JLR-21/31
GPS COMPASS

INSTRUCTION
MANUAL

JRC *Japan Radio Co., Ltd.*

Foreword

Thank you for purchasing the JRC GPS Compass JLR-21/31.
This unit uses signals from GPS satellites to determine the ship's heading.

● Thoroughly read this instruction manual before operating the equipment.
● Keep this manual nearby the equipment to allow ready access to it if necessary. It may provide valuable information on how to deal with a given situation that may arise during the operation.

i

Before Commencing the Operation

Symbols

Several symbols are used in this manual to ensure safety and proper operation of the equipment and to avoid possible human injury or property damage. These symbols and their meanings are shown below. Please read and understand these symbols before proceeding to read this manual.

⚠	**WARNING**	Instructions shown with this symbol represent what can cause death or serious injury if not observed.
⚠	**CAUTION**	Instructions shown with this symbol represent what may cause injury or property damage if not observed.

Examples of the Symbols

The symbols shown in the △ mark represent those that require attention (including potential dangers and warnings).
A depiction of the type of caution is shown inside the symbol (the left symbol indicates a general caution).

The symbols shown in the ⊘ mark represent actions which are prohibited. A depiction of the type of prohibited action is shown inside the symbol (the left symbol indicates that disassembly is prohibited).

The ● symbol indicates required actions. A depiction of the type of required action is shown inside the symbol (the left symbol indicates that the power plug must be disconnected from the outlet).

Precautions Upon the Operation

⚠ WARNING

Do not disassemble or modify the equipment.   Doing so may result in fire, electric shock, or equipment failure.

Do not allow the display to become wet.   Doing so may result in fire, electric shock, or equipment failure.

Operate the equipment only at the indicated voltage.   Failure to do so may result in fire, electric shock, or equipment failure.

Install this unit at least 1 m away from any magnetic compasses.   Installation near a magnetic compass may result in interference with the magnetic compass, and may result in an accident.

Do not perform internal inspections or modifications of the equipment. Inspection or modification by unauthorized personnel may result in fire, electric shock, or equipment failure.   Please consult with JRC or an affiliate to perform internal inspections or repair.

When disposing of the used lithium battery, place insulating tape over the battery terminals, or otherwise insulate the battery.   Failure to do so may result in heating, explosion, or fire due to a shorted battery.

Precautions Upon the Operation

⚠ CAUTION

⃠ Do not use the equipment in environments other than those provided in the specifications.   Doing so may result in equipment failure, malfunction, or injury.

⃠ The dip switches on the unit are all set at the factory, and must not be changed.   Doing so may result in equipment failure, malfunction, or injury.

⃠ Do not install the display unit in locations where it may come in contact with water, oil, or chemicals.   Doing so may result in equipment failure, malfunction, or injury.

⃠ Do not install the equipment in places subject to vibration or shock. Doing so may result in the equipment falling or collapsing, resulting in equipment failure or injury.

⃠ Do not place items on top of the equipment. Doing so may result in equipment failure, malfunction, or injury.

⃠ Please consult with JRC or an affiliate to perform installation.   Installation by unauthorized personnel may result in malfunction.

⃠ Only use the specified batteries.   Failure to do so may result in battery leakage or rupture, resulting in fire, injury, or equipment failure.

⃠ Use the indicated screws when installing the display unit to a stable wooden surface.   Failure to do so may result in the display unit falling over, causing injury or property damage.

⃠ Use only the specified fuse. Failure to do so may result in fire or equipment failure.

⃠ Use only the specified batteries. Failure to do so may result in equipment failure or malfunction.

⃠ When suspected of an antenna failure, check the satellite information display for reception from a satellite and exchange the antenna if necessary.

⚠ CAUTION

When used in other than ships, it may not satisfy the desired performance and functionality. Because this product is designed to be installed for the ship.

Heaving function of this product is intended to measure swinging in the vertical direction of the ship.
So, it is not possible to measure something (wave height etc.) other than swinging in the vertical direction of the ship.
It is not possible to measure also the tsunami.

When you install JLR-21/31 in retractable mast, please observe the following strictly.
① An unusual vibration or an unusual shock should not occur.
② When the mast has retracted, please stop use. Because normal operation cannot be performed.
③ A difference should not occur in the position by retracting.

Install the sensor where there are no obstacles, in order to ensure that GPS signals can be directly received from satellites without interference or reflection of signals from surrounding objects.
Whenever possible, select a place with the following characteristics.

> 1. **An open space, which allows uniform reception of satellite signals.**
> 2. **Far away from any high power transmission antennas.**
> 3. **Outside radar beams.**
> 4. **Away from the INMARSAT antenna by at least 5 meters and outside the INMARSAT beam.**
> 5. **Away from the antenna of a VHF transmitter and a direction finder by at least 3 meters.**
> 6. **Away from a Magnetic Compass by at least 1 meter.**
> 7. **3 meters or more away from amateur radio antennas.**

If it is difficult to find an ideal site, select a place temporarily and install the equipment. Conduct a test to make sure that the proper performance can be obtained and then fix the equipment in position. If it is installed at an improper place, reception accuracy may be impaired.
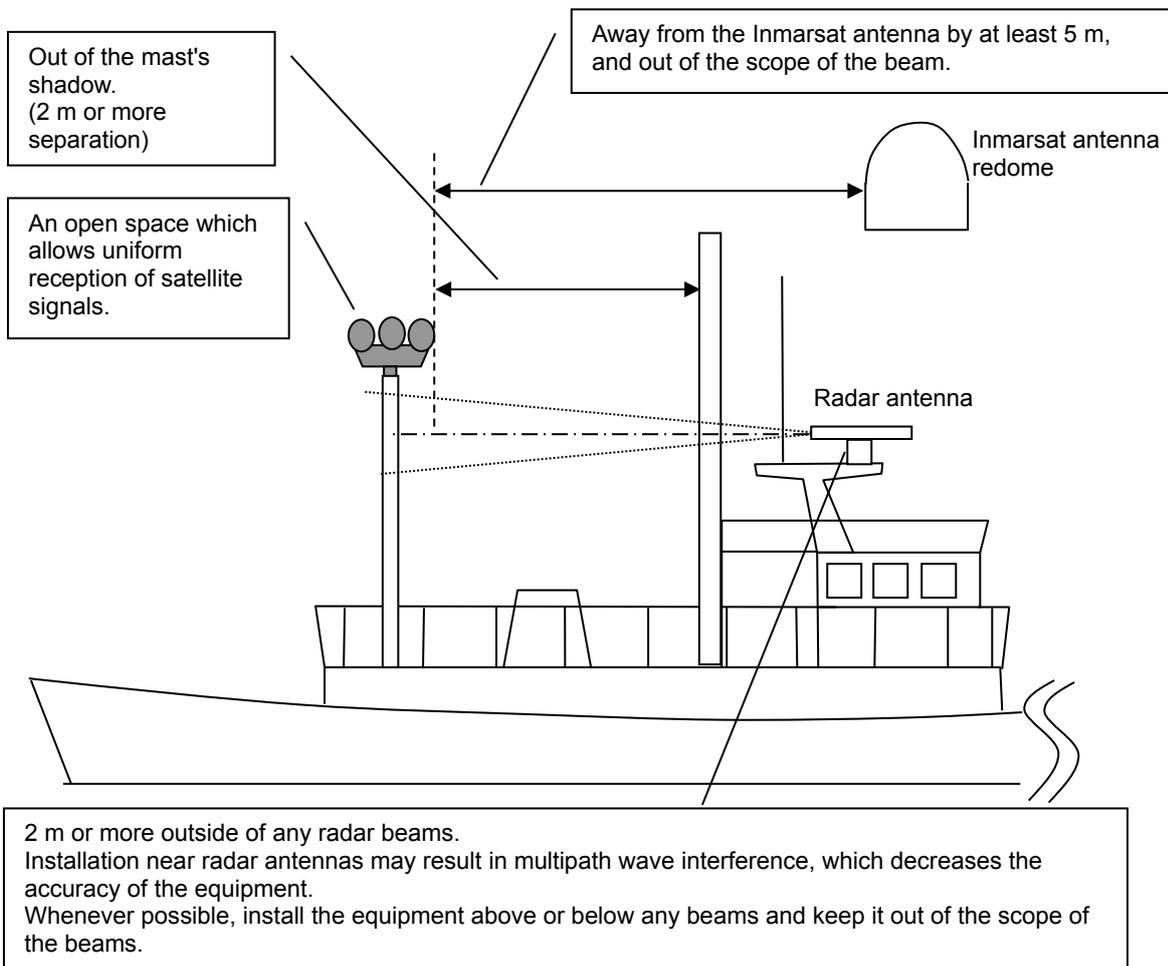
⚠ CAUTION

🚫 Do not bend the cables included with this equipment excessively, or twist them or subject them to other strong forces.   Doing so may result in damage to the interior or exterior of the cables, and may result in fire or electrocution.

🚫 Do not install the equipment in places subject to vibration or shock.
Doing so may result in the equipment failure due to reception problems.

🚫 This equipment uses GPS satellite signals to determine the bearing of the ship. Install the sensor where there are no impediments to electrical signal reception, and no signal reflection.   If the sensor installation location environment is unsatisfactory, ship bearing calculations is repeatedly interrupted.
If selection of the optimal installation location is difficult, and some concessions must be made, place the sensor in the desired installation location and test the acceptability of the sensor results before permanently installing the sensor. Installing the sensor in an inappropriate location may result in decreased accuracy and equipment failure.
Poor visibility and the high occurrence of reflected waves may result in a decrease in bearing accuracy or the interruption of bearing measurement. Whenever possible, select a place having the following characteristics.

Out of the mast's shadow.
(2 m or more separation)

Away from the Inmarsat antenna by at least 5 m, and out of the scope of the beam.

An open space which allows uniform reception of satellite signals.

Inmarsat antenna redome

Radar antenna

2 m or more outside of any radar beams.
Installation near radar antennas may result in multipath wave interference, which decreases the accuracy of the equipment.
Whenever possible, install the equipment above or below any beams and keep it out of the scope of the beams.

Appearance of the Equipment

● Standard Equipment

NWZ-4701 Display Unit

NNN-21 Sensor Unit

NNN-31 Sensor Unit

Contents

Section 1   Equipment Overview

1.1 Functions

This equipment determines the heading of a ship by measuring the orientation between two antennas using the signal from GPS satellites.
The equipment not only determines the heading with high accuracy anywhere in the world and in all weather conditions using the GPS satellites, but determines the position, course, and speed of the ship. When the DGPS beacon receiver is connected, the accuracy of position fixing can be enhanced by receiving correction data from the DGPS beacon station.
Since this equipment outputs the bearing information at high speed, if the unit is interfaced to a JRC radar unit, it is possible to fully draw the capabilities of the radar and ARPA.

1.2 Features

● High accuracy and high stability (JLR-21:0.5 degree rms , JLR-31:0.25 degree rms)

● Short setting time (less than 2 minutes at warm start fix)

● High speed tracking response (Tracking rate of turn is 45 degree/sec)

● High visibility 5.7-inch FSTN LCD

● Many utility display modes (Compass rose graphics, ROT, NAV, GPS status, etc.)

● Easy installation

● Direct connection to the JRC radars

● SBAS compatible: Differential positioning by receiving correction data from SBAS

   satellites (MSAS/WAAS/EGNOS)

● Enhanced positioning reliability derived from RAIM function (the sensor itself can judge

   the positioning accuracy)

●Enhanced attitude measuring functions (rolling, pitching, heaving)

1.3 Configuration

Standard Configuration

JLR-21

No.	Name	Model/Code	Q'ty	Notes
1	Display Unit	NWZ-4701	1	
1-1	Power Cable	CFQ-7257	1	2m / With fuse holder
1-2	Fuse	MF60NR 250V 2	2	2Amps.
1-3	Clamp Filter	TFC-23-11-14	1	5MBAT00002
1-4	Model Identification Plate	MPNN47010	1	
1-5	Model Identification Plate For Panel	MPNN47078	1	
1-6	Installation Screws	MPTG31659	1	4 tapping screws
1-7	Flush Mounting Screw	MPTG31962	1	4 screws（For mount screw from the back）
2	Sensor Unit	NNN-21	1	
2-1	Cable	CFQ-7248	1	10m / 14 cores
2-2	Clamp Filter (Small)	E04SR200935A	2	
2-3	Clamp Filter (Large)	E04SR301334	1	
2-4	Bundling Band (Short)	BRBP07141	1	
2-5	Bundling Band (Long)	BRBP07142	4	
2-6	Self-bonding Tape	BRXP05369	1	
3	Instruction Manual (English)	7ZPNA4224	1	

JLR-31

No.	Name	Model/Code	Q'ty	Notes
1	Display Unit	NWZ-4701	1	
1-1	Power Cable	CFQ-7257	1	2m / With fuse holder
1-2	Fuse	MF60NR 250V 2	2	2Amps.
1-3	Clamp Filter	TFC-23-11-14	1	5MBAT00002
1-4	Model Identification Plate	MPNN47010	1	
1-5	Model Identification Plate For Panel	MPNN47078	1	
1-6	Installation Screws	MPTG31659	1	4 tapping screws
1-7	Flush Mounting Screw	MPTG31962	1	4 screws（For mount screw from the back）
2	Sensor Unit	NNN-31	1	
2-1	Cable	CFQ-7248	1	10m / 14 cores
2-2	Clamp Filter (Small)	E04SR200935A	2	
2-3	Clamp Filter (Large)	E04SR301334	1	
2-4	Bundling Band (Short)	BRBP07141	1	
2-5	Bundling Band (Long)	BRBP07142	4	
2-6	Self-bonding Tape	BRXP05369	1	
3	Instruction Manual (English)	7ZPNA4224	1	

Option

No.	Name	Model/Code	Q'ty	Notes
1	Data Cable	CFQ-5374	1	3m / 12 cores / Serial data transmission
2	Data Cable	CFQ-5404	1	3m / 14 cores / Dry contact signal
3	Data Extension Cable	CFQ-7249	1	20m / 14 cores / For sensor extension
4	Beacon Connecting Cable	CFQ-7250	1	For beacon receiver connection
5	Junction Box	NQE-7720	1	14 connector / for sensor extension
6	GPS Repecon	NQA-4115T	1	Digital/Synchronous Converter
7	DGPS Receiver	JLR-4341	1	Used as a beacon receiver (DGPS position fixing available using the compass)
8	Installation Trestle	MPBX44117	1	For NNN-21
9	Data Extension Cable	CFQ7249-10	1	10m Version of CFQ-7249(20m)
10	Bird Repellent Rod	MPXP34012A	1	For NNN-21/31
11	Y Cable For Sub Display	CFQ-7251	1	NWZ-4701 for Sub Display
12	Data Cable	CFQ-5469	1	For RADAR JMA-5100/5200/5300 Connectors on both sides of the cable(10m)
13	Flush Mount Kit	MPBC43664	1	Panel for Flash Mount
14	Buzzer	CGC-300B	1	Misappropriation for Navtex
15	Data Cable	CFQ5404-15	1	15m Version of CFQ-5404(3m)
16	Data Cable	CFQ5374-15	1	15m Version of CFQ-5374(3m)
17	Installation Metal Fittings Of Junction Box	MPBP31612	1	For Paul installation
18	Data Extension Cable(Exterior Cable)	TTYCYS-7	—	Code：2165411109
19	AC Power Rectifier	NBD-577C	1	AC100 / 220V Misappropriation for AIS
20	AC Power Rectifier	NBG-320	1	[Recommendation] AC100 / 220V Misappropriation for Navtex
21	Power Cable	CFQ-7257-10	1	10m / With fuse holder
22	Power Cable	CFQ-7257-15	1	15m / With fuse holder
23	Cable	CFQ7248-30	1	30m / 14 cores / 30m Version of CFQ-7248(10m)

Attention

When using Power Rectifier (NBG-320), the voltage drops due to cable length, please do not use Power Cable (CFQ-7257-15). By the way, Power Cable (CFQ-7257-15) is available.

1.4 Construction

- **NWZ-4701 Display Unit**
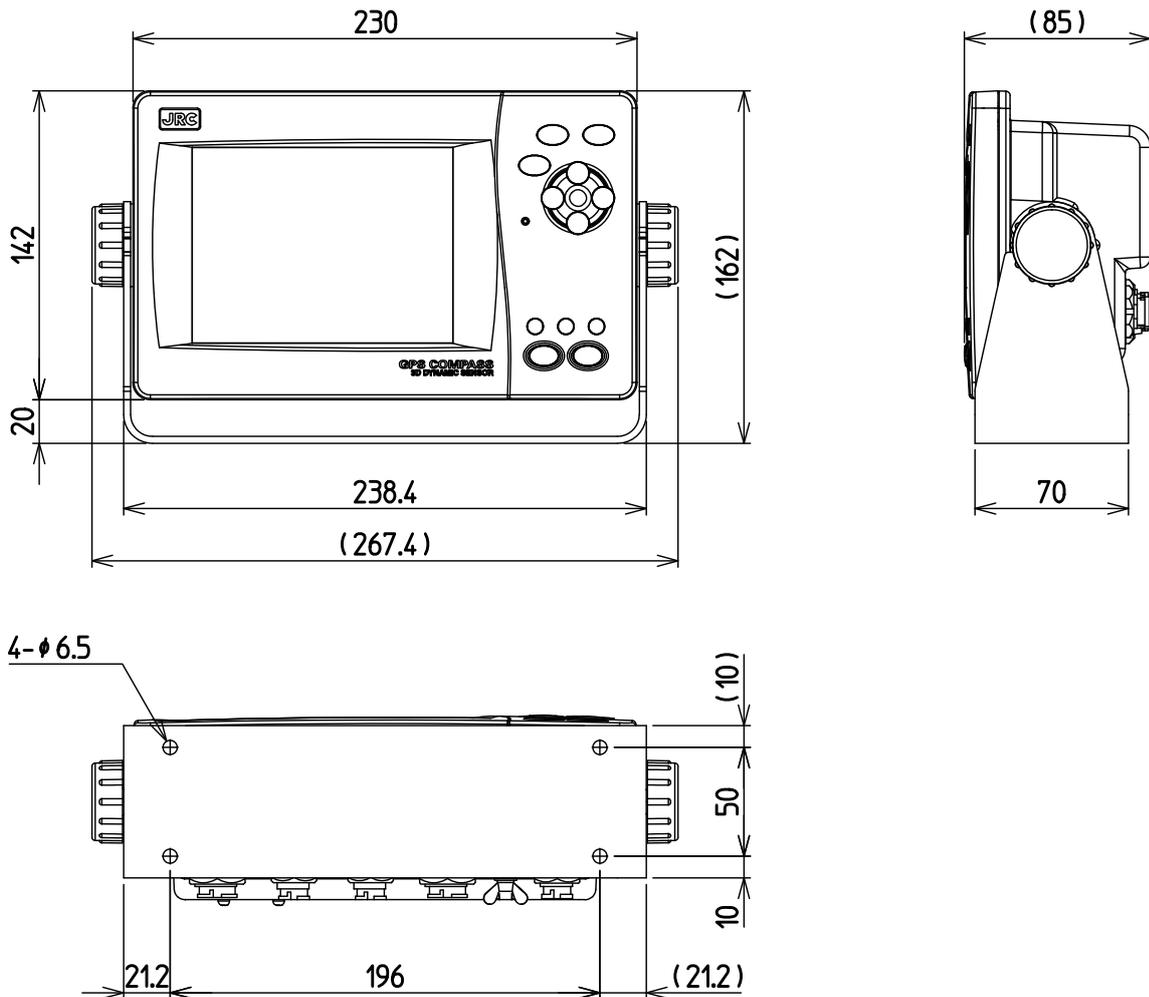
Dimensions: 267.4 x 162 x 85 mm
Mass: Approximately 2.3 kg

NNN-21
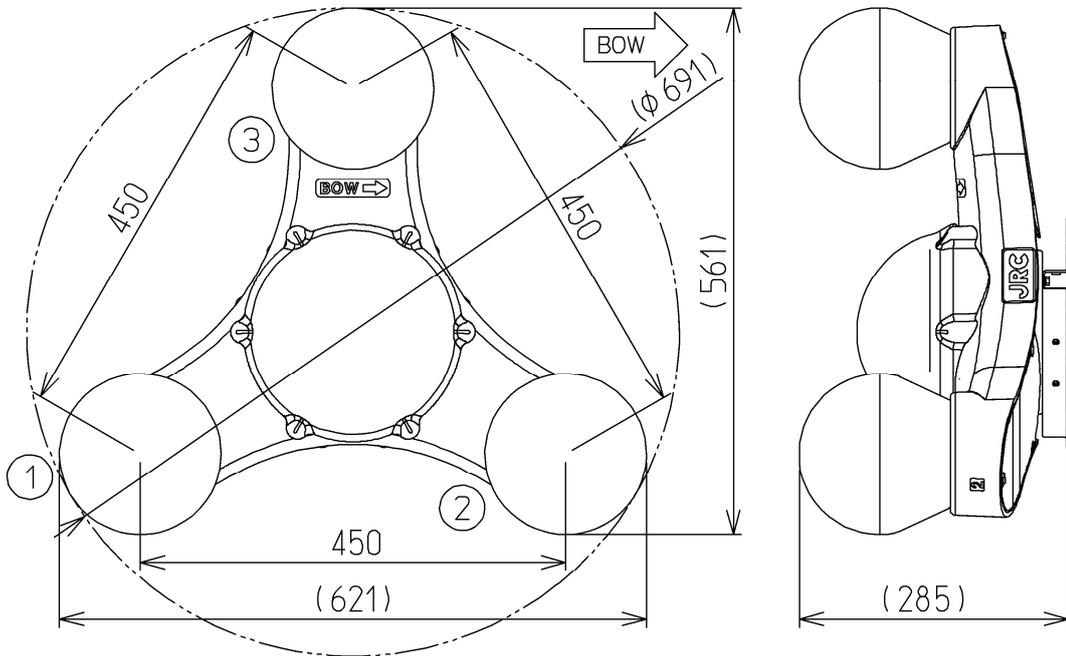
Dimensions: φ691 x 285mm
Mass: Approximately 5.9 kg

NNN-31
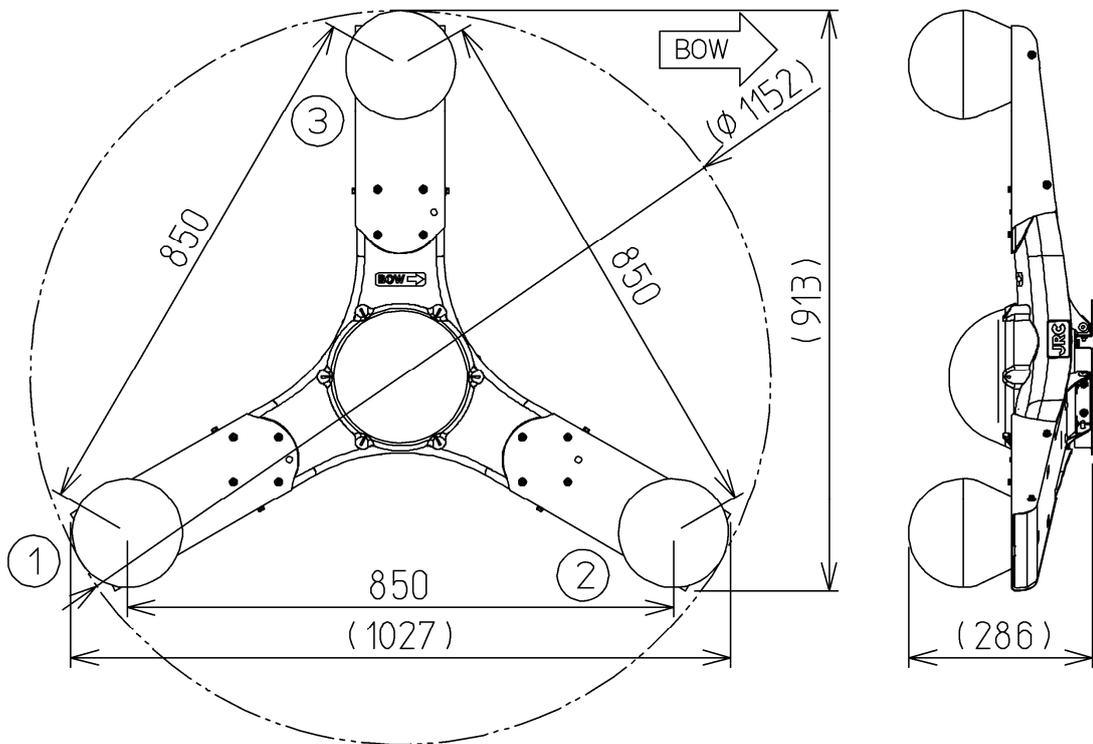
Dimensions: φ1152 x 286 mm
Mass: Approximately 10 kg

1.5 System Diagram

JLR-21

NNN-21
Sensor Unit

or

JLR-31

NNN-31
Sensor Unit

JLR-4341
or JLR-4331
DGPS Receiver

CFQ-7248
Data Cable (10m)

CFQ-7250
Data Cable

Power DC12V
(for beacon receiver)

SENSOR

DATA
IN/OUT 1

CFQ-5374
Data Cable (3m)
IEC61162/NSK x 2

Radar
ECDIS/GPS Plotter
Tide Current Calculator
AIS
GPS Repecon

NWZ-4701
Display Unit

DATA
IN/OUT 2

CFQ-5374
Data Cable (3m)
IEC61162/NSK x 3

CONTACT
IN/OUT

CFQ-5404
Data Cable (3m)
Alert x 2
Log Pulse x 1

Alarm System
External Buzzer
ECDIS

DC12/24V

CFQ-7257
Power Cable
(2m)

DC12V

NBG-320
Rectifier

AC 110/220V

DC 12/24V

Section 2   Installation

⚠ **CAUTION**
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Inmarsat antenna redome

An open space which allows uniform reception of satellite signals.

Radar antenna

2 m or more outside of any radar beams.
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Install the sensor where there are no obstacles, in order to ensure that GPS signals can be directly received from satellites without interference or reflection of signals from surrounding objects.
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> 6. **Away from a Magnetic Compass by at least 1 meter.**
> 7. **3 meters or more away from amateur radio antennas.**

If it is difficult to find an ideal site, select a place temporarily and install the equipment. Conduct a test to make sure that the proper performance can be obtained and then fix the equipment in position. If it is installed at an improper place, reception accuracy may be impaired.

・ Be careful not to damage the equipment during loading or installation.

・ Do not lift the sensor by the equipment cabling.

1. It is recommended that the sensor be installed midway on a strong pole or mast.
   In order to minimize vibration and improve maintainability, the sensor should not be mounted at an excessive height.

2. Use a sufficiently thick metal base for the sensor mount, and any necessary additional reinforcing materials, to reduce vibration and shock as much as possible.   Use stays or wires on the pole or mast on which the mount is connected in order to further reduce vibration or shock to the sensor.
   (Refer to the terms "Installation Procedure" described below)
   Ensure that the mounting surface is as flat as possible.   Do not use rubber, resin, or other flexible materials in order to flatten the mounting surface, as this may result in reduced resonance frequency and increased vibration.   It may also cause mounting bolt loosening of the material when degraded.

3. Use appropriate bolts for the sensor, and tighten all bolts equally.   The length of the mounting bolts varys based on the thickness of the mount, but select bolts of such length that the amount extending past the nut is twice the thickness of the nut.
   Some initial loosening may occur after tightening.   Perform a second bolt tightening some time after the initial tightening.
   After installation, check the tightness of the installation bolts periodically.   It is especially important to check the bolt tightness after traveling in inclement weather, regardless of how much time has passed since the last check.   Continued use of the same bolts may result in decreased strength, bolt degradation, or bolt breakage.   If this occurs, replace both the bolt and the nut with a new bolt and nut.   If bolt loosening occurs frequently, please consult with a JRC technician.

4. Install the sensor as horizontally to the ship as possible. If it is tilted largely, direction accuracy may be degraded.

● Cable Connection Procedure

The unit shown in the figure is the NNN-21, which is almost identical to the NNN-31.
Installing the clamp filter or connecting the extension cable requires a self-bonding tape and vinyl tape.   Apply RTV rubber or silicone rubber to waterproof the sensor unit.

1. Install clamp filters (one large and one small) to the antenna side of the included cable.   Roll the cable once around the large clamp filter.   Also install a clamp filter (small) to the display side.   (Refer to the following figures.)

Approx. Φ30mm   Roll once
Approx. Φ20mm
Approx. Φ6mm
Approx. Φ22.2mm   Antenna side

NOTE1   70±5
mm

Display side

50±5
mm
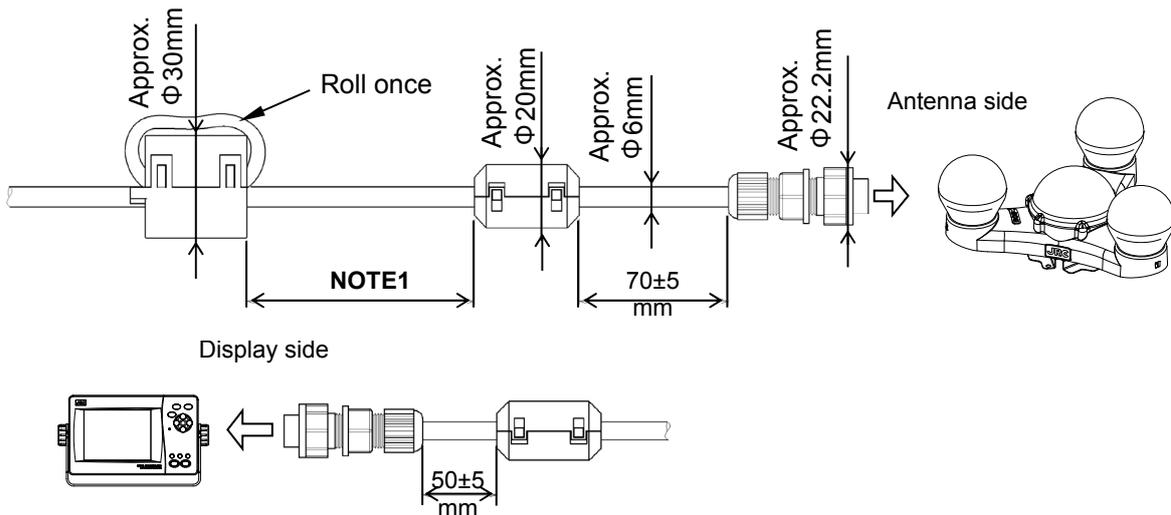
NOTE1: Determine the installation position of the clamp filter (large) by considering the installation condition of the sensor.   (Refer to the installation figure on page 2-7.)

2. Processing Clamp Filter
   2.1 Roll up a self bonding tape around the clamp filters in the antenna side. (No need to roll up the one in the display side.)
      Roll up the tape by pulling so that the tape will be lengthened by two times.   Also, roll up the tape so that the half of it is overlapped.   Repeat three times to make it three-layered. After rolling up, press the tape with the fingers for secure attachment.

   2.2 Wrap by a vinyl tape for protection.
      Do not put tensile force to the vinyl tape as much as possible.   Roll up the vinyl tape so that the half of it is overlapped.   Repeat three times to make it three-layered.
      Crimp the end of the rolled tape without tension.   Press the whole tape with the fingers for secure attachment

Self bonding tape   Self bonding tape   Antenna side

Rolling direction

Rolling direction   Vinyl tape for protection   Vinyl tape for protection
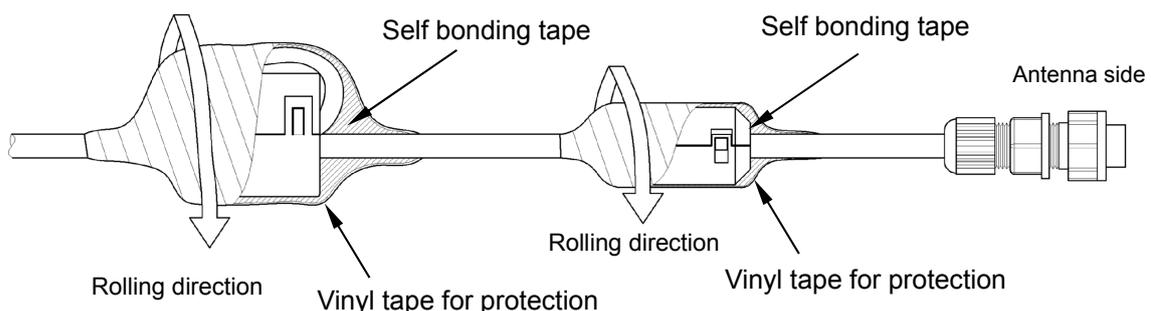
3. Connect the included cable to the sensor unit.   Tighten the nut firmly in order to waterproof the connector (a click sounds when plugged in firmly).
   After connecting, apply RTV (Room Temperature Vulcanizing) rubber on the connector for additional waterproofing.

Waterproofing
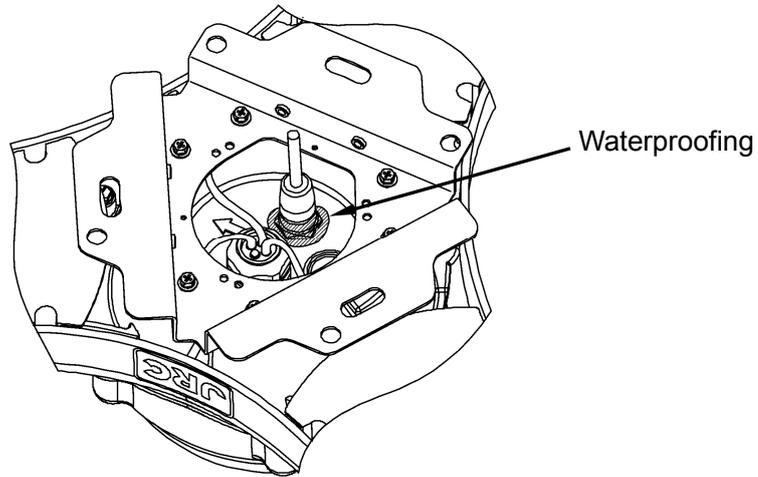
3. With using the included bundling band (short), clamp the cable as shown below.   Position should be between GPS1 and GPS2.

GPS3

BOW

Bundling band (short)
(Clamp the small clamp filter.)

GPS2   GPS1
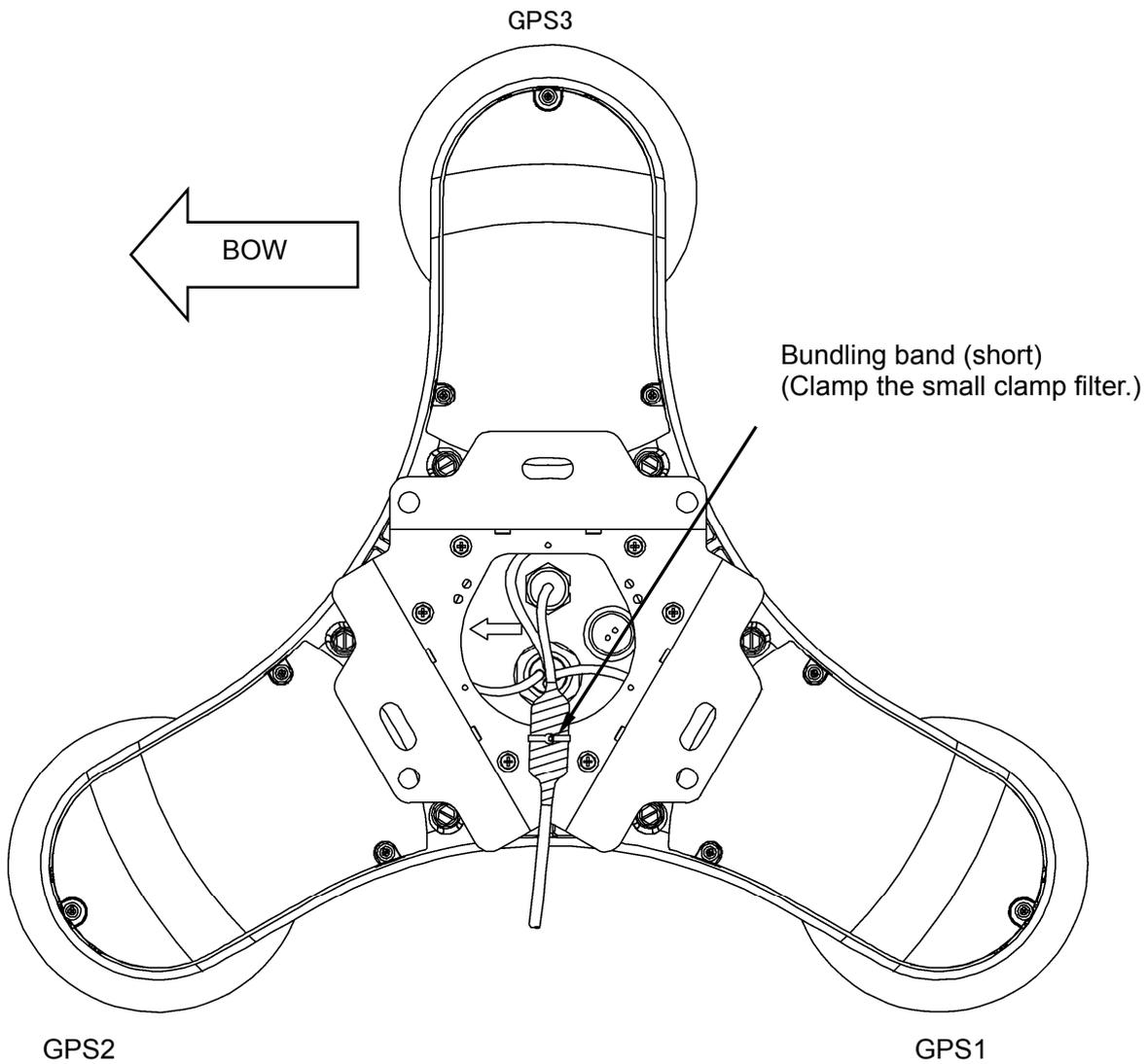
● Installation Procedure

The unit shown in the figure is the NNN-21, which is almost identical to the NNN-31.

1. Provide a mounting plate as shown below, and secure the sensor unit.   Use M10 hex bolts, washers, spring washers, and nuts to secure it.   Tighten the bolt by 3430 N-cm of torque (350 kg-cm).
When making holes in the mounting plate, beware of bow direction.   Excessively long bolts may reach the sensor unit.   For 5 mm (1/5 inch) mounting plate, M10 x 30 mm bolts are just fit.   Using double nuts is also effective to fix plate permanently.

GPS2

GPS3

BOW

GPS1

Sensor Mounting Plate

Nut (SUS)

Spring Washer (SUS)

Flat Washer (SUS)

Dock-yard Supply

Spring Washer (SUS)

Hex Bolt (SUS)

BOW

120°

3-φ12

BOW

120°

120°

P.C.Dφ200

120°

Mount Hole Dimensions

Mount (Dockyard Supply)
Recommended plate thickness: over 5mm
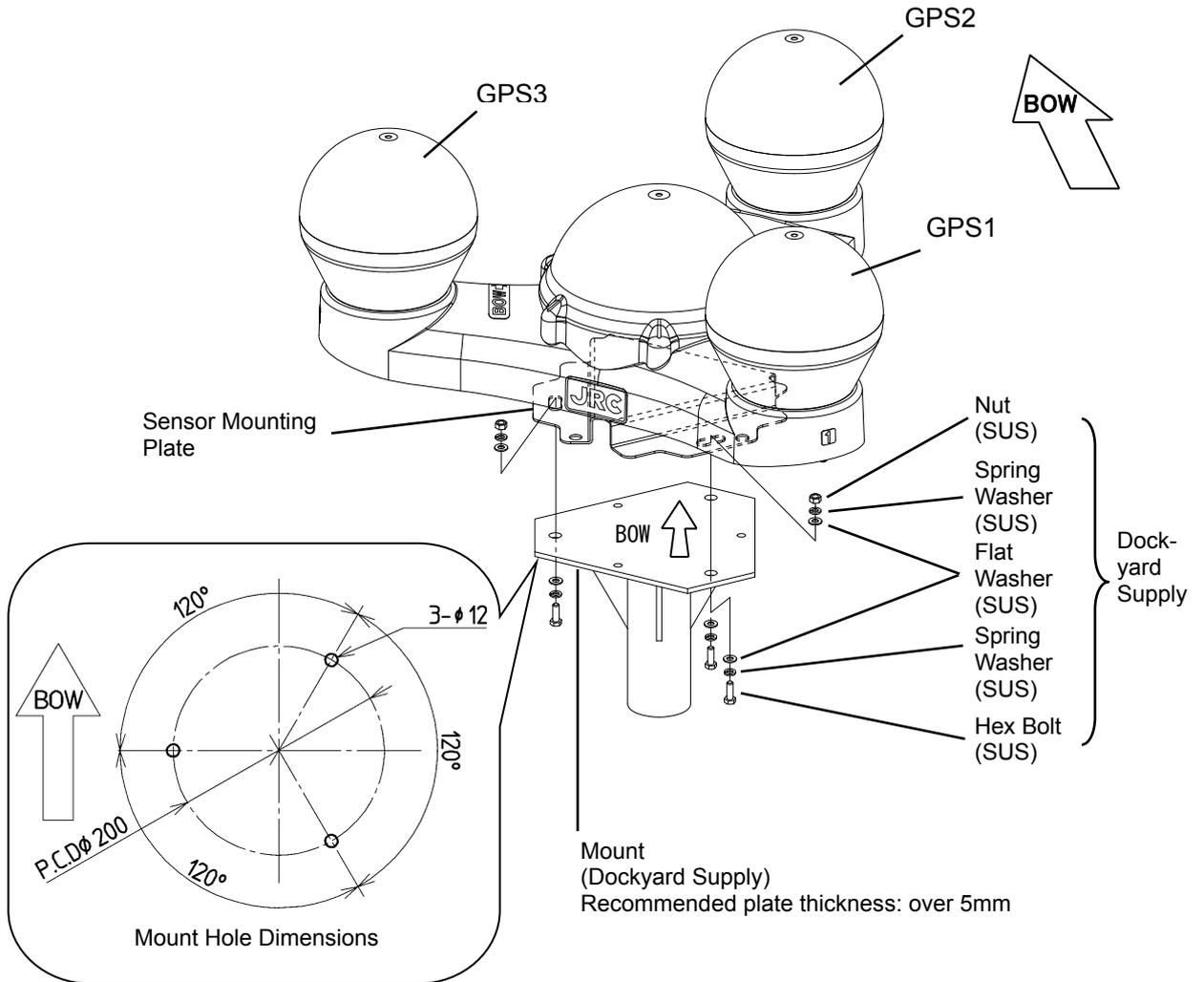
2. Use RTV (Room Temperature Vulcanizing) rubber to cover the hex bolts and nuts.

Apply silicone one-component RTV rubber

Sensor Mounting Plate

Mount

Apply silicone one-component RTV rubber
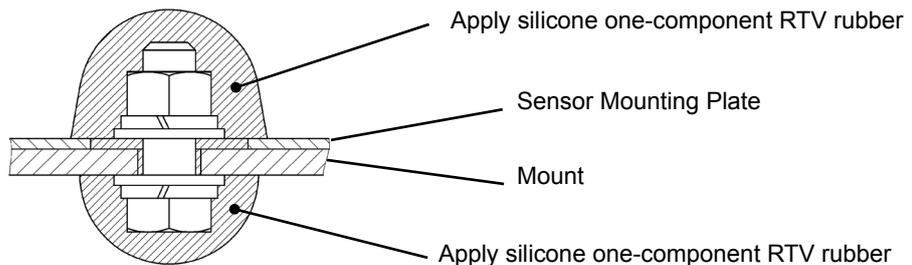
RTV : Room Temperature Vulcanizing

3. Fix the clamp filter (large) to the installation pole by using a bundling band (long).   Fasten both ends of the large clamp filter.   Fix it as closer to the antenna as possible.
   If it is impossible to fix to the pole, make holes in the mounting plate for bundling bands to go through, and fix the clamp filter to the mounting plate.
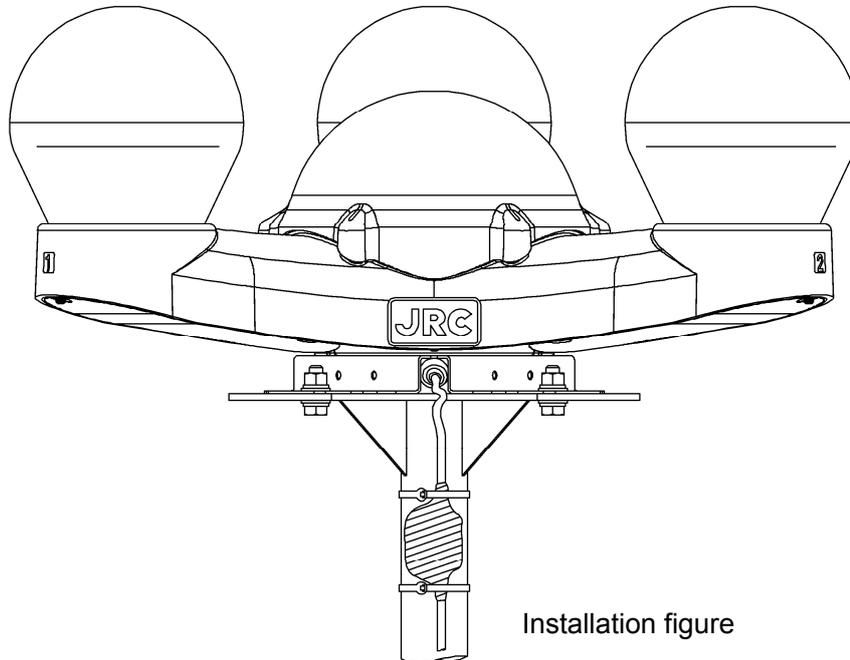
Installation figure

4. Cramp at the preferable position so that the cable weight itself will not be applied to the connector.   If some slack is provided for the cable, beware of the influence from wind or sea wave.   Arrange the cable so that it will not be hooked by a crane or fishing equipment.

