

FURUNO

OPERATOR'S MANUAL

UAIS TRANSPONDER

MODEL FA-150



FURUNO ELECTRIC CO., LTD.
NISHINOMIYA, JAPAN

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Your Local Agent/Dealer

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SAFETY INSTRUCTIONS



WARNING



ELECTRICAL SHOCK HAZARD **Do not open the equipment.**

Only qualified personnel should work inside the equipment.

Immediately turn off the power at the switchboard if water leaks into the equipment or something is dropped in the equipment.

Continued use of the equipment can cause fire or electrical shock. Contact a FURUNO agent for service.

Do not disassemble or modify the equipment.

Fire, electrical shock or serious injury can result.

Do not place liquid-filled containers on the top of the equipment.

Fire or electrical shock can result if a liquid spills into the equipment.

Immediately turn off the power at the switchboard if the equipment is emitting smoke or fire.

Continued use of the equipment can cause fire or electrical shock. Contact a FURUNO agent for service.

Make sure no rain or water splash leaks into the equipment.

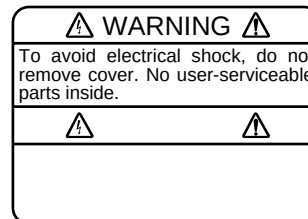
Fire or electrical shock can result if water leaks in the equipment.

Do not operate the equipment with wet hands.

Electrical shock can result.

WARNING LABEL

A warning label is attached to the AC-DC power supply. Do not remove the label. If the label is missing or damaged, contact a FURUNO agent or dealer about replacement.



Name: Warning Label (1)
Type: 86-003-1011-1
Code No.: 100-236-231

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FOREWORD

A Word to the Owner of the FA-150

FURUNO Electric Company thanks you for purchasing the FA-150 UAIS Transponder. We are confident you will discover why the FURUNO name has become synonymous with quality and reliability.

For over 50 years FURUNO Electric Company has enjoyed an enviable reputation for quality and reliability throughout the world. This dedication to excellence is furthered by our extensive global network of agents and dealers.

Your equipment is designed and constructed to meet the rigorous demands of the marine environment. However, no machine can perform its intended function unless properly operated and maintained. Please carefully read and follow the operation and maintenance procedures set forth in this manual.

We would appreciate feedback from you, the end-user, about whether we are achieving our purposes.

Thank you for considering and purchasing FURUNO.

Features

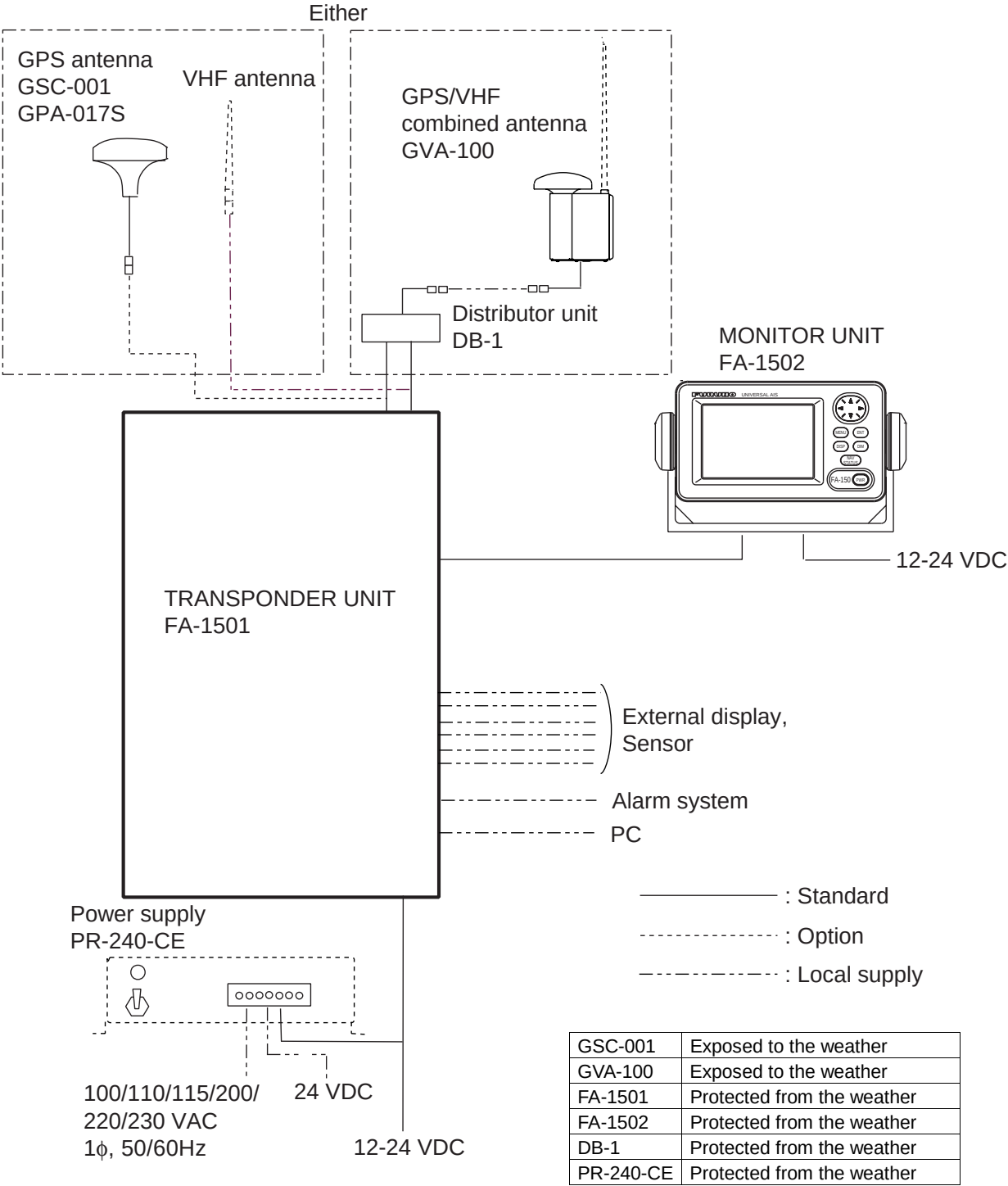
The FA-150 is a universal AIS (Automatic Identification System) capable of exchanging navigation and ship data between own ship and other ships or coastal stations. It complies with IMO MSC.74(69) Annex 3, A.694, ITU-R M.1371-1 and DSC ITU-R M.825. It also complies with IEC 61993-2 (Type testing standard), IEC 60945 (EMC and environmental conditions).

The FA-150 consists of VHF/GPS antennas, a transponder unit, a monitor unit, and several associated units. The transponder contains a VHF transmitter, two TDMA receivers on two parallel VHF channels, a DSC channel 70 receiver, interface, communication processor, and internal GPS receiver. The internal GPS is a 12-channel all-in-view receiver with a differential capability, and provides UTC reference for system synchronization to eliminate clash among multiple users. It also gives position, COG and SOG when the external GPS fails.

The main features are

- Safety of navigation by automatically exchanging navigational data between ships and between ship and coast.
- Static data:
 - MMSI (Maritime Mobile Service Identity)
 - IMO number (where available)
 - Call sign & name
 - Length and beam
 - Type of ship
 - Location of position-fixing antenna on the ship
- Dynamic data:
 - Ship's position with accuracy indication and integrity status
 - UTC
 - Course over ground (COG)
 - Speed over ground (SOG)
 - Heading
 - Navigation status (manual input)
 - Rate of turn (where available)
- Voyage-related data
 - Ship's draught
 - Hazardous cargo (type)
 - Destination and ETA (at master's discretion)
- Short safety-related messages, Free messages
- LCD panel satisfying the IMO minimum requirements plus simple plotting modes
- Interfaces for radar, ECDIS, PC for future networking expansion
- GPS/VHF combined antenna for easy installation available
- CPA/TCPA alarm
- Built-in GPS receiver for UTC synchronization and backup position-fixing device

SYSTEM CONFIGURATION



PROGRAM NUMBER

PCB	Location	Program No.	Version No.	Date of Modification
CPU (24P0062)	Monitor Unit	2450021 (Prog) 2450020 (Boot)	01.** 01.**	
MAIN (24P0035)	Transponder Unit GPS Receiver	2450018 485026	01.** 40**	

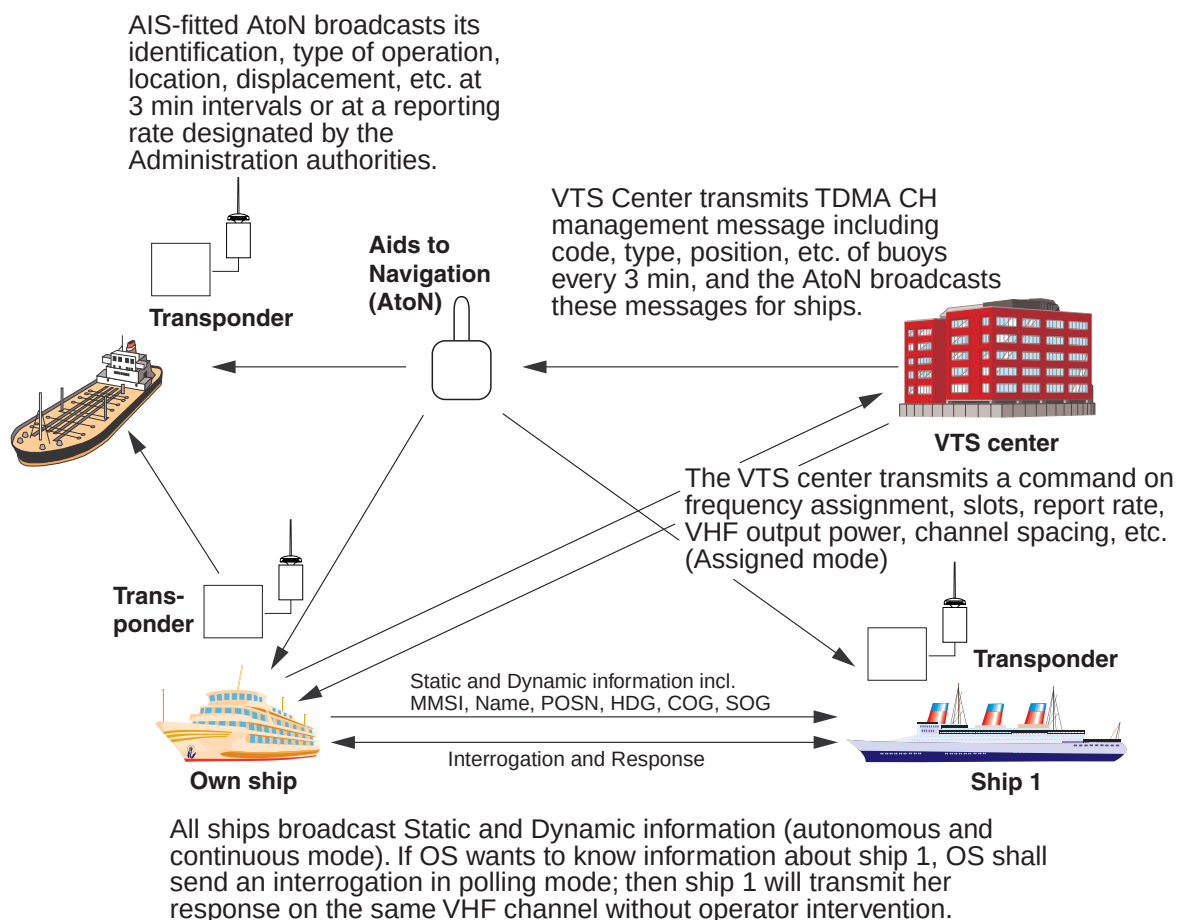
** : Minor Modification

SYSTEM OVERVIEW

System overview

The Automatic Identification System (AIS) was originally developed to aid the Vessel Traffic Services (VTS) by use of a VHF transponder working on Digital Selective Call (DSC) at VHF CH70, and is still in use along the UK coastal areas and others. Some time later the IMO developed a Universal AIS using the new sophisticated technology called Self-Organized Time Division Multiple Access (SOTDMA) based on a VHF Data Link (VDL).

The system operates in three modes – autonomous (continuous operation in all areas), assigned (data transmission interval remotely controlled by authority in traffic monitoring service) and polled (in response to interrogation from a ship or authority). It is synchronized with GPS time to avoid conflict among multiple users (IMO minimum 2000 reports per minute and IEC requires 4500 reports on two channels). The VHF channels 87B and 88B are commonly used and in addition there are local AIS frequencies. Shipborne AIS transponders exchange various data as specified by the IMO and ITU on either frequency automatically set up by the frequency management telecommand received by the DSC receiver on ship. VHF transmit power is also set up for 12.5 W or 2 W automatically.



AIS system

Not all ships carry AIS

The Officer of the Watch (OOW) should always be aware that other ships, and in particular leisure craft, fishing boats and warships, and some coastal shore stations (including Vessel Traffic Service centers) might not be fitted with AIS.

The OOW should also be aware that AIS fitted on other ships as a mandatory carriage requirement might be switched off by the master if its use might compromise the security of the vessel. Thus, users are therefore cautioned to always bear in mind that information provided by AIS may not be giving a complete or correct “picture” of shipping traffic in their vicinity.

Use of AIS in collision avoidance

As an anti-collision aid the AIS has the following advantages over radar:

- Information provided in near real-time
- Capable of instant presentation of target course alterations
- Not subject to target swap
- Not subject to target loss in clutter
- Not subject to target loss due to fast maneuvers
- Able to detect ships within VHF/FM coverage, including in some circumstances, around bends and behind islands.

When using the AIS for anti-collision purposes it is important to remember that the AIS is an additional source of navigation information. It does not replace other navigational systems. The AIS may not be giving a complete or correct “picture” of shipping traffic in its vicinity.

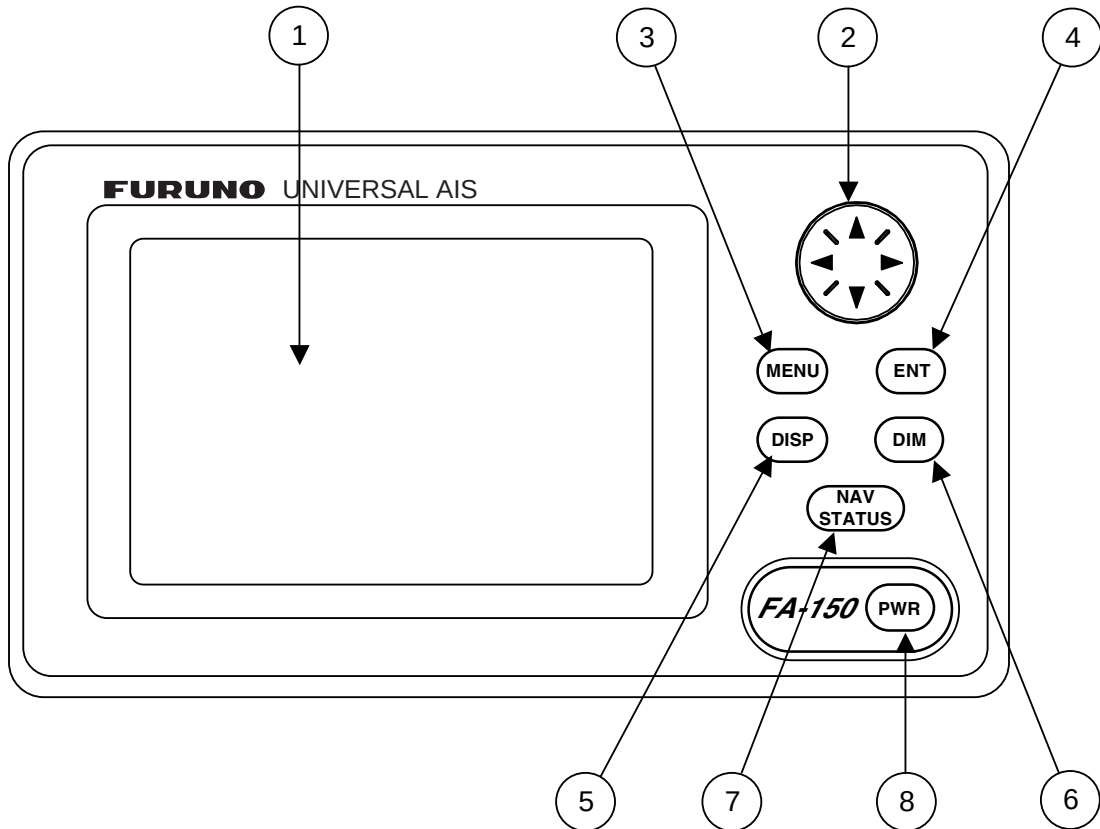
The use of the AIS does not negate the responsibility of the OOW to comply with all collision regulation requirements, especially the maintaining of a proper look-out. The prudent navigator uses all aids available to navigate the ship.

Erroneous information

Erroneous information implies a risk to other ships as well as your own. Poorly configured or improperly calibrated sensors might lead to incorrect information being transmitted. It is the user’s responsibility to ensure that all information entered into the system is correct and up to date.

1. OPERATION

1.1 Description of Controls

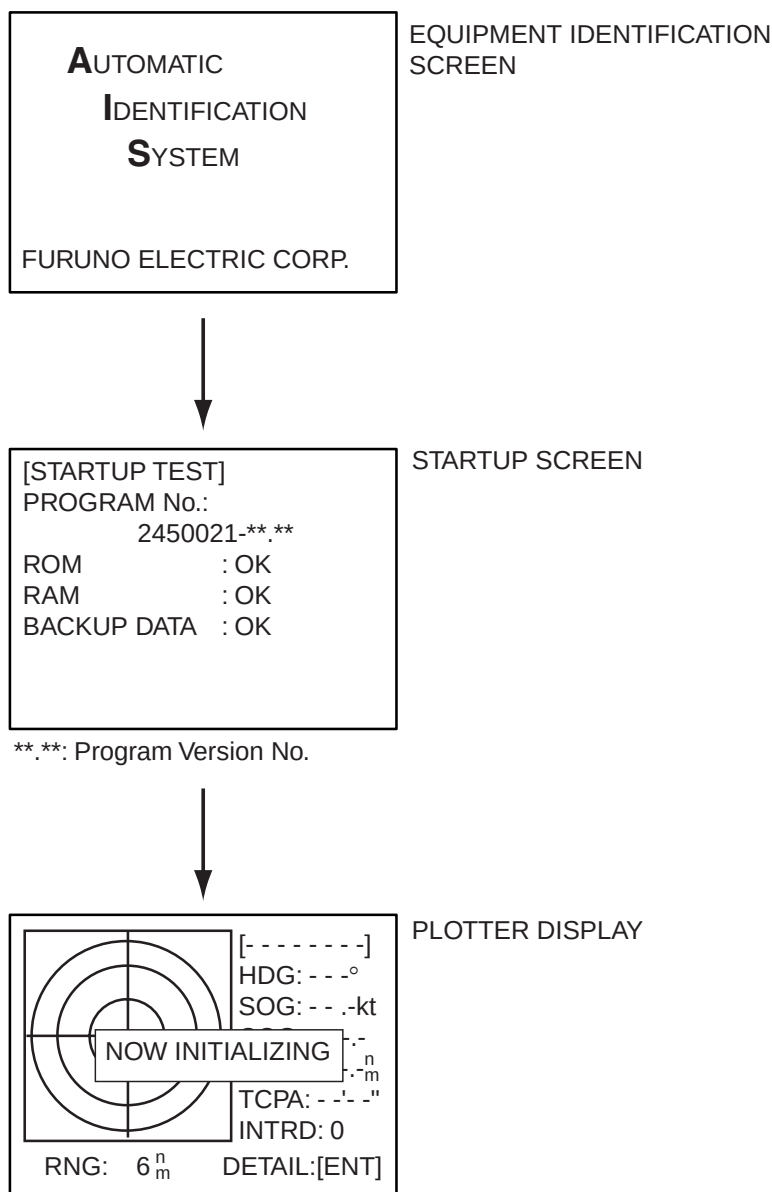


- | | |
|-------------------|--|
| ① LCD Screen: | Displays various data. |
| ② CursorPad: | Shifts cursor; chooses menu items and options; enters alphanumeric data. |
| ③ MENU key: | Opens the menu. |
| ④ ENT key: | Terminates keyboard input; changes screen. |
| ⑤ DISP key: | Chooses a display screen; closes menu (to return to plotter display). |
| ⑥ DIM key: | Adjusts panel dimmer and LCD contrast. |
| ⑦ NAV STATUS key: | Displays nav status menu, which sets up for a voyage. |
| ⑧ PWR key: | Turns the power on and off. |

FA-150 Monitor unit

1.2 Turning the Power On and Off

Press the [PWR] key to turn the equipment on or off. When powered, the equipment sounds a beep for several seconds and then proceeds in the sequence shown below.



Startup sequence

The startup screen displays the program version number and the results of the ROM, RAM and backup data test, showing OK or “NG” (No Good) as the result. If “NG” (No Good) appears for any of the check results, try resetting the power to restore normal operation. If that does not work, contact your dealer for advice. After the startup test is completed the plotter display appears, showing the message “NOW INITIALIZING,” which means the transponder is initializing itself. After completion of initialization the equipment is ready for use.

If there is no response from the transponder unit, the message “COMMUNICATION ERROR” appears at the startup screen. Press any key to erase the message. Check if the transponder unit is powered. Also check the connection between the monitor unit and the transponder unit.

The FA-150 should be powered while underway or at anchor. The master may switch off the AIS if he believes that the continual operation of the AIS might compromise the safety or security of his ship. The AIS should be restarted once the source of danger has disappeared.

The equipment transmits own ship static data within two minutes of start-up and it is transmitted at six-minute intervals. Static data includes MMSI number, IMO number, call sign, ship name, ship length and width, ship type and GPS antenna position.

In addition to static data, ship's dynamic data is also transmitted. This data includes position with accuracy, SOG, COG, rate of turn, heading, etc. Dynamic data is transmitted every 2 s to 3 min depending on ship's speed, course change. Voyage-related data, such as ship's draft, hazardous cargo, destination and estimated time of arrival are transmitted at six-minute intervals.

