt; and, at the location where the nut comes in contact with the plain washer, insert a spring washer, and then securely tighten the nuts (**Fig 2-7 Use of washer and corrosion-resistant measures**).
- To prevent corrosion due to the contacts between different metals, such as the scanner chassis' legs, installation surface, bolts, nuts, etc., cover the bolt's head and nuts with sealant (**Fig 2-7 Use of washer and corrosion-resistant measures**).

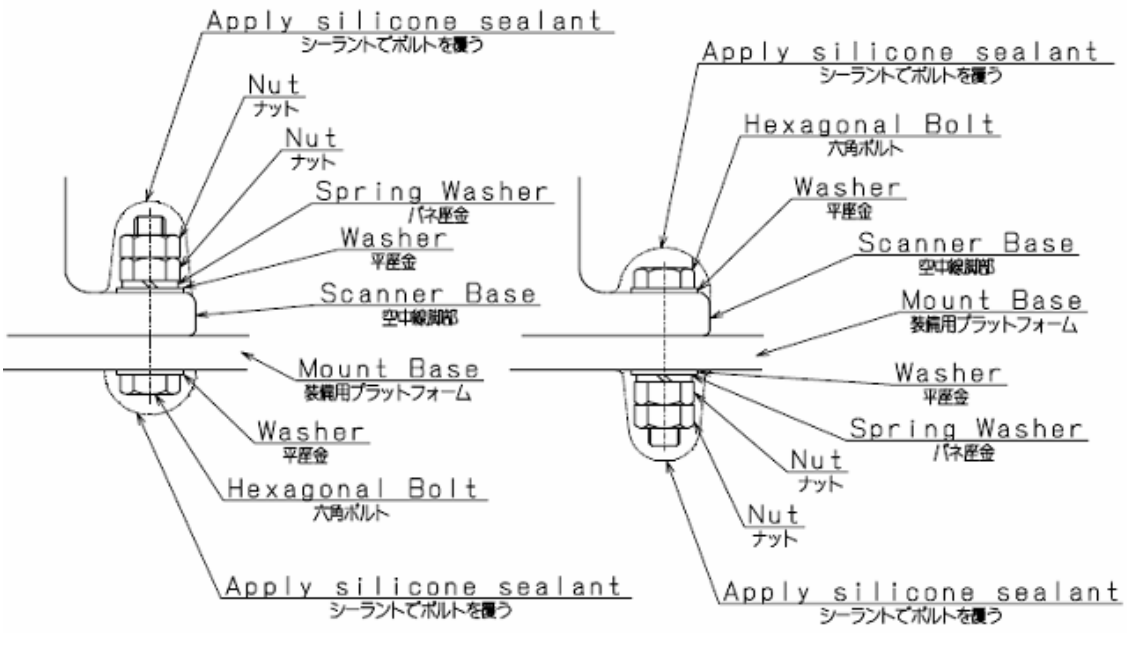


Fig 2-7 Use of washer and corrosion-resistant measures

d. Grounding and corrosion-resistant measures

- Ground the scanner chassis and the installation surface (hull) by using an earth line. Apply sealant to the connection portion of the earth line to prevent corrosion and damage by vibration (**Fig 2-8 Grounding and corrosion-resistant measures**).

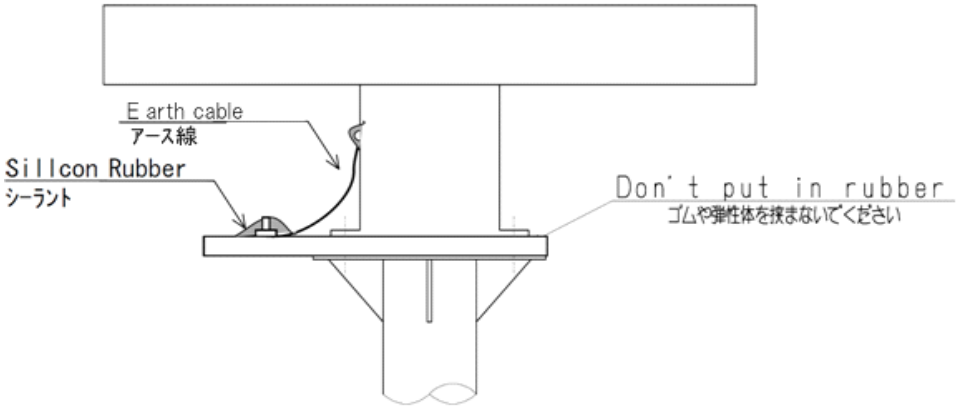


Fig 2-8 Grounding and corrosion-resistant measures

2.4.2 Routing coaxial cable and flexible wave guide

In the case of the three-unit system consisting of the display unit, transmitter-receiver, and the scanner, use a Coaxial cable, shown in **Fig 2-9 Coaxial cable**, between the transmitter-receiver and the scanner for the S-band, and use a Flexible wave guide, shown in **Fig 2-10 Flexible wave guide**, for the X-band.

