OPERATOR'S MANUAL

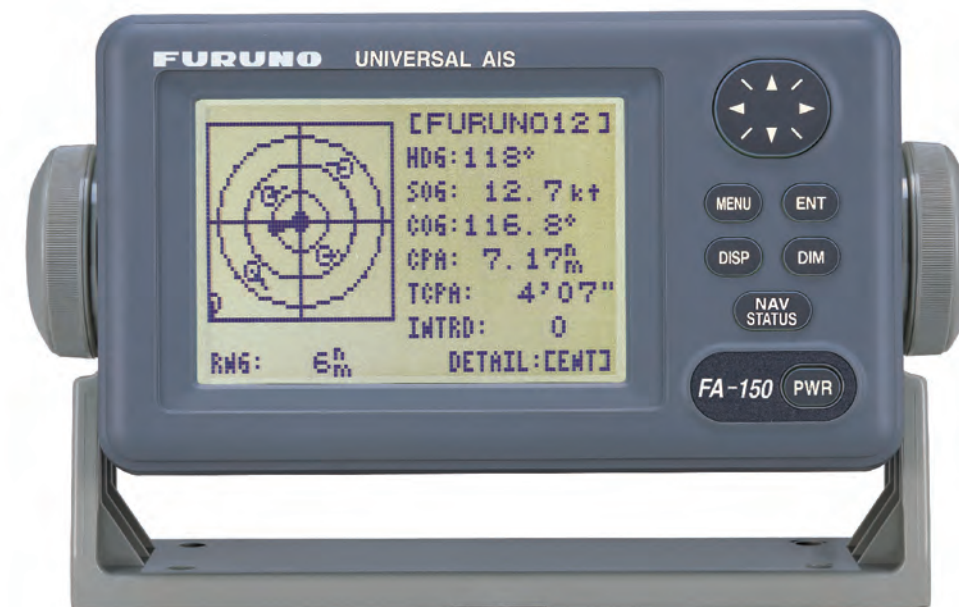# FURUNO®

UAIS Transponder

FA-150

ECF

(Elemental Chlorine Free)

The paper used in this manual
is elemental chlorine free.

© **FURUNO ELECTRIC CO., LTD.**

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Pub. No. OME-44310

(DAMI) FA-150

Your Local Agent/Dealer

FIRST EDITION A2 : DEC. 14, 2004
D   : FEB. 10, 2006

* 00015008103 *

FURUNO ELECTRIC CO., LTD.

NISHINOMIYA, JAPAN

http://www.furuno.co.jp/

⚠ **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.

Use the proper fuse.

Use of the wrong fuse can cause fire or permanent damage to the equipment.

⚠ **WARNING**

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.

<u>**WARNING LABEL**</u>
**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.**

⚠ WARNING ⚠
To avoid electrical shock, do not remove cover. No user-serviceable parts inside.
⚠   ⚠
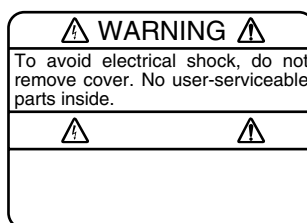
Name: Warning Label (1)
Type: 86-003-1011-1
Code No.: 100-236-231

i

TABLE OF CONTENTS

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 and 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
  - Universal Time Coordinated (UTC)
  - Course over ground (COG)
  - Speed over ground (SOG)
  - Heading
  - Rate of turn (ROT) where available
- Voyage-related data
  - Ship's draught
  - Navigation status (manual input)
  - 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

Important Notices

- No part of this manual may be copied or reproduced without written permission.
- If this manual is lost or worn, contact your dealer about replacement.
- The contents of this manual and equipment specifications are subject to change without notice.
- The example screens (or illustrations) 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.
- This manual is intended for use by native speakers of English.
- FURUNO will assume no responsibility for the damage caused by improper use or modification of the equipment or claims of loss of profit by a third party.

SYSTEM CONFIGURATION

Either

GPS antenna
GSC-001
GPA-017S

VHF antenna

GPS/VHF
combined antenna
GVA-100

MONITOR UNIT
FA-1502
(two units may
be connected)

Distributor unit
DB-1

12-24 VDC

TRANSPONDER UNIT
FA-1501

External display, Pilot plug,
NavNet2, Sensor

Alarm system

PC, Beacon receiver

LAN

————— : Standard

------------- : Option

—·—·—·—·— : Local supply

Power supply
PR-240-CE

100/110/115/200/   24 VDC
220/230 VAC
1φ, 50/60Hz   12-24 VDC

GSC-001	Exposed to the weather
GVA-100	Exposed to the weather
FA-1501	Protected from the weather
FA-1502	Protected from the weather
DB-1	Protected from the weather
PR-240-CE	Protected from the weather

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.

AIS-fitted AtoN broadcasts its identification, type of operation, location, displacement, etc. at 3 min intervals or at a reporting rate designated by the Administration authorities.

VTS Center transmits TDMA CH management message including code, type, position, etc. of buoys every 3 min, and the AtoN broadcasts these messages for ships.

Transponder

Aids to Navigation (AtoN)

VTS center

The VTS center transmits a command on frequency assignment, slots, report rate, VHF output power, channel spacing, etc. (Assigned mode)

Transponder

Transponder

Static and Dynamic information incl. MMSI, Name, POSN, HDG, COG, SOG

Interrogation and Response

Own ship

Ship 1

All ships broadcast Static and Dynamic information (autonomous and continuous mode). If OS wants to know information about ship 1, OS shall send an interrogation in polling mode; then ship 1 will transmit her response on the same VHF channel without operator intervention.

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
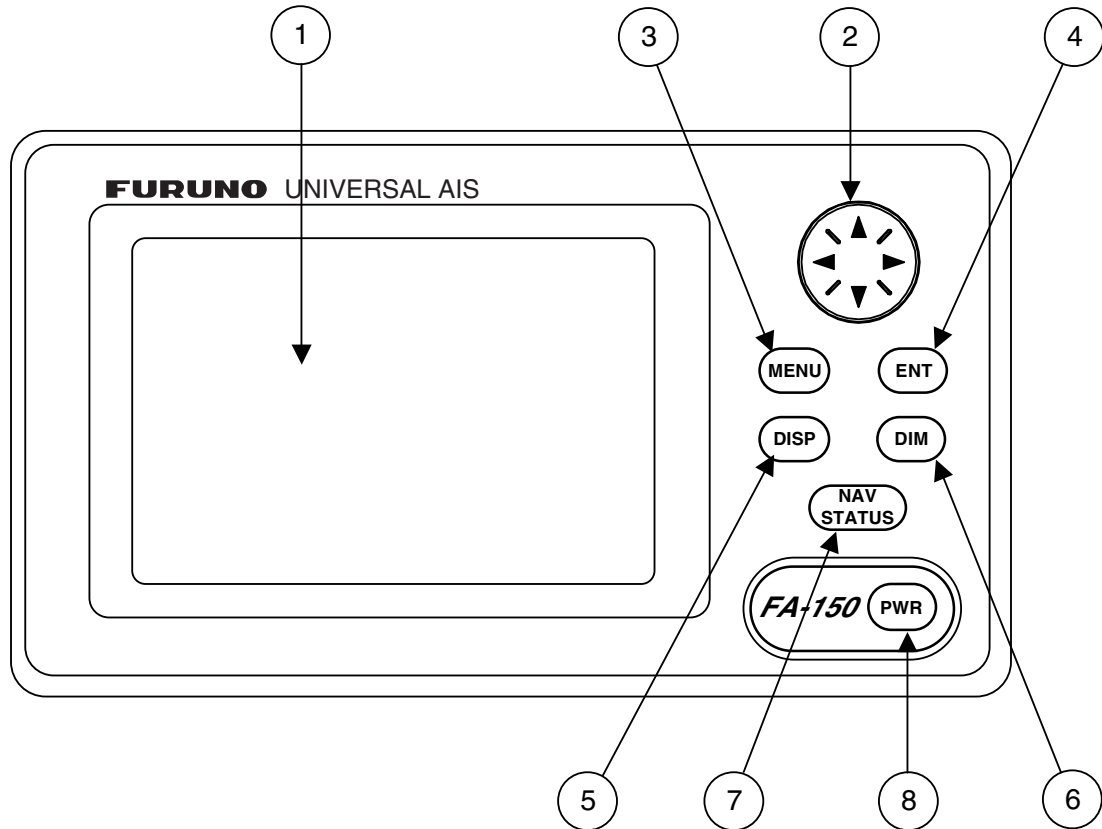
1. LCD Screen: Displays various data.

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

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.

```
┌─────────────────────────┐   EQUIPMENT IDENTIFICATION
│                         │   SCREEN
│    AUTOMATIC            │
│                         │
│        IDENTIFICATION   │
│                         │
│            SYSTEM       │
│                         │
│                         │
│  FURUNO ELECTRIC CORP.  │
└─────────────────────────┘
```

```
┌─────────────────────────┐   STARTUP SCREEN
│ [STARTUP TEST]          │
│ PROGRAM No.:            │
│         2450021-**.**   │
│ ROM         : OK        │
│ RAM         : OK        │
│ BACKUP DATA : OK        │
│                         │
│                         │
└─────────────────────────┘
**.**: Program Version No.
```

```
┌─────────────────────────┐   PLOTTER DISPLAY
│  ┌──────┐[- - - - - - - -]│
│  │NO OWN SHIP │HDG: - - -°│
│  │NOW INITIALIZING│: - - .-kt│
│  │      │: - - -.-        │
│  │      │CPA:  - - -.-nm  │
│  │      │TCPA: - -'- -"   │
│  │      │INTRD: 0         │
│  RNG:   6 nm    DETAIL:[ENT]│
└─────────────────────────┘
```
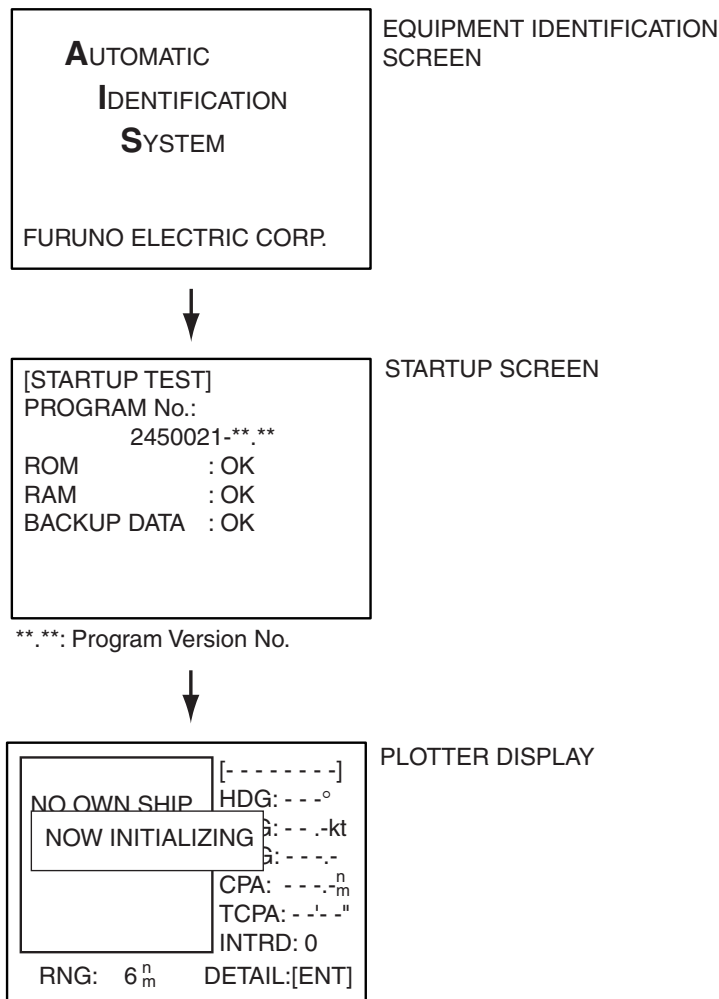
Startup sequence

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 messages "NO OWN SHIP POSITION AVAILABLE." and "NOW INITIALIZING." These messages mean that position data has not yet arrived and the transponder is initializing itself, respectively. When both messages disappear the equipment is ready for use. If the message "ENTER MMSI!" appears, the vessel's MMSI has not been registered in the equipment. Enter MMSI.

If there is no response from the transponder unit or vessel's MMSI is not registered in the equipment, the message "COMMUNICATION ERROR" appears on the 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 (Class A target)
Ship at anchor or moored and not moving faster than 3 kts	3 min
Ship at anchor or moored and moving at more than 3 kts	10 s
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.

```
┌─────────────────────────┐
│ DIMMER  (0-8)           │
│ ▼ ▐███████   ▌ ▲ 4      │
│ CONTRAST (0-63)         │
│ ◄ ▐████████  ▌ ►44      │
│              EXIT: [ENT]│
└─────────────────────────┘
```
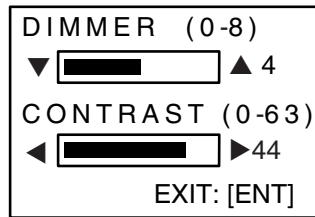
Panel dimmer and contrast dialog box

2. Use ▲ or ▼ to adjust panel dimmer; ◄ or ► to adjust contrast.
3. Press the **ENT** key to close the dialog box.

N**ote:** If the equipment is turned off with the contrast setting of 35 or lower, the equipment will start up with contrast setting 36 when the power is again turned on.

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.

```
[MENU]
MSG
SENSOR STATUS
INTERNAL GPS
USER SETTINGS
INITIAL SETTINGS
CHANNEL SETTINGS
DIAGNOSTICS
```
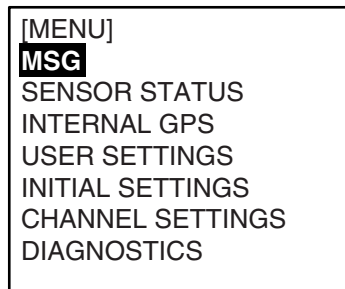
Main menu

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]
KEY BEEP        : ON
ALARM BUZZER  : ON
DISP RCVD MSG : ABM
RCVD MSG BUZZ: OFF
LR MODE         : AUTO
AUTO SORT      : ON
CPA/TCPA ALARM
```
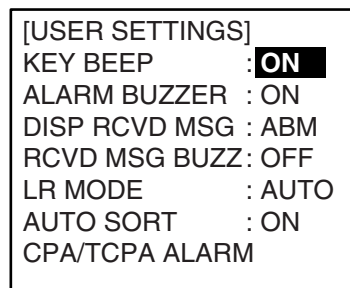
USER SETTINGS sub-menu
(Option selection)

```
[DRAUGHT]              ◄
 DRAUGHT:          00.0 m
```
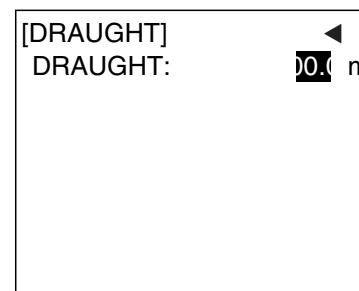
DRAUGHT input screen
(Data input)

Sample sub-menu screens

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

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]
KEY BEEP      : ON
ALARM BUZZER  : ON
DISP RCVD MSG :   OFF
RCVD MSG BUZZ :
LR MODE       : AUTO
AUTO SORT     : ON
CPA/TCPA ALARM
```
Options window
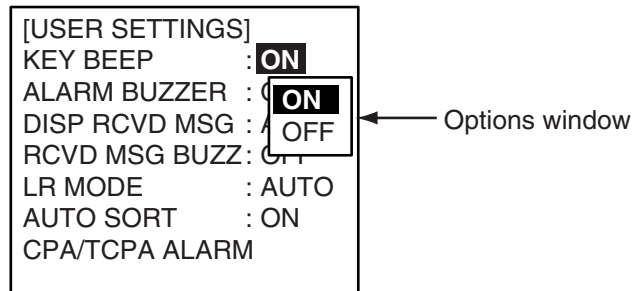
USER SETTINGS menu, showing options for KEY BEEP

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, which is page 5 of the NAV STATUS setup screens.

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

```
[DRAUGHT]          ◄
DRAUGHT:      00.0 m
```
Cursor
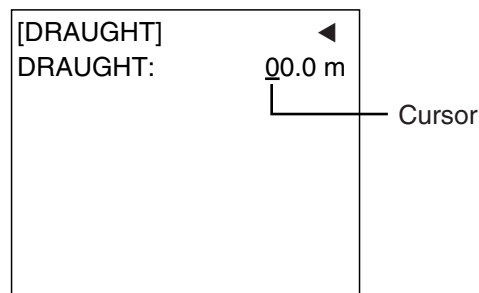
DRAUGHT entry screen

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. To erase a character, insert a space.

e) Press the **ENT** key to register data.