● Installation Procedure for Optional Mount Base for NNN-21

1. Install the mounting base to the pole by using fixing brackets, M8 bolts, flat washers, spring washers, and nuts. Then, secure the sensor to the mounting base. Beware of the bow direction.

GPS2

GPS3

BOW

GPS1

Fix horizontally
to the keel line

Nut

Spring washer

Flat washer

Mounting base

Hex bolt (M8)

Flat washer

Flat washer

Fixing bracket

Flat washer

Spring washer

Spring washer

Hex bolt

Nut (M8)
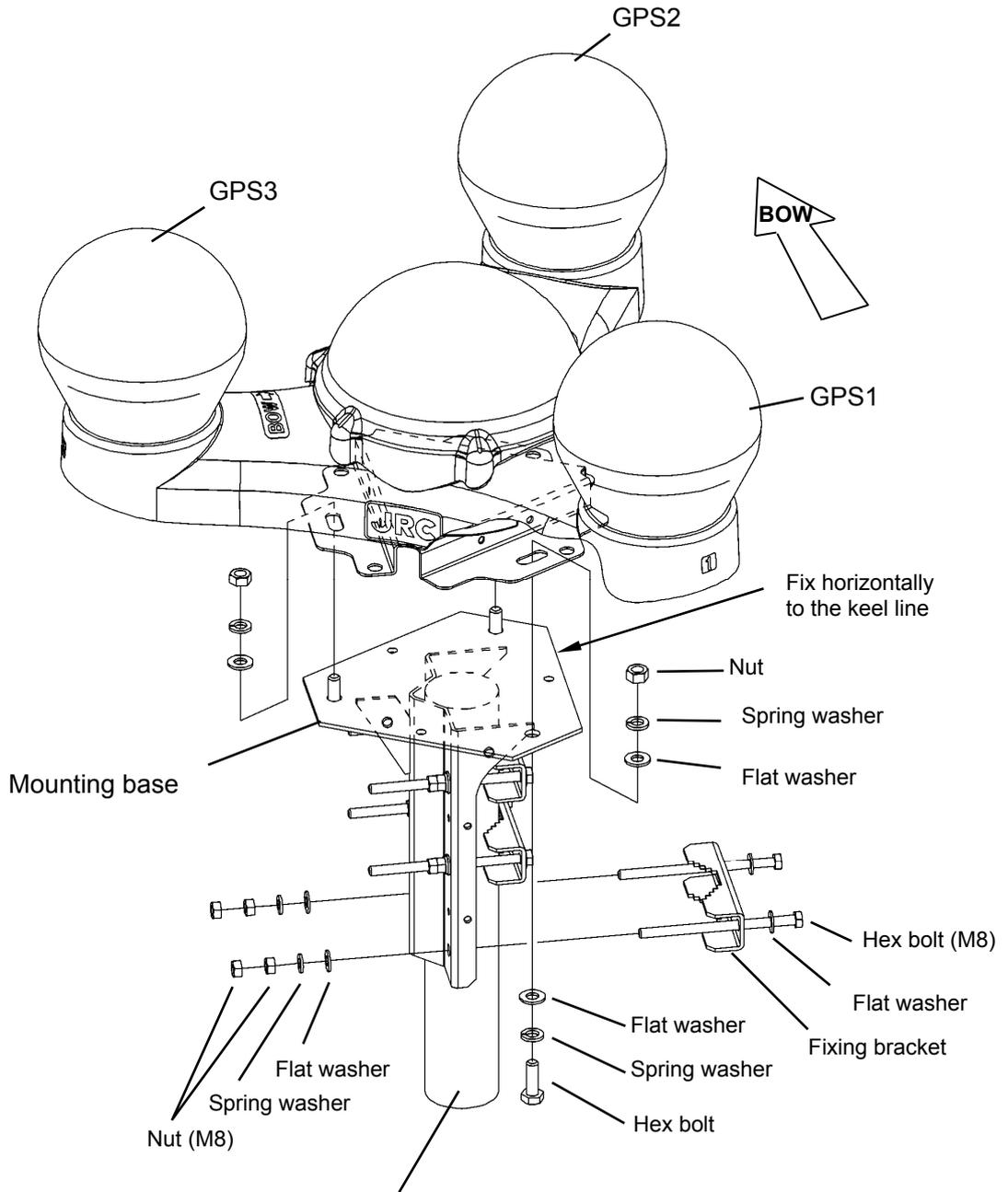
Pole (dockyard supply)

Steel pipe is recommended

Outside diameter: Φ60.5mm / Thickness: 5.5 mm

Outside diameter: Φ76.3mm / Thickness: 7 mm

Outside diameter: Φ89.1mm / Thickness: 7.6 mm

2. Fix both ends of the clamp filter (large) by using bundling bands (long) to secure the cable. Let the bands go through the holes of the mounting base.

GPS1

GPS3

BOW

GPS2

Fix by bundling bands (long).

Contact the pole end to the mounting base.

Installation figure
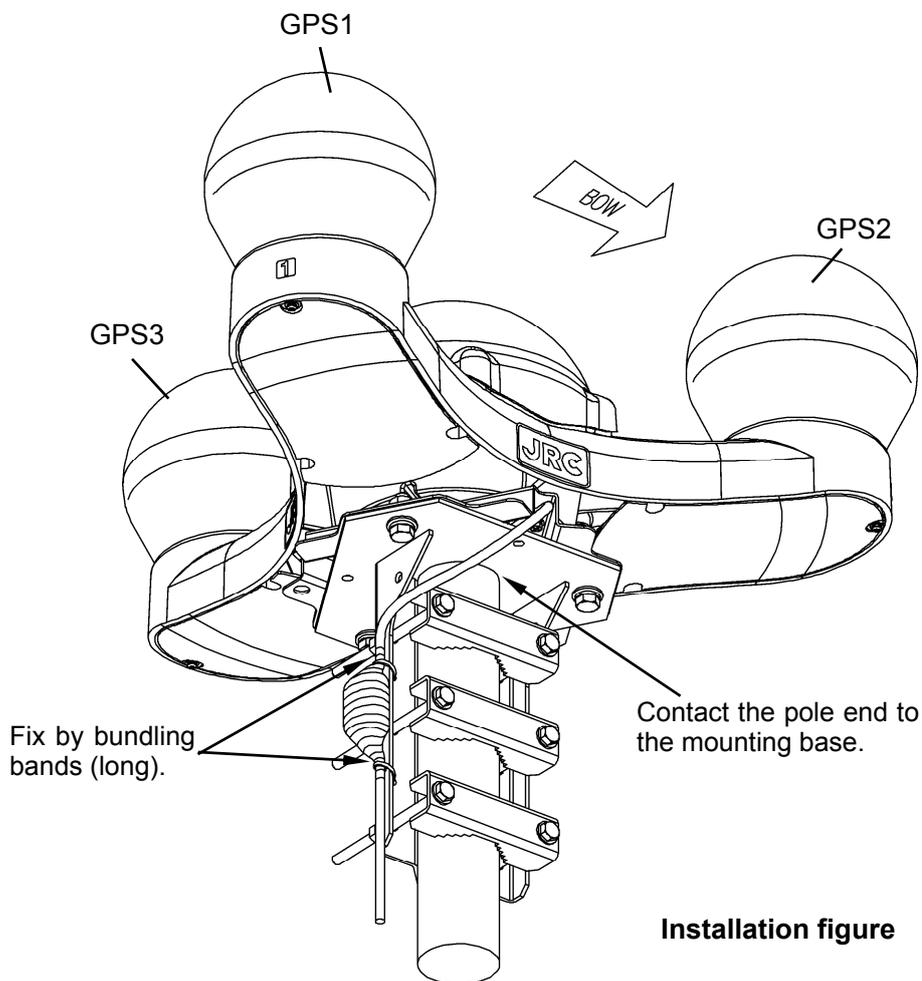
3. Connect the display unit and check the installation condition.
    Check the bow direction on the screen of the display unit.   If direction error is found (more than around 5 degrees), adjust the position of the sensor (the sensor mounting plate has slotted holes).   Also, for reinforcement, weld the mounting base and the pole as necessary.

Option installation trestle (MPBX44117) bundle list for NNN-21

Installation manual X 1	Installation trestle X 1	Fixed bracket X 3	M8 Bolts X 6	M10 Bolts X 3
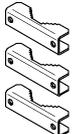
120°

3-φ12

120°

φ200

120°

92

61.5

79

82

98

130

M8 Bolt

4

250

30

35

120

244

211.3
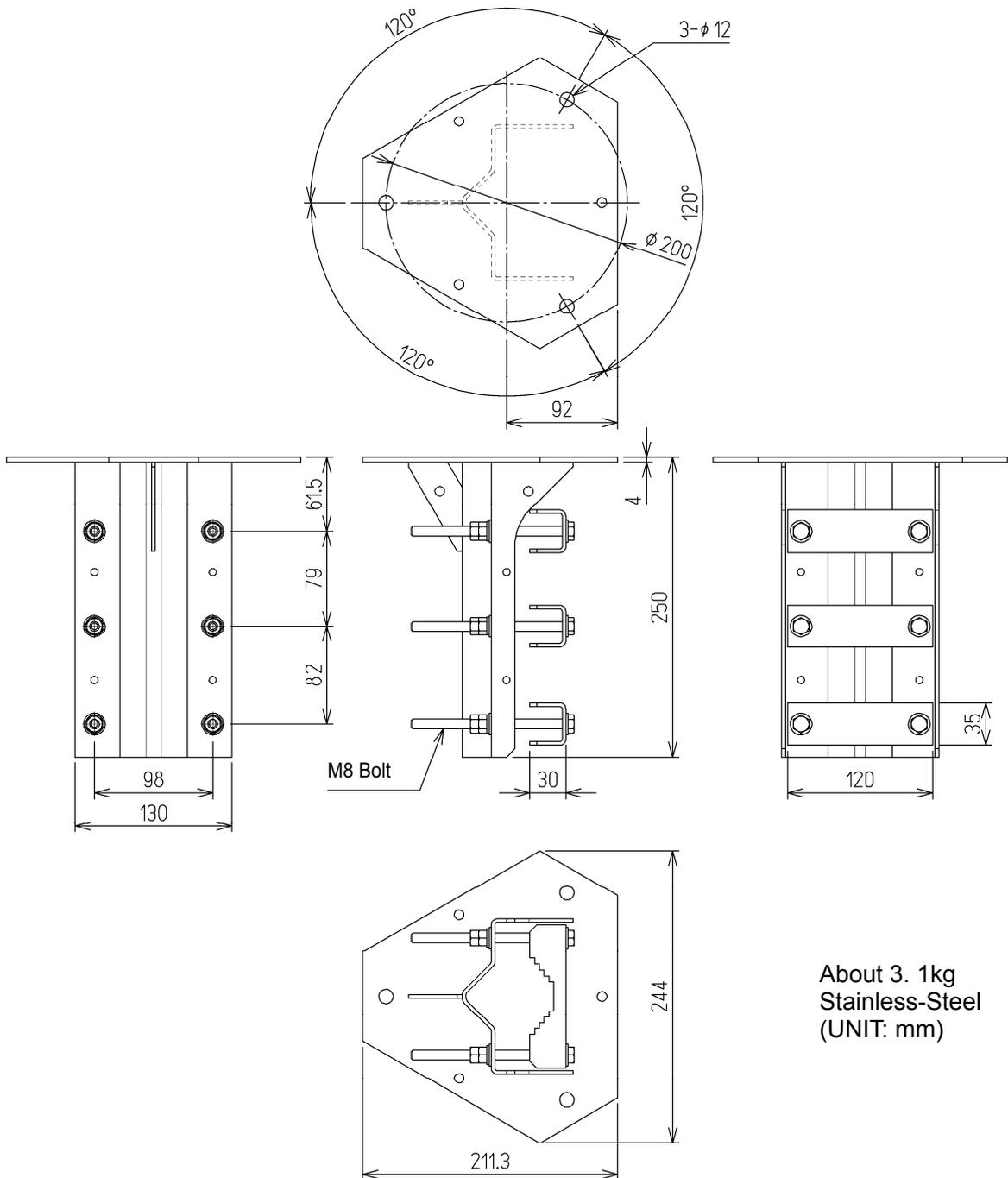
About 3. 1kg
Stainless-Steel
(UNIT: mm)

● About NNN-31

B
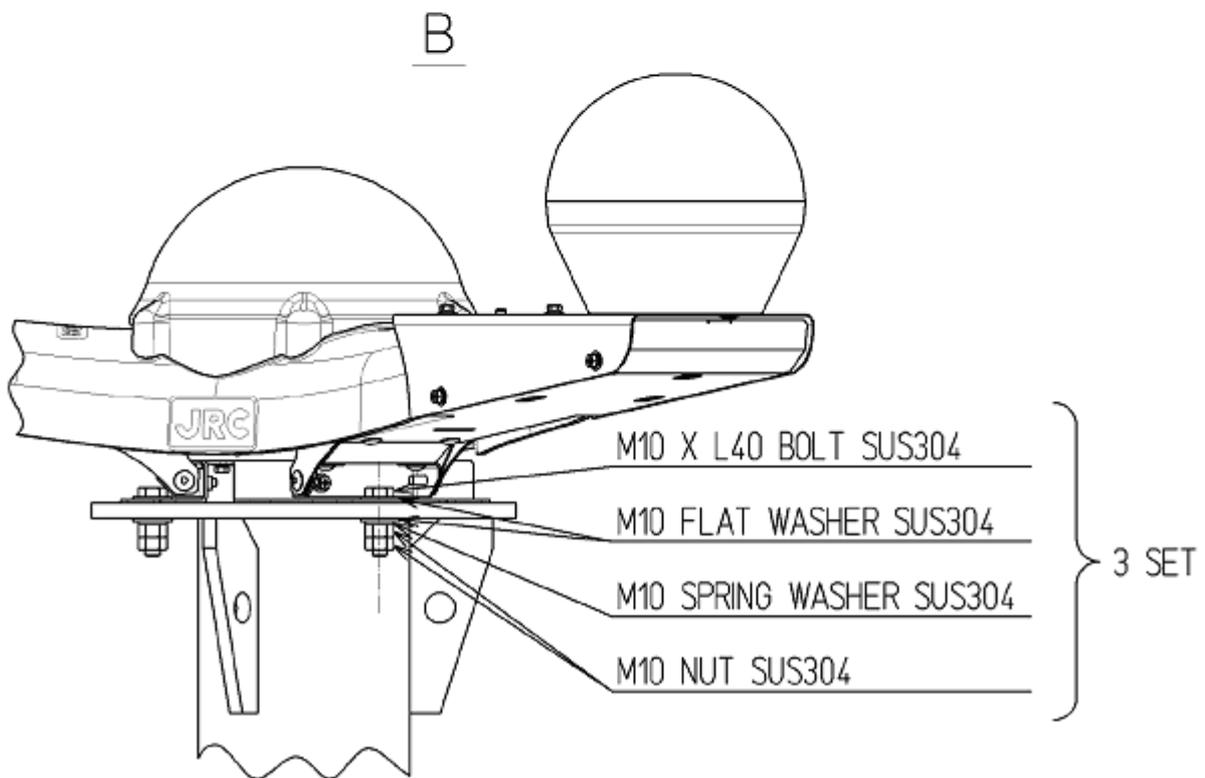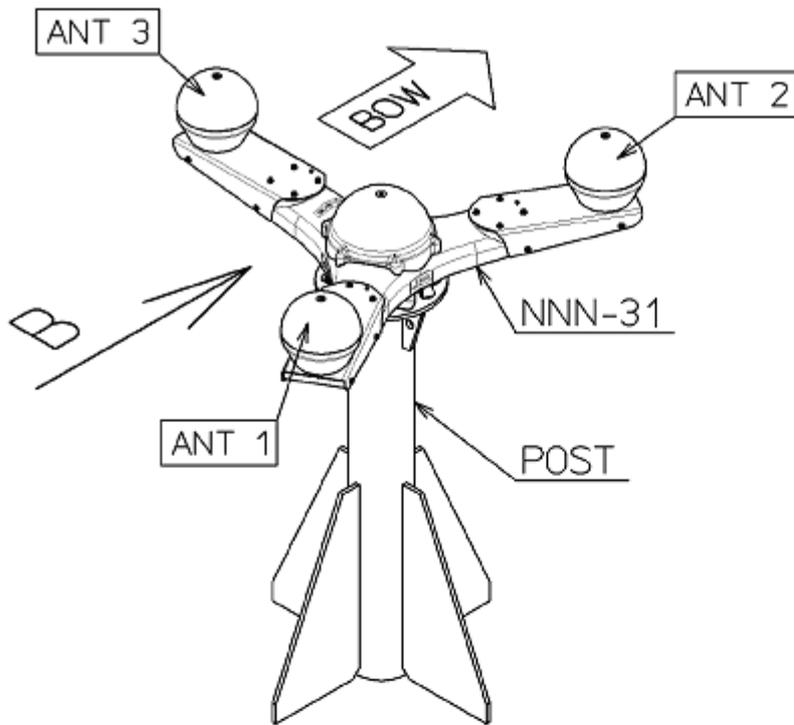
POST Production Example

60°
60°
120°
120°
60°
60°
120°
120°
60°
60°

3-Ø12

Be careful to BOW direction and
the relations of the hole position.

ø200
ø234
ø280

6-Ø20

BOW

10
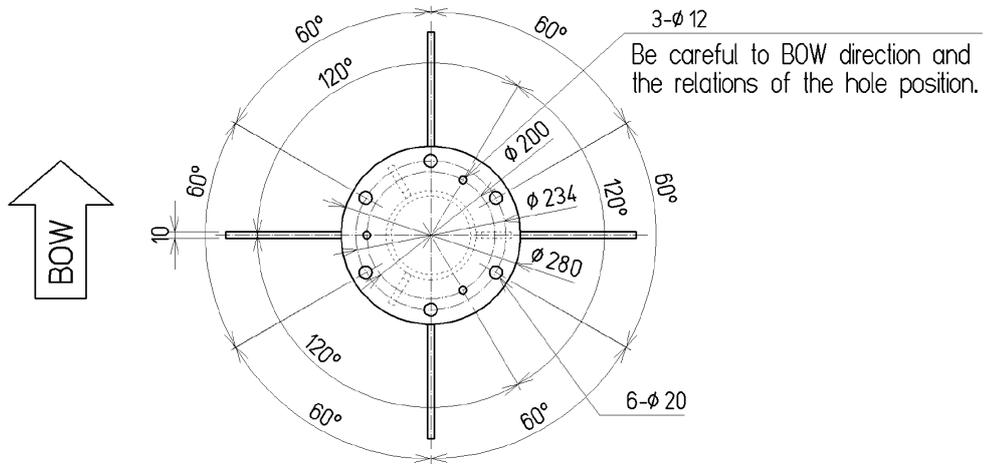
●About Bird Repellent Rod (MPXP34012A)

装備要領 / Installation Procedure

パッキングリスト / Packing List

シール剤 X 1個 Seal Adhesive X 1pc	装備要領書 X 1枚 Installation Procedure X 1pc	鳥よけ棒 X 4個 Bird Repellent Rod x 4pcs

セパレータをはがして下さい。
Peel off the film.

約 250mm
about 250mm

装備参考例 (JLR-20/21)
An Example of Installation on JLR-20/21.

汚れを拭取り、シール剤で補強する。(硬化時間 : 24時間以上)
Wipe off the dirt. Install the rod with the aid of Seal Adhesive.(Cure time : more than 24hr)

約 7mm
about 7mm
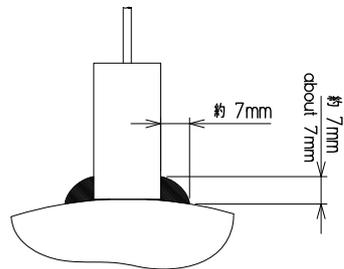
注記 / NOTE
鳥等により力が加わると取れる可能性があります。
その時は新品に交換するか、再度シール剤で補強して下さい。
In case the rod is detached from the antenna by excessive power of blow, replace it by a new one or reinstall it with the aid of seal adhesive.

装備参考例 (JLR-30/31)
Examples of Installation on JLR-30/31.

2セット使用
2Set use

3セット使用
3Set use
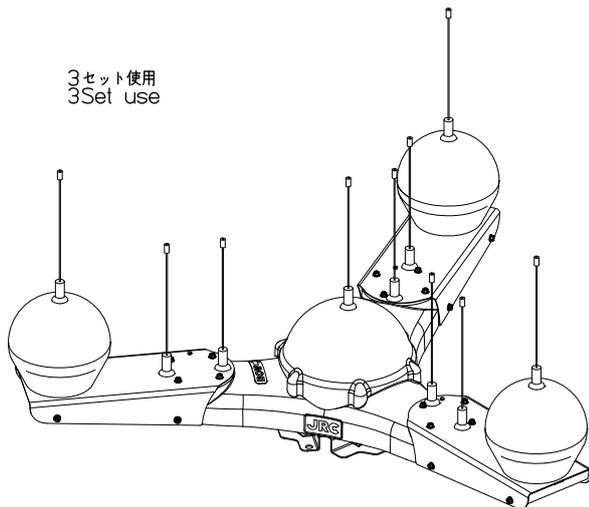
MPXP34012A

⚠ **WARNING**

🚫 Install this unit at least 1 m away from any magnetic compasses.   Installation near a magnetic compass may result in interference with the magnetic compass, and may result in an accident.

⚠ **CAUTION**

🚫 Use the indicated screws when installing the display unit to a stable wooden surface.   Failure to do so may result in the display unit falling over, causing injury or property damage.

The installation stand (trestle) is used and this display can be set up in desk-top, the wall, and the ceiling, etc.
Select installation features according to the following standard.

Read the following instructions and mount the unit accordingly.
  (1)   Loosen the unit knob, and disconnect the mount from the unit.
  (2)   Use the included screws to secure the mount where desired.
  (3)   Return the unit to the mount, and tighten it with the knob.

370 or more   200 or more

190 or more

Knob   Mount

4-φ6.5   Mount (bottom)   (10)

50

(Unit: mm)

10

21.2   196   (21.2)
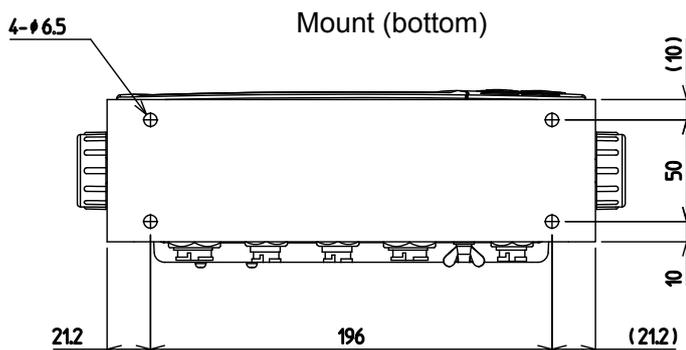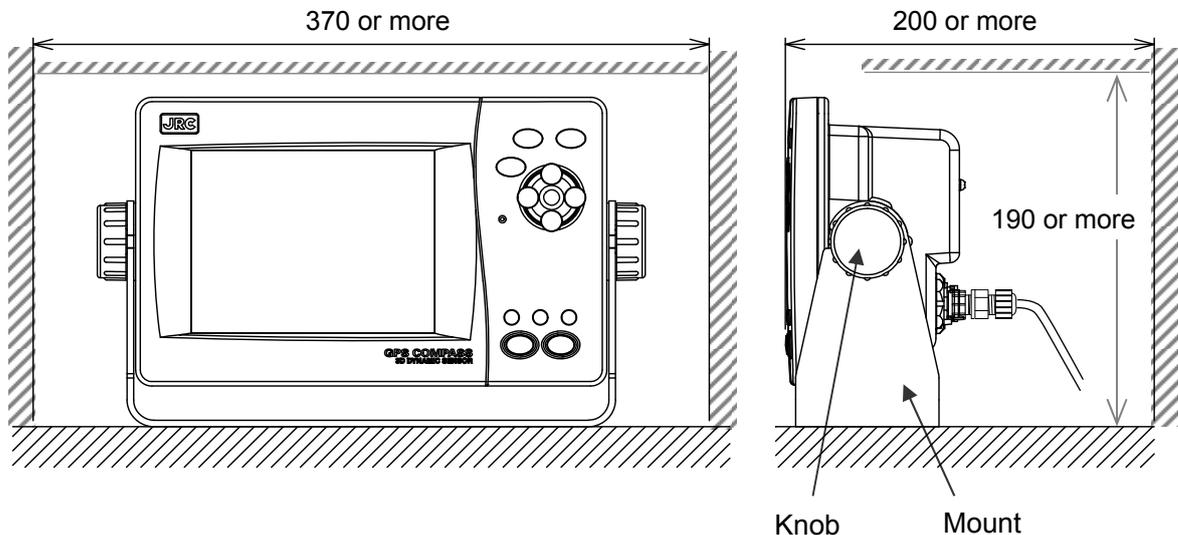
Required Space

●How to Flush Mount the Display
< For fixing the Display from the rear side with four flush mount screws of the option >
  Refer to the diagram shown below for the mount hole and space.

Installation later, reserve the open space to make maintain possible this equipment.

21   64

142

230

180 or more

Display is fixed with four flash mount screws of the attachment.

4-φ4

(3)

116.6 ±0.5

3

Installation hole
dimensional drawing

Square Hole

122.6 ±0.5

(Unit: mm)

13.5   148 ±0.5   (58.5)

220 ±1
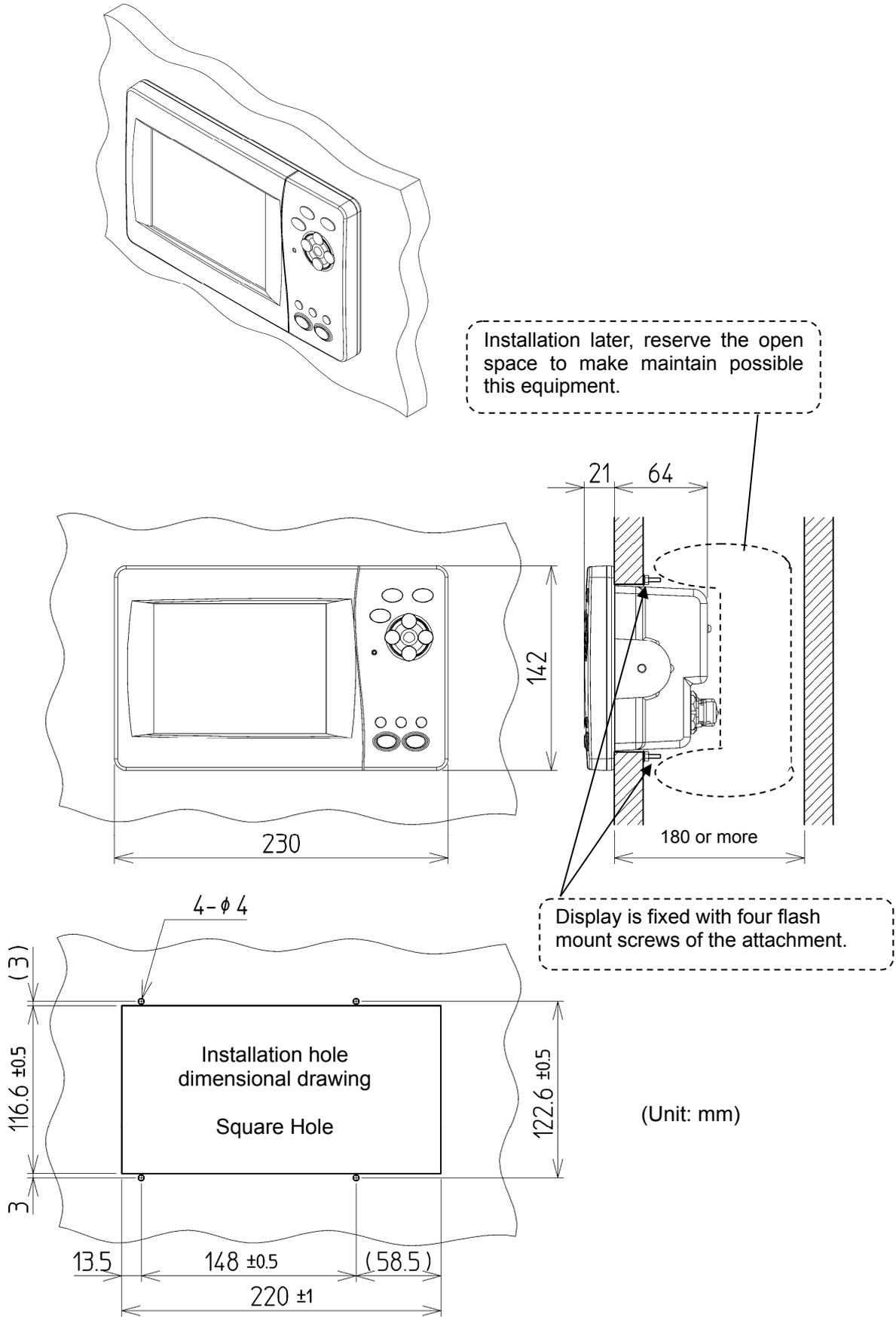
<The Display is fixed from the front side with flash mount kit (MPBC43664) of the option >
 Refer to the diagram shown below for mount hole and space.

Flash mount kit
(MPBC43664)

Wall

21   64

21

116   172

21

7   123   123   7

260

180 or more

6-φ2.5

17.5

10   113   113   10

3.5

116

Installation hole
dimensional drawing

Square Hole

51.5

20   123

51.5

3.5

17.5

7   226   7

240

(Unit: mm)

2-17
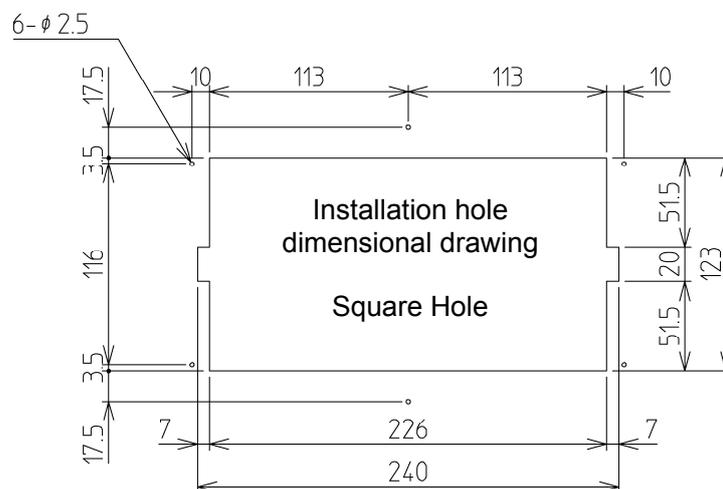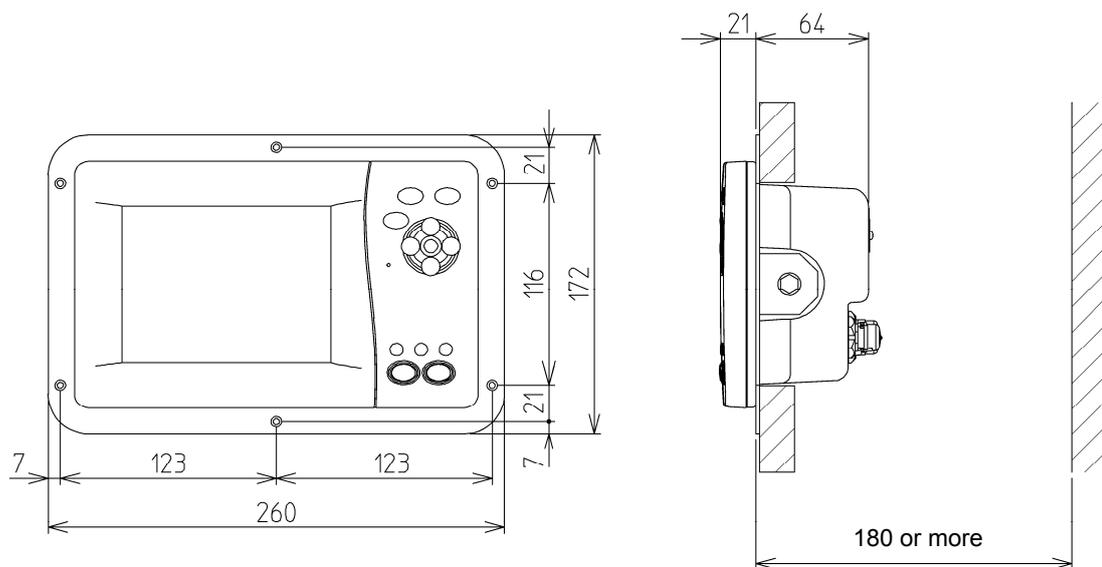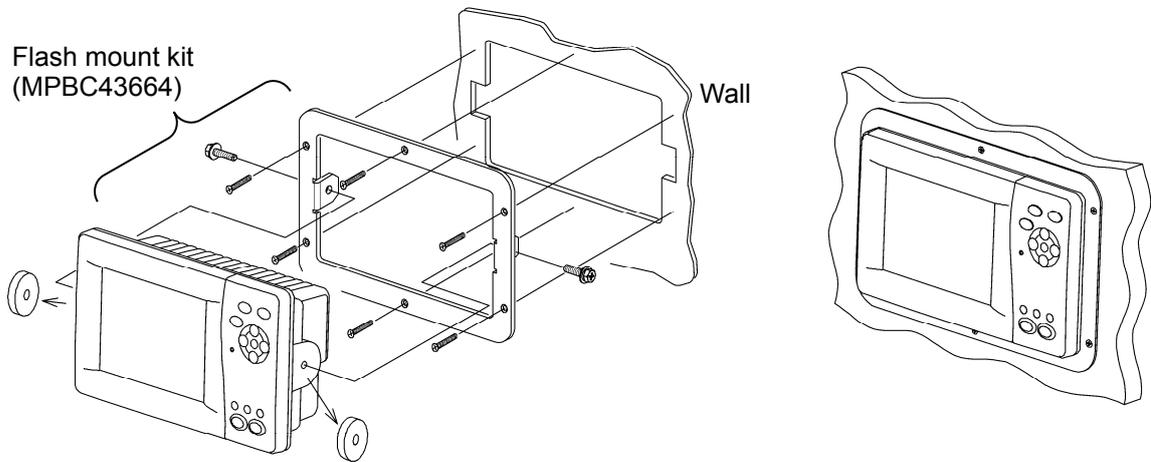
● Unit (Rear Connector)

Maintenance Terminal
Used to connect to a computer (RS-232C).
(Shall be used by service engineer only.)

| DATA IN/OUT 1 | DATA IN/OUT 2 |

CONTACT IN/OUT
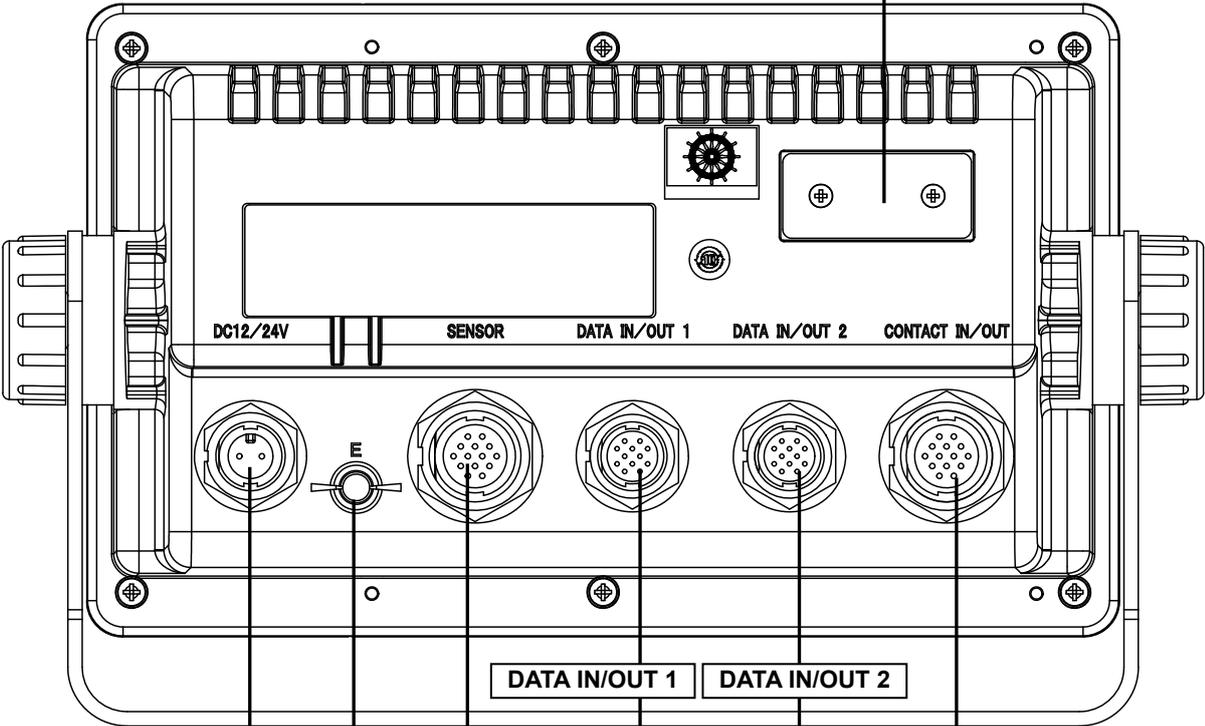
**External Device   Connection Terminal
(For Contact Signal)**
Interfaces to optional equipment such as an external
buzzer.

**External Device   Connection Terminal (For Serial
Transmission)**
Used for connecting equipment such as radar.

SENSOR

Sensor Connection Terminal
Used for connecting the dedicated GPS compass sensor.

E

Chassis Ground Terminal
Connect to the ship's ground terminal as needed.   Butterfly bolt is M4mm x 10mm.

DC12/24V

Power Supply Terminal
Used to supply power to the equipment.
Use the included power cable.

2-18

[Power Supply Connector]

DC12/24V (Label name of the back of Display)
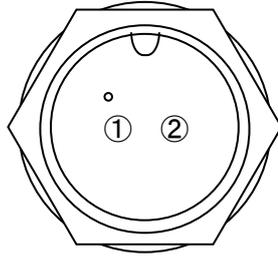
Power Supply Cable: CFQ-7257 (included)

Terminal Number (CFQ-7252)	Name		Explanation
1 (Black)	DC12/24V	DCIN -	Connect the included power supply cable.
2 (Red)		DCIN +	The voltage shall be 10.8 - 31.2 V DC.

Connection Cable Appearance

Red

Cable Length: 2m

CFQ-7257

2A

+

Black

2A

−

Approx. Φ23.2mm

Approx. Φ6mm

Fuse Holder
(2A fuse contained)
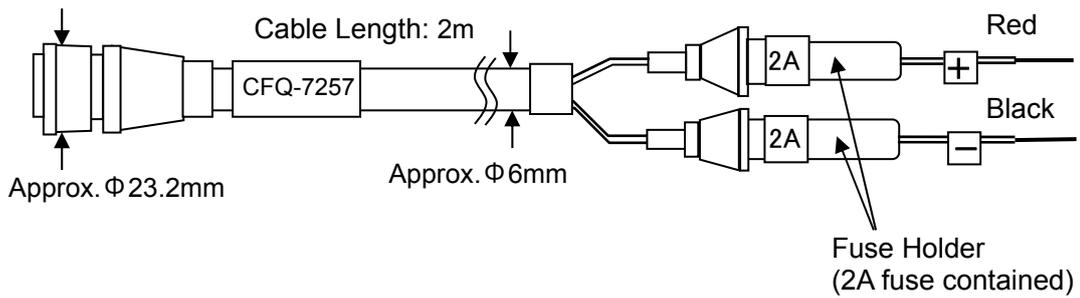
● Noise Filtering
Make a loop with the cable and clamp it with the included Clamp Filter as shown below.

Clamp Filter
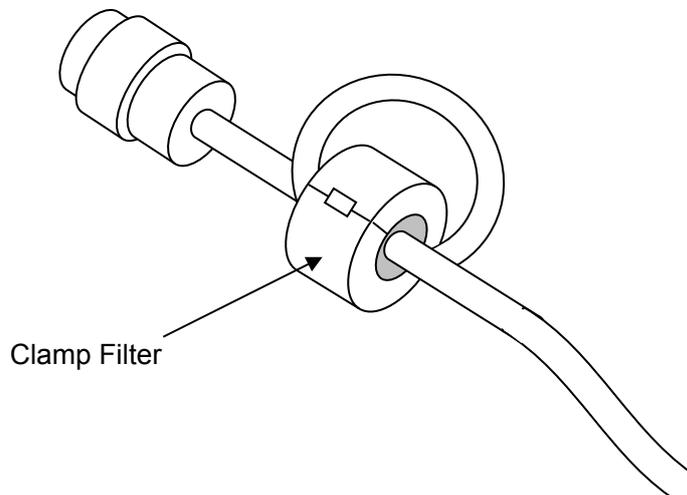
[Sensor Connector]

SENSOR (Label name of the back of Display)

Data Cable: CFQ-7248 (included)

Terminal Number (CFQ-7248)	Name		Explanation
1 (Red Thick)	Sensor Power Supply	13V	Power to the sensor is supplied by the display unit.
2 (Black Thick)		GND	
3 (Orange)	RXD0	A	Receives data from the sensor.
4 (Yellow)		B	
5 (Green)	TXD0	A	Sends configuration data to the sensor.
6 (Blue)		B	
7 (Purple)	Sensor Through	SD-A	Outputs data from the sensor through [DATA IN/OUT 1].
8 (Grey)		SD-B	
9 (White)		SC-A	
10 (Black Thin)		SC-B	
11 (Brown)	TXD4B (*1)	A	Sends configuration data to the beacon receiver. (Option cable required)
12 (Pink)		B	
13 (Light Blue)	Unused		
14 (Light Green)			

*1 : Outputs parallel to the DATA IN/OUT 2 connector 9 and 10 pins. (Refer to page 2-27)

Connection Cable Appearance

Cable Length: 10m

CFQ-7248   CFQ-7248

Approx.Φ7mm

Approx.Φ22.2mm
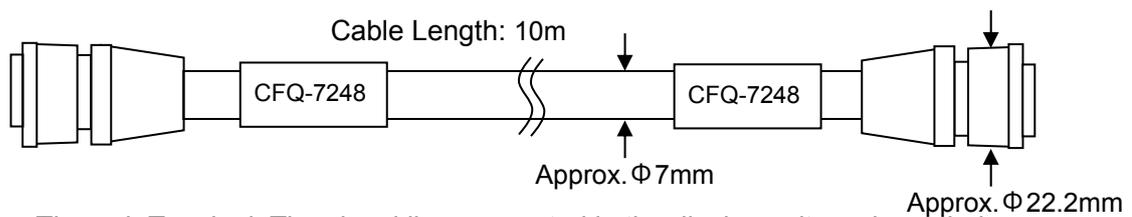
● Sensor Through Terminal: The signal line are routed in the display unit as shown below.

SENSOR

SD-A 7
SD-B 8   CFQ-7248
SC-A 9   NNN-21/31
SC-B 10   Sensor Unit

NWZ-4701
Display Unit
Interior

DATA
IN/OUT 1

3
4   CFQ-5374
5   External Device
6
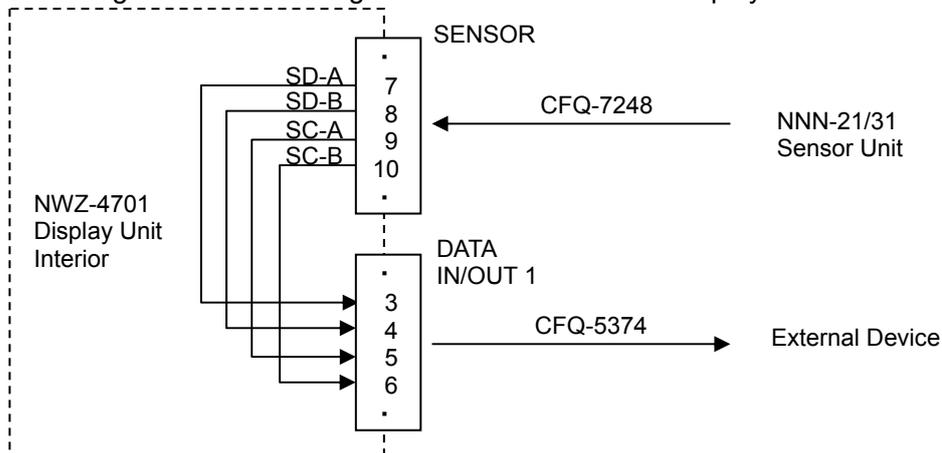
● Beacon Connection

■ JLR-4341 or JLR-4331 (DGPS Receiver) Connection
  Use the option cable (CFQ-7250).

