

Chapter 9 Installation

This chapter has been written for the service technicians to read in case of installation.

WARNING



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

9.1 General

Proper installation of a radar unit is essential for extracting full capability of the unit reliably and for facilitating troubleshooting and maintenance. Follow the guidelines given below when installing the radar unit.

- (a) Install the scanner unit as high as possible while taking its weight into consideration.
- (b) Install the display unit in the wheel house for comfortable observation.
- (c) The scanner unit and display unit are connected by 20m compound cable with an internal shield. The maximum permissible cable length is 30 m (only when DC 24V or DC 32V is input). Cables longer than 30m will deteriorate the radar performance of the radar unit.

9.2 *Installing the Scanner Unit*

9.2.1 Selecting the installation location

CAUTION



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



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



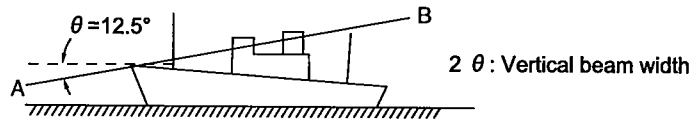
Do not install direction antenna or VHF antenna in the vicinity of the scanner unit. Doing so may cause noise in the antenna reception.



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

Take the following into consideration when selecting the installation location:

- (1) Consider the weight of the scanner unit and decide what height it can be raised for installation in the ship.
- (2) Height at which the scanner unit is installed has to do with the maximum detectable range, the higher its position is the better. On the other hand, however, if raised too high, at a point beyond the beam width (-3 dB position) along the vertical direction radio wave energy will be affected noticeably, making it difficult to spot targets lying very near.
When installing the unit, consider its weight, longest permissible cable length, and the requirements during future maintenance.
Refer to 4.1, "Height of and the Distance to the Target" for the relation between the height of the scanner unit and maximum detectable range.
- (3) If the width of the radiated beam is 2θ (most energy is concentrated within this width), then the energy reduces considerably in directions outside the 2θ range. Thus, if the scanner unit is raised too high it will be difficult to spot targets lying very close-by. If, on the other hand, the scanner unit is installed low, it will be obvious to miss distance targets, and the ship's mast derrick, funnel, etc. will intercept the radiated beams, making most of your targets unobservable. In general, the lowest position of the scanner unit should be as shown by the line AB in the following figure. For example, angle 2θ is 20° for the radar of JMA-5110.
Normally, when deciding the height of the scanner, it is necessary to make sure that the ship's mast does not obstruct the beams.



Lowest Position of Scanner Unit

- (4) When selecting the position of the scanner along the length of the ship, make sure that the shading caused by the ship's mast on the radio waves does not coincide with the ship's center line. If the ship has no large obstruction towards front, normally the scanner is placed on top of the steering room along the ship's center line.
- (5) Avoid placing DF (direction finder) or VHF (communications) antenna near the scanner as these will interfere with the radiated waves.
- (6) Soiling of the radiating surface of the scanner by the smoke from funnel affects radar performance, clean the radiating surface from time to time. To facilitate maintenance, place the scanner in the right position and use mast and tower of the right structure.
- (7) Note that, if placed near ship's flag or rope may cause by wind to wrap or coil around the radiator and damage it.
- (8) Do not select the derrick post as the location for scanner installation. The derrick post is subject to large vibrations.

- (9) Note the swing circle of the scanner and allow a distance of at least $(\text{swing circle}/2)+200$ mm between scanner swing center and other installations (say, mast or radio antenna).
Scanner swing circle in the radar of JMA-5106/5110 is shown in the following table.

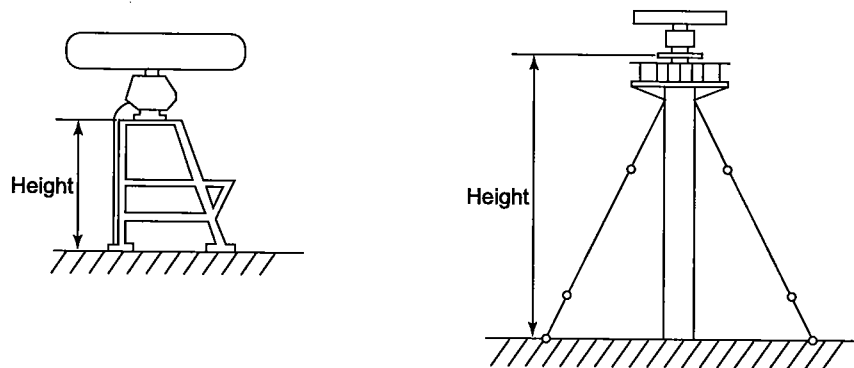
| Scanner unit | Feet | Swing circle (mm) | Swing circle/2+200 (mm) |
|--------------|------|-------------------|-------------------------|
| NKE-2062 | 4 | 1220 | 810 |
| NKE-2102 | 6 | 1910 | 1155 |

9.2.2 Installation procedure

- If it is found that there is no height above the roof of the wheel house enough to directly accommodate a scanner unit, install a pedestal or radar mast.
- In addition to a pedestal or radar mast, it is necessary to provide an appropriate staging for convenience in installation, maintenance, adjustment, and repair of the scanner unit.

1. Stand

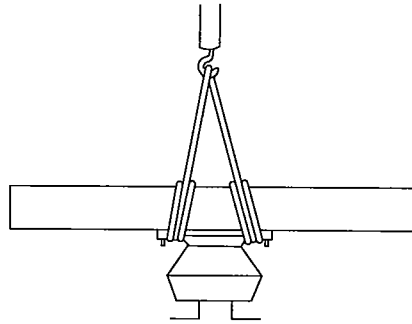
Install the stand as instructed in drawing Fig.1.1, 1.2 and 1.3 in Chapter 1. Direct the cable gland towards ship's stern, making sure that scanner installation base is parallel to surface of the sea. If the stand is installed directly on the top of steering room and find that the scanner is not sufficiently high, use a pedestal or radar mast. Normally, if height of the scanner is not more than 2 m above the roof of the steering room, place the scanner on a pedestal fixed with angle joints. If, on the other hand, the scanner is positioned below a height of 2 m, use a cylindrical radar mast, and place the scanner on top of it. Whether a pedestal or radar mast is used it is necessary to provide proper foothold to facilitate the installation, maintenance, adjustment, and repairs. (Refer to the following figure)



Scanner Stand

2. Suspending the Scanner

The scanner is supplied assembled, with felt wound around the area where the suspension rope will contact it. Engage the sling with the scanner as shown in the following figure.



Scanner Suspension

CAUTION



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

3. Paint

Apply necessarily paint on the fixing legs, bolts, nuts, etc. to prevent corrosion.

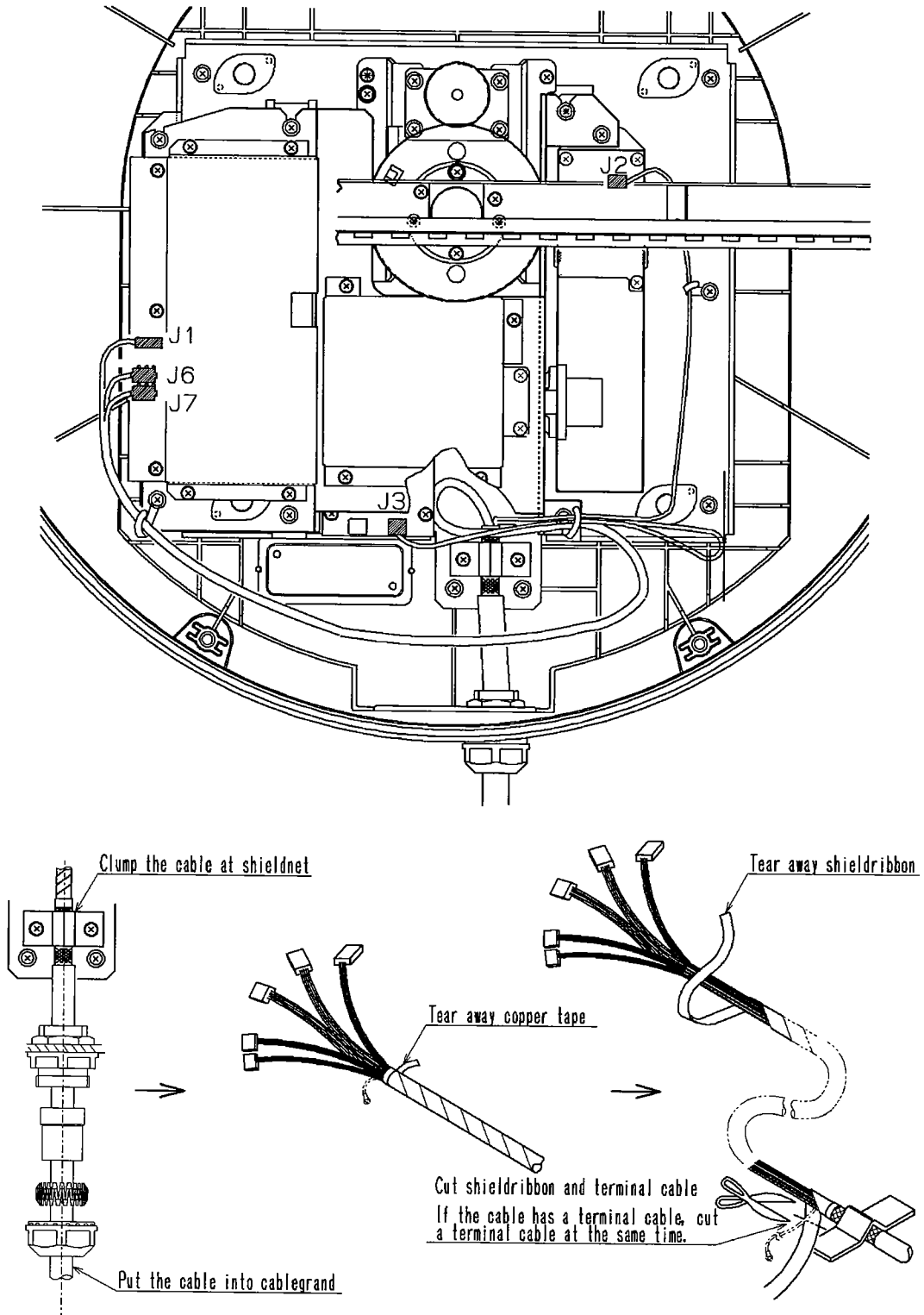
4. Magnetism

Place the scanner at least 3m away from the nautical instruments such as the compass or the chronometer to protect these from the effect of the magnetron inside the scanner.