The FA-150 starts receiving data from AIS-equipped ships as soon as it is turned on, and those ships' location on the plotter display is shown with the AIS symbol. (To learn more about the plotter display, see paragraph 1.7.) With connection of a radar or ECDIS, the AIS target symbols may be overlaid on the radar or ECDIS.

Note 1: If no navigation sensor is installed or a sensor such as a gyrocompass has failed, the AIS automatically transmits "not available" data.

Note 2: The reporting intervals are as follows:

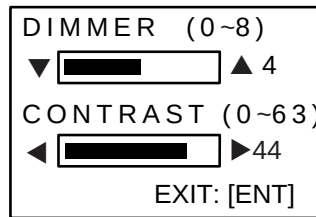
Ship's navigation status and reporting interval

Ship's navigation status	Reporting interval
Moored	3 min
0-14 kt speed	10 s
0-14 kt speed with course change	3+1/3 s
14-23 kt speed	6 s
14-23 kt speed with course change	2 s
Speed higher than 23 kt	2 s
Speed higher than 23 kt with course change	2 s

1.3 Adjusting Panel Dimmer and Contrast

The panel dimmer and display contrast may be adjusted as follows:

1. Press the [DIM] key to show the dialog box below.



A rectangular dialog box with a black border. At the top, it says "DIMMER (0~8)". Below this is a horizontal bar with a black fill, flanked by a downward-pointing triangle on the left and an upward-pointing triangle on the right, with the number "4" to the right of the bar. Below this, it says "CONTRAST (0~63)". Below that is another horizontal bar with a black fill, flanked by a left-pointing triangle on the left and a right-pointing triangle on the right, with the number "44" to the right of the bar. At the bottom, it says "EXIT: [ENT]".

Panel dimmer and contrast dialog box

2. Use ▲ or ▼ to adjust panel dimmer; ◀ or ▶ to adjust contrast.
3. Press the [ENT] key to close the dialog box.

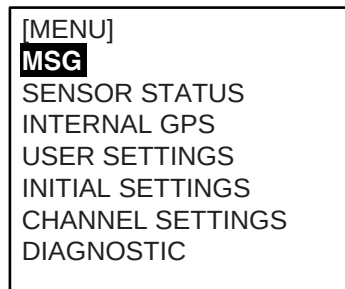
Note: The equipment starts up with the last-used dimmer and contrast settings. Therefore, if necessary, readjust them at power up.

1.4 Menu Overview

You can choose the functionality of the equipment through the menu. If you get lost in operation, press the [MENU] key until you return to the main menu. The complete menu tree is provided in the Appendix.

1.4.1 Menu operating procedure

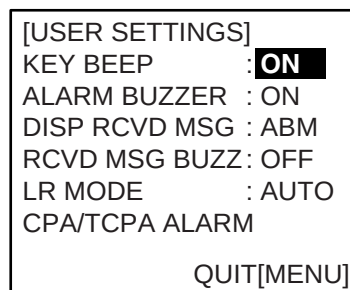
1. Press the [MENU] key to display the main menu.



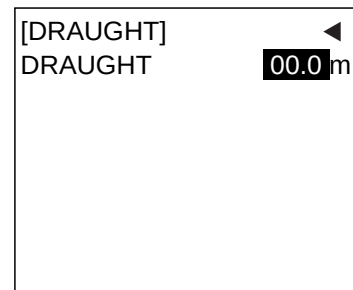
Main menu

2. Use the CursorPad to choose a wanted menu and then press the [ENT] key.
3. Use the CursorPad to choose a wanted sub-menu and then press the [ENT] key.

There are two types of sub-menus: option selection and data entry. (Some sub-menus combine both.) Below are examples of each type of sub-menu.



USER SETTINGS sub-menu
(Option selection)



DRAUGHT input screen
(Data input)

Sample sub-menu screens

4. Use ▲ or ▼ to choose the item you wish to process and then press the [ENT] key.

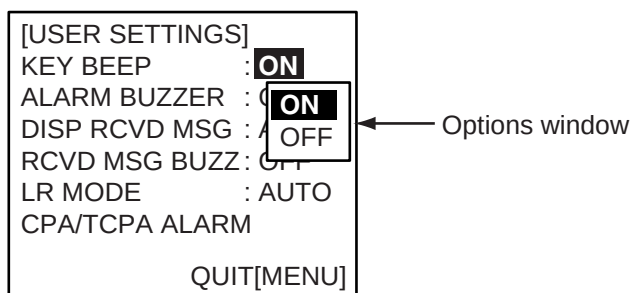
1. OPERATION

5. Depending on the sub-menu selected, you will choose an option or enter alphanumeric data.

Choosing an option

The example below shows how to choose an option from the USER SETTINGS menu. (See the illustration on the previous page.)

- a) Use ▲ or ▼ to choose the menu item desired and then press the [ENT] key. A window showing the options for the item selected is overlaid on the sub-menu selected. For example, the options for KEY BEEP are as shown below.



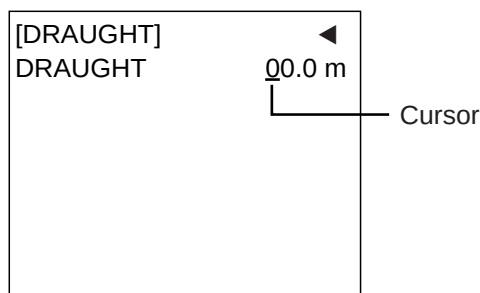
USER SETTINGS menu, showing options for KEY BEEP

- b) Press ▲ or ▼ to choose option desired and then press the [ENT] key.

Entering alphanumeric data

The example below shows how to enter numeric data on the DRAUGHT entry screen.

- a) Choose DRAUGHT and then push the press the [ENT] key. An underline is under the far left-hand digit.



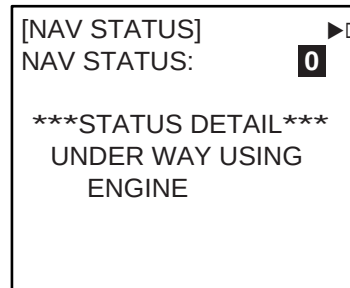
DRAUGHT entry screen

- b) Use ▲ or ▼ to choose appropriate numeric.
Note: For menus where you enter alphanumeric characters, pressing ▲ displays alphanumeric characters cyclically in order of blank space, alphabet, numerals and symbols.
 - c) Use ► to shift the cursor to the adjacent place, and then use ▲ or ▼ to choose numeric.
 - d) Repeat step c) to finish entering data for the item selected.
 - e) Press the [ENT] key to register data.
6. Press the [DISP] key to close the menu and return to the plotter display.

1.5 Setting Up for a Voyage

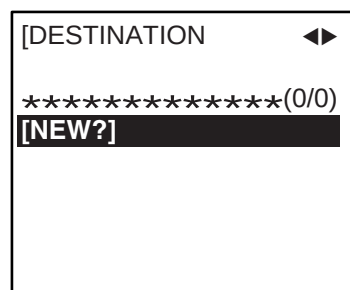
There are five items on the NAV STATUS menu that you will need to enter at the start of a voyage: navigation status, destination, arrival date and time, number of crew, and your vessel type.

1. Press the [NAV STATUS] key to open the NAV STATUS menu.



NAV STATUS menu, page 1, nav status entry screen

2. If your navigation status is different from that shown, follow the procedure below. If not, go to step 3.
 - a) Press the [ENT] key.
 - b) Press ▲ or ▼ to choose appropriate status and then press the [ENT] key. Refer to the data below to choose appropriate nav status.
 - 00: Underway using engine
 - 01: At anchor
 - 02: Not under command
 - 03: Restricted maneuverability
 - 04: Constrained by draught
 - 05: Moored
 - 06: Aground
 - 07: Engaged in fishing
 - 08: Under way by sailing
 - 09: Reserved for high speed craft (HSC)
 - 10: Reserved for wing in ground (WIG)
 - 11-14: Reserved for future use
 - 15: Not defined (default)
3. Press ► to show page 2 of the NAV STATUS menu.



NAV STATUS menu, page 2

1. OPERATION

- NEW is selected; press the [ENT] key.

```
[DESTINATION]  ►
ENTER A NEW
  DESTINATION

[REDACTED]

QUIT:[NAV STATUS]
```

NAV STATUS menu, page 2 (destination entry screen)

- Press the [ENT] key. Use the CursorPad to enter destination. You may use up to 20 alphanumeric characters, and you may enter 20 destinations. Pressing ▲ displays alphanumeric characters in order of blank space, alphabet, numerals and symbols. (For how to enter alphanumeric characters, see “Entering alphanumeric data” on page 1-6.)

PROCESSING DESTINATIONS

If you have already registered some destinations, page 2 of the NAV STATUS menu looks something like the one below. From this screen you can select, edit or delete destinations.

```
[DESTINATION]
COTE D'IVOIRE  ◀ Current destination
***** (0/3)
[NEW?] [REDACTED]
SEATTLE
SAN FRANCISCO
COTE D'IVOIRE } Destination list
```

- Use the CursorPad to choose appropriate destination and then press the [ENT] key to show the options window below.

```
SELECT
EDIT
DELETE
```

- Use the CursorPad to choose SELECT, EDIT or DELETE as appropriate and then press the [ENT] key. Do one of the following according to your objective.

Select a destination: Press the [ENT] key.

Edit a destination: Edit the destination as appropriate; press the [ENT] key.

Delete a destination: The prompt below appears. Press ◀ to choose YES; press the [ENT] key.

```
DESTINATION DELETE.

ARE YOU SURE?
YES  NO
```

6. Press ► to show page 3 of the NAV STATUS menu.

[ARRIVAL TIME] ◀▶	
DATE:	25/APR
TIME:	0:00

NAV STATUS menu, page 3 (date and time of arrival entry screen)

7. DATE is selected; press the [ENT] key.
8. Use the CursorPad to enter the date of arrival and then press the [ENT] key.
9. TIME is selected; press the [ENT] key.
10. Use the CursorPad to enter the estimated time of arrival and then press the [ENT] key. Use 24-hour notation.
11. Press ► to show page 4 of the NAV STATUS menu.

[CARGO TYPE & CREW] ◀	
CREW:	0
TYPE NO:	00
**** TYPE DETAIL ****	
CARGO SHIP	
ALL SHIPS OF	
THIS TYPE	

NAV STATUS menu, page 4 (cargo type and crew entry screen)

12. CREW is selected; press the [ENT] key.
13. Use the CursorPad to enter number of crew (setting range: 0-8191) and then press the [ENT] key.
14. TYPE is selected; press the [ENT] key.
15. Use the CursorPad to choose type of vessel, referring to the table on the next page, and then press the [ENT] key.

Note 1: Only the second digit of the vessel class may be entered here; the first digit is entered on the initial settings menu, during installation.

Note 2: When “Tanker” is chosen, output power is automatically switched to 1 W when ship’s speed is less than 3 kts for more than one minute.

1. OPERATION

10	FUTURE USE ALL SHIPS OF THIS TYPE	60	PASSENGER SHIPS ALL SHIPS OF THIS TYPE
11	FUTURE USE CARRYING DG, HS, OR MP(A)	61	PASSENGER SHIPS CARRYING DG, HS, OR MP(A)
12	FUTURE USE CARRYING DG, HS, OR MP(B)	62	PASSENGER SHIPS CARRYING DG, HS, OR MP(B)
13	FUTURE USE CARRYING DG, HS, OR MP(C)	63	PASSENGER SHIPS CARRYING DG, HS, OR MP(C)
14	FUTURE USE CARRYING DG, HS, OR MP(D)	64	PASSENGER SHIPS CARRYING DG, HS, OR MP(D)
15	FUTURE USE FUTURE USE	65	PASSENGER SHIPS FUTURE USE
16	FUTURE USE FUTURE USE	66	PASSENGER SHIPS FUTURE USE
17	FUTURE USE FUTURE USE	67	PASSENGER SHIPS FUTURE USE
18	FUTURE USE FUTURE USE	68	PASSENGER SHIPS FUTURE USE
19	FUTURE USE NONE	69	PASSENGER SHIPS NONE
20	WIG ALL SHIPS OF THIS TYPE	70	CARGO SHIPS ALL SHIPS OF THIS TYPE
21	WIG CARRYING DG, HS, OR MP(A)	71	CARGO SHIPS CARRYING DG, HS, OR MP(A)
22	WIG CARRYING DG, HS, OR MP(B)	72	CARGO SHIPS CARRYING DG, HS, OR MP(B)
23	WIG CARRYING DG, HS, OR MP(C)	73	CARGO SHIPS CARRYING DG, HS, OR MP(C)
24	WIG CARRYING DG, HS, OR MP(D)	74	CARGO SHIPS CARRYING DG, HS, OR MP(D)
25	WIG FUTURE USE	75	CARGO SHIPS FUTURE USE
26	WIG FUTURE USE	76	CARGO SHIPS FUTURE USE
27	WIG FUTURE USE	77	CARGO SHIPS FUTURE USE
28	WIG FUTURE USE	78	CARGO SHIPS FUTURE USE
29	WIG NONE	79	CARGO SHIPS NONE
30	FISHING	80	TANKER ALL SHIPS OF THIS TYPE
31	TOWING	81	TANKER CARRYING DG, HS, OR MP(A)
32	LENGTH OF THE TOW EXCEEDS 200M OR BREADTH EXCEEDS 25M	82	TANKER CARRYING DG, HS, OR MP(B)
33	ENGAGED IN DREDGING OR UNDERWATER OPERATIONS	83	TANKER CARRYING DG, HS, OR MP(C)
34	ENGAGED IN DIVING OPERATIONS	84	TANKER CARRYING DG, HS, OR MP(D)
35	ENGAGED IN MILITARY OPERATIONS	85	TANKER FUTURE USE
36	SAILING	86	TANKER FUTURE USE
37	PLEASURE CRAFT	87	TANKER FUTURE USE
38	FUTURE USE	88	TANKER FUTURE USE
39	FUTURE USE	89	TANKER NONE
40	HSC ALL SHIPS OF THIS TYPE	90	OTHER TYPE OF SHIP ALL SHIPS OF THIS TYPE
41	HSC CARRYING DG, HS, OR MP(A)	91	OTHER TYPE OF SHIP CARRYING DG, HS, OR MP(A)
42	HSC CARRYING DG, HS, OR MP(B)	92	OTHER TYPE OF SHIP CARRYING DG, HS, OR MP(B)
43	HSC CARRYING DG, HS, OR MP(C)	93	OTHER TYPE OF SHIP CARRYING DG, HS, OR MP(C)
44	HSC CARRYING DG, HS, OR MP(D)	94	OTHER TYPE OF SHIP CARRYING DG, HS, OR MP(D)
45	HSC FUTURE USE	95	OTHER TYPE OF SHIP FUTURE USE
46	HSC FUTURE USE	96	OTHER TYPE OF SHIP FUTURE USE
47	HSC FUTURE USE	97	OTHER TYPE OF SHIP FUTURE USE
48	HSC FUTURE USE	98	OTHER TYPE OF SHIP FUTURE USE
49	HSC NONE	99	OTHER TYPE OF SHIP NONE
50	PILOT		
51	SEARCH AND RESCUE VESSELS		WIG: Wing in ground ☐
52	TUGS		HSC: High speed craft ☐
53	PORT TENDERS		DG: Dangerous goods ☐
54	VESSELS WITH ANTI-POLLUTION FACILITIES OR EQUIPMENT		HS: Harmful substances ☐
55	LAW ENFORCEMENT VESSELS		MP: Marine pollutants ☐
56	SPARE-FOR ASSIGNMENTS TO LOCAL VESSELS		0-9: Undefined
57	SPARE-FOR ASSIGNMENTS TO LOCAL VESSELS		
58	MEDICAL TRANSPORTS		
59	SHIPS ACCORDING TO RESOLUTION NO 18		

16. Press ► to go to page 5 of the NAV STATUS menu.

[DRAUGHT]
◀

DRAUGHT

0.0

m

NAV STATUS menu, page 5 (draught entry screen)

17. Press the [ENT] key.

18. Use the CursorPad to enter ship's draft (setting range: 0-25.5(m)), and then press the [ENT] key.

19. Press the [DISP] key to close the menu and return to the plotter display.

1.6 Setting CPA/TCPA

Set the CPA (Closest Point of Approach) and TCPA (Time to Closest Point of Approach) range for which you want to be alerted to AIS targets close to own ship. When a ship's CPA and TCPA are lower than that set here, the buzzer sounds (if active) and the message COLLISION ALARM appears.

1. Press the [MENU] key to open the main menu.
2. Use ▲ or ▼ to choose USER SETTINGS and then press the [ENT] key.
3. Use ▲ or ▼ to choose CPA/TCPA ALARM and then press the [ENT] key.

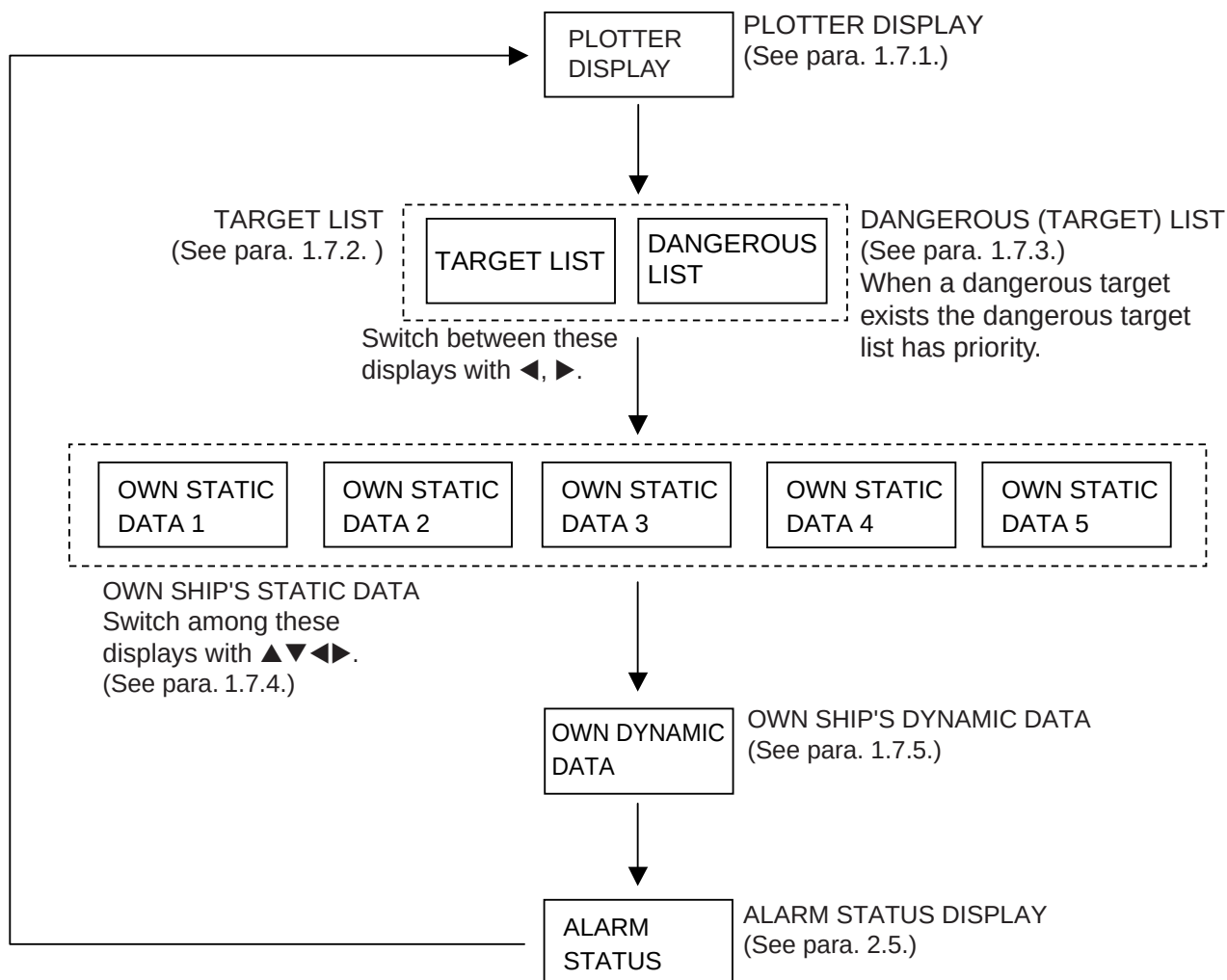
[CPA/TCPA ALARM]	
CPA	: 6.00 nm
TCPA	: 60 min
ALARM MODE	: ON
ALARM BUZZER	: ON
QUIT[MENU]	

CPA/TCPA ALARM sub-menu

3. CPA is selected; press the [ENT] key.
4. Use the CursorPad to enter CPA (setting range: 0-6.00 nm) and then press the [ENT] key.
5. TCPA is selected; press the [ENT] key.
6. Use the CursorPad to enter TCPA (setting range: 0-60 min) and then press the [ENT] key.
7. ALARM MODE is selected; press the [ENT] key.
8. Choose ON to enable the CPA/TCPA alarm feature; OFF to disable it. Press the [ENT] key.
9. ALARM BUZZER is selected; press the [ENT] key.
10. Choose ON to enable the CPA/TCPA audio alarm, or OFF to disable it. Press the [ENT] key.
11. Press the [DISP] key to close the menu and return to the plotter display.