6. Press the **DISP** key to close the menu.

1.5   Setting Up for a Voyage

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

1. Press the **NAV STATUS** key to open the NAV STATUS menu.

```
[NAV STATUS]          ▶
NAV STATUS:        0

 ***STATUS DETAIL***
   UNDER WAY USING
       ENGINE
```
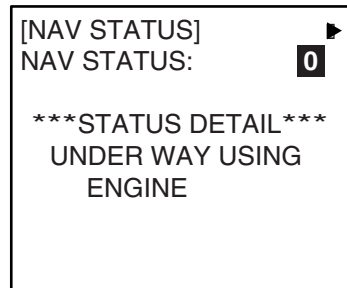
NAV STATUS menu, page 1, nav status entry screen

2. If your navigation status is different from that shown, follow the procedure below. If it is the same as shown, 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:    UNDER WAY 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 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.

```
[DESTINATION]        ◀▶

＊＊＊＊＊＊＊＊＊＊＊＊＊(0/0)
[NEW?]
```

NAV STATUS menu, page 2

4. NEW is selected; press the **ENT** key.

```
[DESTINATION]
ENTER A NEW
          DESTINATION



          ▇▇▇▇▇▇▇▇▇▇▇

QUIT:[NAV STATUS]
```
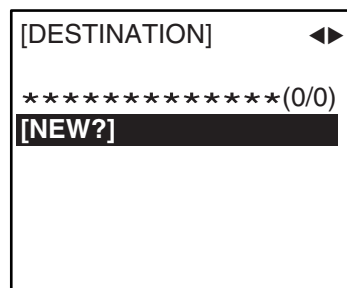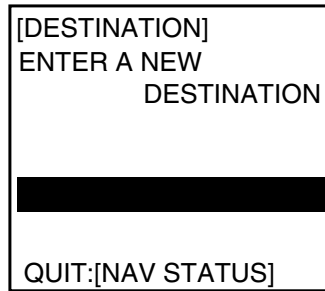
NAV STATUS menu, page 2 (destination entry screen)

5. Press the **ENT** key. Use the **CursorPad** to enter destination and then press the **ENT** key. 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?]
SEATTLE
SAN FRANCISCO ─┐
COTE D'IVOIRE ─┴─ Destination list
```
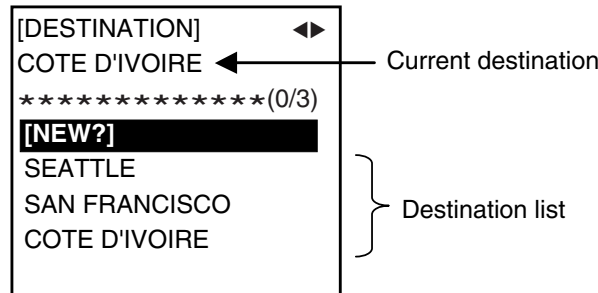
1) Use the **CursorPad** to choose appropriate destination and then press the **ENT** key to show the options window below.

```
SELECT
EDIT
DELETE
```

2) 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
```
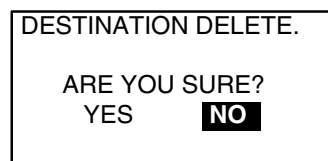
6. Press ► to show page 3 of the NAV STATUS menu.

```
[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****
NOT AVAILABLE



```

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 NO. 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 and the Nav status is "Moored", output power is automatically switched to 1 W when SOG is less than 3 kts. Further, in the above condition, when SOG becomes higher than 3 knots, the pop-up message "CHANGE NAV STATUS?" appears and a beep sounds. (The pop-up message "TX POWER CHANGED" also appears to notify you that the Tx power has changed). To erase the pop-up message, press any key or lower SOG below 3 kts.

10	FUTURE USE	ALL SHIPS OF THIS TYPE	60	PASSENGER SHIPS	ALL SHIPS OF THIS TYPE

No.	Type	Description	No.	Type	Description
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				
52	TUGS				
53	PORT TENDERS				
54	VESSELS WITH ANTI-POLLUTION FACILITIES OR EQUIPMENT				
55	LAW ENFORCEMENT VESSELS				
56	SPARE-FOR ASSIGNMENTS TO LOCAL VESSELS				
57	SPARE-FOR ASSIGNMENTS TO LOCAL VESSELS				
58	MEDICAL TRANSPORTS				
59	SHIPS ACCORDING TO RESOLUTION NO 18				

WIG: Wing in ground
HSC: High speed craft
DG: Dangerous goods
HS: Harmful substances
MP: Marine pollutants
0-9: Undefined

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

```
[DRAUGHT]              ◄
 DRAUGHT:          00.0 m
```
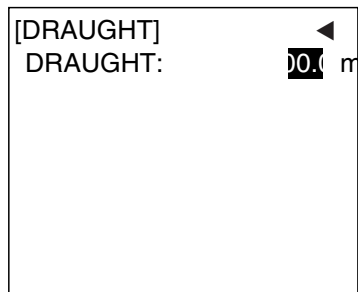
NAV STATUS menu, page 5 (draught entry screen)

17. Press the **ENT** key.
18. Use the **CursorPad** to enter ship's draught (setting range: 0-25.5(m)), and then press the **ENT** key.
19. Press the **DISP** key to close the menu.

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]
```
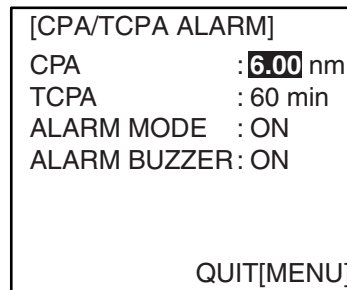
CPA/TCPA ALARM sub-menu

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

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.

PLOTTER DISPLAY
(See para. 1.7.1.)

TARGET LIST
(See para. 1.7.2.)

DANGEROUS (TARGET) LIST
(See para. 1.7.3.)
When a dangerous target exists the dangerous target list has priority.

Switch between these displays with ◄, ►.

OWN SHIP'S STATIC DATA
Switch among these displays with ▲▼◄►.
(See para. 1.7.4.)

OWN SHIP'S DYNAMIC DATA
(See para. 1.7.5.)

ALARM STATUS DISPLAY
(See para. 2.5.)
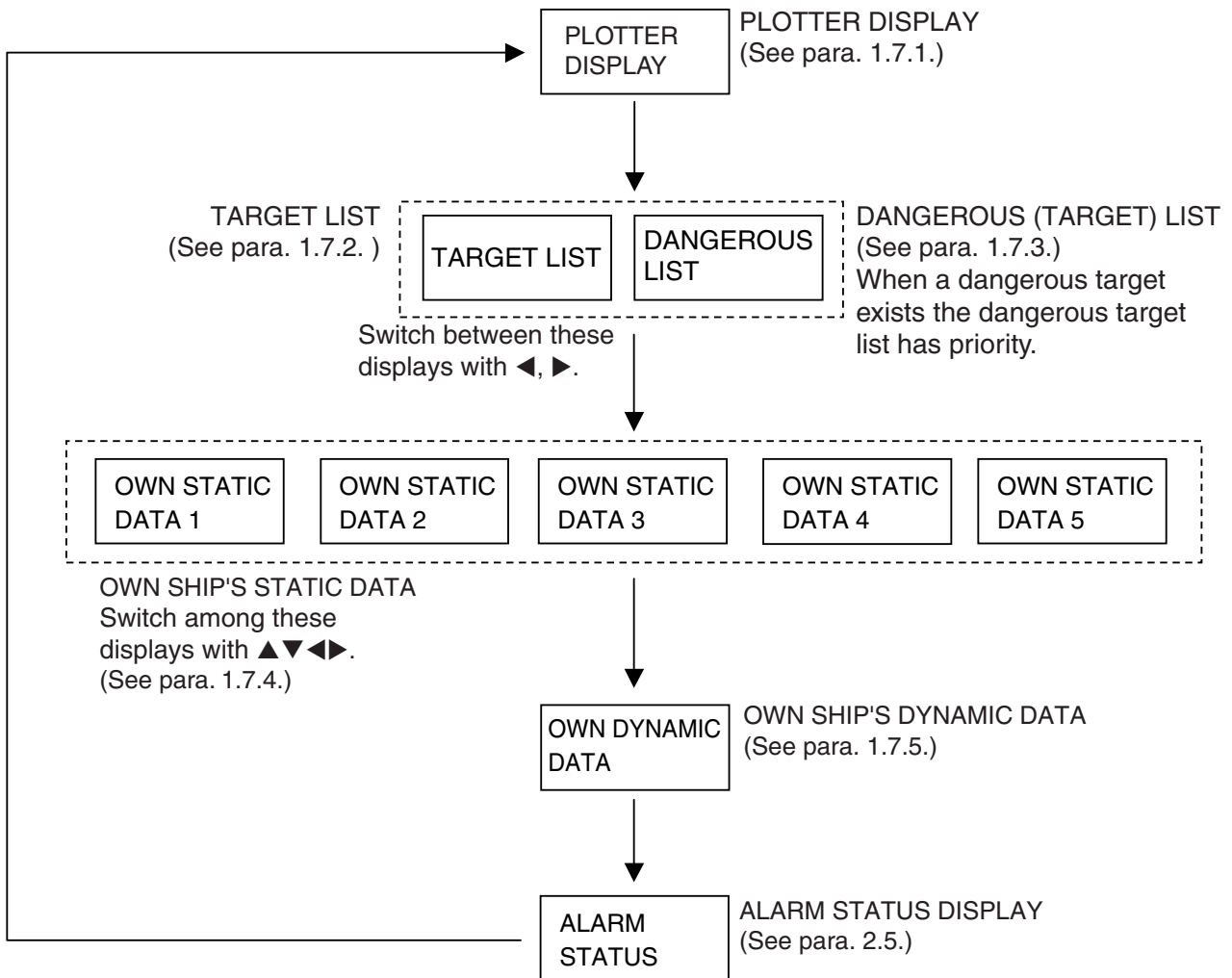
Display selection sequence

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 current range. The position and course of your ship are also displayed.
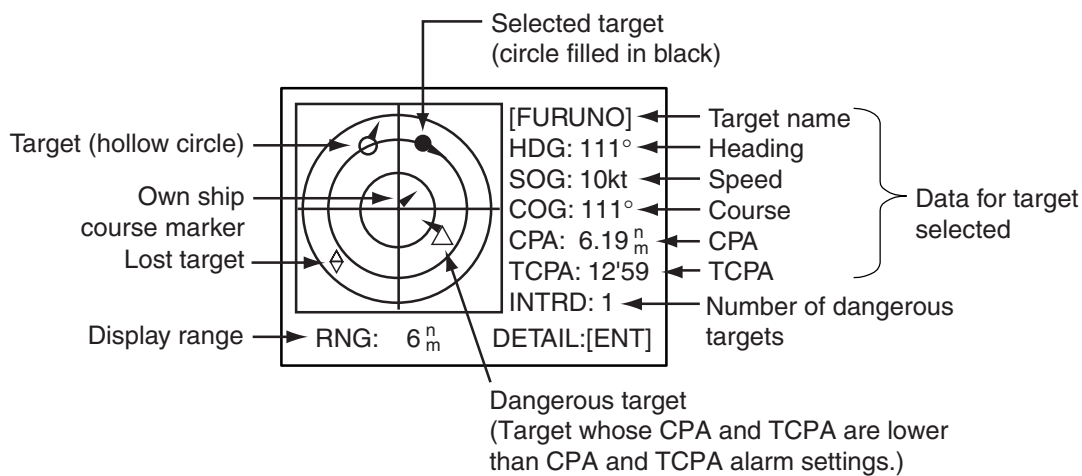
Plotter display

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: A target is declared a lost target under the conditions shown in the table below. A target is erased from the screen 6 minutes and 40 seconds after it is declared a lost target.

Ship's navigation status	Target declared as lost target after
Ship at anchor or moored and not moving faster than 3 kts	10 min
Ship at anchor or moored and moving at more than 3 kts	50 s
0-14 kt speed	50 s
0-14 kt speed with course change	50 s
14-23 kt speed	25 s
14-23 kt speed with course change	25 s
Speed higher than 23 kt	7 s
Speed higher than 23 kt with course change	7 s

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. Further, when a target becomes a lost target, "LOST" appears at the end of the HDG field.

1.7.2   Target list (displaying target data)

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

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

```
[TARGET LIST]
 NAME  RNG(nm)  BRG(°)
FURUNO   2.90   276.1
 VOYAGE  3.10   292.9
■QUEST   4.30   279.5
▲SEADOG  8.60    82.0
†INTREP  9.10   123.1
1/ 10 [▼] DTL[ENT] DNG[▶]
```

← Press ▶ to switch to DANGEROUS LIST. (See para. 1.7.3.)

Target type symbols
None: Ship
■ : Base station
▲ : SAR
† : AtoN

Target list

Note 1: If the dangerous target list appears, press ◄ to switch to the target list.

Note 2: If there is no data for the target selected, the message NO SEL appears. Hit any key to escape.

Note 3: Targets are automatically sorted in range order (closest to furthest) when no key is operated for 30 seconds. Target order is then updated every five seconds.

Note 4: The range and bearing are updated when AUTO SORT on the INITIAL SETTINGS menu is OFF, however target order is not updated. To do this, press ◄, and targets are sorted in range order. "NOW SORTING" is shown while sorting.

Note 5: You may also choose a target directly on the plotter display. Press ◄ or ► to paint the circle of a desired target in black and then press the **ENT** key. You can sort targets in range order: Press ► to sort in closest to furthest order; ◄ to sort in furthest to closest order. The display then looks something like the one shown at the top of one of the next page. If you wish to see other target data, go to step 3 below.

2. 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.

3. Use ▼ or ▲ to scroll the display to see other data.

Target data display, mobile class A

```
[DETAILS SHIP]        1/6
MMSI [A] : 431099806            ←───── MMSI no.
NAME    : FURUNO                ←───── Name

CALL SIGN : ZL6DEF1             ←───── Call sign
IMO No. : 109873421            ←───── IMO no.
CPA     : 0.02 nm              ←───── CPA
TCPA    : 0'17"               ←───── TCPA
```

"DNGR" (DANGER) appears
(in reverse video) when a
target's CPA and TCPA
are lower than the CPA/TCPA
setting.

"LOST" appears (in reverse video)
when signal from a target is lost.
Six minutes and 40 seconds after
loss of signal the target's data is erased.

◄ ▲   ► ▼

```
[DETAILS SHIP]        2/6
MMSI [A]: 431099806            ←───── MMSI No.
LAT  : 34°03.5442'N            ←───── Latitude
LON : 134°30.3883'E           ←───── Longitude
S/C : 17.8 kt/ 213.5°         ←───── Speed over ground, course over ground
HDG : 278° PA: H              ←───── Heading, Position Accuracy (H, High, L, Low)
R/B : 25.12 nm/351.5°         ←───── Range and bearing from own ship
ROT : R 0.1°/min              ←───── Rate of Turn (L: Left, R: Rightt)
```

◄ ▲   ► ▼

```
[DETAILS SHIP]        3/6
MMSI [A]  : 431099806          ←───── MMSI no.

         A    : 100 m          ←───── Distance from bow to GPS antenna position
         B    :  23 m          ←───── Distance from stern to GPS antenna position
   A     C    :   6 m          ←───── Distance from port to GPS antenna position
   B     D    :   6 m          ←───── Distance from starboard to GPS antenna position
         LENGTH: 123 m         ←───── Length of ship
 C D     BEAM  :  12 m         ←───── Beam of ship
```

◄ ▲   ► ▼

```
[DETAILS SHIP]        4/6
MMSI [A]  :  431099806         ←───── MMSI no.
TYPE OF SHIP  : 25             ←───── Type no.