JLR-4341 or JLR-4331
DPGS Receiver

3m

Power
DC12V

6 Pin

14 Pin

CFQ-7250

0.4m
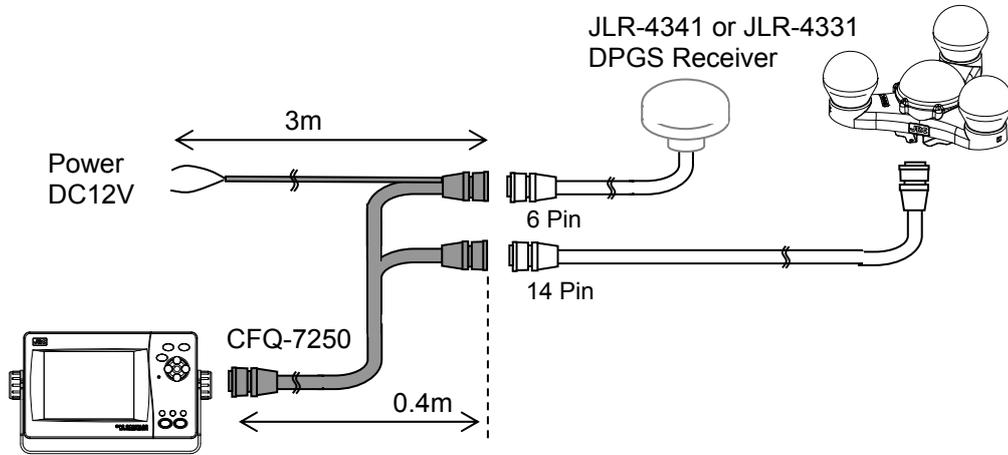
  * Connecting JLR-4331 does not allow DGPS,
    but allows receiving only meteorological information.   (Refer to the following table.)

■ Beacon Receiver Connection
  Modify the option cable (CFQ-7250).

Power

←Output

Input→

Data Common

Beacon
Receiver

Yellow Brown Black

Divide the CFQ-7250
cable to use

14 Pin

CFQ-7250
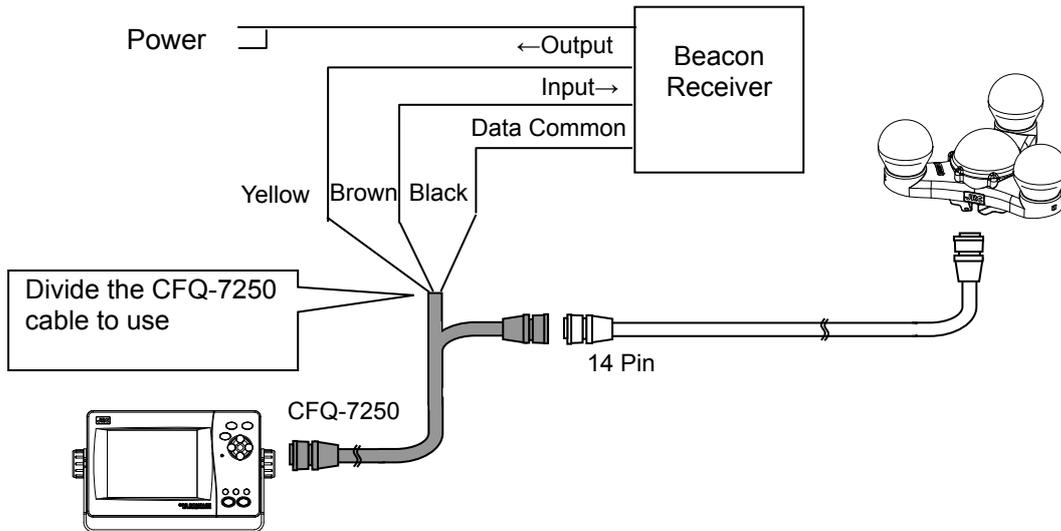
■ Features and installation procedure for beacon receiver

Types of DGPS receivers	Competitor's Beacon receiver	JLR-4331 receiver	JLR-4341 receiver
Enhanced accuracy of The position measured by GPS compass (DGPS conversion)	○	×	○
Receiving weather information	○	○	○
Setting for Data OUT4/IN4	Selecting beacon/**** allows the DGPS receiver to be used as a beacon receiver.		Selecting 4341/**** allows the DGPS receiver to be used as a beacon receiver.

  * Refer to "5.3.7. Data I/O Settings (DATA I/O)" for installation.

● Cable Length
■ For cable lengths of less than 30 m
Use the option cable (CFQ-7249).

Waterproof treatment is required.
Refer to <Waterproofing method for connectors of extended line>
on the next section, please waterproof treatment.

Approx. Φ22.2mm   Approx. Φ7mm   Approx. Φ20.2mm   Female

Female   Male   Female   CFQ-7248(10m)
(Attachment)

CFQ-7249 / 20m
(CFQ7249-10 / 10m)   * A connector with pins is male side.
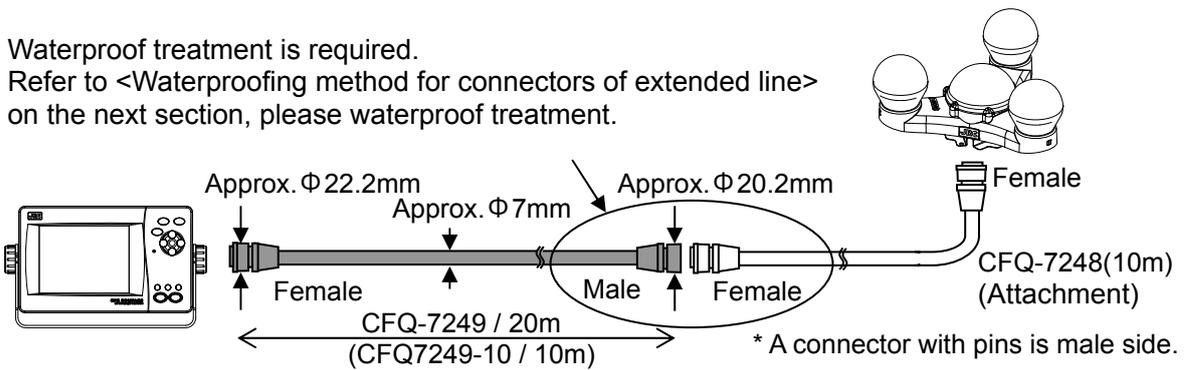
< Waterproofing method for connectors of extended line >

Sensor side

Display side

Sensor side

<End of vinyl tape wrapping>   10mm or m

<End of Self-bonding tape wrapping>

25mm or more

Connector (Socket) or Tube

Self-bonding tape
Take a proper length of tape off the role.
While pulling in accordance with tape
manual, wrap it around the connector
with one half of it overlapped so that the
wrapped tape may form **three layers**.
However, portions between the
connector and cable have different
diameters. This portion apply tape more
than the other portions.
When the tape has been wrapped, press
to hold by hand.

Connector (Socket)

Connector (Plug)

Connector (Plug) or Tube

25mm or more

Protective PVC tape (vinyl tape)
Taking care not to give tension to the
tape,
wrap the tape around the connector with
one
half of it overlapped so that the wrapped
tape
may form **three layers**.

<Start of Self-bonding tape wrapping>

10mm or more

<Start of vinyl tape wrapping>

Display side

■ For cable lengths of 30 m or more
  Use the junction box (NQE-7720).
  (Maximum of 50 m, composed of included cable (10 m)
   plus and extension cable (40 m))

Divide the included CFQ-7248 cable (10 m)

NQE-7720

NQE-7720

Connect the junction boxes with
TTYCYS-7 or equivalent cable
(Maximum 40 m , Approx.Φ22.3mm)
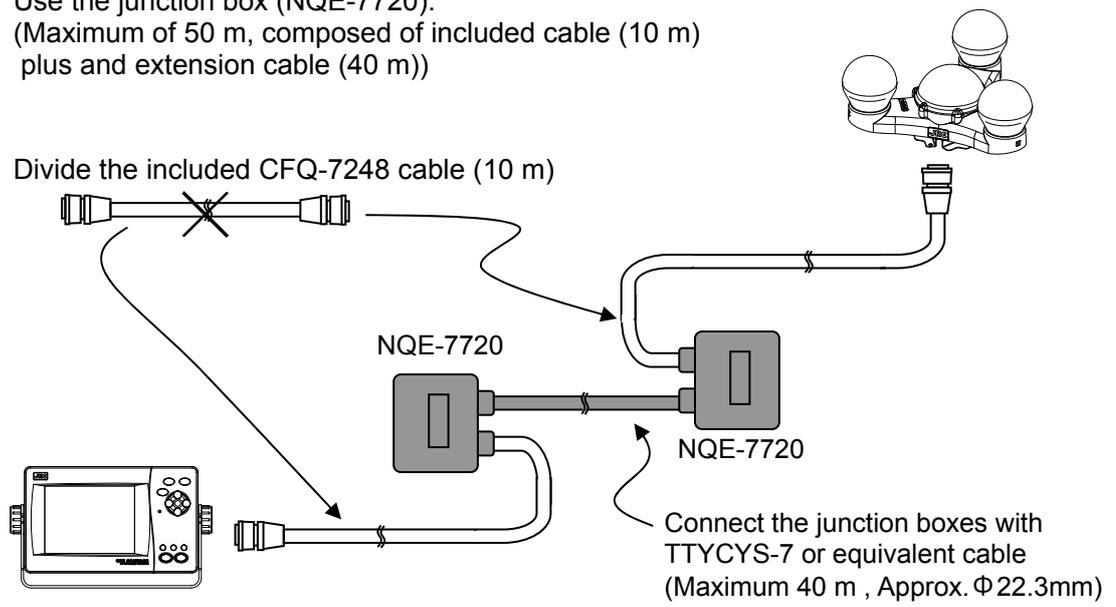
Connect the cut CFQ-7248 cable and junction boxes

NQE-7720

Length of each wire
120±10mm

Length of each wire
100±10mm

The shield line is
connected with the
Oki sleeve or solder.

CFQ-7248
Data cable

TTYCYS-7
Extension cable

Seal processing is effective.
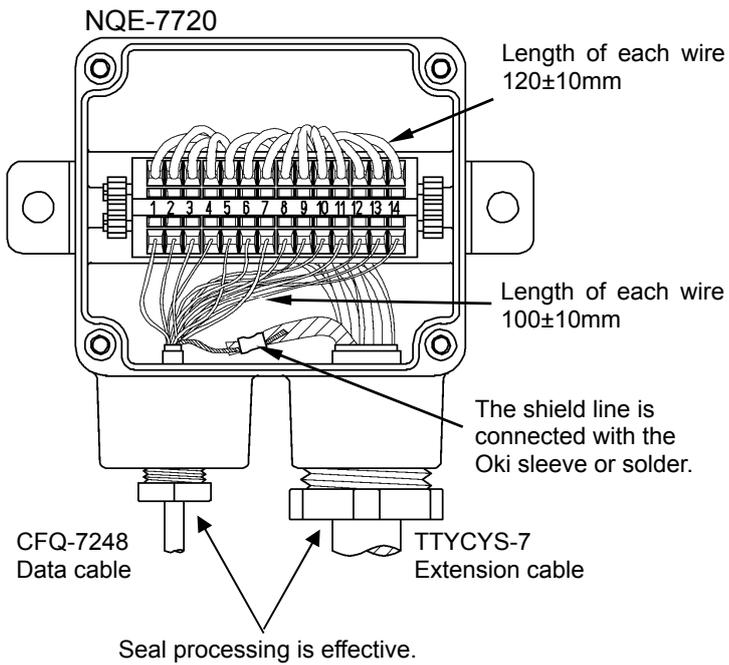
Terminal stand NO	CFQ-7248
1	Red Thick
2	Black Thick
3	Orange
4	Yellow
5	Green
6	Blue
7	Purple
8	Grey
9	White
10	Black Thin
11	Brown
12	Pink
13	Light Blue
14	Light Green
Shield	Shield

Junction box NQE-7720(Option)   Externals chart
(Installation metal fittings MPBP31612 are not included.)

170
136
2-φ10
86
117
32
62
150
36
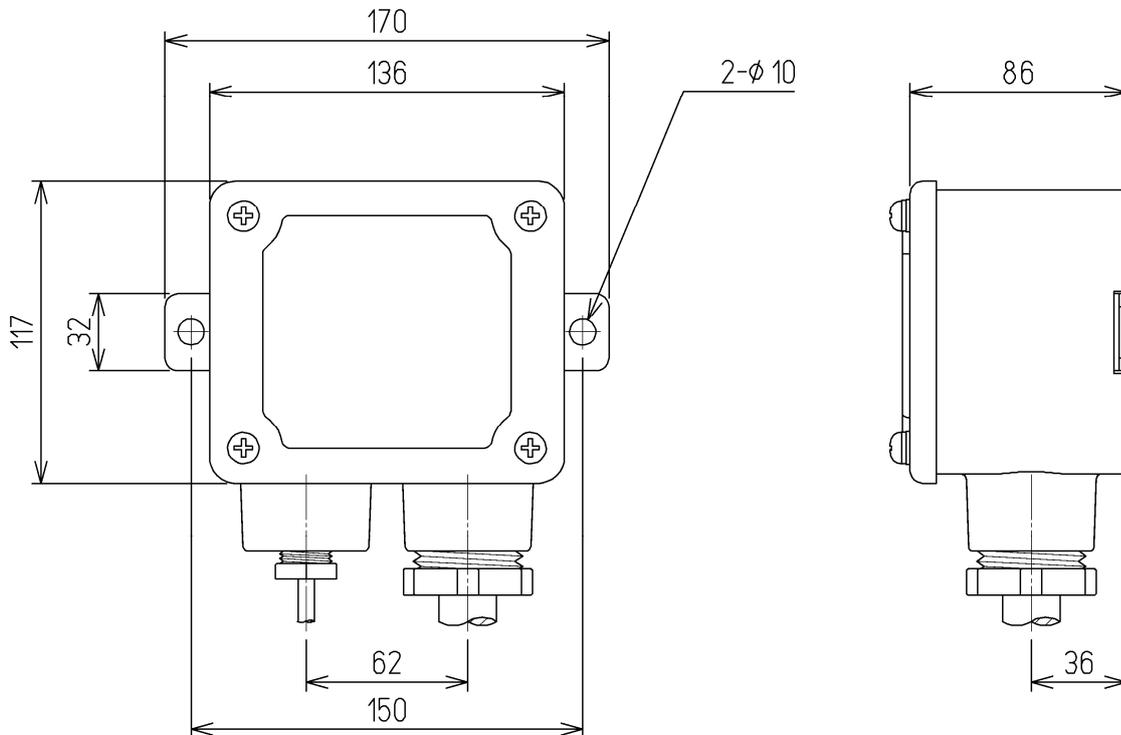
Option metal fittings (Stainless-steel) MPBP31612 Bundled list

Points book X 1	Metal fittings X 2	M 8 Bolt （L=100,150） X 2 pieces for each	Flat washer X 4	Spring lock washer X 2	Hex nut X 4

Select one about M8 volt length according to the diameter of the installed prop.

M8 bolt

Flat washer

Metal fittings

Prop
Possible range
Φ27.2mm～Φ89.1mm

Hex nut

Spring
lock washer

Flat washer

Seal processing is effective.

Junction Box NQE-7720(OPTION)
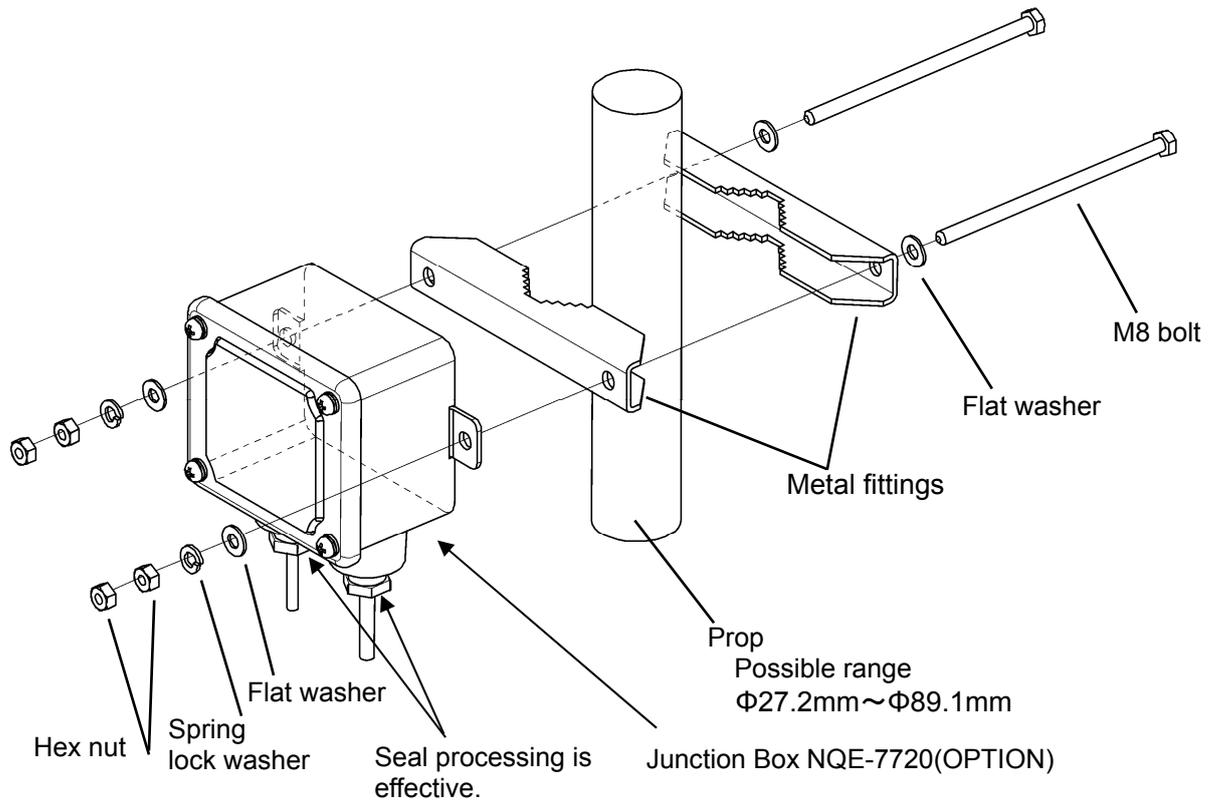
● Connection with Sub Display Unit
Connect by one of the following methods:

1. Connection with using the optional Y cable (CFQ-7251) – recommended method

Main Display Unit

MAIN DISP   CFQ-7251

DC12/24V
NWZ-4701

Approx.750mm   Approx.750mm

Sub Display Unit   Approx.750mm   SENSOR

CFQ-7248(Attachment)

SUB DISP

DC12/24V
NWZ-4701

Approx.1.5m

CFQ-7249 / 20m
（CFQ7249-10 / 10m）
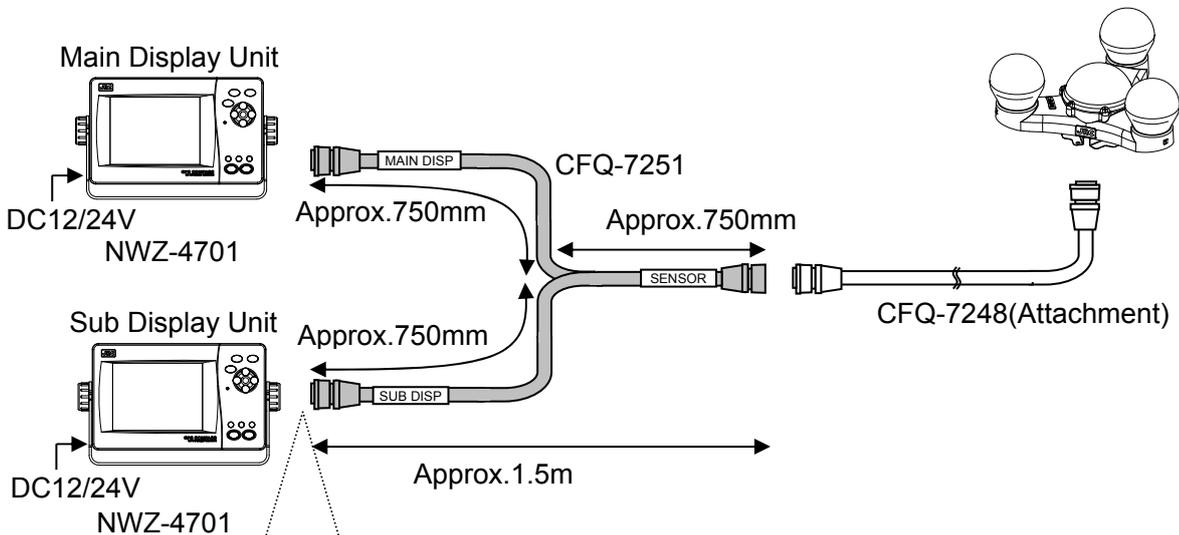
・ For the Sub Display, the cable line can be additionally extended for 20m/10m by connecting the data extension cable CFQ-7249/CFQ-7249-10 to the end of CFQ-7251 cable (even when another data extension cable CFQ-7249/CFQ-7249-10 is inserted between the Y cable and the attached cable CFQ-7248).

・ For the Main Display, the line can be extended by the same way only when CFQ-7249/CFQ-7249-10 is not inserted between the Y cable and the attached cable CFQ-7248.

To select the Sub Display, set "SUB" for DISPLAY TYPE by referring to "5.4.5 Product Type Configuration." (Factory setting is "MAIN.")

2. Connection with using the optional data extension cable CFQ-7249 and attached CFQ-7248
   (Previously mentioned method 1 is recommended.)
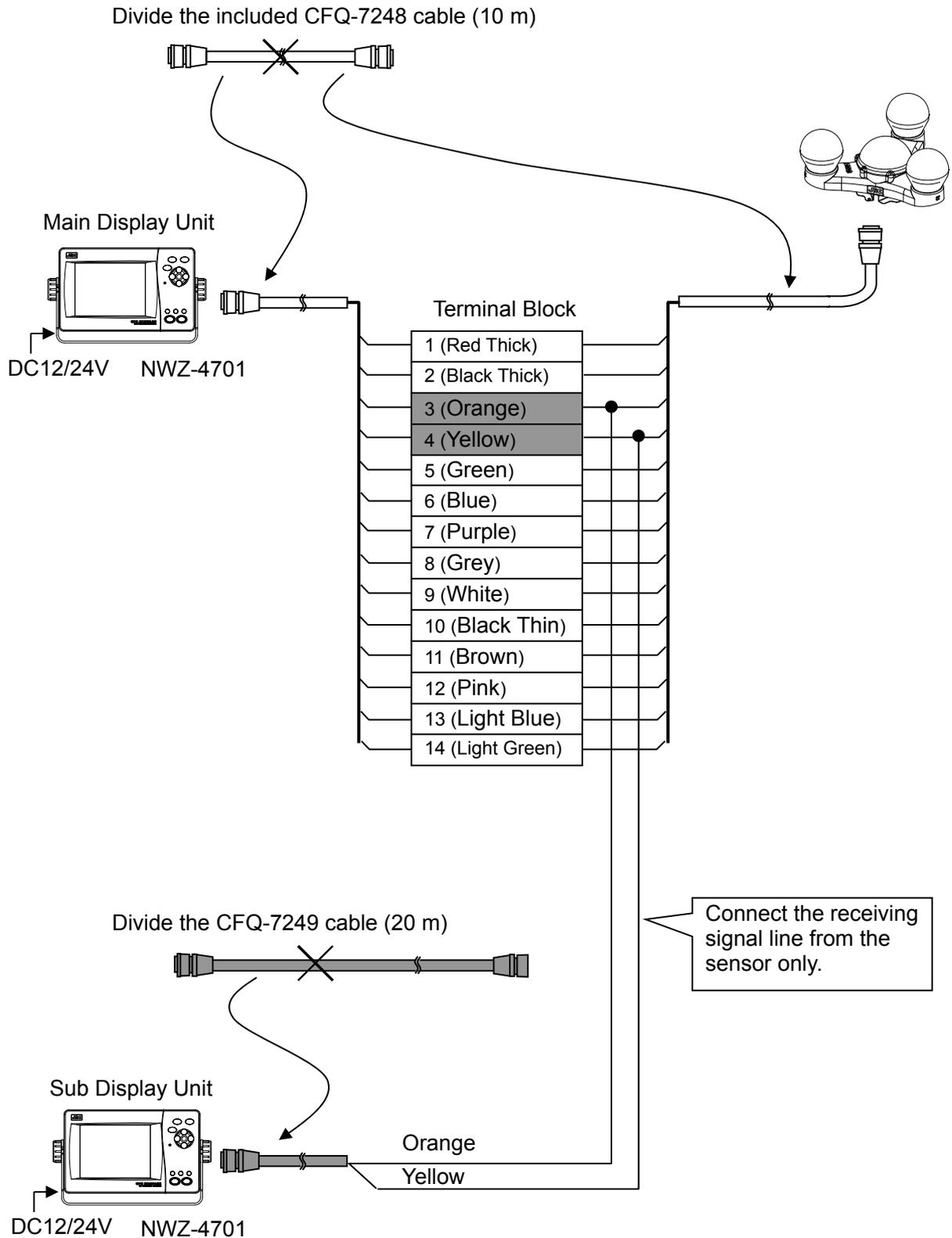
Divide the included CFQ-7248 cable (10 m)

Main Display Unit

DC12/24V   NWZ-4701

Terminal Block

| 1 (Red Thick) |
| 2 (Black Thick) |
| 3 (Orange) |
| 4 (Yellow) |
| 5 (Green) |
| 6 (Blue) |
| 7 (Purple) |
| 8 (Grey) |
| 9 (White) |
| 10 (Black Thin) |
| 11 (Brown) |
| 12 (Pink) |
| 13 (Light Blue) |
| 14 (Light Green) |

Connect the receiving signal line from the sensor only.

Divide the CFQ-7249 cable (20 m)

Sub Display Unit

Orange

Yellow

DC12/24V   NWZ-4701

To select the Sub Display, set "SUB" for DISPLAY TYPE by referring to "5.4.5 Product Type Configuration." (Factory setting is "MAIN.")

[Data IN/OUT 1 Connector]

DATA IN/OUT 1 (Label name of the back of Display)

Data Cable: CFQ-5374 (option)

Terminal Number (CFQ-5374)	Name		Explanation
1 (Brown)	Unused		
2 (Red)			
3 (Orange)	Sensor Through	SD-A	Output signal is sent from this terminal by connecting the sensor.
4 (Yellow)		SD-B	Outputs as defined by "Sensor Through" configuration. (Refer to "5.3.7 Data I/O Settings (DATA I/O)")
5 (Green)		SC-A	Outputs clock when AD-10 configuration is performed for "Sensor Through". This port is not used excluding AD-10. (*1)
6 (Blue)		SC-B	
7 (Purple)	DATA OUT3 (TXD3)	A	Outputs as defined by "Data OUT 3" configuration. (Refer to "5.3.7 Data I/O Settings (DATA I/O)")
8 (Grey)		B	
9 (White)	Unused		
10 (Black)			
11 (Pink)		GND ISO	Connects serial transmission cable ground.
12 (Light Blue)		GND	Chassis ground

*1: 4 pins are used for AD-10.   Refer to "Output of AD-10 Format" in "5.3.7 Data I/O Settings (DATA I/O)" for details.

Appearance of Connection Cable

Approx.Φ6.5mm

CFQ-5374
(CFQ5374-15)

CFQ-5374   3m
(CFQ5374-15   15m)

Approx.Φ18mm

Shield for cable

Connector
Product by LTW : LTWCD-12BFFA-LI80

External Device

A

B
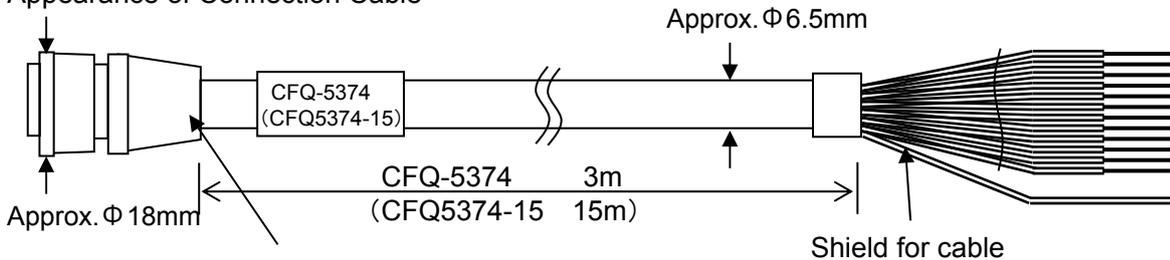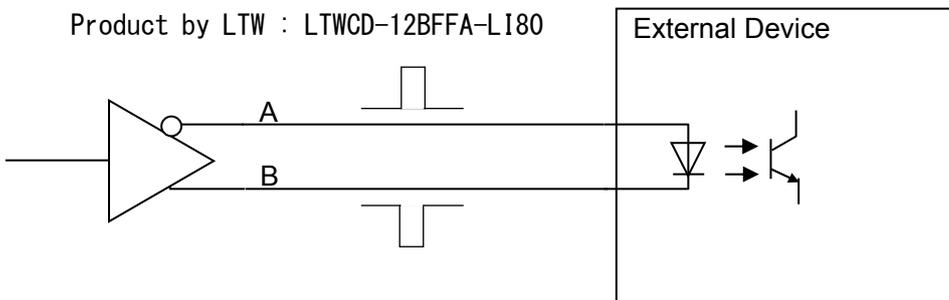
[Data IN/OUT 2 Connector]

DATA IN/OUT 2 (Label name of the back of Display)
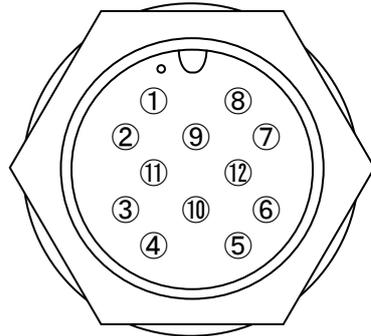
Data Cable: CFQ-5374 (option)

Terminal Number (CFQ-5374)	Name		Explanation
1 (Brown)	DATA IN4 (RXD4)	A	Receives the tide current data (Data IN4). (Refer to "5.3.7 Data I/O Settings (DATA I/O)")
2 (Red)		B	
3 (Orange)	DATA OUT1 (TXD1)	A	Outputs as defined by "Data OUT 1" configuration. (Refer to "5.3.7 Data I/O Settings (DATA I/O)")
4 (Yellow)		B	
5 (Green)	DATA OUT1 (SCK1)	A	Outputs clock when AD-10 configuration is performed for "Data OUT 1". This port is not used excluding AD-10. (*2)
6 (Blue)		B	
7 (Purple)	DATA OUT5 (TXD5)	A	Outputs as defined by "Data OUT 5" configuration. (Refer to "5.3.7 Data I/O Settings (DATA I/O)")
8 (Grey)		B	
9 (White)	DATA OUT4 (TXD4B) (*1)	A	Outputs as defined by "Data OUT 4" configuration. (Refer to "5.3.7 Data I/O Settings (DATA I/O)")
10 (Black)		B	
11 (Pink)		GND ISO	Connects serial transmission cable ground.
12 (Light Blue)		GND	Chassis ground

*1 : Outputs parallel to the SENSOR connector 11 and 12 pins. (Refer to page 2-19)
*2: 4 pins are used for AD-10.   Refer to "Output of AD-10 Format" in "5.3.7 Data I/O Settings (DATA I/O)" for details.

Appearance of Connection Cable

Approx. Φ6.5mm

CFQ-5374 (CFQ5374-15)

Approx. Φ18mm

CFQ-5374   3m
(CFQ5374-15   15m)

Shield for cable

Connector
Product by LTW : LTWCD-12BFFA-LI80

External Device

A

B
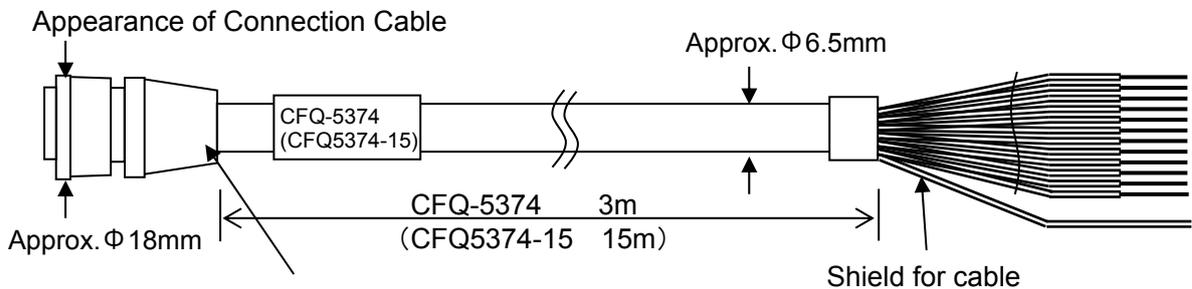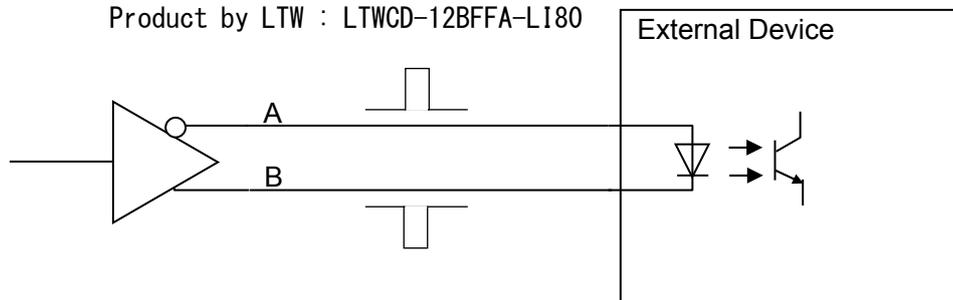
●Output connection of DATA OUT4 (9 and 10 pins of Data IN/OUT2 connector)
DATA OUT4 connects inside the display unit as shown in the following figure.

JLR-4341 or JLR-4331
DGPS receiver

Configuration line to a DGPS
receiver (beacon) (11 and 12 pins)

DC12V

SENSOR
Connector

Inner
NWZ-4701

11

12

CFQ-7250C
Cable

Data OUT4/ IN 4
Port
(This name for
in Display Unit)

9

10

Connect to external equipment

DATA IN/OUT2
Connector
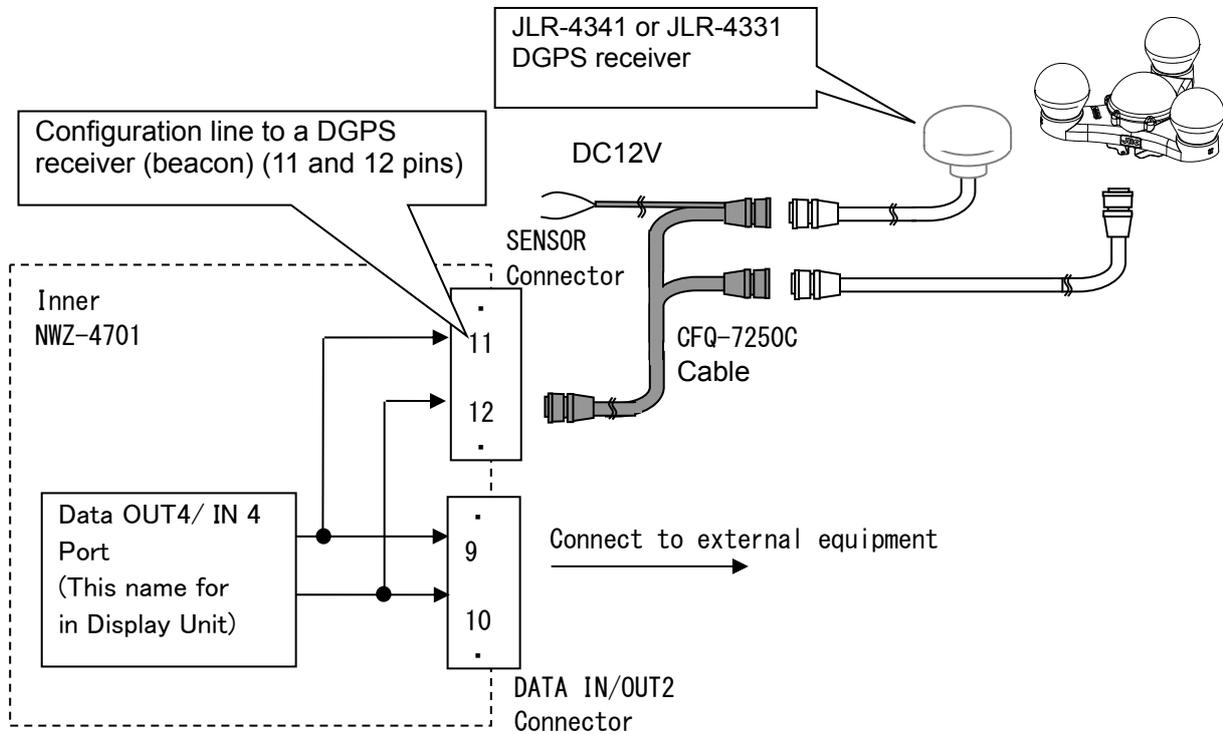
┌─────────────┐
│ **Attention** │
└─────────────┘

When connecting a beacon receiver, Data OUT4/IN4 port is set to beacon/**** and configuration
data is sent from the 11 and 12 pins of SENSOR connector to the beacon receiver; however, be
aware that, at that time, the same data (the configuration data to the beacon receiver) is also led
to the 9 and 10 pins of Data IN/OUT2 connector connected inside.
For this reason, do not connect external equipment to the output of the 9 and 10 pins of the Data
IN/OUT2 connector when using the beacon receiver.

[Contact Signal IN/OUT Connector]

CONTACT IN/OUT (Label name of the back of Display)

Data Cable: CFQ-5404 (option)

Terminal Number (CFQ-5404)	Name		Explanation
1	Unused		
2			
3			
4 (Yellow)	Contact Output 0	COM	Outputs external buzzer 1.
5 (Green)		NC	(Outputs when alert is generated)
6 (Blue)		NO	(For special purpose usage)
7 (Purple)	Contact Output 1	COM	Outputs contact signal (log pulse).
8 (Grey)		NO	(Refer to "5.3.7 Data I/O Settings (DATA I/O)")
9 (White)		NC	
10 (Black)	Contact Output 2	COM	Outputs external buzzer 2.
11 (Pink)		NO	(Outputs when alert is generated)
12 (Light Blue)		NC	(For general use. Here is used usually.)
13 (Light Green)	Contact Input	ACKIN+	Clears [Contact Output 2].
14 (Light Brown)		ACKIN-	(by short-circuiting both terminals)

NO: Normally Open   NC: Normally Closed

Appearance of Connection Cable

Approx. Φ6.5mm

CFQ-5404
(CFQ5404-15)

Approx. Φ22.2mm

CFQ-5404   3m
(CFQ5404-15   15m)

Shield for cable

Connector
Product by LTW : LTWCD-12BFFA-LI80

Relay

COM

NO

NC

External Device

Maximum Contact DC30V / 1.0A
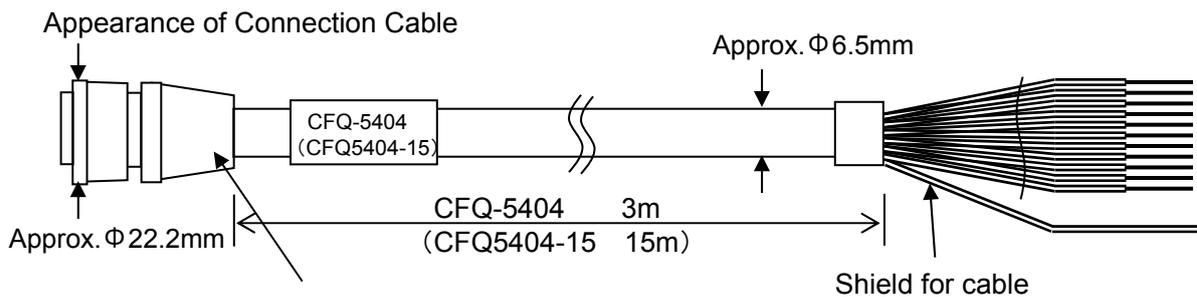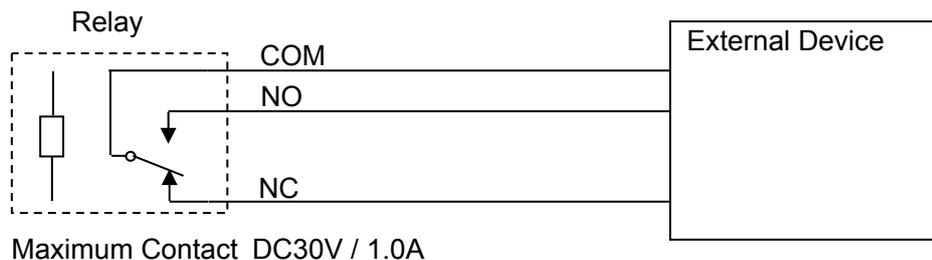
[RS232C Connector]
  This port is a dedicated port for updates. (For use by service technicians)
  Remove the two screws from the rear, remove the cover, and connect the cable.
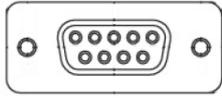
Female (S-type)

Terminal Number	Name	Explanation
1	Unused	
2	TXD	Transmitted data (Being parallel with the Data OUT1 port, outputs the content configured in DATA OUT1.)
3	RXD	Received data
4	Unused	
5	GND ISO	Signal Ground
6	Unused	
7	CTS	Transmission possible
8	RTS	Transmission request
9	Unused	

RS232C Cable

Straight Cable

Display Unit

PC

D-Sub 9 Pin
Male

D-Sub 9 Pin
Female
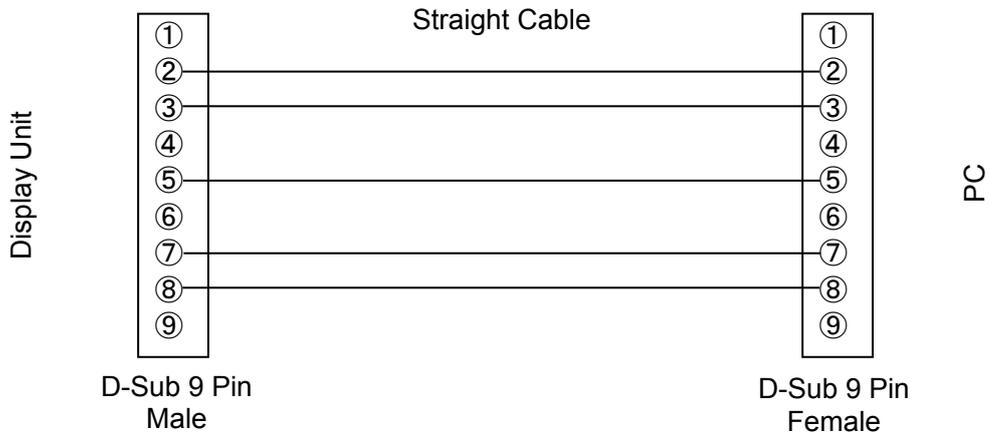
* An all-pin cable can also be used.

Inner NWZ-4701

2
5
RS232C
Connector

Data OUT1
(This name is for
Display Unit)

3
4
DATA IN/OUT2
Connector
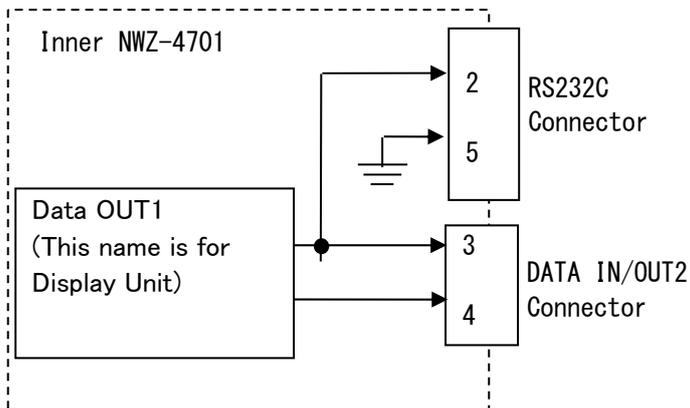
● GPS Repecon Connection

The "NQA-4115T GPS Repecon" option can be connected for repeater (90x) drive.
Use the CFQ-5374 option cable, and connect the DATA IN/OUT 1 or 2 connector to the GPS Repecon.

