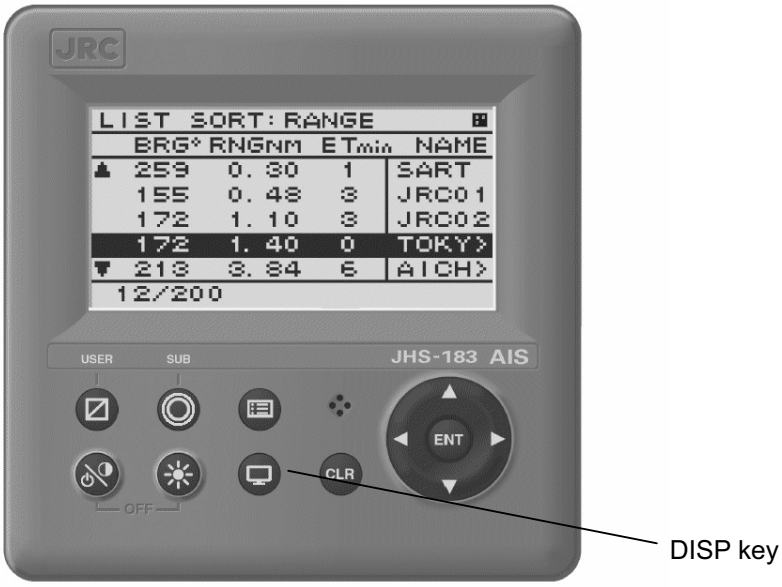
5.4 Explanation of Graphic display

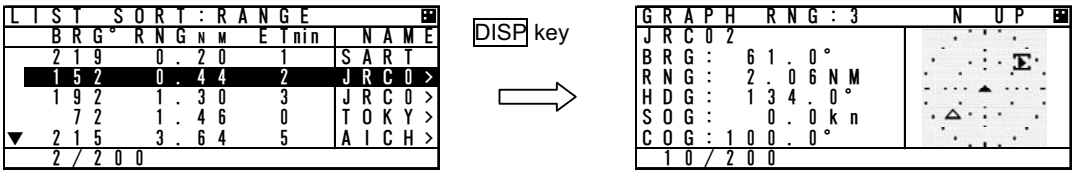
5.4.1 The Outline of Display



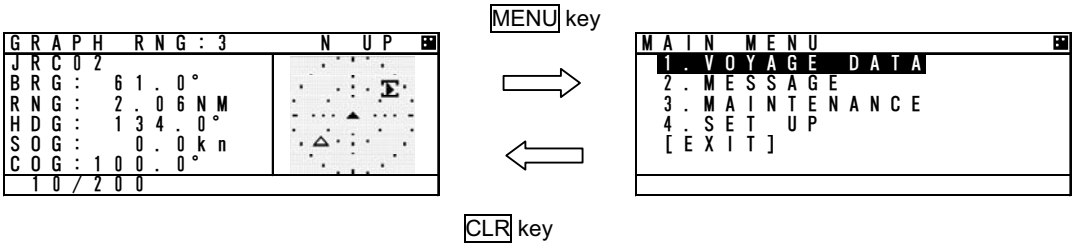
NCM-983 Panel side and Display

5.4.2 Operation for Graphic display

In order to switch the display, press DISP key until Graphic display is appeared.



Also, the display can be switched from Graphic display to MAIN MENU to change the setting of this equipment.
Press CLR key at MAIN MENU, the display is switched to Graphic display.

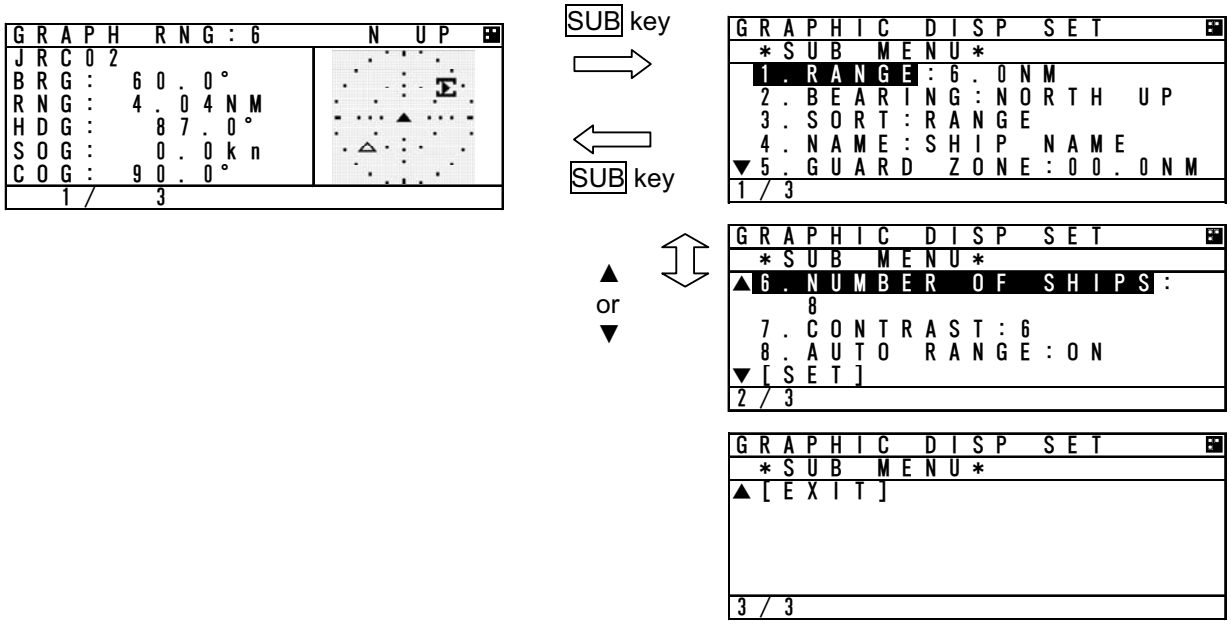


5.4.3 Setting the Contents of Graphic Display

Explain the setting of graphic display (e.g. range changes, setting of guard zone).

5.4.3.1 Display the Setting Screen

Press SUB key at Graphic screen, and then switch to SUB MENU.
In this SUB MENU, Select the desirable item with ▲ key or ▼ key and Press ENT key, then the item can be set.
When [SET] is selected on page 2/3, the setting is saved.
When [EXIT] is selected on page 3/3, the display switched to MAIN MENU.



5.4.3.2 Display Item Explanation

1. RANGE

RANGE means the radius of external circle in the graphic screen.
It is selected from 6 steps (0.75,1.5,3,6,12,24NM） with ▲ key or ▼ key.

2. BEARING

North up of Head up can be select with ▲ key or ▼ key.

- North up : Displays on a north basis
- Head up : Displays on own ship's heading basis.

In case Heading value is not inputted (Not available), Only North up can be selected.

3. SORT

SORT is selected from RANGE, TCPA and GROUP with ▲ key or ▼ key.

- RANGE : In order of the distance from own ships and OTHER SHIPS LIST is arranged.
- TCPA : In order of small TCPA from own ship and the list is arranged.
- GROUP : In order of the distance and gives priority GROUP SHIP, and the list is arranged.

4. SHIP NAME

The SHIP NAME is selected from SHIP NAME and MMSI.

5. GUARD ZONE

The range of GUARD ZONE ALARM can be set. The range is set from 0 to 99.9NM.
If 00.0NM is set, the alarm is cancelled.
（In order to see this operation, refer to 5.2.3.1 GUARD ZONE ALARM）

6. The number of ships displayed in Graphic screen

The number of ships displayed in Graphic screen can be limited.
The number is selected from 8,16,24,32,200 with ▲ key or ▼ key.
This function is set in case it is hard to distinguish others in this screen.

7. CONTRAST

The contrast of display can be adjusted.
The range is selected from 1 to 13 with ▲ key or ▼ key.

8. AUTO RANGE

When a ship (located within 24NM) is selected in the list, Graphic range is set automatically and is adjusted to its distance.
Select from ON (valid) or OFF (invalid) with ▲ key or ▼ key.

5.4.3.3 Display

① **Heading :** In 90-degree segment, 4 types are listed below.

Value [degree]	314.5－ 45.4	45.5－ 134.4	134.5－ 224.4	224.5－ 314.4
Display				

② **ROT :** 3 types are listed below.