1.7 Choosing a Display

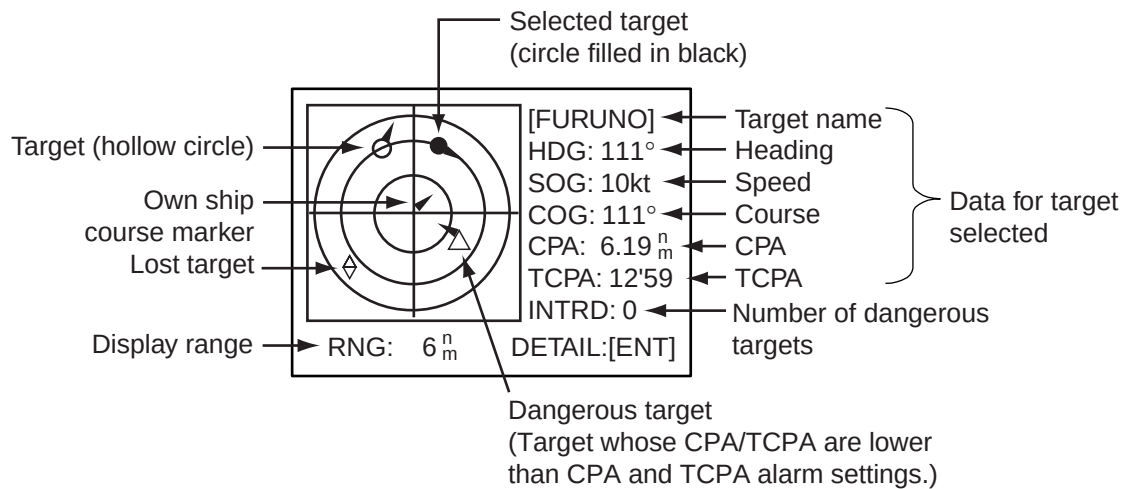
Use the [DISP] key to choose a display. Each time the key is pressed, the display changes in the sequence shown below.



Display selection sequence

1.7.1 Plotter display

The plotter display, which automatically appears at power-on, shows the range and course of AIS-equipped ships within the range set by the equipment. The position and course of your ship are also displayed.



Plotter display

A target marker (hollow circle w/vector) indicates the presence of a vessel equipped with AIS in a certain location and course. If you desire to know more about a vessel's data, see the next paragraph.

Operations on the plotter display

1. Press the [DISP] key to show the PLOTTER display.
2. Use ▼ or ▲ to choose the range. The available ranges are (in nm) 0.125, 0.25, 0.5, 0.75, 1.5, 3, 6, 12, and 24.
3. To find a target's data, see paragraph 1.7.2.

Note 1: If no signal is received from an AIS target for three minutes and twenty seconds it is declared a lost target. Six minutes and forty seconds later it is erased from the screen.

Note 2: When a target's CPA and TCPA are lower than set in paragraph 1.6, the target flashes and the audio alarm sounds (if active). Press any key to stop the flashing and silence the audio alarm. Take suitable measures to avoid collision.

Note 3: "DNGR" (DANGER) appears at the end of the HDG field when a target's CPA and TCPA are lower than the CPA and TCPA alarm settings. "LOST" appears at the end of the HDG field when the signal from a target is lost. Three minutes after the signal is lost the target's data is erased.

1.7.2 Target list (displaying target data)

- At the plotter display, press the [DISP] key to show the TARGET LIST, which lists all AIS targets being detected by the FA-150.

Note: You may also choose the target directly on the plotter display. Press ◀ or ▶ to color the circle of the wanted target in black and then press the [ENT] key. The display then looks something like the one shown at the top of the illustration on the next page. If you wish to see other data of the target, go to step 3 below.

Target's name, and range and bearing (from north) from own ship to target

Target type symbols

None: Ship

■ : Base station

▲ : SAR

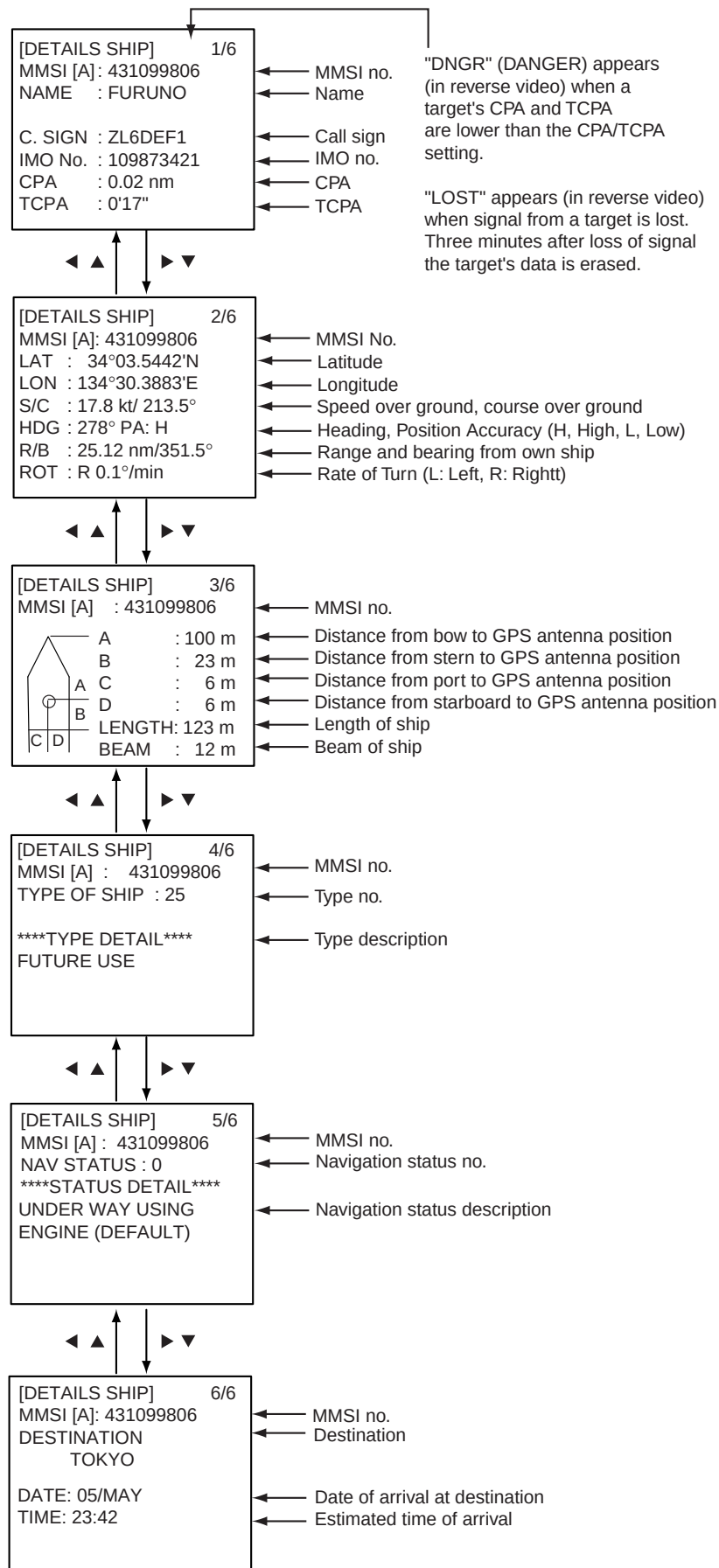
+ : AtoN

[TARGET LIST]		
NAME	RNG(ⁿ _m)	BRG(°)
FURUNO	2.9	276.1
VOYAGE	3.1	292.9
■ QUEST	4.3	279.5
▲ SEADOG	15.6	82.0
+ INTREP	21.1	123.1
GLOBER	28.8	246.3
1/ 10 [▼] DTL[ENT] DNG[▶]		

Press ▶ to switch to Dangerous List.
(See para. 1.7.3.)

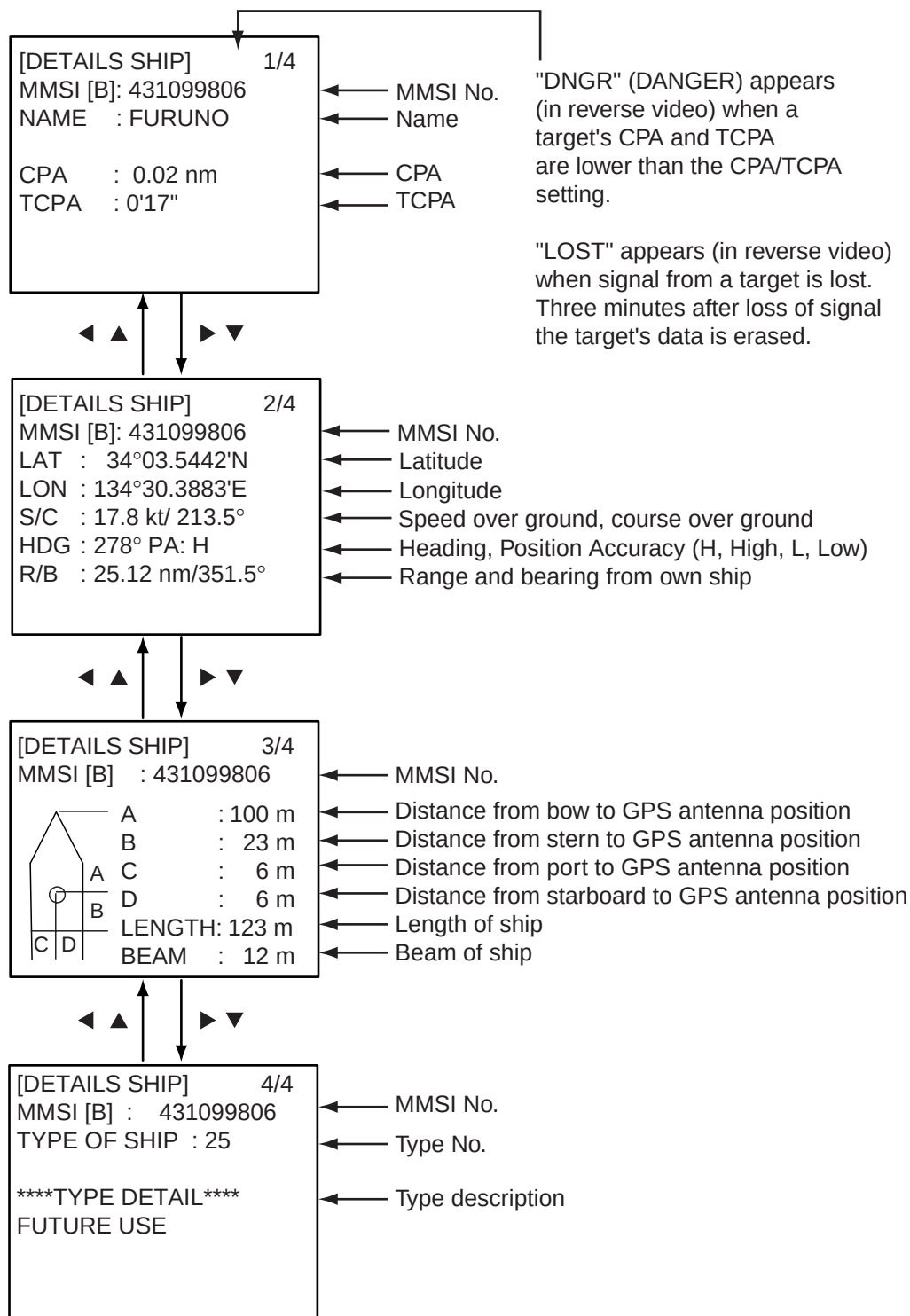
Target list

- Use ▼ or ▲ to choose the target whose data you wish to view, and then press the [ENT] key. The display then looks something like one of the displays shown on the next several pages, according to type of target. (If there is no data for the target selected the message NO SEL appears. Hit any key to escape.)
- Use ▼ or ▲ to scroll the display to see other data.

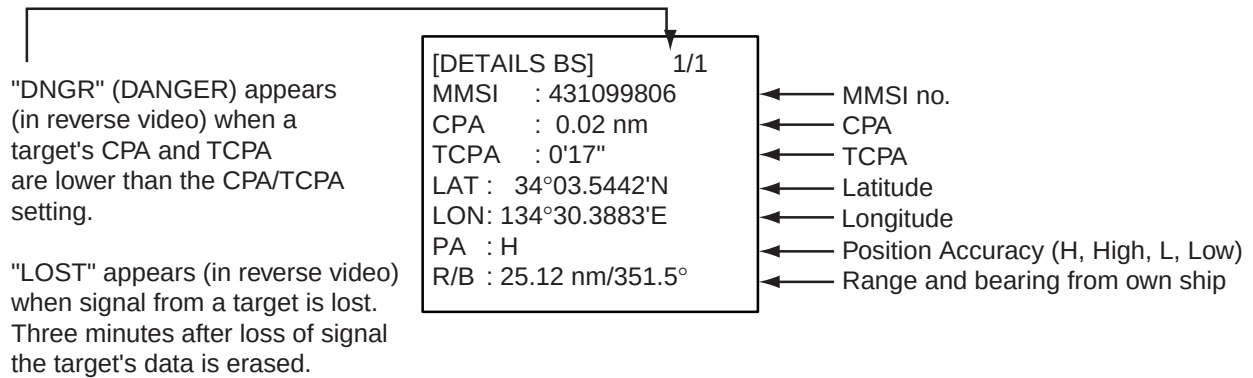
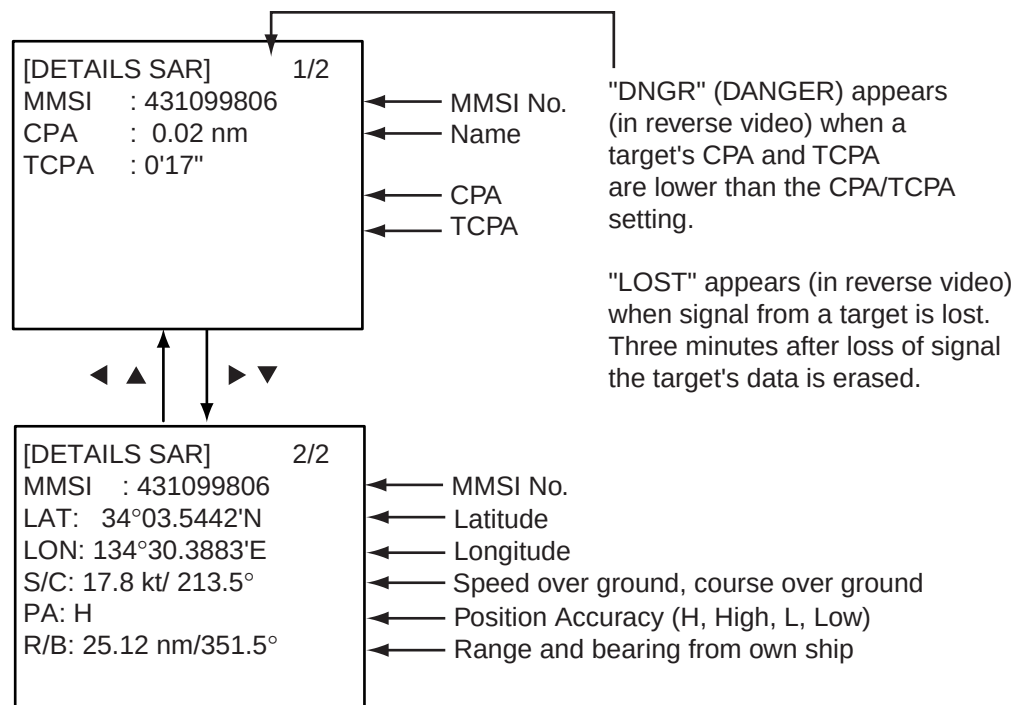
Target data display, mobile class A*Target data display, mobile class A*

1. OPERATION

Target data display, mobile class B

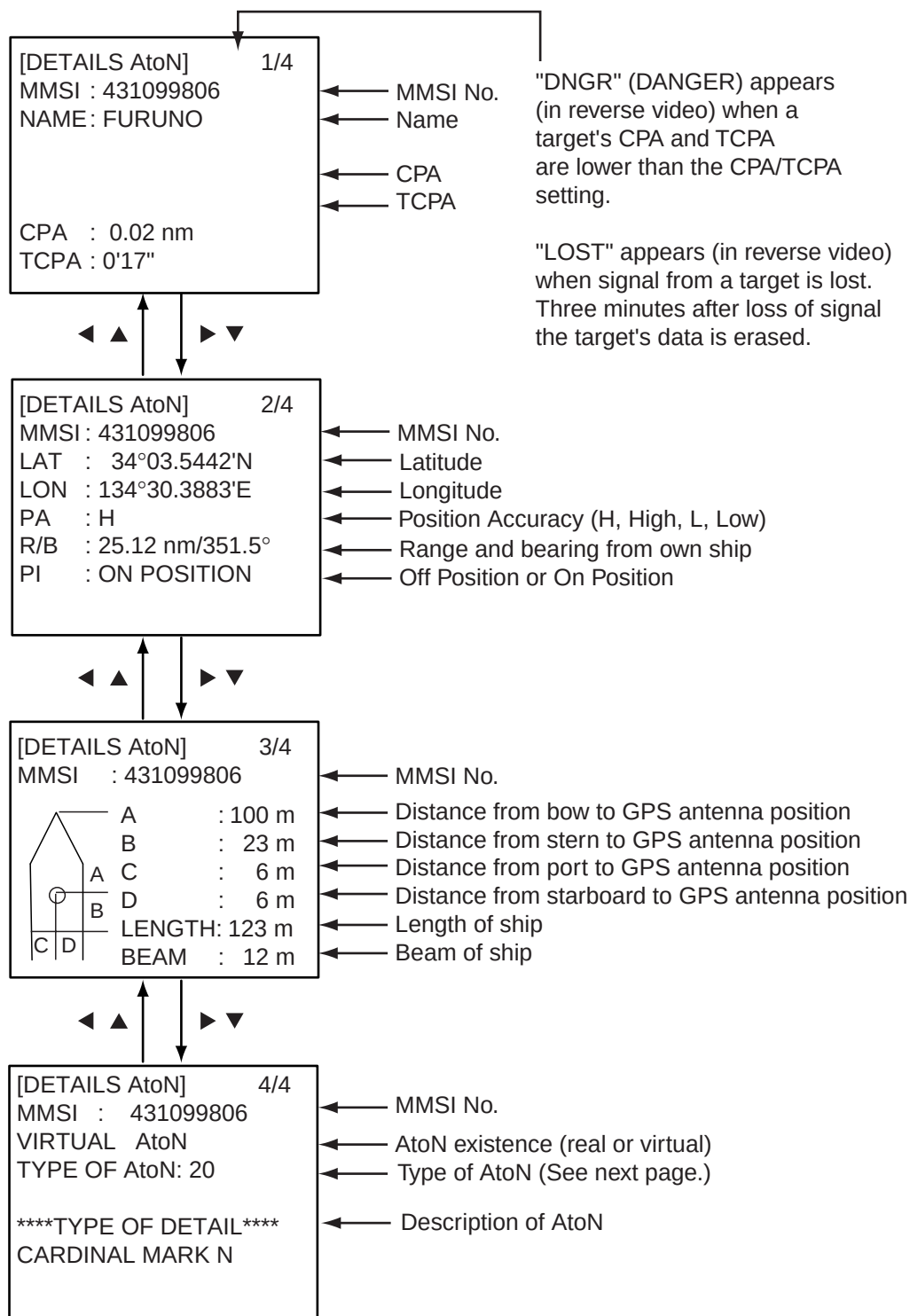


Target data display, mobile class B

Target data display, base station*Target data display, base station***Target data display, SAR (Search and Rescue)**

1. OPERATION

Target data display, AtoN (Aid to Navigation)



The table below shows all the AtoN codes which may appear on the AtoN target data display. The AtoN name which appears on the AtoN target display is shown in uppercase alphabet.

A to N code and description

Code	Description
0	Default, Type of A to N not specified
1	Reference point
2	RACON
3	Off shore structure
4	Spare
5	Light, without sectors
6	Light, with sectors
7	Leading light front
8	Leading light rear
9	Beacon, cardinal N
10	Beacon, cardinal E
11	Beacon, cardinal S
12	Beacon, cardinal W
13	Beacon, port hand
14	Beacon, starboard hand
15	Beacon, preferred channel port hand
16	Beacon, preferred channel starboard hand
17	Beacon, isolated danger
18	Beacon, safe water
19	Beacon, special mark
20	Cardinal mark N
21	Cardinal mark E
22	Cardinal mark S
23	Cardinal mark W
24	Port hand mark
25	Starboard hand mark
26	Preferred channel port hand
27	Preferred channel starboard hand
28	Isolated danger
29	Safe water
30	Special mark
31	Light vessel / LANBY

1.7.3 Dangerous (target) list

You can easily find dangerous ships whose CPA and TCPA are lower than the CPA and TCPA alarm settings.

1. At the plotter display, press the [DISP] key to show the Target List (see paragraph 1.7.2).
2. Press ► to show the Dangerous List.

Target name, CPA and TCPA	[DANGEROUS LIST]		
	NAME	CPA (m)	TCPA
	FURUNO	0.50	3'20"
	EXPLOR	1.20	3'35"
	INTREP	1.80	3'50"
	VOYAGE	1.90	3'55"
	SEADOG	2.00	4'00"
	1/ 10 [▼] DTL[ENT] RNG[◀]		

Press ◀ to sort and view targets in order of range from own ship.

Dangerous list

3. To find detailed information about a dangerous target, use ▼ or ▲ to choose the target and then press the [ENT] key. Use the CursorPad to view other data; ▼ or ► to go forward, ▲ or ◀ to go back. (If there is no data for the target selected the message "NO SEL" appears. Hit any key to escape.)