9.2.3 Connection of cables to be assembled

1. Radome scanner unit (NKE-2042)

ASSEMBLING PROCEDURE FOR CABLE



⚠ CAUTION

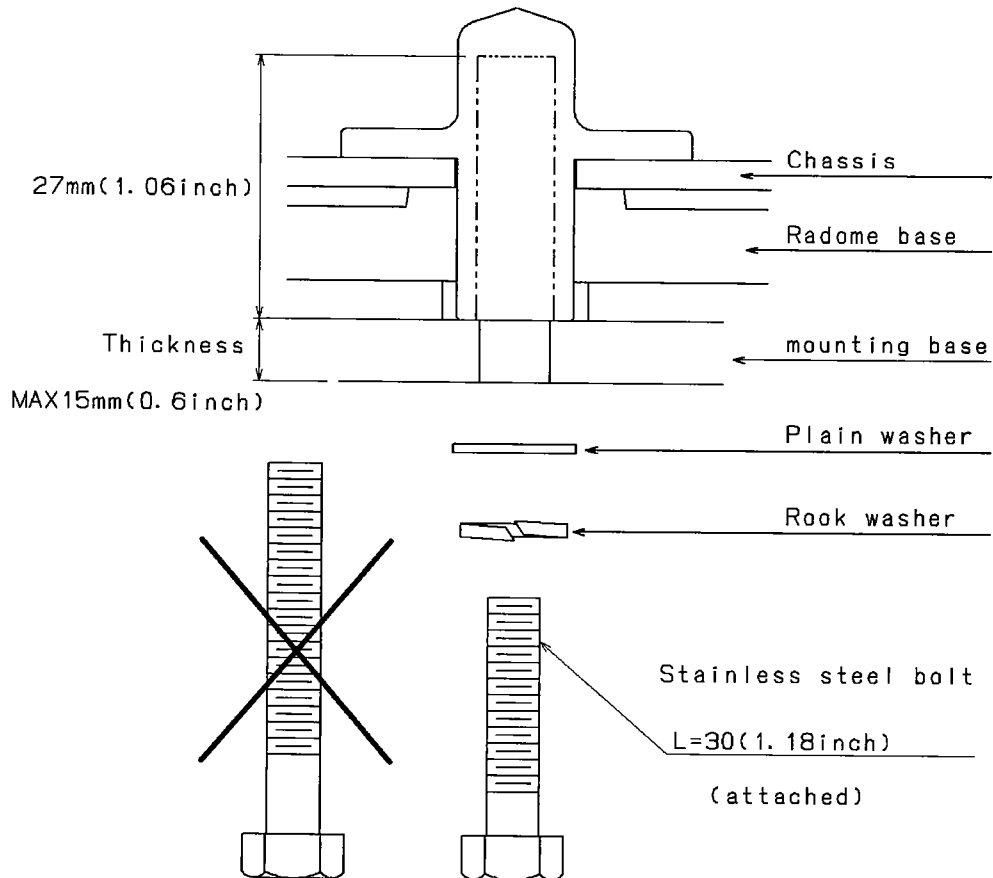


When mounting the scanner unit, please check the maximum length of the holding bolts.

If the bolts are too long, it gives severe damage to inside of the scanner.

When mounting the scanner unit, please use the attached bolts.

The mounting base thickness must not exceed 15mm (0.6inch).

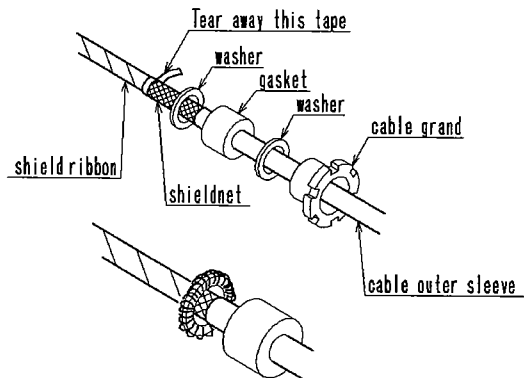


*FIX THE BOLTS BY USING A STANDARD WRENCH (LENGTH 135mm)
(TORQUE 2058N-cm)

2. Rotary scanner unit (NKE-2062/NKE-2102)

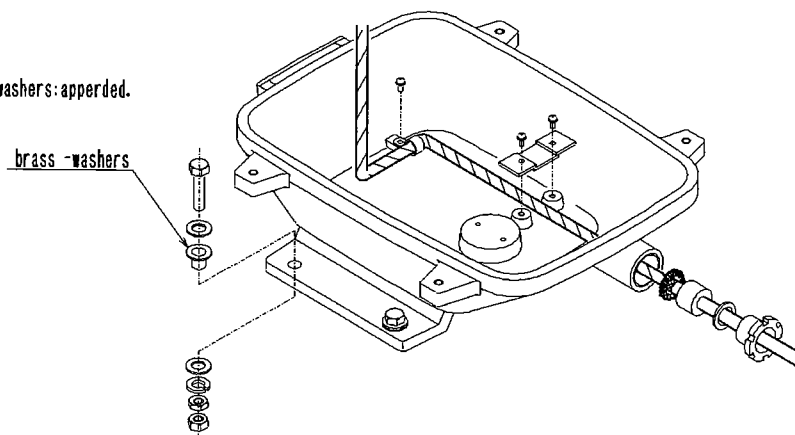
Instruction for equipment

1. Put the cable into cable grand, washers and gasket.
Tear away the tape.

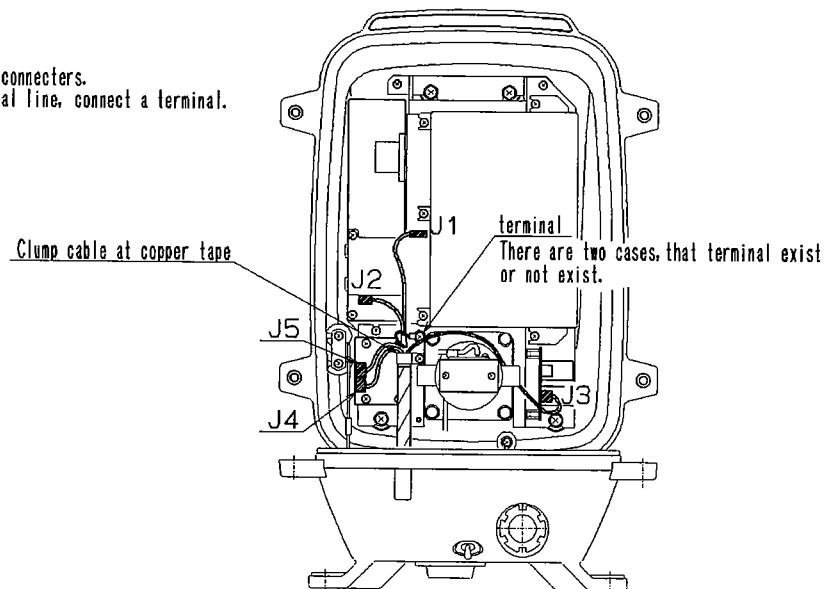


2. Unknot shieldnet and wrap it around a washer.

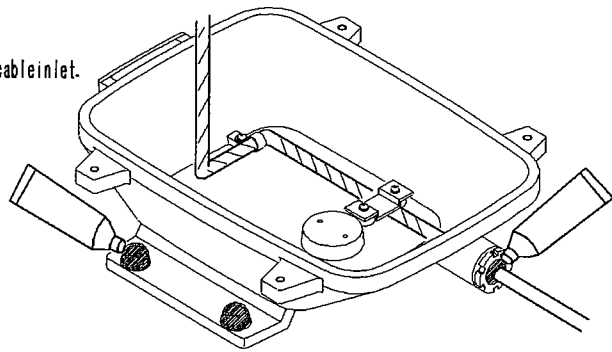
3. Equip the scanner unit with brass-washers: appended.



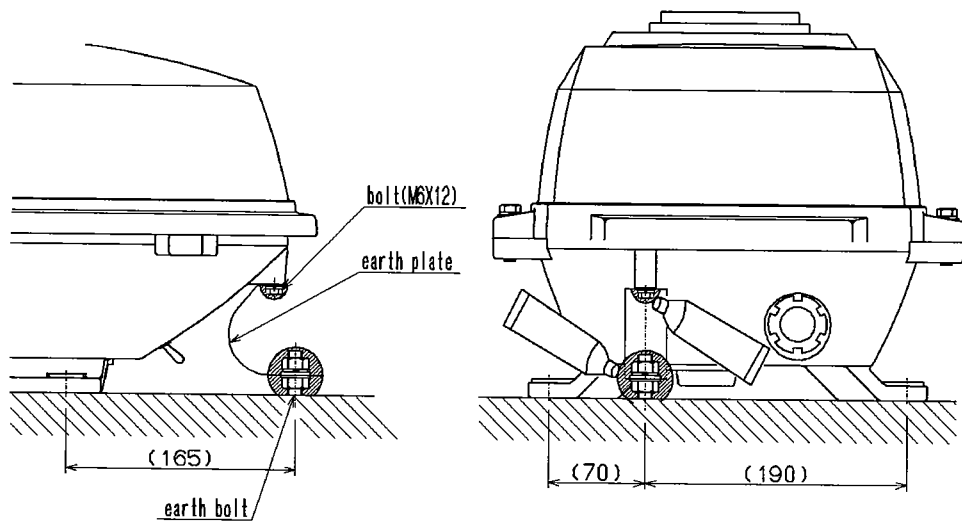
4. Clump the cable, connect 5 connectors.
If the cable has the terminal line, connect a terminal.



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






6. Bolt the earth plate to mountbase and scanner.
Apply silicone sealant around the bolts.



9.3 *Installing an Indicator Unit*

9.3.1 Specifying the installation position

| | |
|--|--|
|  CAUTION | |
|  | Provide a distance of 1m or more between a processing unit and a magnetic compass. If a processing unit is installed in a position too close to a magnetic compass, it may affect the magnetic compass. |
|  | Install a processing unit in the location that is not affected by seawater. The processing unit is not waterproof. |

An indicator unit comprises the following three components.