Course	+ (right)	－ (left)	0 (straight)
display			

③ **Other marks**

Classification	Mark
Own ship	
Other ships	
Base station	
Cursor	

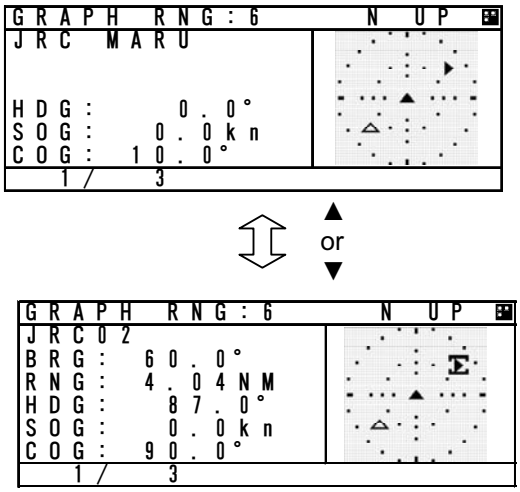
Classification	Mark
AIS SART	
Mark of route(Real) Aids to navigation	
Mark of route (Virtual)	

④ **Display line**

Classification	Mark	Note
Range circle		Setting range Displayed by 15 degree interval circle.
Guard zone alarm circle		Setting range of guard zone Displayed by 30 degree interval circle

5.4.4 Selection of Other Ships

The cursor in Graphic display can move with ▲ key or ▼ key.
When ▲ key is pressed, ships are selected by descending order of the setting SORT.
When ▼ key is pressed, ships are selected by ascending order of the setting SORT.

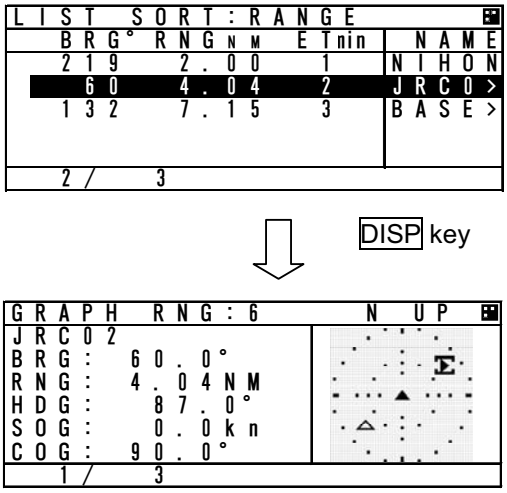


5.4.5 Auto Range Setting

After “AUTO RANGE” is set “ON” (valid), this function works under the condition shown below.

On condition that Graphic range set previously is smaller than the ship’s distance selected in the list (located within 24NM), and then press DISP key and displays the Graphic screen.
The range is set automatically and is adjusted to its distance. Therefore the ship selected can be confirmed in the Graphic display.

e.g.）If the Graphic range is set 0.75NM previously and A ship which is 4.85NM away from own ship is selected in the list, the progress is shown below.
The range is changed 0.75NM into 6.0NM.



6. MAINTENANCE AND INSPECTION

The performance and longevity of this equipment depend on careful maintenance. To maintain the best performance, the following periodic inspections are highly recommended.

(1) Keep the power supply voltage within the specified value (19-35Vdc).
(2) Know the condition of normal status when the equipment is properly functioning. Keep comparing the current status to the normal status to immediately detect any malfunctions.

⚠WARNING

Do not attempt to check or repair the interior of this equipment by non-qualified service personnel, as doing so may cause fire, electric shock or malfunction. If any malfunctions are detected, contact our service center or agents.

6. 1 General Maintenance and Inspection

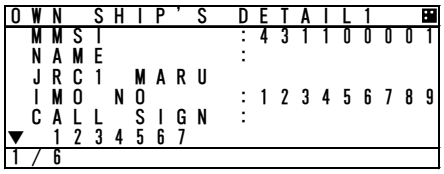
Below are listed general maintaining and inspecting items, which can be done with usual tools and apparatus.

No.	Item	Maintenance and inspection
1	Cleaning	Gently clean the surface of the panel, knobs, switches, and cover with soft cloth or silicon oil. No oil is needed because this unit has no moving mechanisms inside.
2	Looseness of parts	Inspect for looseness and correctly tighten the following: Screws, nuts, knobs, switches and connectors.
3	Fuse	When checking and replacing the fuse, be sure the power is off. If the power source fuse is blown, be sure to inspect the cause before replacing the blown fuse with a new one.
4	Unit	Check whether there is discoloration of parts mounted to the unit. When exchanging a unit, contact our service center or agents.

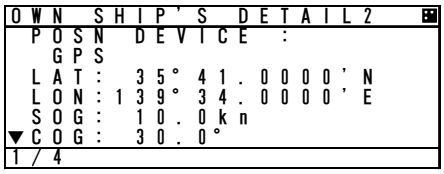
6.2 Periodic Inspection

6.2.1 Confirming the Own Ship's Information

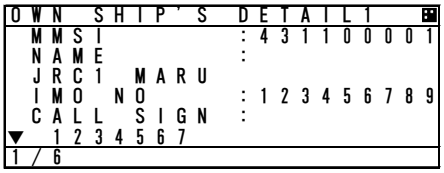
Displays own ship's detail information and confirm that the static (ship name, MMSI etc.) and dynamic (position, heading etc.) information is correct.
In order to display the Own Ship's Detail Information, Press DISP key several times and the screens are changed by each key press. Own Ship's Detail Information is composed of 2 screens.

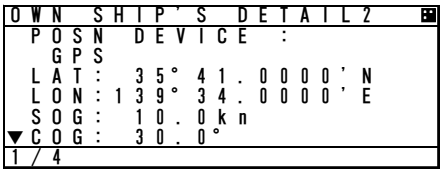


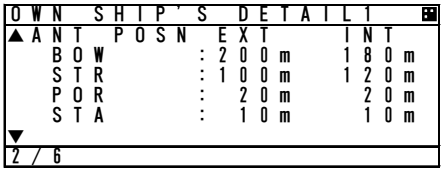
Own ship's detail1 information
(Static information)

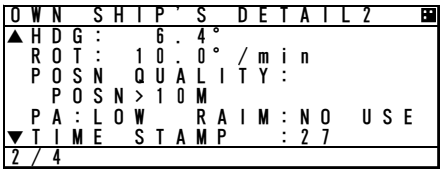


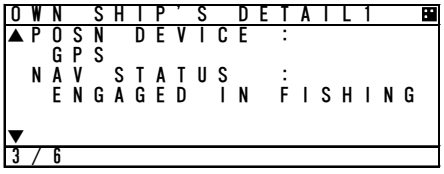
Own ship's detail2 information
(Dynamic information)