****TYPE DETAIL****            ←───── Type description
CARGO SHIPS
 ALL SHIPS OF
 THIS TYPE
```

◄ ▲   ► ▼

```
[DETAILS SHIP]        5/6
MMSI [A] :  431099806          ←───── MMSI no.
NAV STATUS : 0                 ←───── Navigation status no.
****STATUS DETAIL****
 UNDER WAY USING               ←───── Navigation status description
  ENGINE
```

◄ ▲   ► ▼

```
[DETAILS SHIP]        6/6
MMSI [A]: 431099806            ←───── MMSI no.
DESTINATION                    ←───── Destination
       TOKYO

DATE: 05/MAY                   ←───── Date of arrival at destination
TIME: 23:42                    ←───── Estimated time of arrival
```

Target data display, mobile class A

Target data display, mobile class B

```
[DETAILS SHIP]        1/4
MMSI [B]: 431099806          ←——— MMSI No.
NAME   : FURUNO              ←——— Name

CPA     : 0.02 nm           ←——— CPA
TCPA    : 0'17"             ←——— TCPA
```

"DNGR" (DANGER) appears
(in reverse video) when a
target's CPA and TCPA
are lower than the CPA/TCPA
setting.

"LOST" appears (in reverse video)
when signal from a target is lost.
Six minutes and 40 seconds after loss
of signal the target's data is erased.

◄ ▲   ► ▼

```
[DETAILS SHIP]        2/4
MMSI [B]: 431099806          ←——— MMSI No.
LAT  :  34°03.5442'N         ←——— Latitude
LON  : 134°30.3883'E         ←——— Longitude
S/C  : 17.8 kt/ 213.5°       ←——— Speed over ground, course over ground
HDG  : 278° PA: H            ←——— Heading, Position Accuracy (H, High, L, Low)
R/B  : 25.12 nm/351.5°       ←——— Range and bearing from own ship
```

◄ ▲   ► ▼

```
[DETAILS SHIP]        3/4
MMSI [B]   : 431099806       ←——— MMSI No.
       A        : 100 m      ←——— Distance from bow to GPS antenna position
       B        :  23 m      ←——— Distance from stern to GPS antenna position
  A    C        :   6 m      ←——— Distance from port to GPS antenna position
  B    D        :   6 m      ←——— Distance from starboard to GPS antenna position
       LENGTH: 123 m         ←——— Length of ship
C D    BEAM    :  12 m       ←——— Beam of ship
```

◄ ▲   ► ▼

```
[DETAILS SHIP]        4/4
MMSI [B]  :   431099806      ←——— MMSI No.
TYPE OF SHIP  : 25           ←——— Type No.

****TYPE DETAIL****          ←——— Type description
CARGO SHIPS
 ALL SHIPS OF
 THIS TYPE
```

Target data display, mobile class B

Target data display, base station

"DNGR" (DANGER) appears
(in reverse video) when a
target's CPA and TCPA
are lower than the CPA/TCPA
setting.

"LOST" appears (in reverse video)
when signal from a target is lost.
Six minutes and 40 seconds after loss
of signal the target's data is erased.

```
[DETAILS BS]        1/1
MMSI    : 001099806                 ←——— MMSI no.
CPA     : 0.02 nm                   ←——— CPA
TCPA    : 0'17"                     ←——— TCPA
LAT :   34°03.5442'N                ←——— Latitude
LON: 134°30.3883'E                  ←——— Longitude
PA  : H                             ←——— Position Accuracy (H, High, L, Low)
R/B : 25.12 nm/351.5°               ←——— Range and bearing from own ship
```

Target data display, base station

Target data display, SAR (Search and Rescue)

```
[DETAILS SAR]       1/2
MMSI   : 431099806         ←——— MMSI No.
CPA    : 0.02 nm           ←——— CPA
TCPA   : 0'17"             ←——— TCPA
```

"DNGR" (DANGER) appears
(in reverse video) when a
target's CPA and TCPA
are lower than the CPA/TCPA
setting.

"LOST" appears (in reverse video)
when signal from a target is lost.
Six minutes and 40 seconds after loss
of signal the target's data is erased.

◄ ▲   ► ▼

```
[DETAILS SAR]       2/2
MMSI   : 431099806         ←——— MMSI No.
LAT:   34°03.5442'N        ←——— Latitude
LON: 134°30.3883'E         ←——— Longitude
ALT: 1800 m                ←——— Altitude
S/C: 17.8 kt/ 213.5°       ←——— Speed over ground, course over ground
PA: H                      ←——— Position Accuracy (H, High, L, Low)
R/B: 25.12 nm/351.5°       ←——— Range and bearing from own ship
```

1-17

Target data display, AtoN (Aid to Navigation)

```
[DETAILS AtoN]        1/4
MMSI : 431099806              ←——— MMSI No.
NAME : FURUNO                 ←——— Name



CPA   : 0.02 nm               ←——— CPA
TCPA : 0'17"                  ←——— TCPA
```

"DNGR" (DANGER) appears
(in reverse video) when a
target's CPA and TCPA
are lower than the CPA/TCPA
setting.

"LOST" appears (in reverse video)
when signal from a target is lost.
Six minutes and 40 seconds after loss
of signal the target's data is erased.

◄ ▲   ► ▼

```
[DETAILS AtoN]        2/4
MMSI : 431099806              ←——— MMSI No.
LAT   :  34°03.5442'N         ←——— Latitude
LON   : 134°30.3883'E         ←——— Longitude
PA    : H                     ←——— Position Accuracy (H, High, L, Low)
R/B   : 25.12 nm/351.5°       ←——— Range and bearing from own ship
PI    : ON POSITION           ←——— Off Position or On Position
```

◄ ▲   ► ▼

```
[DETAILS AtoN]        3/4
MMSI    : 431099806           ←——— MMSI No.
          A      : 100 m      ←——— Distance from bow to GPS antenna position
          B      :  23 m      ←——— Distance from stern to GPS antenna position
      A   C      :   6 m      ←——— Distance from port to GPS antenna position
      B   D      :   6 m      ←——— Distance from starboard to GPS antenna position
          LENGTH: 123 m       ←——— Length of ship
   C  D   BEAM   :  12 m      ←——— Beam of ship
```

◄ ▲   ► ▼

```
[DETAILS AtoN]        4/4
MMSI   :  431099806           ←——— MMSI No.
VIRTUAL   AtoN                ←——— AtoN existence (real or virtual)
TYPE OF AtoN: 20              ←——— Type of AtoN (See next page.)

****TYPE OF DETAIL****        ←——— Description of AtoN
CARDINAL MARK N
```

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).

   Note 1: If the target list appears, press ► to show the dangerous list.

   Note 2: Targets are automatically sorted by TCPA when no key is operated for 30 seconds. Target order is then updated every five seconds.

2. Press ► to show the Dangerous List.

```
[DANGEROUS LIST]
 NAME   CPA (n/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[◄]
```

Target name, CPA and TCPA →

← Press ◄ to switch to TARGET LIST.

Dangerous list

3. To find detailed information about a dangerous target, use ▼ or ▲ to choose the target and then press the **ENT** key.
4. Use the **CursorPad** to change page – ▼ or ▲ to go forward; ▲ or ◄ to go back.

Note 1: The message "LOST" appears at the top of the Dangerous List when no AIS signal is received from the selected target.

Note 2: CPA and TCPA are automatically updated when AUTO SORT on the INITIAL SETTINGS menu is OFF, however target order is not updated. To do this, press ◄, and the targets are sorted in TCPA order. "NOW SORTING" is shown while sorting.

1.7.4 Own ship's static data

The OWN STATIC DATA display shows, on five pages, own ship's static data, which includes MMSI, call sign and name, IMO number, type of ship and location of position fixing antenna. 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". 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]  1/5
NAME     : FURUNO              ◄──── Name
            VOYAGER
CALL SIGN: CAL0001             ◄──── Call sign
MMSI     : 123456789           ◄──── MMSI no.
IMO No.  : 623498071           ◄──── IMO no.
```

◄ ▲   ► ▼

```
[OWN STATIC DATA]  2/5
DESTINATION:
      TOKYO                    ◄──── Destination

 DATE: 12/DEC                  ◄──── Estimated date of arrival
TIME : 10:25                   ◄──── Estimated time of arrival
```

◄ ▲   ► ▼

```
[OWN STATIC DATA]  3/5
DRAUGHT   : 12.1 m             ◄──── Draught
NAV STATUS: 0                  ◄──── Navigation status no.
***STATUS DETAIL***            ◄──── Navigation status description
 UNDER WAY USING
  ENGINE
```

◄ ▲   ► ▼

```
[OWN STATIC DATA]  4/5
CPA    : 1.50 nm               ◄──── CPA (preset value)
TCPA  :   10 min               ◄──── TCPA (preset value)
ANT POS   INT    EXT           ◄──── INT: Internal GPS, EXT: External GPS
LENGTH A : 75 m    77 m        ◄──── Distance from bow to GPS antenna position
LENGTH B : 20 m    18 m        ◄──── Distance from stern to GPS antenna position
LENGTH C : 15 m    18 m        ◄──── Distance from port to GPS antenna position
LENGTH D : 15 m    12 m        ◄──── Distance from starboard to GPS antenna position
```

◄ ▲   ► ▼

```
[OWN STATIC DATA]  5/5
CREW :   12                    ◄──── Number of crew
TYPE OF SHIP: 36               ◄──── Ship type
CLASS : A                      ◄──── Ship class
****TYPE DETAIL****            ◄──── Type detail
SAILING
```
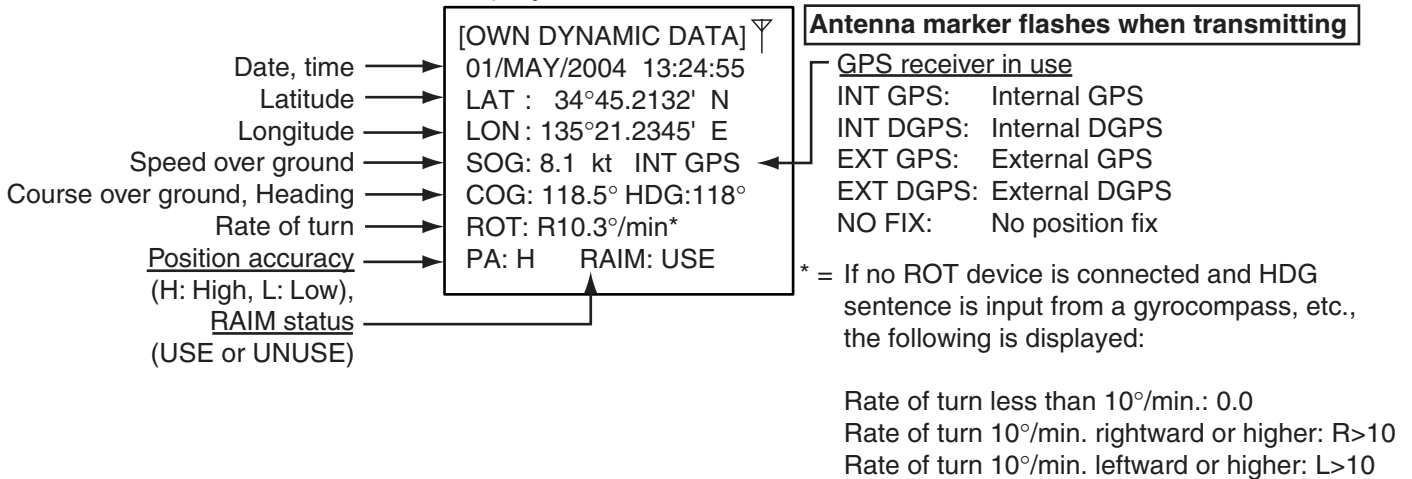
OWN STATIC DATA displays

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.

Date, time → | [OWN DYNAMIC DATA] | **Antenna marker flashes when transmitting**
Latitude → 01/MAY/2004 13:24:55
Longitude → LAT : 34°45.2132' N
Speed over ground → LON : 135°21.2345' E
Course over ground, Heading → SOG: 8.1 kt   INT GPS
Rate of turn → COG: 118.5° HDG:118°
Position accuracy → ROT: R10.3°/min*
(H: High, L: Low), PA: H   RAIM: USE
RAIM status
(USE or UNUSE)

GPS receiver in use
INT GPS: Internal GPS
INT DGPS: Internal DGPS
EXT GPS: External GPS
EXT DGPS: External DGPS
NO FIX: No position fix

* = If no ROT device is connected and HDG sentence is input from a gyrocompass, etc., the following is displayed:

Rate of turn less than 10°/min.: 0.0
Rate of turn 10°/min. rightward or higher: R>10
Rate of turn 10°/min. leftward or higher: L>10

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.
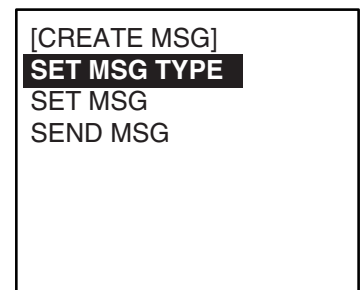
1.8.1 Sending a message

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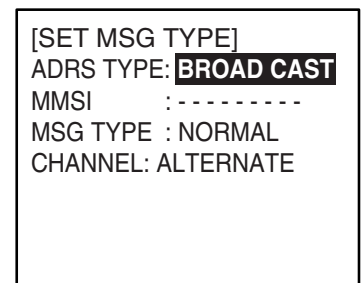2. Use ▼ or ▲ to choose MSG and then press the **ENT** key.

```
[MSG]
CREATE MSG
TX LOG
RX LOG
```
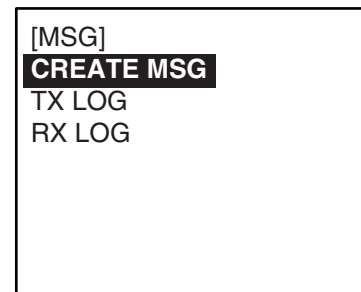
MSG sub-menu

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: BROAD CAST
MMSI     : - - - - - - - - -
MSG TYPE : NORMAL
CHANNEL: ALTERNATE
```

SET MSG TYPE sub-menu

1-23

5. ADRS TYPE is selected; press the **ENT** key.

BROAD CAST
ADRS CAST

6. Choose ADRS CAST to send a message to a specific AIS-equipped ship, or BROAD CAST to send a message to all AIS-equipped ships within broadcasting range. Press the **ENT** key.
7. For BROAD CAST, go to step 8. For ADRS CAST, "MMSI" is selected; press the **ENT** key, use the **CursorPad** to enter MMSI number of the vessel which you want to receive the message, 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.

[SET MSG]

–

01(151)* [DIM]HOLD:CLEAR

Number of characters used/available
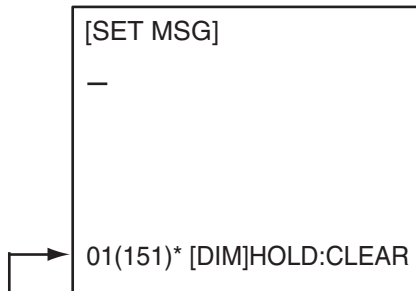
*: Number of characters available with each message type is as follows:
NORMAL message with BROAD-CAST   : 156 characters
NORMAL message with ADDRESS-CAST: 151 characters
SAFETY message with BROAD-CAST   : 161 characters
SAFETY message with ADDRESS-CAST : 156 characters

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, and the prompt shown right appears.
18. Press ◄ to choose YES and then press the **ENT** key to send your message.

SEND MESSAGE.

ARE YOU SURE?
YES   **NO**
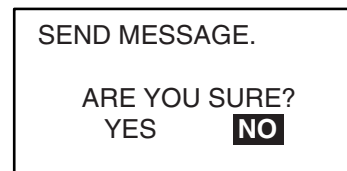
The screen shows message status as follows:

AIS message status messages and their meanings

Message	Meaning
NOW SENDING.	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: XXXXXXXX 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
```
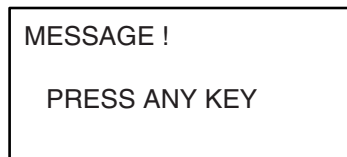
Message received window

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
 FR : 431099111 N-ABM
28/MAR 03:43
 FR: 431099111 S-ABM
22/MAR 18:00
 FR: 431099111 N-ABM
1/3[▼] 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
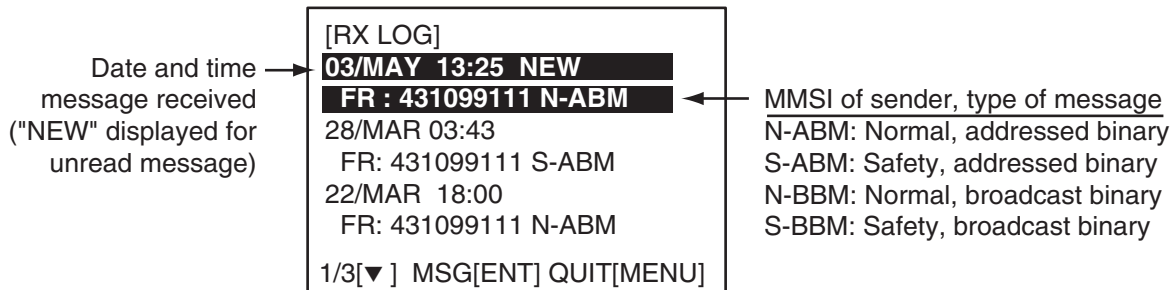
Received message log

1-25

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.

```
[RX LOG]
I HAVE CHANGED MY
COURSE TO 350 DEGREE.




                    QUIT[MENU]
```

Received message example

6. Press the **DISP** key to close the log.

Displaying received messages in a window

You may display incoming messages in a window 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
AUTO SORT      : ON
CPA/TCPA ALARM
```

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.

1.8.3   Message logs

The FA-150 stores the latest 20 each of 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.

Date and time message transmitted, message status
OK: Message transmitted successfully
FAIL: Message could not be transmitted

```
[TX LOG]
31/APR  13:25  OK
  TO: 431099111 N-ABM
27/MAR 03:43
  TO: 431099111 S-ABM
19/MAR  18:00
  TO: 431099111 N-ABM
1/20[▼]  MSG[ENT] QUIT[MENU]
```

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

TX message log

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.