Processing unit NDC-1260 : Box of an A4 size

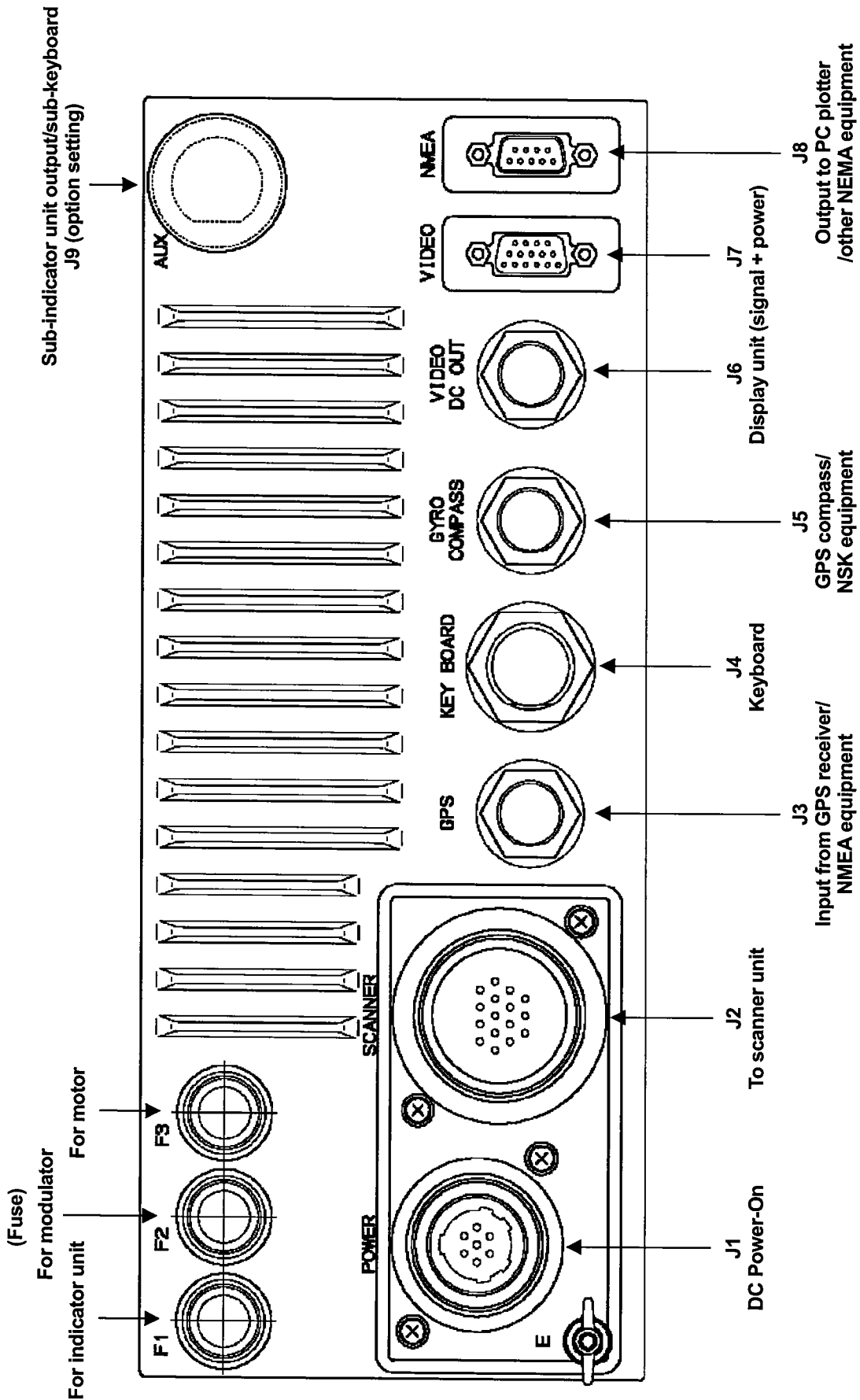
Keyboard unit NCE-7640 : Keyboard with knobs or keys

Display unit NWZ-146 : LCD display unit that is packed separately from a processing unit and a keyboard unit

9.3.2 Installation method

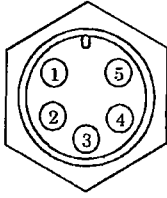
- (a) Install an indicator unit in such a way that can be observed by users easily.
- (b) Install the indicator unit giving consideration to maintenance after installation.

9.3.3 Rear of the processing unit



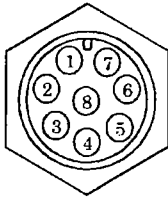
9.3.4 Signals of option connectors

GPS connector (J3)



| | |
|--------------------------|---|
| To GPS or NMEA equipment | |
| (1) +12V | : Power for GPS receiver |
| (2) GND | : Power GND for GPS receiver |
| (3) NAVCOM | : Signal GND |
| (4) NAVRX | : Input from receiving signals from GPS |
| (5) NAVTX | : Output of transmitting signals to GPS |

Connector for GPS compass/NSK equipment (J5)

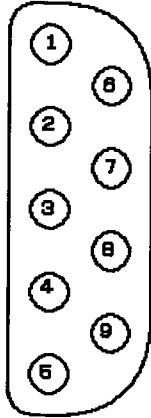


| | |
|----------------------------|---|
| To GPS compass or NSK unit | |
| (1) NSKTX- | : Output of receiving signals from NSK+ |
| (2) NSKTX+ | : Output of receiving signals from NSK- |
| (3) NSKRX+ | : Input of receiving signals from NSK+ |
| (4) NSKRX- | : Input of receiving signals from NSK- |
| (5) GND | : Power GND for NSK |
| (6) ALM+ | : Dry contact output 1 |
| (7) ALM- | : Dry contact output 2 |
| (8) +5V | : Power for NSK (+5V) |

Use the following plug connectors, P3 and P5, for J3 and J5.

| Connector | Type | JRC code |
|-------------|-----------------|------------|
| P3 (for J3) | LTWD06BFFA-L180 | 5JCDX00014 |
| P5 (for J5) | LTWD08BFFA-L180 | 5JCDX00015 |

Connector for signal output to PC plotter/NMEA equipment (J8)



To PC plotter or NMEA equipment

| | |
|-----------|--------------------------------|
| (1) NC | : Unused |
| (2) RSRXD | : RXD signal input (reserved) |
| (3) RSTXD | : NMEA signal output |
| (4) NC | : Unused |
| (5) GND | : Signal GND |
| (6) NC | : Unused |
| (7) RSRTS | : RTS signal output (reserved) |
| (8) RSCTS | : CTS signal input |

(2) RSRXD and (7) RSRTS are used for special purposes.

NMEA signals are output from (3) RSTXD and RS232C output is set at short circuit between 1 and 2 of power terminal block jumper TB1, and RS422 (NEMA0183) is set at short circuit between 2 and 3. To connect J8 and a PC plotter (RS232C port), use a commercial cross type DSUB9-pin cable (for RS232C).

To connect J8 to different NMEA equipment, also obtain a commercial DSUB9-pin connector.

In this case, make sure that the jumper of power terminal block TB1 is set between 2 and 3 (RS422 level).

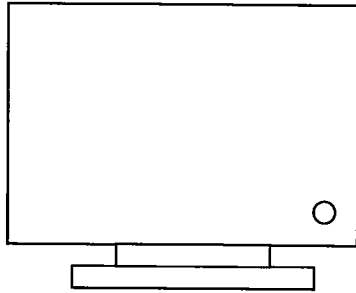
9.3.5 Installing and display unit

Display unit NWZ-146 is connected with two cables.

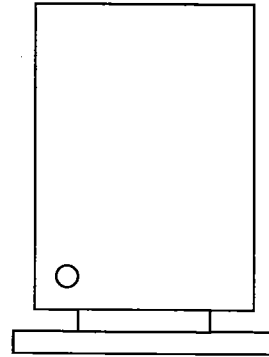
1. Setting vertically or horizontally

A display unit can be installed vertically or horizontally.

When changing the orientation of a display unit from vertically to horizontally or vice versa, remove the four small screws from the rear of the display unit and install it with the required orientation as shown below.



Horizontal installation



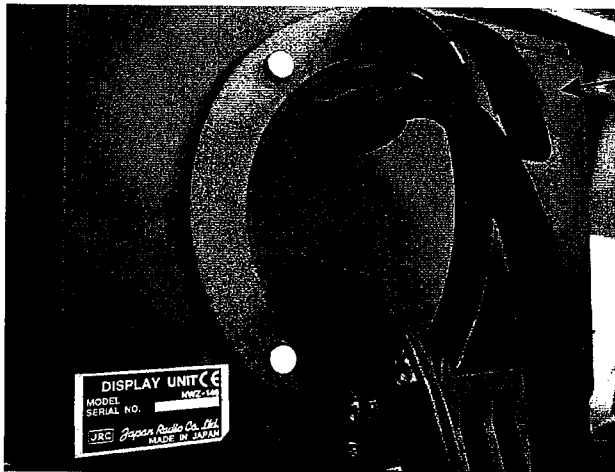
Vertical installation

(o: Brightness adjustment knob)

2. Connecting cables

Connect two cables from the processing unit.

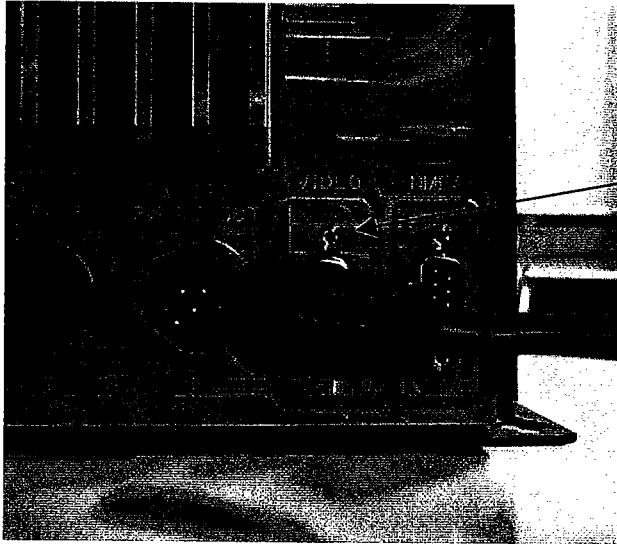
One cable is used as a video cable and the other is used as a power cable. As shown in the photograph below, insert the two cables at the rear of the display unit, turn the plugs until they stop, and check that the cables do not come off even if they are pulled.



Connection on the display unit side :
Make sure that the cables do not come off even if they are pulled.

Connect two cables from the processing unit.

As shown in the photograph below, insert the power cable connector at the rear of the processing unit and turn the plug until it stops, and check that the cable does not come off even if it is pulled.

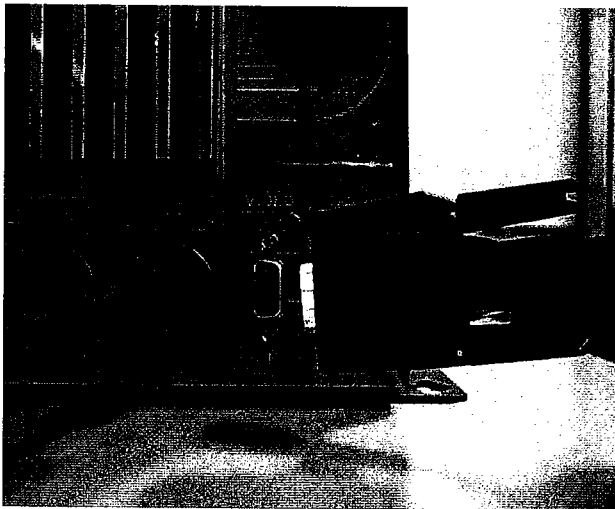


Connection 1 of the processing unit:

Power cable

Check that the cable does not come off even if it is pulled.