1) Protecting coaxial cable and flexible wave guide

- Since cables and wave guides are hollow inside, when mounting them by using electric wire bands, try not to fasten the bands too tightly around the cables and wave guides. If they are fastened too tightly, the inside will become deformed or blocked, which may cause the receiving sensitivity to decrease or the transmitter-receiver to be damaged.

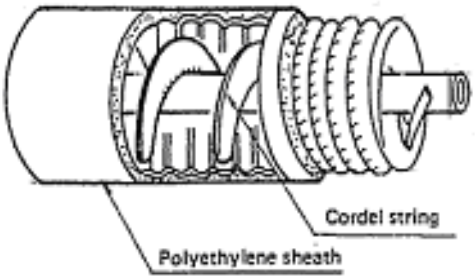


Fig 2-9 Coaxial cable

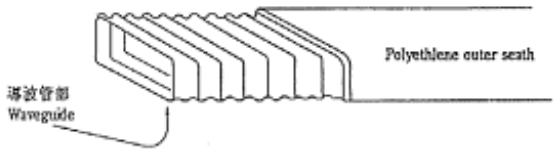


Fig 2-10 Flexible wave guide

- Stabilize the coaxial cable and the flexible wave guide by supporting members that are at maximum intervals of 1000 millimeters. Mount a supporting member for the horizontal wiring portion on the compass deck at an angle of 300 to 400 millimeters, and put a protective metal cover over the cable and wave guide.

2) Preventing the connecting portion from becoming detached due to vibration

- Keep the connecting portion between the coaxial cable and the flexible wave guide and the scanner's chassis, and provide supporting members, as shown in **Fig 2-11 Position of S-band supporting member** and **Fig 2-12 Position of X-band supporting member**, to prevent the connecting portion from becoming detached due to vibration.

- The distance from the connecting portion and the supporting member should be 400 millimeters for the S-band and 300 millimeters for X-band.

- If the distance from the connecting portion and the supporting member is longer than the above distance, vibration may cause metal fatigue, resulting in the occurrence of malfunction even if the connecting portion is not removed.

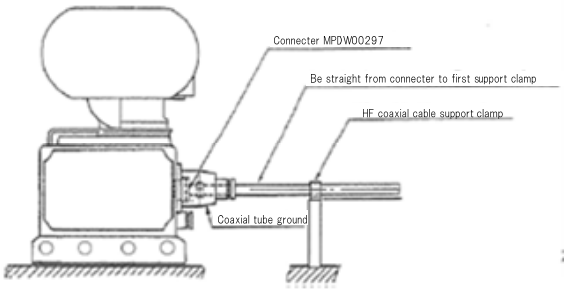


Fig 2-11 Position of S-band supporting member

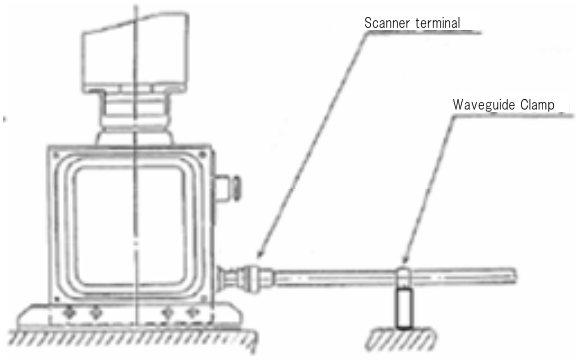


Fig 2-12 Position of X-band supporting member

- For the cable end processing, refer to the procedure manual which comes with the cable.

3) Permissible bending radius

- The permissible bending radius R of flexible wave guide is 200mm/400mm (E-bent/H-bent). More sharp bending with less radius than this must be avoided.

- The permissible bending radius R of coaxial cable is 350mm. More sharp bending with less radius than this must be avoided.

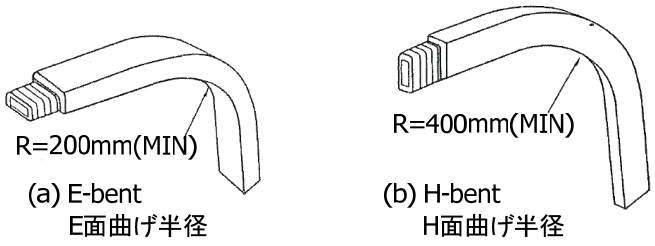


Fig 2-13 The permissible bending radius of flexible wave guide