FURUNO

FA-50

CLASS B AIS TRANSPONDER

OPERATOR'S MANUAL

FURUNO ELECTRIC CO., LTD.

www.furuno.co.jp

IMPORTANT NOTICES

- The descriptions in this manual are intended for readers with a solid knowledge of English.
- 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.
- Store this manual in a convenient place for future reference.
- FURUNO will assume no responsibility for the damage caused by improper use or modification of the equipment (including software) by an unauthorized agent or a third party.
- When it is time to discard this product it must be done according to local regulations for disposal of industrial waste. For disposal in the USA, refer to the Electronics Industries Alliance (http://www.eiae.org/).

⚠ SAFETY INSTRUCTIONS

The operator and installer must read the applicable safety instructions before attempting to install or operate the equipment.

⚠ **WARNING**	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
⚠ CAUTION	Indicates a potentially hazardous situation which, if not avoided, can result in minor or moderate injury.

⚠ Warning, Caution ⃠ Prohibitive Action ❗ Mandatory Action

Safety instructions for the operator

⚠ WARNING

Do not open the equipment.

Only qualified personnel should work inside the equipment.

Do not disassemble or modify the equipment.

Fire, electrical shock or serious injury can result.

Immediately turn off the power at the power source if

- **water leaks into the equipment**
- **something is dropped into the equipment**
- **the equipment is emitting smoke or is on fire**
- **the equipment is emitting strange noises**

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

Do not operate the equipment with wet hands.

Electrical shock can result.

Use the proper fuse.

Use of the wrong fuse can cause fire or electrical shock.

⚠ WARNING

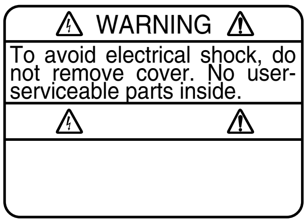
Do not place liquid-filled containers on the top of the equipment.

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

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

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

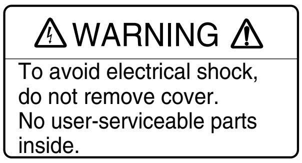
Warning labels are attached to the equipment. Do not remove these labels. If a label is missing or illegible, contact a FURUNO agent or dealer about replacement.



⚠ 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



⚠ WARNING ⚠

To avoid electrical shock, do not remove cover.
No user-serviceable parts inside.

Name: Warning Label (2)
Type: 86-129-1001-1
Code No.: 100-236-741

Safety instructions for the installer

⚠ WARNING

Turn off the power at the switchboard before beginning the installation.

Fire or electrical shock can result if the power is left on.

Do not install the equipment where it may get wet from rain or water splash.

Water in the equipment can result in fire, electrical shock or damage to the equipment.

Be sure that the power supply is compatible with the voltage rating of the equipment.

Connecting an incompatible power supply can cause fire or damage the equipment. The voltage rating appears on the inlet of power.

⚠ CAUTION

Observe the following compass safe distances to prevent interference to a magnetic compass:

	Standard compass	Steering compass
FA-50	0.30 m	0.30 m

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FOREWORD

A Word to the Owner of the FA-50

Congratulations on your choice of the FURUNO FA-50 AIS Transponder. We are confident you will see 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 marine electronics equipment. This dedication to excellence is furthered by our extensive global network of agents and dealers.

This equipment is designed and constructed to meet the rigorous demands of the marine environment. However, no machine can perform its intended function unless operated and maintained properly. Please carefully read and follow the recommended procedures for operation and maintenance.

Thank you for considering and purchasing FURUNO equipment.

Features

The FA-50 is a Class B 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.1371-2 and DSC ITU-R M.825.3 It also complies with IEC 62287-1 (Type testing standard), IEC 60945 (EMC and environmental conditions).

FA-50 consists of VHF and GPS antennas, a transponder unit and several associated units. The transponder contains a VHF transmitter, two TDMA receivers on two parallel VHF channels, interface, communication processor, and internal GPS receiver. The internal GPS is a 12-channel all-in-view receiver with a differential capability. It also gives position, COG and SOG when the external GPS wails. FA-50 receives DSC, time-sharing with TDMA receiver.

The main features are

- Safety of navigation by automatically exchanging navigational data
- Static data

-MMSI (Maritime Mobile Service Identity)

-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

- Voyage-related data

-Hazardous cargo (type)

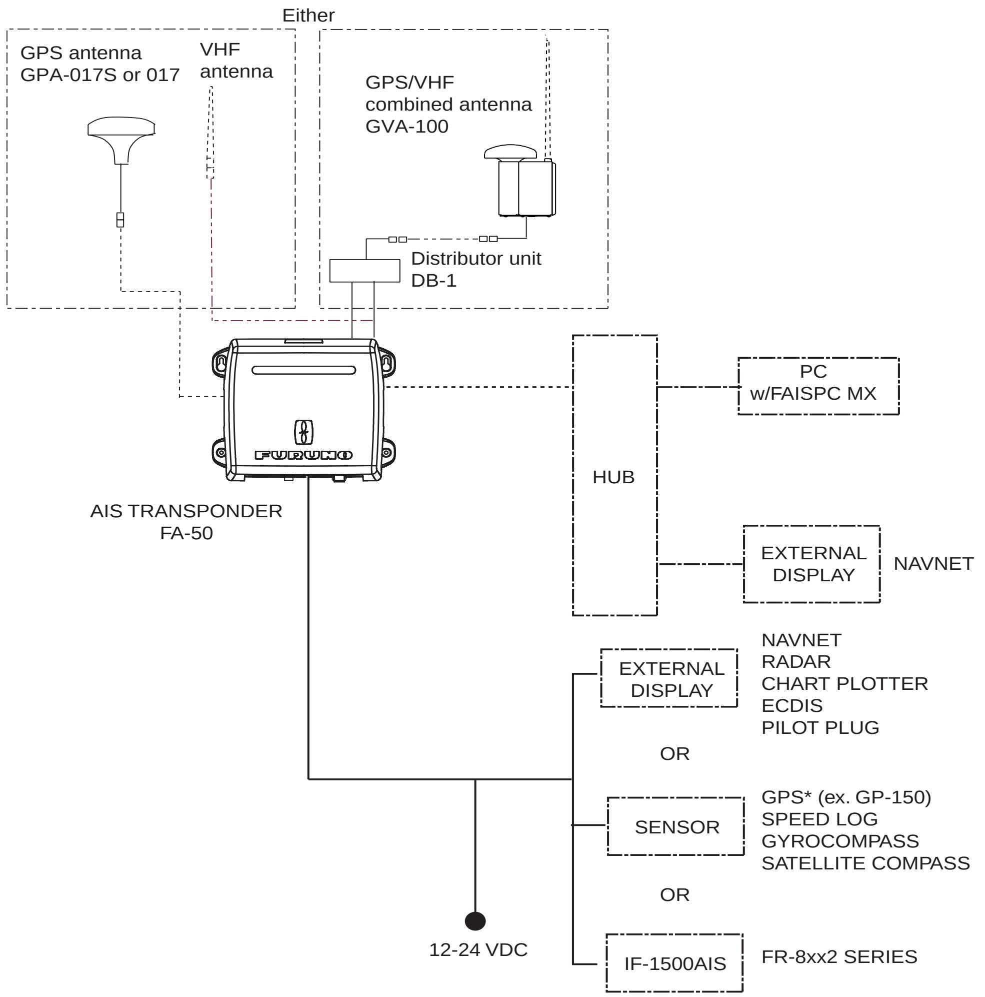
- Short safety-related messages, pre-set messages
- Interfaces for radar, PC for future networking expansion
- GPS/VHF combined antenna for easy installation available
- Built-in GPS receiver for position-fixing device