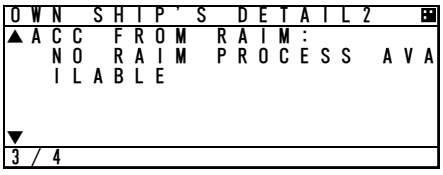


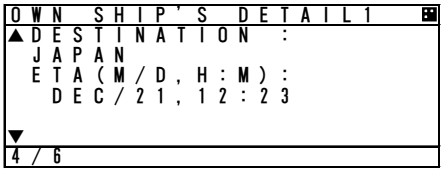


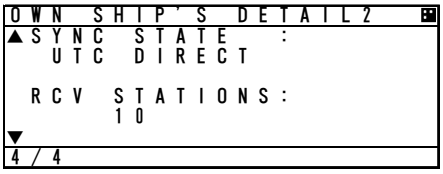


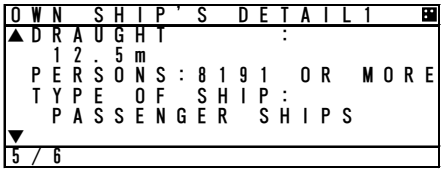


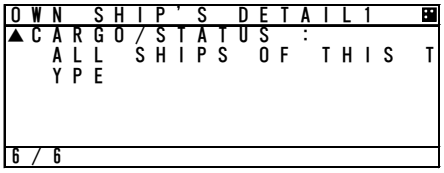








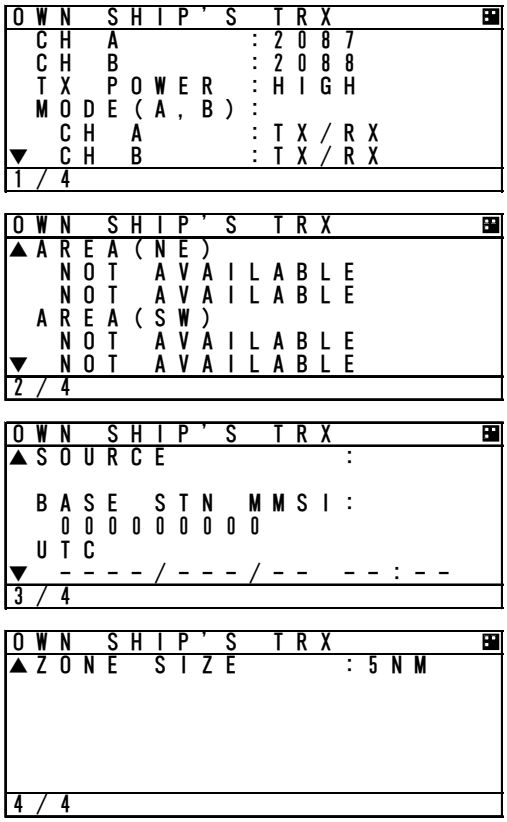




6.2.2 Confirming the TRX Channel

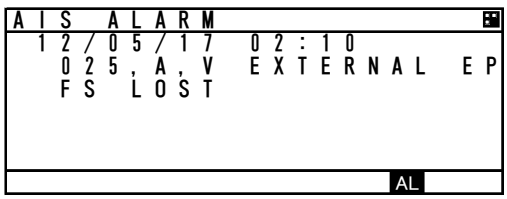
Display the TRX (transponder) condition and confirm that the TRX Channel information is correct.
In order to display “Own ship’s TRX”, Press DISP key at “Own ship’s detail 2” screen.

In case international frequencies are used, the information is displayed as below.

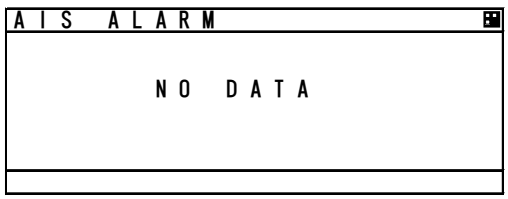


6.2.3 Confirming the Alarm Status

Display the AIS alarm status and confirm there is no alarm. In order to display the AIS alarm status, Select “Main Menu” → “3. MAINTENANCE” → “3. AIS ALARM”.
Built-in integrity test (BIIT) is always working during AIS equipment operation to watch over any alarms and there is a visual and audible signal when it detects any alarms when it detect any alarm. After the automatic displayed alarm screen is closed by pressing CLR key, the current AIS alarm can be confirmed with the AIS alarm status screen.



The present alarm occurrence status



The status when there is no alarm.

If any alarms occur, confirm the alarm occurrence conditions with the alarm table.

JHS-183 Alarm Table

Failure alarm (ALR sentence output)

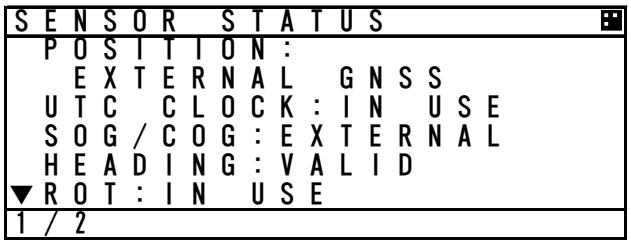
Alarm No.	Indication	Alarm Occurrence Conditions
003	Rx channel 1 malfunction	The RX CH A synthesizer is unlocked.
004	Rx channel 2 malfunction	The RX CH B synthesizer is unlocked.
005	Rx channel 70 malfunction	The RX CH70 synthesizer is unlocked.
008	MKD connection lost	Communication between the transponder and controller is failed. (Transponder generates the alarm.) AIS Transponder setting is initialized.
064	mkd connection lost	Communication between the transponder and controller is failed. (Controller generates the alarm.)
010	Nav Status incorrect	There is a difference between the setting of Nav status and actual Nav status. -Nav status is set from “at anchor”, “moored” and “aground”, and “SOG” is over 3kn. -Nav status is set "UNDER WAY SAILING" or “UNDER WAY USING ENGINE”, and SOG is under 1kn.
014	Active AIS SART	AIS SART SIGNAL is received.
025	external EPFS lost	Any one of the following commands has not been entered from the external sensor or data is invalid. GNS, GLL, GGA, RMC
026	no sensor position in use	The internal GPS is invalid and the following commands has not been entered from the external sensor or data is invalid. GNS, GLL, GGA, RMC
029	no valid SOG information	The internal GPS is invalid and the following commands has not been entered from the external sensor or data is invalid. VBW, VTG, OSD, RMC
030	no valid COG information	The internal GPS is invalid and the following commands has not been entered from the external sensor or data is invalid. RMC, VTG, OSD
032	Heading lost/invalid	Any of the following commands has not been entered from the external sensor or data is invalid. HDT, OSD, THS
035	no valid ROT information	Any of the following commands has not been entered from the external sensor or data is invalid. HDT, OSD, THS, ROT
056	Tx power too low	Tx power level is too low.
058	Tx stop interrupt	Transmission was stopped forcibly.
059	Tx power too high	Tx power level is too high.
061	Not Tx	No transmission
062	Program flash memory error	The flash memory for programs is abnormal.
063	Data flash memory error	The flash memory data is abnormal.
006 052	general failure Tx power supply error	The voltage became abnormal during transmission because of PA failure.
006 053	general failure Power supply error	The voltage became abnormal during reception because of PA failure.
001 054	Tx malfunction Pa current error	The PA collector current became abnormal during transmission.
001 055	Tx malfunction Pa temp error	The PA temperature became abnormal during transmission.
002 051	Antenna VSWR exceeds limit	Computed result of VSWR is 3 or greater but no greater than 4 during rated transmission output or

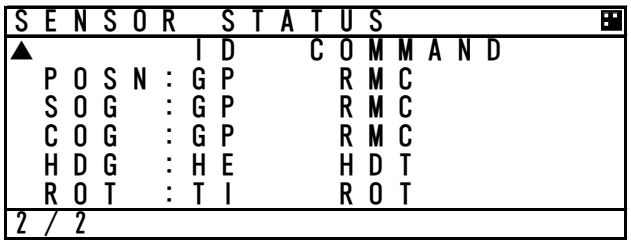
	Tx power down	transmission level is lowered.
001 002	Tx malfunction Antenna VSWR exceeds limit	The computed result of VSWR is 4 or greater.
001 057	Tx malfunction Vr error	The antenna is open or broken.
001 060	Tx malfunction Tx pll unlock	The TX synthesizer is unlocked.

6.2.4 Confirming the Conditions of the Sensors

Display the sensor status and be sure that the sensor is working.
To display the sensor status, please select “Main Menu” → “3. MAINTENANCE” → “4. SENSOR STATUS”.

POSITION: Be sure that the indicated status is not NO SENSOR.
UTC CLOCK: Be sure that the indicated status is IN USE. (It takes some time before IN USE appears in case the power has been off for a long time.)
SOG/COG: Be sure that the indicated status is not NO SENSOR.
HEADING: Be sure that the indicated status is not INVALID.
ROT: Be sure that the indicated status is not NO SENSOR.





The variation of the sensors’ conditions is tabulated below.

Sensor	Indication	Sensor’s Condition
POSITION	EXTERNAL DGNSS	The external DGNSS is in use.
	EXTERNAL GNSS	The external GNSS is in use.
	INT DGNSS (BEACON)	The internal DGNSS (beacon) is in use.
	INT DGNSS (MSG.17)	The internal DGNSS (message 17) is in use.
	INTERNAL GNSS	The internal GNSS is in use.
	NO SENSOR	The position data is not yet entered or invalid or not received.
UTC CLOCK	IN USE	The internal GPS compensates PPS.
	LOST	The internal GPS has not compensated PPS.
SOG /COG	EXTERNAL	The external SOG/COG is in use
	INTERNAL	The internal SOG/COG is in use
	NO SENSOR	The SOG/COG data are not yet entered or invalid or not received.
HEADING	VALID	Heading data are entered.
	INVALID	Heading data are not yet entered or invalid or not received.
ROT	IN USE	The ROT data input from a rate-of-turn indicator.
	OTHER SOURCE	The ROT data input from a source other than a rate-of turn indicator.
	NO SENSOR	The ROT data are not yet entered or invalid or heading data not received.