```
[TX LOG]
CHANGE YOUR COURSE TO
350 DEGREE.




              QUIT[MENU]
```
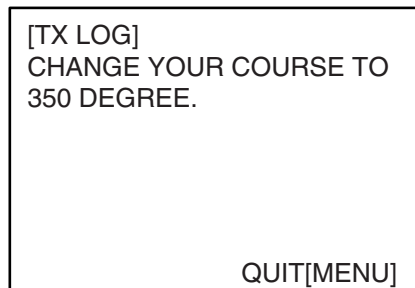
Transmitted message example

5. Press the **DISP** key to close the log.

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 switched 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 CHANNEL SETTINGS and then press the **ENT** key.

```
[CHANNEL SETTINGS]
VIEW CHANNEL
EDIT CHANNEL




                    QUIT[MENU]
```
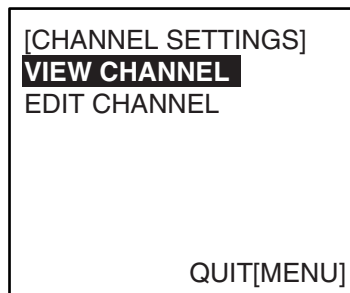
CHANNEL SETTINGS menu

3. Choose VIEW CHANNEL and then press the **ENT** key.

Power ⟶
Channel ⟶

```
[VIEW CHANNEL]
POWER   : 12.5W

CHANNEL NO.
CH-A: 2087
CH-B: 2088

                    QUIT[MENU]
```
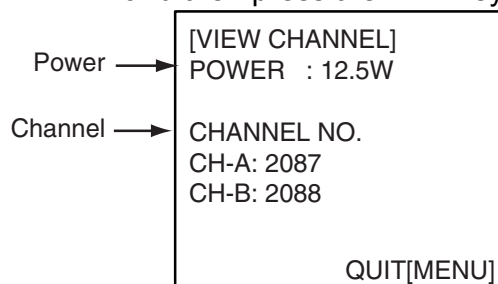
VIEW CHANNEL display

4. Press the **DISP** key to close the 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 HIGH SEA.

About registering areas

- AIS and DSC messages registered within last two hours cannot be edited.
- An item labeled HIGH SEA cannot be registered. ("HIGH SEA" 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 CHANNEL SETTINGS and then press the **ENT** key.
3. Choose EDIT CHANNEL and then press the **ENT** key.

```
[EDIT CHANNEL]
SELECT NO. : 0
TIME
  - -/- - -  - -: - -: - -
FROM
MMSI: - - - - - - - -
 TYPE: MANUAL
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; HIGH SEA (for reference setting) PI, ECDIS or PC; DSC, DSC, MANUAL, manual control

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

4. Use ▼ or ▲ to choose desired file number from SELECT NO.

5. Press the **ENT** key to show details.

```
[EDIT CHANNEL]         1/2
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.

```
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.

Mode	1	2	3	4	5	6
CH-A	TX/RX	TX/RX	RX	RX	RX	UNUSED
CH-B	TX/RX	RX	TX/RX	RX	UNUSED	RX

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)).
18. Use ▼ or ▲ to show page 2 of the [EDIT CHANNEL] sub menu.

```
[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
```

EDIT CHANNEL sub-menu, page 2

19. 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.

20. 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.

21. 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.

22. 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.
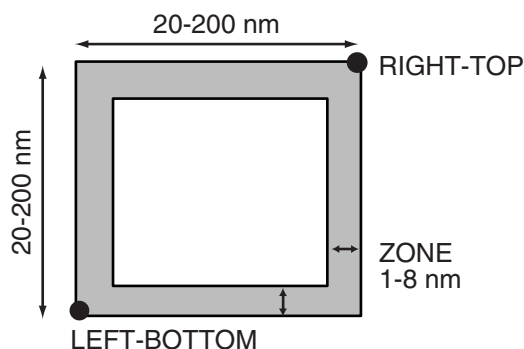
Description of RIGHT-TOP, LEFT-BOTTOM and ZONE items

23. Press the **MENU** key. The prompt shown below appears.

```
SAVE CHANNEL.

ARE YOU SURE?
YES        NO
```

24. Press ◄ to choose YES and then press the **ENT** key.

   Note: If a combination other than that shown in the table at step 13 is selected, the message "ILLEGAL MODE WAS SELECTED PRESS ANY KEY." appears.

25. Press the **DISP** key to close the menu.

Note: If you enter invalid data, the message "OUT OF RANGE!: OO" 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]
KEY BEEP        : ON
ALARM BUZZER  : ON
DISP RCVD MSG : ALL
RCVD MSG BUZZ: ON
LR MODE        : AUTO
AUTO SORT      : ON
CPA/TCPA ALARM
```

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.

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
AUTO SORT       : ON
CPA/TCPA ALARM
```

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.

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. The screen then changes according to your selection.

Information requested (See table on next page.)

```
[RECEIVED LR]
 MMSI: 431456789
 NAME: FURUNO

 C
RESPONSE?
YES: [ENT]  NO: OTHER
```

Press key

```
[LR RESPONSE]
 MMSI: 431456789
 NAME: FURUNO

 C

PRESS ANY KEY
```
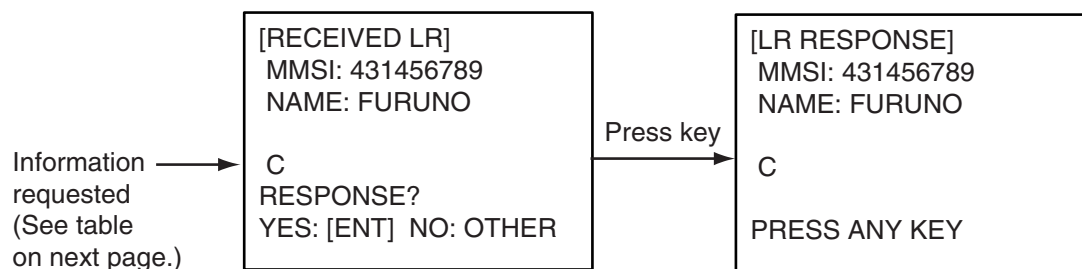
Automatic reply

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.

```
[LR RESPONSE]
 MMSI: 431456789
 NAME: FURUNO

 C

PRESS ANY KEY
```

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 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. Press the **ENT** key twice.
4. Use the **CursorPad** to choose item to view and then press the **ENT** key.
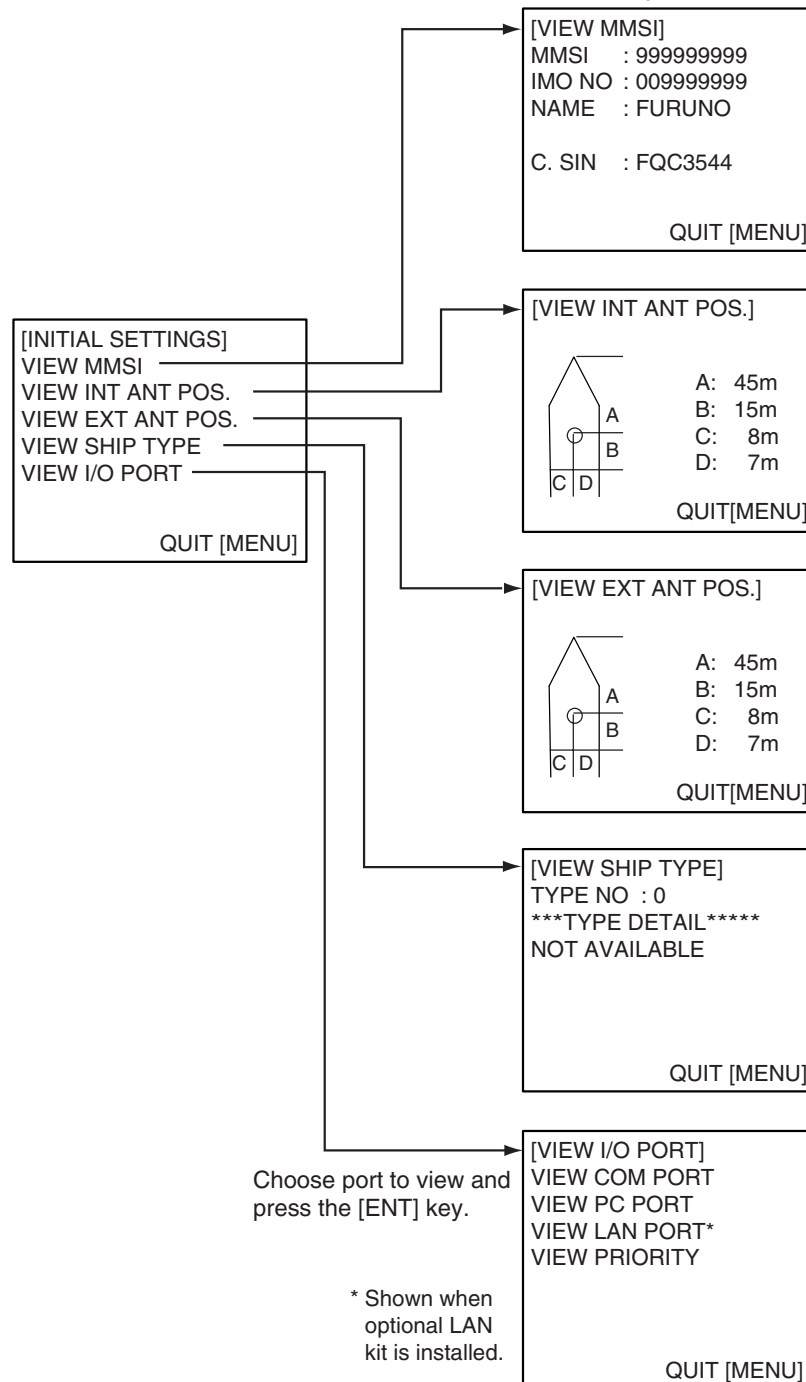
INITIAL SETTINGS menus

This page intentionally left blank.

2.   MAINTENANCE, TROUBLESHOOTING

```
⚠ WARNING
```

ELECTRICAL SHOCK HAZARD
Do not open the equipment.

Only qualified personnel
should work inside the
equipment.
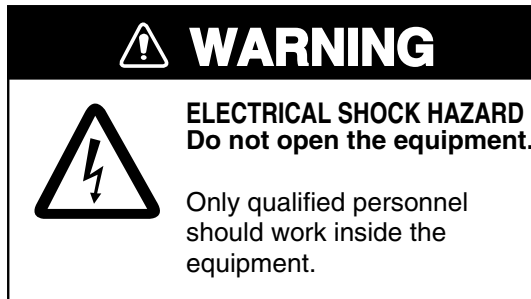
2.1   Maintenance

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.
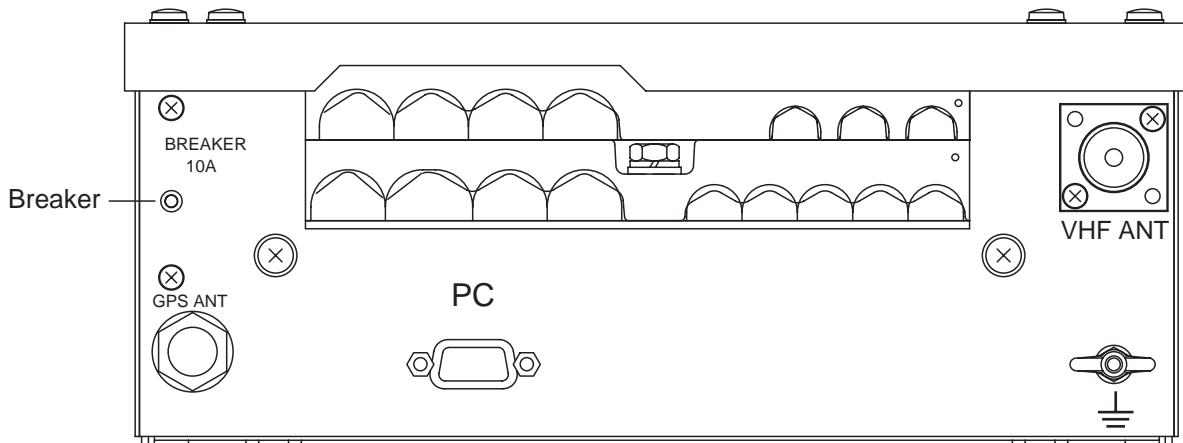
2.3   Troubleshooting

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 MSG, 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 MSG, 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 DIAGNOSTICS and then press the **ENT** key.

```
[DIAGNOSTICS]
MONITOR TEST
TRANSPONDER TEST
PWR ON/OFF HISTORY
TX ON/OFF HISTORY
MEMORY CLEAR
FOR SERVICE
```

For service technician. ⟶ FOR SERVICE
Not accessible by user.
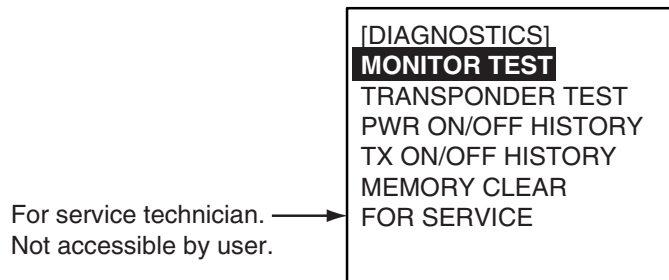
DIAGNOSTIC sub-menu

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]
BOOT NO.: 2450020-XX.XX
PROG NO.: 2450021-XX.XX
ROM   :OK      CONT  :53
SDRAM:OK      DIM    : 4
PORT  : --    PUSH KEY
KEY   :

      QUIT[MENU] 3 TIMES
```

```
<LCD CHECK>

ALL ON    2 SEC.
ALL OFF   3 SEC.
```
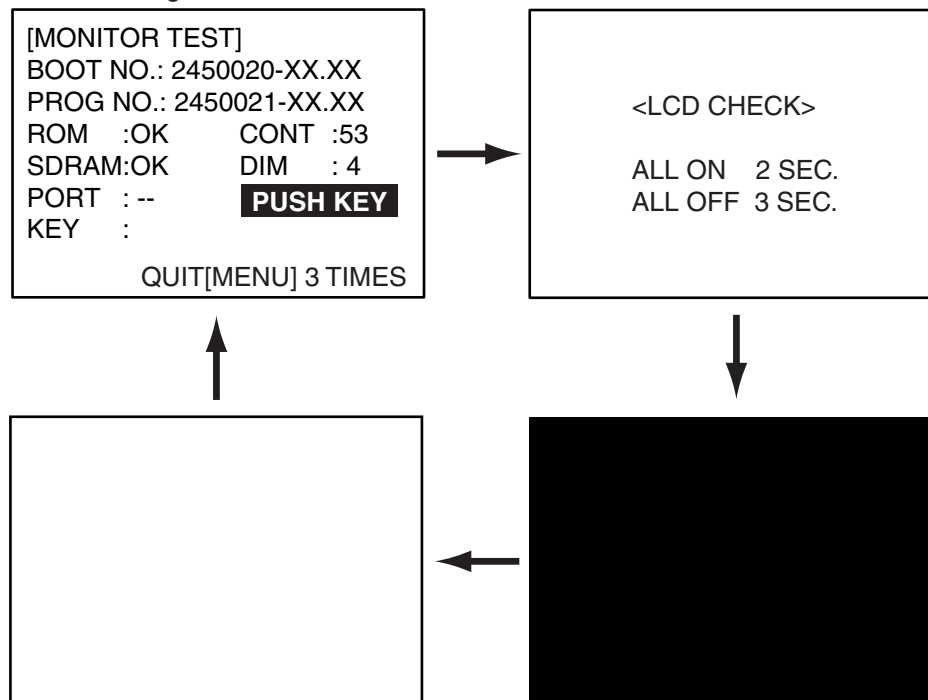
MONITOR TEST screens

a) The first screen in the monitor test program sequence shows program no.
b) After the program no. has been displayed, 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 key test is completed, the ROM, RAM and I/O port (special test connector required, otherwise "- -" appears) are checked. If the results of the ROM and RAM check are shown as OK or NG (No Good). If NG appears contact your dealer for advice.
d) After the items in c) have been checked, the contrast is automatically changed. Check that the contrast changes.
e) 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.
f) 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 DIAGNOSTICS 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 he 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 to return to the DIAGNOSTICS sub-menu.

2-5

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 DIAGNOSTICS 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
   NG: (No Good). NG appears along with reason for NG:
   　　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
   　　ANTENNA ERROR
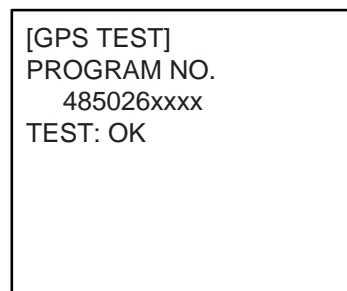
```
[GPS TEST]
PROGRAM NO.
  485026xxxx
TEST: OK
```
xxxx: Program Version No.

GPS TEST display

5. Press the **MENU** key to return to the DIAGNOSTICS sub-menu..

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-off and power-on 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 DIAGNOSTICS and the 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  ◄────  Power turned on 17 May 2004
            05:35:54           at 05:35:54
PWR-OFF   17/MAY/2004
            04:56:57
PWR-ON    17/MAY/2004
            04:06:34

          QUIT[MENU]
```

PWR ON/OFF HISTORY log

4. Use ▼ or ► to change page in the forward direction; ▲ or ◄ to change page in the reverse direction.
5. Press the **MENU** key to return to the DIAGNOSTICS 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.