Program Version

Item	Program No.	Version No.	Date
FA-50 AIS Transponder Main Program	xxx	xxx	July 2007

**: Minor change

SYSTEM CONFIGURATION


Either
GPS antenna
GPA-017S or 017
VHF
antenna
GPS/VHF
combined antenna
GVA-100
Distributor unit
DB-1
AIS TRANSPONDER
FA-50
HUB
PC
w/FAISPC MX
EXTERNAL
DISPLAY
NAVNET
EXTERNAL
DISPLAY
NAVNET
RADAR
CHART PLOTTER
ECDIS
PILOT PLUG
OR
SENSOR
GPS* (ex. GP-150)
SPEED LOG
GYROCOMPASS
SATELLITE COMPASS
OR
IF-1500AIS
FR-8xx2 SERIES
12-24 VDC

——— : Standard supply
- - - - - : Optional supply
—·—·— : Local supply

*Usaually FA-50 uses the internal GPS. When connecting the external GPS, use one which satisfies the followings.

1) Outputs DTM sentence (WGS-84 can be chosen.)
2) Outputs GBS sentence.
3) Outputs sentences with the mode indicator;
   GNS: Ver.3.0 and later
   GLL: Ver.2.0 and later
   GGA: Ver.2.0 and later
   RMC: Ver.1.5 and later
4) The measured result of internal and external GPSs should be within 26 m.(These antenna should be located within 6 m.)

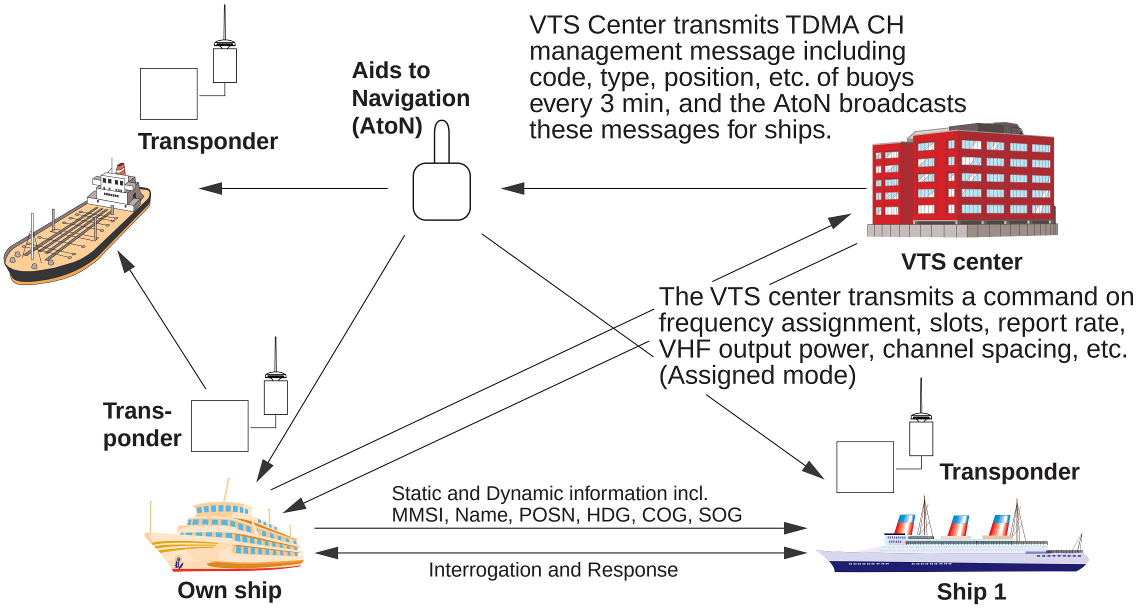
We, FURUNO, prepare GPS navigator GP-150 as the equipment meeting with requirements shown above.

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 UL coastal areas and others. Some time later the IMO developed a Universal AIS using the new sophisticated technology called Carrier-Sence Time Division Multiple Access (CSTDMA) based on a VHF Data Link (VDL).

The system operates in three methods - autonomous (continuous operation in all areas), assigned (data transmission interval remotely controlled by authority in traffic monitoring service) and polled (in response to interrorgation 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 on ship. AIS has Class A and Class B; Class A is the standard for SOLAS ships, Class B is for non-SOLAS. There are two type of transmission method, SOTD MA (Self Organising Time Division Multiple Access) and CSTD MA (Carrier Sence Time Division Multiple Access). Class B is the inexpencive and simple AIS for easy mounting on boats.


Transponder
Aids to Navigation (AtoN)
VTS center
Trans-ponder
Transponder
Static and Dynamic information incl.
MMSI, Name, POSN, HDG, COG, SOG
Interrogation and Response
Own ship
Ship 1

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.

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

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.