6.3 Trouble Shootings

6.3.1 Trouble Shootings

⚠WARNING

Do not attempt to check or repair the interior of this equipment by non-qualified service personnel, as doing so may cause fire, electric shock or malfunction. If any malfunctions are detected, contact our service center or agents.

For reference, this section presents a troubleshooting guideline for finding defective sections.

Symptom of Error	Possible Cause or Cause of Fault	Countermeasures
Power is not supplied when the power switch is pressed	Power is not distributed from the inboard distribution panel.	Supply power from the distribution panel.
	Power is not supplied from the power supply unit (NBD-577C).	Check that the wiring of the power unit is correct. Check that the output voltage of the power unit is correct.
	The supply voltage of power supply (NBD-577C) is out of range.	Replace the power unit.
	The fuses in the connection box are blown out.	Check that the wiring is correct and replace the fuses.
	The termination in the connection box is broken.	Replace the NQE-5183 connection box.
	Power is not supplied to the connection box.	Check the wiring and confirm that the connection is correct
	The IC in the AIS controller is broken.	Replace the CQD-2983 circuit board.
	The power supply cable of the transponder is broken.	Replace the power supply cable of the transponder.
	The power module in the controller is broken.	Replace the CBD-2983 circuit board.
	The key switch is broken.	Replace the switch panel (CDJ-2983) .
The transponder software version is -.--.	The transponder power is not turned on.	Check the voltage at the end of transponder cable.
	The transponder is not turned on. The IC which supplies a power in the transponder is broken.	Replace the transponder.
No response after pressing a key on the operation panel.	The panel unit malfunctions.	Replace the CDJ-2983 circuit board.
	The DPU malfunctions.	Replace the CDJ-2983 circuit board.
Some dots are missing on the LCD.	The LCD malfunctions.	Replace the LCD unit.
	The control unit malfunctions.	Replace the CDJ-2983 circuit board.
No alarming sound is generated.	BUZZER has been set “OFF”	Set BUZZER to “ON” (MENU 4.2.2 BUZZER)
	The buzzer malfunctions.	Replace the CDJ-2983 circuit board.
	The control unit malfunctions.	

Symptom of Error	Possible Cause or Cause of Fault	Countermeasures
The illumination does not light.	The control unit malfunctions.	Replace the CDJ-2983 circuit board.
	The LCD malfunctions.	Replace the LCD unit.
No AIS message is received.	The transponder is not turned on.	Confirm whether the transponder is turned on. (MENU 3.1.1 TRANSPONDER)
	The whip antenna is damaged.	Replace the whip antenna.
	The following alarm number appears: 003, 004, or 005. The synthesizer in the receiving circuit is unlocked.	Replace the transponder.
	Channel setting is not correct.	Set it by operating channels. (MENU 4.6 CHANNEL/POWER)
No AIS message is transmitted.	The following alarm number appears.	Replace the transponder.
	001, 052, 53: Power circuit fault	
	001, 054: PA collector current abnormal	
	001, 055: PA temperature abnormal	
	001, 058: PA protection circuit operated	
	001, 060: TX synthesizer unlock operated	
	003, 004, 005: RX synthesizer unlock operated	
	001, 057: Antenna not connected	Check that the antenna is connected. Check the setting of antenna selection from external and internal.
	001, 002: VSWR abnormal	Check that the antenna is connected. Check that there are no objects around the antenna. Replace the antenna and check for normal transmission.
	MMSI has been set “000000000”	Set the MMSI correctly.
Sensor data (external GPS, gyro, and rate-of-turn) cannot be loaded.	The cable is not connected properly.	Check the connection.
	The polarity of the serial cable is incorrect.	Check the polarity and connect it.
	The interface between the sensor and connection box is incorrect.	Check the interface before its connection.
	The sentence that the sensor generates is not supported by the AIS.	Check the output command and the version. (Refer to 8.3.4 Supported Interface Sentence)
	The sentence that the sensor generates does not match the sentence setting of the controller.	Check the output sentence and sensor setting of JHS-183.
	The sensor data flag has been set to “invalid”.	Check if the sensor is working correctly.
	The sensor (GPS, gyro, rate-of-turn indicator) malfunctions.	Replace the sensor.
	The control unit malfunctions.	Replace the CDJ-2983 circuit board.

Symptom of Error	Possible Cause or Cause of Fault	Countermeasures
Internal GPS data cannot be loaded.	Internal GPS malfunction	Execute TEST2 of self-diagnosis. If the result is “NG”, replace the transponder.
There is a difference between internal GPS data and external GPS data.	External GPS data is abnormal.	Confirm the external GPS setting. If there is any failure, replace the external GPS.
	Internal GPS data is abnormal.	Replace the transponder.
Heading data is mismatched.	External senor data is abnormal.	Confirm the external sensor setting. If there is any failure, replace the external sensor.
	The value of NSK unit is abnormal.	Re-set the initial value of NSK unit. If the setting is not available, check the dip switch setting. In case of another, replace the NSK unit.
There is a difference between Nav status and actual Nav status.	Nav status is set by “at anchor”, “moored” or ”aground”. And SOG is over 3kn. The condition that Nav status is set by “under way sailing”. And SOG is under 1kn is continued for 2 hours or more.	Change the Nav status to another.

6.3.2 Maintenance Units

Maintenance units for repair are followings.

No.	Unit Name	Model	Note
1	AIS Transponder	NTE-183-2	Transponder (CAV-2180 is unattached.)
2	VHF Antenna	CAV-2180	Whip antenna
3	IFU	CQD-2983	Circuit board for NCM-983
4	PSU	CBD-2983	Circuit board for NCM-983
5	DPU	CDJ-2983	Circuit board for NCM-983
6	CONNECTION BOX	NQE-5183	
7	NSK UNIT		NSK UNIT
8	Power Supply unit	NBD-577C	Power supply unit
9	Spare parts	7ZXJD0136	Fuse

6.3.3 Spare parts for periodic maintenance

Spare parts for periodic maintenance are followings.

No.	Unit Name	Code	Decline period	Note
1.	LCD Unit	CCN-423	50,000 hours	6years in continuous operation
2.	VHF Antenna	CAV-2180	About 5 years	Whip antenna

7. AFTER-SALES SERVICE

Warranty

- Warranty period is one year from the purchase day.

Holding period of Service parts

- Keeping period of maintenance parts is ten years from the production halt.

Before returning to repair

If what appears to be a defect is detected, refer to “6.3 Troubleshooting” to check if the equipment is actually defective before requesting repair.
If the defect persists, immediately stop operation and call our service center or agents.

- During the warranty period, our agencies or we will repair the malfunction without any fee, according to the specified procedure.
- After the warranty expires, we will repair the malfunction for a fee, if repair is possible.
- Item for notification
  Product name, type, manufactured data, serial number,
  information about the malfunction (the more detailed, the better),
  information about the alarm number and software version,
  your company or organization name, address and phone number.

Periodical maintenance recommended

Performance of this equipment may degrade over time because parts wear out, although degradation depends on how this unit has been maintained.
We recommend periodic professional maintenance checks in addition to daily maintenance.

Call our service center or agents for periodic professional maintenance (This maintenance requires a service charge).

Call our office or the nearest agency for detailed information about after-sales service.