The data output format is NSK (JRC radar format).   (The display unit outputs "NMEA" data as default)
Refer to the "NQA-4115T GPS Repecon" instruction manual for details.
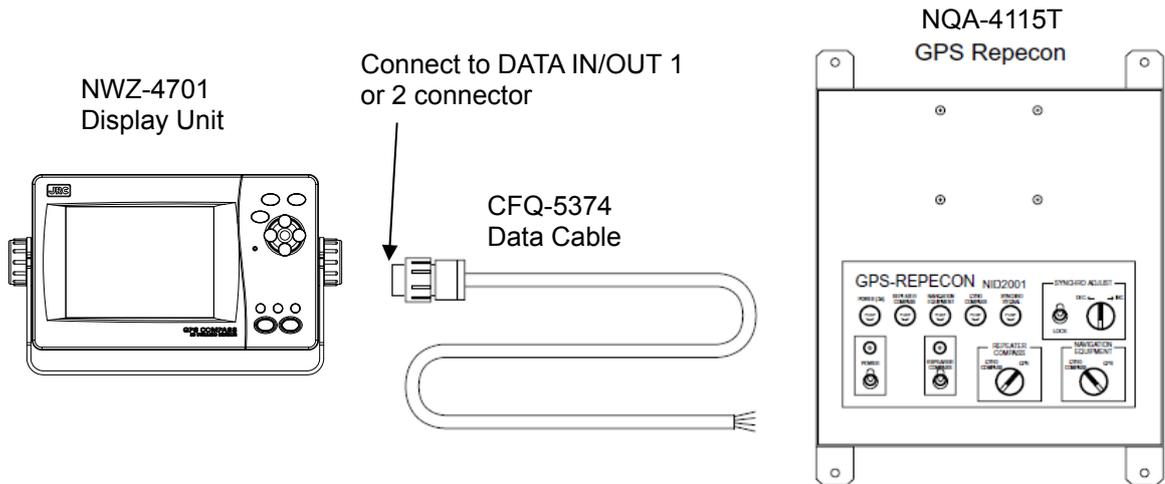
① Connect the AC 100 V power supply to the AC 100 V R1, R2 connectors.
② Connect the terminal configured for NSK format output to the NSK RX+, RX- terminals.

Terminal configured for NSK format output	GPS repecon input terminal
TxD*－A	NSK RX－
TxD*－B	NSK RX＋
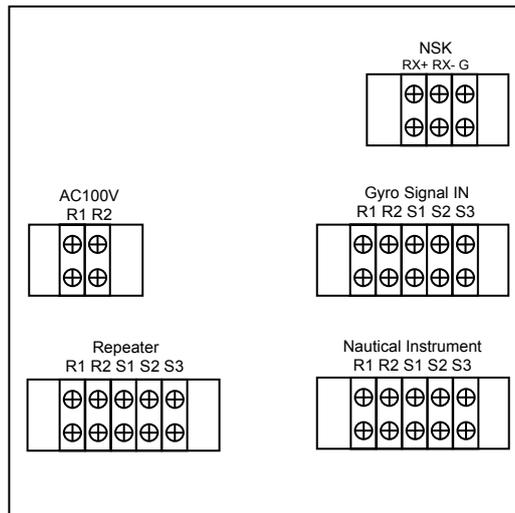
③ Connect the synchronization signal from the gyro compass to the synchronization signal IN terminal.
④ Supply signals from Repeater and Nautical Instrument terminals to each device.

Section 3   Names and Functions of Each Unit

3.1 NWZ-4701   Display Unit

● Unit (Front)
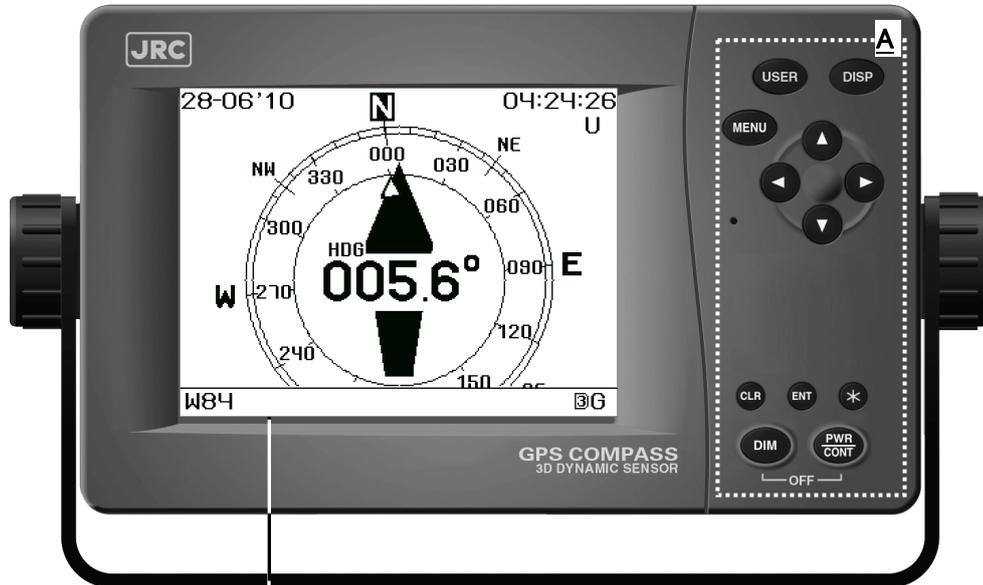
Display
The operator can read the information received from the GPS compass sensor, equipment settings, and soon.
Refer to "● Reading the Display" for details.

A: Control Panel

User Key
Displays satellite information and the like. Also used for setting and clearing anchor watch. Refer to "5.2.9 Anchor Watch Settings" for anchor watch.

Menu Key
Used to display the main menu.

Buzzer
The buzzer sounds here.

Clear Key
Used to return to the previous screen, and to cancel while making configuration changes.   It is also used to silence the buzzer.

Dimmer Key
Used to change the screen brightness. The brightness level changes each time the button is pressed.

Turning off the Power

Press the **DIM** and **PWR CONT** key simultaneously to turn off the power.

Display Key
Changes what is displayed on the screen.   Please refer to "Section 4 Display" for details about what is displayed.

Up, Down, Left, Right Key
Used to select items from the menu, scroll through the screen, and move the cursor.

Enter Key
Used to set the entries.

Asterisk Key
Displays alert information.

Power / Contrast Key
Used to turn the power on. When the power is on, this key is used to change the screen contrast.   The contrast changes each time it is pressed.

- Reading the Display
  The symbols and characters that appear in fixed locations on the screen are described below.

🔲 Subdisplay Setting
   This is displayed when the display unit is configured as a subdisplay.   (Refer to "5.4.5 Product Type Configuration")

Time Display
   Time is displayed in order of hours: minutes: seconds.   (Refer to "5.3.6 System Settings")
   In 12 hour display mode, "AM" or "PM" are displayed.

   If a time difference is set, "**L**" is displayed.   Otherwise, "**U**" is displayed.

Date Display

Screen Title
   The title of the open screen is displayed.

M Maintenance Mode
   In maintenance mode, **M** mark is displayed.
   (Refer to "5.4 Maintenance Menu")

Measurement Status Display
   The status of the bearing measurement is shown by 6 levels.
   (When measurement is completed, the display disappears)

   Measurement ends soon
   Measurement is half-way completed

   Measurement started
   When power has been turned on, or the unit has been reset

Measuring
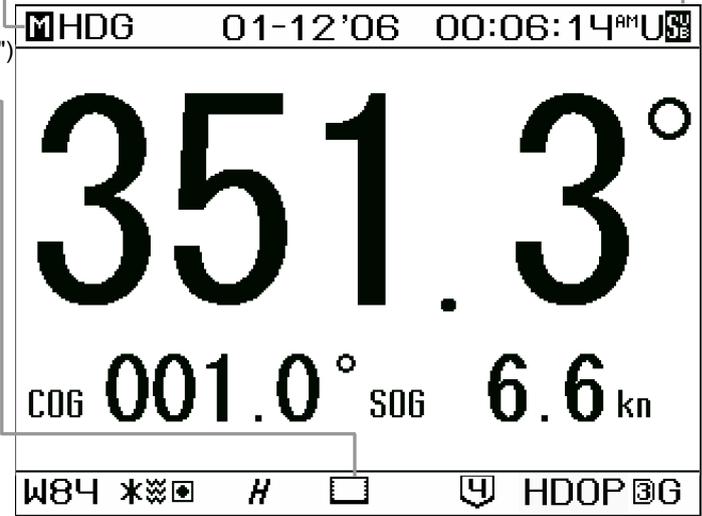
Geodetic System

✳ Alert Information
   This is displayed when alert information messages have been updated.

※ Beacon Information Reception Display
   This is displayed when meteorological information has been received from a beacon.   A buzzer is generated   when this is displayed.

Anchor Watch Display
   ◉ : Inner setting range /   ◻ Outer setting range

H Position Correction Configuration
   This is displayed when a position correction value has been configured.
   (Refer to "5.3.2 Setting the Heading (HEADING)")

Number of Satellites
   Not Displayed: 5 or more /   🛡 : 4 or less / DR : Dead Reckoning

HDOP Alert Display
   Displayed when the number exceeds the configured value.
   (Refer to "5.3.3 GPS Configuration (GPS)")

Measurement Mode Display
   ② : 2 Dimension / ③ : 3 Dimension

Position Correction Mode Display
   G : GPS / **D** : DGPS / **Sb** : SBAS

Display panel:
```
M HDG        01-12'06      00:06:14 AM U 🔲

           351.3°

COG 001.0°   SOG   6.6 kn

W84  ✳※◉   H    ◻        🛡 HDOP ③G
```

3.2 NNN-21/31 Sensor Unit

● Unit

The diagram shows the NNN-21, but applies to the NNN-31 as well.

NNN-21

GPS2
(Antenna)

GPS3
(Antenna)

Processor

BOW

GPS1
(Antenna)

Data Cable
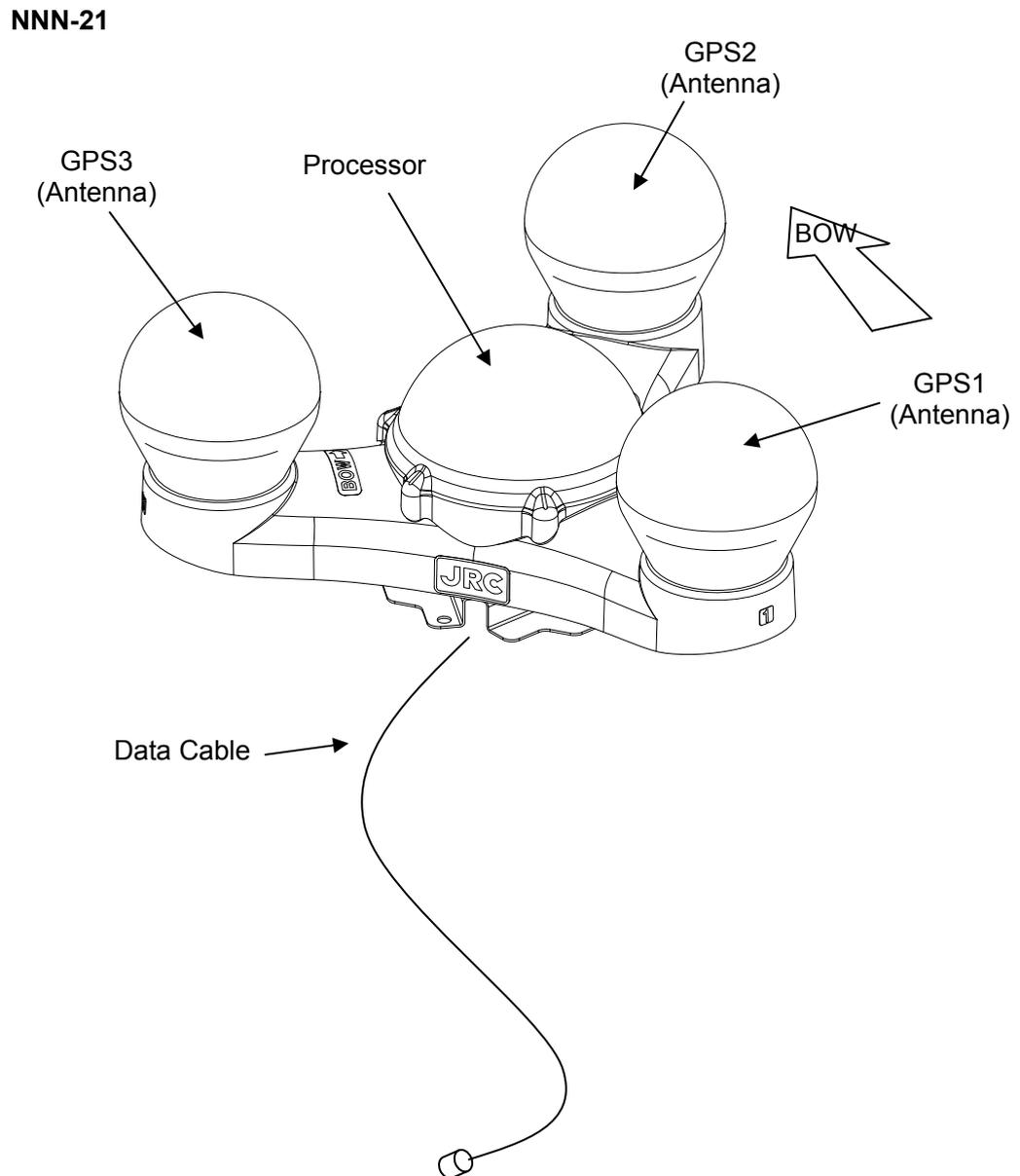
Section 4   Display

Each screen is detailed in this section.

4.1 Display Screen

Pressing the **DISP** key rotates screens. The unit displays the compass screen immediately after turn on.
There are varieties of Compass Screens, Navigation Screens, and Turn Rate screens,
Trend Graph Screens, which can be cycled with the aid of ◀ and ▶ keys.
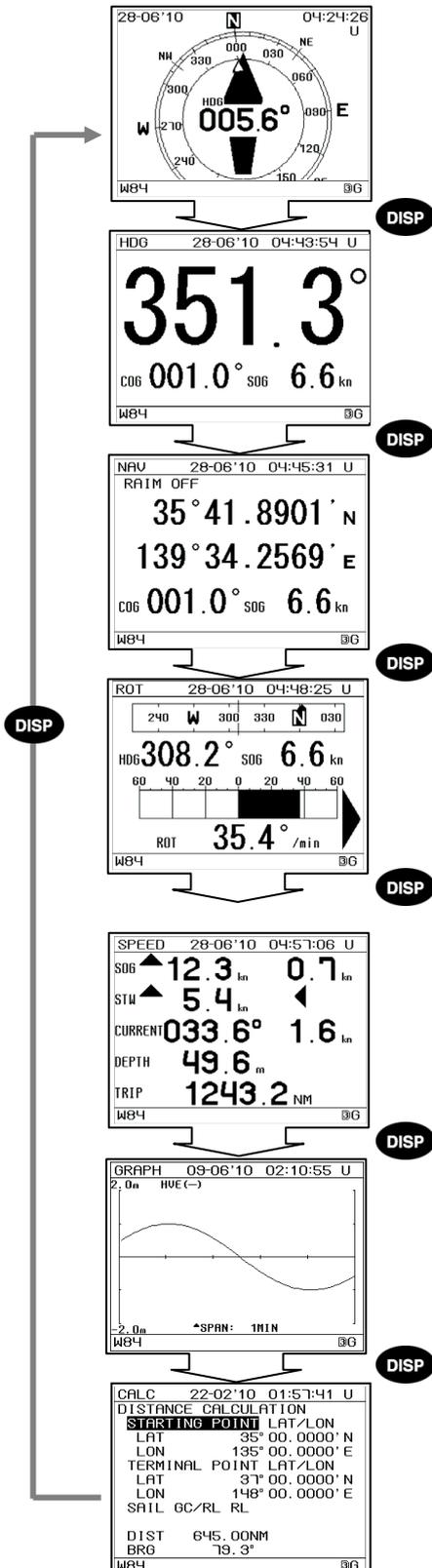
Compass Screen
The heading of the bow of the ship is graphically displayed.

6 types of displays can be cycled using the ◀ and ▶ keys.

Bow Heading Screen
Several varieties of data are displayed in numerical form.
3 types of displays can be cycled using the ◀ and ▶ keys.

Navigation Screen
The latitude and longitude fixed by GPS are displayed

Cycling between 3 and 4 decimals places can be performed using the ◀ and ▶ keys.

Turn Rate Screen
Ship's rate of turn is displayed.

Graphic and numerical display can be cycled between using the ◀ and ▶ keys.

Water Speed / Ground Speed Screen
The bow and stern speeds, port and starboard speeds, and bearing are displayed
(STW, CURRENT, and DEPTH are displayed when the tide current calculator is connected)

Trend Graph Screen
A trend graph for roll/pitch (ROL/PIT), heaving (HVE), or SOG (SPD) is displayed.
The type of graph can be cycled using the ◀ ▶

keys, and the range of time (the display range

of the horizontal axis) using the ▲ ▼ keys.

Calculate Distance Screen
The positions of the starting point and the ending point can be input to calculate the distance between the two points and the bearing of the ending point from the starting point.
The calculation method can be selected in GC/RL.

4-1

The ship's heading is graphically displayed.
4 types of displays (A, B, C, D, E and F) can be cycled between using the ◄ and ► keys.

Heading

Compass Screen A

Date

28-06'10   N   04:24:26 U

NE
000
NW   330   030
300   060
HDG
005.6°   090 E
W   270
120
240
150
W84   3G

Time (U: UTC, L: Local)

COG:
The course over ground is indicated by △

HDG:
As an example, ship's heading reads 5.6°

Compass Screen B

28-06'10   N   04:39:45 U

NE
000
NW   330   030
300   060
HDG **007.1°**   090 E
COG **002.1°**
SOG   **6.6**kn
W   270
120
240
150
W84   3G

COG: Course over ground. "-": less than 1knot.

SOG: Speed over ground

Compass Screen C

N
330   030
300   060
W   E
240   120
210   150
S
100M
SAFE
W84   3G

28-06'10
04:41:31 U

HDG **002.1°**

COG **002.0°**

SOG   **6.9** kn

35° 41.8901' N
139° 34.2563' E

RAIM information:
The following information is displayed in the configured accuracy level. (Refer to 5.3.3. GPS Configuration (GPS).)
RAIM ON: Displays the configured accuracy level (10m 30m 50m 100m)
RAIM OFF: RAIM OFF
No failed satellite: SAFE
Unable to RAIM: CAUTION
Occurrence of a failed satellite: UNSAFE (Check the failed satellite No. in Navigation Screen.)

COG "-": Less than 1 knot.

POS: Present position

Compass Screen D

HVE
+2.0m
210   240   W
S   -30   300
-30
-150
30
120   30
N
E   030
060
-2.0m
100M
SAFE
W84   3G

22-02'10
01:58:50 U

HDG **241.0°**

COG **231.0°**

SOG   **0.3** kn

ROL   **-3.8°**

PIT   **-2.8°**

35° 41.8901' N
139° 34.2563' E

Heaving (HVE) is displayed, which is a relative displacement in the vertical direction.

COG "-": Less than 1 knot.

Roll and pitch are indicated with a ⊕
The ⊕ represents a rolling ball.

The range of roll pitch graph can be switched. (Refer to "5.3.6 System Settings")

The display range of heaving (HVE) can be cycled. (Refer to 5.3.6 System Settings.)

Compass
Screen E

HVE
+2.0m

23-06'10
09:51:38 U

HDG 022.6°
COG 002.0°
SOG 13.8 kn

ROL -3.5°
PIT -4.8°

100M 35° 41.8901' N
SAFE 139° 34.2563' E

W84   ⓑG

HEAVING(HVE)BAR

COG "-": Less than 1 knot.

The vectors of the velocity in the
bow/stern and the port/starboard
directions and their resultant vector
(diagonal direction) are displayed.

The display range of SOG bar can be
switched. (Refer to 5.3.6 System
Settings.)

Compass
Screen F

HVE
+2.0m

HDG 015.5° 19-05'10
00:33:16 U

ROL -13.6°

5 kn

▲ 2.9 kn
◀ 0.6 kn

P   S

PIT -4.1°

3

COG 001.0°

3 SOG 3.0 kn

F   A

3

-2.0m   -30°/min ROT 30°/min

W84   ⓑG
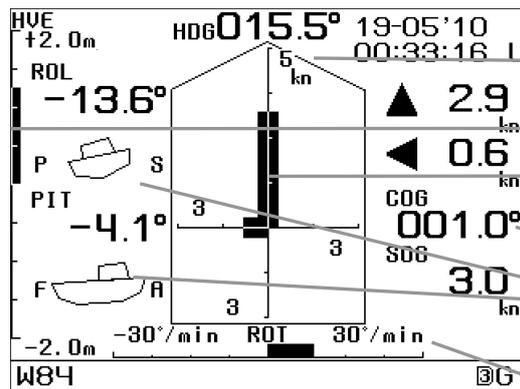
SOG BAR.   The display range can be
switched. (Refer to 5.3.6 System
Settings.)

HEAVING(HVE)BAR

The vectors of the velocity in the
bow/stern and the port/starboard
directions are displayed.
COG "-": Less than 1 knot.

Roll and pitch are displayed graphically.
P: port   S: starboard
F: bow   A: stern

ROT graph.   The display range can be
switched. (Refer to 5.3.6 System
Settings.)

4.1.2   Bow Heading Screen

The Bow Heading, SOG and COG are displayed numerically.

Each screen can be cycled using the ◀ or the ▶ key.

HDG Screen

HDG   28-06'10 04:43:54 U

351.3°

COG 001.0° SOG 6.6 kn

W84   ⓑG
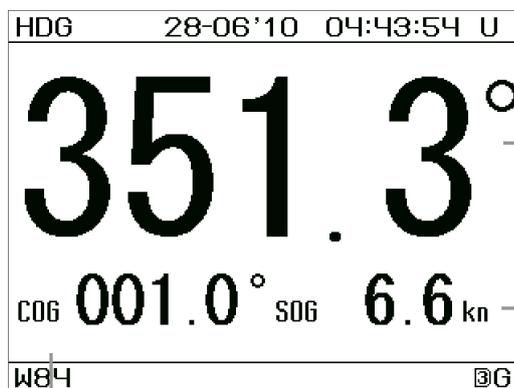
Bow heading (HDG)

SOG: Speed over
        ground

COG: Course over
        ground
        "-": Less than 1 knot.

SOG Screen

SOG: Speed over ground

```
┌────────────────────────────────────┐
│ SOG        07-10'10  05:46:38  U    │
│                                      │
│              4.8 kn                  │
│                                      │
│   HDG 021.4°  COG 016.0°             │
│                                      │
│ W84                          3G      │
└────────────────────────────────────┘
```

COG: Course over ground
"-": Less than 1 knot.

Bow heading (HDG)

COG Screen

```
┌────────────────────────────────────┐
│ COG        07-10'10  05:47:49  U    │
│                                      │
│              016.0°                  │
│                                      │
│   SOG  4.8 kn  HDG 021.4°            │
│                                      │
│ W84                          3G      │
└────────────────────────────────────┘
```
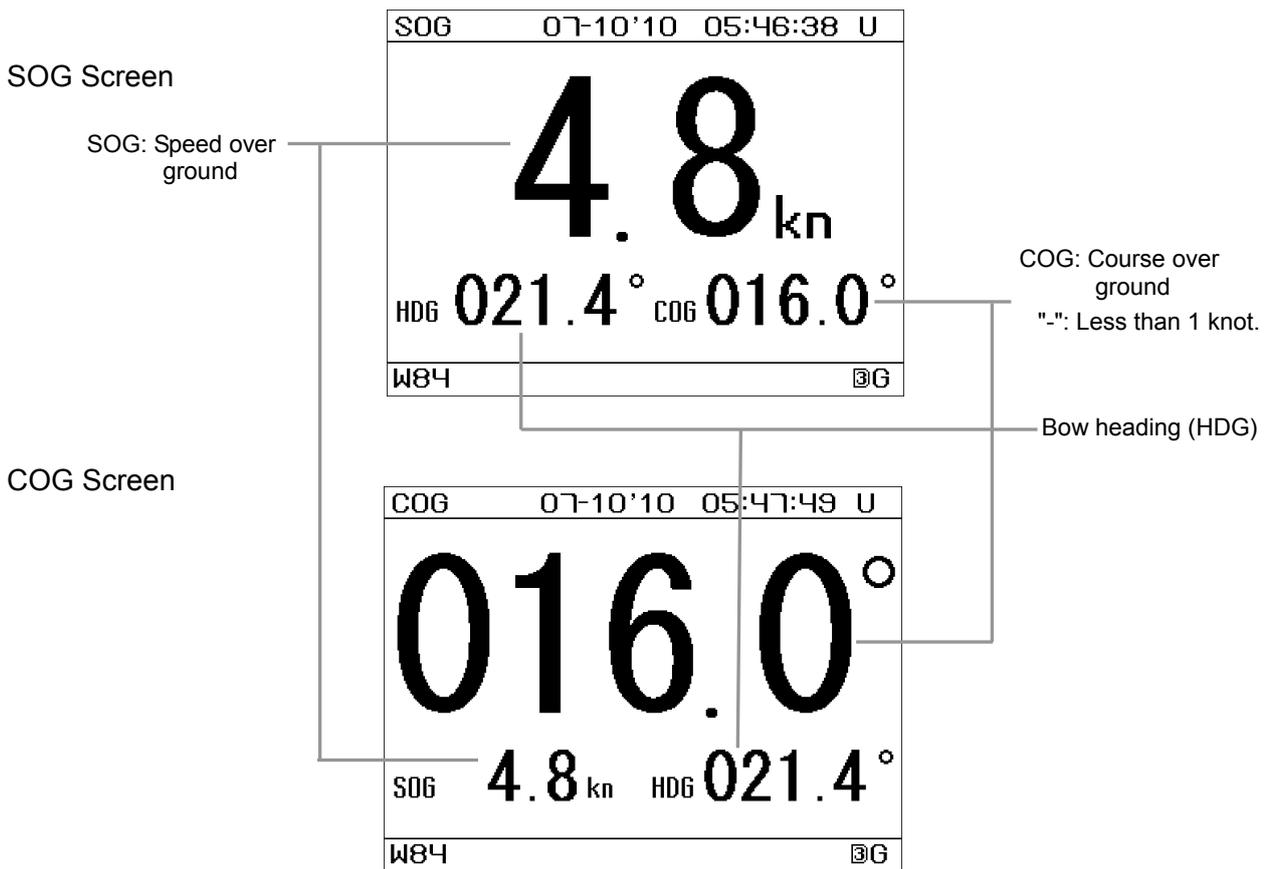
4.1.3 Navigation Screen

The latitude and longitude of the ship's position are displayed.

Latitude and longitude displays (3 decimals or 4 decimals display) can be cycled between using the ◀ and ▶ keys.

```
┌────────────────────────────────────┐
│ NAV        28-06'10  04:45:31  U    │
│ RAIM OFF                             │
│     35°41.8901'N                     │
│    139°34.2569'E                     │
│   COG 001.0°  SOG  6.                │
│ W84                                  │
└────────────────────────────────────┘
```

COG "-": Less than 1 knot.

```
┌────────────────────────────────────┐
│ NAV        28-06'10  04:46:54  U    │
│ RAIM OFF                             │
│   35°41.890'N                        │
│  139°34.256'E                        │
│   COG 001.0°  SOG  6.6 kn            │
│ W84                          3G      │
└────────────────────────────────────┘
```

RAIM information:
The following information is displayed in the configured accuracy level. (Refer to 5.3.3. GPS Configuration (GPS).)
RAIM ON: Displays the configured accuracy level (10m 30m 50m 100m)
RAIM OFF: RAIM OFF
No failed satellite: SAFE
Unable to RAIM: CAUTION
Occurrence of a failed satellite: UNSAFE SATID XX
            (XX is satellite No.)

Ship's rate of turn is displayed.

There are two types of turn rate screens (A and B), and they can be cycled between using with the aid of ◀ and ▶ keys.

Turn Rate Screen A

Bow heading line

```
ROT        28-06'10  04:48:25 U

    240   W   300   330   N   030

HDG 308.2°  SOG  6.6 kn

  60   40   20    0   20   40   60
  [                ███████        ]  ▶
      ROT    35.4° /min
W84                              3G
```

COG:
The bearing is indicated by ▲.

The range can be changed.
(Refer to "5.3.6 System Settings")

◀ is displayed for port turn.

▶ is displayed for starboard turn.

Turn Rate Screen B

```
ROT        28-06'10  04:49:45 U
HDG
          126.1°
ROT              °/min
          84.6 ▶
W84                              3G
```

◀ is displayed for a port turn.

▶ is displayed for starboard turn.
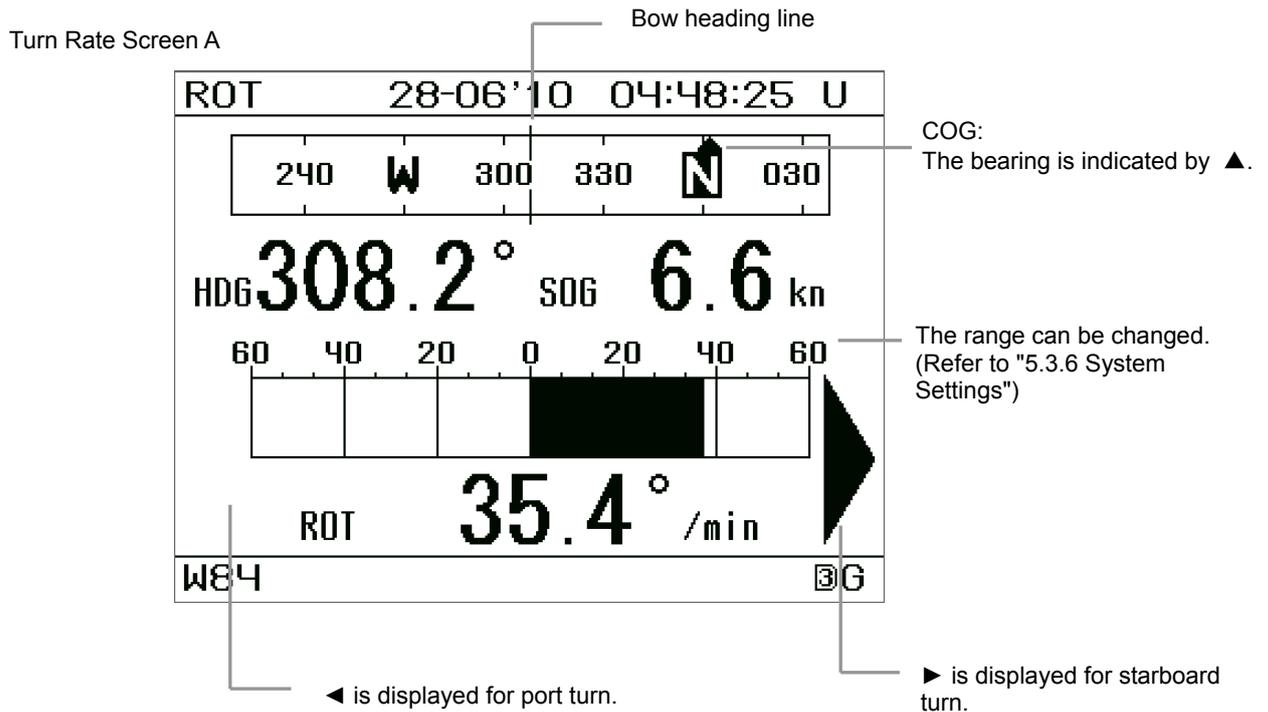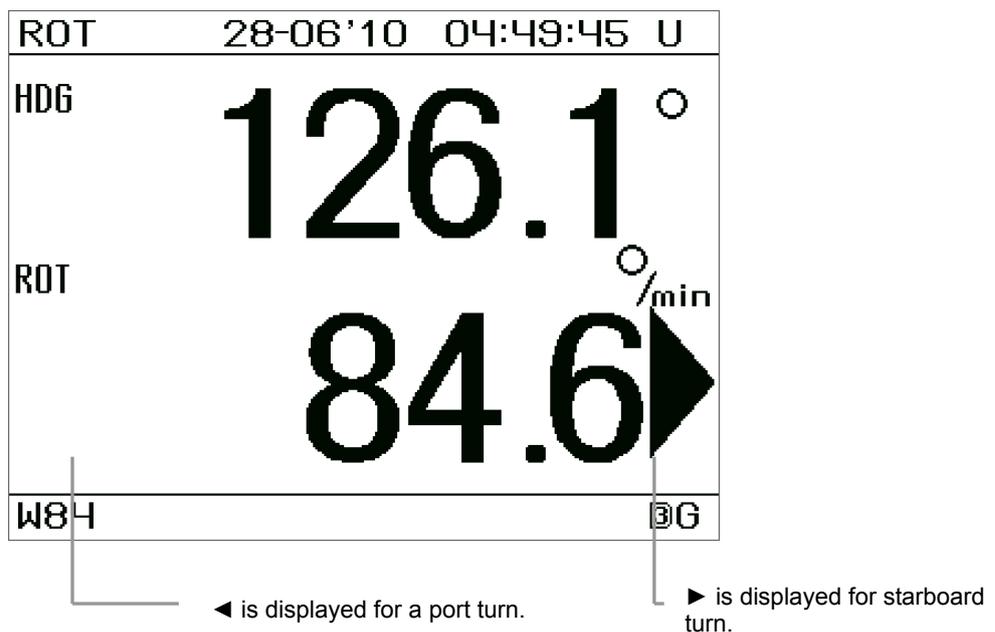
4.1.5 Water Speed / Ground Speed Screen

Ship's longitudinal speed(bow-stern), transverse speed(port-starboard), and bearing are displayed.
When the tide current calculator is not connected, the STW, CURRENT, and DEPTH values are not displayed.
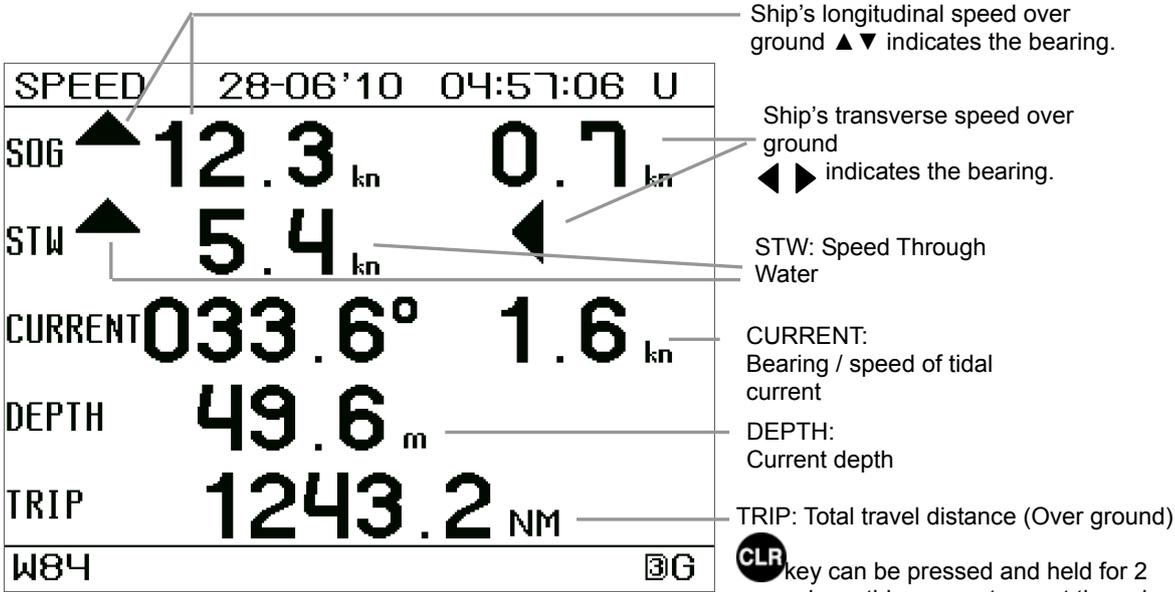
Ship's longitudinal speed over ground ▲▼ indicates the bearing.

```
SPEED    28-06'10  04:57:06  U
SOG  ▲ 12.3 kn      0.7 kn
STW  ▲  5.4 kn          ◀
CURRENT 033.6°     1.6 kn
DEPTH   49.6 m
TRIP   1243.2 NM
W84                       ③G
```

Ship's transverse speed over ground ◀ ▶ indicates the bearing.

STW: Speed Through Water

CURRENT: Bearing / speed of tidal current

DEPTH: Current depth

TRIP: Total travel distance (Over ground)

CLR key can be pressed and held for 2 seconds on this screen to reset the value of TRIP.
The value is kept even after the power is turned off until this reset is performed.

4.1.6 Trend Graph Screen

1) Roll/pitch, 2) heaving, and 3) SOG (Speed Over Ground) are displayed in a trend graph.
The right end of the graph shows the newest data.

Each graph of 1) to 3) can be cycled using the ◀ or the ▶ key.
The time range in the horizontal axis can be cycled using the ▲ or the ▼ key.

CLR key can be pressed and held for 2 seconds on the screen of graph 1) to 3) to reset the display data (past history data).
Attention) This reset is applicable all past history data for 1) Roll/pitch, 2) heaving, and 3) SOG.

```
M GRAPH  07-10'10  09:34:57  U
2.0m  HVE(─)           AVE




-2.0m        ▲SPA
W84
```

```
M GRAPH  08-10'10  05:29:16  U
10deg  ROL/PIT(─/┄)  AVE




-10deg       ▲SPA
W84
```

```
M GRAPH  08-10'10  06:22:06  U
5kn   SPD(─)          AVE




0kn         ▲SPAN:   1MIN
W84                       ③G
```
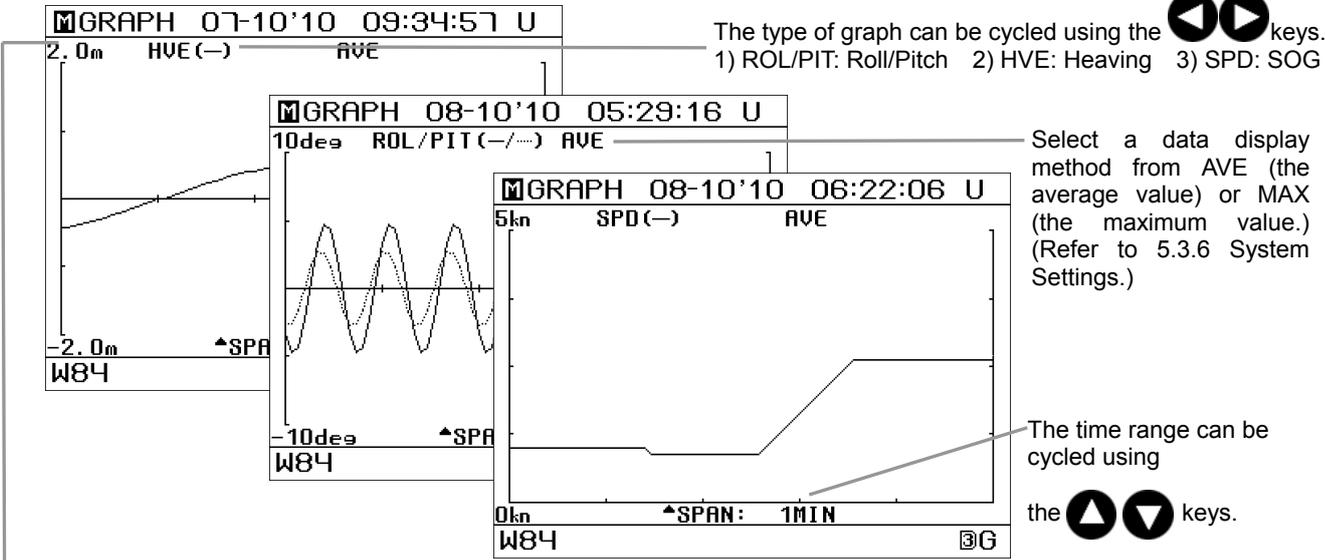
The type of graph can be cycled using the ◀▶ keys.
1) ROL/PIT: Roll/Pitch   2) HVE: Heaving   3) SPD: SOG

Select a data display method from AVE (the average value) or MAX (the maximum value.) (Refer to 5.3.6 System Settings.)

The time range can be cycled using the ▲ ▼ keys.

The range of the vertical axis for each graph can be cycled. (Refer to 5.3.6 System Settings.)

4.1.7 Calculate Distance Screen

The distance and the bearing between any starting point and ending point are calculated.

```
CALC      22-02'10  01:57:41  U
DISTANCE  CALCULATION
 STARTING POINT LAT/LON
  LAT           35° 00.0000'N
  LON          135° 00.0000'E
 TERMINAL POINT LAT/LON
  LAT           37° 00.0000'N
  LON          148° 00.0000'E
 SAIL  GC/RL  RL

 DIST    645.00NM
 BRG      79.3°
W84                        ③G
```

Select a starting point from the ship's position or any other positions. When selecting the ship's position, set to THIS SHIP to automatically configure to the ship's current position.

Displayed starting point

Select a terminal point form the ship's position or any other positions.

Displayed terminal point

Select sail from
GC: Great circle or
RL: Rhumb line

The distance between the starting point and the ending point and the bearing of the ending point from the starting point are displayed.

4.1.8 Configuration Screen

Press the **MENU** key to go to the Configuration menu screen. Refer to "5.3 Main Menu" for details.

```
MAIN MENU        11:46:33  U
 DISPLAY
 HEADING
 GPS
 SBAS
 BEACON
 SYSTEM
 DATA I/O
 VERSION INFO
 OTHERS
 LANGUAGE

W84                        ③G
```

Section 5   Operation

5.1 Menu List

5.1.1 Menu List

MAIN MENU

```
├ DISPLAY ─┬ CONTRAST                                    1～7～13
│          ├ DIMMER          ─┬ MAXIMUM                  1～9～10
│          │                  ├ TYPICAL                  1～6～10
│          │                  └ MINIMUM                  1～4～10
│          ├ CLICK SOUND                                 ON/OFF
│          ├ REVERSING MODE                              NORMAL,REVERSE1,REVERES2
│          ├ START SCREEN                                COMP-A,-B,-C,-D,-E,-F,HDG,SOG,COG,NAVI-A,-B,ROT-A,-B,
│          │                                             SPEED, GRAPH, CALC
│          ├ DECIMAL FONT SIZE                           LARGE, SMALL
│          ├ COMP-C/D POSN DIGIIT                        3,4
│          └ CURRENT LAYERS                              ALL 1～3～999
│
├ HEADING ─┬ RESTORATION                                 AUTO,MANUAL
│          ├ BACKUP                                      1,2,3
│          ├ INTERRUPT NMEA                              NULL,STOP
│          ├ HEADING OFFSET                              `-10.0°～0.0°～+10.0°
│          └ OUTPUT
│            RESOLUTION                                  0.1,0.01°
│
├ GPS ─┬ MODE                                            AUTO,2D,3D
│      ├ HDOP                                            4,10,20
│      ├ SMOOTHING        ─┬ POSITION                    0～10～99s
│      │                   ├ SPEED(SOG)                  0～4～99s
│      │                   └ COURSE(COG)                 0～4～99s
│      ├ RAIM ACCURACY LEVEL                             OFF,10,30,50,100m
│      └ INITIALIZATION   ─┬ LATITUDE
│                          ├ LONGITUDE
│                          ├ ANT HEIGHT
│                          ├ DATE                        DD-MM'YY
│                          └ UTC                         HH:MM:SS
│
├ SBAS ─┬ MODE                                           AUTO,GPS ALONE,SBAS,BEACON
│       ├ SBAS SEARCH                                    AUTO,MANUAL
│       ├ TYPE 0
│       │  INFORMATION                                   ON,OFF
│       └ RANGING                                        ON,OFF
│
├ BEACON ─┬ STATION SELECT                               MANUAL,AUTO
│         ├ BIT RATE                                     50,100,200bps
│         ├ FREQUENCY                                    283.5～325.0kHz
│         └ BEACON INFORMATION                           ON,OFF
│
├ SYSTEM ─┬ TIME   DIFF                                  `-13:00～00:00～+13:00
│         ├ DATE DISP                                    DD-MM'YY,'YY-MM-DD,MM-DD'YY
│         │                                              DD MMM,' YY MMM DD,' YY
│         ├ TIME DISP                                    12,24
│         ├ DATUM                                        WGS84,WGS72,JAPAN,………SPK
│         ├ SPEED UNIT                                   kn,km/h,mi/h
│         ├ ROT RANGE                                  ┌ ±30,60,90,120,150,180,
│         │                                            │ 210,240,270,300,600,900,
│         │                                            └ 1200,1500,1800,2100,2400,2700°/min
│         ├ ROT SMOOTHING                                0～10～99s
│         ├ ROLL/PITCH RANGE                             ±5,10,15,20,25,30°
│         ├ ROLL OFFSET                                  `-30～0～+30°
│         └ PITCH OFFSET                                 `-30～0～+30°
│         NEXT PAGE
│
```

```
├ SYSTEM 2          ┬ PREVIOUS PAGE
|                   ├ HEAVING BAR RANGE                              1, 2, 3, 4, 5, 10, 20, 30, 40, 50, 100
|                   ├ HEAVING BAR DISP                               OFF, DISP1, DISP2, DISP3, DISP4
|                   ├ TREND GRAPH                                    AVERAGE, MAXIMUM
|                   ├ HVE POS OFFSET       ┬ X                       −999.9~+0.0~+999.9m
|                   ├                      ├ Y                       −999.9~+0.0~+999.9m
|                   ├                      └ Z                       −999.9~+0.0~+999.9m
|                   ├ RMC MAG CORR                                   AUTO, MANUAL
|                   ├ GPS 5Hz DRAW                                   ON, OFF
|                   └ SOG BAR RANGE                                  5, 10, 15, 20, 25, 30, 50, 100
|
├ DATA I/O          ┬ SENSOR THROUGH                                 NMEA,NSK,AD-10,IEC
|                   ├ DATA OUT1                                      NMEA,NSK,AD-10,IEC
|                   ├ DATA OUT3                                      NMEA,NSK,IEC
|                                                                    NMEA/OFF, NSK/OFF, BEACON/OFF, IEC/OFF, 4341/OFF,
|                   ├ DATA OUT4/IN4                                  NMEA/CURRENT, BEACON/CURRENT, IEC/CURRENT,
|                   |                                                4341/CURRENT, NMEA/CCRP, BEACON/CCRP, IEC/CCRP, 4341/CCRP
|                   |                                                BEACON/CURRENT
|                   ├ DATA OUT5                                      NMEA,NSK,IEC
|                   └ LOG PULSE                                      OFF,200p/nm,400p/nm
|
├ VERSION INFO                                                       DISPLAY,SENSOR,GPS1,GPS2,GPS3
|
├ ALERT             ─ ALERM ESCALATION  ┬ POSITION                   OFF,ON
|                   |                   ├ HEADING.                    OFF,ON
|                   |                   └ TIME                        30,60,120,180,240,300
|                   ├ HEADER ALERT DISP                              OFF,ON
|                   ├ DGPS ALERT                                     OFF,ON
|                   └ TEST MODE                                      OFF,ON
|
└ LANGUAGE                                                           ENGLISH,JAPANESE


MAIN MENU(M)
├ ANT CHECK
|
├ INPUT CHECK       ─ PORT SELECTION          START,STOP             OFF,INPUT0,INPUT4
|
├ DIAGNOSIS         ┬ DISPLAY                                        OFF,START
|                   ├ SENSOR                                         OFF,START
|                   └ LCD                                            OFF,START
|
├ DEMO              ─ DEMO TYPE                                      OFF,01~99
|
├ PRODUCT TYPE      ┬ DISPLAY          ┬ TYPE                        MAIN,SUB
|                   |                  ├ SERIAL
|                   |                  └ SFI
|                   └ SENSOR           ┬ SERIAL
|                                      ├ BARCODE
|                                      └ DEFAULT No.                 0
|
├ RESET             ┬ DISPLAY                                        NO,YES
|                   ├ SENSOR                                         NO,YES
|                   └ ALL                                            NO,YES
|
├ SOFT UPDATE       ┬ UPDATE AREA                                    SENSOR,DISPLAY
|                   └ BIT RATE FROM PC  ┬ SENSOR                     AUTO
|                                       └ DISPLAY                    38400,57600,115200bps
|
└ CCRP              ┬ SHIP                                           DISABLE, ENABLE
                    ├ BEAM                                           1.0~70.0
                    ├ LENGTH                                         1.0~700.0
                    ├ SENSOR                                         DISABLE, ENABLE
                    ├ SENSOR                                         No.1~No.9
                    ├ X                                              −35,0~0.0~35.0
                    ├ Y                                              0.0~700.0
                    ├ CCRP                                           DISABLE, ENABLE
                    ├ X                                              −35,0~0.0~35.0
                    └ Y                                              0.0~700.0
```

* The underlined settings are factory defaults. If the equipment is master-reset, all the parameters are configured to defaults.
* CCRP settings will not be initialized by master reset.