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. INSTALLATION

1.1 Equipment Lists

Standard supply

Name	Type	Code No.	Qty	Remarks
AIS Transponder	FA-50-E	-	1	
GPS/VHF combined antenna	GVA-100	-	1	Select one.
GPS Antenna (Select one)	GPA-017S	-	1 set	
	GPA017	-	1 set	
Spare parts			1 set	Fuse, FGB0-A 4A AC125V
Accessories			1 set	FAISPC-MX (CD)
Installation Materials	CP24-00141	005-952-330	1 set	For transponder
	CP24-00502	005-955-560	1 set	For GPA-017S
	-	-	1 set	For GPA-017
	CP24-00141	005-952-330	1 set	For GVA-100
	CP24-00101	005-950-730	1 set	For DB-1

Optional supply

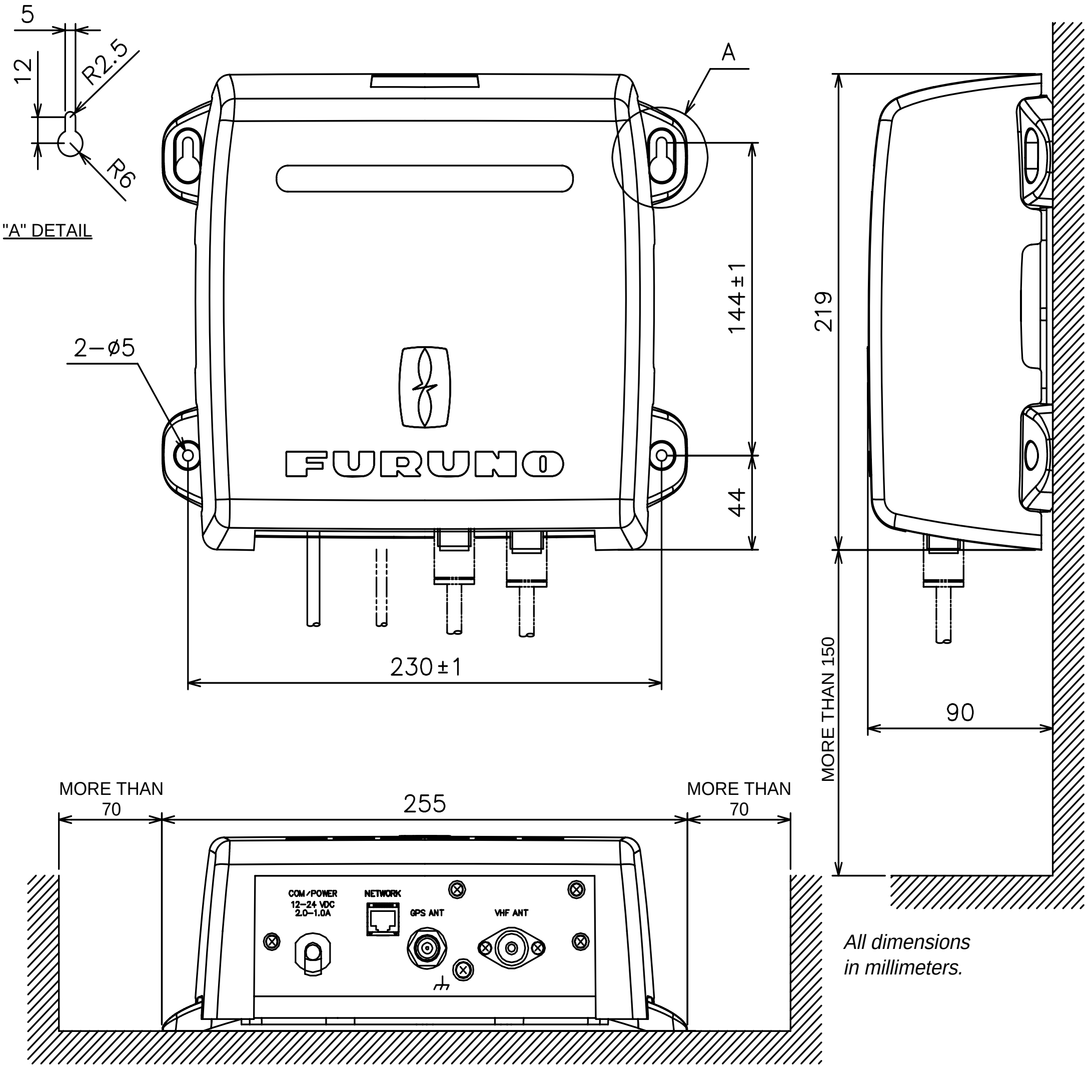
Name	Type	Code No.	Qty	Remarks
AC-DC power supply	PR-240-CE	-	1	
Whip antenna	150M-W2VN	000-113-498	1	For outside Japan
	FAB-151D	000-572-029	1	For Japan only
Antenna fixing bracket	4-310071	000-572-184	1	For FAB-151D
Antenna cable set	CP20-02700	004-381-160	1	For GPA-017S
	CP20-02710	004-381-170	1	For GPA-017S
	CP24-00300	000-041-938	1	For GVA-100
	CP24-00310	000-041-939	1	For GVA-100
Coaxial cable	TNC-PS-3D-15	000-133-670	1	TNC-TNC, 15 m
Right-angle antenna base	No.13-QA330	000-803-239	1	For GPA-017/S
L-angle antenna base	No.13-QA310	000-803-240	1	For GPA-017/S
Antenna base for rail mount	No.13-RC5160	000-806-114	1	For GPA-017/S
Mast mount fixture	CP20-01111	004-365-780	1	For GPA-017/S
AIS viewer	FAISPC-MX		1	
LAN cable	P5E-4PTX-BL		1	2 m/10 m

1.2 AIS Transponder FA-50

Mounting considerations, mounting

The FA-50 can be mounted on a desktop, deck or on a bulkhead. When selecting a mounting location, keep the following points in mind:

- The temperature and humidity should be moderate and stable.
- Locate the unit away from exhaust pipes and vents.
- The mounting location should be well ventilated.
- Mount the unit where shock and vibration are minimal.
- Keep the unit away from electromagnetic field-generating equipment such as motors and generators.
- A magnetic compass will be affected if the FA-50 is placed too close to it. Observe the compass safe distances noted in the safety instructions to prevent disturbance to the magnetic compass.
- Fix the unit to the mounting location with 4x20 self-tapping screws (supplied).



5
12
R2.5
R6
"A" DETAIL
A
2−ø5
144±1
44
230±1
219
MORE THAN 150
90
MORE THAN 70
255
MORE THAN 70
FURUNO
COM/POWER 12−24 VDC 2.0−1.0A
NETWORK
GPS ANT
VHF ANT

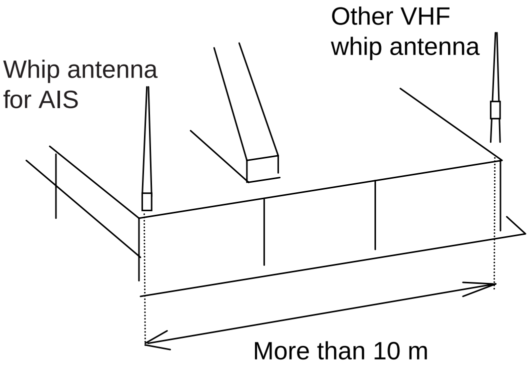
All dimensions in millimeters.