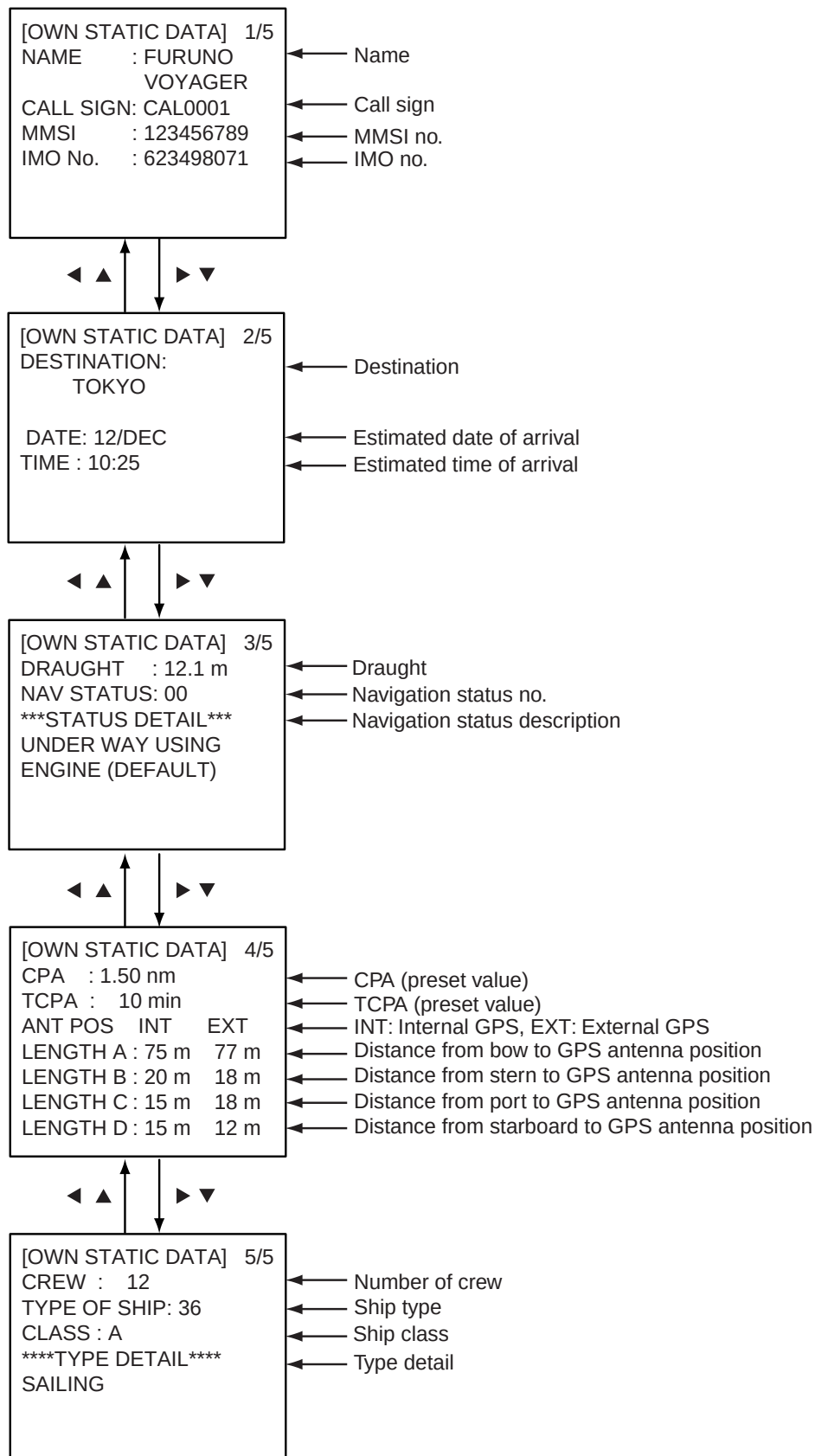
Note: The message "LOST" appears at the top of the Dangerous List when no AIS signal is received from the selected target.

1.7.4 Own ship's static data

The OWN STATIC DATA display shows own ship's static data, which includes MMSI, call sign and name, IMO number, length and beam, type of ship and location of position fixing antenna, on five pages. This data should be checked once per voyage or once per month whichever is shorter. Data may be changed only on the authority of the master.

1. At the plotter display, press the [DISP] key twice to show "OWN STATIC DATA 1/5". See the next page.
2. Use the CursorPad to view other own static data; ▼ or ► to go forward, ▲ or ◀ to go back.

See the illustration on the next page for own ship's static data examples.



OWN STATIC DATA displays

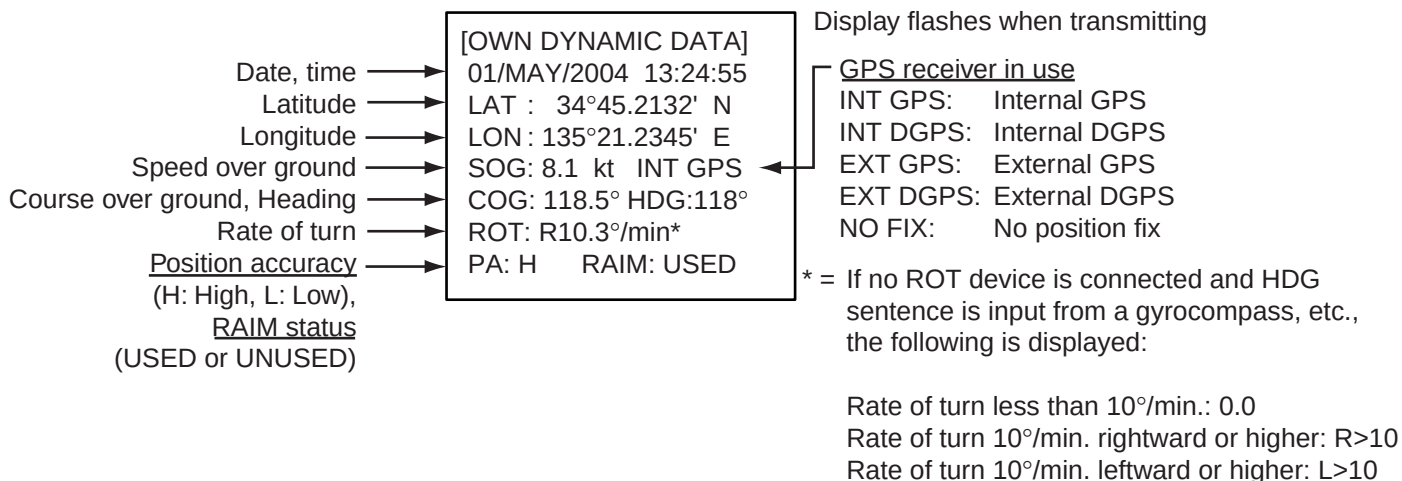
1. OPERATION

1.7.5 Own dynamic data display

The OWN DYNAMIC DATA display shows your ship's dynamic data, which includes time, date, ship's position, course over ground (COG), speed over ground (SOG), rate of turn (ROT), and heading.

The OOW should periodically check position, speed over ground and sensor information.

At the plotter display, press the [DISP] key three times to show the OWN DYNAMIC DATA display.



OWN DYNAMIC DATA display

1.7.6 Alarm status display

The alarm status display shows the date and time alarms were violated. For further details, see paragraph 2.5.

1.8 Messages

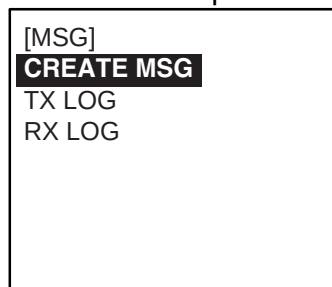
You may send and receive messages via the VHF link, to a specified destination (MMSI) or all ships in the area. Messages can be sent to warn of safety of navigation; for example, an iceberg sighted. Routine messages are also permitted.

Short safety-related messages are only an additional means to broadcast safety information. They do not remove the requirements of the GMDSS.

When a message is received, the equipment beeps and the indication "MESSAGE" appears. The contents of the message may be viewed on the receive message log.

1.8.1 Sending a message

1. Press the [MENU] key to open the main menu.
2. Use ▼ or ▲ to choose MSG and then press the [ENT] key

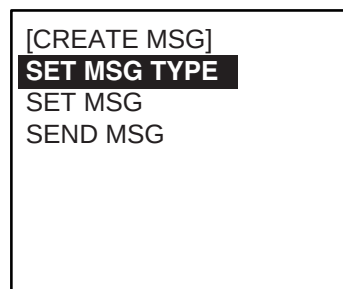


```

[MSG]
CREATE MSG
TX LOG
RX LOG
  
```

MSG sub-menu

3. CREATE MSG is selected; press the [ENT] key.

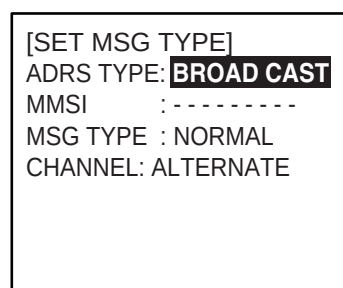


```

[CREATE MSG]
SET MSG TYPE
SET MSG
SEND MSG
  
```

CREATE MSG sub-menu

4. SET MSG TYPE is selected; press the [ENT] key.



```

[SET MSG TYPE]
ADRS TYPE: BROADCAST
MMSI      : -----
MSG TYPE  : NORMAL
CHANNEL   : ALTERNATE
  
```

SET MSG TYPE sub-menu

1. OPERATION

5. ADRS TYPE is selected; press the [ENT] key.

BROADCAST
ADRS CAST

6. Choose ADRS CAST to send a message to a specific ship, or BROADCAST to send a message to all ships. Press the [ENT] key.
7. For BROADCAST, go to step 8. For ADDRESS-CAST, "MMSI" is selected; press the [ENT] key, use the CursorPad to enter MMSI number of receiving vessel and then press the [ENT] key.
8. MSG TYPE is chosen; press the [ENT] key.

SAFETY
NORMAL

9. Choose message type: NORMAL (message other than safety) or SAFETY (important navigational or meteorological warning). Press the [ENT] key.
10. CHANNEL is chosen; press the [ENT] key.

ALTERNATE
BOTH A & B
A
B

11. Choose which channel to transmit your message over.
12. Press the [ENT] key.
13. Press the [MENU] key to return to the CREATE MSG sub-menu.
14. Choose SET MSG and press the [ENT] key.

Number of characters used/available →

[SET MSG]

—

0(151)* QUIT[MENU]

*: Up to 161 characters can be entered, but recipients receive the following number of characters.

NORMAL message with BROADCAST	: 156 characters
NORMAL message with ADDRESS-CAST	: 151 characters
SAFETY message with BROADCAST	: 161 characters
SAFETY message with ADDRESS-CAST	: 156 characters

SET MSG screen

15. Use the CursorPad to enter your message. Use ▼ or ▲ to choose character; ◀ or ▶ to shift the cursor.
16. Press the [ENT] key to return to the CREATE MSG sub-menu.
17. Choose SEND MSG and then press the [ENT] key to send your message.

The screen shows message status as follows:

AIS message status messages and their meanings

Message	Meaning
NOW PROCESSING.	Message is being sent.
SEND MESSAGE COMPLETE. PRESS ANY KEY.	Transmission of message completed. (MMSI is additionally shown in case of addressed message.)
SEND MESSAGE UNSUCCESSFUL. PRESS ANY KEY.	Message could not be sent.
SEND MESSAGE UNSUCCESSFUL. MMSI: XXXXXXXXX PRESS ANY KEY.	Message sent successfully, however there is no reply from receiver of message.
NOW WAITING RESPONSE. PRESS ANY KEY.	You tried to send a message while the transponder is awaiting receive confirmation (successful or unsuccessful) for the first-sent message. After confirmation is received, the next sequential message will be sent.

1.8.2 Receiving messages

How to view a received message

When a message is received, the window below appears on the display. To view the contents of the message follow the procedure below.

MESSAGE !

PRESS ANY KEY

Message received

1. Press any key to erase the "message received" window.
2. Press the [MENU] key to show the main menu.
3. Choose MSG and then press the [ENT] key.
4. Choose RX LOG and then press the [ENT] key.

Date and time
message received
("NEW" displayed for
unread message)

[RX LOG]
03/MAY 13:25 NEW
FROM: 431099111 N-ABM
28/MAR 03:43
FROM: 431099111 S-ABM
22/MAR 18:00
FROM: 431099111 N-ABM
1/10[▼] MSG[ENT] QUIT[MENU]

MMSI of sender, type of message
N-ABM: Normal, addressed binary
S-ABM: Safety, addressed binary
N-BBM: Normal, broadcast binary
S-BBM: Safety, broadcast binary

Received message log

5. To view the contents of an unread message, use the CursorPad to choose the message and then press the [ENT] key. Below is an example of a received message.

```
[RCVD MSG]
I HAVE CHANGED MY
COURSE TO 350 DEGREE.

SCROLL[▲▼]    QUIT[MENU]
```

Received message example

6. Press the [MENU] key several times to close the log and return to the plotter display.

Automatically displaying received messages

You may automatically display incoming messages as follows:

1. Press the [MENU] key to open the menu.
2. Use the CursorPad to choose USER SETTINGS and then press the [ENT] key.

```
[USER SETTINGS]
KEY BEEP      : ON
ALARM BUZZER : ON
DISP RCVD MSG : ALL
RCVD MSG BUZZ: ON
LR MODE       : AUTO
CPA/TCPA ALARM

QUIT[MENU]
```

USER SETTINGS sub-menu

3. Use the CursorPad to choose DISP RCVD MSG and then press the [ENT] key.

```
ALL
ABM
OFF
```

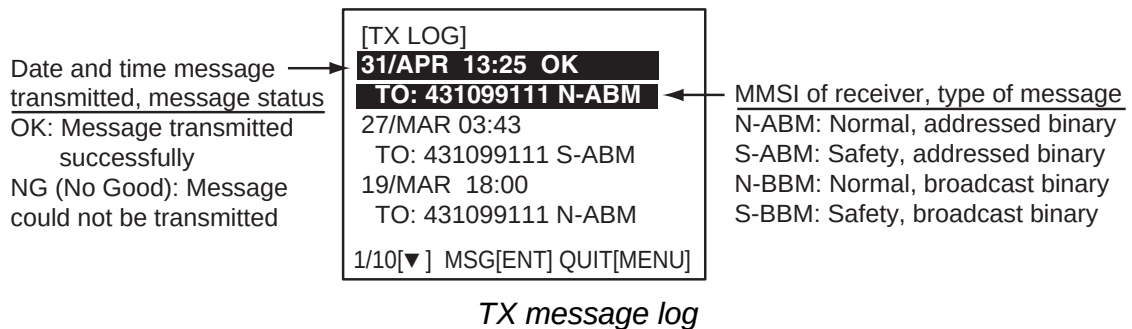
4. Use the CursorPad to choose which category of receive message you want to display automatically and then press the [ENT] key.
ALL: Display any message upon receipt
ABM: Display only addressed binary messages upon their receipt
OFF: Disable automatic displaying of incoming messages
5. Press the [DISP] key to close the menu and return to the plotter display.

1.8.3 Message logs

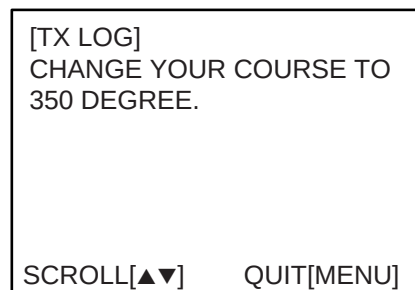
The FA-150 stores the latest five transmitted and received messages in respective message logs. When a log becomes full, the oldest message in the log is automatically deleted to make room for the latest.

To display a message log, do the following:

1. Press the [MENU] key to open the menu.
2. Choose MSG and then press the [ENT] key.
3. Choose TX LOG or RX LOG as appropriate and then press the [ENT] key.
Below is an example of the Tx log. For the appearance of the Rx log, see paragraph 1.8.2.



4. To view the contents of a message, choose it with ▼ or ▲ and then press the [ENT] key. Below is an example of a transmitted message. For an example of a received message, see paragraph 1.8.2.



5. Press the [MENU] key several times to close the log and return to the plotter display.

1.9 Regional Operating Channels

AIS operates primarily on two dedicated VHF channels, CH 2087 and CH2088. Where these channels are not available regionally, the AIS is capable of being automatically switching to designated alternate channels by means of a message from a shore facility. Where no shore based AIS or GMDSS sea area A1 station is in place, the AIS should be switched manually as in paragraph 1.9.2.

A regional operating area is set with the procedure shown below. The most recent eight areas are memorized.

- Automatic setting of VHF DSC (channel 70) from shore-based AIS
- Automatic setting by AIS message from shore-based AIS
- Setting by shipboard system such as ECDIS
- Manual setting

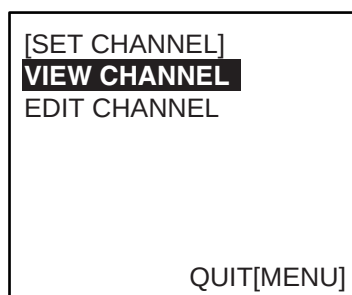
The default area is as follows:

- Tx power: 12.5 W
- Channel no. 2087, 2088
- Frequency bandwidth: 25 kHz
- Tx/Rx mode: Tx/Rx

1.9.1 Viewing channels, Tx power

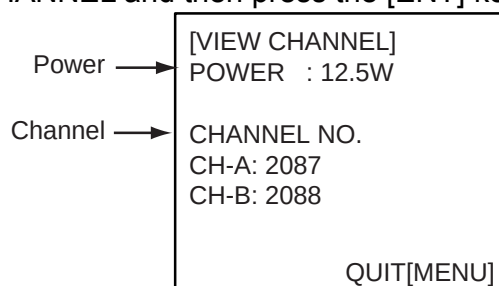
Do the following to view current channels.

1. Press the [MENU] key to open the menu.
2. Choose SET CHANNEL and then press the [ENT] key.



SET CHANNEL menu

3. Choose VIEW CHANNEL and then press the [ENT] key.



VIEW CHANNEL display

4. Press the [MENU] key several times to return to the plotter display.

1.9.2 Displaying, editing regional operating area status

You may display the status of regional operating areas currently memorized in the equipment. Nine of any combination of AIS message from shore-based AIS, DSC message, manual settings and commands from ECDIS or a PC may be registered and one will be a default value.

About registering areas

- AIS and DSC messages registered within last two hours cannot be edited.
- An item labeled DEFAULT cannot be registered. ("DEFAULT" are data used for international waters not controlled by shore-based AIS.)
- If two areas overlap one another the older data is deleted.
- Data older than five weeks is deleted.
- Area data is deleted when it is more than 500 miles from the area for which it was registered.

1. Press the [MENU] key to open the menu.
2. Choose SET CHANNEL and then press the [ENT] key.
3. Choose EDIT CHANNEL and then press the [ENT] key.

```
[EDIT CHANNEL]
SELECT NO. : 0
TIME
- - / - - - - : - - : - -
FROM
MMSI: DEFAULT
TYPE: DEFAULT
QUIT [MENU] EDIT[ENT]
```

EDIT CHANNEL sub-menu, page 1

SELECT NO.: File number, 0-9. In order of distance from own ship, from closest to furthest.

TIME: Data and time equipment controlled by external source.

MMSI: MMSI displayed for control by DSC or shore-based AIS. Dashes or "EMPTY" (no data) otherwise.

TYPE: How channel is controlled: AIS, AIS message; PI, ECDIS or PC; DSC, DSC, MANUAL, manual control

Note: MMSI and TYPE must be set to other than "DEFAULT" to edit.

4. Use ▼ or ▲ to choose desired file number from SELECT NO. and then press the [ENT] key.

1. OPERATION

5. Press the [ENT] key to show details.

[EDIT CHANNEL]	1/2	Note: Power is fixed at 1W for CH No. 1013 and/1067.
FROM MMSI:		
POWER :	12.5W	
CH NO.	CH-A: 2087 CH-B: 2088	
MODE	CH-A: TX/RX CH-B: TX/RX	
ZONE:	1nm	

EDIT CHANNEL sub-menu, page 1

6. POWER is selected; press the [ENT] key to show the channel power options.

1W
2W
12.5W

7. Use ▼ or ▲ to choose power desired and then press the [ENT] key.
8. CH NO. CH-A is selected; press the [ENT] key.
9. Use the CursorPad to choose channel number for CH-A and then press the [ENT] key.
10. CH NO. CH-B is selected; press the [ENT] key.
11. Use the CursorPad to choose channel number for CH-B and then press the [ENT] key.
12. MODE CH-A is selected; press the [ENT] key.

TX/RX
RX
UNUSED

13. Use the CursorPad to choose desired mode for CH-A and then press the [ENT] key.
14. MODE CH-B is selected; press the [ENT] key.
15. Use the CursorPad to choose desired mode for CH-B and then press the [ENT] key.
16. ZONE is selected; press the [ENT] key.
17. Key in the zone distance and then press the [ENT] key. (The setting range is 1 to 8 (nm).) Then, the following screen appears.

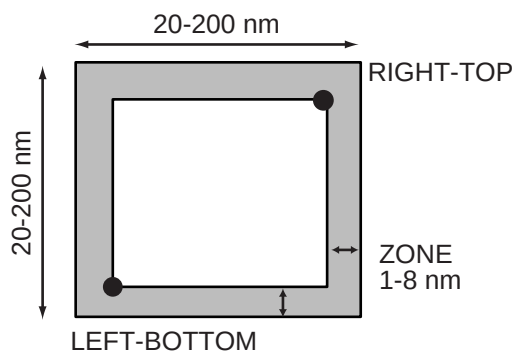
[EDIT CHANNEL]	2/2
CH AREA	
RIGHT TOP	
LAT:	0°00.0'N
LON:	0°00.0'E
LEFT BOTTOM	
LAT:	0°00.0'N
LON:	0°00.0'E

CHANNEL EDIT sub-menu, page 2

18. LAT of RIGHT TOP is selected; press the [ENT] key. Use the CursorPad to enter latitude for the right-top position (northeast point) of the AIS operating area and then press the [ENT] key.

19. LON of RIGHT TOP is selected; press the [ENT] key. Use the CursorPad to enter longitude for the right-top position (northeast point) of the AIS operating area and then press the [ENT] key.
20. LAT of LEFT BOTTOM is selected; press the [ENT] key. Use the CursorPad to enter latitude for the left-bottom position (southwest point) of the AIS operating area and then press the [ENT] key.
21. LON of LEFT BOTTOM is selected; press the [ENT] key. Use the CursorPad to enter longitude for the left-bottom position (southeast point) of the AIS operating area and then press the [ENT] key.

Note: The available range is 20-200 nm. If the area contains overlapping data the older data will be erased.



Description of RIGHT-TOP, LEFT-BOTTOM and ZONE items

22. Press the [MENU] key. The prompt shown below appears.

SAVE CHANNEL.

ARE YOU SURE?