8. SPECIFICATIONS

8.1 General (JHS-183)

(1) Applicable equipment standards

ITU-R .1371-4(2010)	Technical characteristics for an automatic identification system using time-division multiple access in the VHF maritime mobile band.
IEC61993-2(2001)	Class A shipborne equipment of the universal automatic identification system (AIS) –Operational and performance requirements, methods of test and required test results.
IEC60945-2(2002)	Maritime navigation and radio communication equipment and systems –General requirements – Methods of testing and required test results
IEC61162-1(2010)	Maritime navigation and radio communication equipment and systems –Digital interfaces - Single talker and multiple listeners
IEC61162-2(2008)	Maritime navigation and radio communication equipment and systems –Digital interfaces - Single talker and multiple listeners, high speed transmission
IEC61162-450(2011)	Maritime navigation and radio communication equipment and systems –Digital interfaces - Part 450: Multiple talkers and multiple listeners – Ethernet interconnection
IEC62288(2008)	Maritime navigation and radio communication equipment and systems – Presentation of navigation-related information on shipborne navigational displays – General requirements, methods of testing and required test results

(2) Rated power supply voltage : 24VDC (19 - 35VDC)
(3) Current consumption : 3.0A max. when transmitting
: 1.0A max. when receiving

8.2 AIS Transponder (NTE-183)

8.2.1 TRX part

(1) Frequency range : 156.025 MHz to 162.025 MHz,
: Default channels: 161.975 MHz, 162.025 MHz
(2) Channel spacing : 25 kHz
(3) Frequency accuracy : Within $\pm 3 \times 10^{-6}$
(4) Type of emission : G1D (F1D), G2B (F2B)
(5) Type of modulation : GMSK
(6) Output power : 12.5 W/1W

8.2.2 Environmental condition

(1) Operating temperature : -25°C to +55°C (IEC 60945)
(2) Equipment category : Exposure to weather
(3) Protection rank : IP56

8.3 AIS Controller (NCM-983)

8.3.1 Operation panel

(1) Type of display : 4.5-inch FSTN LCD, 128×64 dots
(2) Keyboard : 12 keys
(3) Back-light : For LCD and keyboard
(4) Dimmer control : Bright, medium1, medium2, off (Selectable from keyboard)

8.3.2 Environmental condition

(1) Operating temperature : -15°C to +55°C (IEC 60945)
(2) Equipment category : Protection against weather
(3) Protection rank : IP55 (In case rear panel is attached)

8.3.3 External interfaces

(1) Sensor data input ports SENSOR1 / SENSOR2/ SENSOR3/ SENSOR4
Four input ports meet the requirements of IEC 61162-1.
(2) Gyrocompass data input
Current loop 1 communication port (multiple use as SENSOR3)
(3) GNSS differential correction data input port SENSOR4
One input port meet the requirement of ITU-R M.823-2 on TTL level
(4) External display equipment communication ports AUX1 / AUX2 / AUX3
Three communication ports meet the requirements of IEC 61162-2
(5) Long range communication port AUX3
One communication port meets the requirements of IEC 61162-2
(6) Relay terminals ALR
One port for external alarm device
(7) External display equipment communication ports with Pilot Plug
One communication port meets the requirements of IEC 61162-2
(8) LAN port
One communication port meets the requirements of IEC 61162-450

8.3.4 Transmission intervals

Sentence format	Transmission interval	Note
VDO	1 second intervals	AIS VHF data-link own-vessel report. The AIS channel is null. Not transmitted on the VDL.
VDO	Every transmission	AIS VHF data-link own-vessel report. The AIS channel is A or B. Transmitted on the VDL.
ALR (No alarm)	Every 60 second.	An ALR sentence is output every 60sec when all alarms are none.
ALR (active)	Every 30 second.	An ALR sentence is output every 30sec when the alarm is generated one and more.
ABK,ACA,ACS,DSR,SSD, NAK,TRL,TXT,VER,VSD, VDM	At the time of event generating	

8.3.5 Supported interface sentences

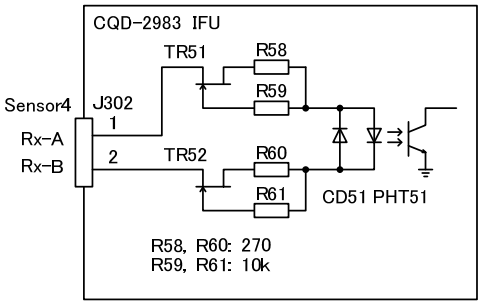
(1)Supported interface sentences

	Indication	Format	Supported Sentence	
			Input data	sentences
1	SENSOR1※) SENSOR2※) SENSOR3	IEC61162-1/2 (NMEA1.5-2.3)	Positioning system: Longitude/Latitude Position Accuracy	GNS, GLL,GGA,RMC
			Datum Reference	DTM
			Speed Over Ground (SOG)	VBW,VTG,RMC
			Course Over Ground (COG)	RMC,VTG
			Heading	HDT,THS
			RAIM indicator	GBS
			Rate Of Turn (ROT)	ROT
2	SENSOR4	IEC61162-1	The above	VHW,POS
3	SENSOR4	ITU-R M.823-2	RTCM SC-104 Ver.2.0 Type 1, 2, 7, 9	Binary data
4	SENSOR3	IEC61162-1	Heading	HDT
5	AUX1※),AUX2	IEC61162-2	Input: ABM, ACA, ACK, AIQ, AIR, BBM, EPV, LRI, LRF, POS, SSD, SPW, VDO, VDM, VSD Output: ABK, ACA, ACK, ACS, ALR, DSC, DSR, EPV, HBT, LRI, LRF, LR1, LR2, LR3, NAK , SSD, SPW, TXT, TRL,VDO, VDM, VSD, VER	
6	AUX3	IEC61162-2	Output: ABK, ACA, ACK, ACS, ALR, DSC, DSR, EPV, HBT, LRI, LRF, LR1, LR2, LR3, NAK , SSD, SPW, TXT, TRL,VDO, VDM, VSD, VER	
7	Long range	IEC61993-2	Input: LRI,LRF, Output: LRF, LR1,LR2,LR3	
8	BIIT ALARM	IEC61993-2		
9	Pilot※)	IEC61162-2	Input: ABM, ACA, ACK, AIQ, AIR, BBM, EPV, LRI, LRF, POS, SSD, SPW, VDO, VDM, VSD Output: ABK, ACA, ACK, ACS, ALR, DSC, DSR, EPV, HBT, LRI, LRF, LR1, LR2, LR3, NAK , SSD, SPW, TXT, TRL,VDO, VDM, VSD, VER	

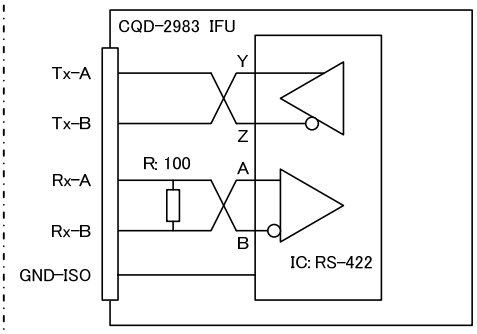
Note) When NQE-5183 connection box is equipped, all sentence are available.
When it is not equipped, 4 terminations which added ※) mark can be available.

(2)Electrical description interface

Sensor4



AUX1-3, Sensor1-3



Sensor1; R51, IC504(CDJ-2983) AUX1; R54, IC506(CDJ-2983)
Sensor2; R52, IC505(CDJ-2983) AUX2; R55, IC55
Sensor3; R53, IC53 AUX3; R56, IC56
AUX4; R57, IC57

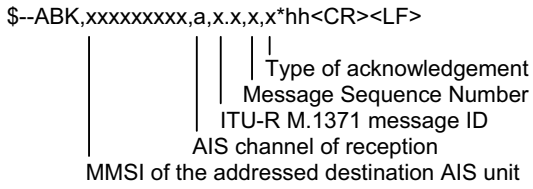
Load requirements

Current consumption:	2mA at 2V or less
Maximum input voltage:	±15V or more
Recommended operating current:	2mA or more

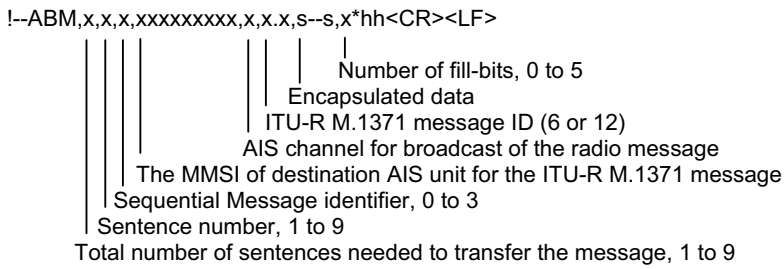
Note: IEC61162-2 interfaces comply with the following specifications.
- Output drive capacity: Differential driver output voltage is 2.0V or more (RL=100 ohms), Driver output current 50mA
- Load on the line of inputs: 100 ohms. 1 IEC61162-2 output can drive 1 IEC61162-2 input.
- Electrical isolation of input circuits: Input circuits are electrically isolated from internal circuit with opt-isolator.
- The input impedance for the non terminated Sensor1/2/3: between 333k and 357k ohms.