1.3 Whip Antenna

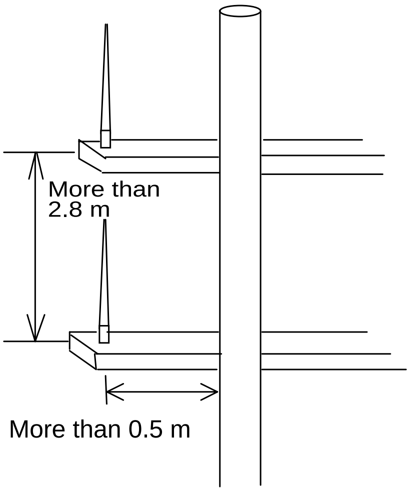
Location

The location of the AIS VHF-antenna should be carefully considered. Digital communication is more sensitive than analog/voice communication to interference created by reflections in obstructions like masts and booms. It may be necessary to relocate the VHF radiotelephone antenna to minimize interference effects. To minimize interference effects, the following guidelines apply:

- The AIS VHF antenna should be placed in an elevated position that is as free as possible with a minimum of 0.5 meters in the horizontal direction from constructions made of conductive materials. The antenna should not be installed close to any large vertical obstruction. The objective for the AIS VHF antenna is to see the horizon freely through 360 degrees.
- There should not be more than one antenna on the same plane. The AIS VHF antenna should be mounted directly above or below the ship's primary VHF radiotelephone antenna, with no horizontal separation and with a minimum of 2.8 meters vertical separation. If it is located on the same plane as other antennas, the distance apart should be at least 10 meters.
- Install the VHF whip antenna (option) referring to the outline drawing at the back of this manual. Separate this antenna from other VHF radiotelephone antennas as shown below to prevent interference to the FA-50.



Horizontal separation distance



Vertical separation distance

Cabling

- Use coaxial cable type 5D-2V or the equivalent.
- The cable should be kept as short as possible to minimize signal attenuation, and the maximum length is 50 meters.
- All outdoor-installed connectors on coaxial cables should be fitted with preventive isolation such as vulcanizing tape to protect against water penetration into the antenna cable.
- Coaxial cables should be installed in separate signal cable channels/tubes and at least 10 cm away from power supply cables. Crossing of cables should be done at right angles (90 degrees). The minimum bend radius of the coaxial cable should be 5 times the cable's outer diameter.

1.4 GPS Antenna

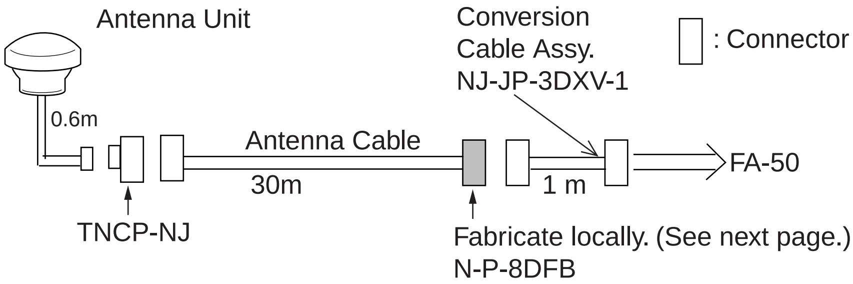
Install the GPS antenna unit referring to the drawing on page D-5 or D-6 at the back of this manual. When selecting a mounting location for the antenna, keep in mind the following points.

- Select a location out of the radar beam. The radar beam will obstruct or prevent reception of the GPS satellite signal.
- There should be no interfering object within the line-of-sight to the satellites. Objects within line-of-sight to a satellite, for example, a mast, may block reception or prolong acquisition time.
- Mount the antenna unit as high as possible to keep it free of interfering objects and water spray, which can interrupt reception of GPS satellite signal if the water freezes.

Extending antenna cable

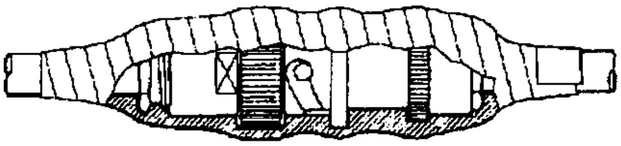
Three types of antenna cable extensions are optionally available.

a) Antenna cable set CP20-02700



- Waterproofing connector

Wrap connector with vulcanizing tape and then vinyl tape. Bind the tape end with a cable-tie.



Waterproofing connector

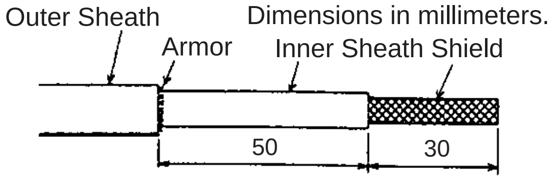
b) Antenna cable set CP20-02710 (8D-FB-CV, 50m)

Connect the cable the same as a) above.

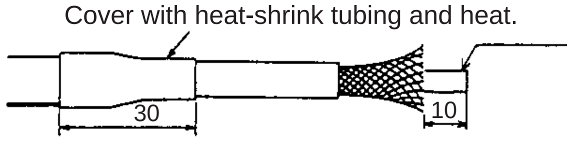
c) Cable type RG-10/UY (shipyard supply)

Note: The length of this cable should be less than 20 m to prevent signal loss. The coax. coupling cable assy.(type: NJ-TP+3DXV-1, code no. 000-123-809), coaxial connector(N-P-8DFB; supplied), vulcanizing tape and vinyl tape are required. Fabricate both ends of the cable as shown in the figure on the next page.

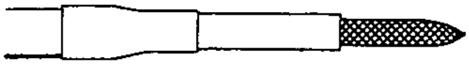
How to attach the connector N-P-8DFB for cable 8D-FB-CV


Outer Sheath
Dimensions in millimeters.
Armor
Inner Sheath Shield
50
30

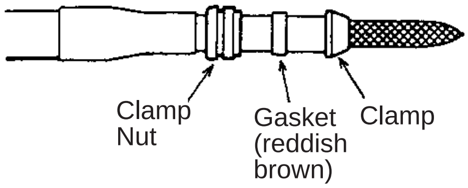
Remove outer sheath and armor by the dimensions shown left.
Expose inner sheath and shield by the dimensions shown left.


Cover with heat-shrink tubing and heat.
30
10

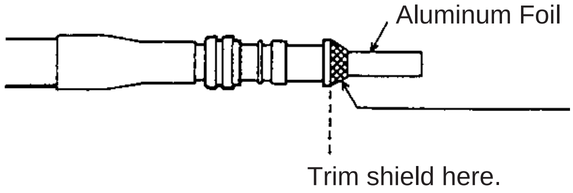
Cut off insulator and core by 10mm.



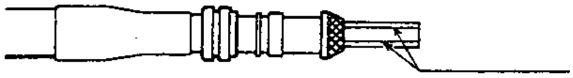
Twist shield end.