YES **NO**

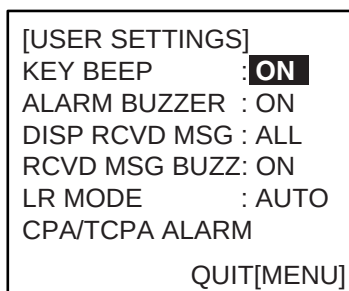
23. Press ◀ to choose YES and then press the [ENT] key.
24. Press the [DISP] key to close the menu and return to the plotter display.

Note: If you enter invalid data, the message “OUT OF RANGE L/L” appears. Press any key to escape. Reenter data.

1.10 Enabling/Disabling Buzzers, Key Beep

You may turn on or off the buzzers that sound for alarms or incoming messages. Further, you may turn off the beep which sounds for valid key input. Note that the alarm buzzer is not related to a radar or ECDIS alarm.

1. Press the [MENU] key to open the menu.
2. Use the CursorPad to choose USER SETTINGS and then press the [ENT] key.



USER SETTINGS sub-menu

3. Use the CursorPad to choose KEY BEEP, ALARM BUZZER or RCVD MSG BUZZ as appropriate and then press the [ENT] key.
4. Choose ON or OFF as appropriate and then press the [ENT] key.
5. Press the [DISP] key to close the menu and return to the plotter display.

1.11 Long Range Mode

The long range mode sets how to reply to a request for own ship data from a distant station, for example, Inmarsat C station. You may reply automatically or manually.

1. Press the [MENU] key to open the menu.
2. Use the CursorPad to choose USER SETTINGS and then press the [ENT] key.

```

[USER SETTINGS]
KEY BEEP      : ON
ALARM BUZZER  : ON
DISP RCVD MSG : ALL
RCVD MSG BUZZ : ON
LR MODE       : AUTO
CPA/TCPA ALARM

QUIT[MENU]
  
```

USER SETTINGS sub-menu

3. Use the CursorPad to choose LR MODE and then press the [ENT] key.

```

  AUTO
  MANUAL
  
```

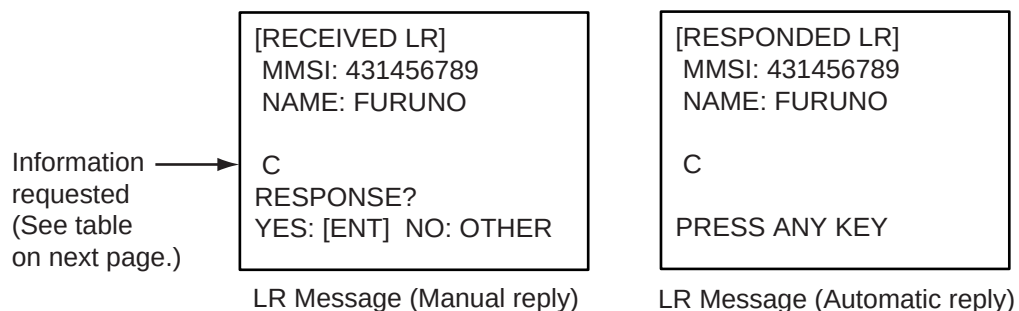
4. Use the CursorPad to choose AUTO (auto reply) or MANUAL (manual reply) as appropriate and then press the [ENT] key.
5. Press the [DISP] key to close the menu and return to the plotter display.

Manual reply

For manual reply, the left-side message below appears when a request for own ship data arrives from a distant station. Press the [ENT] key to send the data, or press any key other than [ENT] to send no data.

Automatic reply

For automatic reply, the right-side message below appears when a request for own ship data arrives from a distant station. Ship's data is automatically transmitted. Press the [ENT] key to erase the message.



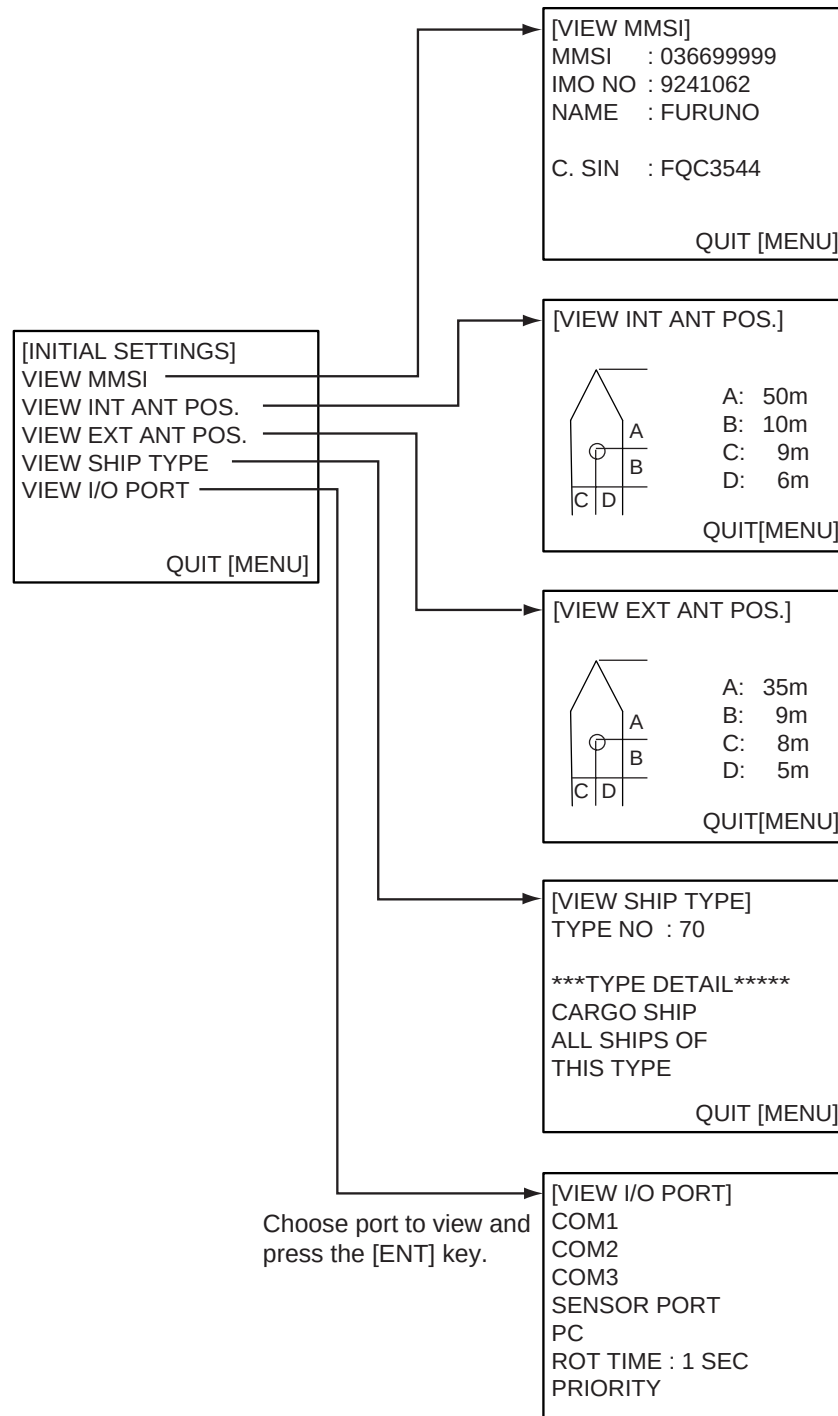
Codes used in long range messages

Code	Meaning
A	Ship name, call sign, IMO number
B	Date message created
C	Position
E	Course over ground
F	Speed over ground
I	Waypoint, ETA
O	Draft
P	Ship type, Load
U	Ship length, width, type
W	Number of crew

1.12 Viewing Initial Settings

The INITIAL SETTINGS menu, which is locked with a password, is where the installer enters ship's MMSI, internal and external antenna positions, ship type and I/O port settings. You can view the settings on this menu (without a password) as follows.

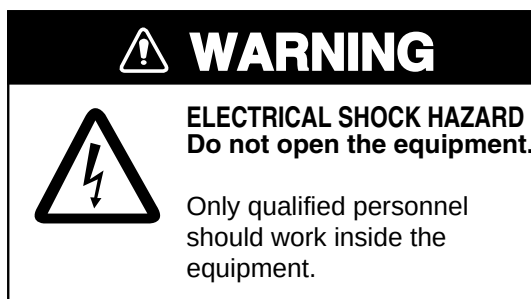
1. Press the [MENU] to open the menu.
2. Use the CursorPad to choose INITIAL SETTINGS and then press the [ENT] key.
3. Use the CursorPad to choose item to view and then press the [ENT] key.



1. OPERATION

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2. MAINTENANCE, TROUBLESHOOTING



2.1 Maintenance

Regular maintenance is necessary to maintain performance. A monthly maintenance program should be established and should at least include the items listed in the table below.

Maintenance items

Item	Check point
Connectors	Check that all connectors on the rear panel of the transponder unit and monitor unit are firmly connected.
Cabling	Check cabling for damage. Replace if damaged.
Ground terminal	Check the ground terminal on the monitor unit and transponder unit for rust. Clean if necessary.
Ground wire	Confirm that the ground wire on the monitor unit and transponder unit is firmly fastened.
Monitor unit, Transponder unit	Dirt and dust should be removed from units with a soft, dry cloth. For the LCD, wipe it carefully to prevent scratching, using tissue paper and an LCD cleaner. To remove dirt or salt deposits, use an LCD cleaner, wiping slowly with tissue paper so as to dissolve the dirt or salt. Change paper frequently so the salt or dirt will not scratch the LCD. Do not use solvents such as thinner, acetone or benzene for cleaning any unit; they can remove paint and marks and deform the equipment.

2.2 Replacement of Fuse, Resetting Breaker

2.2.1 Replacement of fuse

The power cable for the monitor unit contains a 3A fuse which protects the equipment from overvoltage, reverse polarity and equipment fault. If the power cannot be turned on, check if the fuse has blown. If it has blown, find the cause before replacing the fuse. If the fuse blows again after replacement, contact your dealer for advice.

Part	Type	Code No.
Fuse	FGBO-A 3A AC125V	000-549-063

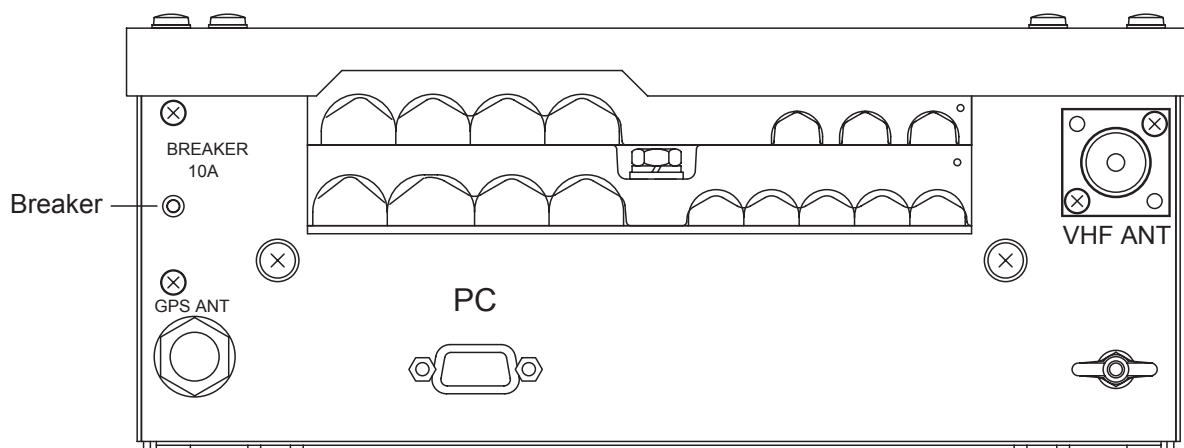
WARNING

Use the proper fuse.

Use of a wrong fuse can cause fire or result in damage to the equipment.

2.2.2 Resetting the breaker

If the power cannot be turned on, the BREAKER button on the rear panel of the transponder unit may have activated. The BREAKER button pops out when overvoltage, reverse polarity or equipment fault is detected, to protect the system from damage. If the button pops out, find the reason before pushing it in to restore normal operation.



2.3 Troubleshooting

The troubleshooting table below provides common symptoms of trouble and the means to rectify them. If you cannot restore normal operation, do not attempt to check inside the equipment. Refer any repair work to a qualified technician.

Troubleshooting

Symptom	Remedy
Power	
Cannot turn on the power.	• Check that the power connector is firmly fastened. • Check the power supply.
Transmitting, receiving messages	
Cannot transmit or receive.	• Check that the VHF antenna cable is firmly fastened. • Check the VHF antenna. • For TX message, try different TX channel. (operating sequence: [MENU], MSG, CREATE MESSAGE, SET MSG TYPE, CHANNEL)
Can transmit but message is sent to wrong party.	• On the SET MSG TYPE sub-menu, check that ADRS TYPE is selected to ADRS-CAST and MMSI is correct, before sending a message. (operating sequence: [MENU], MSG, CREATE MESSAGE, SET MSG TYPE, ADRS TYPE and MMSI)
Position data	
No position data	• Check the GPS antenna for damage. • Check the GPS antenna cable and its connectors.

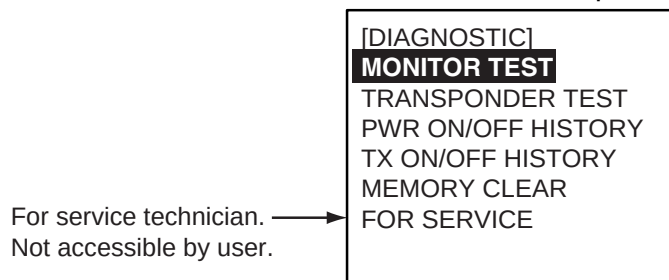
2.4 Diagnostics

The FA-150 provides diagnostic tests to check the monitor unit and transponder unit for proper operation.

2.4.1 Monitor unit test

The monitor unit test shows program no., and checks the ROM, RAM, LCD and controls.

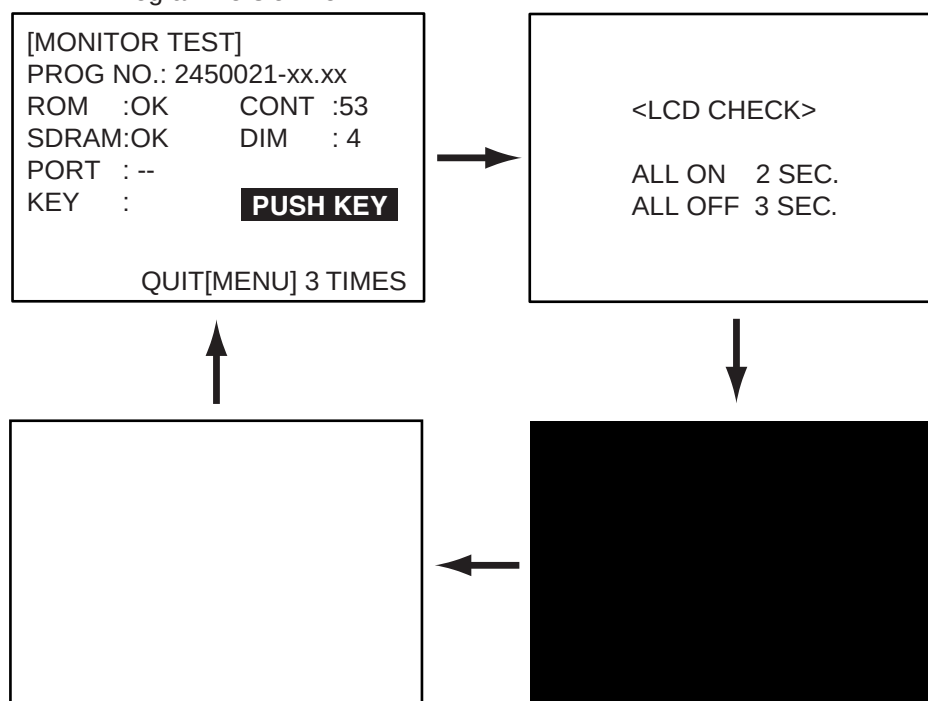
1. Press the [MENU] key to open the main menu.
2. Use the CursorPad to choose DIAGNOSTIC and then press the [ENT] key.



DIAGNOSTIC sub-menu

3. Use the CursorPad to choose MONITOR TEST and then press the [ENT] key. The test program automatically proceeds in the sequence shown below.

xx.xx = Program version no.



MONITOR TEST screens

- a) The first screen in the monitor test program sequence shows program no., results of ROM, RAM and I/O port (special test connector required, otherwise “-” appears), dimmer setting, and checks controls. The results of the ROM and RAM check are shown as OK or NG (No Good). If NG appears contact your dealer for advice. “CONT” indicates the number of times the test has been executed consecutively.
 - b) After all devices and ports have been checked, the message “PUSH KEY” appears, in reverse video. Press each key and arrows on the CursorPad one by one. The pressed key or arrow’s name appears next to “KEY” if the control is functioning normally.
 - c) After the controls have been checked (or there is no control pressed for a few seconds), the LCD is checked. All LCD segments turn on for two seconds and then go off for three seconds, and then the screen turns black and then turns white.
 - d) The test is repeated.
4. To escape from the test, press the [MENU] key three times when PUSH KEY is shown in reverse video.

2.4.2 Transponder test

The transponder test consists of two tests: memory test and internal GPS receiver test.

Memory test

The memory can be checked for proper operation and the program number displayed as follows:

1. Press the [MENU] key to open the main menu.
2. Use the CursorPad to choose DIAGNOSTIC and then press the [ENT] key.
3. Use the CursorPad to choose TRANSPONDER TEST and then press the [ENT] key.
4. Use the CursorPad to choose MEMORY TEST and then press the [ENT] key. The program no. is displayed and the ROM and RAM are checked. The results of the ROM and RAM check are shown as OK or NG (No Good). For any NG, contact your dealer for advice.

[MEMORY TEST]
 PROGRAM NO.
 2450018-xx.xx
 MAIN ROM : OK
 MAIN RAM : OK
 SUB RAM : OK

xx.xx: Program Version No.

MEMORY TEST display

5. Press the [MENU] key several times to return to the DIAGNOSTIC sub-menu.

Internal GPS test

The internal GPS receiver can be checked for proper operation as follows:

1. Press the [MENU] key to open the main menu.
2. Use the CursorPad to choose DIAGNOSTIC and then press the [ENT] key.
3. Use the CursorPad to choose TRANSPONDER TEST and then press the [ENT] key.
4. Use the CursorPad to choose GPS TEST and then press the [ENT] key to start the test. The program no. and the test results appear as shown below.

OK: Normal

DATA BACKUP ERR: Data backup problem

GPS COMMUNICATION ERROR: Comm. error with internal GPS receiver

PARAMETER BACKUP ERR: Parameter backup problem

ROM ERROR, RAM ERROR

```
[GPS TEST]
PROGRAM NO.
  485026xxxx
TEST: OK
```

xxxx: Program Version No.

GPS TEST display

5. Press the [MENU] key to escape.

2.4.3 Power on/off history

The PWR ON/OFF HISTORY log shows the date and time of the latest 30 power-ons and power-offs. If the interval between power-on and power-off is less than 15 minutes those times are not shown.

1. Press the [MENU] key to open the main menu.
2. Use the CursorPad to choose DIAGNOSTIC and then press the [ENT] key.
3. Use the CursorPad to choose PWR ON/OFF HISTORY and then press the [ENT] key.

```
[PWR ON/OFF HISTORY]
PWR-ON  17/MAY/2004
        05:35:54
PWR-OFF  17/MAY/2004
        04:56:57
PWR-ON   17/MAY/2004
        04:06:34
QUIT[MENU]
```

Power turned on 17 May 2004
at 05:35:54

PWR ON/OFF HISTORY log

4. Use ▼ or ▲ to scroll the log.
5. Press the [MENU] key to return to the DIAGNOSTIC sub-menu.

2.4.4 Tx on/off history

The TX ON/OFF HISTORY log shows the date and time of the latest 30 transmissions. In special cases, on and off times of 0 W transmission may also be shown.

1. Press the [MENU] key to open the main menu.
2. Use the CursorPad to choose DIAGNOSTIC and then press the [ENT] key.
3. Use the CursorPad to choose TX ON/OFF HISTORY and then press the [ENT] key.

[TX ON/OFF HISTORY]	
TX-ON	17/MAY/2004
	05:35:54
TX-OFF	17/MAY/2004
	04:34:57
TX-ON	17/MAY/2004
	04:33:57
PAGE 1/2 :[▶] QUIT[MENU]	

← Tx at 17 May 2004
at 05:35:54

TX ON/OFF HISTORY log

4. Use ▼ or ▲ to scroll the log.
5. Press the [MENU] key to return to the DIAGNOSTIC sub-menu.

2.5 Alarm Status

The alarm status log shows the latest 25 dates and times alarms were violated.

1. At the plotter display, press the [DISP] key four times to show the ALARM STATUS display.

Alarm name, → date and time of alarm	[ALARM STATUS]		
	EPFS	7/MAY	4:32:16
	L/L	7/MAY	4:02:01
	SOG	7/MAY	2:34:54
	COG	6/MAY	7:09:32
	HDG	3/MAY	8:00:21
	ROT	19/APR	9:05:22

ALARM STATUS display

2. Use ▼ or ▲ to scroll the log.

Alarm statuses and their meanings

Alarm Status Indication	Meaning
TX	TX malfunction
ANT	Antenna VSWR trouble. Continued operation possible.
CH1	TDMA RX1 Board trouble. TX stopped on corresponding TX channel.
CH2	TDMA RX2 Board trouble. TX stopped on corresponding TX channel.
CH70	DSC RX Board trouble, transmission stopped on CH70.
COG	Invalid COG data
EPFS	No data from external navigator. Continued operation possible.
FAIL	General system failure
HDG	Invalid/nonexistent HDG data
L/L	No L/L data
MKD	Minimum input device failure
ROT	Invalid ROT data
SOG	Invalid SOG data

2.6 Error Messages

The FA-150 displays the following error messages to alert you to invalid data, etc.