(2.1) List of sentences and associated data fields

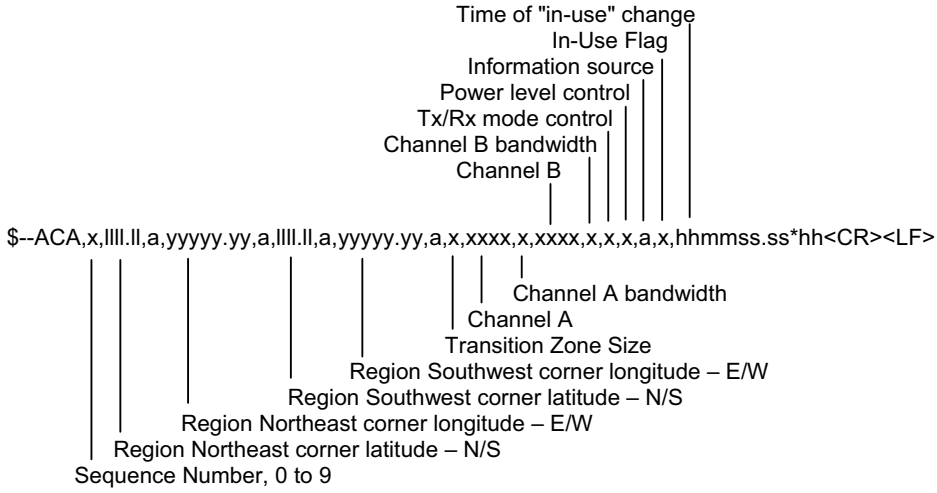
(2.1.1) ABK – Addressed and binary broadcast acknowledgement



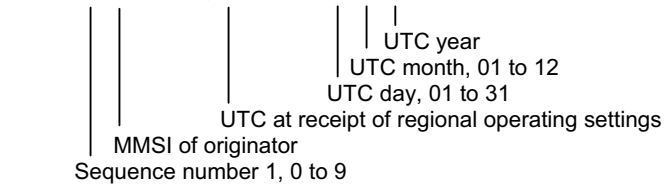
(2.1.2) ABM – Addressed Binary and safety related Message



(2.1.3) ACA – AIS Regional Channel Assignment Message



(2.1.4) ACS – Channel management information Source



(2.1.5) ACK – Acknowledge alarm

```
$--ACK, xxx*hh<CR><LF>
          |
          Unique alarm number at   alarm source
```

(2.1.6) ALR – Set alarm state

```
$--ALR,hhmmss.ss,xxx,A,A,c--c*hh<CR><LF>
        |           |   | | |
        |           |   | | Alarm's description text
        |           |   | Alarm's acknowledge state, A = acknowledged
        |           |   |                            V = unacknowledged
        |           |   Alarm condition (A = threshold exceeded, V = not exceeded)
        |           Unique alarm number (identifier) at alarm source
        Time of alarm condition change, UTC
```

(2.1.7) AIR – AIS Interrogation Request

```
Message sub-section (Reserved for future use)
Number of message requested from station-2
MMSI of interrogated station-2
                                 |
$--AIR,xxxxxxxxx,x.x,x,x.x,x,xxxxxxxxx,x.x,x*hh<CR><LF>
        |           |   | | |
        |           |   | | Message sub-section (Reserved for future use)
        |           |   | Number of second message from station-1
        |           |   Message sub-section (Reserved for future use)
        |           ITU-R M.1371 message requested from station-1
        MMSI of interrogated station-1
```

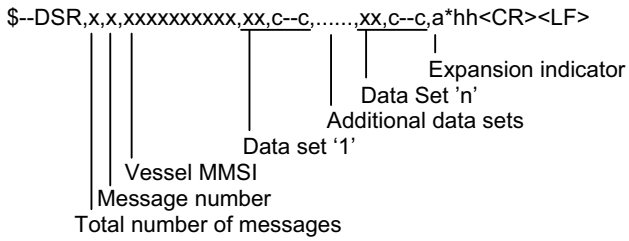
(2.1.8) BBM – Broadcast Binary Message

```
!--BBM,x,x,x,x,x.x,s--s,x*hh<CR><LF>
        | | | | |   |   |
        | | | | |   |   Number of fill-bits, 0 to 5
        | | | | |   Encapsulated data
        | | | |   ITU-R M.1371 message ID, 8 or 14
        | | |   AIS channel for broadcast of the radio message
        | |   Sequential message identifier, 0 to 9
        |   Sentence number, 1 to 9
        Total number of sentences needed to transfer the message, 1 to 9
```

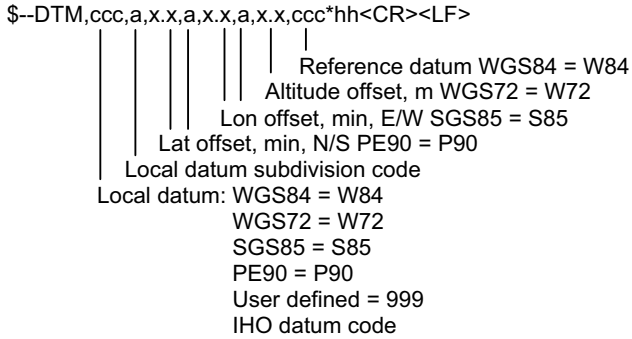
(2.1.9) DSC – Digital selective calling information

```
$ --DSC,xx,xxxxxxxxxx,xx,xx,xx,x.x,x.x,xxxxxxxxxx,xx,a,a*hh<CR><LF>
        | |           | | | | | | |           | | |
        | |           | | | | | | |           | | Expansion indicator
        | |           | | | | | | |           | Acknowledgement
        | |           | | | | | | |           Nature of distress
        | |           | | | | | | MMSI of ship in distress
        | |           | | | | | Time or Tel. No.
        | |           | | | | Position or Channel/frequency
        | |           | | | Type of communication or second telecommand
        | |           | | Nature of distress or first telecommand
        | |           | Category
        | Address
        Format specifier
```

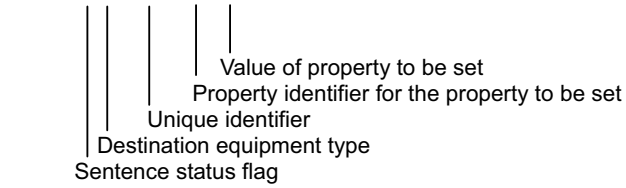
(2.1.10) DSR – DSC transponder response



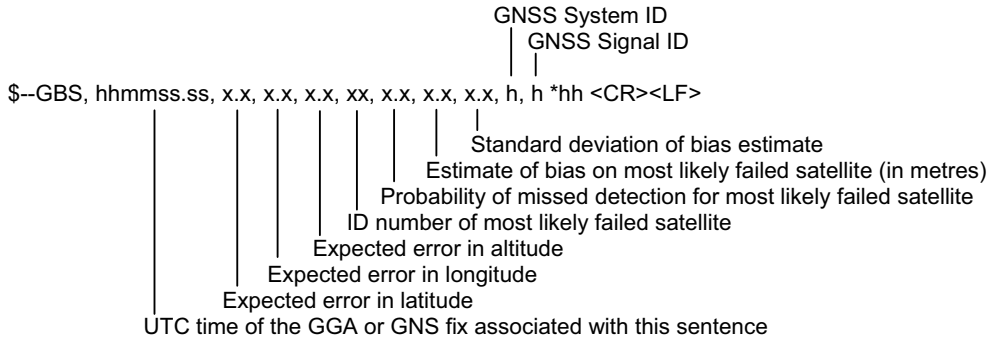
(2.1.11) DTM – Datum reference



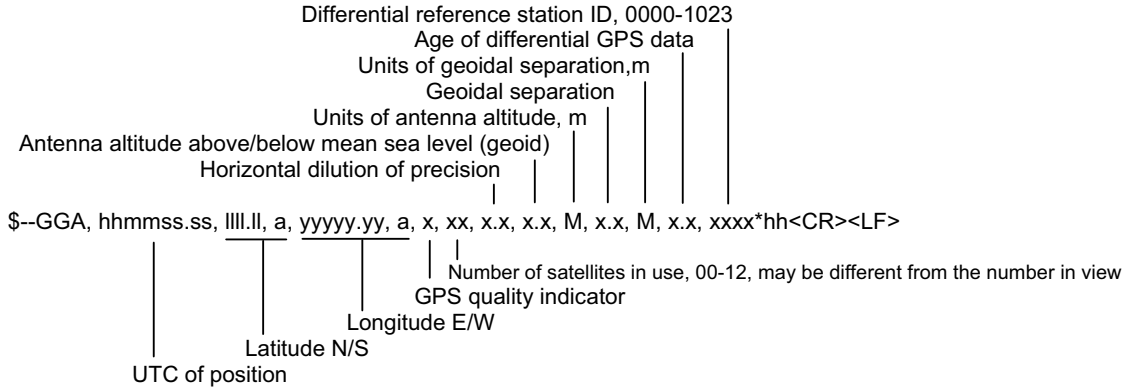
(2.1.12) EPV – Command or report equipment property value