Insert the signal cable at the rear of the processing unit, turn the two knobs with plugs until they stop, and check that the cable does not come off even if it is pulled.



Connection 1 of the processing unit:

Signal cable

After inserting a signal cable, fix the cable firmly by turning the knob of the cable until it stops. Check that the cable does not come off even it is pulled.

9.3.6 Installing a keyboard unit

A keyboard unit can be installed at any location within a distance of 5m with a processing unit.

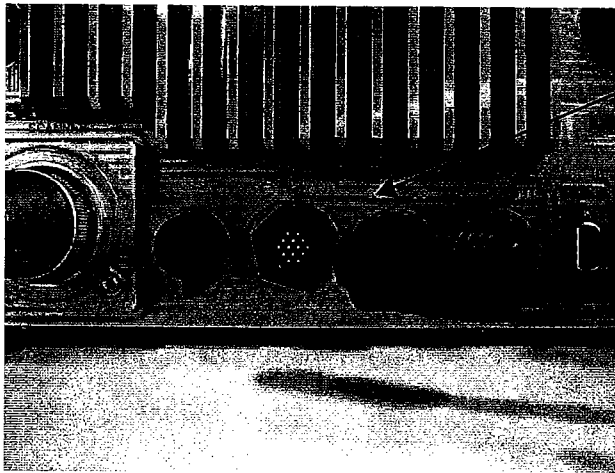


The cable is attached to the keyboard unit.

Connecting a cable

Connect one cable to a processing unit.

Turn the insertion plug at the rear of the processing unit to the full position and check that the cable does not come off even if it is pulled.

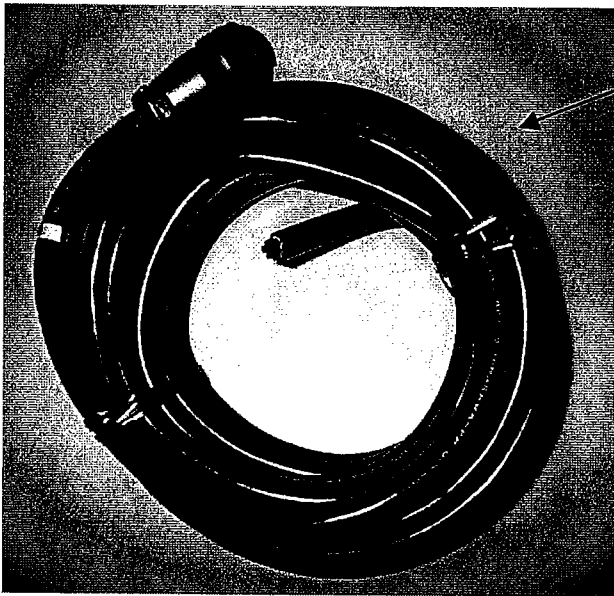


Check that the cable does not come off even if it is pulled.

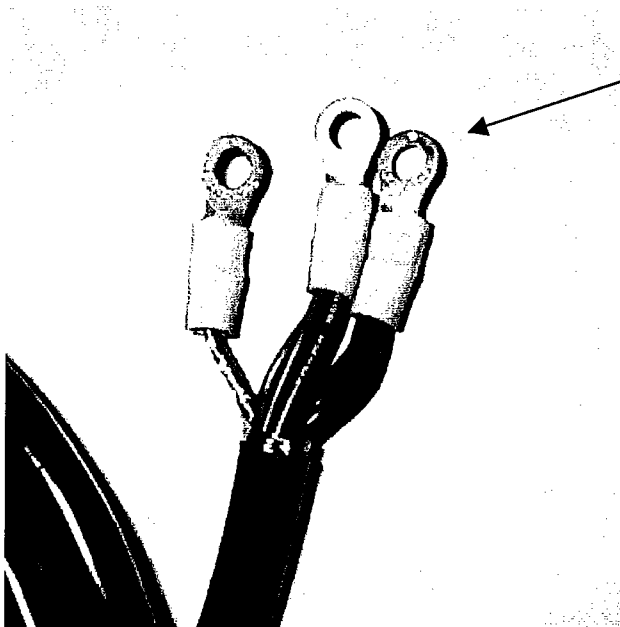
9.3.7 Attaching a power cable (CFQ-6911-5)

A power cable of 5m length with a connector is attached to this radar equipment.

| Color | Number of element wires/ diameter (mm) | Cross section (mm ²) | Polarity |
|-------|---|-------------------------------------|----------|
| Red | 50/0.18 | 1.25 | + |
| Red | 50/0.18 | 1.25 | + |
| Red | 50/0.18 | 1.25 | + |
| Black | 50/0.18 | 1.25 | - |
| Black | 50/0.18 | 1.25 | - |
| Black | 50/0.18 | 1.25 | - |

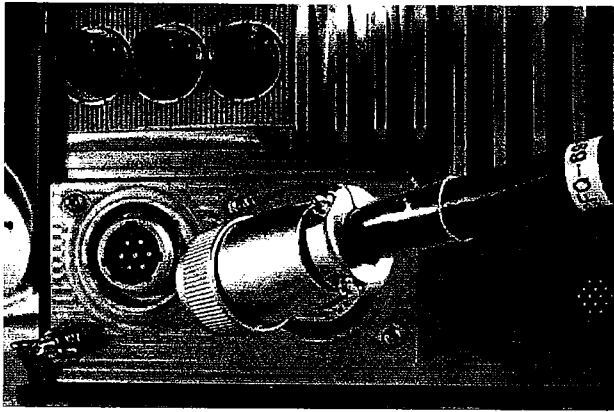


CFQ-6911-5 cable
Cable length 5m



Cable process method

1. Crimp three black cables together.
2. Crimp three red cables together in the same way.
3. Crimp the shielding cable.
4. Install the red cables on the + side of the ship's power supply, the black cables on the - side of the ship's power supply, and the shielding cable in the hull's earth.



Inset cable CFQ-6911-5 into processing unit J1.

Caution

- Incorrect connection between the ship's power supply or the rectifier and the power cable may cause an equipment failure.

Selecting a cable when a long power cable is required

- The input voltage to an indicator is determined by subtracting the voltage drop up to the power cable from the ship's power supply voltage. Therefore, if the power cable is too thin or too long, the voltage drops substantially, preventing the radar from functioning at its full capacity. Use the following guideline for selecting a power cable.

- Take the voltage fluctuation rate into consideration when determining a voltage (V_s) value of the ship's power supply.
- Use the following formula for calculating a voltage drop (V).

$$V=2LRKI$$

L : Cable length

R : Direct current resistance at 20°C (Ω/m)

K : Conductor resistance temperature counting (=1.22)

I : Maximum peak current (A)

- Various cable direct current resistances (R) and allowable current (I_{max})

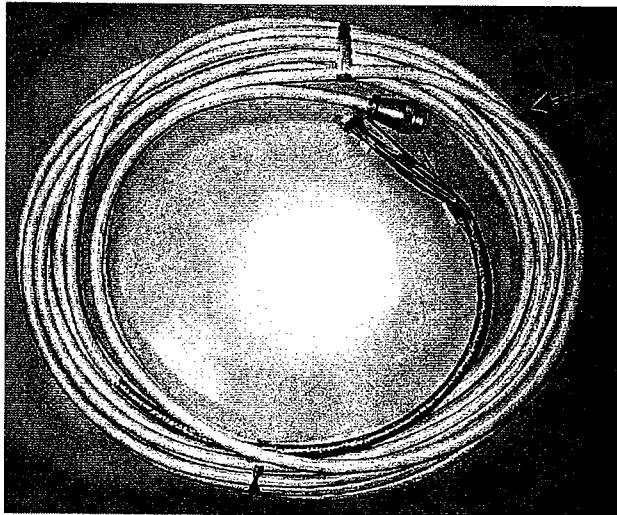
| Cable type | R (20°C) | I_{max} (45°C continuously) |
|--------------|------------------|----------------------------------|
| CVVS2 x 1.25 | 16.7 Ω/km | 13A |
| CVVS2 x 2.0 | 9.42 Ω/km | 19A |
| CVVS2 x 3.5 | 5.30 Ω/km | 26a |

Provide a sufficient extra current value to I_{max} when selecting cables.

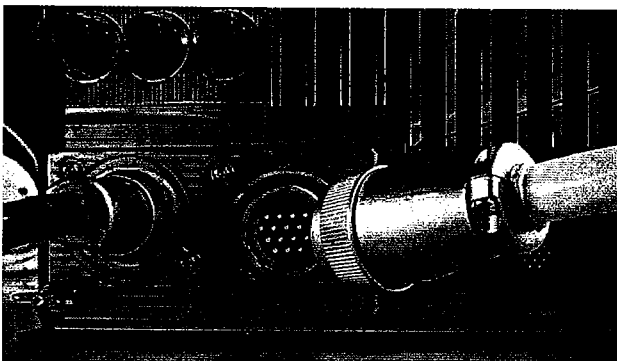
9.3.8 Attaching a cable between a processing unit and a scanner unit (CFQ-6912-20/30)

- (a) Use this cable for connecting a processing unit and a scanner unit.
- (b) Use a cable with the following connector for this radar equipment.

| Cable length | JRC code | Remarks |
|--------------|-------------|----------|
| 20m | CFQ-6912-20 | Standard |
| 30m | CFQ-6912-30 | Option |



Cable CFQ-6912-20/30
Connector on both sides



Insert cable CFQ-6912-20/30
in processing unit J2

After inserting the cable, push the cable to the end.

Connection table of cable CFQ-6912-20/30

| Pin number | Color | Wire material | Signal name |
|------------|---|--------------------|-------------|
| 1 | Blue thick, gray thick | AWG16 | 2A |
| 2 | Purple thick, brown thick | AWG16 | 2A |
| 3 | White thick, orange thick | AWG16 | 1A |
| 4 | Red thick, green thick | AWG16 | 1A |
| 5 | Black thick, blue thick | AWG16 | 2A |
| 6 | Black | AWG22 | GND |
| 7 | Drain wire (coaxial) (drain wire: Shielding, braided shielding) | AWG24 | VDE |
| 8 | – | – | +12V |
| 9 | Yellow thick, pink thick | AWG16 | 1A |
| 10 | Coaxial cable core | AWG24 | VD |
| 11 | Yellow | AWG24 twisted pair | COM+ |
| 12 | Green | AWG24 | BZ |
| 13 | White | AWG24 twisted pair | COM– |
| 14 | Drain wire (shielding) (drain wire: coaxial, braided shielding) | AWG24 | TIE |
| 15 | Shielding wire core | AWG24 | TI |
| 16 | Orange medium | AWG22 | BP |
| Cover | Braided shielding (drain wire, coaxial, drain wire shielding) | | |

* Cable shape: 14mm ± 0.5mm

Caution

- A cable is not connected to pin number 8, however, +12V is output to the processing unit side. This voltage (+12V) is used when an external simulator is connected.