Clamp Nut
Gasket (reddish brown)
Clamp

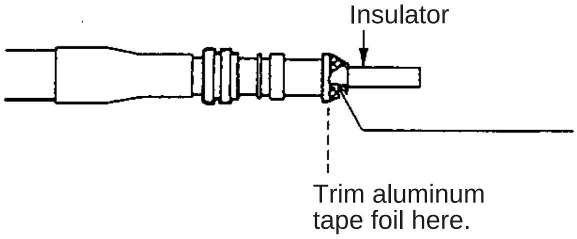
Slip on clamp nut, gasket and clamp as shown left.


Aluminum Foil
Trim shield here.

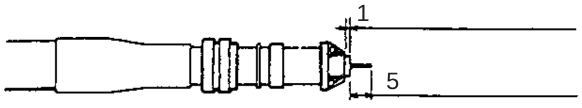
Fold back shield over clamp and trim.



Cut aluminum foil at four places, 90° from one another.

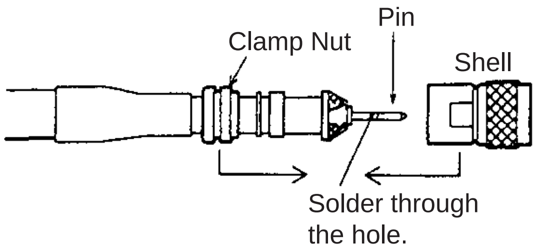

Insulator
Trim aluminum tape foil here.

Fold back aluminum foil onto shield and trim.



Expose the insulator by 1mm.

Expose the core by 5mm.


Pin
Clamp Nut
Shell
Solder through the hole.

Slip the pin onto the conductor. Solder them together through the hole on the pin.

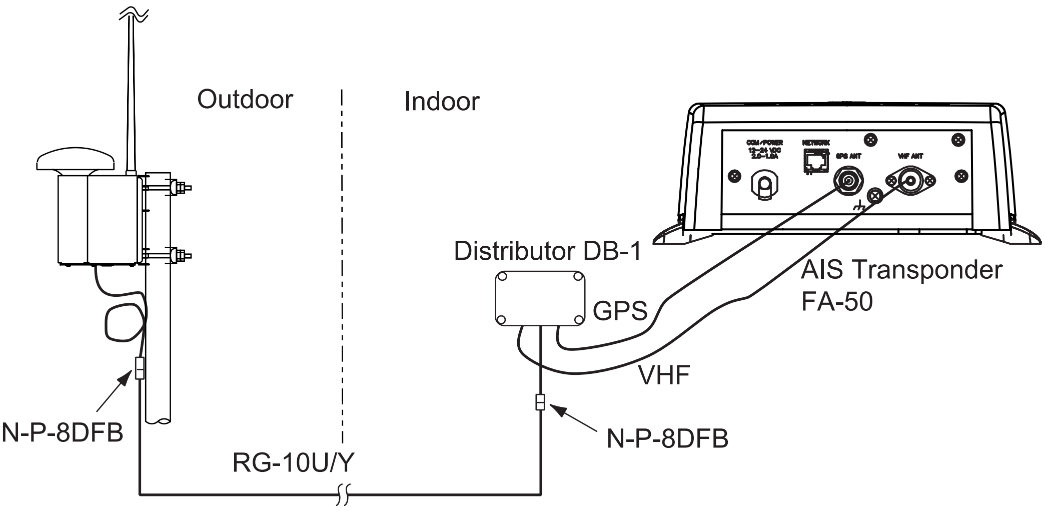
Insert the pin into the shell. Screw the clamp nut into the shell.
(Tighten by turning the clamp nut. Do not tighten by turning the shell.)

How to attach connector N-P-8DFB

1.5 GPS/VHF Combined Antenna

Install the combined antenna unit referring to the outline drawing. When selecting a mounting location for the antenna, keep in mind the following points.

- Select a location out of the radar beam. The radar beam will obstruct or prevent reception of the GPS satellite signal.
- There should be no interfering object within the line-of-sight to the satellites. Objects within line-of-sight to a satellite, for example, a mast, may block reception or prolong acquisition time.
- Mount the antenna unit as high as possible. Mounting it this way keeps it free of interfering objects and water spray, which can interrupt reception of GPS satellite signal if the water freezes.