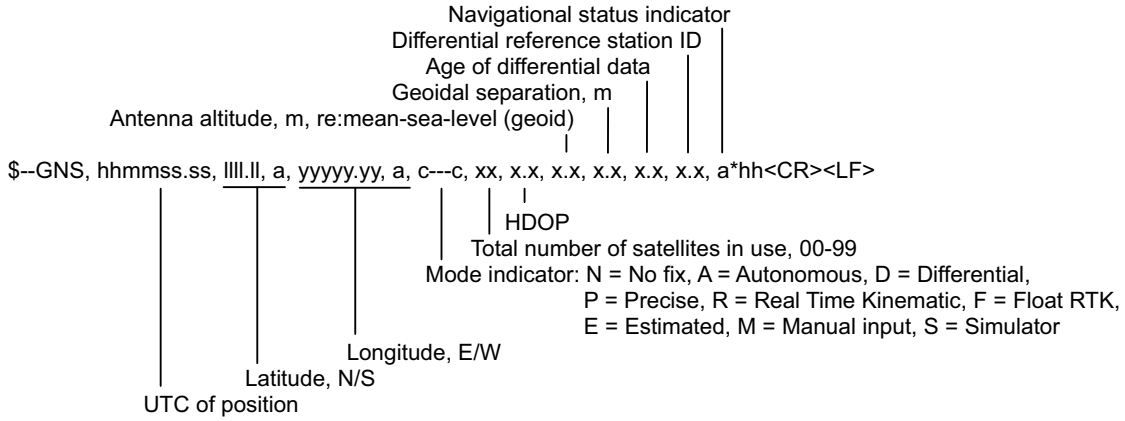
(2.1.13) GBS – GNSS satellite fault detection



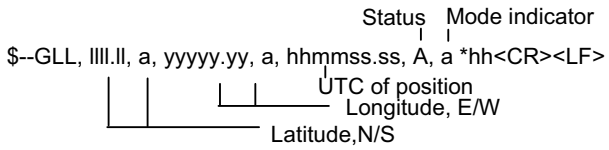
(2.1.14) GGA – Global positioning system (GPS) fix data



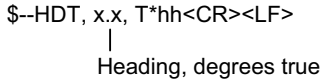
(2.1.15) GNS – GNSS fix data



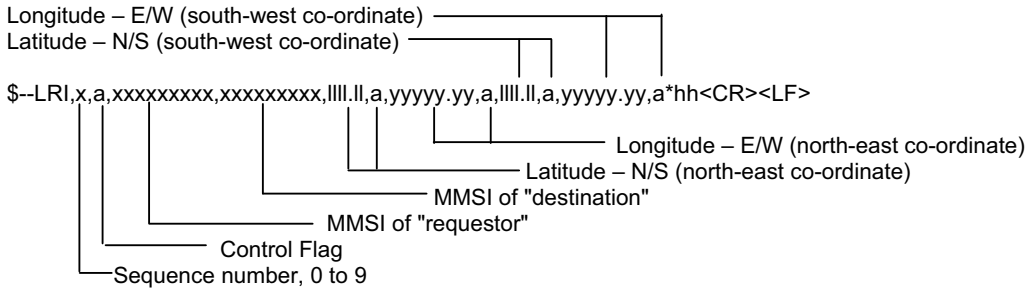
(2.1.16) GLL – Geographic position – Latitude/longitude



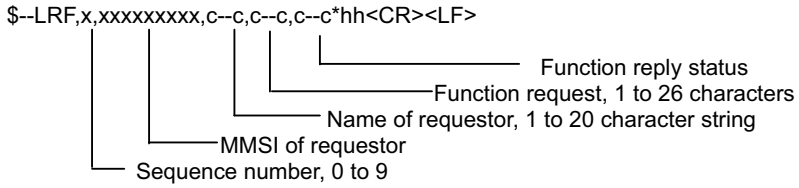
(2.1.17) HDT – Heading true



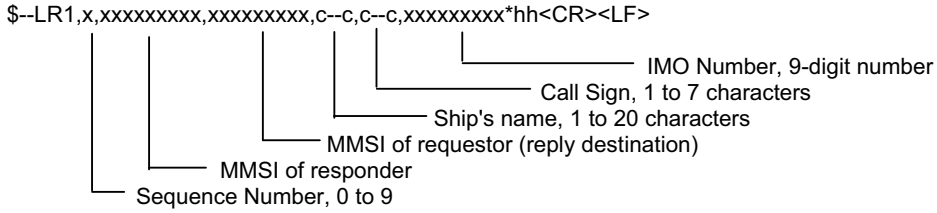
(2.1.18) LRI – Long-Range Interrogation



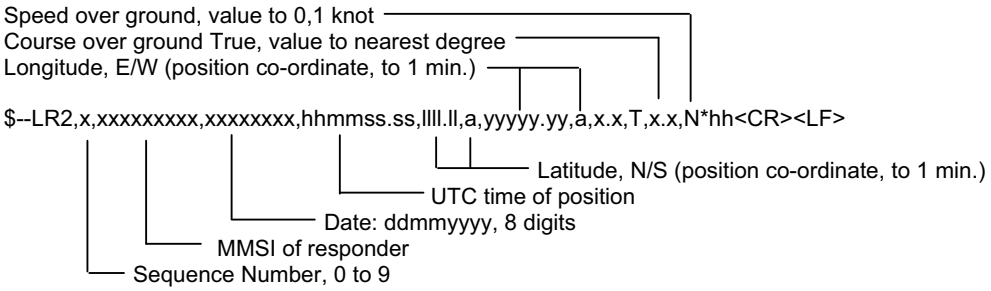
(2.1.19) LRF – Long Range Function



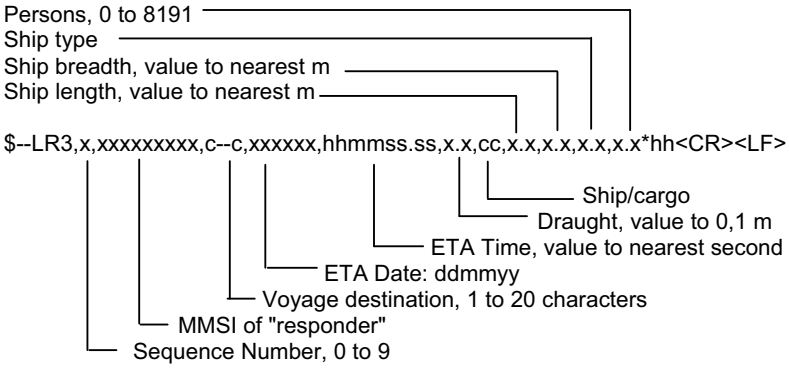
(2.1.20) LR1 – Long-range Reply with destination for function request "A"



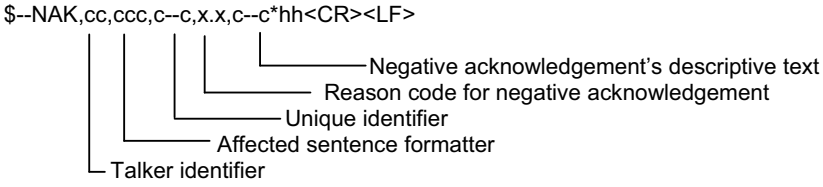
(2.1.21) LR2 – Long-range Reply for function requests "B, C, E, and F"



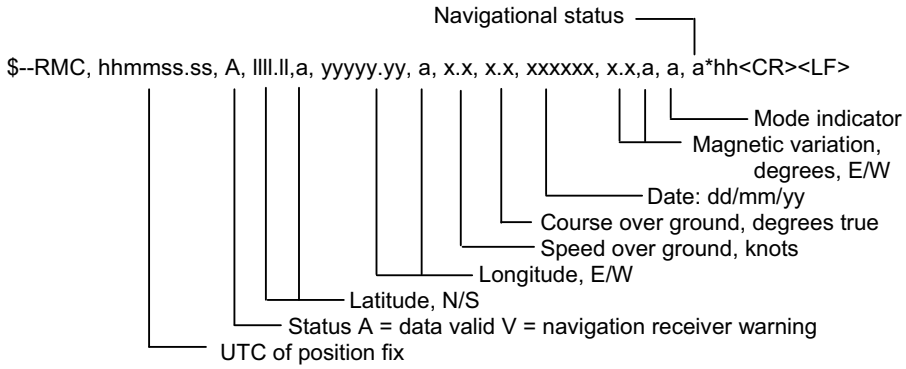
(2.1.22) LR3 – Long-range Reply for function requests "I, O, P, U and W"