The explanation up to this section covers the method in standard configuration. The next section describes cable attaching methods when optional equipment is connected.

9.3.9 Connecting a GPS receiver and NMEA equipment

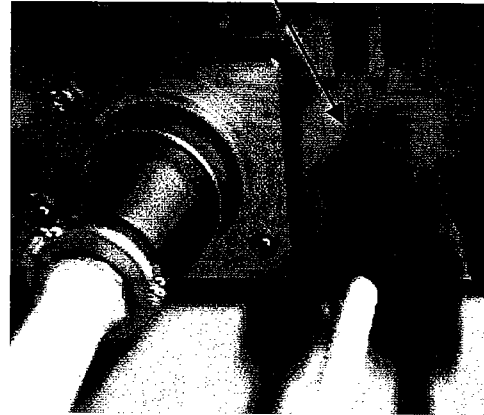
1. Connecting GPS receiver of JRC

A cable of a GPS receiver such as GPS100/DGPS212 can be connected by directly inserting the cable to the J3 connector.

GPS100 manufactured by JRC



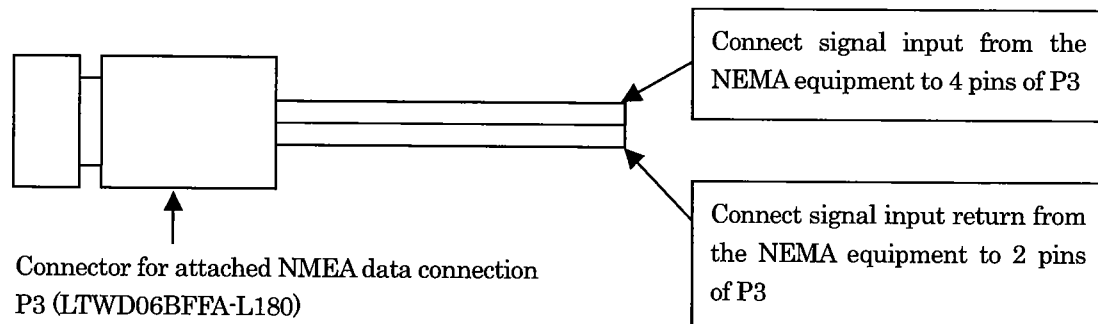
Insert a cable in J3 from GPS.



2. Connecting another manufacturer's GPS receiver or NMEA data output equipment

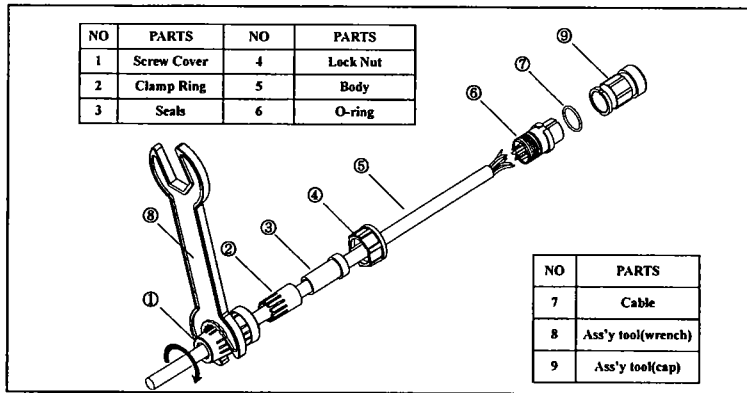
When connecting NMEA data from the NMEA data output equipment of JRC other than those indicated above or other manufacturer's GPS, use 6-pin connector P3 for J3 (LTWD06BFFA-L180).

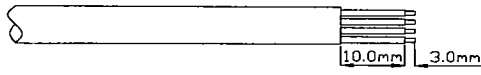
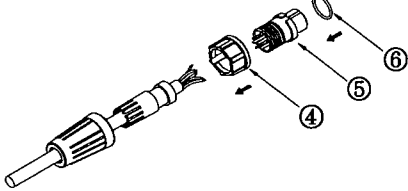
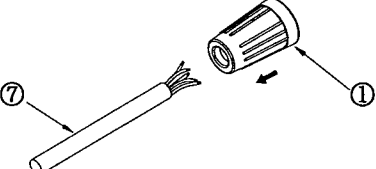
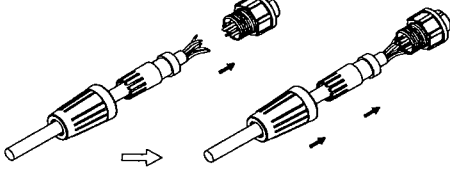
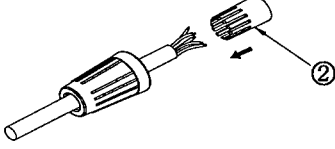
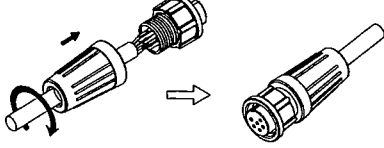
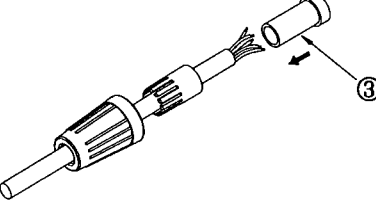
Connect signal output to pin 4 from the NEMA equipment and signal return from the NMEA equipment to pin 2.



Method of assembling and connecting P3 (LTWD06BFFA-L180) and P5 (LTWD08BFFA-L180) that are attached

THE INSTRUCTION FOR FIELD INSTALLATION CONNECTOR



| | |
|--|---|
| <p>Step 1: Strip cable sheath & insulation.</p> <p style="text-align: right;">Unit : mm</p>  | <p>Step 5: Insert lock nut ④ into cable, and then insert O-ring ⑥ into connector body ⑤.</p>  |
| <p>Step 2: Insert screw cover ① into cable.</p>  | <p>Step 6: Solder conductors to allocated contacts, then screw or install every part into connector body ⑤.</p>  |
| <p>Step 3: Insert clamp ring ② into cable.</p>  | <p>Step 7: Tighten screw cover with hand tool (Optional) or your hand while holding Ass'y tool (Optional)</p>  |
| <p>Step 4: Insert seal ③ into cable.</p>  | <p>Note: 1. Ass'y tool (cap) help to ensure good locking of screw cover into the connector body. 2. Ass'y Hand Tools (cap & wrench) are sold separately.</p> |

3. NMEA0183 standard input/output sentences

●Input sentences

| NORMAL INPUT | |
|---|--|
| \$xxGGA | Global Positioning System Fix Data |
| \$xxGLL | Geographic Position - Latitude/Longitude |
| \$xxVTG | Course Over Ground and Ground Speed |
| \$xxRMC | Recommended Minimum Specific GNSS Data |
| \$xxBWC | Bearing and Distance to Waypoint |
| \$xxRMB | Recommended Minimum Navigation Information |
| HIGH RATE INPIUT (Use only heading information) | |
| \$xxHDG | Heading, Deviation and Variation |
| \$xxHDM | Heading - Magnetic |
| \$xxHDT | Heading - True |
| \$xxVHW | Water Speed and Heading |

●Output sentences

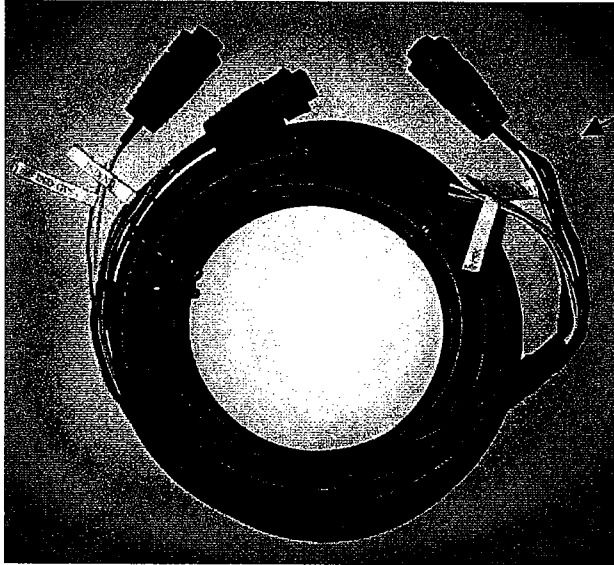
| | |
|---------|--|
| \$GPGGA | Global Positioning System Fix Data Necessary to connect the GPS112 or DGPS212 |
| \$GPGLL | Geographic Position - Latitude/Longitude Necessary to connect the GPS112 or DGPS212 |
| \$GPRMC | Recommended Minimum Specific GNSS Data Necessary to connect the GPS112 or DGPS212 |
| \$GPVTG | Course Over Ground and Ground Speed Necessary to connect the GPS112 or DGPS212 |
| \$RAOSD | Own Ship Data |
| \$RARSD | Radar System Data |
| \$RATTM | Tracked Target Messege |

9.3.10 Connecting a GPS compass (JLR-10)

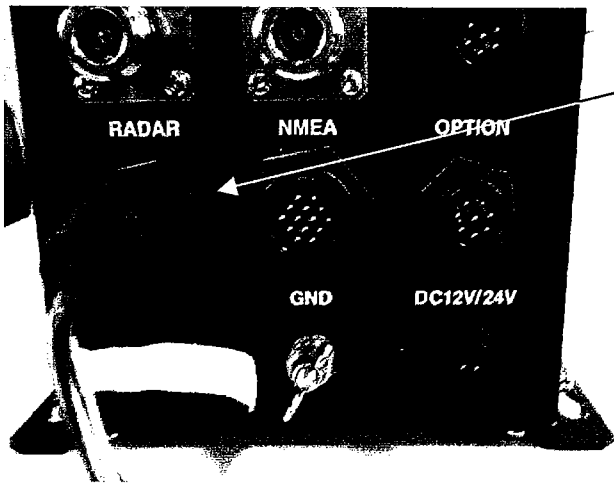
A MARPA unit, which is an optional unit, can be used by connecting GPS compass JLR-10 of JRC.