Error messages and their meanings

Message	Meaning
CAN'T DISPLAY INVALID DATA	Invalid own ship position.
CAN'T DISPLAY OVER LAT85°	Own ship's latitude is higher than 85°.
COLLISION ALARM	AIS target within set CPA/TCPA range.
COMMUNICATION ERROR	No communication with transponder
ERROR REGIST	Duplicate data in overlapping sea areas.
GPS COMMUNICATION ERROR	Communication error with internal GPS, shown at internal GPS self test.
NO MESSAGE	No TX message when you attempted to send a message.
NO SEL	Attempted to see detailed data for a target which has no data.
OUT OF RANGE!: CH-A:IT DOESN'T EXIST	Invalid CH-NO. A entered on the CHANNEL EDIT sub-menu.
OUT OF RANGE!: CH-B:IT DOESN'T EXIST	Invalid CH-NO. B entered on the CHANNEL EDIT sub-menu.
OUT OF RANGE!: CPA:0-6.00	Invalid CPA range entered.
OUT OF RANGE!: CREW:0-8191	Invalid crew no. entered in SET CREW&TYPE.
OUT OF RANGE!: DAY	Invalid day entered in SET DESTINATION.
OUT OF RANGE!: DRAUGHT:0-25.5	Invalid draught entered in SET SHIP DATA.
OUT OF RANGE!: HOUR:0-23	Invalid hour entered in SET DESTINATION.
OUT OF RANGE!: MINUTE:0-59	Invalid minute entered in SET DESTINATION.
OUT OF RANGE!: MONTH:1-12	Invalid month entered in SET DESTINATION.
OUT OF RANGE!: ROT CYCLE:1-10	Invalid ROT entered in SET I/O menu.
OUT OF RANGE!: TCPA:1-60	Invalid TCPA entered.
OUT OF RANGE!: YEAR	Invalid year entered in SET DESTINATION.
OUT OF RANGE!: ZONE:1-8	Invalid ZONE entered on the CHANNEL EDIT sub-menu.
SEND MESSAGE UNSUCCESSFUL	Message could not be sent.
TRANSPONDER WAS REBOOTED	Transponder was rebooted.

Note: Detection of RX malfunction

1) Detection of TDMA RX malfunction

Frequency error

PLL chip on receiver board generates lock or unlock signal for synthesizer.

MPU watches and sets status flag which reflects data of ALR sentence.

ID 003 for RX1, ID 004 for RX2

2) Detection of DSC RX malfunction

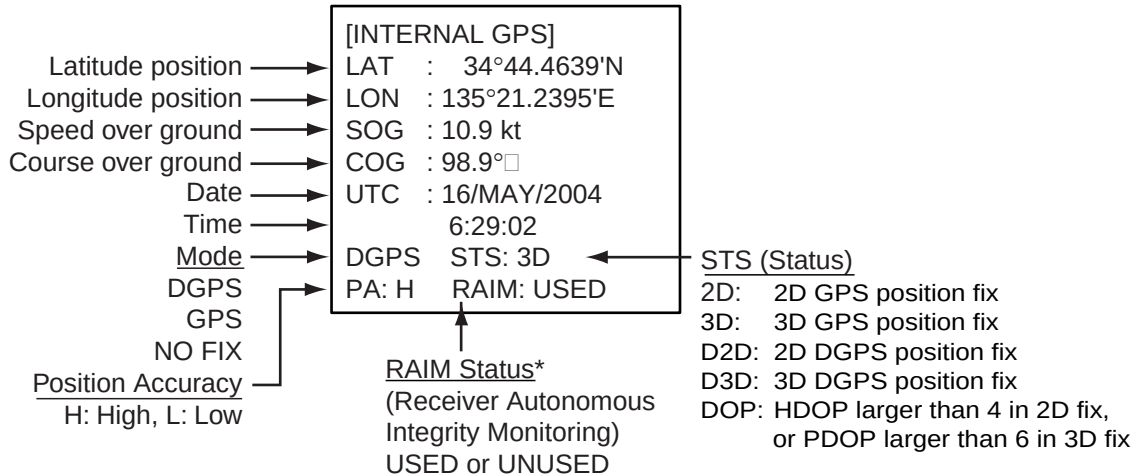
General error

DSC Error (ID: 005) will happen in case of DSC MPU could not receive format specifier of the data from DSC amplifier unless RSSI exists more than 90 seconds.

2.7 GPS Monitor

The GPS monitor display shows information about the built-in GPS receiver, including position, speed over ground, course over ground, date, time, mode position accuracy, position-fixing status and RAIM status.

1. Press the [MENU] key to open the menu.
2. Use the CursorPad to choose INTERNAL GPS and then press the [ENT] key.



*RAIM: Technique whereby the GPS receiver verifies the integrity of the signals received from the GPS constellation.

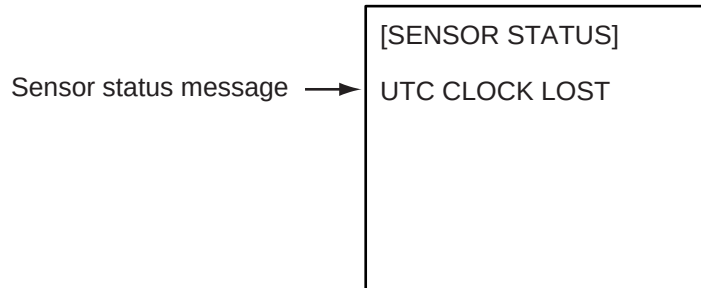
Internal GPS monitor

4. Press the [MENU] key several times to close the display and return to the plotter display.

2.8 Displaying Sensor Status

The SENSOR STATUS screen shows sensor status.

1. Press the [MENU] key.
2. Use the CursorPad to choose SENSOR STATUS and then press the [ENT] key.



SENSOR STATUS screen

3. Press the [MENU] key to close the display.

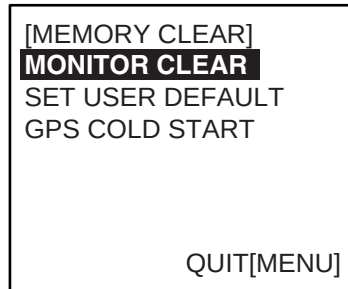
Sensor status messages and their meanings

Sensor Status Message	Meaning
CH MANAGEMENT	Channel changed
EXTRL DGNSS	Using external DGNSS
EXTRL DGNSS BEACON	Using external DGNSS beacon
EXTRL GNSS	Using external GNSS
EXTRL SOG/COG	Using external SOG/COG
HDT VALID	Heading data normal
INTRL DGNSS	Using internal DGNSS
INTRL GNSS	Using internal GNSS
INTRL SOG/COG	Using internal SOG/COG
OTHER ROT	Using external ROT
ROT VALID	ROT data normal
UTC CLOCK LOST	No UTC time

2.9 Restoring Default Settings

You may clear all or specific settings to start afresh with default settings. When all data is cleared, the default settings for all items in the INIT SETTING and SYSTEM SETTINGS sub-menus are restored. GPS data is also cleared; however, MMSI and IMO numbers, ship's name and call sign are not cleared.

1. Press the [MENU] key to open the menu.
2. Use the CursorPad to choose DIAGNOSTIC and then press the [ENT] key.
3. Use the CursorPad to choose MEMORY CLEAR and then press the [ENT] key.



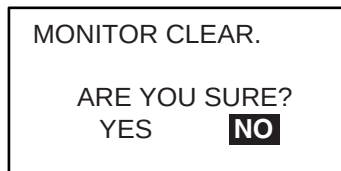
MEMORY CLEAR sub-menu

4. Use the CursorPad to choose MONITOR CLEAR, SET USER DEFAULT or GPS COLD START as appropriate and then press the [ENT] key.

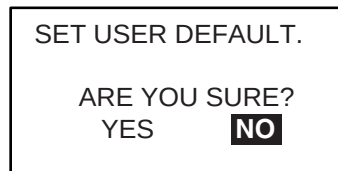
DISPLAY CLEAR: Restore default settings for dimmer, contrast CPA/TCPA, key beep, audible alarm, and received message alarm.

USER DEFAULT: Clears all user settings except MMSI No., IMO No., ship's name and call sign.

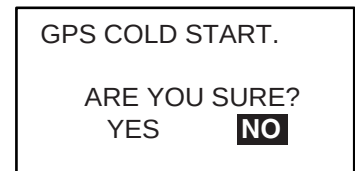
GPS COLD START: Clears GPS Almanac to receive latest Almanac.



MONITOR CLEAR



USER DEFAULT



GPS COLD START

Confirmation screens for memory clear

3. Press ◀ to choose YES and then press the [ENT] key.

2. MAINTENANCE, TROUBLESHOOTING

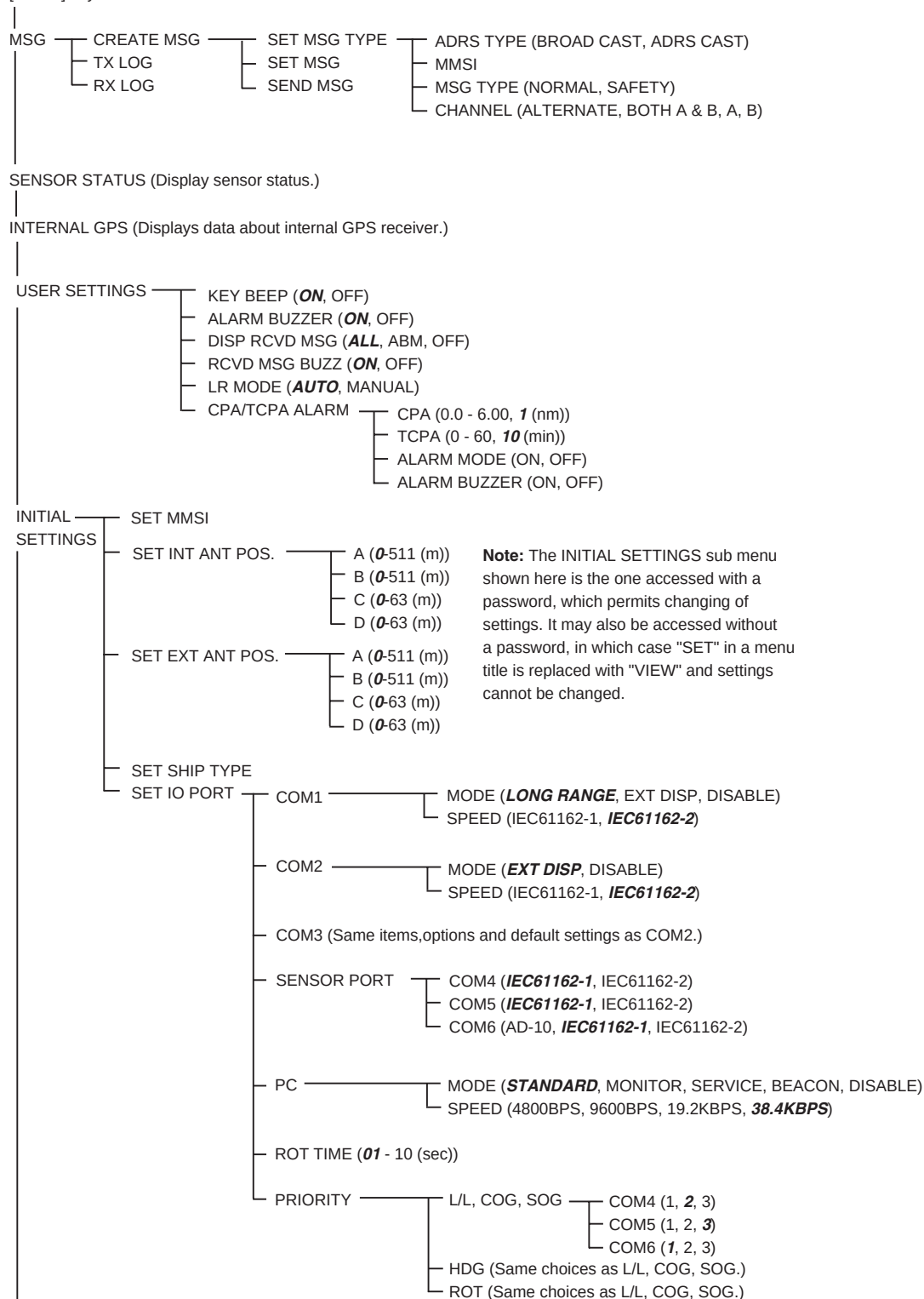
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APPENDIX

Menu Tree

The example screens shown in this manual may not match the screens you see on your display. The screen you see depends on your system configuration and equipment settings.

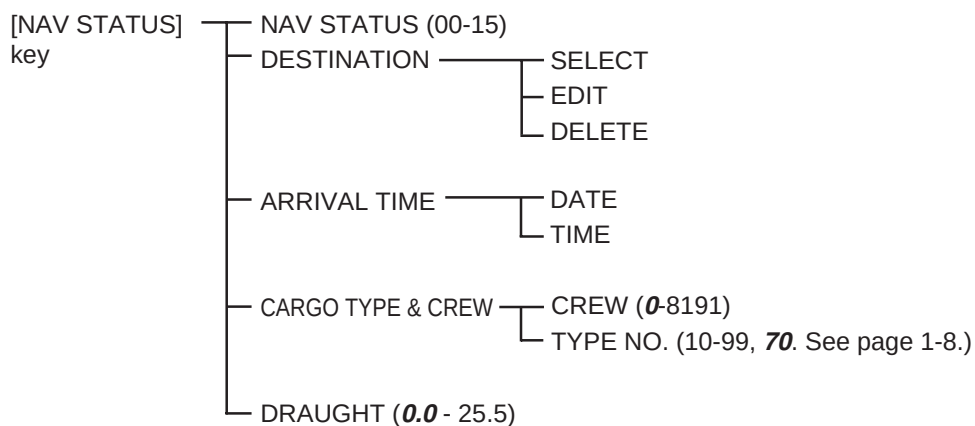
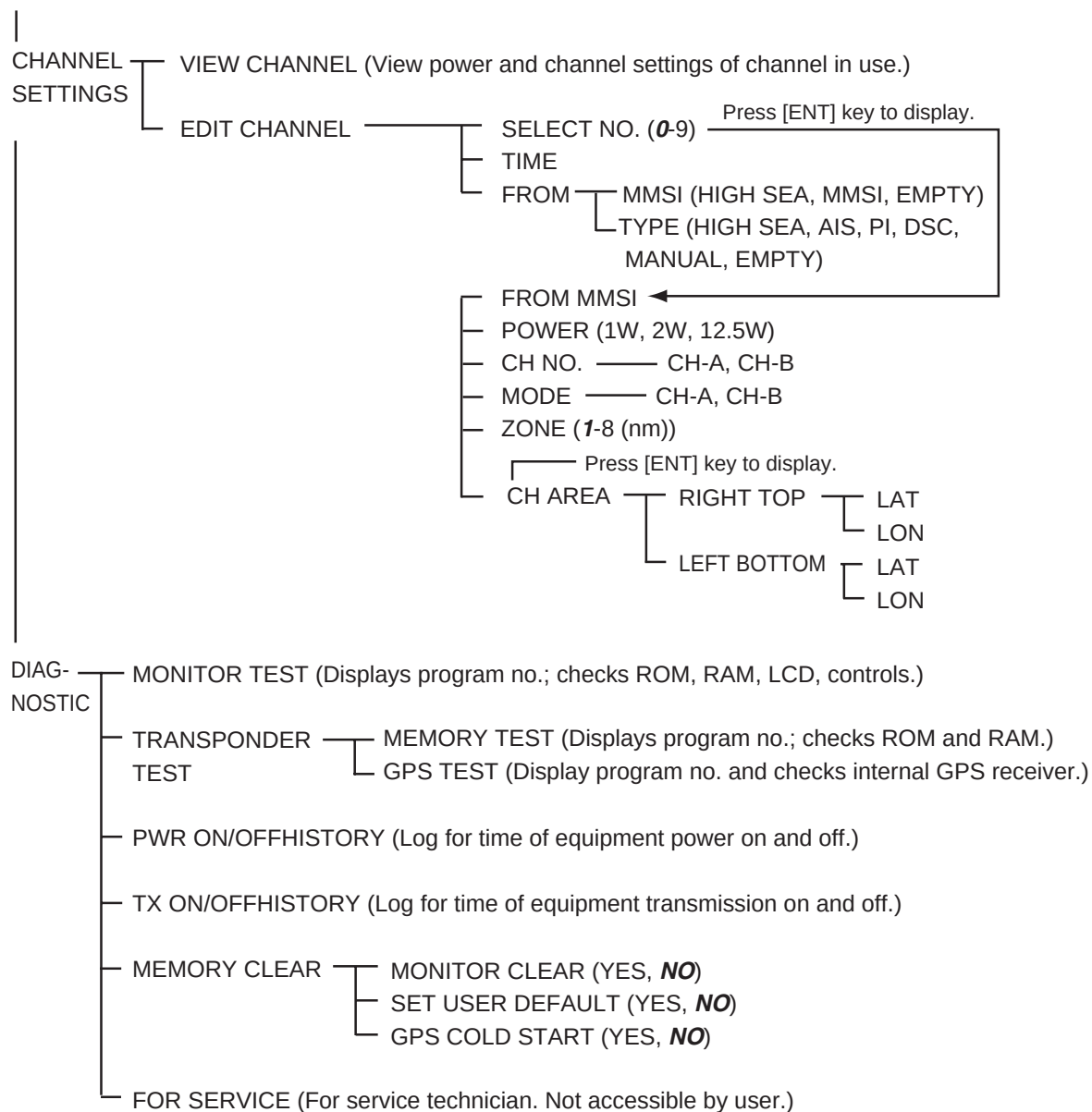
[MENU] key



(Continued on next page)

APPENDIX

(Continued from previous page)



Parts List

This equipment contains complex modules in which fault diagnosis and repair down to component level are not practical (IMO A.694(17)/8.3.1). Only some discrete components are used. FURUNO Electric Co., Ltd. believes identifying these components is of no value for shipboard maintenance; therefore, they are not listed in the manual. Major modules can be located on the parts location photo on page AP-4 and AP-5.

FURUNO	Model	FA-150	
	Unit	MONITOR UNIT, TRANSPONDER UNIT	
	Blk.No.		
ELECTRICAL PARTS LIST			
TYPE, NAME		LOCATION	
PRINTED CIRCUIT BOARD			
24P0062, CPU		MONITOR UNIT	
24P0034, DSC		TRANSPONDER UNIT	
24P0043, GPSTB		TRANSPONDER UNIT	
24P0035, MAIN		TRANSPONDER UNIT	
24P0036, MOT		TRANSPONDER UNIT	
24P0037, PWR		TRANSPONDER UNIT	
24P0033A, RX1		TRANSPONDER UNIT	
24P0033B, RX2		TRANSPONDER UNIT	
24P0032, TX		TRANSPONDER UNIT	
GN-8093, GPS RECEIVER		TRANSPONDER UNIT	

Parts Location

Monitor unit

CPU Board
24P0062



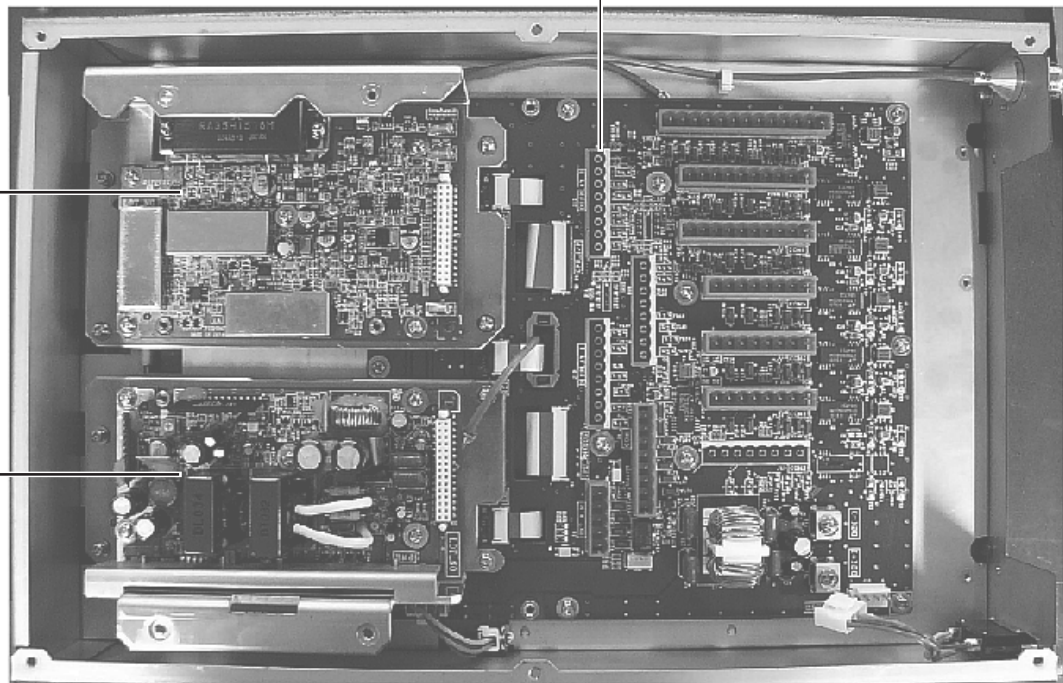
Monitor unit, rear cover opened

Transponder unit

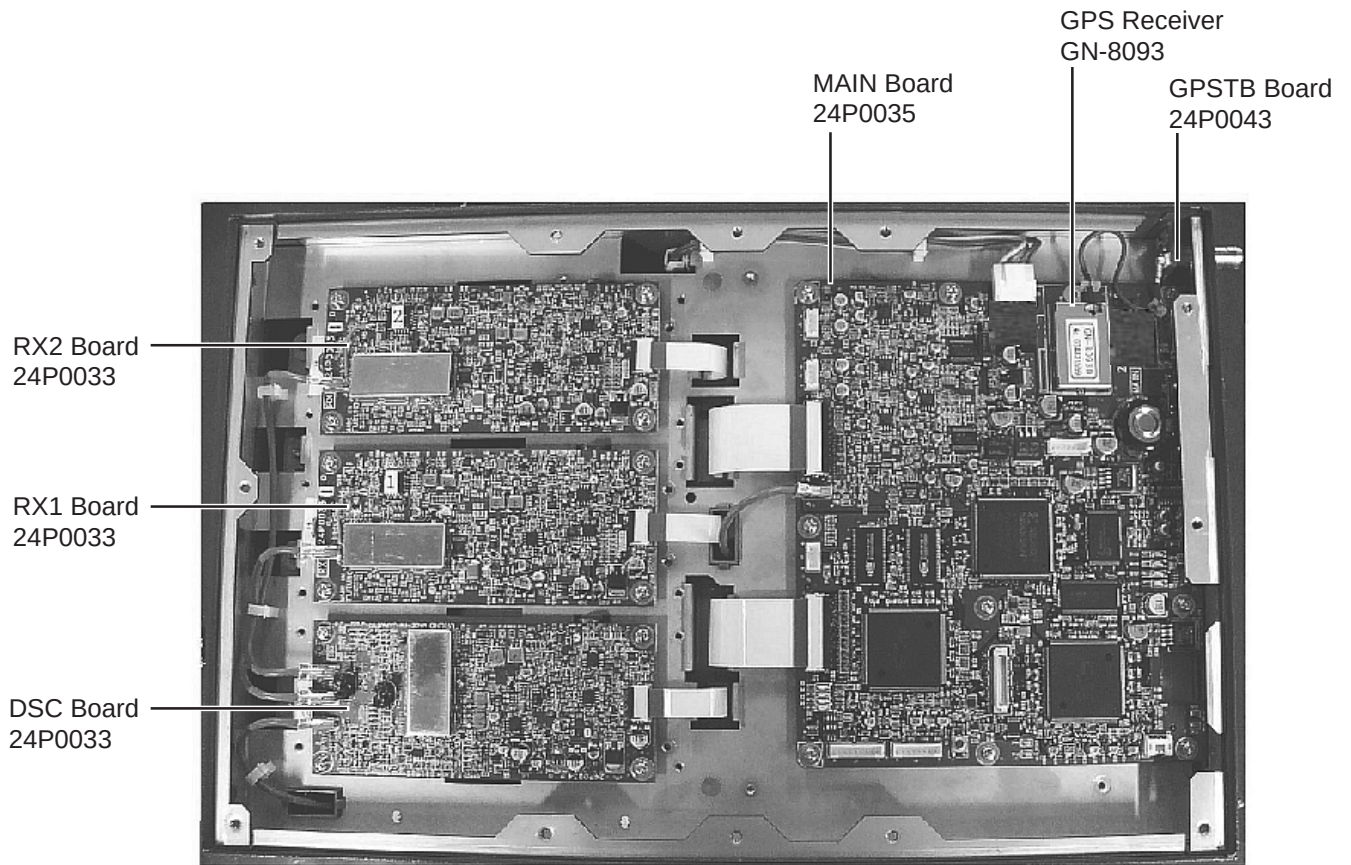
MOT Board
24P0036

TX Board
24P0032

PWR Board
24P0037



Transponder unit, top cover removed



Transponder unit, bottom cover removed

Digital Interface (IEC 61162-1 Edition 2, IEC 61162-2)