1. Press the **MENU** key to open the main menu.
2. Use the **CursorPad** to choose DIAGNOSTICS and the 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  ◄────  Tx at 17 May 2004
            05:35:54           at 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 ON/OFF HISTORY log

4. Use ▼ or ► to change page in the forward direction; ▲ or ◄ to change page in the reverse direction.
5. Press the **MENU** key to return to the DIAGNOSTICS 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 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	In channel editing, you entered MSG22 or DSC data whose sea areas overlap one another.
GPS COMMUNICATION ERROR	Communication error with internal GPS, shown at internal GPS self test.
ILLEGAL MODE WAS SELECTED. PRESS ANY KEY.	Invalid combination of channels is chosen for editing.
NO MESSAGE	No TX message when you attempted to send a message.
NO OWN SHIP POSITION AVAILABLE	Invalid own ship position.
NO SEL	Attempted to see detailed data for a target which has no data.
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!: INVALID CHANNEL	Invalid CH-NO. A or CH-NO. B entered on the EDIT CHANNEL sub-menu.
OUT OF RANGE!: MINUTE:0-59*	Invalid minute entered in SET DESTINATION.
OUT OF RANGE!: TCPA:0-60	Invalid TCPA entered.
OUT OF RANGE!: ZONE:1-8	Invalid ZONE entered on the EDIT CHANNEL sub-menu.
SEND MESSAGE UNSUCCESSFUL	Message could not be sent.
TRANSPONDER WAS REBOOTED	Transponder was rebooted.

* Error message displayed for both even if only one is out of range.

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.

Label	Value
Latitude position →	LAT : 34°44.4639'N
Longitude position →	LON : 135°21.2395'E
Speed over ground, Course over ground →	SOG : 10.9 kt COG : 98.9
Date →	UTC : 16/MAY/2004
Time →	06:29:02
Mode →	DGPS STS: 3D
DGPS →	PA: H RAIM: USE

STS (Status)
2D: 2D GPS position fix
3D: 3D GPS position fix
D2D: 2D DGPS position fix
D3D: 3D DGPS position fix
DOP: HDOP larger than 4 in 2D fix, or PDOP larger than 6 in 3D fix

Mode
DGPS
GPS
NO FIX

Position Accuracy
H: High, L: Low

RAIM Status*
(Receiver Autonomous Integrity Monitoring)
USE or UNUSE

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

Internal GPS monitor

3. Press the **DISP** key to close the 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]

UTC CLOCK LOST




                    QUIT[MENU]
```

Sensor status message ⟶
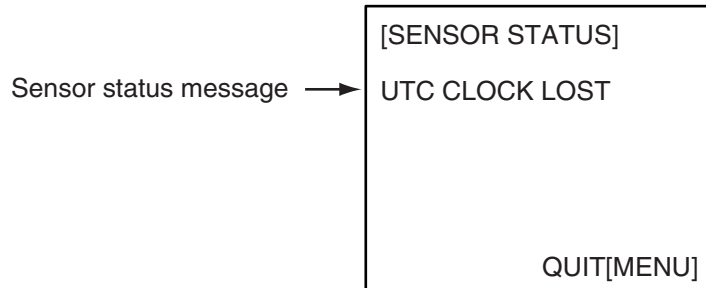
SENSOR STATUS screen

3. Press the **DISP** key to close the display.

Sensor status messages and their meanings

Sensor Status Message	Meaning
UTC CLOCK LOST	Internal position fix lost
EXTRL GNSS	Using external GNSS
EXTRL DGNSS	Using external DGNSS
INTRL DGNSS BEACON	Using internal DGNSS beacon
INTRL DGNSS MSG 17	MSG 17 corrects internal GNSS with differential correction
INTRL DGNSS	Using internal DGNSS
INTRL GNSS	Using internal GNSS
EXTRL SOG/COG	Using external SOG/COG
INTRL SOG/COG	Using internal SOG/COG
HDT VALID	Heading data normal
ROT VALID	ROT data normal
OTHER ROT	Value calculated from HDT, or ROT device used and talker is other than T1
CH MANAGEMENT	Channel changed (displayed about 30 s)

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 DIAGNOSTICS and then press the **ENT** key.
3. Use the **CursorPad** to choose MEMORY CLEAR and then press the **ENT** key.

```
[MEMORY CLEAR]
MONITOR CLEAR
SET USER DEFAULT
GPS COLD START




                QUIT[MENU]
```
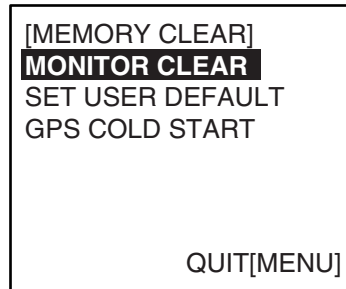
MEMORY CLEAR sub-menu

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

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

USER DEFAULT: Restores all settings to default, except items in the INITIAL SETTINGS menu (MMSI No., IMO No., ship's name and call sign, etc.)

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

```
MONITOR CLEAR.         SET USER DEFAULT       GPS COLD START.

 ARE YOU SURE?          ARE YOU SURE?          ARE YOU SURE?
 YES      NO            YES      NO            YES      NO
```

MONITOR CLEAR   USER DEFAULT   GPS COLD START
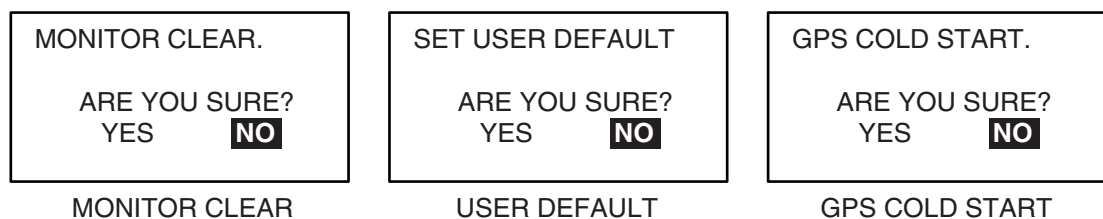
Confirmation screens for memory clear

5. Press ◄ to choose YES and then press the **ENT** key.

For MONITOR CLEAR and USER DEFAULT, a beep sounds and then the equipment restarts.

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

```
MSG ──┬── CREATE MSG ──┬── SET MSG TYPE ──┬── ADRS TYPE (BROAD CAST, ADRS CAST)
      ├── TX LOG        ├── SET MSG        ├── MMSI
      └── RX LOG        └── SEND MSG       ├── MSG TYPE (NORMAL, SAFETY)
                                           └── CHANNEL (ALTERNATE, BOTH A & B, A, B)
```
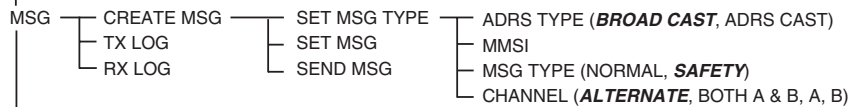
SENSOR STATUS (Display sensor status.)

INTERNAL GPS (Displays data about internal GPS receiver.)

```
USER SETTINGS ──┬── KEY BEEP (ON, OFF)
                ├── ALARM BUZZER (ON, OFF)
                ├── DISP RCVD MSG (ALL, ABM, OFF)
                ├── RCVD MSG BUZZ (ON, OFF)
                ├── LR MODE (AUTO, MANUAL)
                ├── AUTO SORT (ON, OFF)
                └── CPA/TCPA ALARM ──┬── CPA (0.0 - 6.00, 6.0 (nm))
                                     ├── TCPA (0 - 60, 60 (min))
                                     ├── ALARM MODE (ON, OFF)
                                     └── ALARM BUZZER (ON, OFF)
```

```
INITIAL
SETTINGS ──┬── SET MMSI (MMSI, IMO NO., NAME, C. SIGN)
           │
           ├── SET INT ANT POS. ──┬── A (0-511 (m))
           │                      ├── B (0-511 (m))
           │                      ├── C (0-63 (m))
           │                      └── D (0-63 (m))
           │
           ├── SET EXT ANT POS. ──┬── A (0-511 (m))
           │                      ├── B (0-511 (m))
           │                      ├── C (0-63 (m))
           │                      └── D (0-63 (m))
```

Note: The INITIAL SETTINGS sub menu shown here is the one accessed with a password, which permits changing of settings. If accessed without a password, in which case "SET" in a menu title is replaced with "VIEW" and settings cannot be changed.

```
           ├── SET SHIP TYPE (Type no.)
           ├── SET I/O ──┬── SET ──┬── SET COM1 ──┬── MODE (LONG RANGE, EXT DISPLAY, DISABLE)
           │   PORT      │  COM    │              └── SPEED (IEC61162-1, EC61162-2)
           │             │  PORT   ├── SET COM2 ──┬── MODE (EXT DISPLAY, MONITOR, HI LEVEL IF, DISABLE)
           │             │         │              └── SPEED (IEC61162-1, EC61162-2)
           │             │         ├── SET COM3 (Same as SET COM2.)
           │             │         ├── SET COM4 ──┬── MODE (SENSOR, EXT DISPLAY, DISABLE)
           │             │         │              └── SPEED (IEC61162-1, IEC61162-2)
           │             │         ├── SET COM5 ──┬── MODE (SENSOR(Fixed)
           │             │         │              └── SPEED (IEC61162-1, IEC61162-2)
           │             │         └── SET COM6 ──┬── MODE (SENSOR(Fixed)
           │             │                        └── SPEED (IEC61162-1, IEC61162-2, AD-10)
           │             │
           │             ├── SET PC ──┬── MODE (STANDARD, MONITOR, SERVICE, BEACON, DISABLE)
           │             │   PORT     └── SPEED (4800BPS, 9600BPS, 19.2KBPS, 38.4KBPS, 57.6KBPS)
           │             │
           │             ├── SET LAN ──┬── MODE (STANDARD, MONITOR, SERVICE, DISABLE)
           │             │   PORT*     ├── IP ADDRESS (000.000.000.000 - 255.255.255.255; 172.031.024.001)
           │             │             ├── SUB NET MASK (000.000.000.000 - 255.255.255.255; 255.255.000.000)
           │             │             └── PORT NO. (0 - 65535; 10000)
           │             │
           │             └── SET ──┬── L/L, COG, SOG ──┬── COM4 (1, 2, 3)
           │                 PRIORITY │                ├── COM5 (1, 2, 3)
           │                          │                └── COM6 (1, 2, 3)
           │                          ├── HDG ──┬── COM4 (1, 2, 3)
           │                          │         ├── COM5 (1, 2, 3)
           │                          │         └── COM6 (1, 2, 3)
           │                          └── ROT (Same choices and defaults as HDG)
```

(Continued on next page)

* Shown when optional LAN kit is installed.

AP-1

(Continued from previous page)

```
│
CHANNEL ─┬─ VIEW CHANNEL (View power and channel settings of channel in use.)
SETTINGS │                                          Press [ENT] key to display.
         │                                 ┌── SELECT NO. (0-9) ──────────────────────┐
         └── EDIT CHANNEL ─────────────────┼── TIME                                   │
             │                             └── FROM ─┬─ MMSI (HIGH SEA, MMSI, EMPTY)   │
             │                                       └─ TYPE (HIGH SEA, AIS, PI, DSC,  │
             │                                          MANUAL, EMPTY)                 │
             │                             ┌── FROM MMSI ◄────────────────────────────┘
             │                             ├── POWER (2W, 12.5W)
             │                             ├── CH NO. ──── CH-A, CH-B
             │                             ├── MODE ──── CH-A, CH-B
             │                             ├── ZONE (1-8 (nm), 5)
             │                             │
             │                             └── CH AREA ─┬─ RIGHT TOP ─┬─ LAT
             │                                          │             └─ LON
             │                                          └─ LEFT BOTTOM ─┬─ LAT
             │                                                          └─ LON
             │
DIAG- ─┬─ MONITOR TEST (Displays program no.; checks ROM, RAM, LCD, controls.)
NOSTICS│
       ├─ TRANSPONDER ─┬─ MEMORY TEST (Displays program no.; checks ROM and RAM.)
       │  TEST         └─ GPS TEST (Display program no. and checks internal GPS receiver.)
       │
       ├─ PWR ON/OFF HISTORY (Log for time of equipment power on and off.)
       │
       ├─ TX ON/OFF HISTORY (Log for time of equipment transmission on and off.)
       │
       ├─ MEMORY CLEAR ─┬─ MONITOR CLEAR (YES, NO)
       │                ├─ SET USER DEFAULT (YES, NO)
       │                └─ GPS COLD START (YES, NO)
       │
       └─ FOR SERVICE (For service technician. Not accessible by user.)