1. Using a dedicated cable

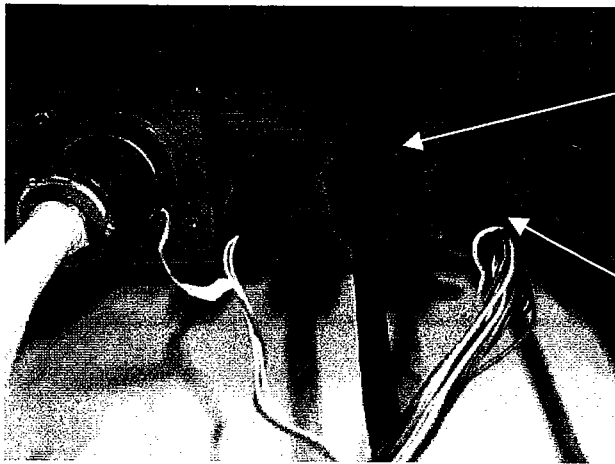
JLR-10 can be connected easily by using the CFQ-6934 dedicated cable of JRC. This cable enables not only receiving of azimuth information from JLR-10 but also receiving of longitude and latitude information as NMEA data.



Photograph 1
JLR-10/NSK unit dedicated
connection cable :
CFQ-6934



Photograph 2
Insert the 8-pin connector of
CFQ-6934 with COMPAS
(RADAR) label attached to the
"RADAR" connector of JLR-10.



Photograph 3

Insert the 6-pin connector of CFQ-6934 with GPS (IND) label attached to the connector of processing unit J3.

Insert the 9-pin connector of CFQ-6934 with NSK(IND) label attached to the connector of processing unit J5.

To input NMEA data such as position information from the GPS equipment of JRC or a different manufacturer by acquiring azimuth data from JLR-10, connect a cable from GPS equipment using the connection method that is described in 9.3.9, "Connecting a GPS receiver and NMEA equipment" or using a reserved cable, P3. Do not use the cable from JLR-10, which is inserted in GPS(J3) input, as shown in Photograph 3.

2. When not using a dedicated cable

To connect azimuth information data from a GPS compass, use J5 8-pin connector P5 (LTWD09BFFA-L180) that is included in the main unit package.

See below for the connection method.

| Signal name | GPS compass connector side | Connector of the equipment |
|----------------------|----------------------------|----------------------------|
| Compass data input+ | NC | J5-1 |
| Compass data input- | NC | J5-2 |
| Compass data output+ | RADAR-4 | J5-3 |
| Compass data output- | RADAR-3 | J5-4 |
| GND | RADAR-5 | J5-5 |

The above information is related to the connection of azimuth data for JLR-10 only. For position information, use the method that is described in 9.3.9, "Connecting a GPS receiver and NMEA equipment".

9.3.11 Connecting an electromagnetic compass

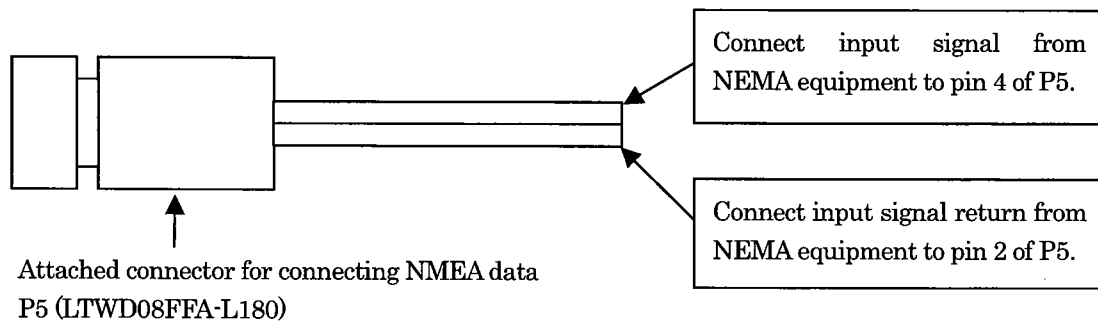
Caution

- Make correctly connection between the output of ship's power and rectifier unit, and power cable.
If neither connection nor voltage is right, it may cause an equipment failure.

Azimuth information can be input to a radar indicator unit if the electromagnetic compass is equipped with a NMEA0183 output pin. (An electromagnetic compass without NMEA0183 output pin cannot be connected.)

To connect azimuth information data from an electromagnetic compass, use 8-pin connector P5 for J5 (LTWD09BFFA-L180).

For the connection, connect NEMA0183+ from the electromagnetic compass to pin 3 and NEMA0183- from the electromagnetic compass to pin 4.



Note:

The data that can be input from a magnetic compass is NMEA-0183 (HDT/HDM/HDG format).

Caution

- For data input from a magnetic compass, operation is not enabled even if optional MARPA is connected.
The data input from GPS compass or gyro is required.

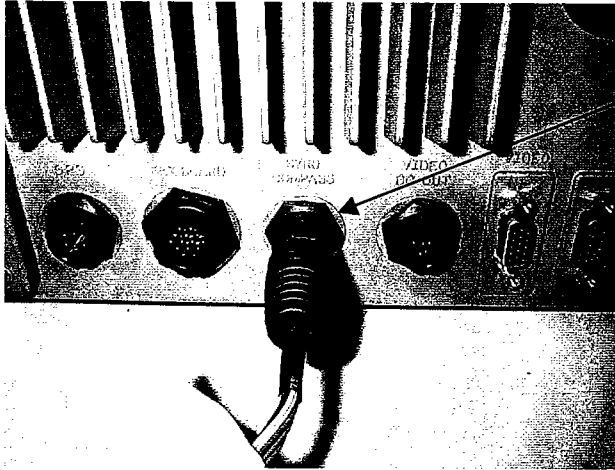
9.3.12 Connecting gyro

By purchasing an optional item, NSK Unit NCT-4106, gyro and electromagnetic log can be connected.

For connecting, use the CFQ-6934 dedicated cable of JRC that is enclosed by the NCT-4106.

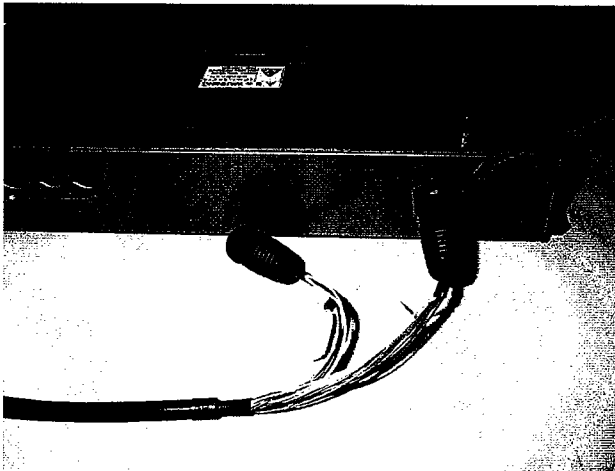
NCT-4106 can be connected easily with the processing unit by using this cable.

And the NCT-4106 is built in the interface circuit for high capacity external buzzer contact output (dry contact output), a big buzzer can be directly driven.



Photograph 1

Insert the 8-pin connector (IND NSK) of CFQ-6934 (JLR-10/NSK unit dedicated connection cable) to the connector of processing unit J5.



Photograph 2

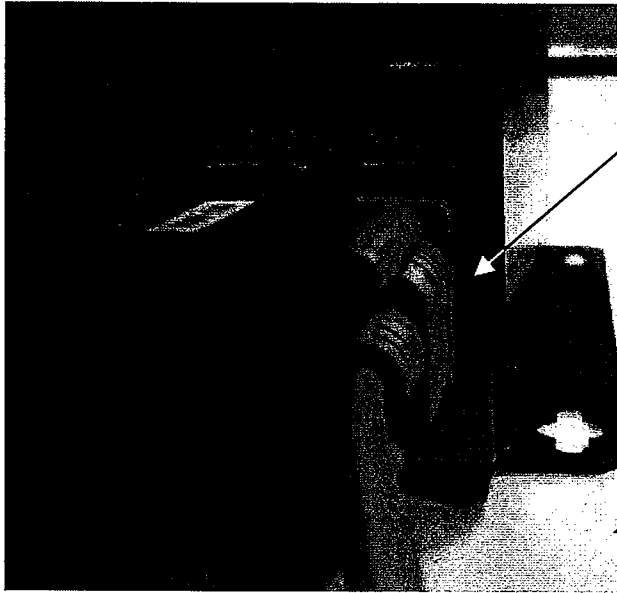
Insert the 8-pin connector (NSK) of CFQ-6934 (JLR-10/NSK unit dedicated connection cable) to the connector of NCT 4106.

9.3.13 Connecting a PC plotter and NMEA equipment

This equipment can output NEMA0183 data to a PC plotter and NMEA equipment. It is possible to select RS232C output and NMEA output (RS422 level) by setting a jumper pin.

1. Outputting NMEA0183 data to a PC plotter (RS232C output)

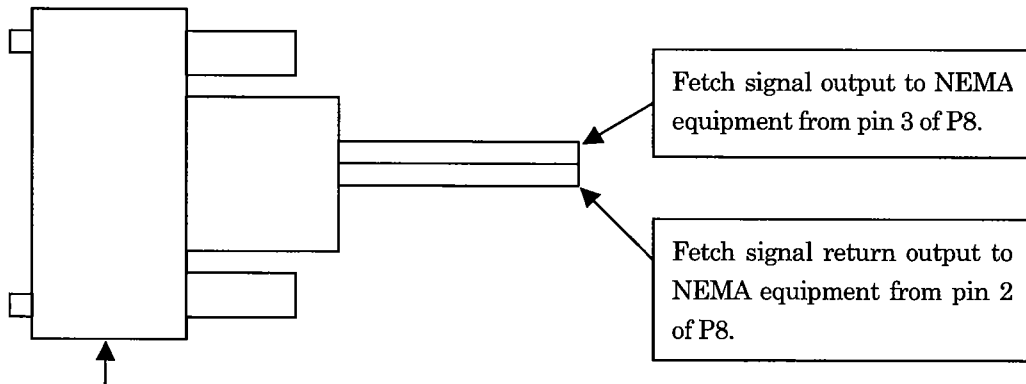
Set JP1 of the CBD-1638 power terminal block to a jumper between 1 and 2 (initial position). Connect a commercial RS232C cross cable (9-pin DSUB female) to this equipment J8 and connect the other side to the COM port of the personal computer.



Connect a commercial 9-pin RS232C cross cable (9-pin DSUB female) to this equipment J8 and connect the other side to the COM port of the personal computer.