●Default of DATA I/O

Name on Display	Set item	Default
SENSOR THROUGH	NMEA VER	NMEA　Ver2.1
	BIT RATE	38400bps
	INTERVAL(HDT,THS,ROT)	25msec
	SENTENCE	HDT　ROT
DATA OUT1	NMEA VER	NMEA　Ver2.1
	BIT RATE	4800bps
	SENTENCE	―（None）
DATA OUT2	NOT USED	
DATA OUT3	NMEA VER	NMEA　Ver2.1
	BIT RATE	4800bps
	SENTENCE	GGA　VTG　RMC　GLL　(Interval is 1 sec.)
DATA OUT4	NMEA VER	NMEA　Ver2.1
	BIT RATE	4800bps
	SENTENCE	―（None）
DATA OUT5	NMEA VER	NMEA　Ver2.1
	BIT RATE	4800bps
	SENTENCE	―（None）

5.2 Basic Operation

Press the [PWR CONT] key to turn the power on, the system starts initialization.
Once initialization has been completed, self-diagnosis will run when the equipment condition has been checked, the screen switches to the standard screen.

Attention

If the unit cannot be turned on, check the main power supply and the connection of display unit cable.

Unit Initialization   Self-Diagnosis Screen


```
JRC


GPS COMPASS



DISPLAY VER. R52.01
```

```
*SELF DIAGNOSING...
 ROM[1]       : OK
 ROM[2]       : OK
 RAM          : OK
 SIO[0]       : OK
 SIO[1]       : OK
 SIO[2]       : OK
 SIO[3]       : OK
 SIO[4]       : OK
 SIO[5]       : OK

-PRESS 'CLR' KEY
```

```
*CHECKING CONFIG OF SENSOR
```

Display Unit
Diagnosis

Sensor Diagnosis
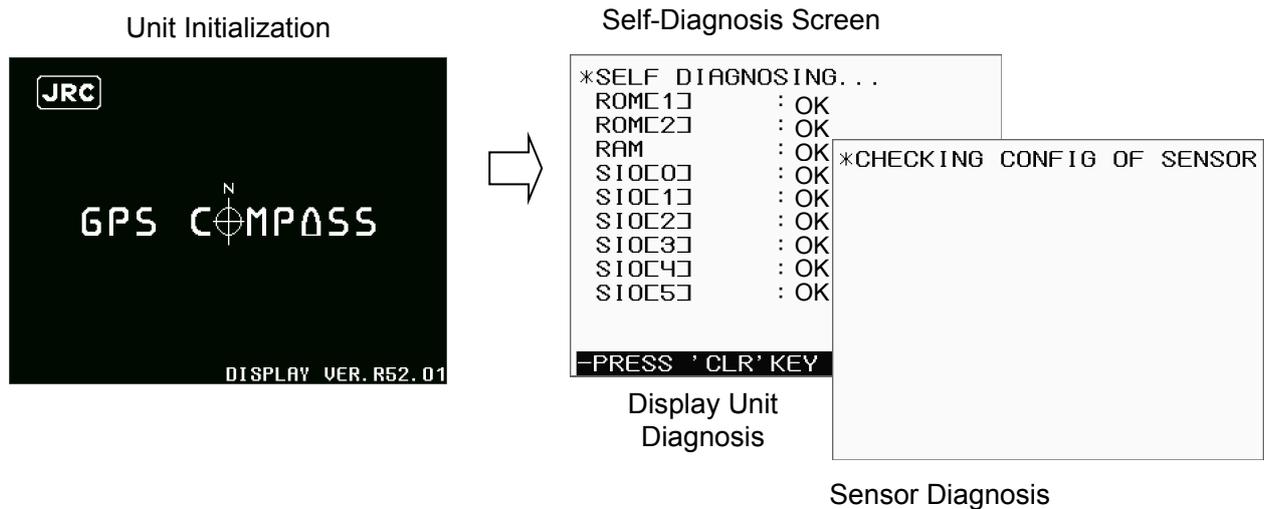
Memo

Pressing the [CLR] key during the initialization of the system moves you to the self-diagnosis screen. (Initialization is still performed in this case.)

Press the [CLR] key to break the self-diagnosis and display the standard screen.

5.2.1.1 Startup (Standard)

If the self-diagnosis results are all "OK", the unit automatically switches to the standard screen.

Self-Diagnosis Screen

```
*SELF DIAGNOSING...
 ROM[1]       : OK
 ROM[2]       : OK
 RAM          : OK
 SIO[0]       : OK
 SIO[1]
 SIO[2]
 SIO[3]
 SIO[4]
 SIO[5]

-PRESS 'CL
```

```
*CHECKING CONFIG OF SENSOR
```

Standard Screen


```
28-06'10        N         04:24:26
                                    U
           NW    000    NE
              330    030
         300               060
              HDG
        W  270  005.6°  090  E
                               120
           240
                 150
W84                           ③G
```
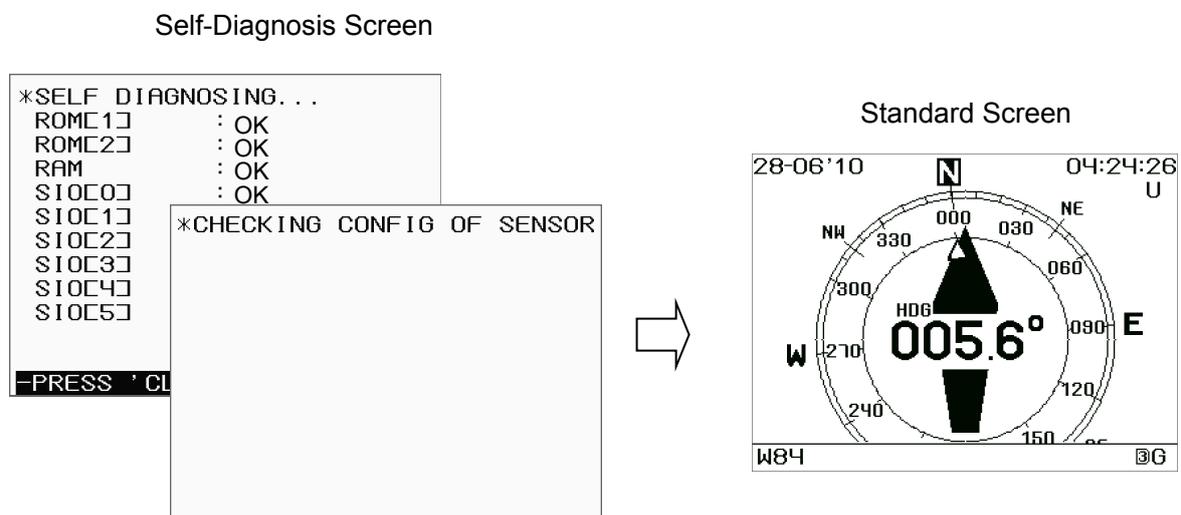
If any of the self-diagnosis results are "NG", the results are displayed.
The unit does not switch to the standard screen unless the **CLR** key is pressed.

Attention

> If any errors (NG) are detected, perform a DIAGNOSIS (self-diagnosis) from the 5.4 Maintenance Menu, and check the details of the failed item. (Refer to "5.4.3 Self-Diagnosis (DIAGNOSIS)").

```
*SELF DIAGNOSING...
 ROM[1]        : OK
 ROM[2]        : OK
 RAM           : OK
 SIO[0]        : OK
 SIO[1]        : OK
 SIO[2]        : OK
 SIO[3]        : OK
 SIO[4]        : OK
 SIO[5]        : NG


-PRESS 'CLR'KEY TO EXIT-
```

5.2.1.3 Startup (Error-2)

Messages shown below may be displayed during sensor diagnostics.
The message appears when display unit and sensor configuration settings do not match, when equipment has been replaced.

When this occurs, select one of the items, and press the **ENT** key to perform it.

[1. USE SENSOR CONFIG]: Replaces display configuration with the sensor configuration.
[2. USE DISPLAY CONFIG]: Replaces the sensor configuration with the display configuration.

Attention

> Consult with JRC or its affiliate if this is displayed frequently.

```
*CHECKING CONFIG OF SENSOR

 DISPLAY CONFIG DIFFERS
FROM SENSOR.

 SELECT ONE OF;
1.USE SENSOR CONFIG.
2.USE DISPLAY CONFIG.
```

If the following screen is displayed after the unit is turned on, press the [PWR CONT] key and [DIM] key simultaneously to turn off the power.

Attention

> Contact JRC or its affiliate.

```
CHECK SUM
    COMPARING ERROR !

PLEASE RE-INSTALL
            THE PROGRAM.




PLEASE RESTART AFTER
            SOFTWARE UPDATE

PRESS AND HOLD [DIM]+[PWR]
```
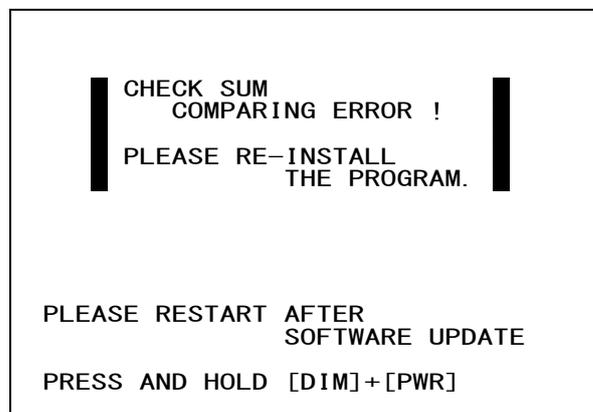
5.2.2 Turning the Unit Off

If the [DIM] key and [PWR CONT] key are pressed and held down simultaneously, the power will be turned off and the screen display will be off.

5.2.3 Adjusting the Backlight

The brightness of the display can be set to one of four levels.
The brightness is set to medium when the unit is turned on.

Each time the **DIM** key is pressed, the brightness of the backlight cycles as below:
Bright (MAXIMUM) → Medium (TYPICAL) → Dark (MINIMUM) → Off → Dark (MINIMUM) →
Medium (TYPICAL) → Bright (MAXIMUM)

Memo

> Level settings can be performed for all brightness levels except "Off".   (Refer to "5.3.1 Display Settings")
> The key panel brightness changes in accordance with the display brightness.

5.2.4 Adjusting the Contrast

The contrast of the display can be set to one of 13 levels.

Each time the **PWR CONT** key is pressed, the display contrast decreases, and after the lightest level is reached, the contrast gradually increases back.
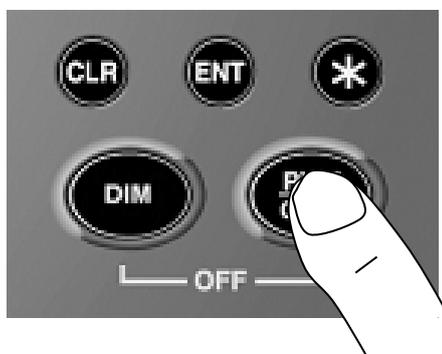
5.2.5 Stopping the Buzzer

Pressing the **CLR** key silence the buzzer.

The buzzer sounds when one of the following occurs.
- Position measurement is interrupted
- Bearing measurement is interrupted
- An error occurs

5.2.6 Changing the Display

Each time the **DISP** key is pressed, the screen display changes. (Refer to "4.1 Display Screen")

Each time the **USER** key is pressed, the screen display changes.

SATINFO2: The positions of the GPS satellite(s) can be confirmed.
SATINFO1: The signal levels from individual satellite can be checked.

Satellite
Position
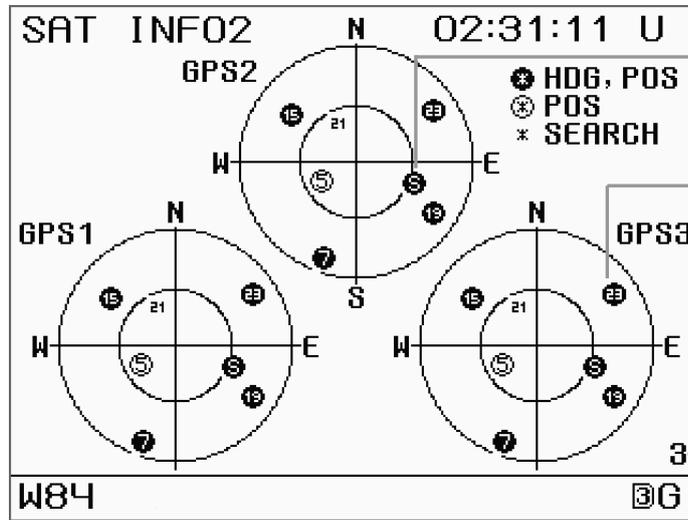
SBAS Satellite
(Corresponds to
  MSAS/WAAS/EGNOS)

Satellite Number
No border: unused
○: Used for position
●: Used for bearing and
   position

Antenna in use
3: With three antenna
2: With two antenna

Signal Level
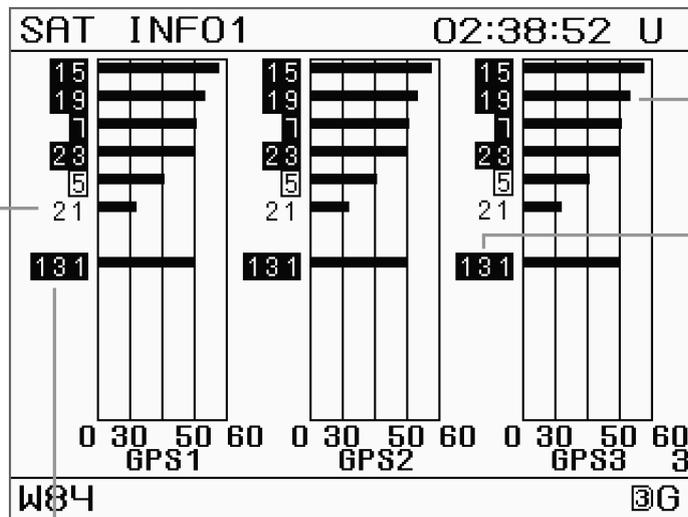
Reception Level
Standard levels are
around 40 - 50

Number of treble:
SBAS Satellite
(Corresponds to
  MSAS/WAAS/EGNOS)

Reception Level
Scale

Antenna in use
3: With three antenna
2: With two antenna

Unused
satellite

Satellite Number
□: Used for position fix
■: Used to determine the bearing and fix the position

Memo

• If JLR-4331 or a DGPS beacon receiver is connected, Beacon Information will be added to the above. Refer to "5.3.5 Beacon Settings(BEACON)".
  BEACON INFO Screen → SAT INFO2 Screen → SAT INFO1 Screen
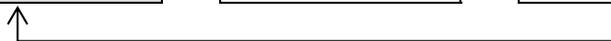
Each time the ✳ key is pressed, the screen display changes.   Date and time

When alert information is updated, the ✳ symbol appears on the status bar.

Pressing the ◀ ▶ key will diaplay the member of grouping / aggregation.

Pressing the ▲ ▼ key will scroll the screen.

Alert ID

++: Guroping header
 +: Aggregation
space: Alert

Alert state

Alert instance

Date and time

```
ALERT INFO      09:38:29 U
⇕11001, 0,14-05'20 13:17:56
 B,A,UNACK,CALCULATION FAIL
 LOSS OF POSITION,ATTITUDE
  3012, 2,14-05'20 13:19:21
 B,W,SILENCED,DOUBTFUL HEAD
 PORT1 HEADING UNCHANGE




W84 ✳                    3G
```

Category

priority

Alert title
Alert description text

Alert information
 update symbol

Priority	
A	Alarm
W	Warning
C	Caution

Alert state	
UNACK	unacknowledged
ACKED	acknowledged
RESP	responsibility transferred
SILENCED	silenced
RECTIFIED	rectified

▶ (◀

```
ALERT INFO      09:39:19 U
⇕11001, 0,14-05'20 13:17:56
 B,A,UNACK,CALCULATION FAIL
 LOSS OF POSITION,ATTITUDE
┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐
│  3014, 2,14-05'20 13:17:56│
│ B,A,UNACK,LOST POSITION  │
│ LOSS OF POSITION         │
│  3015, 1,14-05'20 13:20:56│
│ B,W,UNACK,LOST HEADING   │
│ LOSS OF HEADING,ROT      │
└ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘
  3012, 2,14-05'20 13:19:21
 B,W,SILENCED,DOUBTFUL HEAD
 PORT1 HEADING UNCHANGE


W84 ✳                    3G
```

Member

Memo

- If alert has not occurred, "NO ALERTS" is displayed.
- To display the menber of grouping / aggregation, refer to "5.3.9 Alert Settings (ALERT)" and "HEADER ALERT DISP" set to "ON".

●Starting the anchor watch

Press and hold the **USER** key for 2 seconds to set (start) anchor watch.
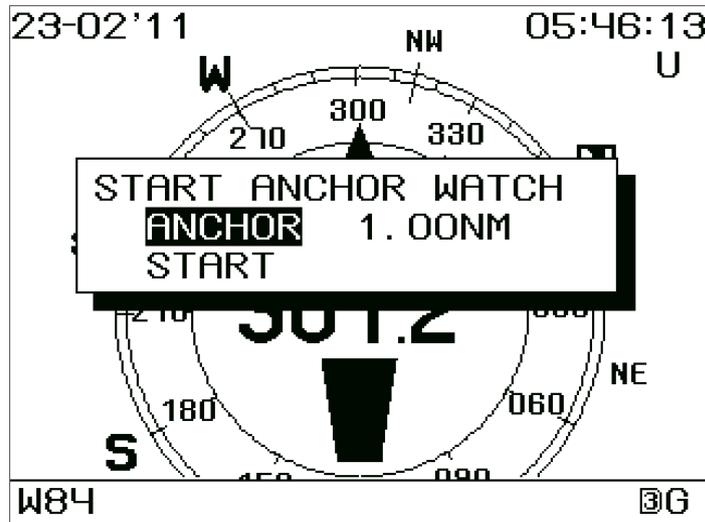
1.   Select ANCHOR using the **ENT** key, and input a desired range (radius) to watch using the ▲ ▼ keys.

2.   The range can be from 0.01 to 9.99.   The unit of range is the unit configured in SPEED UNIT in the System menu.   Refer to 5.3.6 System settings for details.

3.   Next, enter the input range (radius) using the **ENT** key.

4.   Select START and press the **ENT** key to start anchor watch.
During anchor watch, the following icons are displayed in a status bar (the bar in the bottom of the screen.)

◉ : Inside the set range (radius)

◯ : Outside the set range (radius)

●Stopping the anchor watch
1.   Stop the anchor watch by pressing and holding the **USER** key for 2 seconds again.

2.   The following pop-up is displayed, then, select STOP using the **ENT** key.
     At a confirmation display- "STOP ANCHOR WATCH.   ARE YOU SURE?", select YES to stop anchor watch.
     Selecting YES stops anchor watch.
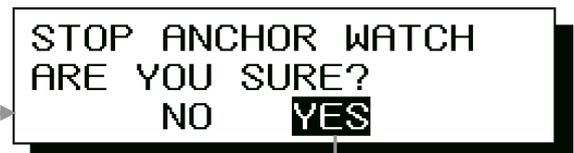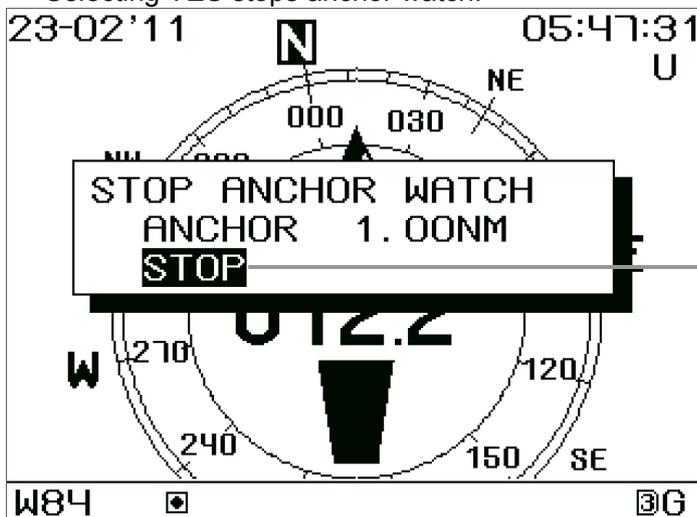
Selecting YES stops anchor watch.

Memo

Anchor watch
If the ship moves out of the following dotted circle, an alert will turn on.

⬡ is displayed when the ship is outside the circle.

OWN SHIP

X.XX

An alert will turn on when the ship moves out of this circle.

⬣ is displayed when the ship is inside the circle.

The set range of anchor watch (set by radius)
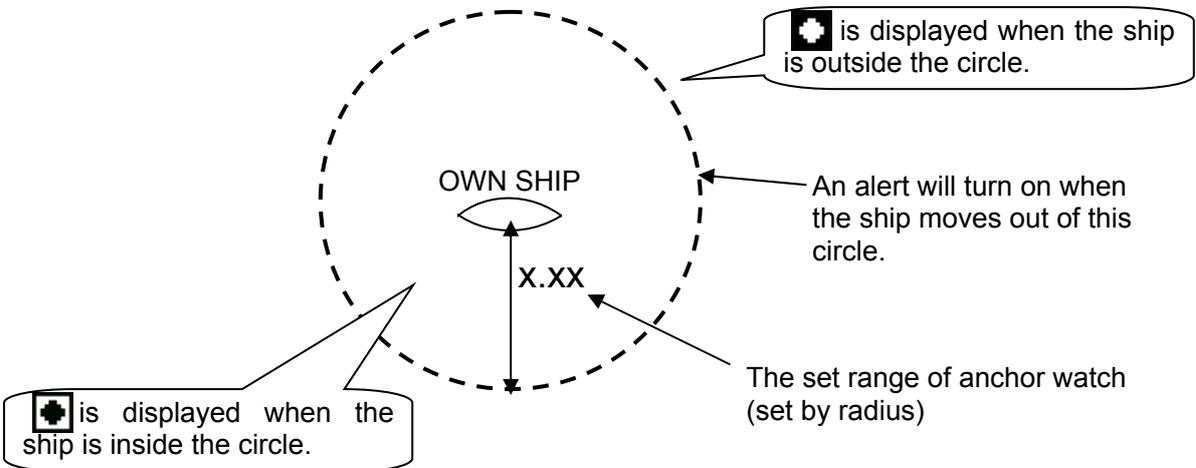
When the ship moves out of the set range, the following pop-up will show and an alert will turn on (Contact points are not coordinated.)

```
3032, 1,30-07'20  10:12:08
B,W,UNACK,ANCHOR OUT
EXCEEDING THE ANCHOR RANGE
```

5.3 Main Menu

Open the Main Menu to check or change settings.
The Main Menu can be invoked by pressing the [MENU] key on any screen.

As delivered the language is English. To change to Japanese, Refer to "5.3.10 Language Settings (LANGUAGE)".

```
MAIN MENU          06:45:18 U
DISPLAY
HEADING
GPS
SBAS
BEACON
SYSTEM
DATA I/O
VERSION INFO
ALERT
LANGUAGE

W84                          3G
```
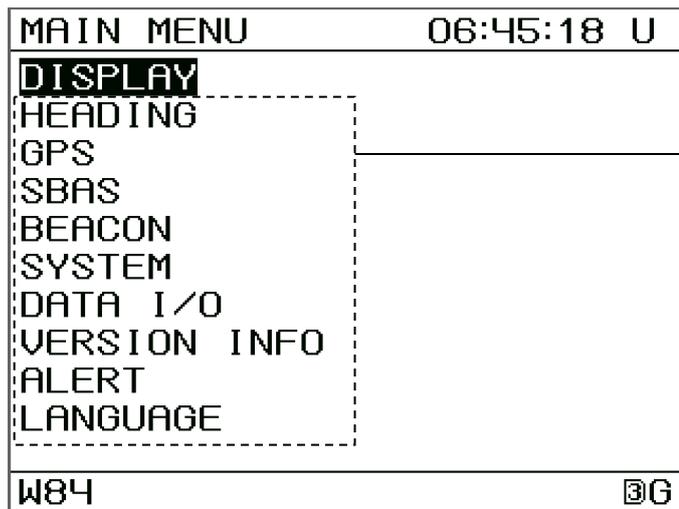
Settings confirmation
(Items setting changes
cannot be performed.)
To alter the settings of these
items go to Maintenance
Mode.
(Refer to 5.4)

Main Menu

Procedure

1. Press the ▲ ▼ keys to move the cursor and select an item.

2. Press the [ENT] key to display the menu for the selected item.

The following menus are available.
- DISPLAY: Displays settings menu for screen settings such as contrast and brightness.
                  (Refer to 5.3.1)
- HEADING: Displays settings menu for heading alignment related settings. (Refer to 5.3.2)
- GPS: Displays settings menu for GPS related settings. (Refer to 5.3.3)
- SBAS: Displays settings menu for SBAS related settings. (Refer to 5.3.4)
- BEACON: Displays settings menu for beacon related settings. (Refer to 5.3.5)
- SYSTEM: Displays settings menu for system related settings. (Refer to 5.3.6)
- DATA I/O: Displays settings menu for input and output port (data) related settings. (Refer
                  to 5.3.7)
- VERSION INFO: Displays program version of display unit and sensor. (Refer to 5.3.8)
- ATERT: Displays settings menu for alert settings. (Refer to 5.3.9)
- LANGUAGE: Displays Language Settings Menu. (Refer to 5.3.10)

Selecting **DISPLAY** from the "5.3 Main Menu" displays the Setup Menu.
From the Setup Menu you can set the contrast, brightness levels, and change buzzer settings.

```
┌─────────────────────────────────┐
│ DISPLAY          06:47:36 U     │
│ ┌─────────┐                     │
│ │CONTRAST │        :    1       │
│ └─────────┘                     │
│ DIMMER                          │
│   - MAXIMUM      :    1          │
│   - TYPICAL      :    1          │
│   - MINIMUM      :    1          │
│ CLICK SOUND      :  OFF          │
│ REVERSING MODE : NORMAL          │
│ START SCREEN     :  COMP-A       │
│ DECIMAL FONT SIZE    :LARGE      │
│ COMP-C/D POSN DIGIT :3           │
│ CURRENT LAYERS  :  ALL           │
│ W84                       3G    │
└─────────────────────────────────┘
```

Setup Menu

Procedure

1. Press the ▲ ▼ keys to move the cursor and select an item.

2. Press the **ENT** key to display the menu for the selected item.

Memo

• Press **CLR** to return to the Main Menu.

The following submenus are available.
- CONTRAST: Adjusts LCD contrast. (Refer to 5.3.1.1)
- DIMMER: Adjusts LCD brightness. (Refer to 5.3.1.2)
- CLICK SOUND: Turns click sound on or off. (Refer to 5.3.1.3)
- REVERSING MODE: Reverses black and white of display screen. (Refer to 5.3.1.4)
- START SCREEN First screen after power up is selected.
  The Screen allocated in the DISP key can be selected.
  (Refer to 5.3.1.5)
- DECIMAL DISP SIZE: Select the display size of decimal numbers on the screen.
  (Refer to 5.3.1.6)
- COMP-C/D POSITION DIGIT: Select 3 or 4 digits for displaying the current position on
  the Compass screens C/D. (Refer to 5.3.1.7)
- CURRENT LAYERS: Select the layer of current for displayed. (Refer to 5.3.1.8)

5.3.1.1　Adjusting the Contrast

Select CONTRAST to adjust the contrast. Press the ⬆⬇ keys to adjust the contrast, and press the ENT key to set the adjustment.

```
------------------------------------------------
 CONTRAST               :   ٦
------------------------------------------------
```

The lowest contrast is 1, and the highest is 13.
The default is 7.

5.3.1.2　Brightness Settings (DIMMER)

The brightness can be set to bright, medium, dark, and off by pressing the DIM key. From this menu, you can set the values for each of these brightness levels.

Select MAXIMUM (TYPICAL , MINIMUM), and press the ENT key to move the cursor to the right.

Pressing the ⬆⬇ keys increments or decrements the value by one, and the screen brightness changes accordingly. Press the ENT key to set the selection. (TYPICAL and MINIMUM values can be set in the same way)

```
------------------------------------------------
 DIMMER
   -  MAXIMUM      :   9
   -  TYPICAL      :   6
   -  MINIMUM      :   4
------------------------------------------------
```
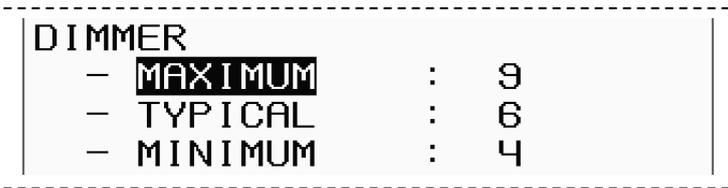
> **Memo**
> - Set the largest value for MAXIMUM, and the smallest value for MINIMUM.
> - The maximum/minimum level adjustable by key-brightness are the ones set here DIMMER settings.

5.3.1.3　Click Sound Settings (CLICK SOUND)

Select CLICK SOUND to turn on or off the key click sound.

Pressing the ⬆⬇ keys cycles the buzzer on and off. Press the ENT key to confirm the selection.

```
------------------------------------------------
 CLICK SOUND       :  ON
------------------------------------------------
```

ON: Buzzer on
OFF: Buzzer off

> **Memo**
> The buzzer cannot be deactivated.

5.3.1.4 Display Reversing Setting (REVERSING MODE)

Select **REVERSING MODE** to reverse the black and white of the display screen.
Pressing the ▲ ▼ keys will rotate the settings. Press the **ENT** key to confirm the selection.

NORMAL: The letters are black. (Background is white)
REVERSE 1:   The letters are white. (Background is black)
REVERSE 2:   The letters are white, and the letters on the status bar are black.

NORMAL   REVERSE1   REVERSE2

Reversed Screens

5.3.1.5 First Screen Setting (START SCREEN)

The first screen after power up can be selected.
The screen allocated in the DISP key (Refer to 4.1 Display Screen) can be selected.

5.3.1.6 Decimal Display Size Setting (DECIMAL DISP SIZE)

The display size of decimals on the screen assigned to the DISP key (refer to 4.1 Display Screen) can be selected.

```
DECIMAL FONT SIZE   :LARGE
                     LARGE
                     SMALL
```

LARGE: The display size of decimal numbers is large.   Ex. **3.2**
SMALL: The display size of decimal numbers is small.   Ex. **3**.₂

Applicable screens are Compass Screens A to F, Bow Heading Screen, Navigation Screen, Turn Rate Screen, and Water Speed/Ground Speed Screen.

5.3.1.7 Current Position Display Digit Setting on Compass Screens C/D (COMP-C/D POSITION DIGIT)

The number of digits for displaying the current position on the Compass screens C/D can be selected.

```
                            3
                            4
COMP-C/D POSN DIGIT  :4
```

3: The current position is displayed with 3 decimals. Ex.
```
35° 41.890'N
139° 34.256'E
```

4: The current position is displayed with 4 decimals. Ex.
```
35° 41.8901'N
139° 34.2569'E
```

5.3.1.8 Current Layers Setting

When the current meter is connected, the layer to be displayed can be selected.

CURRENT LAYERS : 000 ALL

      1~999   : Select the layer number for displayed.
      ALL   : Display the data for received.

● For connection of a current meter
  When a current meter is connected, STW (speed through water), CURRENT (current set and speed of tidal stream), and DEPTH (depth of tidal stream) can be displayed.
  (For the screen, refer to 4.1.5.)
1. Connect the current data to 1 and 2 pins of DATA IN/OUT2 connector. (Format is VBW and CUR sentence, 4800bps. There is no setting item for inverval. Outputting in every 1 - 1.5 seconds from the output side is favourable.)
2. Select NMEA/CURRENT or BEACON/CURRENT in the DATA OUT4/IN4 menu in the DATA I/O screen. (IN4 port will be set for CURRENT input.) By this procedure, the data of VBW, CUR sentence, and 4800bps can be received.
3. Select the LAYER.

Selecting **HEADING** from the "5.3 Main Menu" displays the Heading Settings Screen.
From this screen, the bow heading settings can be checked.

```
┌─────────────────────────────────────┐
│ⅯHEADING          05:59:27 U │
│RESTORATION           :AUTO │
│BACKUP                :3min │
│                             │
│ INTERRUPT NMEA       :STOP  │
│                             │
│ HEADING OFFSET       : +0.0°│
│ OUTPUT RESOLUTION    :0.01° │
│                             │
│                             │
│                             │
│                             │
│W84                     ⅊G   │
└─────────────────────────────────────┘
```

HEADING Settings Screen

Procedure

  1. Press the ▲ ▼   keys to move the cursor and select an item.

  2. Press the **ENT** key to display the menu for the selected item.

The following submenus are available.
  • RESTORATION: After initially checking the measured heading, to input it to a connected external device, select MANUAL. When the heading measurement has been completed, a buzzer sounds, and heading data is not output to the external device until the buzzer is stopped by pressing CLR.
  If AUTO is selected, when heading measurement has been completed, heading data is output automatically to the external device.
  • BACKUP: If the GPS signal is interrupted for some reason and the equipment cannot determine the ship's heading with the fixed position, the bearing will be reckoned with the aid of internal roll and pitch sensors.
  The user can set the time of reckoning from 1 and 3 minutes.
  • INTERRUPT NMEA: Sets HDT sentence (or THS sentence) processing when heading measurement cannot be performed.
  In case the ship's heading cannot the specified BACKUP time, the following part of $GPHDT (or $GPTHS) shall be either blank or the last determined ship's heading, Or the output of sentence can be halted.
  (Applies to output HDT sentence (or THS sentence).)

   STOP: Stops the output of HDT sentence.
   NULL: Blanks will follow $GPHDT or $GPTHS.
       $GPHDT, ,   ← NULL
       ($GPTHS, ,   ← NULL

- HEADING OFFSET:　　　The heading can be offset from -10.0º to +10.0º.
　　　　　　　　　　　　The output heading to external devices is also offset.
　　　　　　　　　　　　If an offset value is entered (any value other than 0), "H" will appear in the status bar at the bottom of the screen.
　　　　　　　　　　　　The sensor shall always be installed parallel to the keel, but in the event that this is impossible, the error can be aligned here.
- OUTPUT RESOLUTION:　Sets the resolution of the HDT (THS) sentence output.
　　　　　　　　　　　　0.1 or 0.01 can be selected.
　　　　　　　　　　　　(Normally, select the default value of 0.1)

Memo

- Press **CLR** to return to the Main Menu.

- In Maintenance Mode settings can be changed press and hold both **MENU** and ✳ for 3 seconds or more to go to the mode.

Selecting GPS from the "5.3 Main Menu" displays the **GPS** Settings Screen.
From this screen, the parameters for the sensor can be confirmed.

```
┌─────────────────────────────────────┐
│ⓂGPS               06:00:59 U        │
│┌──────┐                             │
││MODE  │              :AUTO          │
│└──────┘                             │
│HDOP                  :10            │
│SMOOTHING-POSITION     :10s          │
│         -SPEED(SOG)   : 4s          │
│         -COURSE(COG)  : 4s          │
│RAIM ACCURACY LEVEL :100m            │
│                                     │
│INITIALIZATION                       │
│                                     │
│                                     │
│                                     │
│W84                           ③G     │
└─────────────────────────────────────┘
```

GPS Settings Menu

Procedure

1. Press the ⬆ ⬇ keys to move the cursor and select an item.

2. Press the ⒺⓃⓉ key to display the menu for the selected item.

The following submenus are available.
- MODE   AUTO: 2D and 3D position fix automatically switched.
                         Normally, the setting should be left AUTO.
              2D   The position is fixed in two-dimensional measurement.
              3D: The position is fixed in three-dimensional measurement.
- HDOP: 4, 10, or 20 can be selected. Normally, the setting should be left 10.
- SMOOTHING   POSITION: Can be set between 0 and 99.
              SPEED: Can be set between 0 and 99.
              COURSE: Can be set between 0 and 99.
- RAIM ACCURACY LEVEL: Off, 10, 30, 50, or 100 can be selected.
- INITIALIZATION: Displays the Initial Settings Screen. This is used for initial settings for the GPS receiver. This item is not normally used.

Memo

- Press ⒸⓁⓇ to return to the Main Menu.

- In Maintenance Mode settings can be change press and hold both (MENU) and ✳ for 3 seconds or more to go to the mode.

The parameters of GPS receiver can be set in INITIALIZATION.

With ▲ ▼ keys select an item, and press the **ENT** key.

```
┌─────────────────────────────────┐
│ⓂINITIALIZATION 12:16:23 U       │
│LATITUDE      :   35°00.00'N      │
│LONGITUDE     :  135°00.00'E      │
│ANT HEIGHT      :  20m            │
│DATE(DD-MM'YY)  :  30-01'07       │
│UTC (HH:MM:SS)  :  12:00:00       │
│                                  │
│                                  │
│SET                               │
│                                  │
│                                  │
│                                  │
│W84                          ③G   │
└─────────────────────────────────┘
```

GPS Initial Settings Menu

Procedure

1. Press the ▲ ▼ keys to move the cursor and select an item.

2. Press the **ENT** key to display the menu for the selected item.

3. Values can be selected with the ▲ ▼ keys, and the cursor position can be changed with the ◄ ► keys.

4. Press the **ENT** key at the **SET**.

The following submenus are available.
*   LATITUDE: Enter the approximate ship's latitude.
*   LONGITUDE: Enter the approximate ship's longitude.
*   ANT HEIGHT: Enter the sensor height above the waterline. 2D positioning needs the height for
                    calculation.   The height is not used in 3D positioning.
*   DATE: Enter today's date in UTC.
*   UTC: Enter the present time in UTC.
*   SET: Send the value to the sensor.

Memo

*   Press **CLR** to return to the Main Menu.

*   In Maintenance Mode settings can be changed press and hold both **MENU** and **✱** for 3
    seconds or more to go to the mode.

Selecting SBAS from the "5.3 Main Menu" displays the **SBAS** Settings Screen.
From this screen, the parameters for the sensor can be confirmed.

```
SBAS            12:22:58 U
MODE   : SBAS
SBAS SEARCH  : AUTO
TYPE 0 INFORMATION : ON
RANGING          : OFF




W84                       3G
```
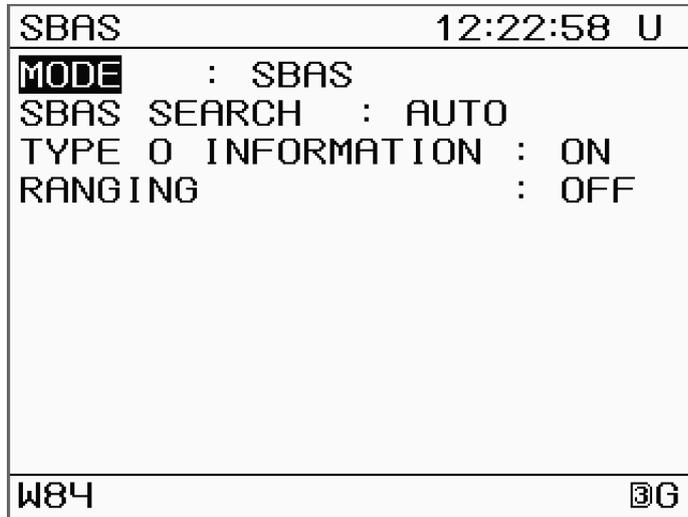
SBAS Settings Menu

Procedure

1. Press the ▲ ▼ keys to move the cursor and select an item.

2. Press the **ENT** key to display the menu for the selected item.

The following submenus are available.
*   MODE: Select the position correction mode.
    *   AUTO: Beacon, SBAS, or GPS Only will be selected automatically for measurement according to the status of signal reception.
        (In order of : Beacon → SBAS → GPS only)
    *   GPS ALONE: Position is fixed by GPS only.
        SBAS or beacon measurement will not be performed.
    *   SBAS: SBAS takes the priority of measurement.
        Switched automatically to "GPS Only" when SBAS information is not obtained.
    *   BEACON: The beacon takes the priority of measurement.
        Switchied automatically to "GPS Only" when Beacon information is not obtained.
*   SBAS SEARCH: AUTO or MANUAL can be selected.
        When MANUAL is selected, the following TYPE 0 INFORMATION must be set.
*   TYPE 0
    INFORMATION: Test broadcast data can be turned on (for use) or off (when not in use).
        (When broadcasting starts, the broadcast data overrides, and this item is disabled)
*   RANGING: ON or OFF can be selected.
        Used when an SBAS satellite is used with a GPS satellite.
        Normally, the setting should be left ON.

Memo

*   Press **CLR** to return to the Main Menu.
*   In Maintenance Mode settings can be changed press and hold both **MENU** and **✳** for 3 seconds or more to go to the mode.

Selecting **BEACON** from the "5.3 Main Menu" displays the Beacon Settings Screen.
From this screen, the parameters can be confirmed.

```
┌─────────────────────────────┐
│ⓂBEACON        07:24:57 U    │
│STATION SELECT   : MANUAL    │
│BIT RATE         : 200bps    │
│FREQUENCY        : 309.0kHz  │
│(MANU 309.0kHz 200bps 133)   │
│                             │
│BEACON INFORMATION:ON        │
│                             │
│                             │
│                             │
│                             │
│W84                     ⒷG   │
└─────────────────────────────┘
```

These parameter are not displaied When JLR-4341 is used as beacon receiver.

Beacon Settings Menu

Procedure

1. Press the ▲ ▼ keys to move the cursor and select an item.

2. Press the **ENT** key to display the menu for the selected item.

The following submenus are available.
- STATION SELECT: Select either manual or automatic selection of beacon station.
- BIT RATE: Select the bit rate of received data.
                        (Available only when STATION SELECT is set to manual mode)
- FREQUENCY: Select the frequency of received data.
                        (Available only when STATION SELECT is set to manual mode)
- BEACON INFORMATION: When set to ON, received data is displayed as is.

Memo

- Press **CLR** to return to the Main Menu.

- In Maintenance Mode settings can be changed press and hold both **MENU** and **✳** for 3 seconds or more to go to the mode.

- This setting, even if changed, is disabled if a beacon receiver is not connected.

- If BEACON INFORMATION is set to ON, pressing the **USER** key cycles through the following screens.