[NAV STATUS] ─┬─ NAV STATUS (00-15)
key           ├─ DESTINATION ─┬─ SELECT
              │               ├─ EDIT
              │               └─ DELETE
              │
              ├─ ARRIVAL TIME ─┬─ DATE
              │                └─ TIME
              │
              ├─ CARGO TYPE & CREW ─┬─ CREW (0-8191)
              │                     └─ TYPE NO. (10-99. See page 1-8.)
              │
              └─ DRAUGHT (0.0 - 25.5)
```

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.

F U R U N O	Model	FA-150	
	Unit	MONITOR UNIT, TRANSPONDER UNIT	
ELECTRICAL PARTS LIST			
	Blk.No.		
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

AP-4

CPU Board
24P0062
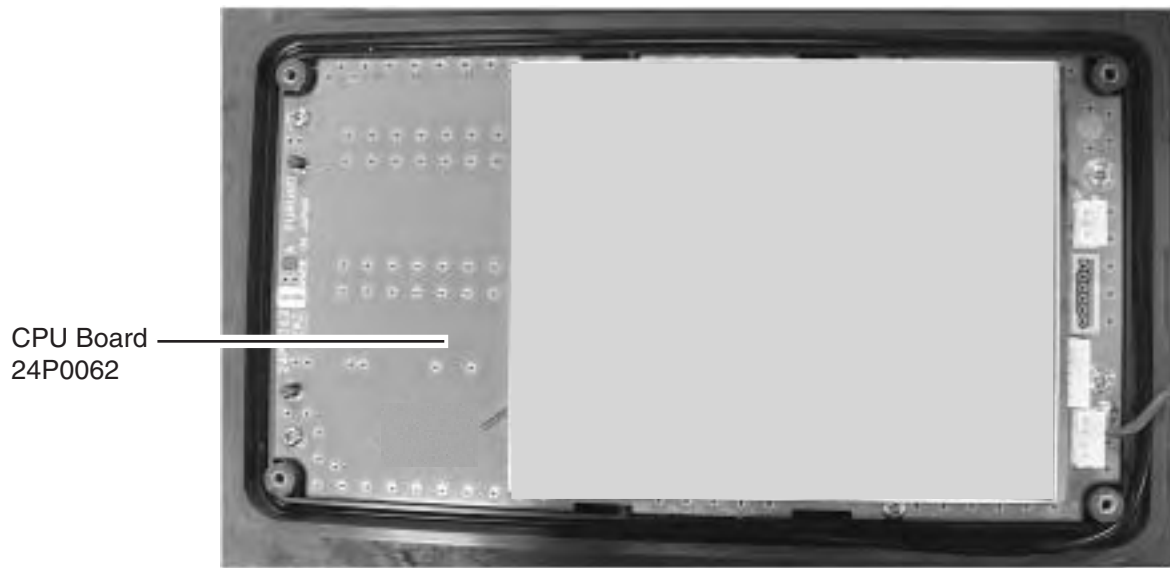
Monitor unit, rear cover opened

Transponder unit

MOT Board
24P0036

TX Board
24P0032

PWR Board
24P0037
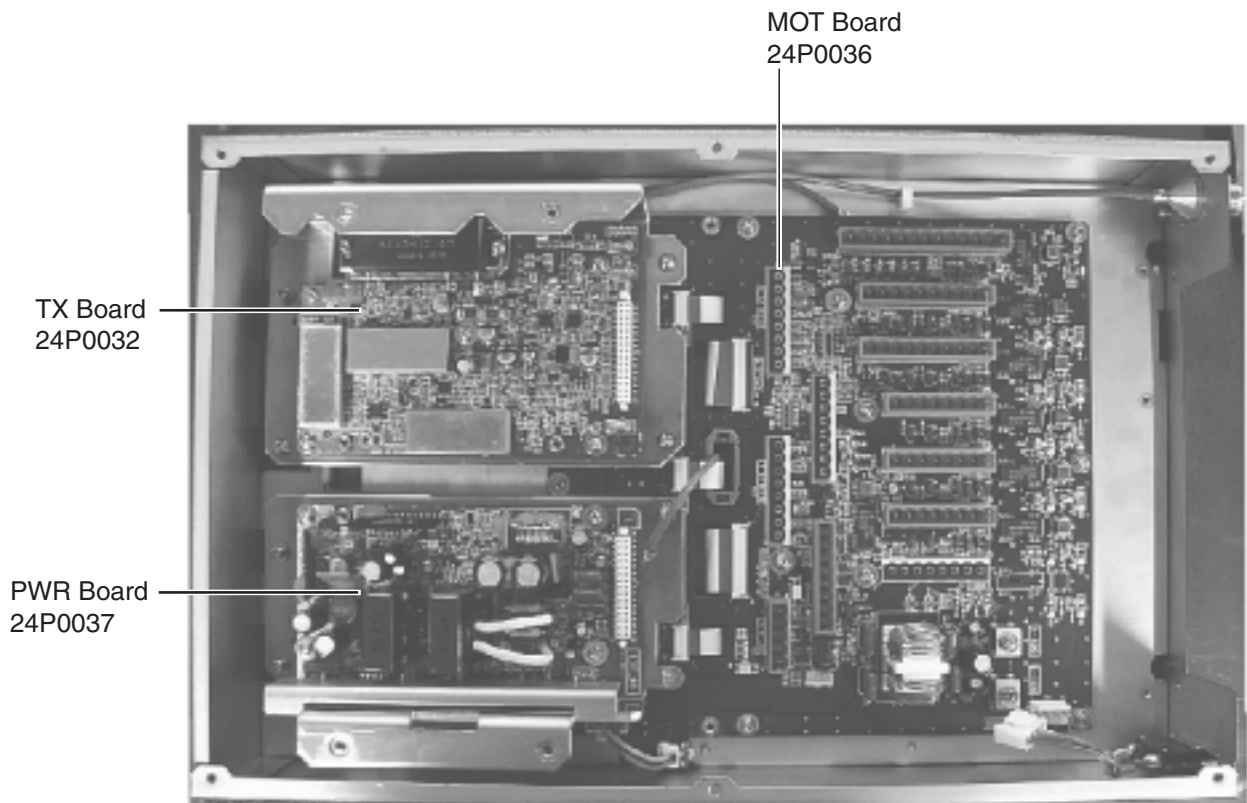
Transponder unit, top cover removed

GPS Receiver
GN-8093

MAIN Board
24P0035

GPSTB Board
24P0043

RX2 Board
24P0033

RX1 Board
24P0033

DSC Board
24P0033
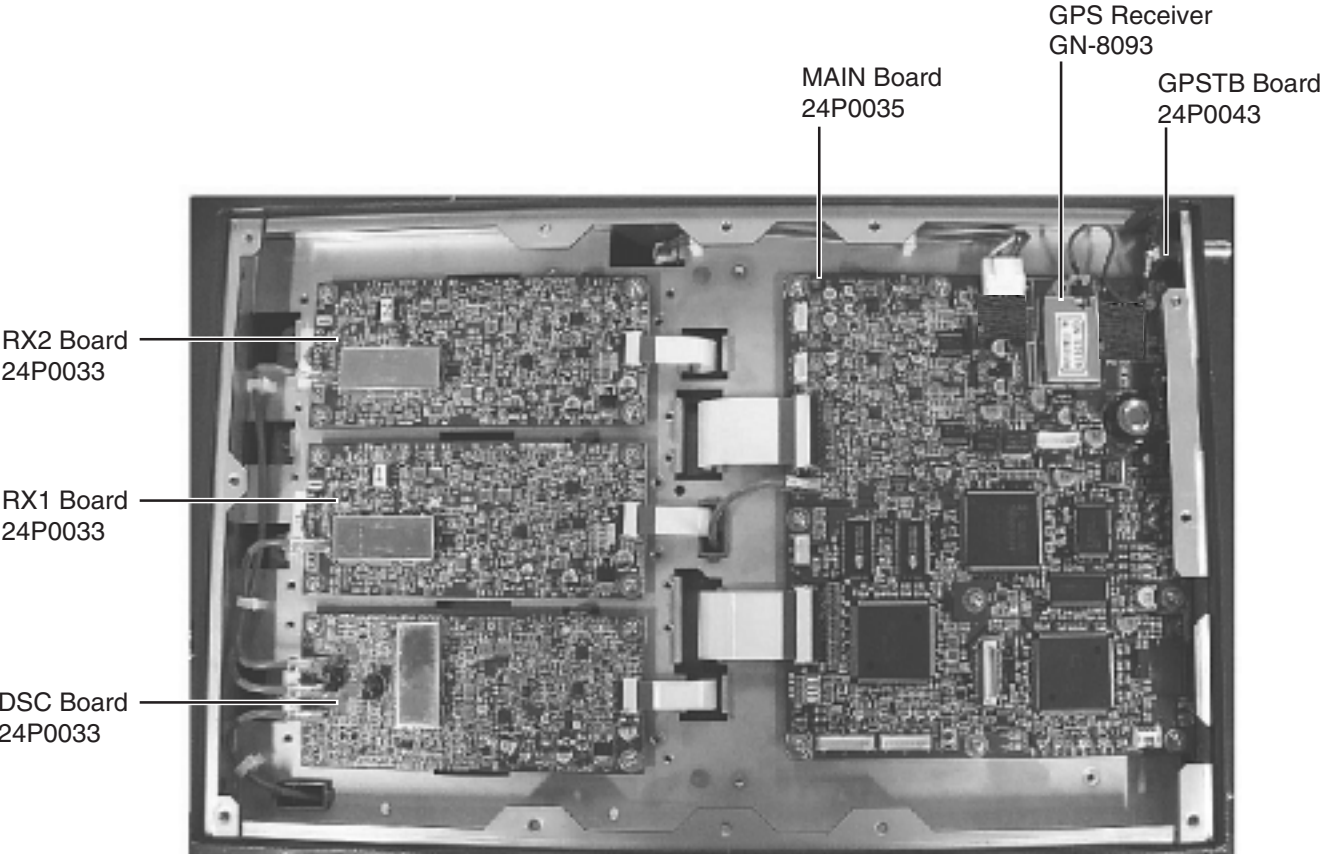
Transponder unit, bottom cover removed

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

AP-6
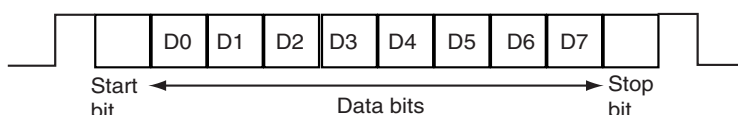
Serial interface I/O circuit

COM1, 2, 3 port

Baud rate selectable from 4800 and 38400 (bps).
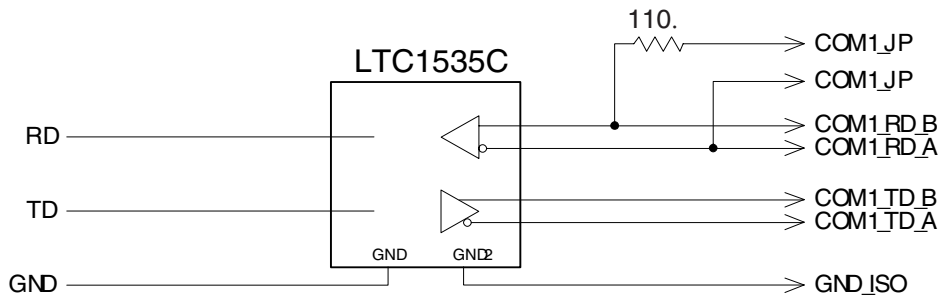
COM 4, 5 port

Baud rate selectable from 4800 and 38400 (bps).
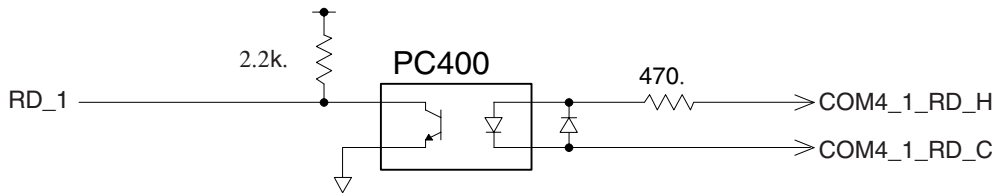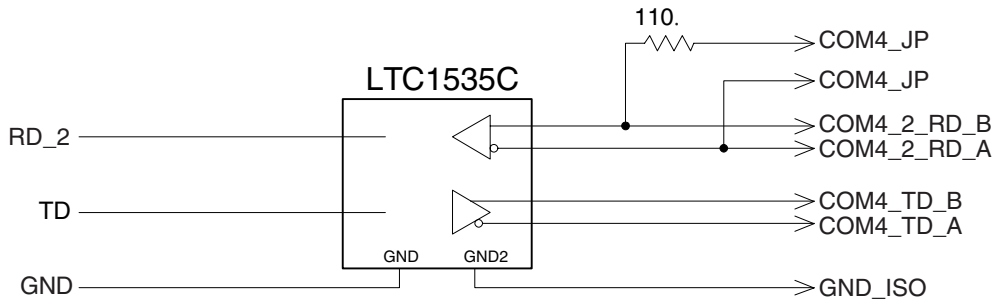
COM6 port

Baud rate selectable from 4800 and 38400 (bps).

APPENDIX
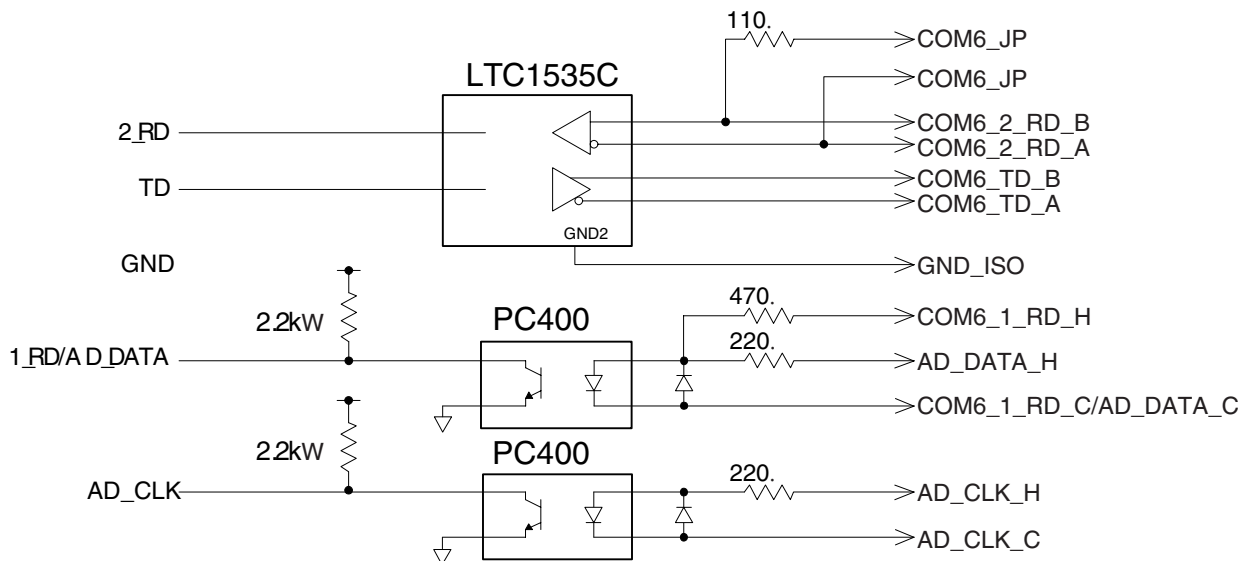
DISP port

Baud rate selectable from 4800 and 38400 (bps).
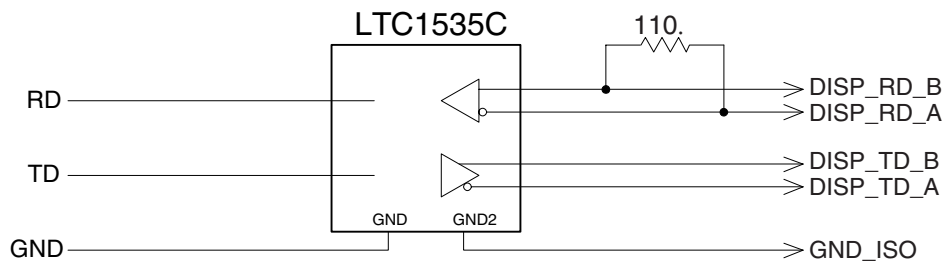
Sentence description

Input sentences

ABM - Addressed binary and safety related message