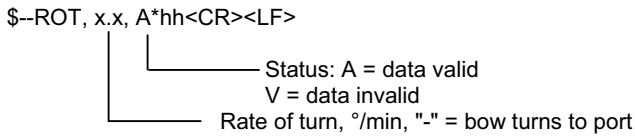
(2.1.23) NAK – Negative acknowledgement



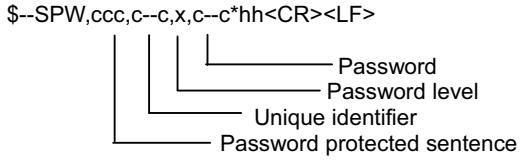
(2.1.24) RMC – Recommended minimum specific GNSS data



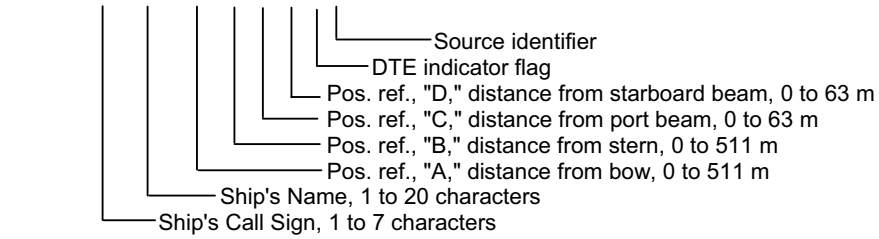
(2.1.25) ROT – Rate of turn



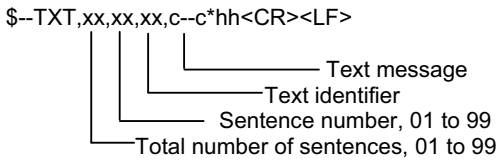
(2.1.26) SPW – Security password sentence



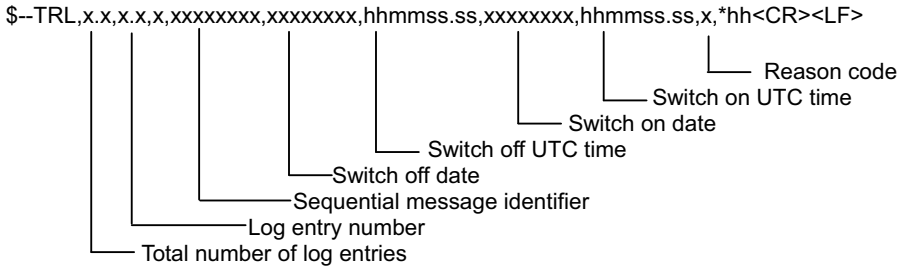
(2.1.27) SSD – Ship Static Data



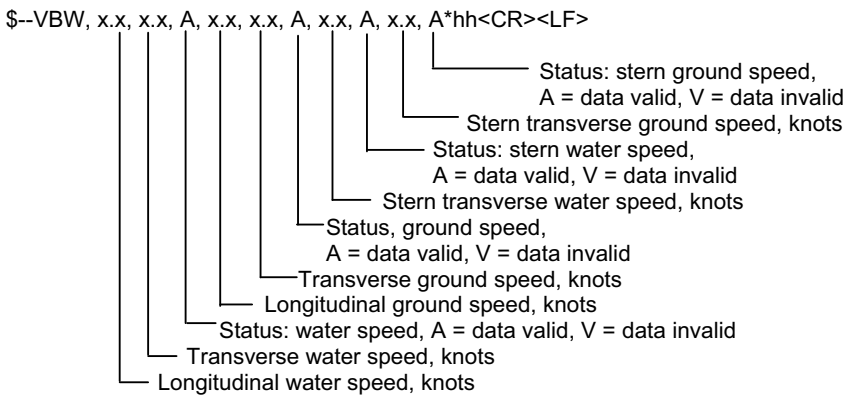
(2.1.28) TXT – Text transmission



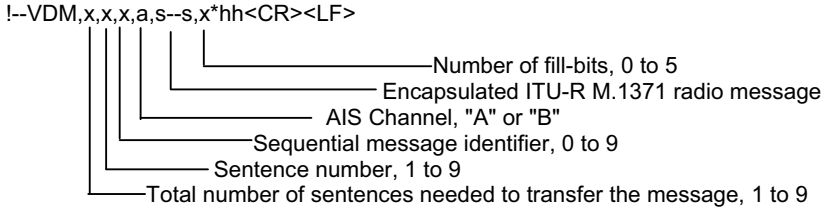
(2.1.29) TRL – AIS transmitter non functioning log



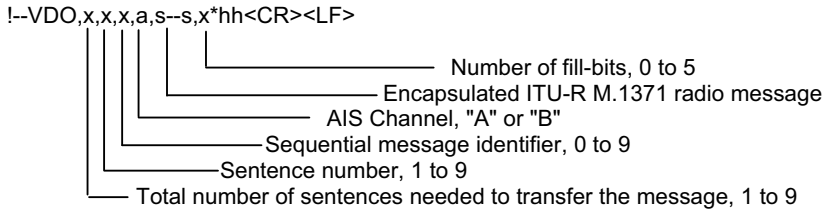
(2.1.30) VBW – Dual ground/water speed



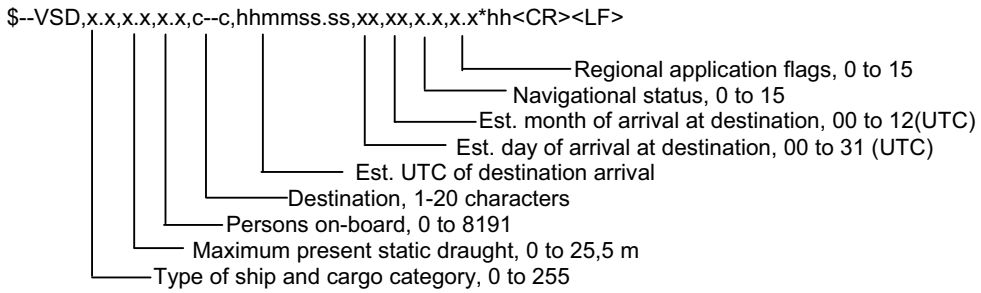
(2.1.31) VDM – VHF Data-link Message



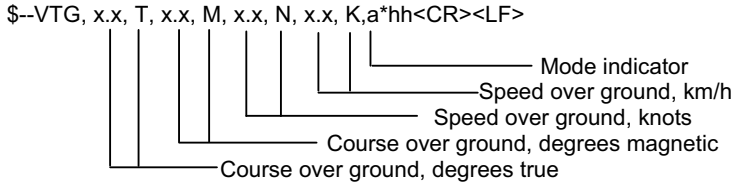
(2.1.32) VDO – VHF Data-link Own-vessel message



(2.1.33) VSD – Voyage Static Data



(2.1.34) VTG – Course over ground and ground speed



8.4 Connection Box (NQE-5183 option)

8.4.1 Environmental condition

(1) Operating temperature : -15°C to +55°C (IEC 60945)

8.4.2 External interfaces (connected with NCM-983)

(1) Sensor data input ports SENSOR1 / SENSOR2/ SENSOR3
Four input ports meet the requirements of IEC 61162-1.
(2) Gyrocompass data input
Current loop 1 communication port (multiple use as SENSOR3)
(3) GNSS differential correction data input port SENSOR4
One input port meet the requirement of ITU-R M.823-2 on TTL level
(4) External display equipment communication ports AUX1 / AUX2 / AUX3
Three communication ports meet the requirements of IEC 61162-2
(5) Long range communication port AUX3
One communication port meets the requirements of IEC 61162-2
(6) Relay terminals ALR
One port for external alarm device

8.5 AC Power Supply Unit (NBD-577C option)

(1) Input voltage : 100 - 120 / 200 - 240 VAC ±10%, 50/60Hz Single phase
: 24VDC (backup power supply)
(2) Output voltage : Nominal 24VDC, 19 - 35VDC