  BEACON INFO Screen → SAT INFO2 Screen → SAT INFO1 Screen

Selecting **SYSTEM** from the "5.3 Main Menu" displays the System Settings Screen.

```
 ⓜSYSTEM 23-02'11  06:07:15 U
 TIME DIFF        :+00:00
 DATE DISP        :DD-MM'YY
 TIME DISP        :24hr
 DATUM            :WGS-84
 SPEED UNIT       :kn
 ROT RANGE        :±30°/min
 ROT SMOOTHING    : 0s
 ROLL/PITCH RANGE:± 5°
 ROLL  OFFSET     :+ 0°
 PITCH OFFSET     :+ 0°
 ▼NEXT  PAGE
 W84                    ③G
```

System Settings Screen

Procedure

1. Press the ▲ ▼ keys to move the cursor and select an item.

2. Press the **ENT** key to display the menu for the selected item.
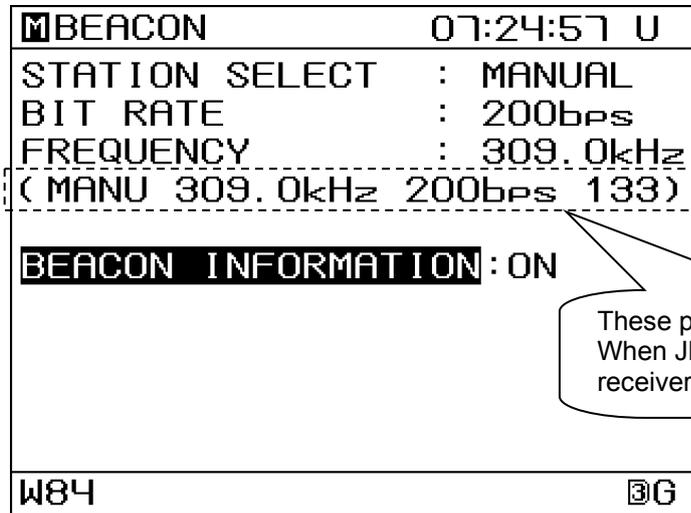
The following submenus are available.
*   TIME DIFF: Enter the time difference from UTC in order to display the local time.
                            Japanese Standard Time is UTC +9 hours, so enter "+9:00".
                            If this is set, local time (indicated with an "L") is displayed.
*   DATE DISP: Select among DD-MM'YY, 'YY-MM-DD, MM-DD'YY, DD MMM,'YY or
                            MMM DD,'YY date display types.
*   TIME DISP: Select 24 hour or 12 hour time display.
*   DATUM: Select from the Geodetic System Table (Appendix 1).
*   SPEED UNIT: Select from kn, km/h, or mi/h.
*   ROT RANGE: Select one of the following based on the turn rate of the ship.
                            (30,60,90,120,150,180,210,240,270,300,600,900,1200,1500,1800, 2100,
                            2400, 2700)
*   ROT SMOOTHING: Select from 0 to 99 seconds.
*   ROLL/PITCH RANGE: Select the maximum value for the roll/pitch graph shown on Compass
                            Screen D.
                            Normally, this should be left at the default value of 10°.
*   ROLL OFFSET / PITCH OFFSET:
                            Used when the roll / pitch graph shown on Compass Screen D is to be
                            centered around the ✣ symbol.   (Roll and pitch data output to external
                            devices is also offset)

Memo

*   Press **CLR** to return to the Main Menu.
*   In Maintenance Mode settings can be changed press and hold both **MENU** and ✱ for 3
    second or more seconds), settings can be changed.

Selecting NEXT in "5.3.6 System" allows you to continue system settings.

< Polarity Illustration for Inputting Offset >

S: Starboard
P: Port
F: Fore
A: After
U: Up
D: Down
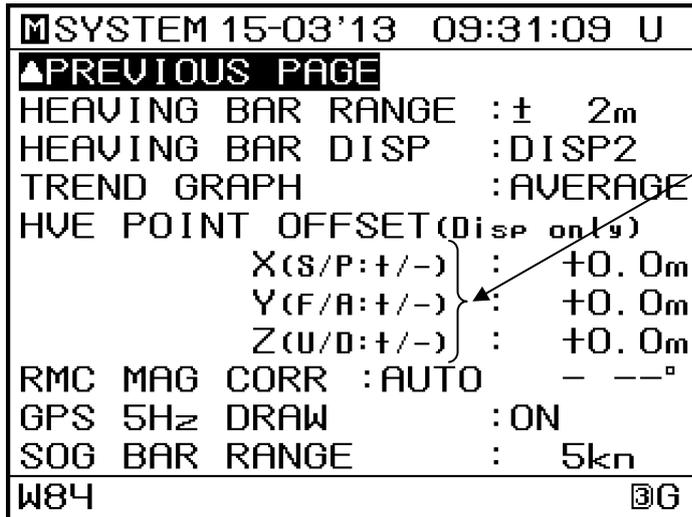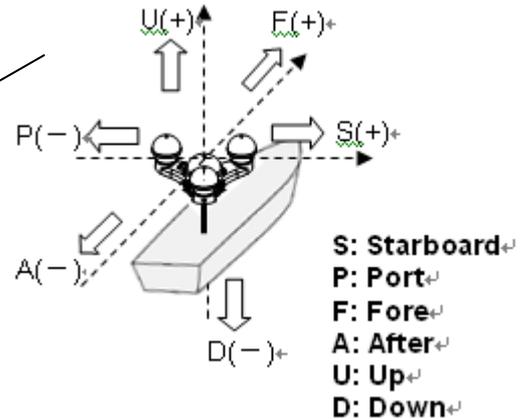
System Settings Screen

Procedure

1. Press ⬆ ⬇ to move the cursor and select an item in the menu.

2. Press ENT to display menu for the selected item.

The following submenus are available.

- RPEVIOUS: Goes to the previous page (Refer to the previous page.)
- HVE BAR RANGE: Set the maximum value for the heaving bar graph, displayed on the Compass screens D, E, and F, and the Trend Graph screen (Select from 1, 2, 3, 4, 5, 10, 20, 30, 40, 50, or 100m.)
- HVE BAR DISPLAY: Select the type of heaving bar displayed on the Compass screens D and E.
  - ・OFF   Heaving bar is not displayed.
  - ・DISPLAY 1 - 4   Refer to the following figure.
  - (The Compass screen F turns the display off when OFF is selected, otherwise, displays the DISP1.)

| DISP 1 | DISP2 | DISP3 | DISP4 |
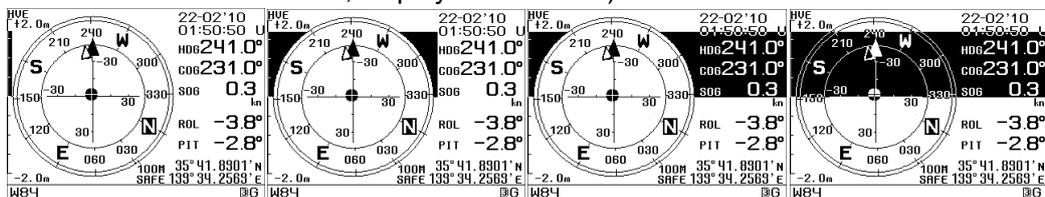
- TREND GRAPH :   AVERAGE: Displays the average value of each sampling zone.
  MAXIMUM: Displays the maximum value of the absolute value of each sampling zone.
- HVE POSITION OFFSET :   Applicable to a heaving bar display and a trend graph display only, excluding any external output. A desired offsetting position is specified by the following polarities on the basis of the installation position of the sensor unit of the device.
  X: + for offsetting to the starboard side, - for offsetting to the port side.
  Y: + for offsetting to the bow side, - for offsetting to the stern side.
  Z: + for offsetting upward, - for offsetting downward.
  Refer to the above "Polarity Illustration for Inputting Offset" for details.

- RMC MAG CORR: You can select automatic or manual magnetic correction.

    When you select automatic, correction is automatically calculated for the correction value from the GPS position and output the data (except sensor through port in Data IN/OUT 1 connector).

    When you select manual, correction is performed using a manually entered value.

- 5Hz DISPLAY: Turning ON will change a display-updating cycle for the Latitude/Longitude, SOG, and COG displays to every 5Hz (200msec). Turning OFF will change a display-updating cycle back to the normal setting of every 1 sec.

    However, the updating cycle of the Latitude/Longitude, SOG, and COG output data for external devices is set in Data I/O Menu regardless of this setting. (Refer to 5.3.7 Data I/O Settings (DATA I/O) for details.)

- SOG BAR RANGE : Set the maximum value for the SOG bar range from the following. Applicable to the Compass screens E and F, and the Trend Graph screen.

Unit of measure configured in SPEED UNIT in the SYSTEM menu	Available range
kn	5,10,15,20,25,30,50,100
km/h	9,19,28,37,46,56,93,185
mi/h	6,12,17,23,29,35,58,115
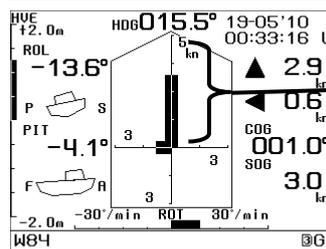
SOG bar range is set to this axis (vertical axis) on this screen. (Compass F screen)

Memo

- Press **CLR** to return to the system settings.

- Settings can be changed in Maintenance Mode (Press and hold both **MENU** and **✻** for about 3 seconds to go to the mode.)

Memo

●Plot interval of the trend graph

The display range of X-axis (time axis) in the trend graph can be changed by the ▲,▼ keys. (Select from 1 min, 5 min, 30 min, 1 hr, 3 hrs, 5 hrs, or 12 hrs.)

The plot interval of each display range is shown in the following table. The longer the display range, the longer the plot interval, and a change in the period of time shorter than this interval is not displayed (plotted.)

<Plot Interval>

Display range of X-axis	1min.	5min.	30min.	1hour.	3hour.	5hour.	12hour.
Plot interval	every 1sec.	every 4sec.	every 24sec.	every 48sec.	every 144sec.	every 240sec.	every 576sec.
Average	The average in each plot interval						
Maximum	The maximum of the absolute value in each plot interval						

Memo

●Offset function for a heaving measuring position displayed on the display unit
All defaults in "HVE POINT OFFSET" are 0; in this case, the heaving measuring
position is the installation position of the sensor unit. The measuring position can be offset to
another position by the following procedure (as an example.)

1. Set offset values in "HVE POINT OFFSET" in "SYSTEM MENU".
2. An example of the offset values (Refer to the following figure.)
    ・X-direction: 3m rightward (enter +3m)
    ・Y-direction: 10m forward (enter +10m)
    ・Z-direction: 3m downward (enter -3m)
3. The heaving display on the display unit will be the display at the offset position
(● in the following figure.)
(The offset setting is not applicable to the heaving data delivered to external devices.)

The reference
line for the
Z-direction

Z =－3m

Y = + 10m

X = +3m

For the X- and Y-directions,
their references are the
center of the sensor unit (the
center of the processing unit
cover.)

Offsetting target
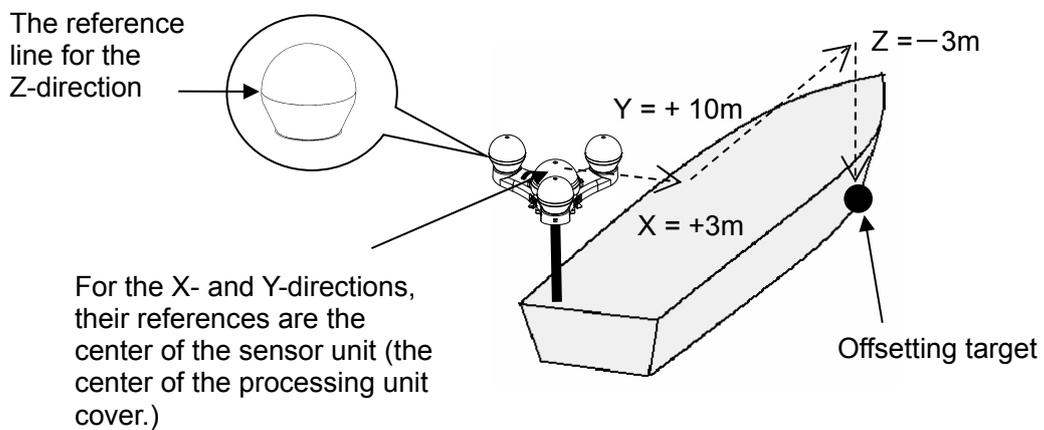
Selecting **DATA I/O** from the "5.3 Main Menu" displays the DATA I/O Settings Screen.
The DATA I/O Settings Screen can be used to confirm connection settings for external devices.

```
DATA I/O          10:05:44 U
SENSOR THROUGH
              : NMEA
DATA OUT1 : NMEA
DATA OUT2 : NOT USED
DATA OUT3 : NMEA
DATA OUT4/IN4
              : NMEA/OFF
DATA OUT5 : NMEA
LOG PULSE : OFF

W84                        3G
```

Data I/O Settings Menu

Screen display change example for NMEA selection

```
MSENSOR THROUGH 06:11:59 U
NMEA VER    : Ver2.1
BIT RATE    : 38400BPS
INTERVAL
(HDT THS ROT ATT HVE
 PJRC,GC POT) : 25msec

SENTENCE
   HDT

W84
```

INTERVAL:
Sets the HDT, THS, ROT, ATT, HVE, PJRC,GC and POT output intervals.
To turn output on, set the sentence selection to "ON".

Screen display change example for NMEA selection

```
MDATA OUT1          06:13:09 U
NMEA VER    : Ver2.1
BIT RATE    : 4800BPS
SENTENCE
   HDT

W84                        3G
```

The set sentence is displayed.

Screen display change example for output sentence settings

Version : Ver 1.5
HDT : 50m THS :   ROT :
ZDA :   GGA :   VTG :
RMC :   --- :   --- :
--- :   --- :   --- :
--- :   --- :   GLL :
ATT :   HVE :
CD,GP,0 :   CD,GP,1 :
CD,GP,2 :   ------- :
CD,GP,5 :   CD,GP,8 :
CF,GP,0 :   CF,GP,2 :
CD,GP,6 :
PJRC,GC :   POT   :

Version : Ver 2.1
HDT : 50m THS :   ROT :
ZDA :   GGA :   VTG :
RMC :   GBS :   DTM :
GSA :   GSV :   --- :
MSS :   GST :   GLL :
ATT :   HVE :
------- :   ------- :
------- :   CD,GP,3 :
CD,GP,5 :   CD,GP,8 :
CF,GP,0 :   CF,GP,2 :
CD,GP,6 :
PJRC,GC :   POT   :

Version : Ver 2.3
HDT : 50m THS :   ROT :
ZDA :   GGA :   VTG :
RMC :   GBS :   DTM :
GSA :   GSV :   GNS :
MSS :   GST :   GLL :
ATT :   HVE :
------- :   ------- :
------- :   CD,GP,3 :
CD,GP,5 :   CD,GP,8 :
CF,GP,0 :   CF,GP,2 :
CD,GP,6 :
PJRC,GC :   POT   :

* For SENSOR THROUGH, sentences other than HDT, THS, and ROT can only be set to "OFF" or "1s".

Version : Ver 1.5
HDT : 50m THS :   ROT :
ZDA :   GGA :   VTG :
RMC :   --- :   --- :
--- :   --- :   --- :
--- :   --- :   GLL :
ATT :   HVE :   --- :
CD,GP,0 :   CD,GP,1 :
CD,GP,2 :   ------- :
CD,GP,5 :   CD,GP,8 :
CF,GP,0 :   CF,GP,2 :
CCRP :   リモートメンテ :
PJRC,GC :   POT   :

Version : Ver 2.1
HDT : 50m THS :   ROT :
ZDA :   GGA :   VTG :
RMC :   GBS :   DTM :
GSA :   GSV :   --- :
MSS :   GST :   GLL :
ATT :   HVE :   --- :
------- :   ------- :
------- :   CD,GP,3 :
CD,GP,5 :   CD,GP,8 :
CF,GP,0 :   CF,GP,2 :
CCRP :   リモートメンテ :
PJRC,GC :   POT   :

Version : Ver 2.3
HDT : 50m THS :   ROT :
ZDA :   GGA :   VTG :
RMC :   GBS :   DTM :
GSA :   GSV :   GNS :
MSS :   GST :   GLL :
ATT :   HVE :   ALR :
------- :   ------- :
------- :   CD,GP,3 :
CD,GP,5 :   CD,GP,8 :
CF,GP,0 :   CF,GP,2 :
CCRP :   リモートメンテ :
PJRC,GC :   POT   :

When connecting to BAM, please use DATA OUT4/IN4 port.

```
┌─────────────────────────────────────┐
│ Ⓜ DATA I/O          04:55:04 U       │
│ SENSOR THROUGH                       │
│             : NMEA                   │
│ DATA OUT1 : IEC                      │
│ DATA OUT2 : NOT USED                 │
│ DATA OUT3 : IEC                      │
│╔═══════════════════════════════════╗│
│║DATA OUT4/IN4                       ║│
│║           : IEC/OFF                ║│
│╚═══════════════════════════════════╝│
│ DATA OUT5 : IEC                      │
│ LOG PULSE : OFF                      │
│                                      │
│                                      │
│ W84                         ③G       │
└─────────────────────────────────────┘
```

Select IEC/OFF for
DATE OUT4/IN4

DATA I/O settings menu

Screen display change exsample for IEC selection

Screen display change exsample for output sentence settings

```
┌─────────────────────────────────────┐
│ Ⓜ DATA OUT4/IN4  04:56:48 U          │
│ BIT RATE  : 4800BPS                  │
│ ▮SENTENCE▮                           │
│                                      │
│                                      │
│                                      │
│                                      │
│  "VERSION" can not be                │
│    selected.                         │
│                                      │
│ W84                         ③G       │
└─────────────────────────────────────┘
```

```
┌─────────────────────────────────────┐
│ Ⓜ DATA OUT4/IN4  04:57:22 U          │
│ HDT :      THS :       ROT :         │
│ ZDA :      GGA :       VTG :         │
│ RMC :      GBS :       DTM :         │
│ GSA :      GSV :       GNS :         │
│ MSS :      GST :       GLL :         │
│ ALERT  : ON  ▮HBT▮ : ON   ALR :      │
│                                      │
│                                      │
│ W84                         ③G       │
└─────────────────────────────────────┘
```

When connecting to BAM, select "ALERT" and "HBT".
If "ALERT" is selected, "ALF", "ALC", "ARC" and "AGL" sentences can be output.

Memo

• Even if the input setting is "OFF", the ACK, ACN and HBT sentence can be received.

1. Press the ⬆️ ⬇️ keys to move the cursor and select an item.

2. Press the **ENT** key, and select the data I/O type. (Depending on the type, the screen change flow may vary)

3. Select the NMEA VER, BIT RATE, and SENTENCE.

The following submenus are available.
* SENSOR THROUGH: Outputs through data from the sensor. Connects to equipment requiring high speed output (radar, etc.). (Select from NMEA, NSK, AD-10 or IEC)
* DATA OUT1: Select from NMEA, NSK, AD-10 or IEC.
* DATA OUT3: Select NMEA, NSK or IEC.
* DATA OUT4/IN4: Select from NMEA, NSK, BEACON, IEC or 4341.
  CCRP data can be entered for CCRP.   (CCRP sentence)
  Current data can be entered for CURRENT. (CUR and VBW sentences)
  Both input and output settings can be set by this port (DATA OUT4/IN4).
  Select from the following:
  Even if the input setting is "OFF", the ACK, ACN and HBT sentence can be received.

Selection	Output (DATA IN/OUT2 9,10 pins of connector)	Input (DATA IN/OUT2 1,2 pins of connector)	Purpose
NMEA/OFF	NMEA	Off	For outputting NMEA
NSK/OFF	NSK	Off	For outputting NSK
BEACON/OFF	Dedicated setting for beacon (4800bps)	Off	For connecting beacon receiver
IEC/OFF	IEC	Off	For outputting IEC For connection BAM
4341/OFF	Dedicated setting for JLR-4341(4800bps)	Off	For connecting JLR-4341
NMEA/CURRENT	NMEA (4800bps)	Dedicated setting for tidal current meter (4800bps)	For inputting current meter and outputting NMEA simultaneously
BEACON/CURRENT	Dedicated setting for beacon (4800bps)	Dedicated setting for tidal current meter (4800bps)	For connecting beacon receiver and inputting current meter simultaneously
IEC/CURRENT	NMEA (4800bps)	Dedicated setting for tidal current meter (4800bps)	For inputting current meter and outputting IEC simultaneously
4341/CURRENT	Dedicated setting for JLR-4341(4800bps)	Dedicated setting for tidal current meter (4800bps)	For connecting JLR-4341 and inputting current meter simultaneously.
NMEA/CCRP	NMEA	Dedicated setting for CCRP	For inputting CCRP and outputting NMEA simultaneously
BEACON/CCRP	Dedicated setting for beacon (4800bps)	Dedicated setting for CCRP (4800bps)	For connecting beacon receiver and inputting CCRP simultaneously.
IEC/CCRP	NMEA	Dedicated setting for CCRP	For inputting CCRP and outputting IEC simultaneously
4341/CCRP	Dedicated setting for JLR-4341(4800bps)	Dedicated setting for CCRP (4800bps)	For connecting JLR-4341 and inputting CCRP simultaneously.

* DATA OUT5: Select NMEA, NSK or IEC.
* LOG PULSE: Select from OFF, 200p/NM, or 400p/NM.

● Output of AD-10 format
AD-10 receiver (FR-14**, etc.) can be connected.
AD-10 format can be output from the following two ports (refer to p2-18,19 for detail).
INTERVAL (cycle) can be selected from 25msec and 200msec.
・DATA IN / OUT 1 connector: 3 thru 6 pin (Select "AD-10" in SENSOR THROUGH.)
・DATA IN / OUT 2 connector: 3 thru 6 pin (Select "AD-10" in DATA OUT1.)

Setting method (same as in SENSOR THROUGH)
1. Set "AD-10" for the data format.

```
DATA OUT1 : NMEA
            NMEA
            NSK
            AD-10
            IEC
```

2. Select 25msec or 200sec in INTERVAL.
   For connecting to RADAR, select 25msec (Default is 25msec.)

```
INTERVAL : 25msec
           25msec
           200msec
```

Connecting method

DATA IN/OUT1 Connector or DATA IN/OUT2 Connector			Radar	Note
3 (Orange)	SENSOR THROUGH or DATA OUT1 (TXD1,SCK1)※1	SD-A →	DATA-H	Select AD-10 in the connection port setting (SENSOR THROUGH or DATA OUT1) and select 25msec or 200msec for the output interval (Refer to the above.)
4 (Yellow)		SD-B →	DATA-C	
5 (Green)		SC-A →	SHIFT-H(CLK-H)	
6 (Blue)		SC-B →	SHIFT-C(CLK-C)	

*1   AD-10 can output through the following 2 ports: Sensor Through port and Data OUT1 port (TXD1).
*2   Use CFQ-5374 (3m) or CFQ5374-15 (15m) for the cable (Refer to 2-26 and 2-27.)

● Adjust(Adj) function for ATT and HVE sentence
ATT and HVE sentence have adjust function.
An Adj value is determined after choosing an output cycle. The more an adj value is large,
the more an output is delayed.
(Usually default settings don't need to change.)

Setting method for ATT
1. Choose Output cycle

In the case of sensor through   In the case of not sensor through

ATT :   **ATT** :

```
┌──────┐                    ┌──────┐
│OFF   │                    │  OFF │
│ON    │                    │ 25ms │
└──────┘                    │100ms │
                            │200ms │
                            │1sec  │
                            │2sec  │
                            └──────┘
```

2. And, Choose adjust Value between +0 and +10. (Default is +5)

ATT :
(Adj   )

```
┌────┐
│+0  │
│+1  │
│+2  │
│+3  │
│+4  │
│+5  │
└────┘
```

Setting method for HVE

1. Choose Output cycle

In the case of sensor through   In the case of not sensor through

HVE :   **HVE** :

```
┌──────┐                    ┌──────┐
│OFF   │                    │  OFF │
│ON    │                    │ 25ms │
└──────┘                    │100ms │
                            │200ms │
                            │1sec  │
                            │2sec  │
                            └──────┘
```

2. And, Choose adjust Value between +0 and +2. (Default is +1)

HVE :
(Adj   )

```
┌────┐
│+0  │
│+1  │
│+2  │
└────┘
```

Selecting **VERSION INFO** from the "5.3 Main Menu" displays the Version Confirmation Screen.

```
┌──────────────────────────────┐
│ⓂVERSION  INFO    06:15:50 U │
│          JLR-21              │
│ DISPLAY  :NWZ-4701           │
│          R52.01              │
│ SENSOR   :NNN-21             │
│          R34.01              │
│                              │
│ GPS1     :RL2.1              │
│ GPS2     :RL2.1              │
│ GPS3     :RL2.1              │
│                              │
│                              │
│ W84                      ③G │
└──────────────────────────────┘
```
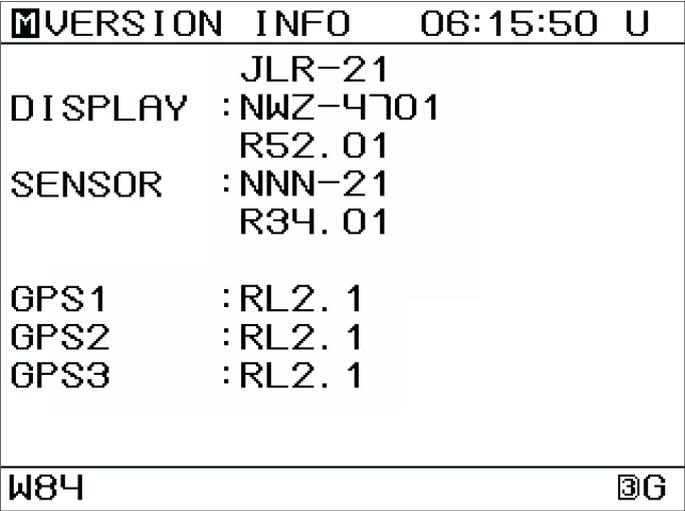
Version Confirmation Menu

The following items are displayed.
  • JLR-21/31:   Displays model.
  • DISPLAY: Displays display unit model and version.
  • SENSOR: Displays sensor model and version.
  • GPS1:   Displays GPS receiver 1's version.
  • GPS2:   Displays GPS receiver 2's version.
  • GPS3:   Displays GPS receiver 3's version.

┌───┐
│ **Memo** │
├───┤
│   │
│ • Press **CLR** to return to the Main Menu.   │
│   │
└───┘

Selecting **ALERT** from the "5.3 Main Menu" displays the Alert Settings Screen.

```
ALERT            01:23:09 U
ALARM ESCALATION
 POSITION          :ON
 HEADING           :ON
  TIME             : 30s
HEADER ALERT DISP  :OFF
DGPS ALERT         :OFF

TEST MODE          :OFF



W84                      🄱G
```

Alert Settings Menu

Procedure

1. Press the ⬆ ⬇ keys to move the cursor and select an item.

2. Press the **ENT** key to display the menu for the selected item.

The following items are displayed.
*   ALARM ESCALATION: Select whether the "No positioning" or "No Heading" warning will escalate to an alarm.
    - POSITION ON: Enable the escalation.
    - OFF: Disable the escalation.
    - HEADING ON: Enable the escalation.
    - OFF: Disable the escalation.
    - TIME: Set the time until escalation.
*   HEADER ALERT DISP: Select whether to display the aggregation or grouping in the alert display.
    - ON: Display in aggregation or grouping.
    - OFF: Not display aggregation or grouping.
*   DGPS ALERT: Select whether to occur the alert for non-DGPS.
    - ON: Enable.
    - OFF: Disable.
*   TEST MODE: Select whether to return the ALF of all alerts for "Q" of ACN for wildcard.
    - ON: Returns ALF of all alerts (include normal condition).
    - OFF: Returns ALF other than normal condition.

Memo

*   If the position correction mode is "GPS ALONE" (Refer to 5.3.4), DGPS alert is disable.
*   After muting the warning alert, if it is not acknowledged for 15 seconds, the warning will occur again (warning escalation).
*   Starting-up the display uint (turning the power on), the setting value of "HEADER ALERT DISP" and "TEST MODE" will set to "OFF".

Selecting **LANGUAGE** from the "5.3 Main Menu" displays the Language Settings screen.

```
┌─────────────────────────────────┐
│ LANGUAGE          07:33:38  U   │
│ ┌─────────┐                     │
│ │LANGUAGE │     :  ENGLISH      │
│ └─────────┘                     │
│                                 │
│                                 │
│                                 │
│                                 │
│                                 │
│                                 │
│                                 │
│ W84                         3G  │
└─────────────────────────────────┘
```
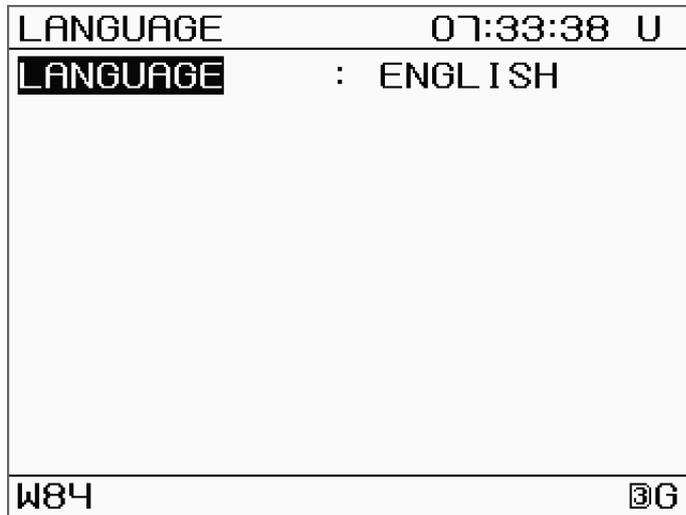
Language Settings Menu

Procedure

1. Press the **ENT** key.

2. Press the ▲ ▼ keys to move the cursor and select the language.

3. Press the **ENT** key to confirm the language selection.

Memo

- Press **CLR** to return to the Main Menu.

- In Maintenance Mode settings can be changed press and hold both **MENU** and **✱** for 3 seconds or more to go to the mode.

5.4   Maintenance Menu

Use the Main Menu to confirm or change function settings.

Press and hold both **MENU** and ✳ for 3 seconds or more to display the Maintenance Main Menu.

```
MAIN MENU          06:45:18 U
DISPLAY
HEADING
GPS                ┌──────────────┐
SBAS               │ In Maintenance│
BEACON             │ Mode,         │
SYSTEM             │ M mark is     │
DATA I/O           │ displayed.    │
VERSION INFO       └──────────────┘
ALERT
LANGUAGE

W84
```

Press and hold both **MENU** and ✳

```
MMAIN MENU         06:56:03 U
DISPLAY            <MAINTENANCE>
HEADING            ANT CHECK
GPS                 INPUT CHECK
SBAS               DIAGNOSIS
BEACON             DEMO
SYSTEM             PRODUCT TYPE
DATA I/O           RESET
VERSION INFO       SOFT UPDATE
ALERT              CCRP
LANGUAGE

W84                       3G
```

Maintenance Main Menu
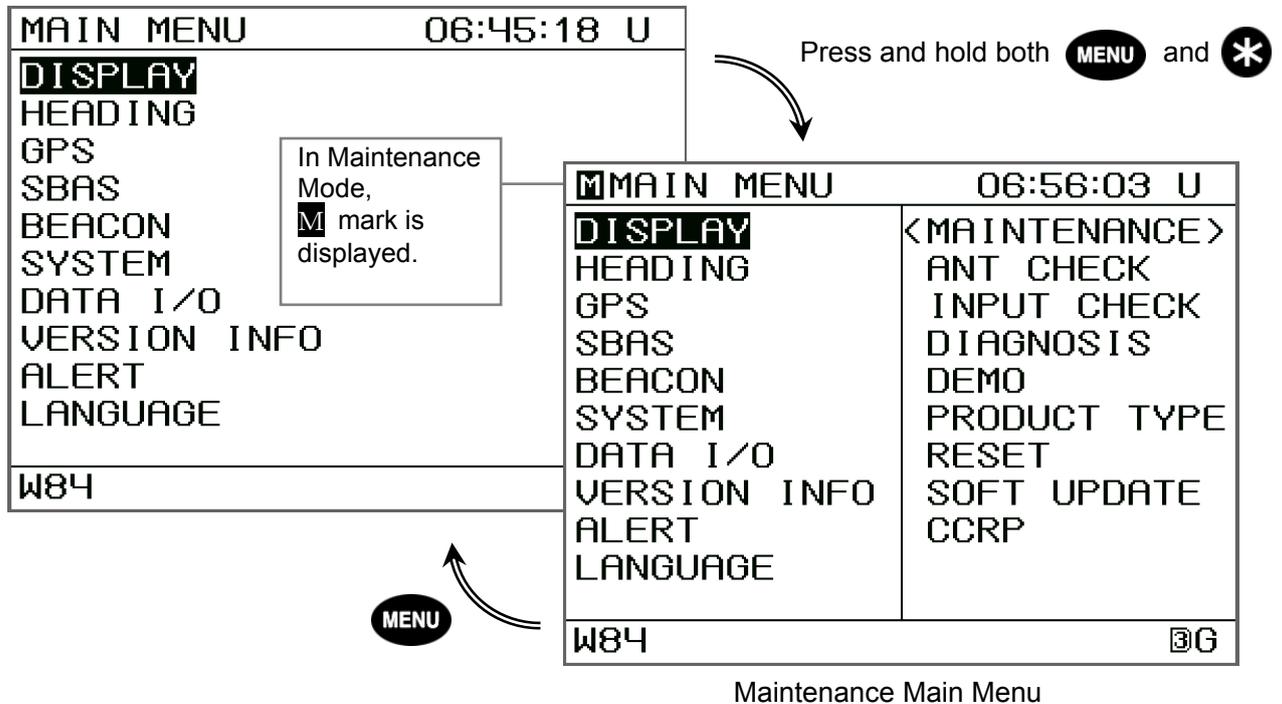
Procedure

1. While holding down the **MENU** key, press and hold the ✳ key for 3 seconds or more.

2. Use the ▲▼◀▶ keys to select an item, and press the **ENT** key.

Memo

The Maintenance Menu disappears if one of the following is done. (be canceled)

• The **MENU** key is pressed.

• The power is turned off.

• A screen other than the Settings menu is displayed for 3 min or more.

The following submenus are available.
- ANT CHECK: (Refer to 5.4.1)   Displays sensor information.
- INPUT CHECK: (Refer to 5.4.2)   Displays input information.
- DIAGNOSIS: (Refer to 5.4.3)   Performs self-diagnosis on equipment.
- DEMO: (Refer to 5.4.4)   Initiates equipment demonstration.
- PRODUCT TYPE: (Refer to 5.4.5)   Sets unit as subdisplay, confirm the equipment number.
- RESET: (Refer to 5.4.6)   Restores all settings to their factory defaults.
- SOFT UPDATE: (Refer to 5.4.7)   Updates software.
- CCRP: (Refer to 5.4.8)   Allows CCRP settings.

Selecting   **ANT CHECK**   from the "5.4 Maintenance Menu" displays information about the sensor.
This allows confirmation of the sensor status, and can be used to determine if the equipment is faulty.

```
┌─────────────────────────────────┐
│ MANT  CHECK        05:37:54 U    │
│ TIMER   0:20                     │
│         <AVE>      <TRUE>        │
│ HEAD   123.0°     123.0°         │
│ ROLL      +1°        +1°         │
│ PITCH     +1°        +1°         │
│                            3     │
│ <AVE> SAT ---LEVEL--- SAT        │
│       POS MIN TYP MAX HED        │
│ GPS1   10  39  43  51  10        │
│ GPS2   10  38  42  55  10        │
│ GPS3   10  37  41  54  10        │
│ W84                       3G     │
└─────────────────────────────────┘
```

Antenna in use
3: With three antenna
2: With two antenna

Antenna Check Screen

The following items are displayed.
- TIMER: Time is counted from when this screen is displayed.
- HEAD: Average bow heading (AVE) and current measured heading value (TRUE) are displayed.
              Check that the displayed heading is correct.
- ROLL: Average roll (AVE) and measured roll value (TRUE) are displayed.
              Confirm the indication matches to the ship's rolling.
- PITCH: Average pitch (AVE) and measured pitch value (TRUE) are displayed.
              Confirm the indication matches to the ship's rolling.
- GPS1 - 3:   Reception status of each GPS receiver is displayed.
              SAT POS: Average number of satellites used for position measurement.
              LEVEL: MIN (minimum), TYP (average), and MAX (maximum) signal levels
              SAT HED: Average number of satellites used for bearing measurement.
              Confirm the values of GPS1 thru GPS3 are almost the same. Also confirm the level (TYP) is around 40 to 50.
- Antennas in use:
              3 (If it is not "3", the antenna installation position may not be suitable. Relocate the sensor to the place with clear view.)

┌─ **Memo** ───┐
│   │
│ • Press **CLR** to return to the Main Menu.   │
│   │
└──┘

Selecting ▮INPUT CHECK▮ from the "5.4 Maintenance Menu" displays input data information.

```
┌─────────────────────────────────┐
│ Ⓜ INPUT  CHECK      05:39:37 U   │
│ ┌──────────────────┐             │
│ │PORT SELECTION│ :  OFF          │
│ └──────────────────┘ ┌──────────┐│
│                      │OFF       ││
│                      │INPUT0    ││
│                      │▮INPUT4▮  ││
│                      └──────────┘│
│                                  │
│                                  │
│                                  │
│                                  │
│                                  │
│                                  │
│ W84                       ③G     │
└─────────────────────────────────┘
```

Received Data Display Area
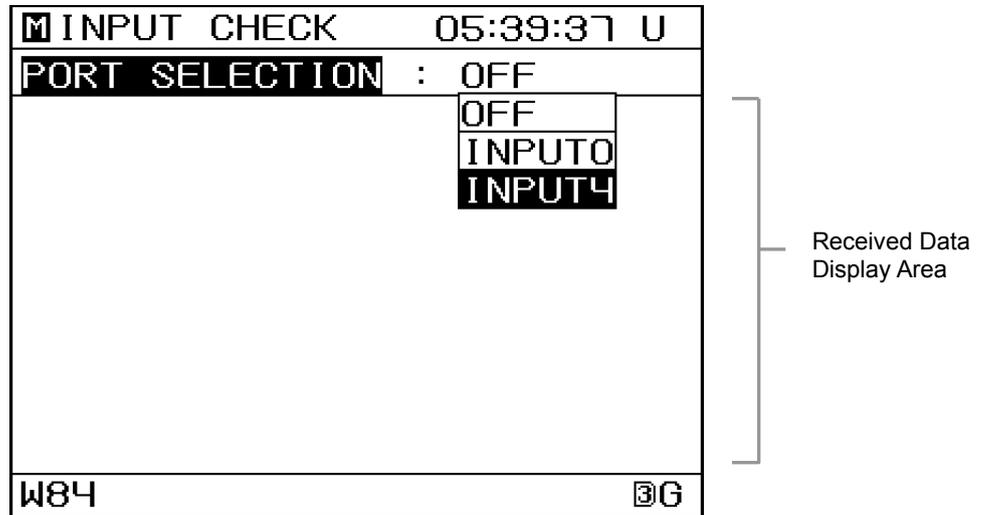
Input Check Screen

Procedure

1. Press **ENT** on the PORT SELECTION item.

2. Select the port you wish to confirm with the ▲ ▼ keys, and press **ENT** to confirm.

3. Press the **ENT** key to start data display.   (Data is displayed in the received data display area)

```
┌─────────────────────────┐
│ START  -> ENT KEY        │
│ STOP   -> CLR KEY        │
└─────────────────────────┘
```

Pressing the **CLR** key when data is displayed stops the display.

Pressing the **ENT** key again restarts the data display.

The following items are displayed.
- INPUT0:   Displays data from the sensor.
             However, the data is not readable, because it uses a specialized data format.
- INPUT4:   Displays data from DATA IN4.
             Perform this only after making sure that the input and output bit rates are equal.
             (Refer to "5.3.7 Data I/O Settings (DATA I/O)" for details on setting the bit rate)

Memo

- Press **CLR** to return to the Main Menu.

Selecting   **DIAGNOSIS**   displays the Self-Diagnosis Screen.
This screen can be used to perform self-diagnosis by the equipment.

```
╔════════════════════════════╗
║ⓂDIAGNOSIS      05:41:29 U║
║┌──────────┐                ║
║│DISPLAY   │  :  OFF        ║
║└──────────┘                ║
║ SENSOR       :  OFF        ║
║ LCD          :  OFF        ║
║                            ║
║                            ║
║                            ║
║                            ║
║                            ║
║                            ║
║ W84                     ⒷG ║
╚════════════════════════════╝
```

Self-Diagnosis Menu Screen

Procedure

1. Use the ▲ ▼ keys to select an item for self-diagnosis.

2. Press the **ENT** key, select START, and press the **ENT** key again to start self-diagnosis.

The following submenus are available.
  • DISPLAY: Performs self-diagnosis of display unit. (Refer to a)
  • SENSOR: Performs self-diagnosis of sensor. (Refer to b)
  • LCD: Performs self-diagnosis of LCD display.   (Refer to c)

Memo

  • Press **CLR** to return to the Main Menu.

a. Display Unit Self-Diagnosis (DISPLAY UNIT)

Once each item in the self-diagnosis is completed, the results for that item is displayed.

```
┌─────────────────────────────────────┐
│ⓂDISPLAY DIAG   02:07:43 U│
│ ROM[1] :  OK                         │
│ ROM[2] :  OK                         │
│ RAM    :  OK                         │
│ SIO[0] :  OK                         │
│ SIO[1] :  OK                         │
│ SIO[2] :  OK                         │
│ SIO[3] :  OK                         │
│ SIO[4] :  OK                         │
│ SIO[5] :  OK                         │
│                                      │
│ W84                             ⒊G│
└─────────────────────────────────────┘
```

Display Unit Self-Diagnosis Screen

┌──────────────┐
│ **Attention** │
└──────────────┘

If any problems are detected, please contact JRC or an affiliate.

Self-Diagnosis Items

Self-Diagnosis Item	Self-Diagnosis Contents
ROM	Checks program memory and data memory operation. If errors are detected, a [1] indicates a program memory problem, and a [2] indicates a data memory error.
RAM	Checks temporary storage memory.
SIO	Checks serial interface operation. The number in brackets indicates the port channel number. If errors are detected, the displayed port channel has experienced an error.
Buzzer test	Checks if the buzzer sounds.

b. Sensor Self-Diagnosis (SENSOR)

```
SENSOR DIAG       05:43:33 U
CONTROLER
   ROM CHECK          : OK
   RAM CHECK          : OK
   FRAM CHECK         : OK
GPS1
   ANTENNA CHECK      : OK
   ROM CHECK          : OK
   RAM CHECK          : OK
   FRAM CHECK         : OK
   EXTENSION CHECK  : OK
GPS2
W84                        ３G
```

Sensor Self-Diagnosis Screen

Attention

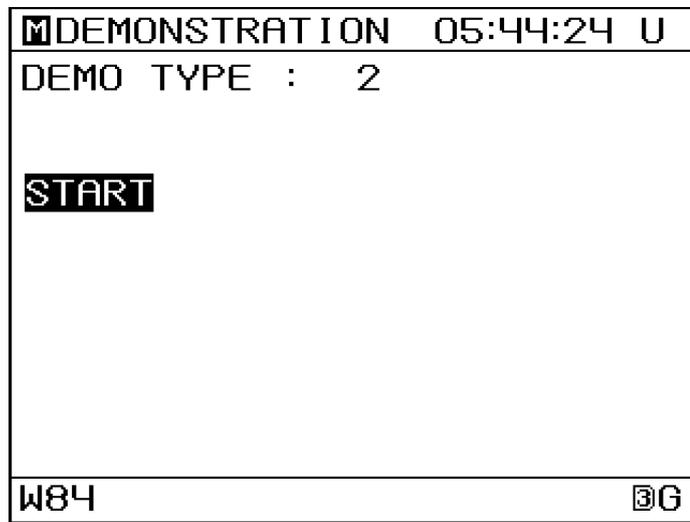If any problems are detected, please contact JRC or an affiliate.

c. Screen Self-Diagnosis (LCD)

This self-diagnosis repeatedly alternates the screen from black → white → black → ... Please check if there are any dead pixels.

Press the **CLR** key to stop the test.

Selecting   **DEMO**   from the "5.4 Maintenance Menu" displays the settings screen.

```
┌─────────────────────────────────┐
│ⓂDEMONSTRATION  05:44:24 Ⓤ│
│ DEMO TYPE :   2                 │
│                                 │
│                                 │
│ START                           │
│                                 │
│                                 │
│                                 │
│                                 │
│                                 │
│                                 │
│ W84                         ⒷG │
└─────────────────────────────────┘
```

Demo Type
1: Right turn
2: Left turn
3: Manual
4: Meandering

5 and over are disabled

Demo Settings Menu

Procedure

1. Press the 🅴🅽🆃 key, and use the 🔼 🔽 keys to enter a value.

2. Pressing the 🅴🅽🆃 key displays **START**.   Press the 🅴🅽🆃 key again.

3. A message is displayed.   Select **YES**, and press the 🅴🅽🆃 key.
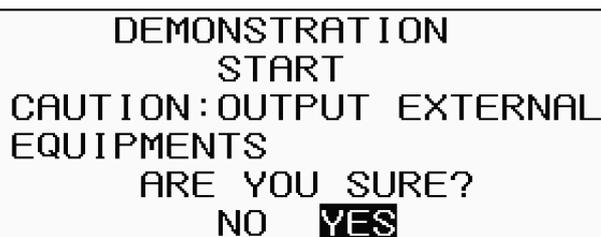
```
┌─────────────────────────────────┐
│        DEMONSTRATION            │
│            START                │
│ CAUTION:OUTPUT  EXTERNAL        │
│ EQUIPMENTS                      │
│        ARE  YOU  SURE?          │
│         NO    YES               │
└─────────────────────────────────┘
```

Note that if an external device is connected, demo data is sent to the external device.