```
!--ABM,x,x,x,xxxxxxxxx,x,x.x,s--s,x*hh<CR><LF>
         | | |       |     | |   | | |
         | | |       |     | |   | | | +--- 9
         | | |       |     | |   | +----- 8
         | | |       |     | |   +-------- 7
         | | |       |     | +----------- 6
         | | |       |   +-------------- 5
         | | |       +-------------------- 4
         | | + ------------------------- 3
         | +------------------------- 2
         +---------------------------- 1
```
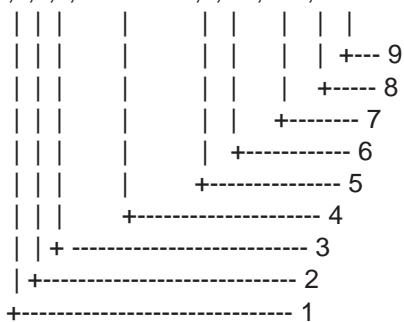
1. Total number of sentences needed to transfer the message, 1 to 9
2. Message sentence number, 1 to 9
3. Message sequence identifier, 0 to 3
4. The MMSI of destination AIS unit for the ITU-R M.1371 message 6 or 12
5. AIS channel for broadcast of the radio message
6. VDL message number(6 or 12), see ITU-R M.1371
7. Encapsulated data
8. Number of fill-bits, 0 to 5
9. Checksum

AP-8

ACA - AIS regional channel assignment message

$--ACA,x,llll.l, a,yyyyy.y,a,llll.l,a,yyyyy.y,a,x,xxxx,x,xxxx,x,x,x,a,x,hhmmss.s*hh<CR><LF>
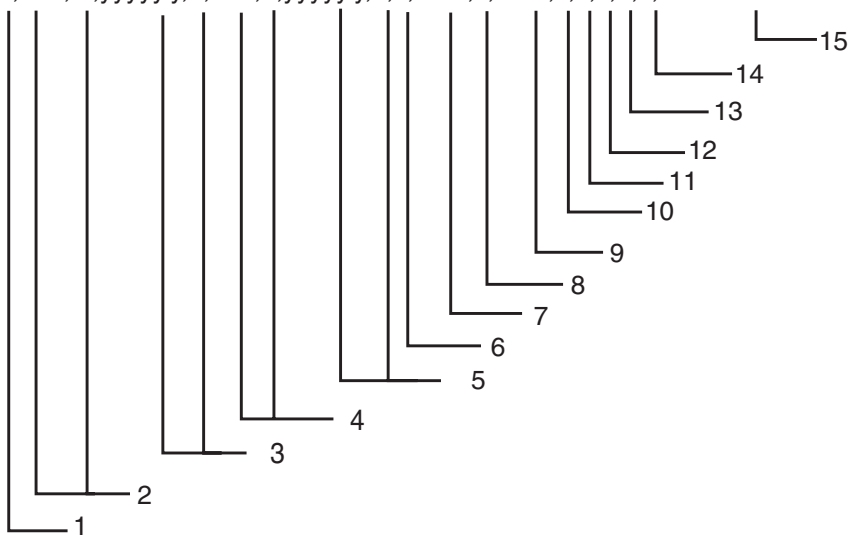
1. Sequence number, 0 to 9
2. Region Northeast corner latitude - N/S
3. Region Northeast corner longitude - E/W
4. Region Southwest corner latitude - N/S
5. Region Southwest corner longitude - E/W
6. Transition Zone Size
7. Channel A
8. Channel A bandwidth
9. Channel B
10. Channel B bandwidth
11. Tx/Rx 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>
        |   +-------------------- 2
        +------------------------ 1
```
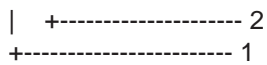
1. Local alarm number(identifier)
2. Checksum

AP-9

AIR - AIS interrogation request

```
$--AIR,xxxxxxxxx,x.x,x,x.x,x,xxxxxxxxx,x.x,x*hh<CR><LF>
                |        | | | |     |       | | |
                |        | | | |     |       | | +--- 9
                |        | | | |     |       | +----- 8
                |        | | | |     |       +-------- 7
                |        | | | |     +-------------- 6
                |        | | | +------------------- 5
                |        | | +---------------------- 4
                |        | +------------------------- 3
                |        +-------------------------- 2
                +---------------------------------- 1
```
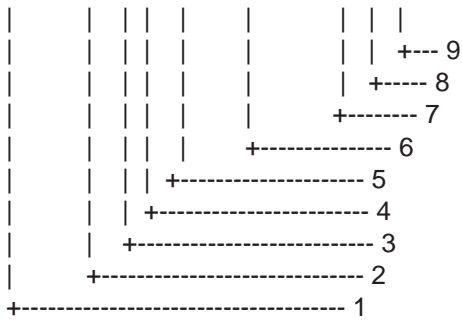
1. MMSI of interrogated station 1
2. ITU-R M.1371 message requested from station 1
3. Message sub-section
4. Number of second message requested from station 1
5. Message sub-section
6. MMSI of interrogated station 2
7. Number of message requested from station 2
8. Message data sub-section
9. Checksum

BBM - UAIS broadcast binary message.

```
!--BBM,x,x,x,x,x.x,s--s,x*hh<CR><LF>
      || | | |    | | |
      || | | |    | | +--- 8
      || | | |    | +------ 7
      || | | |    +--------- 6
      || | | +------------- 5
      || | +--------------- 4
      || +----------------- 3
      | +------------------ 2
      +--------------------- 1
```
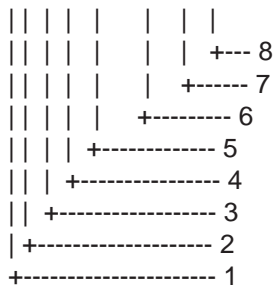
1. Total number of sentences needed to transfer the message, 1 to 9
2. Message sentence number, 1 to 9
3. Sequential Message identifier, 0 to 9
4. AIS channel for broadcast of the radio message
5. VDL message number(8 or 14), see ITU-R M.1371
6. Binary data
7. Number of fill-bits, 0 to 5
8. Checksum

AP-10

DTM - Datum reference

```
$--DTM,ccc,a,x.x,a,x.x,a,x.x,ccc*hh<CR><LF>
           |  |  |  |  |  |  |  |   |   |
           |  |  |  |  |  |  |  |   +--- 7
           |  |  |  |  |  |  |  +------ 6
           |  |  |  |  |  |  +---------- 5
           |  |  |  |  +---+------------ 4
           |  |  +---+------------------ 3
           |  +----------------------- 2
           +-------------------------- 1
```
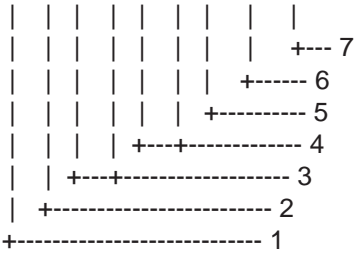
1. Local datum W84 - WGS84
             W72 - WGS72
             S85 - SGS85
             P90 - PE90
             999 - User defined
             IHO datum code
2. Not used
3. Lat offset, min, N/S
4. Lon offset, min, E/W
5. Not used
6. Reference dattum W84 - WGS84
                 W72 - WGS72
                 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>
              |       |  |  |  |  |  |  |  |  |
              |       |  |  |  |  |  |  |  |  +--------- 9
              |       |  |  |  |  |  |  |  +----------- 8
              |       |  |  |  |  |  |  +--------------- 7
              |       |  |  |  |  |  +------------------ 6
              |       |  |  |  |  +--------------------- 5
              |       |  |  |  +----------------------- 4
              |       |  |  +--------------------------- 3
              |       |  +------------------------------ 2
              |       +--------------------------------- 1
```
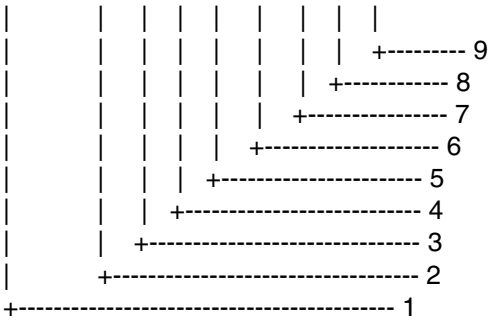
1. Not used
2. Expected error in latitude
3. Expected error in longitude
4. Not used
5. Not used
6. Not used
7. Not used
8. Not used
9. Checksum

GGA - Global positioning system (GPS) fix data

```
$--GGA,hhmmss.ss,llll.ll,a,yyyyy.yy,a,x,xx,x.x,x.x,M,x.x,M,x.x,xxxx*hh<CR><LF>
           |       |  |      |    | | | |  |  |  |  |  |  |   |  |
           |       |  |      |    | | | |  |  |  |  |  |  |   |  +-- 11
           |       |  |      |    | | | |  |  |  |  |  |  |   +---- 10
           |       |  |      |    | | | |  |  |  |  |  +---------- 9
           |       |  |      |    | | | |  |  |  +---+----------- 8
           |       |  |      |    | | | |  +---+---------------- 7
           |       |  |      |    | | | +---------------------- 6
           |       |  |      |    | | +----------------------- 5
           |       |  |      |    | +------------------------ 4
           |       |  |      +----+------------------------- 3
           |       +---+----------------------------------- 2
           +----------------------------------------------- 1
```
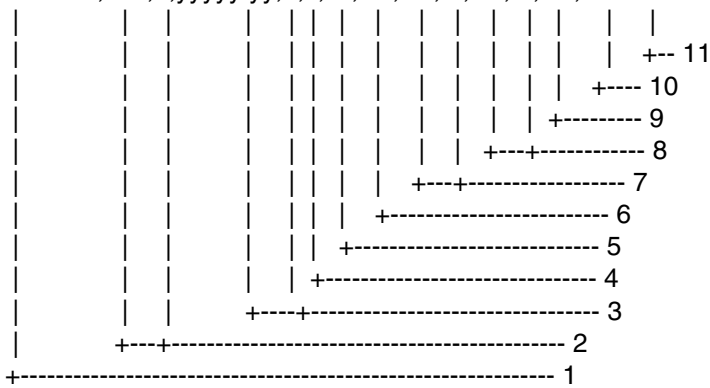
1. Not used
2. Latitude, N/S
3. Longitude, E/W
4. GPS quality indicator
5. Not used
6. Not used
7. Not used
8. Not used
9. Not used
10. Not used
11. Checksum

GLL - Geographic position - latitude/longitude

```
$--GLL,llll.ll,a,yyyyy.yy,a,hhmmss.ss,A,a*hh<CR><LF>
         | |      |       |      |    | | | |
         | |      |       |      |    | | | +------- 6
         | |      |       |      |    | | +--------- 5
         | |      |       |      |    | +----------- 4
         | |      |       |      +--------------- 3
         | |        +------+-------------------- 2
         +--+-------------------------------- 1
```
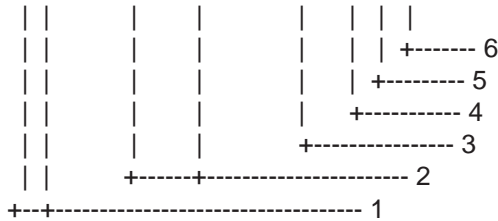
1. Latitude, N/S
2. Longitude, E/W
3. Not used
4. Status: A=data valid, V=data invalid
5. Mode indicator(see note)
6. Checksum

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,llll.ll,a,yyyyy.yy,a,c--c,xx,x.x,x.x,x.x,x.x,x.x*hh<CR><LF>
                  |      | |        | |    | | |  |   |   |   |   |
                  |      | |        | |    | | |  |   |   |   |   +--- 11
                  |      | |        | |    | | |  |   |   |   +------ 10
                  |      | |        | |    | | |  |   |   +---------- 9
                  |      | |        | |    | | |  |   +------------- 8
                  |      | |        | |    | | |  +---------------- 7
                  |      | |        | |    | | +-------------------- 6
                  |      | |        | |    | +---------------------- 5
                  |      | |        | |    +------------------------- 4
                  |      | |        +-------+---------------------------- 3
                  |      +--+----------------------------------------- 2
                  +------------------------------------------------------- 1
```
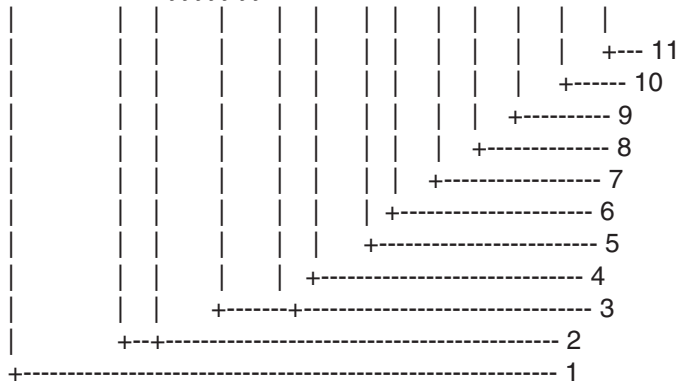
1. Not used
2. Latitude, N/S
3. Longitude, E/W
4. Mode indicator
5. Not used
6. Not used
7. Not used
8. Not used
9. Not used
10. Not used
11. Checksum

HDT - Heading - true

```
$--HDT,x.x,T*hh<CR><LF>
        |   | |
        |   | +--------- 2
        +----+----------- 1
```
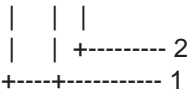
1. Heading, degrees true
2. Checksum

LRF - Long-range function

```
$--LRF,x,xxxxxxxxx,c--c,c--c,c--c*hh<CR><LF>
        |    |       |    |    |    |
        |    |       |    |    |    +--6
        |    |       |    |    +--- 5
        |    |       |    +------ 4
        |    |       +---------- 3
        |    +------------------ 2
        +----------------------- 1
```
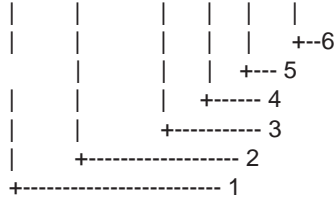
1. Sequence number, 0 to 9
2. MMSI of requestor
3. Name of requestor, 1 to 20 characters
4. Function request, 1 to 26 characters
5. Function reply status
6. Checksum

AP-13

LRI - Long-range interrogation

```
$--LRI,x,a,xxxxxxxxx,xxxxxxxxx,llll.ll,a,yyyyy.yy,a,llll.ll,a,yyyyy.yy,a*hh<CR><LF>
       ||    |        |       | |      | | | |     |  | |
       ||    |        |       | |      | | | |     |  | +--- 9
       ||    |        |       | |      | | | |     +---+---- 8
       ||    |        |       | |      | | +--+-------------- 7
       ||    |        |       | |      +--+------------------ 6
       ||    |        |     +--+------------------------------ 5
       ||    |      +------------------------------------------ 4
       ||    +-------------------------------------------------- 3
       | +-------------------------------------------------------- 2
       +------------------------------------------------------------ 1
```

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

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

AP-14

RMC - Recommended minimum specific GPS/TRANSIT data

```
$--RMC,hhmmss.ss,A,llll.ll,a,yyyyy.yy,a,x.x,x.x,xxxxxx,x.x,a,a*hh<CR><LF>
        |      | | |   |     | | | |    |   | | | |
        |      | | |   |     | | | |    |   | | | +--- 10
        |      | | |   |     | | | |    |   | | +----- 9
        |      | | |   |     | | | |    |   +--+------ 8
        |      | | |   |     | | | |    +-------------- 7
        |      | | |   |     | | | +-------------------- 6
        |      | | |   |     | | +---------------------- 5
        |      | | |   |     +--+------------------------ 4
        |      | | +---+------------------------------- 3
        |      +--------------------------------------- 2
        +--------------------------------------------- 1
```

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>
        |  | |
        |  | +--- 3
        |  +----- 2
        +-------- 1
```

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
```
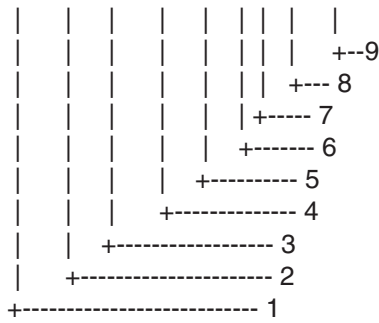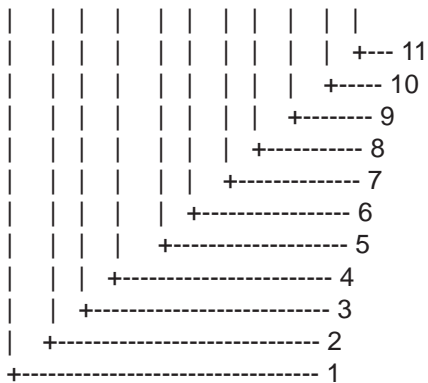
1. Ship's Call Sign, 1 to 7 characters
2. Ship's Name, 1 to 20 characters
3. Pos. ref. point distance, "A," from bow, 0 to 511 Meters
4. Pos. ref. point distance, "B," from stern, 0 to 511 Meters
5. Pos. ref. point distance, "C," from port beam, 0 to 63 Meters
6. Pos. ref. point distance, "D," from starboard 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
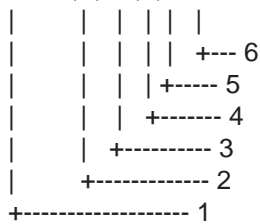
NOTE Positioning system Mode indicator:
  A = Autonomous
  D = Differential
  E = estimated(dead reckoning)
  M = Manual input
  S = Simulator
  N = Data not valid
 The positioning system Mode indicator field shall not be a null field.