2. Outputting NMEA0183 data to NMEA equipment (RS422 output)

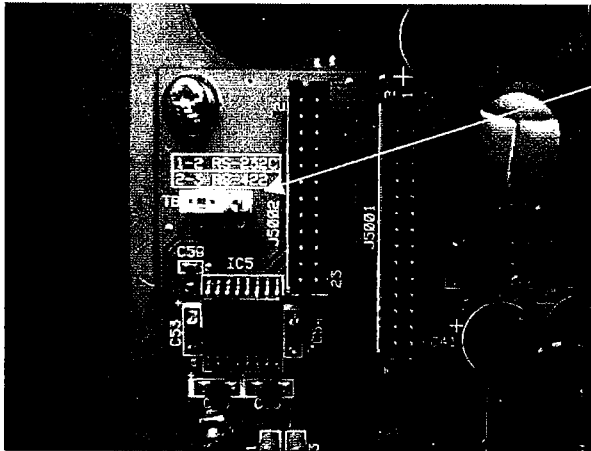
Set JP1 of the CBD-1638 power terminal block to a jumper between 2 and 3. Prepare a 9-pin DSUB female connector, connect output from pin 3 to NMEA+signal input of NMEA equipment and output from pin 5 to NMEA-signal input of NMEA equipment.



P8: Use a commercial RS232C cross cable by shortening.

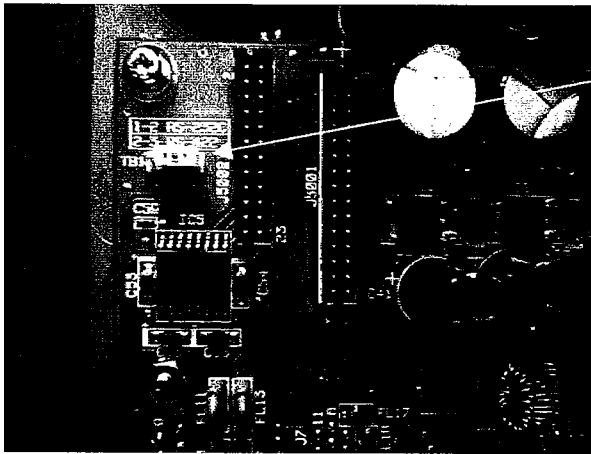
3. Switching RS232C/RS422 signal output

Switching signal output from RS232C to RS422 alternately, switch jumper JP1 of power terminal block CBD-1638.



RS232C signal output

Jumper set between 1 and 2 of TB1 as shown in the photograph.



RS422 signal output

Jumper set between 2 and 3 of TB1 as shown in the photograph.

The TB1 jumper is set between 1 and 2 (RS232C) at factory delivery.

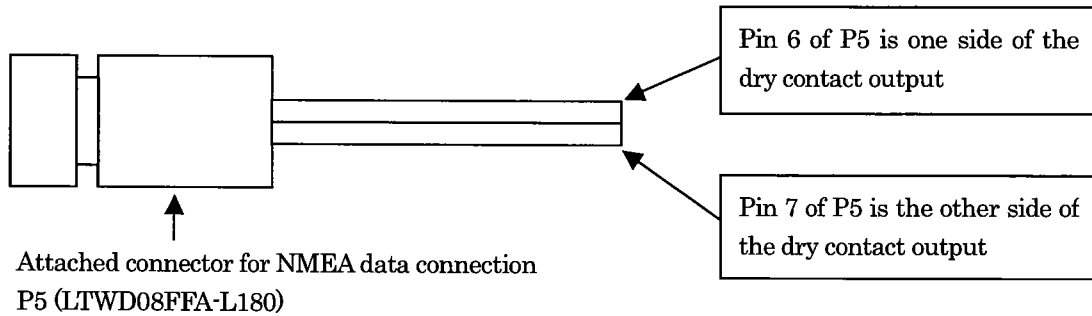
9.3.14 Connecting external buzzers

This equipment is equipped with dry contact output for external buzzers.

Dry contact is output from a jumper set between pins 6 and 7 from the 8-pin connector of J5. The contact of the output is a capacity up to 1A/30V.

If a greater current/voltage is applied, install equipment of adequate contact capacity such as relay in the external section.

If the current/voltage exceeds the contact capacity, the contact of this equipment becomes fused and the external buzzer keeps ringing, causing an extremely dangerous situation.



9.4 Changing Ship's Power

CAUTION



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

- **Modify the ratings as follows according to the ship's power.**
(At product delivery, a fuse of 24V is provided.)

1. Display

Three types of fuses, F1, F2, and F3, are available.

- F1 : Fuse for the processing unit (10A)
- F2 : Fuse for scanner unit transmitter-receiver (or less)
- F3 : Fuse for scanner unit motor (or less)

A fuse for a processing unit (F1) is 10A regardless of the input voltage and scanner unit output. A fuse for a modulator (F2) and a fuse for a scanner unit motor (F3) change according to the input voltage as shown in the table below.

When the product is purchased, the 6.3A time-lag fuse is inserted in the F2 fuse as the fuse for 12V, and the 5A time-lag fuse is inserted in the F3 fuse as the fuse for 12V.

Surely exchange for the fuses suitable for the scanner unit and ship's power by using the table below.

For NKE-2042 (4kw radome type scanner unit), fuse insertion is not necessary since F3 (fuse for motor) is not available.

List of fuses

| Scanner unit model | Input power voltage | F2 | | F3 | |
|--------------------|---------------------|----------------|------------|-------------|------------|
| | | Rating | JRC code | Rating | JRC code |
| NKE-2042 (4kw) | DC12V | 6.3A time-lag | 5ZFAD00543 | – | – |
| | DC24V/32V | 3.15A time-lag | 5ZFAD00359 | – | – |
| NKE-2062 (6kw) | DC12V | 6.3A time-lag | 5ZFAD00543 | 5A time-lag | 5ZFAD00393 |
| | DC24V/32V | 3.15A time-lag | 5ZFAD00359 | 5A time-lag | 5ZFAD00393 |

2. Scanner unit

No changes are made for a scanner unit.

9.5 Checking and Adjustment After Installation

9.5.1 Checking after installation

- (a) After completion of installation, it is necessary to check if all the operations have been carried out according to the instruction. In particular, check if the cables are connected correctly, each unit is installed properly, there is no water leakage from the scanner unit, and cable shielding braiding is installed correctly.

9.5.2 Checking operation

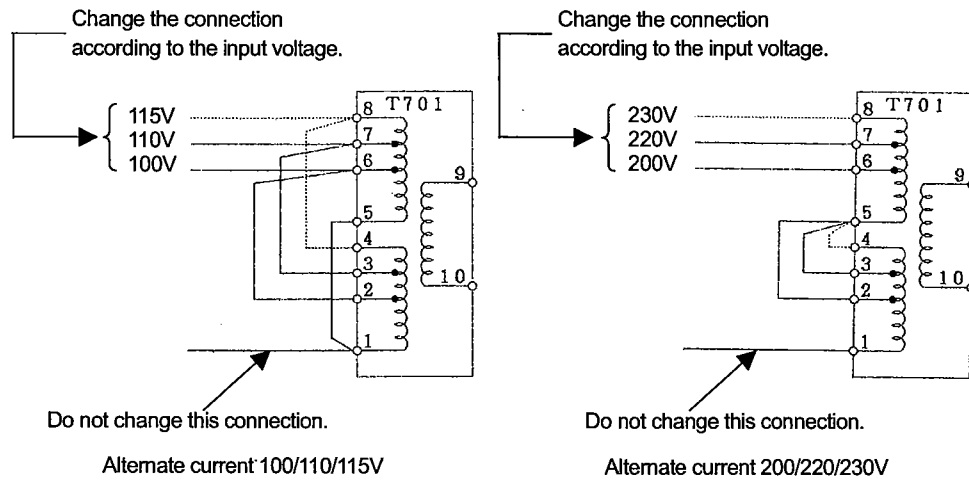
- (a) After checking installation, confirm that the ship's voltage is within the permissible range before checking radar operation.
- (b) After examining the contents of Chapter 3, "Operation Procedures" and confirming that there is no abnormality as a result of radar operation, check that all the keyboard units function normally by actually operating them.
- (c) When re-adjustment is necessary even if the result of operation checking indicates normal, make adjustments as instructed by studying 9.6, "Adjustment".

9.5.3 Various adjustments

- (a) It is absolutely necessary to adjust the azimuth of the radar.
- (b) When the knob is set near the center at tuning or the radar cannot be tuned, make rough tuning adjustments using "Tuning preset" in the initialization menu.
- (c) When the distance on the radar PPI screen and the actual distance do not match, adjust the distance using "0 mile adjustment" in the menu.
- (d) The alarm volume can be adjusted using "Buzzer volume" in the menu.
- (e) STC can be adjusted using "Sea clutter preset" menu.

9.5.4 Rectifier

- A rectifier can be used for both of the ship's voltage types, AC100/110/115V and 200/220/230V, however, the input pin connection modes must be changed as shown in the diagram below.



NBA-797 input pin connection change

9.6 Adjustment

9.6.1 General adjustment



Adjustment after component replacement

This section describes the adjustment required as a result of replacement of the main components.

- (a) Replacement of magnetron V101 → Tuning preset
- (b) Replacement of front end E101 → Tuning preset

9.6.2 Adjusting a scanner unit

Some scanner unit adjustments are necessary, however, no re-adjustments are necessary since the scanner unit is thoroughly adjusted at the factory. However, if adjustments become necessary as a result of the operation checking at inspection or fault repair, make the following adjustments.

| | |
|---|--|
|  DANGER | |
|  | High Voltage |
| | Since some sections of the modulator (CME-322 or QME-323) generate a high voltage of about 4000V, no one except service engineers are allowed to touch inside of the modulator. The high voltage may cause death or a serious injury of any person by electric shock. |

1. Adjusting AVR output voltage of a modulator

- (a) When the radar is in a transmission mode, set the distance range to 12 nautical miles, connect a voltmeter between J201-13PIN and GND of modulator CME-322 or CME-323, and adjust the voltage to +8(V) at RV2.

2. Adjusting a tuning indication level of a receiver

- (a) Set the tuning mode to manual when it is set to automatic.
- (b) Carry out tuning by setting the distance range to 12 nautical miles or more.

9.6.3 Adjusting an indicator unit

Some adjustments are necessary for the indicator unit, however, no re-adjustments are necessary since the indicator unit is thoroughly adjusted at the factory. However, if adjustments become necessary as a result of operation checking at inspection or fault repair, make the following adjustments.

Adjusting AVR output

- (a) Connect a calibrated voltmeter (digital display is recommended to eliminate reading error) between TP15 +13V and TP16 GND of power terminal block CBD-1638 and adjust the output to $+13V \pm 0.1V$.

Caution

- Make sure that the scanner unit is connected before adjustment.

9.7 Initialization

This section describes how to initialize radar equipment. Initialization of radar equipment is necessary when using it for the first time.