Sentence data

Input sentences

ABM, ACA, ACK, AIR, BBM, DTM, GBS, GGA, GLL, GNS, HDT, LRF, LRI, OSD, RMC, ROT, SSD, VBW, VSD, VTG

Output sentences

ABK, ACA, ACS, ALR, LRF, LR1, LR2, LR3, TXT, VDM, VDO

Transmission interval

ABK: With each event

ACA, ACS: At RX

ALR: 30 s during alarm, 2 min normally no alarm

LRF, LR1, LR2, LR3: At RX

TXT: Each update

VDM: At RX

VDO: 1 s

Load requirements as listener

Isolation: Provided

Input Impedance: Input Impedance: 110 ohms (130K ohms without jumper plug)

Max. Voltage: ± 14 V to GNDiso

Threshold: ± 0.2 V (A-B)

Output drive capability

Differential driver output

R=50 ohm 2 v min.

R=27 ohm 1.5 V min.

Driver short-circuit current

60 mA min. 150 mA max.

Data transmission

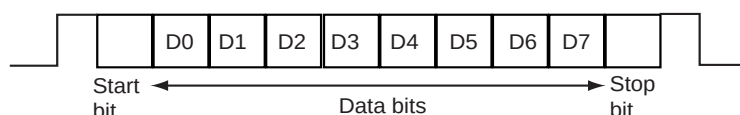
Data is transmitted in serial asynchronous form in accordance with the standard referenced in 2.1 of IEC 61162-1/2. The first bit is a start bit and is followed by data bits, least-significant-bit as illustrated below.

The following parameters are used:

Baud rate: 38.4 Kbps /4800 bps

Data bits: 8 (D7 = 0), parity none

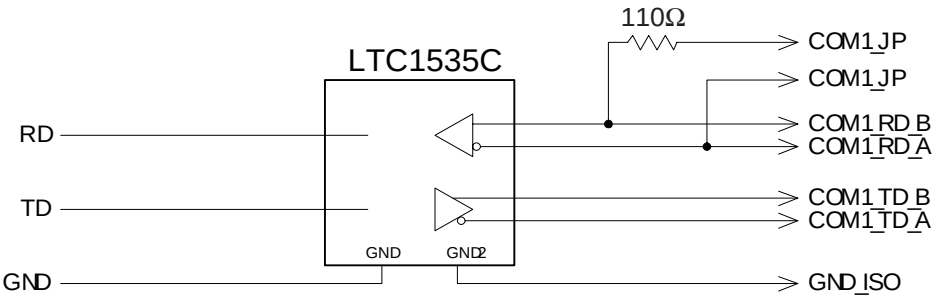
Stop bits: 1



Serial interface I/O circuit

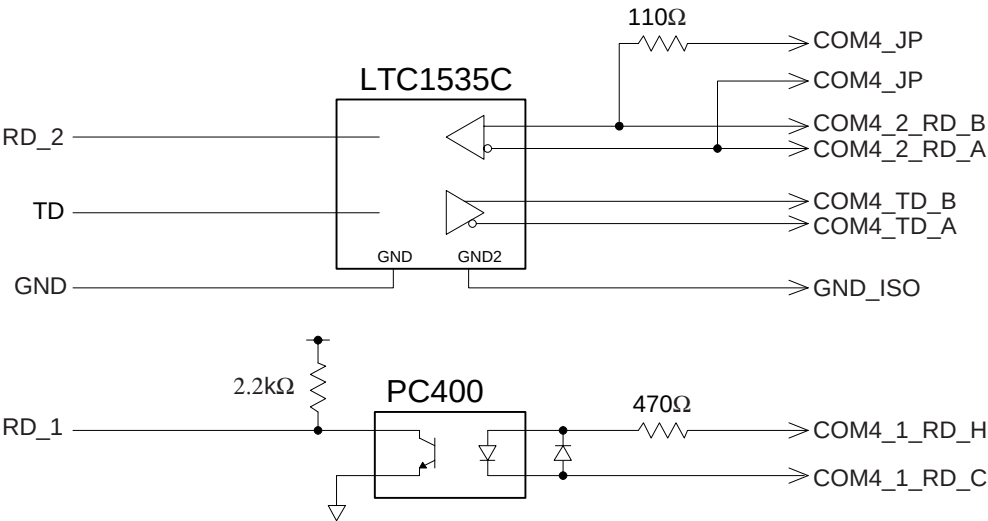
COM1, 2, 3 port

Baud rate selectable from 4800 and 38400 (bps).



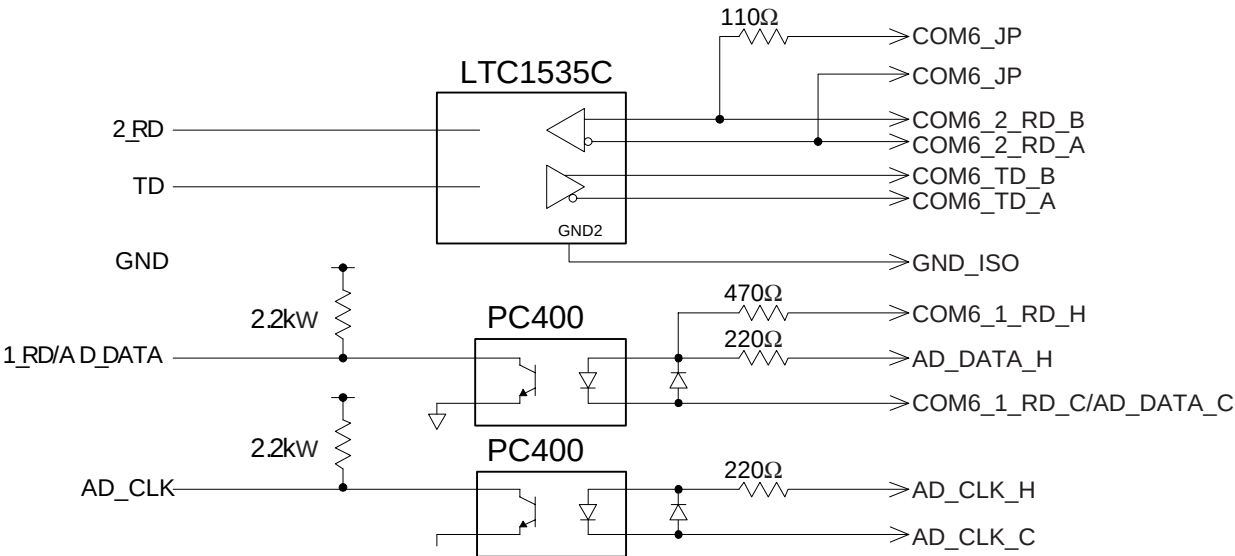
COM 4, 5 port

Baud rate selectable from 4800 and 38400 (bps).



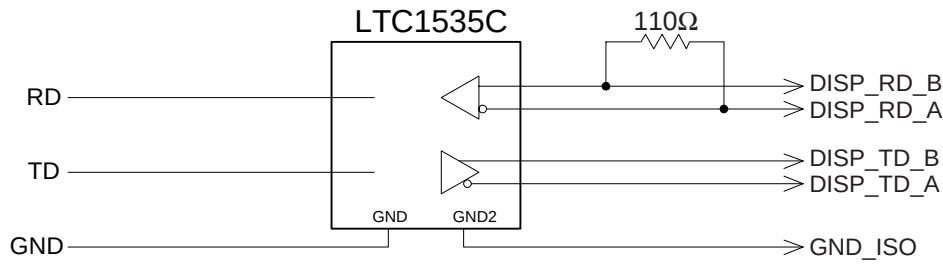
COM6 port

Baud rate selectable from 4800 and 38400 (bps).



DISP port

Baud rate selectable from 4800 and 38400 (bps).

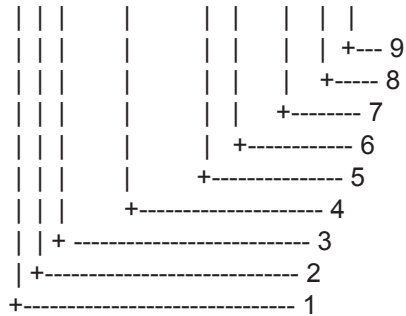


Sentence description

Input sentences

ABM - Addressed binary and safety related message

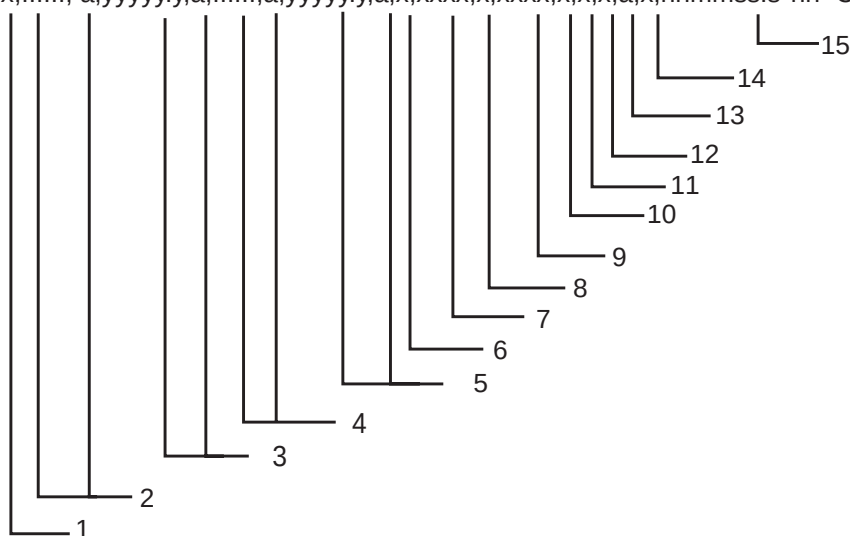
!-ABM,x,x,x,xxxxxxxx,x,x,x,s--s,x*hh<CR><LF>



1. Total number of sentences needed to transfer the message, 1 to 9
2. Message sentence number, 1 to 9
3. Message sequence identifier, 0 to 3
4. The MMSI of destination AIS unit for the ITU-R M.1371 message 6 or 12
5. AIS channel for broadcast of the radio message
6. VDL message number(6 or 12), see ITU-R M.1371
7. Encapsulated data
8. Number of fill-bits, 0 to 5
9. Checksum

ACA - AIS regional channel assignment message

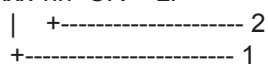
\$--ACA,x,IIII.l, a,yyyyy.y,a,IIII.l,a,yyyyy.y,a,x,xxxx,x,xxxx,x,x,x,a,x,hhmmss.s*hh<CR><LF>



1. Sequence number, 0 to 9
2. Region Northeast corner latitude - N/S
3. Region Northeast corner longitude - E/W
4. Region Southwest corner latitude - N/S
5. Region Southwest corner longitude - E/W
6. Transition Zone Size
7. Channel A
8. Channel A bandwidth
9. Channel B
10. Channel B bandwidth
11. Tx/Rx mode control
12. Power level control
13. Not used
14. In-use flag
15. Time of in-used change

ACK - Acknowledge alarm

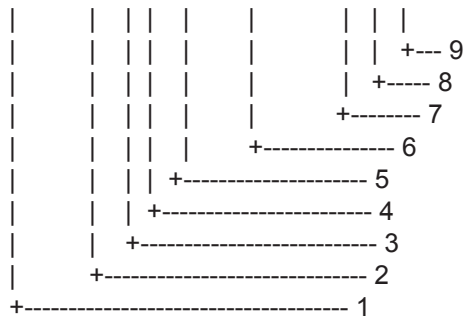
\$--ACK,xxx*hh<CR><LF>



1. Local alarm number(identifier)
2. Checksum

AIR - AIS interrogation request

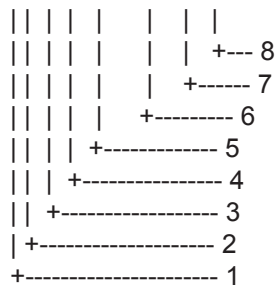
\$--AIR,xxxxxxxx,x.x,x.x,x.x,xxxxxxxx,x.x,x*hh<CR><LF>



1. MMSI of interrogated station 1
2. ITU-R M.1371 message requested from station 1
3. Message sub-section
4. Number of second message requested from station 1
5. Message sub-section
6. MMSI of interrogated station 2
7. Number of message requested from station 2
8. Message data sub-section
9. Checksum

BBM - UAIS broadcast binary message.

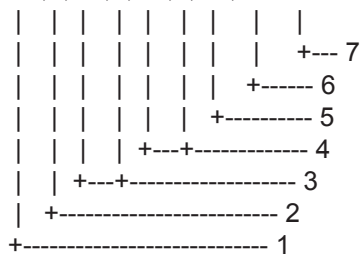
!--BBM,x,x,x,x,x.x,s--s,x*hh<CR><LF>



1. Total number of sentences needed to transfer the message, 1 to 9
2. Message sentence number, 1 to 9
3. Sequential Message identifier, 0 to 9
4. AIS channel for broadcast of the radio message
5. VDL message number(8 or 14), see ITU-R M.1371
6. Binary data
7. Number of fill-bits, 0 to 5
8. Checksum

DTM - Datum reference

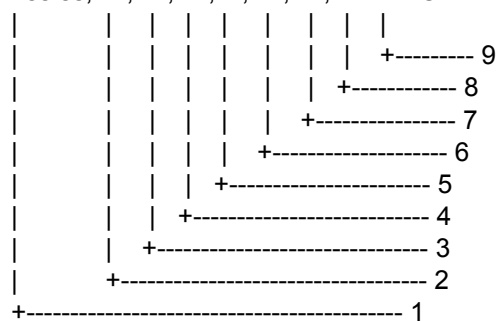
```
$--DTM,ccc,a,x.x,a,x.x,a,x.x,ccc*hh<CR><LF>
```



1. Local datum W84 - WGS84
W72 - WGS72
S85 - SGS85
P90 - PE90
999 - User defined
IHO datum code
2. Note used
3. Lat offset, min, N/S
4. Lon offset, min, E/W
5. Not used
6. Reference datum W84 - WGS84
W72 - WGS72
S85 - SGS85
P90 - PE90
7. Checksum

GBS - GNSS satellite fault detection

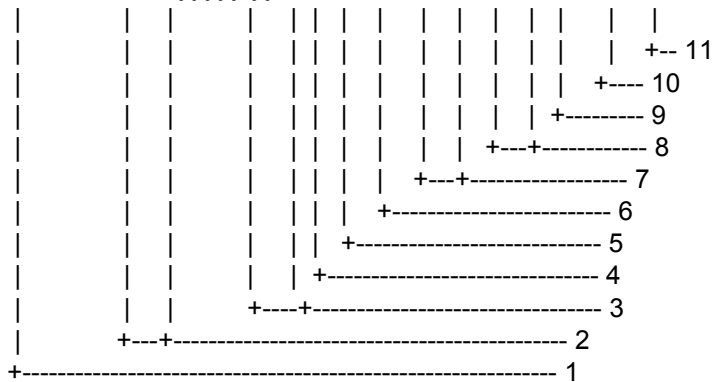
```
$--GBS,hhmmss.ss,x.x,x.x,x.x,xx,x.x,x.x,x.x*hh<CR><LF>
```



1. Not used
2. Expected error in latitude
3. Expected error in longitude
4. Not used
5. Not used
6. Not used
7. Not used
8. Not used
9. Checksum

GGA - Global positioning system (GPS) fix data

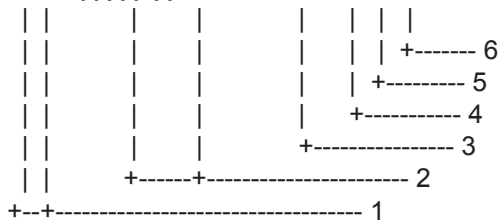
\$--GGA,hhmmss.ss,lll.ll,a,yyyyy.yy,a,x,xx,x.x,x.x,M,x.x,M,x.x,xxxx*hh<CR><LF>



1. Not used
2. Latitude, N/S
3. Longitude, E/W
4. GPS quality indicator
5. Not used
6. Not used
7. Not used
8. Not used
9. Not used
10. Not used
11. Checksum

GLL - Geographic position - latitude/longitude

\$--GLL,lll.ll,a,yyyyy.yy,a,hhmmss.ss,A,a*hh<CR><LF>



1. Latitude, N/S
2. Longitude, E/W
3. Not used
4. Status: A=data valid, V=data invalid
5. Mode indicator(see note)
6. Checksum

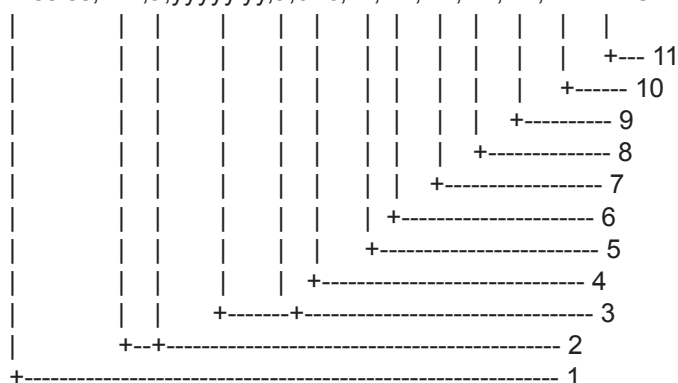
NOTE Positioning system Mode indicator:

- A = Autonomous
- D = Differential
- E = estimated(dead reckoning)
- M = Manual input
- S = Simulator
- N = Data not valid

The Mode indicator field supplements the Status field. The Status field shall be set to V=invalid for all values of Operating Mode except for A=Autonomous and D=Differential. The positioning system Mode indicator and Status field shall not be null fields.