AP-17

Output sentences

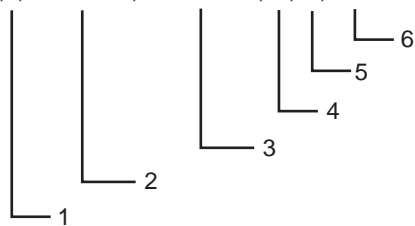## ABK - UAIS addressed and binary broadcast acknowledgement

```
$--ABK,xxxxxxxxx,a,x.x,x,x*hh<CR><LF>
             |        |  | | | |  |
             |        |  | | | |  +--- 6
             |        |  | | |+----- 5
             |        |  | | +------- 4
             |        |  | +--------- 3
             |        +------------ 2
             +------------------ 1
```

    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."
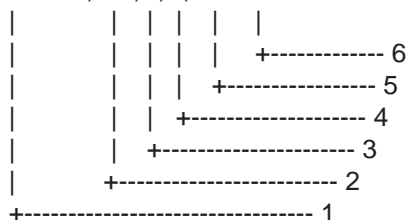
ACS - Channel management information source

```
$--ACS,x,xxxxxxxxx,hhmmss.ss,xx,xx,xxxx*hh<CR><LF>
       |     |          |      |  |   |
       |     |          |      |  |   └─ 6
       |     |          |      |  └─ 5
       |     |          |      └─ 4
       |     |          └─ 3
       |     └─ 2
       └─ 1
```

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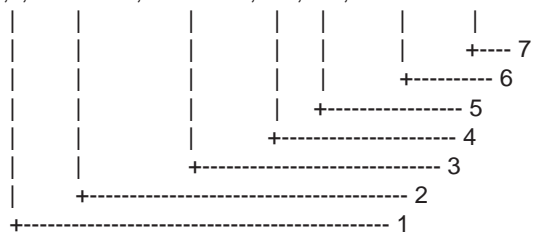
    1. Time of alarm condition change, UTC
    2. Local alarm number(identifier)
    3. Alarm condition(A=threshold exceeded, V=not exceeded)
    4. Alarm's acknowledge state, A=acknowledged V=unacknowledged
    5. Alarm's description text
    6. Checksum

AP-18

LRF - See "Input sentences."
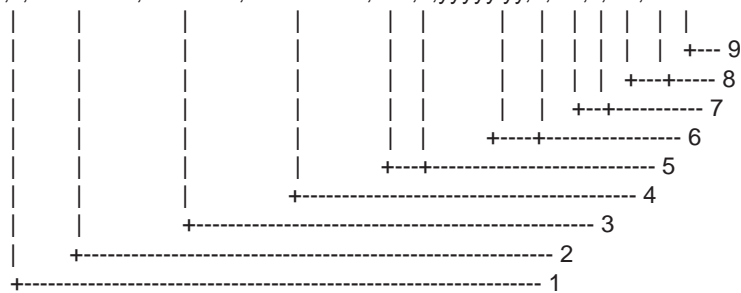
LR1 - Long-range reply with destination for function request "A"

```
$--LR1,x,xxxxxxxxx,xxxxxxxxx,c--c,c--c,xxxxxxxxx*hh<CR><LF>
           |    |        |        |     |    |         |
           |    |        |        |     |    |         +---- 7
           |    |        |        |     |    +---------- 6
           |    |        |        |     +---------------- 5
           |    |        |        +-------------------- 4
           |    |        +-------------------------- 3
           |    +------------------------------------ 2
           +---------------------------------------- 1
```

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

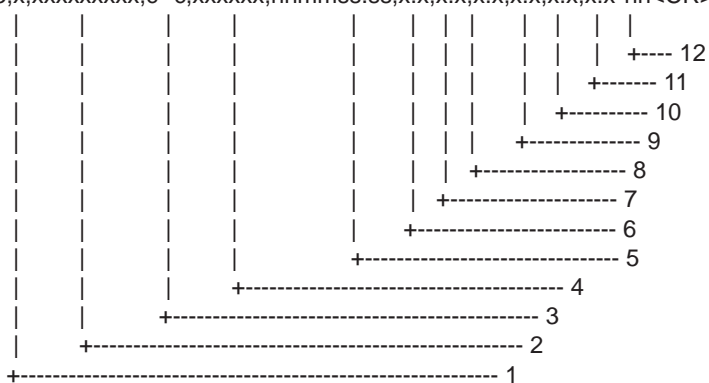## LR2 - Long-range reply for function requests "B, C, E, and F"

```
$--LR2,x,xxxxxxxxx,xxxxxxxx,hhmmss.ss,llll.ll,a,yyyyy.yy,a,x.x,T,x.x,N*hh<CR><LF>
           |    |        |          |       | |       | | |   | |   | |
           |    |        |          |       | |       | | |   | |   | +--- 9
           |    |        |          |       | |       | | |   | +---+---- 8
           |    |        |          |       | |       | | +--+---------- 7
           |    |        |          |       | |     +----+--------------- 6
           |    |        |          |     +---+------------------------ 5
           |    |        |          +--------------------------------- 4
           |    |        +---------------------------------------- 3
           |    +------------------------------------------------ 2
           +------------------------------------------------- 1
```

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

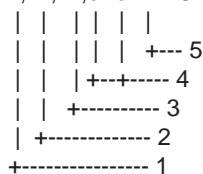## LR3 - Long-range reply for function requests "I, O, P, U and W"

```
$--LR3,x,xxxxxxxxx,c--c,xxxxxx,hhmmss.ss,x.x,x.x,x.x,x.x,x.x,x.x*hh<CR><LF>
        |    |       |     |        |      |  | |  |   |  |  |  |
        |    |       |     |        |      |  | |  |   |  |  |  +---- 12
        |    |       |     |        |      |  | |  |   |  |  +------- 11
        |    |       |     |        |      |  | |  |   |  +---------- 10
        |    |       |     |        |      |  | |  |   +------------- 9
        |    |       |     |        |      |  | |  +---------------- 8
        |    |       |     |        |      |  | +------------------- 7
        |    |       |     |        |      |  +--------------------- 6
        |    |       |     |        |      +---------------------- 5
        |    |       |     |        +------------------------------ 4
        |    |       |     +---------------------------------------- 3
        |    |       +--------------------------------------------- 2
        |    +------------------------------------------------------- 1
        +--------------------------------------------------------- 1
```

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(ITUR-R M.1371, Table 18)
11. Persons, 0 to 8191
12. Checksum

TXT - Text transmission

```
$--TXT,xx,xx,xx,c--c*hh<CR><LF>
        |  |  |  |   |
        |  |  |  |   +--- 5
        |  |  | +--+----- 4
        |  |  +---------- 3
        | +------------- 2
        +--------------- 1
```

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

International mode

Ch No.	FREQUENCY	Ch No.	FREQUENCY	Ch No.	FREQUENCY	Ch No.	FREQUENCY
1001	156.05	1088	157.425	277	156.8875	2079	161.575
1002	156.1	1201	156.0625	1278	156.9375	2080	161.625
1003	156.15	1202	156.1125	1279	156.9875	2081	161.675
1004	156.2	1203	156.1625	1280	157.0375	2082	161.725
1005	156.25	1204	156.2125	1281	157.0875	2083	161.775
6	156.3	1205	156.2625	1282	1571375	2084	161.825
1007	156.35	1206	156.3125	1283	157.1875	2085	161.875
1018	156.9	1207	156.3625	1284	157.2375	2086	161.925
1019	156.95	208	156.4125	1285	157.2875	2087	161.975
1020	157	209	156.4625	1286	157.3375	2088	162.025
1021	157.05	210	156.5125	1287	157.3875	2201	160.6625
1022	157.1	211	156.5625	2001	160.65	2202	160.7125
1023	157.15	212	156.6125	2002	160.7	2203	160.7625
1024	157.2	213	156.6625	2003	160.75	2204	160.8125
1025	157.25	214	156.7125	2004	160.8	2205	160.8625
1026	157.3	215	156.7625	2005	160.85	2206	160.9125
1027	157.35	216	156.8125	2007	160.95	2207	160.9625
1028	157.4	217	156.8625	8	156.4	2218	161.5125
1060	156.025	1218	156.9125	9	156.45	2219	161.5625
1061	156.075	1219	156.9625	10	156.5	2220	161.6125
1062	156.125	1220	157.0125	11	156.55	2221	161.6625
1063	156.175	1221	157.0625	12	156.6	2222	161.7125
1064	156.225	1222	157.1125	13	156.65	2223	161.7625
1065	156.275	1223	157.1625	14	156.7	2224	161.8125
1066	156.325	1224	157.2125	15	156.75	2225	161.8625
67	156.375	1225	157.2625	16	156.8	2226	161.9125
68	156.425	1226	157.3125	17	156.85	2227	161.9625
69	156.475	1227	157.3625	2018	161.5	2228	162.0125
70	156.525	1228	157.4125	2019	161.55	2260	160.6375
71	156.575	1260	156.0375	2020	161.6	2261	160.6875
72	156.625	1261	156.0875	2021	161.65	2262	160.7375
73	156.675	1262	156.1375	2022	161.7	2263	160.7875
74	156.725	1263	156.1875	2023	161.75	2264	160.8375
75	156.775	1264	156.2375	2024	161.8	2265	160.8875
76	156.825	1265	156.2875	2025	161.85	2266	160.9375
77	156.875	1266	156.3375	2026	161.9	2278	161.5375
1078	156.925	267	156.3875	2027	161.95	2279	161.5875
1079	156.975	268	156.4375	2028	162	2280	161.6375
1080	157.025	269	156.4875	2060	160.625	2281	161.6875
1081	157.075	270	156.5375	2061	160.675	2282	161.7375
1082	157.125	271	156.5875	2062	160.725	2283	161.7875
1083	157.175	272	156.6375	2063	160.775	2284	161.8375
1084	157.225	273	156.6875	2064	160.825	2285	161.8875
1085	157.275	274	156.7375	2065	160.875	2286	161.9375
1086	157.325	275	156.7875	2066	160.925	2287	161.9875
1087	157.375	276	156.8375	2078	161.525		

AP-22

USA mode

Ch No.	FREQUENCY	Ch No.	FREQUENCY	Ch No.	FREQUENCY	Ch No.	FREQUENCY
1001	156.05	1088	157.425	277	156.8875	2079	161.575
		1201	156.0625	1278	156.9375	2080	161.625
1003	156.15	1202	156.1125	1279	156.9875	2081	161.675
		1203	156.1625	1280	157.0375	2082	161.725
1005	156.25	1204	156.2125	1281	157.0875	2083	161.775
6	156.3	1205	156.2625	1282	157.1375	2084	161.825
1007	156.35	1206	156.3125	1283	157.1875	2085	161.875
1018	156.9	1207	156.3625	1284	157.2375	2086	161.925
1019	156.95	208	156.4125	1285	157.2875	2087	161.975
1020	157	209	156.4625	1286	157.3375	2088	162.025
1021	157.05	210	156.5125	1287	157.3875	2201	160.6625
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1025	157.25	214	156.7125	2004	160.8	2205	160.8625
1026	157.3	215	156.7625	2005	160.85	2206	160.9125
1027	157.35	216	156.8125	2007	160.95	2207	160.9625
1028	157.4	217	156.8625	8	156.4	2218	161.5125
		1218	156.9125	9	156.45	2219	161.5625
1061	156.075	1219	156.9625	10	156.5	2220	161.6125
		1220	157.0125	11	156.55	2221	161.6625
1063	156.175	1221	157.0625	12	156.6	2222	161.7125
1064	156.225	1222	157.1125	13	156.65	2223	161.7625
1065	156.275	1223	157.1625	14	156.7	2224	161.8125
1066	156.325	1224	157.2125	15	156.75	2225	161.8625
67	156.375	1225	157.2625	16	156.8	2226	161.9125
68	156.425	1226	157.3125	17	156.85	2227	161.9625
69	156.475	1227	157.3625	2018	161.5	2228	162.0125
70	156.525	1228	157.4125	2019	161.55	2260	160.6375
71	156.575	1260	156.0375	2020	161.6	2261	160.6875
72	156.625	1261	156.0875	2021	161.65	2262	160.7375
73	156.675	1262	156.1375	2022	161.7	2263	160.7875
74	156.725	1263	156.1875	2023	161.75	2264	160.8375
75	156.775	1264	156.2375	2024	161.8	2265	160.8875
76	156.825	1265	156.2875	2025	161.85	2266	160.9375
77	156.875	1266	156.3375	2026	161.9	2278	161.5375
1078	156.925	267	156.3875	2027	161.95	2279	161.5875
1079	156.975	268	156.4375	2028	162	2280	161.6375
1080	157.025	269	156.4875	2060	160.625	2281	161.6875
1081	157.075	270	156.5375	2061	160.675	2282	161.7375
1082	157.125	271	156.5875	2062	160.725	2283	161.7875
1083	157.175	272	156.6375	2063	160.775	2284	161.8375
1084	157.225	273	156.6875	2064	160.825	2285	161.8875
1085	157.275	274	156.7375	2065	160.875	2286	161.9375
1086	157.325	275	156.7875	2066	160.925	2287	161.9875
1087	157.375	276	156.8375	2078	161.525		

1 W power on CH13 and CH67.

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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 Bandwidth   25 kHz/ 12.5 kHz

2.   MONITOR UNIT

2.1   Display   4.5-inch, monochrome LCD

2.2   Display Size   60 (H) x 95 (W) mm

2.3   No. of Dots   120 x 64 dots

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: 36 seconds, Cold start: 43 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 – COM4   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

                             Note: COM4 also functions as SENSOR input.

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

4.4 External Beacon   RS-232C (PC)

4.5 PC   RS-232C

4.6 Alarm Output   Contact closure

4.7 AD-10   AD-10 format (FURUNO gyro format)

5. POWER SUPPLY

5.1 Monitor Unit   12-24 VDC: 0.3-0.15 A

5.2 Transponder Unit   12-24 VDC: 7-3.5 A

5.3 AC/DC Power Supply Unit PR-240 (option)

                      100-115/200-230 VAC, 1 phase, 50/60 Hz
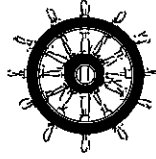
6. ENVIRONMENTAL CONDITION

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 Waterproofing (IEC 60529)

      Antenna Unit: IPX6

      Transponder Unit: IP20

      Display Unit: IP22

6.4 Vibration (IEC 60945 ed.4)

                      From 2 Hz-5 Hz to 13.2 Hz : Amplitude ±1 mm ±10%

                      (Maximum acceleration at 13.2Hz: 7m/s^2)

7. COATING COLOR

7.1 GPS Antenna Unit: N9.5

7.2 Other Units: 2.5GY5/1.5

INDEX

FURUNO®

FURUNO ELECTRIC CO., LTD.
9-52 Ashihara-Cho, Nishinomiya City, 662-8580, Hyogo, Japan
Tel: +81 798-65-2111 Fax: +81 798-65-4200

Pub NO. DOC-745

Declaration of conformity

0735

We   FURUNO ELECTRIC CO., LTD.

(Manufacturer)

9-52 Ashihara-Cho, Nishinomiya City, 662-8580, Hyogo, Japan

(Address)

hereby declare under our sole responsibility that the product

Automatic Identification System type FA-150 consisting of AIS transponder unit FA-1501, Minimum keyboard & display (MKD) unit FA-1502, GPS antenna GSC-001 or GPA-017S, VHF antenna FAB-151D or 150M-W2VN; Optional components: GPS/VHF combined antenna GVA-100/DB1 and AC/DC power supply unit PR-240

(Model names, type numbers)

to which this declaration relates conforms to the following standard(s) or normative document(s)

IMO Resolution MSC.74(69) Annex 3
ITU-R Recommendations M.1371-1 (Class A), M.825-3, M.1084-3
IALA Technical Clarification of Recommendation ITU-R M.1371-1 (Edition 1.4)
IEC 61993-2: 2001-12, IEC 61162-1: 2000-07, IEC 61162-2: 1998-09, IEC 60945: 2002-08,
IEC 61108-1: 2003-07

(title and/or number and date of issue of the standard(s) or other normative document(s))

For assessment, see:

- EC type examination (Module B) certificate No. 734.2/0068/2004 of 20 December 2004 issued by Federal Maritime and Hydrographic Agency, the Federal Republic of Germany

- EC Quality System (Module D) Certificate no. BSH-022-03-1999/4 of 15 June 2004 and its Annex of 05 January 2005 issued by Federal Maritime and Hydrographic Agency, the Federal Republic of Germany

- Test report 734.2/0068-1/2004/S3220 of 21 October 2004 issued by Federal Maritime and Hydrographic Agency, the Federal Republic of Germany

- Radio test report 99495430 of 3 August 2004 issued by Telefication, The Netherlands

- Test Report FLI 12-04-049 of 17 August 2004 issued by Furuno Labotech International Co., Ltd.

This declaration is issued according to the provisions of European Council Directive 96/98/EC on marine equipment as modified by Commission Directive 2002/75/EC.

On behalf of Furuno Electric Co., Ltd.

Hiroaki Komatsu
Manager,
International Rules and Regulations

Nishinomiya City, Japan
January 13, 2005

(Place and date of issue)   (name and signature or equivalent marking of authorized person)