Memo

• Press 🅲🅻🆁 to return to the Main Menu.

• A demonstration is performed by the sensor, and the data received from the sensor is displayed, so the demo cannot be run unless the sensor is connected.

• During the demo, Ⓢ blinks at the bottom of whichever screen is displayed.
• To stop the demo:
   a) Turning the unit off restores the unit to normal operation when the power is turned back on.
   b) Select STOP on the demo settings screen.

5.4.5 Product Type Settings

Selecting **PRODUCT TYPE** from the "5.4 Maintenance Menu" displays the settings screen.

```
Ⓜ PRODUCT  TYPE    06:57:17 U
DISPLAY
 TYPE     :  MAIN
 SERIAL   :  ───────
 SFI      :  GP9997
SENSOR
 SERIAL  :  EK12345678
 BARCODE :  4971660040001
 DEFAULT NO.  :   0



W84                        ③G
```

Product Type Settings Menu

The following submenus are available.

DISPLAY
- TYPE:
  If any additional display units are connected, set any units besides the primary unit to "SUB".
  When a display unit is set to "SUB", an 🔲 symbol appears in the upper right of the screen.
- SERIAL :
  The equipment number can be entered. (This value is already entered when the unit is manufactured)
- SFI :
  The SFI can be entered. (It is not necessary to change normally.)

SENSOR
- SERIAL:
  Displays the equipment number. (Can not enter)
- BARCODE:
  Displays the internal circuit board number. (Can not enter)
- DEFAULT NO.:
  Normally, Displays at "0".

Memo

- Press **CLR** to return to the Main Menu.

- The SERIAL is not erased even if a master reset is performed.

Attention

- If the display unit is set to "SUB", sensor settings cannot be performed by that display unit.
- Do not change the SERIAL.
  (If the serial number is accidentally erased, enter the serial number that appears on the plate on the back of the display unit)

Selecting **RESET** from the "5.4 Maintenance Menu" displays the reset selection screen.

> Make notes of setting values before performing the master reset. (Write to the last pages)

DISPLAY: All internal settings on the display unit are erased.
SENSOR: All internal settings on the sensor are erased.
ALL: All internal settings on the display unit and sensor are erased.
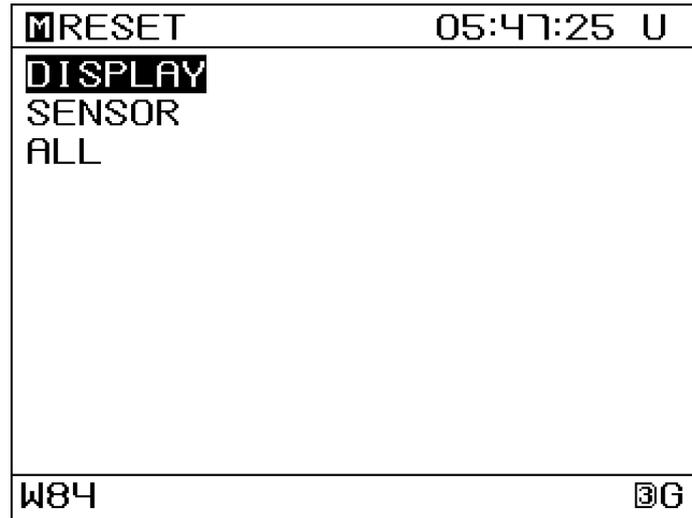
```
ⓂRESET            05:47:25 U
DISPLAY
SENSOR
ALL




W84                          ЗG
```
Reset Menu

Procedure

1. Use the ▲ ▼ keys to select the item to be reset, and press the **ENT** key.

2. A confirmation message is displayed.   Select **YES**, and press the **ENT** key to perform the reset.

```
MASTER RESET
   DISPLAY
ARE YOU SURE?
  NO   YES
```
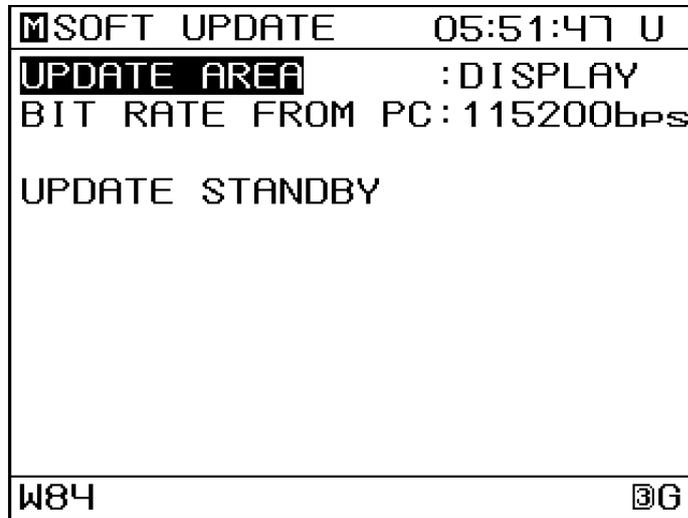
Memo

• Press **CLR** to return to the Main Menu.

Attention

• Performing a reset erases all display unit and/or sensor settings.
  (All values returns to factory defaults)

Selecting **SOFT UPDATE** from the "5.4 Maintenance Menu" displays the software update
selection screen.

```
┌────────────────────────────┐
│ MSOFT UPDATE      05:51:47 U │
│ ┌────────────────────────┐  │
│ │UPDATE AREA      :DISPLAY│  │
│ └────────────────────────┘  │
│ BIT RATE FROM PC:115200bₚₛ  │
│                             │
│ UPDATE STANDBY              │
│                             │
│                             │
│                             │
│                             │
│                             │
│ W84                      ⒷG │
└────────────────────────────┘
```

Software Update Menu

Procedure

1. Press the **ENT** key, use the ▲ ▼   keys to select the area to be written to, and
    press the
    ENT key to confirm.

2. Select the transmission speed (bit rate). (Selection is automatic for sensor)

3. Press the ▲ ▼   keys to move the cursor to **UPDATE STANDBY** , and press the
    ENT key.

    Displayed when   ┌──────────────────────────────────────┐
    preparation is complete: │ STANDBY OK   │
                             │ CONTROL A PC, TRANSMIT SOFTWARE!!   │
                             │ CAN USE ONLY "DIM" + "PWR" KEY   │
                             └──────────────────────────────────────┘

    * Once the preparation completed message is displayed, you cannot return to the standard
       screen.   If you do not intend to update the software, reboot the system.

4. Connect a computer, and transfer the program.

The following submenus are available.
   • UPDATE AREA: Select the area for the update (DISPLAY/SENSOR).
   • BIT RATE FROM PC: Select the update transfer speed.

┌─ **Memo** ───┐
│   │
│   • Press **CLR** to return to the Main Menu.   │
│   • Please contact JRC or an affiliate regarding software updates.   │
│   │
└───┘

5.4.8 CCRP Settings

Selecting CCRP in "5.4 Maintenance Main Menu" displays a CCRP setting screen.
CCRP stands for Consistent Common Reference Point, and is a reference point for defining the positional relationship of equipment installed outdoors using a common coordinate system.
(Only CCRP settings are allowed in this device, and a measurement conversion process to CCRP is not available.)

[CCRP Settings]
・"Ship Information", "Sensor Unit Installation Position", and "CCRP Information" are set.
・"Sensor Unit Installation Position" and "CCRP Information" are set in the coordinate system having the center of stern as the origin (The unit of measure is m.)
・CCRP settings are not allowed when the display is set to the Sub Display setting (secondary display setting); set CCRP in the main display unit (primary display unit.)

Input ship information.
Width: Ship beam
Length: Ship length

Input the installation position of a sensor unit.
Any number from 1 to 9 can be

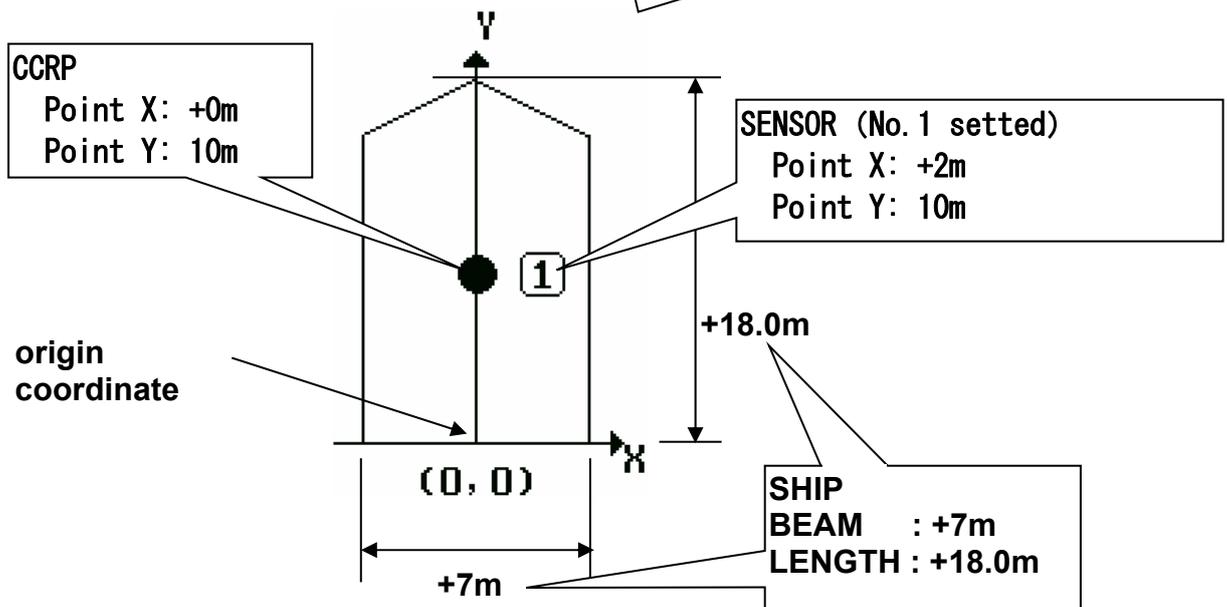Input CCRP information (the reference point).

Select from Valid or Invalid.

The number set for "SENSOR" is displayed.

● is displayed at the position input in "CCRP".

```
M CCRP              06:32:23  U
 SHIP      : ENABLE              Y
   BEAM    :   7.0m             ▲
   LENGTH  :  18.0m
 ①SENSOR   : ENABLE
  SENSOR   : NO.1
   X       :  +2.0               ●  ①
   Y       :  10.0m
 ●CCRP     : ENABLE
   X       :  +0.0
   Y       :  10.0m            (0,0)    X
 W84                              3G
```

Example for setting

```
CCRP
 Point X: +0m
 Point Y: 10m
```

```
SENSOR (No.1 setted)
 Point X: +2m
 Point Y: 10m
```

origin
coordinate

+18.0m

(0,0)

+7m

```
SHIP
BEAM    : +7m
LENGTH : +18.0m
```

[CCRP Output]

The configured CCRP information can be output to external devices.　When doing so, select "CCRP" in the Output sentence by referring to "5.3.7 Data I/O Settings (DATA I/O)".
In order to utilize CCRP data, a function compatible with CCRP transmission/reception must be connected.

[CCRP Input]

CCRP information (including ship information) can be received from external devices.
When doing so, set DATA OUT4/IN4 to one of NMEA/CCRP, beacon/CCRP, IEC/CCRP, and 4341/CCRP (Refer to "5.3.7 Data I/O Settings (DATA I/O)"), and connect the signal to DATA IN4 of the Data IN/OUT2 connector (Refer to P2-27.)
When the data configured in this device is different from the data received from an external device, the following warning is displayed.
In this case, reset in this device.
* will be displayed in the status bar until the completion of the reset.
Press the CLR key to return to the Main menu.
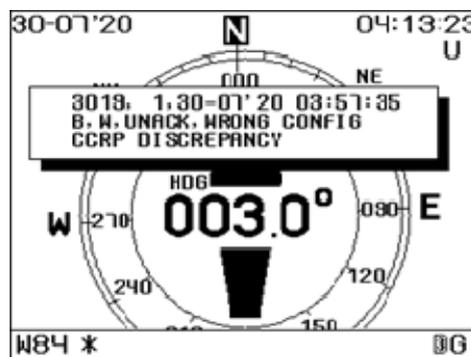
The following submenus are available.

- SHIP: Select from Valid or Invalid for Ship information.(set invalid if don't use information)
- BEAM :   Ship's BEAM(0~70.0m)
- LENGTH: Ship's LENGTH(0~700.0m)
- SENSOR: Select from Valid or Invalid for SENSOR(set invalid if don't use information)
- SNESOR: Select SENSOR number (No.1~9)
- X   Set point X for the installation position of a sensor unit. (unit is m)
- Y   Set point Y for the installation position of a sensor unit. (unit is m)
- CCRP   Select from Valid or Invalid for CCRP (set invalid if don't use information)
- X   Set point X for CCRP (unit is m)
- Y   Set point Y for CCRP (unit is m)

Memo

- Press 🅲🅻🆁 to return to the Main Menu.

- If the installation position of the sensor unit is off the ship, the sensor unit installation position (SENSOR) will be "Invalid".
  In this case, change the position setting onto the ship and reset the SENSOR to "Valid".
  The same applies to CCRP.

Section 6　Maintenance and Inspection

Proper maintenance may greatly affect the lifespan of the equipment.　In order to maintain the equipment in peak state, perform the following regularly.

⚠ WARNING
🚫 Do not perform internal inspections or modifications of the equipment. Inspection or modification by unauthorized personnel may result in fire, electric shock, or equipment failure.　Please consult with JRC or an affiliate to perform internal inspections or repair.

⚠ CAUTION
🚫 Use only the specified fuse. Failure to do so may result in fire or equipment failure.
🚫 Use only the specified batteries. Failure to do so may result in equipment failure or malfunction.

6.1　General Maintenance and Inspection

Operate the equipment under standard power voltage levels (DC 10.8 - 31.2 V).

The following shows general maintenance and inspection methods using standard tools.

No.	Item	Maintenance and Inspection
1	Cleaning	Clean the panel screen, knobs, and switches with a soft cloth. There are no gears in the unit, so oil lubrication is unnecessary.
2	Parts Securing	Check for loose screws, nuts, and connectors, and connect securely any that have loosened.

Perform inspection of the displayed items when the equipment is functioning normally.　Compare operating results to the normal operation values in order to detect problems quickly.

6.2 Alerts

Refer to 5.2.8 and check if any alert is given or not. If it is, check the details referring to the list shown below.
Regarding the troubleshooting, Refer to "6.3 Troubleshooting".

Table 6.1 Alert List

Alert ID	Alert title	Alert description text	Alert causes	Category	priority	instance
3002	Lost core IF	GPS core1 error	GPS Core 1 Error (Sensor)	B	W	1
		GPS core2 error	GPS Core 2 Error (Sensor)	B	W	2
		GPS core3 error	GPS Core 3 Error (Sensor)	B	W	3
3065	Rapid motion	X Gyro input error	X Axis Gyroscope Error (Sensor)	B	W	1
		Y Gyro input error	Y Axis Gyroscope Error (Sensor)	B	W	2
		Z Gyro input error	Z Axis Gyroscope Error (Sensor)	B	W	3
		G Sensor input error	Tiltmeter Error (Sensor)	B	W	4
3065	Rapid change	Temp sensor input error	Temperature Sensor Error (Sensor)	B	W	5
3062	Sensor fault	FRAM error, contact JRC	Memory Error (Sensor)	B	W	1
		SRAM error, contact JRC	Memory Error (Sensor)	B	W	2
		ROM error, contact JRC	Memory Error (Sensor)	B	W	3
10002	GPS malfunction	restart the equipment	Sensor Internal Error	B	W	12~28
3012	Doubtful head	Port1 heading unchange	Port1 heading error (Sensor)	B	W	1
		Port2 heading unchange	Port2 heading error (Sensor)	B	W	1
10002	GPS malfunction	restart the equipment	Sensor Internal Error	B	W	31~52
3008	Lost core func	update GPS1 core software	GPS1 No Program(Sensor)	B	W	1
		update GPS2 core software	GPS2 No Program(Sensor)	B	W	2
		update GPS3 core software	GPS3 No Program(Sensor)	B	W	3
3055	Quality reduce	Excessive vibration x	Excessive Vibration	B	W	1~4
3062	Display fault	FROM error, contact JRC	Flash ROM Deletion, Write Error (ROM[1][2])	B	W	11
		RAM error, contact JRC	RAM Read, Write Error	B	W	12
		SIO[0] error, contact JRC	SIO[0] Error	B	W	13
		SIO[1] error, contact JRC	SIO[1] Error	B	W	14
		SIO[2] error, contact JRC	SIO[2] Error	B	W	15
		SIO[3] error, contact JRC	SIO[3] Error	B	W	16
		SIO[4] error, contact JRC	SIO[4] Error	B	W	17
		SIO[5] error, contact JRC	SIO[5] Error	B	W	18

Alert ID	Alert title	Alert description text	Alert causes	Category	priority	instance
3015/ 3014	Lost Heading	Loss of heading, rot	Bearing Calculation Error, Unable to Obtain Data	B	W/A ※1)	2
3015/ 3014	Lost position	Loss of position	Position Calculation Error, Unable to Obtain Data	B	W/A ※1)	1
3062	Core fault	GPS core error, contact JRC	Sensor Self-Diagnosis Error	B	W	21
3002	Lost sensor IF	not responded from sensor	Sensor Unconfigurable (Configuration Not Possible)	B	W	4
		not received from sensor	Sensor Periodic Input Not Possible (Position Measurement Data Unobtainable)	B	W	5
3015	Lost roll	Loss of roll	Roll Calculation Error, Unable to Obtain Data	B	W	3
3015	Lost pitch	Loss of pitch	Pitch Calculation Error, Unable to Obtain Data	B	W	4
3055	Not differential	DGPS correction not applied	In non-DGPS	B	W	11
3008	Lost sens func	update sensor software	Sensor No Program	B	W	4
3032	Anchor Out	Exceeding the anchor range	Exceeding the anchor watch setting range.	B	W ※2)	1
10005	Wrong config	CCRP Discrepancy	CCRP Discrepancy	B	W ※2)	1
3056	quality reduce	HDOP exceeded	HDOP Value has been exceeded setting level	B	C ※2)	1

※1) Escalate from waring to alarm.

※2) If it is rectified, it will be normal status without acknowledgement.

・All alerts grant a responsibility transfer.

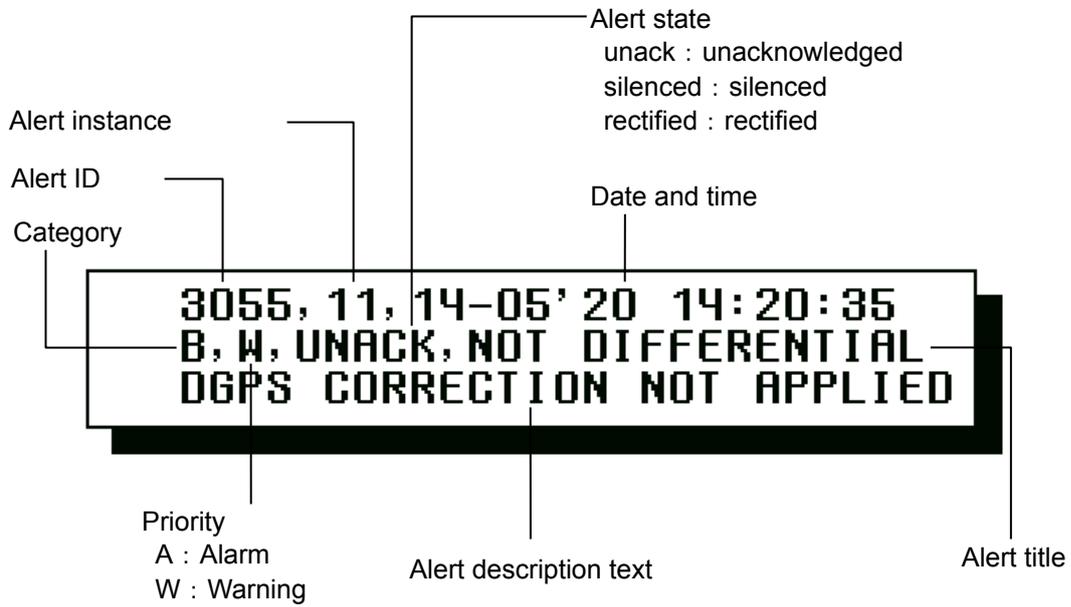When an alert occurs, a pop-up will be displayed.

Alert pop-up example

Alert state
  unack : unacknowledged
  silenced : silenced
  rectified : rectified

Alert instance

Alert ID

Category

Date and time

```
3055,11,14-05'20 14:20:35
B,W,UNACK,NOT DIFFERENTIAL
DGPS CORRECTION NOT APPLIED
```

Priority
 A : Alarm
 W : Warning

Alert description text

Alert title

Table 6.2 Grouping List

Alert ID	Alert title	Alert description text	Group member[2]		Category	Priority
			Alert description for member	Alert ID for member		
11002/ 11001	calculation fail	Loss of position, attitude[3]	Lost of position	3015/3014	B	W/A[1]
			Lost of heading, rot	3015/3014		
			Lost of roll	3015		
			Lost of pitch	3015		
11005/ 11004	measure fail	Bad environment	X Gyro input error	3065	B	W/A[1]
			Y Gyro input error	3065		
			Z Gyro input error	3065		
			G Sensor input error	3065		
			Excessive Vibration x	3055		
			calculation fail	11002/ 11001		
11008/ 11007	Sensor fail	Sensor communication fail	not responded from sensor	3002	B	W/A[1]
			not received from sensor	3002		
			update sensor software	3008		
			calculation fail	11002/ 11001		
11012/ 11011	GPS core fail	Core communication fail	GPS core 1 Error	3002	B	W/A[1]
			GPS core 2 Error	3002		
			GPS core 3 Error	3002		
			update GPS1 core software	3008		
			update GPS2 core software	3008		
			update GPS3 core software	3008		
			calculation fail	11002/ 11001		

※1) Escalate from waring to alarm.

※2) Refer to "Table 6.1 Alert List" for the cause of alert.

※3) Lost of attitude: When the "Lost position" has not occurred.
     Lost of position, heading: When only "Lost position" and "Lost heading" occur.

Table 6.3 Aggregation List

Alert ID	Alert title	Alert description text	Aggregation member		Category	Priority
			Alert description for member	Alert ID for member		
3062	System fault	xx aggregation alerts	FRAM error, contact JRC SRAM error, contact JRC ROM error, contact JRC FROM error, contact JRC RAM error, contact JRC SIO[0] error, contact JRC SIO[1] error, contact JRC SIO[2] error, contact JRC SIO[3] error, contact JRC SIO[4] error, contact JRC SIO[5] error, contact JRC GPS core error, contact JRC	3062	B	W

xx : Number of occurrence alert

<div align="center">

⚠ WARNING

</div>

🚫	Do not perform internal inspections or modifications of the equipment. Inspection or modification by unauthorized personnel may result in fire, electric shock, or equipment failure. Please consult with JRC or an affiliate to perform internal inspections or repair.

The following is reference information concerning identification of problems.

Problem Behavior	Possible Causes	Troubleshooting Measures
The power does not turn on when the power switch is pressed.	Power is not being supplied by the ship junction box.	Check the cabling from the junction box.
	Power is not being supplied by the power supply equipment (option).	Check the power supply unit cabling.
	The fuse connected to the power cable has blown.	If there are no problems in the cabling, replace the fuse.
	The power supply equipment (option) fuse has blown.	If there are no problems in the cabling, replace the fuse.
	The display unit switch is broken.	Consult with JRC or an affiliate.
The LCD display does not display anything.	The LCD display is broken.	Consult with JRC or an affiliate.
The display does not light up.		
The buzzer sound. Is not generated	The buzzer is broken.	Consult with JRC or an affiliate.
The click does not sound.	The key press sound is turned off.	Refer to 5.3.1.3 for setting the key press sound.
There is no reception. (from sensor)	The sensor connection cable is cut.	Check the connection cable.
	The sensor is broken.	Consult with JRC or an affiliate.
There is no reception. (from external devices)	The polarity of the serial cable is incorrect.	Check the polarity of the cable.
	The interface does not match.	Check the interface.
	An unsupported sentence has been entered.	Check the entered commands and version.
There is no transmission. (to external devices)	Output settings have not been configured.	Refer to 5.3.7 for setting the key press sound.
	The configured channel is incorrect.	Refer to 5.3.7 for setting the key press sound.
	The DISP-DPU or connector board is broken.	Consult with JRC or an affiliate.

6.3.2 Repair Unit

Repair units and their models are shown below.

	Name	Model	Notes
1	DISP-DPU	CMJ-501C1	For NWZ-4701 Display Unit
2	LCD Unit	CCN-392A	For NWZ-4701 Display Unit
3	Keyboard Unit	CMD-953A	For NWZ-4701 Display Unit
4	Connector Board	CMH-2192C	For NWZ-4701 Display Unit
5	Processing Unit	CMJ-497-U	For NNN-21/31 Sensor Unit
6	Antenna Unit	CAY-62	For NNN-21/31 Sensor Unit

Fuse

	Name	Model	Notes
1	2A Fuse	MF60NR 250V 2	For NWZ-4701 Display Unit

6.3.3 Regular Replacement Parts

Parts which should be regularly replaced are shown below.
Contact JRC or an affiliate to order.

	Name	Model	Life	Notes
1	LCD Unit (Inside display unit)	CCN-392A	40000 hours	Approximately 5 years of continuous use
2	Lithium Battery (Inside sensor)	BR-2/3AGE2P	Approximately 10 years	Reception is possible even without battery power. (It will takes 30 to 60 seconds longer to fix the position)

Section 7   After-Sales Service

7.1 Warranty

- Specific periods may vary based on our warranty policies, but the standard warranty period is one year from the date of purchase.

7.2 Repair Parts Stocking Period

- We keeps functional repair parts for this equipment (parts necessary for the functioning of this equipment) in stock for 10 years from the discontinuation of production.

7.3 When Requesting Service

When you think the equipment is not operating properly, please read "6.3 Troubleshooting" carefully, and inspect the equipment again.   If the problem persists, stop using the equipment, and consult your dealer, or a JRC branch or affiliate.

- Repairs during the warranty period
  Should a malfunction or failure occur when the equipment is operated according to the descriptions and instructions contained herein, it is repaired free of charge during the warranty period by JRC or another location specified by your dealer.   However, any repair for failures resulting from misuse, negligence, or natural disasters, fire, or other Acts of God is charged.
- Repairs after the warranty period
  Repairs to restore the proper equipment operation can be made at a specified rate with the user's consent.   In this case, the equipment can either be sent to JRC or an affiliate, or on-ship repairs can be performed at a location specified by JRC or a sales affiliate. Repairs which cannot be performed on-board the ship needs to be performed in a repair plant.
- Information that needs to be provided when requesting service
  - Name, model, production date, and serial number
  - Detailed description of the malfunction (alert number, etc.)
  - Name, address, and telephone number of your company or organization

7.4 Recommended Checks and Inspections

Equipment performance is subject to degradation due to age and change of component conditions over time.   In addition to your own routine check, additional inspection and maintenance is recommended.   Please consult with your dealer or one of our local offices. Note that this inspection and maintenance is not free of charge.

If you have any other questions about after-sales service, please direct your inquiries to your dealer or nearest local office.

A list of branches is provided at the end of the "Contact List".

Section 8   Disposal

⚠ WARNING

When disposing of the used lithium battery, place insulating tape over the battery terminals, or otherwise insulate the battery.   Failure to do so may result in heating, explosion, or fire due to a shorted battery.

8.1   Disposal of the Equipment

- Observe all rules and regulations of the local authorities when disposing of this equipment.

8.2   Disposal of Used Batteries

This equipment contains a lithium battery.
- When disposing of the used lithium battery, place insulating tape over the battery terminals, or otherwise insulate the battery.   Dispose of the battery properly as directed by the local authorities.   Consult your dealer, our sales office, or the local authorities for further details on disposal methods.

Section 9   Specifications

9.1   Display Unit (NWZ-4701)

9.1.1 Panel

(1) Display Unit: 5.7 inch FSTN LCD, 320 x 240 dots
(2) Operating Keys: 12 keys
(3) Backlight (LED):   LCD and key lighting
(4) Dimmer Levels: Bright, medium, dark, off

9.1.2 Power Supply

(1) Power Supply Voltage: 12/24 VDC (+30%, -10%)
(2) Power Consumption: Maximum 12W (including sensor)
                             Maximum 6W (except sensor)

9.1.3 Environment

(1) Operating Temperature: -15ºC to +55ºC
(2) Storage Temperature: -25ºC to +70ºC
(3) Waterproofing: correspond to IP44
(4) Vibration: IEC60945 ed.4 conformant
(5) EMC: IEC60945 ed.4 conformant
(6) Compass Safe Distance   1.35m(STD)、0.75m(STEER)

9.1.4 Dimensions and Mass

(1) Dimensions: 267.4mm (W) X 162mm (H) X 85mm (D)
                             Except projections
(2) Mass: Approximately 2.3 kg

◇Serial Transmission

Name	Specifications	I/O	Format	Notes
Sensor Through	RS422	Output	NMEA / NSK / AD-10 / IEC	
DATA OUT1	RS422	Output	NMEA / NSK / AD-10/ IEC	
	RS232	Input /Output		Dedicated port for updating. Not usually use.
DATA OUT3	RS422	Output	NMEA / NSK / IEC	
DATA OUT4	RS422	Output	NMEA / NSK / BEACON/ IEC/4341	
	RS422	Input	CURRENT/CCRP / ALERT	CUR,VBW,ACN, HBT,ACK sentence
DATA OUT5	RS422	Output	NMEA / NSK / IEC	

(1)   NMEA
Specification: NMEA0183
Version: Ver. 1.5 / 2.1 / 2.3
Transmission Speed: Based on setting (4800 / 9600 / 19200 / 38400 / 57600 bps)
Data bit: 8 bit / parity: none / stop bit: 1 bit
Output Interval: Based on setting
                            (20ms / 25ms / 50ms / 100ms / 200ms / 500ms / 1s / 2s / 3s / 4s / 5s / 6s / 7s / 8s / 9s)
Sentence: HDT / THS / ROT / ZDA / GGA / VTG / RMC / GBS / DTM / GSA / GSV / GNS / MSS / GST / GLL/ ALR / ATT/ HVE / HBT / ALF / ALC / ARC / AGL

1 :   The sensor through selects either HDT or THS sentence, but not both.
2 :   Selectable sentences depends on the version.
3 :   Some combinations of output sentences, bit rates, and output intervals may not be possible.
4 :   ATT and HVE sentences can be set from output cycles of 25ms/100ms/200ms/1s/2s only. The both sentences are not a complete guarantee at present.
5 :   Only DATA OUT4/IN4 port (1 port) is possible for BAM connection.

(2)   IEC
Specification: IEC61162

(3)   JRC Sentence(Only for service):
                            PJRCD,GP,0 / PJRCD,GP,1 / PJRCD,GP,2 / PJRCD,GP,3/ PJRCD,GP,5 / PJRCD,GP,8 / PJRCF,GP,0 / PJRCF,GP,2 / PJRCD,GP,6 / CCRP / REMOTE MAINTENANCE

(4)   NSK
                            Fixed

(5)   AD-10
Period: 25ms / 200ms

◇Contact Signal

Name	Specifications	Notes
Contact Output 0	External Buzzer 1	For special purpose usage
Contact Output 1	Log Pulse	Off, 200p/NM , 400p/NM
Contact Output 2	External Buzzer 2	For general use
Contact Input	External Buzzer 2 Release	

9.2 Sensor Unit (NNN-21/31)

9.2.1 Electrical Specifications

(1)   Reception Method: Multichannel all in view (12CH + SBAS 1CH)
(2)   Reception Frequency: 1575.42MHz $\pm$ 1MHz (C/A code)
(3)   Positional Accuracy: 0.25º RMS (NNN-31)
                              0.5º RMS (NNN-21)
(4)   Tracking Rate of Turn: 45º / sec.
(5)   Tracking Acceleration: 1G
(6)   Roll/Pitch Output: -60° $\sim$ +60°

9.2.2 Environment

(1)   Operating Temperature: -25ºC $\sim$ +55ºC
(2)   Storage Temperature: -25ºC $\sim$ +70ºC
(3)   Waterproofing: correspond to IP56
(4)   Vibration: IEC60945 ed.4 conformant
(5)   EMC: IEC60945 ed.4 conformant
(6)   Compass Safe Distance   0.30m(STD/STEER)

9.2.3 Dimensions and Mass

(1)   Dimensions: NNN-31 ϕ 1152 x 286 mm
                              NNN-21 ϕ 691 x 285 mm
(2)   Mass: NNN-31 Approximately 10 kg
                              NNN-21 Approximately 5.9 kg
(3)   Cable: 10 m

Appendix

Appendix 1　List of Geodetic Systems

Screen Display	Setting		Geodetic System
W84	WGS-84	0	WGS-84
W72	WGS-72	1	WGS-72
TOY	JAPAN	2	Tokyo Datum
NAS	NAD27 USA	3	North American 1927 (USA)
NAS	NAD27 CAN	4	North American 1927 (Canada, Alaska)
EUR	EUROPE 50	5	Europe 1950 (Europe)
AUA	AUSTRA 66	6	Australian geodetic 1966 (Australia)
OGB	OSGB-36	7	Ordnance Survey of Great Britain (England)
008	NAD-83	8	NAD-83
ADI	ADI	11	Adindan (Ethiopia, Sudan)
ARF	ARF	12	ARC 1950 (Botswana)
AUG	AUG	13	Australian Geodetic 1984 (Australia)
BER	BER	14	Bermuda 1957 (Bermuda islands)
BOO	BOO	15	Bogota Observatory (Columbia)
CAI	CAI	16	Compo Inchauspe (Argentine)
CHI	CHI	17	Chatham 1971 (Chatham Islands)
CHU	CHU	18	Chua Astro (Paraguay)
COA	COA	19	Corrego Alegre (Brazil)
BAT	BAT	20	Djakarta (Vatavia) (Sumatra)
EUR	EUR	21	European 1979 (Europe)
GEO	GEO	22	Geodetic Datum 1949 (New Zealand)
GUA	GUA	23	Guam 1963 (Guam)
024	024	24	Hayford 1910 (Finland)
HJO	HJO	25	Hjorsey 1955 (Iceland)
IND	IND	26	Indian (India, Napal)
IRL	IRL	27	Ireland 1965 (Ireland)
KEA	KEA	28	Kertau 1948 (West Malaysia, Singapore)
LCF	LCF	29	L.C.5 Astro (Cayman Brac island)
LIB	LIB	30	Liberia 1964 (Liberia)
LUZ	LUZ	31	Luzon (Philippines)
MER	MER	32	Merchich (Morocco)
MIN	MIN	33	Minna (Cameroon)
NAH	NAH	34	Nahrwan (Oman)
NAP	NAP	35	Naparima, BWI (Trinidad and Tobago)
OEG	OEG	36	Old Egyptian (Egypt)
OHA	OHA	37	Old Hawaiian (Hawaiian Islands)
PLN	PLN	38	Pico de las Nieves (Canary Islands)
PRP	PRP	39	Provisional south American 1956 (South America)
HIT	HIT	40	Provisional south Chilean 1963 (South Chile)
PUR	PUR	41	Puerto Rico (Puerto Rico, Virgin Islands)
QUO	QUO	42	Qornoq (South Greenland)
043	043	43	RT90 (Sweden)
SAO	SAO	44	Santa Braz (San Miguel, Santa Maria islands)
SAN	SAN	45	South American 1969 (South America)
046	046	46	Southwest Base (Faial, Gracinao, Pico, San Jorge, Terceira islands)
TIL	TIL	47	Timbalai 1948 (Brunei, Malaysia)
SPK	SPK	48	SK-42(Pulkovo 42)

Appendix 1-2

[1]   Output Data
[1-1] Data Sentences

1.   Sentences are not necessarily output in the order shown below.   Make sure that sentences can be received in any order.
2.   The length of each sentence is variable.   Make sure that sentences of any length can be received.

NMEA0183 Output Sentences

HDT	-	Heading true
THS	-	True heading and status
ROT	-	Rate of turn
ZDA	-	Time and date
GGA	-	Global positioning system (GPS) fix data
VTG	-	Course over ground and ground speed
RMC	-	Recommended minimum specific GNSS data
GBS	-	GNSS satellite fault detection
GNS	-	GNSS fix data
DTM	-	Datum reference
GSA	-	GNSS DOP and active satellites
GSV	-	GNSS satellites in view
MSS	-	MSK beacon receiver signal status
GST	-	GNSS pseudorange noise statistics
GLL	-	Geographic position – latitude/longitude
ATT	-	Attitude information
HVE	-	Heaving information
ALR	-	Set Alert State
HBT		Heartbeat supervision sentence
ALF		Alert sentence
ALC		Cyclic alert list
ARC		Alert command refused
AGL		Alert group list

JRC Output Sentences (Only for service)

PJRCD, GP, 0	PJRCD, GP, 1	PJRCD, GP, 2	PJRCD, GP, 3
PJRCD, GP, 5	PJRCD, GP, 8	PJRCF, GP, 0	PJRCF, GP, 2
PJRCD, GP, 6			

[1-2]   Protocols

NMEA Protocols(JRC Protocols, IEC Protocols)

Bit Rate:	4800, 9600, 19200, 38400, 57600bps (Select one)
Data Bits:	8 bits
Parity:	None
Start Bit:	1 bit
Stop Bit:	1 bit
Transmission Interval:	20ms, 25ms, 50ms, 100ms, 200ms, 500ms
	1s, 2s, 3s, 4s, 5s, 6s, 7s, 8s, 9s (Select one)

Some combinations of bit rate, transmission interval, and number of sentences are not possible. In such a case, increase the transmission interval or configure the equipment to output the minimum required sentences only.

[1-3]   Data Format

■ HDT   -   Heading true

$GPHDT,xxx.x,T*hh<CR><LF>
           1   2

        1:     Heading, degrees true
        2:     Checksum (Version 2.1, 2.3)

■ THS   -   True heading and status

$GPTHS,xxx.x,x*hh<CR><LF>
          1   2 3

        1:     Heading, degrees true
        2:     Mode indicator
             A = Autonomous
             E = Estimated (dead reckoning)
             S = Simulator mode
             V = Data not valid (including standby)
        3:     Checksum

■ ROT   -   Rate of turn

$GPROT,uxxxx.x,A*hh<CR><LF>
           1   2 3

        1:     Rate of turn, °/min, "-" = bow turns to port
        2:     Status
             A = data valid
             V = data invalid
        3:     Checksum

■ ZDA   -   Time and date

Version 1.5
$GPZDA, hhmmss,xx,xx,xxxx,xx,xx<CR><LF>
             1   2 3 4   5 6
Version 2.1,2.3,IEC
$GPZDA, hhmmss.ss,xx,xx,xxxx,xx,xx*hh<CR><LF>
           1   2 3   4   5 6 7

        1:     UTC
        2:     Day, 01 to 31 (UTC)
        3:     Month, 01 to 12 (UTC)
        4:     Year (UTC)
        5:     Local zone hours, 00h to ±13h (+: Not indicate)
        6:     Local zone minutes, 00 to +59 (+: Not indicate)
        7:     Checksum

■ GGA - Global positioning system (GPS) fix data

Version 1.5
$GPGGA,hhmmss,ddmm.mmm,a,dddmm.mmm,a,x,x,xx,uxxxx,M,uxxx,M,xx,xxxx<CR><LF>
        1   2   3   4   5 6 7 8   9 10 11 12 13 14
Version 2.1
$GPGGA,hhmmss,ddmm.mmmm,a,dddmm.mmmm,a,x,xx,xx,uxxxx,M,uxxx,M,xx,xxxx*hh<CR><LF>
        1   2   3   4   5 6 7 8   9 10 11 12 13 14 15
Version 2.3
$GPGGA,hhmmss.ss,ddmm.mmmm,a,dddmm.mmmm,a,x,xx,xx,uxxxx,M,uxxx,M,xx,xxxx*hh<CR><LF>
          1   2   3   4   5 6 7 8   9 10 11 12 13 14 15

1:	UTC of position	(Version 1.5, 2.1)
1:	UTC of position (1/100 sec)	(Version 2.3)
2, 3:	Latitude (deg, min), N / S	
4, 5:	Longitude (deg, min), E / W	
6:	GPS quality indicator	

            0 = fix not available or invalid
            1 = GPS SPS mode
            2 = differential GPS, SPS mode
            8 = Simulator mode   (Version 2.3 only)

7:	Number of satellites in use, 00-12, may be different from the number in view
8:	Horizontal dilution of precision, 00-20
9, 10:	Antenna altitude above/below mean sea level (geoid) (m)
11, 12:	Geoidal separation (m)

13: Version 1.5: Age of differential GPS data (NULL if not performing DGPS positioning)
     Version 2.1: Age of differential GPS data (00 if not performing DGPS positioning)
     Version 2.3: Age of differential GPS data (NULL if not performing DGPS positioning)

14: Version 1.5: Differential reference station ID, 0000-1023
     Version 2.1: Differential reference station ID (0000 if not performing DGPS positioning
     Version 2.3: Differential reference station ID (NULL if not performing DGPS positioning)
15:   Checksum

Note   For version 1.5, when the position is not fixed, outputs last measured position data.
       For version 2.3, when the position is not fixed, outputs last measured position data, and time.
       For version 2.3, when power is turned on, or master reset is performed, the initial time, and position settings are NULL.

■ VTG - Course over ground and ground speed

Version 1.5
$GPVTG, xxx.x,T,,,xxx.x,N,,<CR><LF>
        1 2   3   4
Version 2.1
$GPVTG, xxx.x,T,,,xxx.x,N,xxx.x,K*hh<CR><LF>
        1 2   3   4   5 6 7
Version 2.3, IEC
$GPVTG, xxx.x,T,,,xxx.x,N,xxx.x,K,x*hh<CR><LF>
        1 2   3   4   5 6 7 8

1, 2:	Course over ground, degrees true	
3, 4:	Speed over ground, knots	
5, 6:	Speed over ground, km/h	
7:	Checksum	(Version 2.1)
7:	Mode indicator	(Version 2.3, IEC)

          A = Autonomous mode
          D = Differential mode
          N = Data not valid
          S = Simulator mode
          P = SBAS mode (IEC only)

8:	Checksum	(Version 2.3, IEC)

■ RMC - Recommended minimum specific GNSS data

Version 1.5
$GPRMC, hhmmss,A,ddmm.mm,a,dddmm.mm,a,xxx.x,xxx.,xxxxxx,xx,a*hh<CR><LF>
              1   2   3   4   5   6 7 8   9 10 11 12

Version 2.1
$GPRMC, hhmmss,A,ddmm.mmmm,a,dddmm.mmmm,a,xxx.x,xxx.,xxxxxx,xx.,a*hh<CR><LF>
              1   2   3   4   5   6 7 8   9   10 11 12

Version 2.3
$GPRMC,hhmmss.ss,A,ddmm.mmmm,a,dddmm.mmmm,a,xxx.x,xxx.x,xxxxxx,xx.,a,a*hh<CR><LF>
                1   2   3   4   5   6 7   8   9   10 11 12 13

IEC
$GPRMC,hhmmss.ss,A,ddmm.mmmm,a,dddmm.mmmm,a,xxx.x,xxx.x,xxxxxx,xx.x,a,a,a *hh<CR><LF>
          1   2   3   4   5   6 7   8   9   10 11 12 13 14

1:	UTC of position fix	(Version 1.5, 2.1)
1:	UTC of position fix (1/100 sec)	(Version 2.3,IEC)
2:	Status	
	A = data valid	
	V = navigation receiver warning	
3, 4:	Latitude (deg, min), N / S	
5, 6:	Longitude (deg, min), E / W	
7:	Speed over ground, knots	
8:	Course over ground, degrees true	
9:	Date: dd/mm/yy	
10,11:	Magnetic variation value, E/W	
12:	Checksum	(Version 1.5, 2.1)
12:	Mode indicator	(Version 2.3,IEC)
	A = Autonomous mode	
	D = Differential mode	
	N = Data not valid	
	S = Simulator mode	
	P = SBAS mode (IEC only)	
13:	Checksum	(Version 2.3)
13:	Navigational status	
	S = Safe	
	C = Caution	
	U = Unsafe	
	V = Not Valid	
14:	Checksum	

Note   For version 1.5, when not performing positioning, outputs last measured position data.
       For version 2.3,IEC when not performing positioning, outputs last measured position data,
      date, and time.
       For version 2.3,IEC when power is turned on, or master reset is performed, the initial
      time, date, and position settings are NULL.