GNS - GNSS fixed data

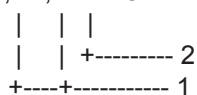
\$--GNS,hhmmss.ss,lll.ll,a,yyyyy.yy,a,c--c,xx,x.x,x.x,x.x,x.x,x.x,x.x*hh<CR><LF>



1. Not used
2. Latitude, N/S
3. Longitude, E/W
4. Mode indicator
5. Not used
6. Not used
7. Not used
8. Not used
9. Not used
10. Not used
11. Checksum

HDT - Heading - true

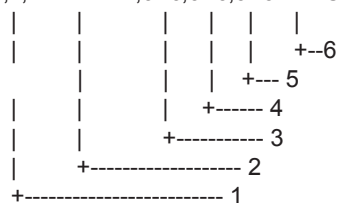
\$--HDT,x.x,T*hh<CR><LF>



1. Heading, degrees true
2. Checksum

LRF - Long-range function

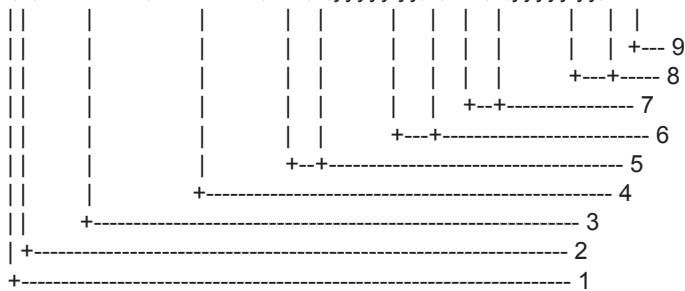
\$--LRF,x,xxxxxxxx,c--c,c--c,c--c*hh<CR><LF>



1. Sequence number, 0 to 9
2. MMSI of requestor
3. Name of requestor, 1 to 20 characters
4. Function request, 1 to 26 characters
5. Function reply status
6. Checksum

LRI - Long-range interrogation

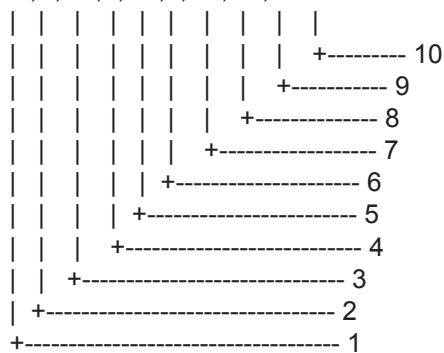
\$--LRI,x,a,xxxxxxxx,xxxxxxxx,IIII,II,a,yyyyy.yy,a,IIII,II,a,yyyyy.yy,a*hh<CR><LF>



1. Sequence number, 0 to 9
2. Control Flag
3. MMSI of requestor
4. MMSI of destination
5. Latitude - N/S(north-east coordinate)
6. Longitude - E/W(north-east coordinate)
7. Latitude - N/S(south-west coordinate)
8. Longitude - E/W(south-west coordinate)
9. Checksum

OSD - Own ship data

\$--OSD,x.x,A,x.x,a,x.x,a,x.x,x.x,a*hh<CR><LF>



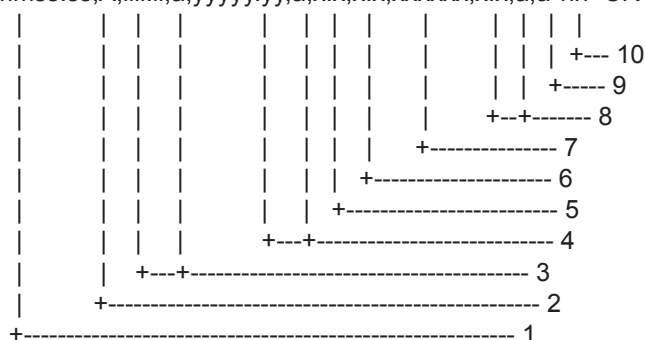
1. Heading, degrees true
2. Heading status: A=data valid, V=data invalid
3. Vessel course, degrees true
4. Course reference, B/M/W/R/P(see note)
5. Vessel speed
6. Speed reference, B/M/W/R/P(see note)
7. Not used
8. Not used
9. Speed units, K(km/h) / N(Knots) / S(statute miles/h)
10. Checksum

NOTES - Reference systems(speed/course):

- B = bottom tracking log
- M = manually entered
- W = water referenced
- R = radar tracking(of fixed target)
- P = positioning system ground reference

RMC - Recommended minimum specific GPS/TRANSIT data

```
$--RMC,hhmmss.ss,A,lll.ll,a,yyyy.yy,a,x.x,x.x,xxxxx,x.x,a,a*hh<CR><LF>
```



1. UTC of position fix
2. Status: A=data valid, V=navigation receiver warning
3. Latitude, N/S
4. Longitude, E/W
5. Speed over ground, knots
6. Course over ground, degrees true
7. Date: dd/mm/yy
8. Not used
9. Not used
10. Checksum

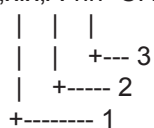
NOTE Positioning system Mode indicator:

- A = Autonomous
- D = Differential
- E = estimated(dead reckoning)
- M = Manual input
- S = Simulator
- N = Data not valid

The Mode indicator field supplements the Status field. The Status field shall be set to V=invalid for all values of Operating Mode except for A=Autonomous and D=Differential. The positioning system Mode indicator and Status field shall not be null fields.

ROT - Rate of turn

```
$--ROT,x.x,A*hh<CR><LF>
```



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

SSD - UAIS ship static data

\$--SSD,c--c,c--c,xxx,xxx,xx,xx,c, aa*hh<CR><LF>

```

| | | | | | | | |
| | | | | | | | | +---9
| | | | | | | | | +---8
| | | | | | | | | +---7
| | | | | | | | | +---6
| | | | | | | | | +---5
| | | | | | | | | +---4
| | | | | | | | | +---3
| | | | | | | | | +---2
| | | | | | | | | +---1

```

1. Ship's Call Sign, 1 to 7 characters
2. Ship's Name, 1 to 20 characters
3. Pos. ref. point distance, "A," from bow, 0 to 511 Meters
4. Pos. ref. point distance, "B," from stern, 0 to 511 Meters
5. Pos. ref. point distance, "C," from port beam, 0 to 63 Meters
6. Pos. ref. point distance, "D," from starboard beam, 0 to 63 Meters
7. DTE indicator flag
8. Not used
9. Checksum

VBW - Dual ground/water speed

\$--VBW,x.x,x.x,A,x.x,x.x,A,x.x,A,x.x,A*hh<CR><LF>

```

| | | | | | | | | | |
| | | | | | | | | | | +---11
| | | | | | | | | | | +---10
| | | | | | | | | | | +---9
| | | | | | | | | | | +---8
| | | | | | | | | | | +---7
| | | | | | | | | | | +---6
| | | | | | | | | | | +---5
| | | | | | | | | | | +---4
| | | | | | | | | | | +---3
| | | | | | | | | | | +---2
| | | | | | | | | | | +---1

```

1. Not used
2. Not used
3. Not used
4. Longitudinal ground speed, knots
5. Transverse ground speed, knots
6. Status: ground speed, A=data valid V=data invalid
7. Not used
8. Not used
9. Not used
10. Not used
11. Checksum

VSD - UAIS voyage static data

\$--VSD,x.x,x.x,x.x,c--c,hhmmss.ss,xx,xx,x.x,x.x*hh<CR><LF>

```

| | | | | | | | | |
| | | | | | | | | | +--- 10
| | | | | | | | | | +----- 9
| | | | | | | | | | +----- 8
| | | | | | | | | | +----- 7
| | | | | | | | | | +----- 6
| | | | | | | | | | +----- 5
| | | | | | | | | | +----- 4
| | | | | | | | | | +----- 3
| | | | | | | | | | +----- 2
| | | | | | | | | | +----- 1

```

1. Type of ship and cargo category, 0 to 255
2. Maximum present static draught, 0 to 25.5 Meters
3. Persons on-board, 0 to 8191
4. Destination, 1-20 characters
5. Estimated UTC of arrival at destination
6. Estimated day of arrival at destination, 00 to 31(UTC)
7. Estimated month of arrival at destination, 00 to 12(UTC)
8. Navigational status, 0 to 15
9. Regional application flags, 0 to 15
10. Checksum

VTG - Course over ground and ground speed

\$--VTG,x.x,T,x.x,M,x.x,N,x.x,K,a*hh<CR><LF>

```

| | | | | | | | | |
| | | | | | | | | | +----- 6
| | | | | | | | | | +----- 5
| | | | | | | | | | +----- 4
| | | | | | | | | | +----- 3
| | | | | | | | | | +----- 2
| | | | | | | | | | +----- 1

```

1. Course over ground, degrees true
2. Not used
3. Speed over ground, knots
4. Speed over ground, km/h
5. Mode indicator(see note)
6. Checksum

NOTE Positioning system Mode indicator:

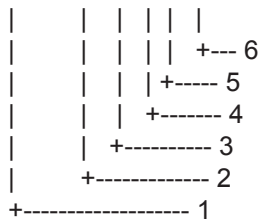
A = Autonomous
 D = Differential
 E = estimated(dead reckoning)
 M = Manual input
 S = Simulator
 N = Data not valid

The positioning system Mode indicator field shall not be a null field.

Output sentences

ABK - UAIS addressed and binary broadcast acknowledgement

\$--ABK,xxxxxxxx,a,x.x,x,x*hh<CR><LF>

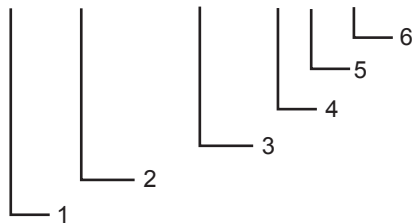


1. MMSI of the addressed AIS unit
2. AIS channel of reception
3. Message type
4. Message sequence number
5. Type of acknowledgement
6. Checksum

ACA - See "Input sentences."

ACS - Channel management information source

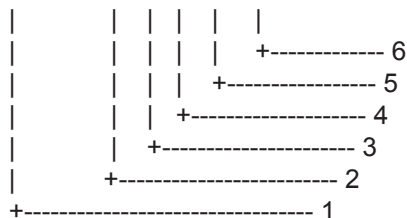
\$--ACS,x,xxxxxxxx,hhmmss.ss,xx,xx,xxx*hh<CR><LF>



1. Sequence number, 0 to 9
2. MMSI of originator
3. UTC at receipt of regional operating settings
4. UTC day, 01- to 31
5. UTC month, 01 to 12
6. UTC year

ALR - Set alarm state

\$--ALR,hhmmss.ss,xxx,A,A,c--c*hh<CR><LF>

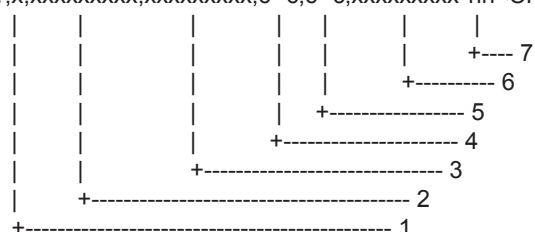


1. Time of alarm condition change, UTC
2. Local alarm number(identifier)
3. Alarm condition(A=threshold exceeded, V=not exceeded)
4. Alarm's acknowledge state, A=acknowledged V=unacknowledged
5. Alarm's description text
6. Checksum

LRF - See “Input sentences.”

LR1 - Long-range reply with destination for function request “A”

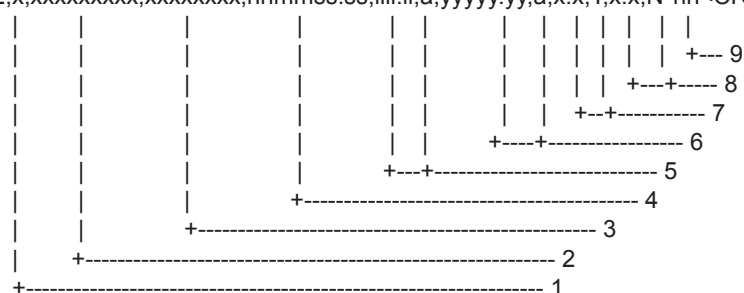
\$--LR1,x,xxxxxxxx,xxxxxxxx,c--c,c--c,xxxxxxxx*hh<CR><LF>



1. Sequence Number
2. MMSI of responder
3. MMSI of requestor(reply destination)
4. Ship's name, 1 to 20 characters
5. Call Sign, 1 to 7 characters
6. IMO Number, 9-digit number
7. Checksum

LR2 - Long-range reply for function requests “B, C, E, and F”

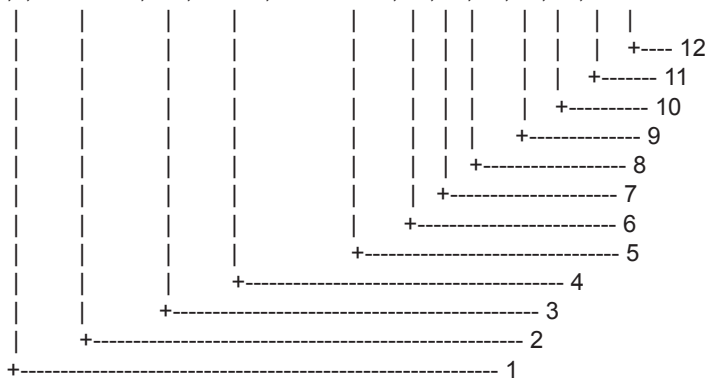
\$--LR2,x,xxxxxxxx,xxxxxxxx,hhmmss.ss,lll.ll,a,yyyy.yy,a,x.x,T,x.x,N*hh<CR><LF>



1. Sequence Number
2. MMSI of responder
3. Date: ddmmYYYY
4. UTC of Position
5. Latitude - N/S
6. Longitude - E/W
7. Course over ground, degrees True
8. Speed over ground, Knots
9. Checksum

LR3 - Long-range reply for function requests “I, O, P, U and W”

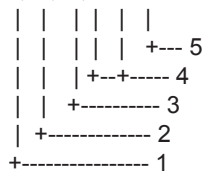
\$--LR3,x,xxxxxxxx,c--c,xxxxxx,hhmmss.ss,x.x,x.x,x.x,x.x,x.x,x.x*hh<CR><LF>



1. Sequence Number
2. MMSI of responder
3. Voyage destination, 1 to 20 characters
4. ETA Date: ddmmyy
5. ETA Time
6. Draught
7. Ship/cargo(ITU-R M.1371, Table 18)
8. Ship length
9. Ship breadth
10. Ship type(ITU-R M.1371, Table 18)
11. Persons, 0 to 8191
12. Checksum

TXT - Text transmission

\$--TXT,xx,xx,xx,c--c*hh<CR><LF>



1. Total number of message, 01 to 99
2. Message number, 01 to 99
3. Text identifier
4. Text Message
5. Checksum

VDM - VHF data-link message

!-VDM,x,x,x,a,s--s,x*hh<CR><LF>

```

| | | | | | |
| | | | | | +--- 7
| | | | | +---- 6
| | | | +----- 5
| | | +----- 4
| | +----- 3
| +----- 2
+----- 1

```

1. Total number of sentences needed to transfer the message, 1 to 9
2. Message sentence number, 1 to 9
3. Sequential message identifier, 0 to 9
4. AIS channel
5. Encapsulated ITU-R M.1371 radio message
6. Number of fill-bits, 0 to 5
7. Checksum

VDO - UAIS VHF data-link own-vessel report

!-VDO,x,x,x,a,s--s,x*hh<CR><LF>

```

| | | | | | |
| | | | | | +--- 7
| | | | | +---- 6
| | | | +----- 5
| | | +----- 4
| | +----- 3
| +----- 2
+----- 1

```

1. Total number of sentences needed to transfer the message, 1 to 9
2. Message sentence number, 1 to 9
3. Sequential message identifier, 0 to 9
4. AIS channel
5. Encapsulated ITU-R M.1371 radio message
6. Number of fill-bits, 0 to 5
7. Checksum

VHF Channel List

VHF Channel List (International Mode)

Ch No.	FREQUENCY	Ch No.	FREQUENCY	Ch No.	FREQUENCY	Ch No.	FREQUENCY	Ch No.	FREQUENCY	Ch No.	FREQUENCY	Ch No.	FREQUENCY	Ch No.	FREQUENCY
1001	156.0500	1060	156.0250	1201	156.0625	1260	156.0375	2001	160.6500	2060	160.6250	2201	160.6625	2260	160.6375
1002	156.1000	1061	156.0750	1202	156.1125	1261	156.0875	2002	160.7000	2061	160.6750	2202	160.7125	2261	160.6875
1003	156.1500	1062	156.1250	1203	156.1625	1262	156.1375	2003	160.7500	2062	160.7250	2203	160.7625	2262	160.7375
1004	156.2000	1063	156.1750	1204	156.2125	1263	156.1875	2004	160.8000	2063	160.7750	2204	160.8125	2263	160.7875
1005	156.2500	1064	156.2250	1205	156.2625	1264	156.2375	2005	160.8500	2064	160.8250	2205	160.8625	2264	160.8375
6	156.3000	1065	156.2750	1206	156.3125	1265	156.2875			2065	160.8750	2206	160.9125	2265	160.8875
1007	156.3500	1066	156.3250	1207	156.3625	1266	156.3375	2007	160.9500	2066	160.9250	2207	160.9625	2266	160.9375
8	156.4000	67	156.3750	208	156.4125	267	156.3875								
9	156.4500	68	156.4250	209	156.4625	268	156.4375								
10	156.5000	69	156.4750	210	156.5125	269	156.4875								
11	156.5500	70	156.5250	211	156.5625	270	156.5375								
12	156.6000	71	156.5750	212	156.6125	271	156.5875								
13	156.6500	72	156.6250	213	156.6625	272	156.6375								
14	156.7000	73	156.6750	214	156.7125	273	156.6875								
15	156.7500	74	156.7250	215	156.7625	274	156.7375								
16	156.8000	75	156.7750	216	156.8125	275	156.7875								
17	156.8500	76	156.8250	217	156.8625	276	156.8375								
1018	156.9000	77	156.8750	1218	156.9125	277	156.8875	2018	161.5000			2218	161.5125		
1019	156.9500	1078	156.9250	1219	156.9625	1278	156.9375	2019	161.5500	2078	161.5250	2219	161.5625	2278	161.5375
1020	157.0000	1079	156.9750	1220	157.0125	1279	156.9875	2020	161.6000	2079	161.5750	2220	161.6125	2279	161.5875
1021	157.0500	1080	157.0250	1221	157.0625	1280	157.0375	2021	161.6500	2080	161.6250	2221	161.6625	2280	161.6375
1022	157.1000	1081	157.0750	1222	157.1125	1281	157.0875	2022	161.7000	2081	161.6750	2222	161.7125	2281	161.6875
1023	157.1500	1082	157.1250	1223	157.1625	1282	157.1375	2023	161.7500	2082	161.7250	2223	161.7625	2282	161.7375
1024	157.2000	1083	157.1750	1224	157.2125	1283	157.1875	2024	161.8000	2083	161.7750	2224	161.8125	2283	161.7875
1025	157.2500	1084	157.2250	1225	157.2625	1284	157.2375	2025	161.8500	2084	161.8250	2225	161.8625	2284	161.8375
1026	157.3000	1085	157.2750	1226	157.3125	1285	157.2875	2026	161.9000	2085	161.8750	2226	161.9125	2285	161.8875
1027	157.3500	1086	157.3250	1227	157.3625	1286	157.3375	2027	161.9500	2086	161.9250	2227	161.9625	2286	161.9375
1028	157.4000	1087	157.3750	1228	157.4125	1287	157.3875	2028	162.0000	2087	161.9750	2228	162.0125	2287	161.9875
		1088	157.4250							2088	162.0250				

SPECIFICATIONS OF THE UAIS TRANSPONDER FA-150

1. TRANSPONDER UNIT

- | | | |
|-----|-----------------|---|
| 1.1 | TX/RX Frequency | 156.025 MHz to 162.025 MHz |
| 1.2 | Output Power | 1W/ 2 W/ 12.5 W within ± 1.5 db, selectable |
| 1.3 | Impedance | 50 ohms |
| 1.4 | DSC Receiver | CH70 fixed, 156.525 MHz, G2B, 1200 bps |
| 1.5 | Band Width | 25 kHz/ 12.5 kHz |

2. MONITOR UNIT

- | | | |
|-----|--------------|---|
| 2.1 | Display | 3.5-inch, monochrome LCD, |
| 2.2 | Display Size | 60 (H) x 95 (W) mm, |
| 2.3 | No. of Dots | 120 x 64 dots |
| 2.4 | Menu | Target data/ Plotter/ Own data/ Set MSG/ Init Settings/
System Settings/ Diagnostics |

3. GPS RECEIVER

- | | | |
|-----|--------------------------|---|
| 3.1 | Receiving Channels | 12 channels parallel, 12 satellites tracking |
| 3.2 | Rx Frequency/ Rx Code | 1575.42 MHz, C/A code |
| 3.3 | Position Fixing System | All in view, 8-state Kalman filter |
| 3.4 | Position Accuracy | Approx. 10 m, 95% of the time, (HDOP ≤ 4)
DGPS: approx. less than 5 m, 95% of the time |
| 3.5 | Tracking Velocity | 900 kts |
| 3.6 | Position-fixing Time | Warm start: 12 seconds, Cold start: 90 seconds |
| 3.7 | Position Update Interval | 1 second |
| 3.8 | DGPS Data Receiving | RTCM SC-104 Ver 2.1 formatted |

4. INTERFACES

- | | | |
|-----|------------------|---|
| 4.1 | COM1 – COM3 | IEC 61162-1(2000-07)/61162-2(1998-09) |
| | Input: | VSD, SSD, ABM, BBM, ACA, ACK, AIR, DTM, GBS, GGA, GLL,
GNS, HDT, LRF, LRI, OSD, RMC, ROT, VBW, VTG |
| | Output: | VDM, VDO, ABK, ACA, ALR, TXT, LR1, LR2, LR3, LRF, LRI |
| 4.2 | SENSOR (input) | IEC 61162-1(2000-07)/61162-2(1998-09) |
| 4.3 | COM4 – 6 (input) | DTM, GNS, GLL, GGA, RMC, VBW, VTG, OSD, HDT, GBS, ROT* |
| | | *: Any talker. Priority: GN>GP>GL>LC |
| 4.4 | DISP | RS-422, for display unit, FURUNO proprietary format |
| 4.5 | External Beacon | RS-232C (PC) |
| 4.6 | PC | RS-232C |
| 4.7 | Alarm | Contact closure |
| 4.8 | AD-10 | AD-10 format |

5. POWER SUPPLY

- 5.1 Monitor Unit 12-24 VDC
- 5.2 Transponder Unit 12-24 VDC: 7 A (Max.)
- 5.3 AC/DC Power Supply Unit PR-240 (option) 100-115/200-230 VAC, 1 phase, 50/60 Hz

6. ENVIRONMENTAL CONDITION

- 6.1 Ambient Temperature
 - GPS Antenna Unit: -25°C to +70°C
 - Other Units: -15°C to +55°C
- 6.2 Relative Humidity 95% at 40°C
- 6.3 Waterproof (IEC 61529)
 - Antenna Unit: IPX6
 - Other Units: IPX0
- 6.4 Vibration IEC 60945 ed.3

7. COATING COLOR

- 7.1 GPS Antenna Unit: N9.5
- 7.2 Other Units: 2.5GY5/1.5

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