Initialization involves the following tasks.

- 9.7.1 Adjusting a receiver [+RANGE-] [TX/PRF] [AUTO-TUNE] [MENU]
 1. Tuning preset
 2. Center frequency adjustment
 3. Tuning indicator level adjustment
- 9.7.2 Noise level adjustment [MENU]
- 9.7.3 Azimuth adjustment [TM/RM] [AZI MODE] [MENU]
- 9.7.4 0 mile adjustment [TM/RM] [AZI MODE] [MENU]
- 9.7.5 Setting a scanner unit height [MENU]
- 9.7.6 Setting a gyro value [MENU] [AZI MODE]

Caution

- Initialize radar equipment before using it for the first time.
Without initialization, radar equipment can neither indicate targets nor measure distances and azimuths.

Caution

- Do not turn off the power until the following adjustments are completed.
Otherwise, an error occurs in the memory of the setting values that were adjusted internally and, in the worst case, the equipment may not function.

- The initialization menu "Setting at installation" can be displayed by pressing the [MENU] key in long mode.
Text "Initialization menu described above" is displayed in the description provided below. This setting indicates the menu indication method.

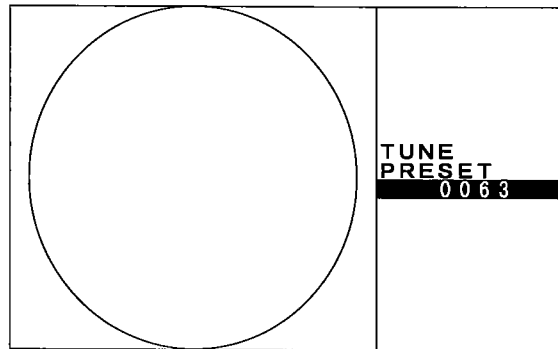
9.7.1 Adjusting a receiver [+RANGE-] [TX/PRF] [AUTO-TUNE] [MENU]

1. Tuning preset



On this menu, make a rough tuning adjustment. When this menu is displayed, the automatic tuning setting state is temporarily changed to manual tuning setting during adjustment. At completion of adjustment, the mode is reset to automatic tuning setting.

Use the following procedure to perform tuning preset.

- Press the [+RANGE-] key and set the range to 24NM.
- Press the [TX/PRF] key and send signals for 10 minutes or more.
- Set the [AUTO-TUNE] knob to a 12 o'clock position.
- Display the **INSTALLATION** menu by pressing the [MENU] key in long mode, select **RADAR**, **RADAR ADJUST**, and **TUNE PRESET**, and press [JOG DIAL] or [ACQ/ENT].
- When the following menu is displayed, press [JOG DIAL] to maximize the tuning oscillation, and end the operation by pressing [JOG DIAL] or [ACQ/ENT].



2. Center frequency adjustment

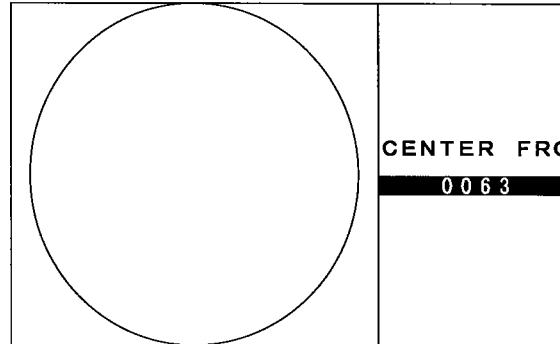
| | |
|--|--|
|  WARNING | |
|  | <p>This adjustment is a function of adjusting tune indication and peak of echo, it is already made at the factory. The default value is 64. The settings must not be changed on the spot. When the tune indication and peak of echo shift, if the settings are carefully adjusted,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

Adjust the frequency so that the image size becomes the maximum when oscillation of the tuning indicator reaches the maximum.

Use the following procedure to set a central frequency.

- Carry out steps from (a) to (c) of "1. Tuning preset".

- (b) Display the **INSTALLATION** menu by pressing the **[MENU]** key in long mode, select **RADAR**, **RADAR ADJUST**, and **CENTER FRQ**, and press **[JOG DIAL]** or **[ACQ/ENT]**.
- (c) Adjust the frequency by changing the value by turning **[JOG DIAL]** to the left or right, and end the operation by pressing **[JOG DIAL]** or **[ACQ/ENT]**.

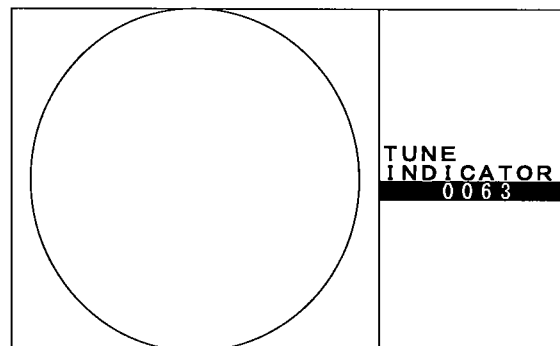


3. Tuning indicator level adjustment

Set the scale when the tuning indicator bar has reached the maximum level.

Use the following procedure to adjust a tuning indicator level.

- (a) Carry out steps from (a) to (c) of "1. Tuning preset".
- (b) Display the **INSTALLATION** menu by pressing the **[MENU]** key in long mode, select **RADAR**, **RADAR ADJUST**, and **TUNE INDICATOR**, and press **[JOG DIAL]** or **[ACQ/ENT]**.
- (c) Adjust the indicator level by changing the value by turning **[JOG DIAL]** to the left or right until the tuning indicator indicates 70% to 80% of the tuning indicator area, and end the operation by pressing **[JOG DIAL]** or **[ACQ/ENT]**.



9.7.2 Noise level adjustment [MENU]

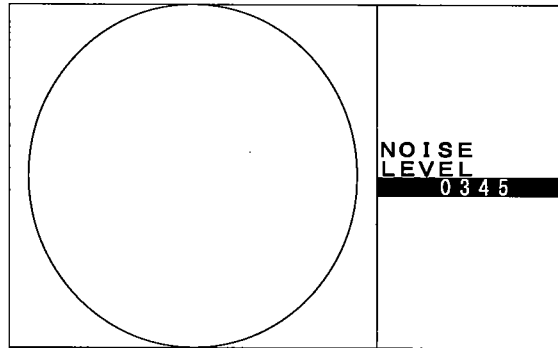
Adjust the base level of the echo that is displayed on the PPI screen.

Caution

- Since this adjustment is made at the factory before delivery, basically, the settings must not be changed.
Unnecessary adjustments cause degradation of sensitivity, causing image display abnormality.

Use the following procedure to adjust a nozzle level.

- Display the **INSTALLATION** menu by pressing the [MENU] key in long mode, select **RADAR**, **RADAR ADJUST2**, and **NOISE LEVEL**, and press [JOG DIAL] or [ACQ/ENT].
- Adjust the noise level that is displayed on the screen by turning [JOG DIAL] to the left or right, and end the operation by pressing [JOG DIAL] or [ACQ/ENT].

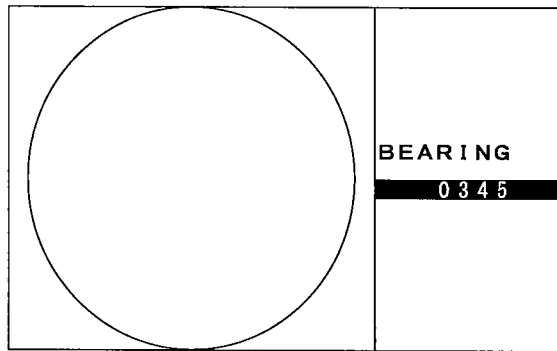


9.7.3 Azimuth adjustment [TM/RM] [AZI MODE] [MENU]

This operation is to adjust the azimuth on the PPI screen.

Use the following procedure to adjust the azimuth.

- Select the RM mode by pressing the [TM/RM] key.
When the mode is already set to "RM", this operation is not necessary.
- Select the H-UP mode by pressing the [AZI MODE] key.
When the mode is already set to "H-UP", this operation is not necessary.
- Display the **INSTALLATION** menu by pressing the [MENU] key in long mode, select **RADAR**, **RADAR ADJUST**, and **BEARING**, and press [JOG DIAL] or [ACQ/ENT].
- When a line for setting an azimuth is displayed, set the azimuth to the established target on the screen by turning [JOG DIAL], and press [JOG DIAL] or [ACQ/ENT].
- Move the established target to the position to be displayed on the screen by turning [JOG DIAL], and end the operation by pressing [JOG DIAL] or [ACQ/ENT].

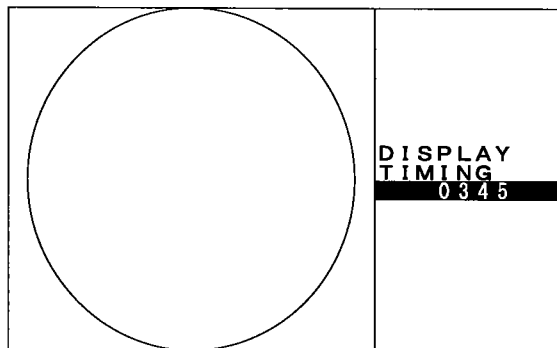


9.7.4 0 mile adjustment [TM/RM] [AZI MODE] [MENU]

This operation is to adjust the distance calibration on the PPI screen.

Use the following procedure for 0 mile adjustment.

- (a) Select the RM mode by pressing the [TM/RM] key.
When the mode is already set to "RM", this operation is not necessary.
- (b) Select the H-UP mode by pressing the [AZI MODE] key.
When the mode is already set to "H-UP", this operation is not necessary.
- (c) Set the range to 0.125 miles by pressing the [+RANGE-] key.
- (d) Display the **INSTALLATION** menu by pressing the [MENU] key in long mode, select **RADAR**, **RADAR ADJUST**, and **DISPLAY TIMING**, and press [JOG DIAL] or [ACQ/ENT].
- (e) Set the target to a required position on the screen by turning [JOG DIAL] and end the operation by pressing [JOG DIAL] or [ACQ/ENT].



9.7.5 Setting a scanner unit height [MENU]

Set a height from a surface of the sea to the scanner unit of the radar.

By changing this setting value, the effect of the STC function (sea clutter elimination function) for distances can be changed.

This function is also useful for changing the effect of the [AUTO-SEA] knob.

Use the following procedure to set a scanner unit height.

- (a) Display the **INSTALLATION** menu by pressing the [MENU] key in long mode, select **RADAR**, **RADAR ADJUST2**, and **ANTTENA HEIGHT**, and press [JOG DIAL] or [ACQ/ENT].