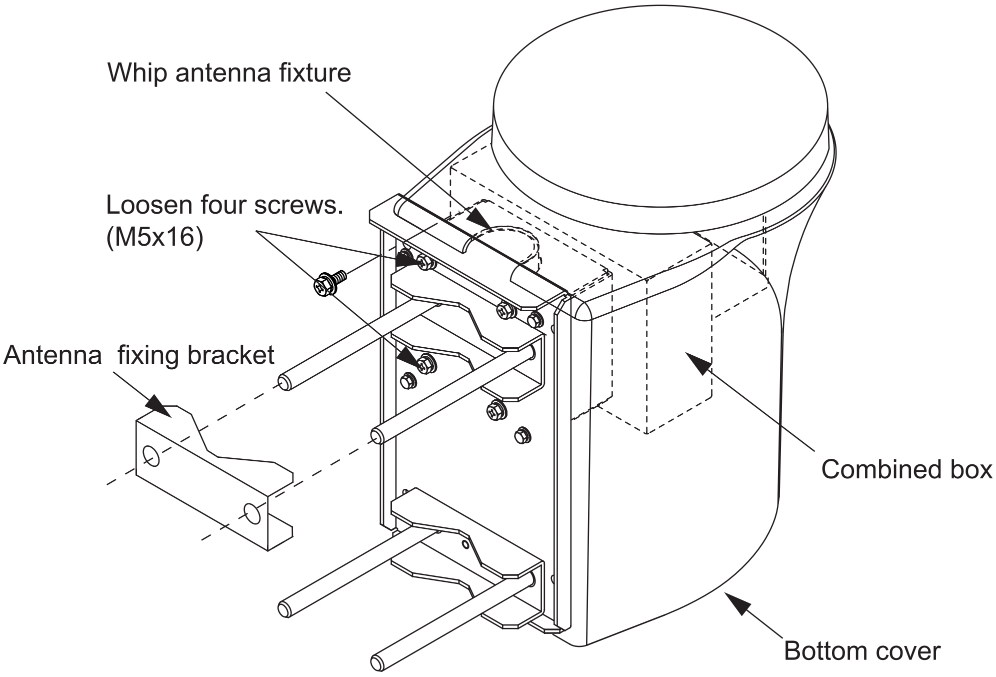


Installation overview of GPS/VHF combined antenna

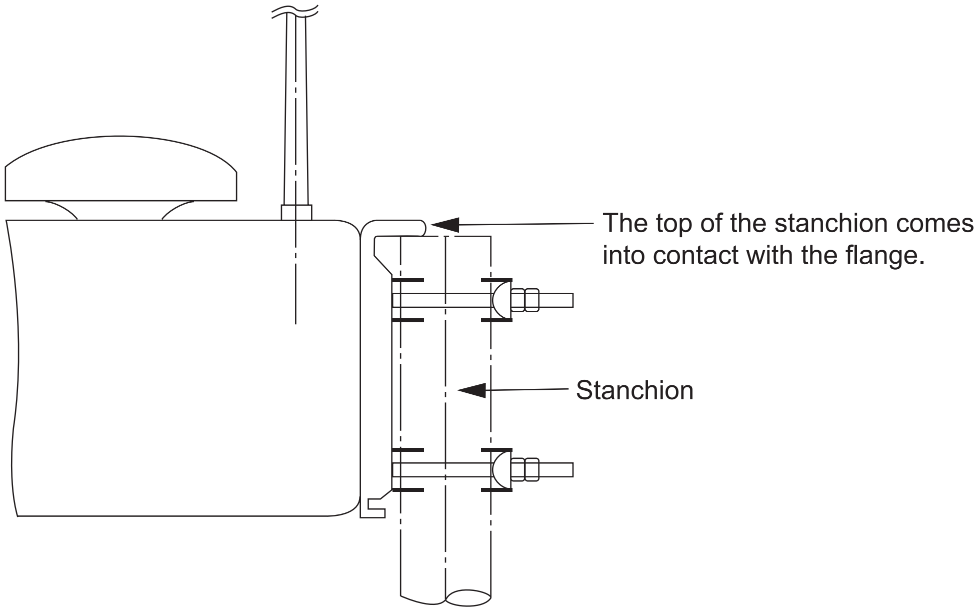
Mounting procedure

1. Dismount the bottom cover, cut the cable-tie inside the unit and take out the coaxial connector attached to the combined box.
2. Loosen four screws to loosen whip antenna fixture and pull out the coaxial connector coming from the combined box through the hole in the whip antenna fixture.
3. Connect the coaxial connector to the whip antenna base and wrap the junction part of the whip antenna with vulcanizing tape and then vinyl tape for waterproofing.
4. Insert the whip antenna from the top of the combined antenna.
5. Secure the whip antenna with whip antenna fixture.
6. Using a new plastic band (supplied), secure the cables and coaxial connector inside the antenna case.
7. Mount the bottom cover.
8. Fix the GPS/VHF combined antenna to the ship's stanchion (40 to 50 mm diameter) with antenna fixing brackets, flat washers and hex. nuts.

Note: Coat the exposed parts of bolts and nuts with silicon sealant.

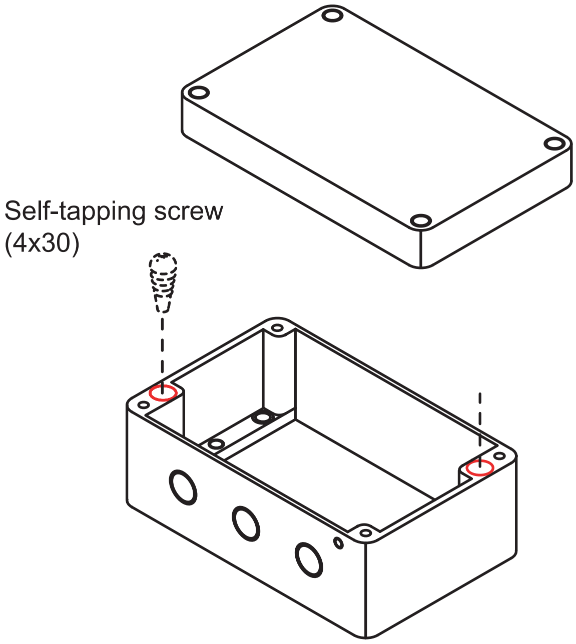

Whip antenna fixture
Loosen four screws.
(M5x16)
Antenna fixing bracket
Combined box
Bottom cover

GPS/VHF Combined antenna


The top of the stanchion comes into contact with the flange.
Stanchion

Installing distributor unit DB-1

The length of the cable between the distributor unit and transponder unit is 1 m so locate the distributor unit within 1 m from the transponder unit. Fix the distributor unit on the bulkhead, facing the cable entrance downward. Remove the lid of the distributor unit and secure the unit with two self-tapping screws.



Note: Be sure no foreign material or water enters the distributor unit.

1.6 Power Supply (option)

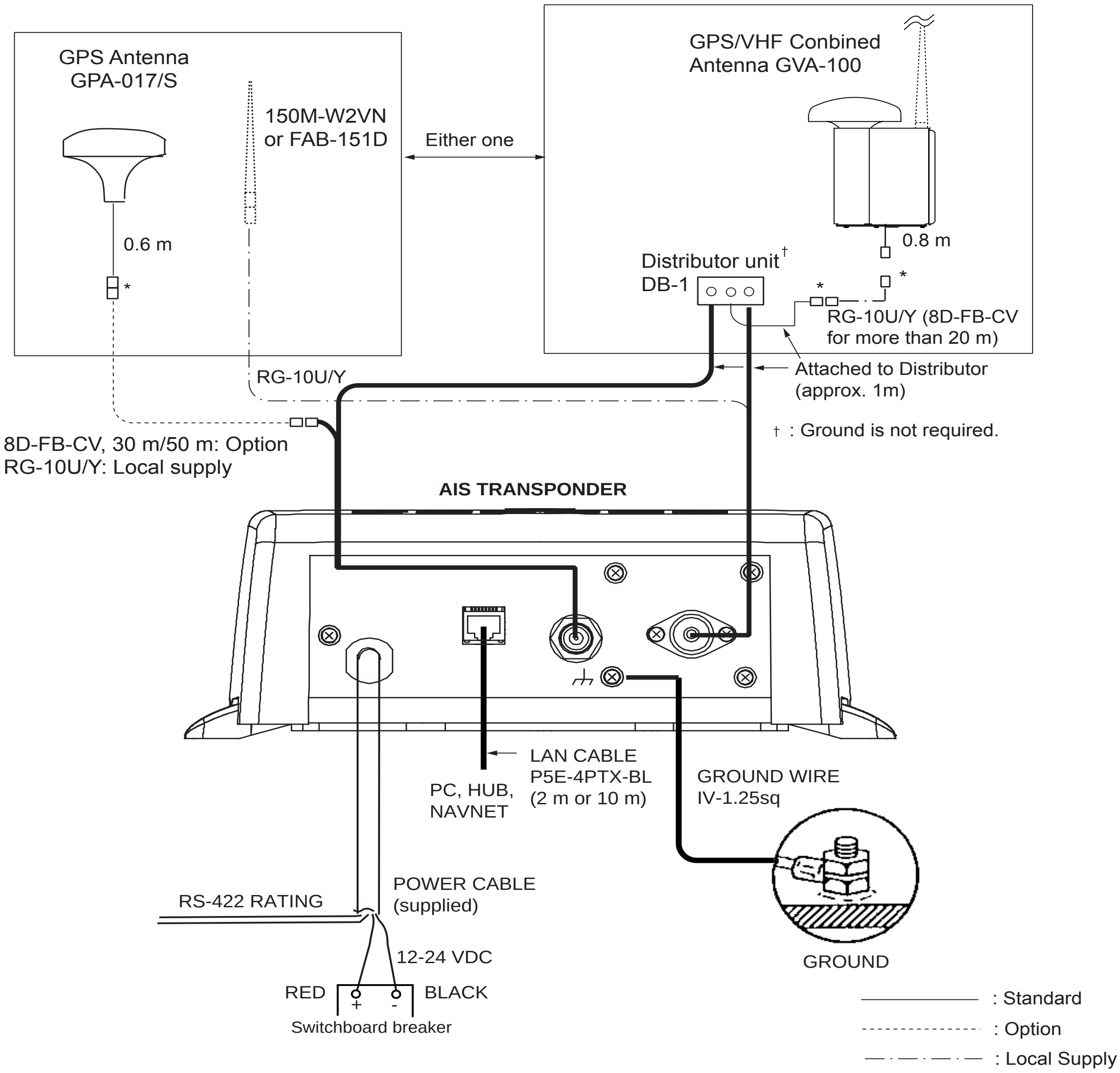
When selecting a mounting location for the unit, keep the following in mind:

- Keep the unit out away from areas subject to water splash.
- Locate the unit away from exhaust pipes and vents.
- The mounting location should be well ventilated.
- Mount the unit where shock and vibration are minimal.
- A magnetic compass will be affected if the unit is placed too close to it. Observe the following compass safe distances to prevent disturbance to the magnetic compass:
  -Steering compass: 0.6 m
  -Standard compass: 0.9 m

Fix the unit with four self-tapping screws (4x16) to a desktop or the deck as shown in the figure below. It is not necessary to open the cover.

1.7 Wiring

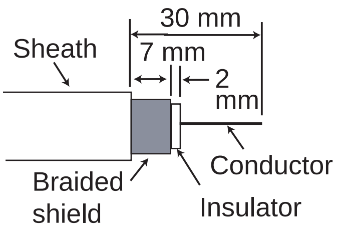
Connect power source, LAN cable, VHF antenna and ground wire as shown below.

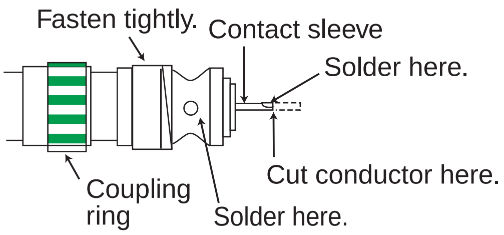

GPS Antenna
GPA-017/S
150M-W2VN
or FAB-151D
0.6 m
*
Either one
GPS/VHF Conbined
Antenna GVA-100
0.8 m
Distributor unit†
DB-1
*
*
RG-10U/Y (8D-FB-CV
for more than 20 m)
Attached to Distributor
(approx. 1m)
RG-10U/Y
† : Ground is not required.
8D-FB-CV, 30 m/50 m: Option
RG-10U/Y: Local supply
AIS TRANSPONDER
LAN CABLE
P5E-4PTX-BL
(2 m or 10 m)
PC, HUB,
NAVNET
GROUND WIRE
IV-1.25sq
RS-422 RATING
POWER CABLE
(supplied)
12-24 VDC
RED
BLACK
+
-
Switchboard breaker
GROUND
: Standard
: Option
: Local Supply

Note 1: Supply from breaker on switchboard.
Note 2: If COM lines (connection for NavNet, sensor) are not used, tape tham to prevent short circuit.

Attaching coaxial connector (M-P-5) to coaxial cable

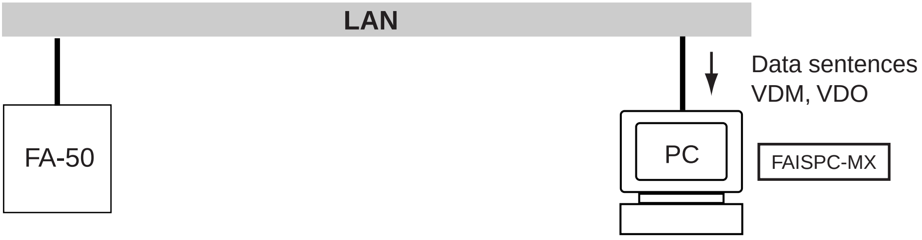
The antenna cable (coaxial cable, type 5D-2V) is terminated at the FA-50 with an M-P-5 coaxial connector. Attach the connector to the cable as shown below.


30 mm
Sheath
7 mm
2 mm
Conductor
Braided shield
Insulator

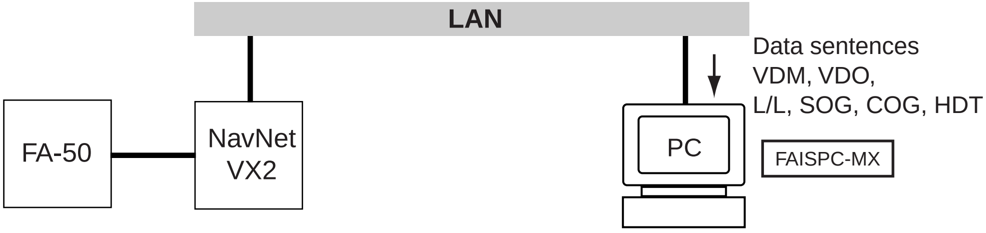

Fasten tightly.
Contact sleeve
Solder here.
Cut conductor here.
Coupling ring
Solder here.

Connection of AIS viewer (FAISPC-MX)

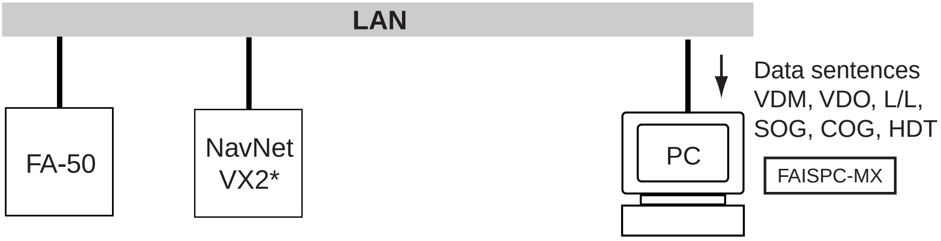
The AIS viewer may be connected to the FA-50 directly, or to both FA-50 and NavNet vx2. See the figure below for connection examples.