■ GBS - GNSS satellite fault detection

Version 2.1, 2.3 only
```
$GPGBS,hhmmss.ss,uxxx.x,uxxx.x,uxxx.x,xx,x.xxxxx,uxxx.x,xxxx.x*hh<CR><LF>
          1        2        3        4     5    6       7       8    9
```
IEC
```
$GPGBS,hhmmss.ss,uxxx.x,uxxx.x,uxxx.x,xx,x.xxxxx,uxxx.x,xxxx.x,1,1*hh<CR><LF>
          1        2        3        4     5    6       7       8  9 10 11
```

1:	UTC time of the GGA or GNS fix associated with this sentence
2:	Expected error in latitude (m)
3:	Expected error in longitude (m)
4:	Expected error in altitude (m)
5:	ID number (see Note 1) of most likely failed satellite
	GPS: 1-32
	SBAS satellites 120 to 138 are represented by 33 to 51.
	33 to 64 are reserved for SBAS satellite use.
6:	Probability of missed detection for most likely failed satellite (0.00000 to 1.00000)
7:	Estimate of bias on most likely failed satellite (m)
8:	Standard deviation of bias estimate (m)
9:	Checksum (Version 2.1,2.3)
9:	GNSS System ID 1: fixed
10:	GNSS Signal ID 1: fixed
11:	Checksum

■ GNS - GNSS fix data

Version 2.3 only
```
$GPGNS, hhmmss.ss,ddmm.mmmm,a,dddmm.mmmm,a,x,xx,xx,uxxxx,uxxx,xx,xxxx*hh<CR><LF>
            1          2      3      4     5 6 7  8    9    10  11  12   13
```
IEC
```
$GPGNS, hhmmss.ss,ddmm.mmmm,a,dddmm.mmmm,a,x,xx,xx,uxxxx,uxxx,xx,xxxx,a*hh<CR><LF>
            1          2      3      4     5 6 7  8    9    10  11  12  13 14
```

1:	UTC of position (1/100 sec)
2, 3:	Latitude (deg, min), N / S
4, 5:	Longitude (deg, min), E / W
6:	Mode indicator
	N = No fix. Satellite system not used in position fix, or fix not valid.
	A = Autonomous. Satellite system used in non-differential mode in position fix.
	D = Differential. Satellite system used in differential mode in position fix.
	S = Simulator mode.
	P = SBAS (IEC only)
7:	Total number of satellites in use
8:	HDOP (0 - 20)
9:	Antenna altitude, m, mean-sea-level (geoid)
10:	Geoidal separation, m
11:	Age of differential data (NULL if not performing DGPS positioning)
12:	Differential reference station ID (NULL if not performing DGPS positioning)
13:	Checksum (Version 2.3)
13:	Navigational Status indicator
	S = Safe
	C = caution
	U = Unsafe
	V = Not valid
14:	Checksum

Note   When not performing position fixing, outputs last measured position data, and time.
        When power is turned on, or master reset is performed, the initial time, and position settings
        are NULL

■ DTM　-　Datum reference

Version 2.1, 2.3 only
$GPDTM, ccc,,x.x,a,x.x,a,ux.x,ccc*hh<CR><LF>
         1   2 3 4 5 6   7 8

        1:       Local datum
               W84 = WGS84
               W72 = WGS72
               IHO = datum code (Version 2.1: JRC proprietary value)
               IHO = datum code (Version 2.3: IHO datum code)

        2, 3: Lat offset, min, N/S (see Note)
        4, 5: Lon offset, min, E/W (see Note)
        6:       Altitude offset, m (see Note)
        7:       Reference datum, W84 = WGS84
        8:       Checksum

Note   Latitude and longitude offsets are positive numbers, the altitude offset may be negative.
           Offsets change with position: position in the local datum is offset from the position in the
           reference datum in the directions indicated:
$$P_{local\ datum} = P_{ref\ datum} + offset$$

■ GSA　-　GNSS DOP and active satellites

Version 2.1 only
$GPGSA, a,x,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx.x,xx.x,xx.x*hh<CR><LF>
          1 2 3 4   5   6   7   8   9 10 11 12 13 14 15   16   17   18

Version 2.3 only
$GPGSA, a,x,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx.x,xx.x,xx.x*hh<CR><LF>
          1 2 3 4   5   6   7   8   9 10 11 12 13 14 15   16   17   18
Version 2.3 only
$GPGSA, a,x,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx.x,xx.x,xx.x,1*hh<CR><LF>
          1 2 3 4   5   6   7   8   9 10 11 12 13 14 15   16   17 18 19
        1:     Mode
              M = manual, forced to operate in 2D or 3D mode
              A = automatic, allowed to automatically switch 2D/3D
        2:     Positioning dimensions
              1 = fix not available
              2 = 2D
              3 = 3D
      3 - 14:ID numbers of satellites used in solution
           (For less than 12 satellites, the field are "00".)   (Version 2.1)
        15:    PDOP (4 digit fixed length)   (Version 2.1)
        16:    HDOP (4 digit fixed length)   (Version 2.1)
        17:    VDOP (4 digit fixed length)   (Version 2.1)
        18:    Checksum   (Version 2.1)

      3 - 14:ID numbers of satellites used in solution
           (For less than 12 satellites, the fields are NULL.)   (Version 2.3, IEC)
             SBAS satellites 120 to 138 are represented by 33 to 51.
             33 to 64 are reserved for SBAS satellite use.
             If there are 12 or more GPS satellites when positioning, even if
             there are SBAS satellites, the output gives priority to GPS.
        15:    PDOP (4 digit fixed length)   (Version 2.3, IEC)
        16:    HDOP (4 digit fixed length)   (Version 2.3, IEC)
        17:    VDOP (4 digit fixed length)   (Version 2.3, IEC)
        18:    Checksum   (Version 2.3)
        18:    GNSS System ID 1: fixed
        19:    Checksum

■ GSV - GNSS satellites in view

Version 2.1, 2.3 only
$GPGSV, x,x,xx,xx,xx,xxx,xx,xx,xx,xxx,xx,xx,xx,xxx,xx,xx,xx,xxx,xx*hh<CR><LF>
           1 2 3 4 5   6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
IEC
$GPGSV, x,x,xx,xx,xx,xxx,xx,xx,xx,xxx,xx,xx,xx,xxx,xx,xx,xx,xxx,xx,1*hh<CR><LF>
           1 2 3 4 5   6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21

1:	Total number of GSV messages (1 - 3)	(Version 2.1)
2:	GSV message number (1 - 3)	(Version 2.1)
1:	Total number of GSV messages (1 - 4)	(Version 2.3, IEC)
2:	GSV message number (1 - 4)	(Version 2.3, IEC)
3:	Total number of satellites in view	
4:	1st Satellite ID number (01 - 32)	
	SBAS satellites 120 to 138 are represented by 33 to 51.	(Version 2.3, IEC)
	33 to 64 are reserved for SBAS satellite use.	(Version 2.3, IEC)
5:	1st satellite Elevation, degrees, 90° maximum	
6:	1st satellite Azimuth, degrees true, 000 to 359	
7:	1st satellite SNR (C/No) 00-99 dB-Hz, null when not tracking	

8 - 11:2nd satellite information   (same as 4 - 7)
12 - 15:3rd satellite information   (same as 4 - 7)
16 - 19:4th satellite information   (same as 4 - 7)
20:    Checksum (Version 2.1, 2.3)
20:    Signal ID   1: fixed
21:    Checksum

Note1   Each GSV sentence includes 4 satellites, so the number of GSV sentences varys based on the number of satellites detected.

■ MSS - MSK beacon receiver signal status

Version 2.1
$GPMSS, ⅠⅠⅠ,SSS,FFF.F,BBB*hh<CR><LF>
         1   2   3   4 5
Version 2.3
$GPMSS, ⅠⅠⅠ,SSS,FFF.F,BBB,x*hh<CR><LF>
         1   2   3   4 5 6

1:	Signal strength (SS), dB/1 μV/m	
2:	Signal-to-noise ratio (SNR), dB	
3:	Beacon frequency, kHz	
4:	Beacon bit rate, bits/s	
5:	Checksum	(Version 2.1)
5:	Channel Number "1" or null	(Version 2.3)
6:	Checksum	(Version 2.3)

■ GST - GNSS pseudorange noise statistics

Version 2.1, 2.3 only

```
$GPGST,hhmmss.ss,xxxx.x,xxxx.x,xxxx.x,xxx,xxxx.x,xxxx.x,xxxx.x*hh<CR><LF>
          1        2       3       4     5    6       7       8    9
```

- 1: UTC time of the GGA or GNS fix associated with this sentence
- 2: RMS value of the standard deviation of the range inputs to the navigation process. (m)
  Range inputs include pseudoranges and DGPS corrections
- 3: Standard deviation of semi-major axis of error ellipse, (m)
- 4: Standard deviation of semi-minor axis of error ellipse, (m)
- 5: Orientation of semi-major axis of error ellipse, (degrees from true north)
- 6: Standard deviation of latitude error, (m)
- 7: Standard deviation of longitude error, (m)
- 8: Standard deviation of altitude error, (m)
- 9: Checksum

■ GLL - Geographic position – latitude/longitude

Version 1.5

```
$GPGLL,ddmm.mm,a,dddmm.mm,a<CR><LF>
          1    2     3    4
```

Version 2.1

```
$GPGLL,ddmm.mmmm,a,dddmm.mmmm,a,hhmmss.ss,A*hh<CR><LF>
          1      2      3      4     5     6 7
```

Version 2.3

```
$GPGLL,ddmm.mmmm,a,dddmm.mmmm,a,hhmmss.ss,A,x*hh<CR><LF>
          1      2      3      4     5     6 7 8
```

- 1, 2: Latitude (deg, min), N / S
- 3, 4: Longitude (deg, min), E / W

5:	UTC of position (1/100 sec fixed at 00)	(Version 2.1)
5:	UTC of position (1/100 sec)	(Version 2.3)

- 6: Status
  - A=data valid
  - V=data invalid

7:	Checksum	(Version 2.1)
7:	Mode indicator	(Version 2.3)

  - A = Autonomous
  - D = Differential
  - N = Data not valid
  - S = Simulator

8:	Checksum	(Version 2.3)

Note   For version 1.5, when not performing positioning, outputs last measured position data.
For version 2.3, when not performing positioning, outputs last measured position data, and time.
For version 2.3, when power is turned on, or master reset is performed, the initial time, and position settings are NULL.

■ PFEC, GPatt - ATTITUDE INFORMATION
Version 1.5
$PFEC, GPatt,xxx.x,uxx.x,uxx.x<CR><LF>
          1   2   3   4   5
Version 2.1~
$PFEC, GPatt,xxx.x,uxx.x,uxx.x*hh<CR><LF>
          1   2   3   4   5

           1:        Data format (att)
           2:        YAW   000.0～359.9 deg.
           3:        PITCH -90.0～90.0 deg.   u:sign(+※,-)
           4:        ROLL -90.0～90.0 deg.   u:sign(+※,-)
           5:        Checksum
           ※: Sensor Through port only

■ PFEC, GPhve - HEAVING INFORMATION
Version 1.5
$PFEC, GPhve,xxx.x,X<CR><LF>
          1   2   3
Version 2.1~
$PFEC, GPhve,xxx.x,X*hh<CR><LF>
          1   2   3

           1:        Data format (att)
           2:        HVEAVING -99.999m～99.999m sign(+,-)
           3:        A(Data valid)/V(Data invalid)

■ ALR - Set Alert State
Version 2.3 only
$GPALR, hhmmss.ss, xxx, A, A, c--c *hh<CR><LF>
              1   2 3 4   5

           1:        Time of alert condition change, UTC
           2:        Local alert number (identifier)
           3:        Alert condition (A= threshold exceeded, V= not exceeded)
           4:        Alert's acknowledge state, A= acknowledged, V= unacknowledged
           5:        Alert's description text

■ ALC - Cyclic alert list
$GPALC, xx,xx,xx,x.x,aaa,x.x,x.x,x.x,……,aaa,x.x,x.x,x.x*hh<CR><LF>
          1 2 3 4 5 6   7   8   9 10 11 12 13

           1:        Total number of sentences for this massage, 01-99
           2:        Sentence number, 01-99
           3:        Sequential message identifier, 00-99
           4:        Number of alert entries
           5:        Manufacturer mnemonic code: Null or "JRC"
           6:        Alert identifier
           7:        Alert instance
           8:        Revision counter
           9～12:   Alert entry n
           13:       Checksum

■ ALF - Alert sentence

$GPALF, x,x,x,hhmmss.ss,a,a,a,JRC,x.x,x.x,x.x,x,c---c*hh<CR><LF>
        1 2 3 4   5 6 7 8   9   10   11 12 13 14

1:	Total number of ALF sentence for this massage, 1-2
2:	Sentence number, 1～2
3:	Sequential message identifier, 0-9
4:	Time of last change 2nd ALF: Null
5:	Alert category, "B" 2nd ALF: Null
6:	Alert priority 2nd ALF: Null
	A: Alarm (Alarm)
	W: Warning (Warning)
	C: Caution (Caution)
7:	Alert status 2nd ALF: Null
	V: active - unacknowledged
	S: active - silenced
	A: active - acknowledged or active
	O: active - responsibility transferred
	U: rectified - unacknowledged
	N: normal
8:	Manufacture mnemonic code,: Null or "JRC"
9:	Alert identifier
10:	Alert instance, 1-999999
11:	Revision counter, 1-99
12:	Escalation counter, 0-9
13:	Alert text
	1st ALF: Alert title
	2nd ALF: Alert description text
14:	Checksum

■ HBT - Heartbeat supervision sentence

$GPHBT, x.x,A,x*hh<CR><LF>
       1 2 3 4

1:	Configured repeat interval
2:	Equipment status
	A: yes
	V: no
3:	Sequential sentence identifier, 0-9
4:	Checksum

■ ARC   -   Alert command refused
$GPARC, hhmmss.ss,aaa,x.x,x.x,c*hh<CR><LF>
        1   2   3   4   5 6

1:	Time
2:	Manufacture mnemonic code: Null or "JRC"
3:	Alert identifier
4:	Alert instance, 1-999999
5:	Refused alert command
6:	Checksum

■ AGL   -   Alert group list
$GPARC, xx,xx,xx,c--c,ccc,x.x,x.x,........,c--c,c--c,x.x,x.x*hh<CR><LF>
        1 2 3   4   5   6 7   8   9   10   11 12 13

1:	Total number of sentences for this massage
2:	Sentence number
3:	Sequential messege identifier, 00-99
4:	SFI of alert source
5:	Manufactuer mnemonic code: Null or "JRC"
6:	Alert identifier
7:	Alert instance
8:	Additional alert entries
9-12:	Alert entry n
13:	Checksum

[2]   Input Data
[2-1]   Data Sentences

NMEA0183 Input Sentences

VBW	-	Dual ground/water speed
CUR	-	Water current layer
ACK	-	Acknowledge alert
HBT	-	Heartbeat supervision sentence
ACN		Alert command

DGPS correction data

RTCM SC-104 Version2.0

[2-2]   Protocols

NMEA Protocol

Bit Rate:	4800bps
Data Bits:	8 bits
Parity:	None
Start Bit:	1 bit
Stop Bit:	1 bit
Receiving interval:	Auto (Automatic receive)

[2-3]   Data Formats

■ VBW   -   Dual ground/water speed

$VDVBW , uxx.xx , uxx.xx , A , uxx.xx , uxx.xx , A , uxx.xx , A , uxx.xx , A * hh <CR><LF>
              1   2   3   4   5   6   7   8   9   10   11

    1:    Longitudinal water speed (see Note), knots
    2:    Transverse water speed (see Note), knots
    3:    Status: water speed
            A = data valid
            V = data invalid
    4:    Longitudinal ground speed (see Note), knots
    5:    Transverse ground speed (see Note), knots
    6:    Status: ground speed
            A = data valid
            V = data invalid
    7:    Stern transverse water speed (see Note), knots
    8:    Status: stern water speed
            A = data valid
            V = data invalid
    9:    Stern transverse ground speed (see Note), knots
    10:   Status: stern ground speed
            A = data valid
            V = data invalid
    11:   Checksum

Note   Transverse speed: "-" = port,
          Longitudinal speed: "-" = astern.

■ CUR   -   Water current layer – Multi-layer water current data

$VDCUR , A , x , x , x.x , x.x , T ,x.x , x.x , x.x , T , B * hh <CR><LF>
            1   2   3   4   5   6   7   8   9   10 11 12

    1:    Validity of the data
            A = Valid
            V = not valid
    2:    Data set number, 0 to 9
    3:    Layer number
    4:    Current depth in metres
    5:    Current direction in degrees
    6:    Direction reference in use, True/Relative T/R
    7:    Current speed in knots
    8:    Reference layer depth in metres
    9:    Heading in degrees
    10:   Heading reference in use, True/Magnetic T/M
    11:   Speed reference
            B = Bottom track
            W= Water track
            P= Positioning system
    12:   Checksum

■ ACK　-　Acknowledge alert

$--ACK, xxx*hh<CR><LF>
　　　　　1

　　　　　　　1:　　　　Unique alert number (identifier) at alert source

■ HBT　-　Heartbeat supervision sentence

$GPHBT, x.x,A,x*hh<CR><LF>
　　　　1　2 3 4

　　　　　　　1:　　　　Configured repeat interval
　　　　　　　2:　　　　Equipment status
　　　　　　　　　　　　A: yes
　　　　　　　　　　　　V: no
　　　　　　　3:　　　　Sequential sentence identifier, 0-9
　　　　　　　4:　　　　Checksum

■ ACN　-　Alert command

$--ACK, hhmmss.ss,aaa,x.x,x.x,c,a*hh<CR><LF>
　　　　　1　　　　　2　3　4　5 6 7
　　　　　　　1:　　　　Time　Null
　　　　　　　2:　　　　Manufacture mnemonic code: Null or "JRC"
　　　　　　　3:　　　　Alert identifier
　　　　　　　4:　　　　Alert instance, 1-999999
　　　　　　　5:　　　　Alert command
　　　　　　　　　　A: acknowledge
　　　　　　　　　　Q: request / repeat information
　　　　　　　　　　O: responsibility transfer
　　　　　　　　　　S: silence
　　　　　　　6:　　　　Sentence status flag, 　"C" fixed
　　　　　　　7:　　　　Checksum

Appendix 3　Terminology

Term	Meaning
2D (2 dimension)	Positioning with antenna elevation height in addition to satellite data.
3D (3 dimension)	The three dimensional position fix, 4 or more satellites required.
AD-10	Transmission method for handling bow heading data.
ARPA	Automatic Radar Plotting Aids, equipment for automatic collision avoidance.
ANCHOR WATCH	Function for monitoring a shift in position while the ship is at anchor.
Bow Heading	Angle between the ship's bow and meridian.
CCRP	Abbreviation of Consistent Common Reference Point. A common reference point for controlling a ship is defined so that all the measurements including the range, the bearing, the relative course, and the velocity to the target can be measured on the basis of CCRP. (Only CCRP settings are allowed in this device.　Conversion of measured values to the CCRP reference point is not available.)
Checksum	An error detection method to check that the data has been correctly transmitted.
COG	Course Over Ground.
CURRENT	Sea and ocean currents, expressed in speed and direction.
DISP-DPU	The main circuitry of display unit.
DGPS	Abbreviation of Differential Global Positioning System.　GPS satellite error data sent from a reference station whose position is accurately known is received via beacon from a beacon station, improving positioning accuracy.
DR	Abbreviation of Dead Reckoning.　Reckoning of course and distance with the aid of Gyro and ship's speed.
FRAM	Nonvolatile memory using a ferroelectric substance.
Geodetic	Conditions for expressing position via latitude and longitude.
GPS Repecon	Device for synchro / step conversion of true bearing signal output by GPS compass.
GPS Satellite (GPS)	Abbreviation of Global Positioning System.　Refers to satellites launched for navigational support of military vessels managed by the United States Department of Defense.
HDG	Abbreviation of Heading, indicating heading of ship's bow.
HDOP	Abbreviation of Horizontal Dilution of Precision.　Indicates accuracy of positioning.　The smaller the number, the higher the accuracy.　If GPS satellites are unevenly distributed, this number will grow.　If GPS satellites are evenly distributed, this number will be smaller.

Heaving	The up and down of the ship
IEC60945	IEC is the abbreviation of International Electrotechnical Commission. It is an international standard governing electrical and electronic technologies.
IPX	IPX is a standard of waterproofing, there are nine grades (0 - 8). (IPX4: splash-proof, IPX6: waterproof)
LCD Unit (LCD)	Liquid Crystal Display Unit.
Log Pulse	Contact output signal, output in 1 pulse per nm. Expressed in units of "p/nm".
mi/h	Unit of ship speed.
Multipath Wave	Waves received from multiple directions due to reflection or refraction of an initial wave by obstacles.
NMEA0183 (NMEA)	Abbreviation of National Marine Electrical Association 0183. International standard for naval equipment transmission established by the National Marine Electrical Association.
NSK	JRC radar supported format.
Pitch	Medial rotation
Positioning	Use of GPS or DGPS receiving functions to determine the current position of a ship.
RAIM Accuracy Standard (RAIM)	Abbreviation of Receiver Autonomous Integrity Monitoring. This system automatically detects failed satellites and deselects their positioning data from calculations. Including data from failed satellites will result in a decrease in positioning accuracy; the RAIM accuracy standard indicates the accuracy degradation base for removal of failed satellites from positioning calculations.
Ranging	Positioning with the use of SBAS satellite in addition to GPS satellite.
Rate of Turn	Same as ROT
Reception Level	GPS signal reception level.
Roll	Lateral rotation
ROT	Rate of Turn, the rate at which the ship turns, expressed by "deg/min".
RS232	Serial data transmission standard. It is unbalanced, and hence can only be used for short distance transmission.
RS422	Balanced serial transmission standard.
SBAS	Abbreviation of Satellite-based Augmentation System. It is a blanket term for wide scale GPS support systems using fixed position satellites which send GPS error correction data over a wide range.

SBAS Search	SBAS reception mode (manual / automatic).
Smoothing	Function for averaging over a specified number of seconds.
SOG	Speed Over Ground, This is the ship's relative speed to the ground.
STW	Speed Through Water.
Type 0 Information	SBAS satellite test broadcast.
UTC	Abbreviation of Universal Time Coordinated. Successor to Greenwich Standard Time.

MENU			SETTING
DISPLAY	CONTRAST		1 2 3 4 5 6 7 8 9 10 11 12 13
	DIMMER	MAXIMUM	1 2 3 4 5 6 7 8 9 10
		TYPICAL	1 2 3 4 5 6 7 8 9 10
		MINIMUM	1 2 3 4 5 6 7 8 9 10
	CLICK SOUND		ON OFF
	REVERSING MODE		NORMAL REVERSE1 REVERSE2
	START SCREEN		COMP-A -B -C -D -E -F HDG SOG COG NAVI-A -B ROT-A -B SPEED GRAPH CALC
	DECIMAL FONT SIZE		LARGE SMALL
	COMP-C/D POSN DIGIT		3 4
	CURRENT LAYERS		(1～999) ALL
HEADING	RESTORATION		AUTO MANUAL
	BACKUP		1 2 3 4 5
	INTERRUPT NMEA		NULL LAST STOP
	HEADING OFFSET		(-10～+10)
	OUTPUT RESOLUTION		0.1 0.01
GPS	MODE		AUTO 2D 3D
	HDOP		4 10 20
	SMOOTHING	POSITION	(0～99)
		SPEED	(0～99)
		COURSE	(0～99)
	RAIIM ACCURACY LEVEL		OFF 10 30 50 100
	INITIALIZATION	LATITUDE	
		LONGITUDE	
		ANT HEIGHT	
SBAS	MODE		AUTO GPS ALONE SBAS BEACON
	SBAS SEARCH		AUTO MANUAL
	TYPE 0 INFORMATION		ON OFF
	RANGING		ON OFF
BEACON	STATION SELECT		MANUAL AUTO
	BIT RATE		50 100 200
	FREQUENCY		(275.0～325.0)
	BEACON INFORMATION		ON OFF
SYSTEM	TIME DIFF		(-13:00～+13:00)
	DATE DISP		DD-MM'YY 'YY-MM-DD MM-DD'YY DD MMM,'YY MMM DD,'YY
	TIME DISP		12 24
	DATUM		
	SPEED UNIT		kn km/h mi/h
	ROT RANGE		30 60 90 120 150 180 210 240 270 300 600 900 1200 1500 1800 2100 2400 2700
	ROT SMOOTHING		(0～99)
	ROLL/PITCH RANGE		5 10 15 20 25 30
	ROLL OFFSET		(-30～+30)
	PITCH OFFSET		(-30～+30)
SYSTEM2	HEAVING BAR RANGE		1 2 3 4 5 10 20 30 40 50 100
	HEAVING BAR DISP		OFF DISP1 DISP2 DISP3 DISP4
	TREND GRAPH		AVERAGE MAXIMUM
	HVE POINT OFFSET X		
	HVE POINT OFFSET Y		
	HVE POINT OFFSET Z		
	RMC MAG CORR		AUTO MANUAL
	GPS 5Hz DRAW		ON OFF
	SOG BAR RANGE		5 10 15 20 25 30 50 100

MENU			SETTING						
DATA I/O	SENSOR THROUGH	NMEA							
		VER	Ver1.5	Ver2.1	Ver2.3				
		BIT RATE	4800	9600	19200	38400	57600		
		INTERVAL	20m	25m	50m	100m	200m	500m	1
		SENTENCE	HDT :		THS :		ROT :		
			ZDA :		GGA :		VTG :		
			RMC :		GBS :		DTM :		
			GSA :		GSV :		GNS :		
			MSS :		GST :		GLL :		
			ATT		HVE		ALR		
			CD,GP,0 :			CD,GP,1 :			
			CD,GP,2 :			CD,GP,3 :			
			CD,GP,5 :			CD,GP,8 :			
			CF,GP,0 :			CF,GP,2 :			
			CD,GP,6 :						
			PJRC,GC			POT			
		NSK							
		AD-10	25	200					
		IEC							
	DATA OUT1	NMEA							
		VER	Ver1.5	Ver2.1	Ver2.3				
		BIT RATE	4800	9600	19200	38400	57600		
		SENTENCE	HDT :		THS :		ROT :		
			ZDA :		GGA :		VTG :		
			RMC :		GBS :		DTM :		
			GSA :		GSV :		GNS :		
			MSS :		GST :		GLL :		
			ATT		HVE		ALR		
			CD,GP,0 :			CD,GP,1 :			
			CD,GP,2			CD,GP,3 :			
			CD,GP,5 :			CD,GP,8 :			
			CF,GP,0 :			CF,GP,2 :			
			CCRP :			REMOTE :			
			PJRC,GC			POT			
			ALERT						
		NSK							
		AD-10	25	200					
		IEC							
	DATA OUT3	NMEA							
		VER	Ver1.5	Ver2.1	Ver2.3				
		BIT RATE	4800	9600	19200	38400	57600		
		SENTENCE	HDT :		THS :		ROT :		
			ZDA :		GGA :		VTG :		
			RMC :		GBS :		DTM :		
			GSA :		GSV :		GNS :		
			MSS :		GST :		GLL :		
			ATT :		HVE :		ALR :		
			CD,GP,0 :			CD,GP,1 :			
			CD,GP,2			CD,GP,3 :			
			CD,GP,5 :			CD,GP,8 :			
			CF,GP,0 :			CF,GP,2 :			
			CCRP :			REMOTE :			
			PJRC,GC			POT			
			ALERT						
		NSK							
		IEC							

MENU			SETTING
DATA I/O	DATA OUT4/IN4	NMEA	NMEA/OFF NMEA/CURRENT NMEA/CCRP
		VER	Ver1.5 Ver2.1 Ver2.3
		BIT RATE	4800 9600 19200 38400 57600
		SENTENCE	HDT : THS : ROT :
			ZDA : GGA : VTG :
			RMC : GBS : DTM :
			GSA : GSV : GNS :
			MSS : GST : GLL :
			ATT : HVE : ALR :
			CD,GP,0 : CD,GP,1 :
			CD,GP,2 CD,GP,3 :
			CD,GP,5 : CD,GP,8 :
			CF,GP,0 : CF,GP,2 :
			CCRP : REMOTE :
			PJRC,GC POT
			ALERT
		NSK	NSK/OFF
		BEACON	BEACON/OFF BEACON/CURRENT BEACON/CCRP
		IEC	IEC/OFF IEC/CURRENT IEC/CCRP
		4341	4341/OFF 4341/CURRENT 4341/CCRP
	DATA OUT5	NMEA	
		VER	Ver1.5 Ver2.1 Ver2.3
		BIT RATE	4800 9600 19200 38400 57600
		SENTENCE	HDT : THS : ROT :
			ZDA : GGA : VTG :
			RMC : GBS : DTM :
			GSA : GSV : GNS :
			MSS : GST : GLL :
			ATT : HVE : ALR :
			CD,GP,0 : CD,GP,1 :
			CD,GP,2 CD,GP,3 :
			CD,GP,5 : CD,GP,8 :
			CF,GP,0 : CF,GP,2 :
			CCRP : REMOTE :
			PJRC,GC POT
			ALERT
		NSK	
		IEC	
	LOG PULSE		OFF 200 400
VERSION INFO	DISPLAY		
	SENSOR		
	GPS1		
	GPS2		
	GPS3		
ALERT	ALERT ESCALATION	POSITION	ON OFF
		HEADING	ON OFF
		TIME	30 60 120 180 240 300
	HEADER ALERT DISP		ON OFF
	DGPS ALERT		ON OFF
	TEST MODE		ON OFF
LANGUAGE	LANGUAGE		ENGLISH JAPAN

MENU			SETTING
PRODUCT TYPE	DISPLAY	TYPE	MAIN SUB
		SERIAL	
		SFI	
	SENSOR	SERIAL	
		BARCODE	
		DEFAULT NO.	
CCRP	SHIP		ENABLE DISABLE
	BEAM		
	LENGTH		
	SENSOR		ENABLE DISABLE
	SENSOR		No.
	X		
	Y		
	CCRP		ENABLE DISABLE
	X		
	Y		

· List of screens assigned to **DISP**

Vertical direction: Can be switched by the **DISP** key

Horizontal direction: Can be switched by the ◀ ▶key
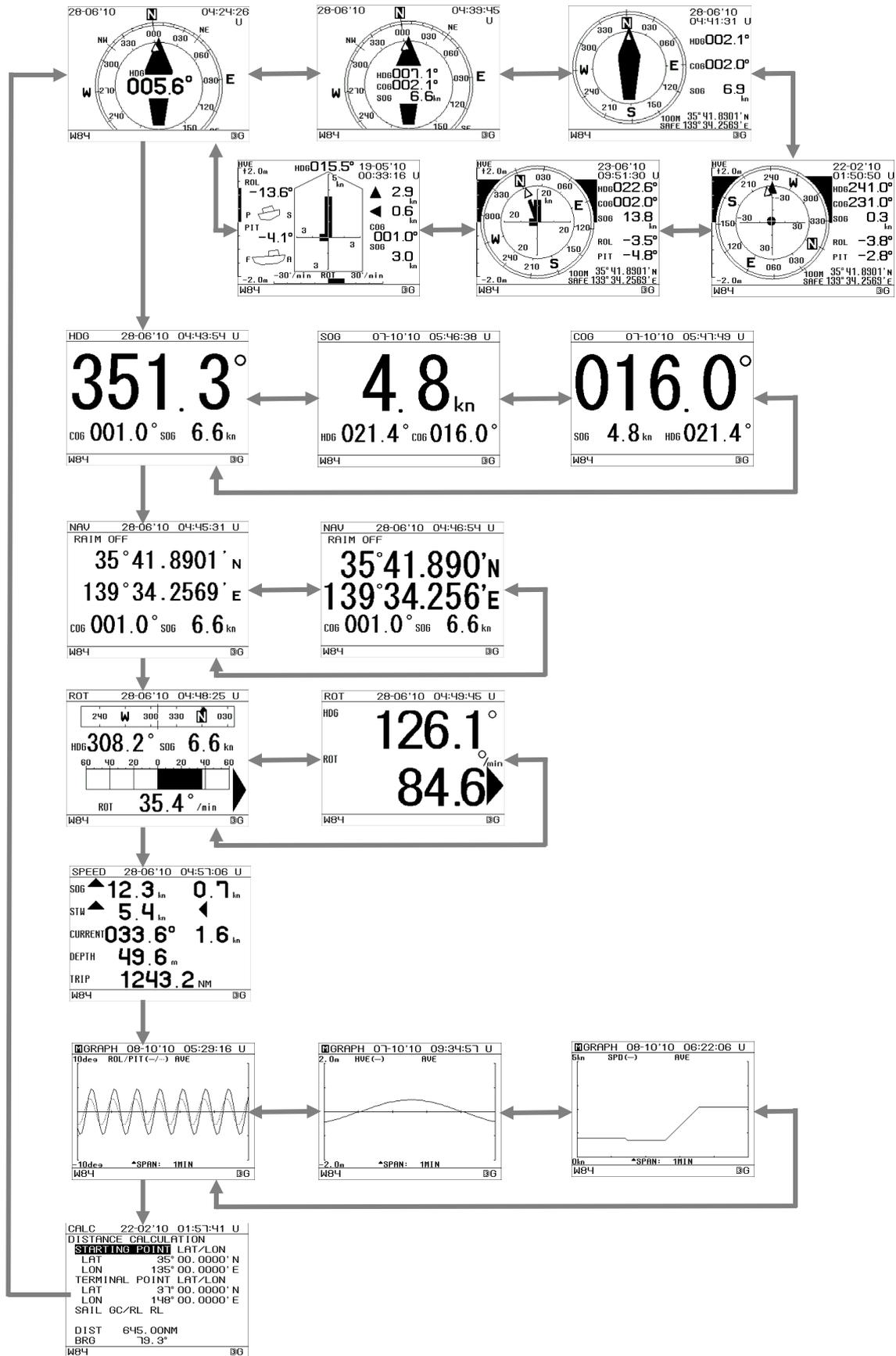
・List of screens assigned to USER

Can be switched by the USER key
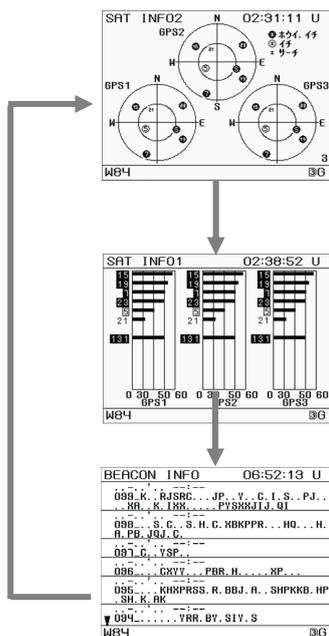
A beacon information screen is displayed only when the beacon Information Display is ON.
To display beacon information, connect an optional beacon receiver.

Term	Abbreviation
Acknowledge	ACK
Acquire, Acquisition	ACQ
Acquisition Zone	AZ
Adjust, Adjustment	ADJ
Aft	AFT
Alarm	ALARM
Altitude	ALT
Amplitude Modulation	AM
Anchor Watch	ANCH
Antenna	ANT
Anti Clutter Rain	RAIN
Anti Clutter Sea	SEA
April	APR
Audible	AUD
August	AUG
Automatic	AUTO
Automatic Frequency Control	AFC
Automatic Gain Control	AGC
Automatic Identification System	AIS
Automatic Identification System – Search and Rescue Transmitter	AIS-SART
Automatic Radar Plotting Aid	ARPA
Autopilot	AP
Auxiliary System/Function	AUX
Available	AVAIL
Azimuth Indicator	AZI
Background	BKGND
Bearing	BRG
Bearing Waypoint To Waypoint	BWW
Bow Crossing Range	BCR
Bow Crossing Time	BCT
Brilliance	BRILL
Built in Test Equipment	BITE

Term	Abbreviation
Calibrate	CAL
Cancel	CNCL
Carried (for example, carried EBL origin)	C
Central Processing Unit	CPU
Centre	CENT
Change	CHG
Circularly Polarised	CP
Clear	CLR
Closest Point of Approach	CPA
Compact Disk Read Only Memory	CDROM
Consistent Common Reference Point	CCRP
Consistent Common Reference System	CCRS
Contrast	CONT
Coordinated Universal Time	UTC
Correction	CORR
Course	CRS
Course Over the Ground	COG
Course Through the Water	CTW
Course To Steer	CTS
Course Up	C UP
Cross Track Distance	XTD
Cursor	CURS
Dangerous Goods	DG
Date	DATE
Day	DAY
Dead Reckoning, Dead Reckoned Position	DR
December	DEC
Decrease	DECR
Delay	DELAY
Delete	DEL
Departure	DEP
Depth	DPTH

Term	Abbreviation		Term	Abbreviation
Destination	DEST		Fix	FIX
Deviation	DEV		Forward	FWD
Differential GLONASS	DGLONASS		Frequency	FREQ
Differential GNSS	DGNSS		Frequency Modulation	FM
Differential GPS	DGPS		Full	FULL
Digital Selective Calling	DSC		Gain	GAIN
Display	DISP		Geographics	GEOG
Distance	DIST		Geometric Dilution Of Precision	GDOP
Distance Root Mean Square	DRMS		Global Maritime Distress and Safety System	GMDSS
Distance To Go	DTG		Global Navigation Satellite System	GNSS
Drift	DRIFT		Global Orbiting Navigation Satellite System	GLONASS
Dropped (for example, dropped EBL origin)	D		Global Positioning System	GPS
East	E		Great Circle	GC
Echo Reference	REF		Grid	GRID
Electronic Bearing Line	EBL		Ground	GND
Electronic Chart Display and Information System	ECDIS		Grounding Avoidance System	GAS
Electronic Chart System	ECS		Group Repetition Interval	GRI
Electronic Navigational Chart	ENC		Guard Zone	GZ
Electronic Position Fixing System	EPFS		Gyro	GYRO
Electronic Range and Bearing Line	ERBL		Harmful Substances (applies to AIS)	HS
Emergency Position Indicating Radio Beacon	EPIRB		Head Up	H UP
Emergency Position Indicating Radio Beacon – AIS	EPIRB-AIS		Heading	HDG
			Heading Control System	HCS
			Heading Line	HL
Enhance	ENH		High Frequency	HF
Enter	ENT		High Speed Craft	HSC
Equipment	EQUIP		Horizontal Dilution Of Precision	HDOP
Error	ERR			
Estimated Position	EP		Identification	ID
Estimated Time of Arrival	ETA		In	IN
Estimated Time of Departure	ETD		Increase	INCR
European Geo-Stationary Navigational Overlay System	EGNOS		Indication	IND
			Information	INFO
			Infrared	INF RED
Event	EVENT		Initialisation	INIT
Exclusion Zone	EZ		Input	INP
External	EXT		Input/Output	I/O
F-Band (applies to radar)	F-Band		Integrated Navigation System	INS
February	FEB		Integrated Radio Communication System	IRCS
Foreword	FWD			
Fishing Vessel	FISH		Interference Rejection	IR

Term	Abbreviation	Term	Abbreviation
Interswitch	ISW	Not Less Than	NLT
Interval	INT	Not More Than	NMT
January	JAN	Not Under Command	NUC
July	JUL	November	NOV
June	JUN	October	OCT
Label	LBL	Off	OFF
Latitude	LAT	Officer On Watch	OOW
Latitude/Longitude	L/L	Offset	OFFSET
Leeway	LWY	On	ON
Limit	LIM	Out/Output	OUT
Line Of Position	LOP	Own Ship	OS
Log	LOG	Panel Illumination	PANEL
Long Pulse	LP	Parallel Index Line	PI
Long Range	LR	Past Positions	PAST POSN
Longitude	LON	Passenger Vessel	PASSV
Loran	LORAN	Performance Monitor	MON
Lost Target	LOST TGT	Permanent	PERM
Low Frequency	LF	Person Overboard	POB
Magnetic	MAG	Personal Identification Number	PIN
Man Overboard	MOB	Pilot Vessel	PILOT
Manoeuvre	MVR	Port/Portside	PORT
Manual	MAN	Position	POSN
Map(s)	MAP	Positional Dilution Of Precision	PDOP
March	MAR	Power	PWR
Maritime Mobile Services Identity number	MMSI	Predicted	PRED
Maritime Pollutant (applies to AIS)	MP	Predicted Area of Danger	PAD
Maritime Safety Information	MSI	Predicted Point of Collision	PPC
Marker	MKR	Pulse Length	PL
Master	MSTR	Pulse Modulation	PM
Maximum	MAX	Pulse Repetition Frequency	PRF
May	MAY	Pulse Repetition Rate	PRR
Medium Frequency	MF	Pulses Per Revolution	PPR
Medium Pulse	MP	Racon	RACON
Menu	MENU	Radar	RADAR
Minimum	MIN	Radar Plotting	RP
Missing	MISSING	Radar Transponder	TPR
Mute	MUTE	Radius	RAD
Navigation	NAV	Rain	RAIN
Night	NT	Range	RNG
Normal	NORM	Range Rings	RR
North	N	Raster Chart Display System	RCDS
North Up	N UP		

Term	Abbreviation
Raster Navigational Chart	*RNC*
Rate Of Turn	*ROT*
Real-time Kinematic	*RTK*
Receive	*RX*
Receiver	*RCDR*
Receiver Autonomous Integrity Monitoring	*RAIM*
Reference	*REF*
Relative	*REL*
Relative Motion	*RM*
Revolutions per Minute	*RPM*
Rhumb Line	RL
Roll On/Roll Off Vessel	*RoRo*
Root Mean Square	*RMS*
Route	ROUTE
Safety Contour	SF CNT
Sailing Vessel	SAIL
Satellite	SAT
S-Band	S-BAND
Scan to Scan	SC/SC
Search And Rescue	SAR
Search And Rescue Transponder	SART
Search And Rescue Vessel	SARV
Select	SEL
September	SEP
Sequence	SEQ
Set (i.e., set and drift, or setting a value)	SET
Ship's Time	TIME
Short Pulse	SP
Signal to Noise Ratio	SNR
Simulation	SIM
Slave	SLAVE
South	S
Speed	SPD
Speed and Distance Measuring Equipment	SDME
Speed Over the Ground	SOG
Speed Through the Water	STW
Stabilized	STAB
Standby	STBY
Starboard/Starboard Side	STBD
Station	STN
Symbol(s)	SYM

Term	Abbreviation
Synchronised/ Synchronous	*SYNC*
System Electronic Navigational Chart	SENC
Target	*TGT*
Target Tracking	*TT*
Test	*TEST*
Time	*TIME*
Time Difference	*TD*
Time Dilution Of Precision	*TDOP*
Time Of Arrival	*TOA*
Time Of Departure	*TOD*
Time to CPA	*TCPA*
Time To Go	*TTG*
Time to Wheel Over Line	*TWOL*
Track	*TRK*
Track Control System	*TCS*
Tracking	TRKG
Trail(s)	*TRAIL*
Transmit and Receive	*TXRX*
Transceiver	*TCVR*
Transferred Line Of Position	*TPL*
Transmit	TX
Transmitter	*TMTR*
Transmitting Heading Device	*THD*
Trial	*TRIAL*
Trigger Pulse	*TRIG*
True	*T*
True Motion	*TM*
Tune	*TUNE*
Ultrahigh Frequency	*UHF*
Uninterruptible Power Supply	UPS
Universal Time, Coordinated	*UTC*
Universal Transverse Mercator	UTM
Unstabilised	*UNSTAB*
Variable Range Marker	*VRM*
Variation	*VAR*
Vector	*VECT*
Very High Frequency	*VHF*
Very Low Frequency	*VLF*
Vessel Aground	*GRND*
Vessel at Anchor	*ANCH*

Term	Abbreviation
Vessel Constrained by Draught	*VCD*
Vessel Engaged in Diving Operations	*DIVE*
Vessel Engaged in Dredging or Underwater Operations	*DRG*
Vessel Engaged in Towing Operations	*TOW*
Vessel Not Under Command	*NUC*
Vessel Restricted in Manoeuvrability	*RIM*
Vessel Traffic Service	*VTS*
Vessel Underway Using Engine	*UWE*
Video	*VID*

Term	Abbreviation
Visual Display Unit	VDU
Voyage	*VOY*
Voyage Data Recorder	*VDR*
Warning	*WARNING*
Water	*WAT*
Waypoint	*WPT*
Waypoint Closure Velocity	WCV
West	*W*
Wheel Over Line	*WOL*
Wheel Over Point	WOP
Wheel Over Time	*WOT*
World Geodetic System	*WGS*
X-Band	*X-BAND*

JRC *Japan Radio Co., Ltd.*

电子信息产品有害物资申明
日本无线株式会社

Declaration on toxic & hazardous substances or elements
of Electronic Information Products
Japan Radio Company Limited

有毒有害物质或元素的名称及含量
(Names & Content of toxic and hazardous substances or elements)

形式名(Type): JLR-21/31　　　　　　　名称(Name): GPS COMPASS

部件名称 (Part name)	有毒有害物质或元素 (Toxic and Hazardous Substances and Elements)					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr^{6+})	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
GPS指南针接收器 (Sensor Unit)	×	○	×	×	×	×
显示装置(Display Unit)	×	○	×	×	×	×
外部设备(Peripherals) ・选择(Options) ・电线类(Cables) ・手册(Documennts)	×	○	×	×	×	×

○：表示该有毒有害物质在该部件所有均质材料中的含量均在SJ/T11306-2006 标准规定的限量要求以下。
　（Indicates that this toxic, or hazardous substance contained in all of the homogeneous materials for this part is below the requirement in
　　SJ/T11363-2006.）
×：表示该有毒有害物质至少在该部件的某一均质材料中的含量超出SJ/T11363-2006 标准规定的限量要求。
　（Indicates that this toxic or hazardous substance contained in at least one of the homogeneous materials used for this part is above
　　the limit requirement in SJ/T 11363-2006.）

RE：中华人民共和国电子信息产品污染控制管理办法
　　Management Methods on Control of Pollution from Electronics Information Products of the People's Republic of China

For further information,contact:

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