LAN
FA-50
PC
Data sentences
VDM, VDO
FAISPC-MX

DIRECT CONNECTION


LAN
FA-50
NavNet
VX2
PC
Data sentences
VDM, VDO,
L/L, SOG, COG, HDT
FAISPC-MX

NavNet vx2 CONNECTION


LAN
FA-50
NavNet
VX2*
PC
Data sentences
VDM, VDO, L/L,
SOG, COG, HDT
FAISPC-MX

NavNet VX2 CONNECTION

*Required updating software.

1.8 Setting and Adjustments

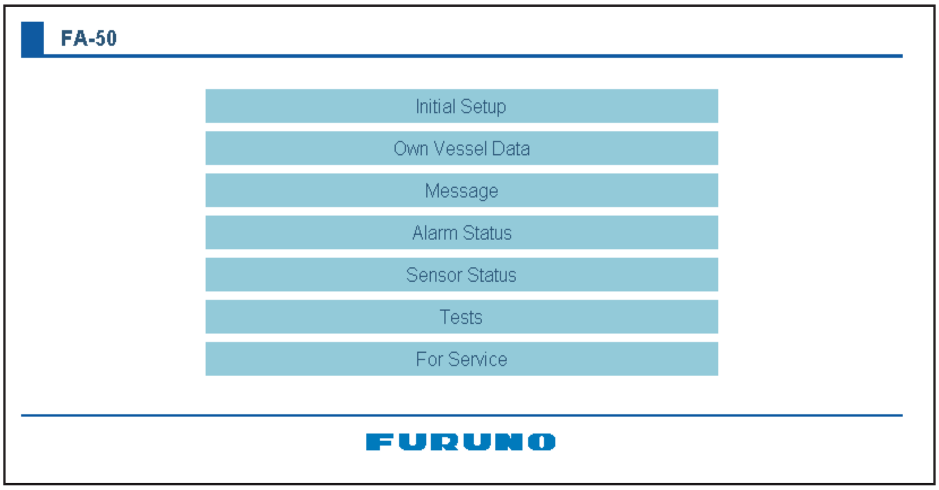
After installing the equipment, set up the COM port, Network and own ship's static information (MMSI, ship's name, call sign, antenna position and type of ship). The FA-50 is set up from the PC or external display. The procedure below shows how to set up any setting from a PC.

1.8.1 COM Port Setup, Network Setup

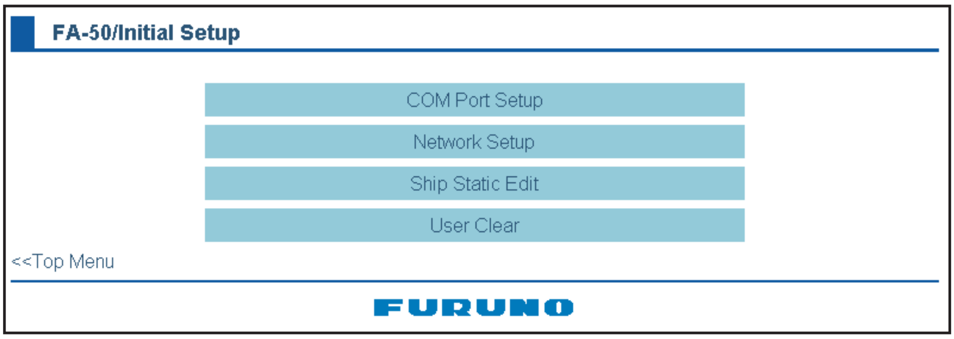
NOTICE: Only one FA-50 may be connected to the network.

Start up

1. Start up the PC and enter IP address and subnet mask.
    1) Right-click My Network and Properties.
    2) Right-click Local Area Network and Properties.
    3) Select Internet Protocol and Properties.
    4) Enter IP address 172.31.24.xxx (xxx=any three digits from 1 to 254, except 3).
    5) Enter subnet mask 255.255.0.0.
2. Open Internet Explorer and do the following:
    1) Click Tools on the menu bar.
    2) Click Internet Options.
    3) The General tab is selected. Click Settings at Temporary Internet Files.
    4) Click the radio button "Every visit to the page" at "Check for newer versions of stored page".
    5) Click the OK button.
    6) Click the OK button again.
3. Enter URL as http://172.31.24.3 and press the Enter key.

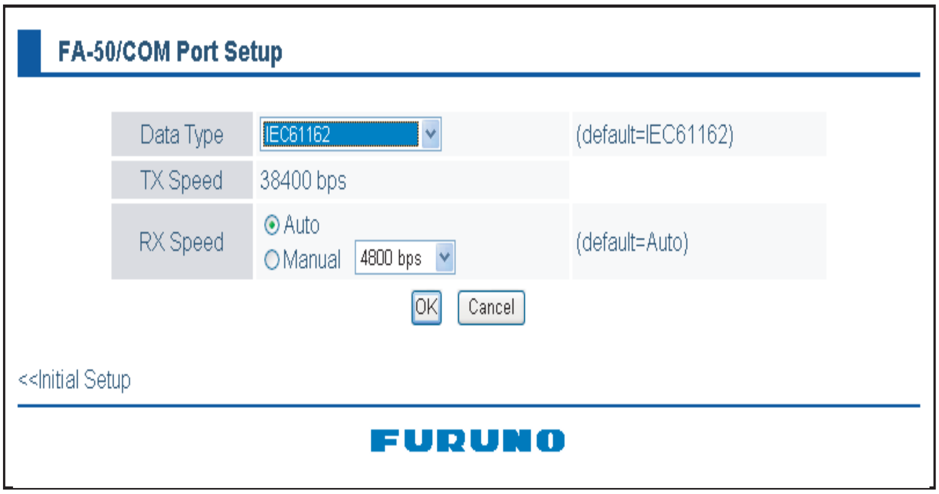


4. Click Initial Setup to show the Initial Setup screen.


FA-50/Initial Setup
COM Port Setup
Network Setup
Ship Static Edit
User Clear
<<Top Menu
FURUNO

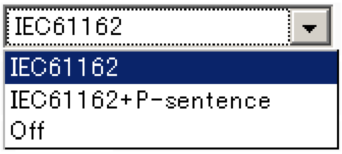
COM port setup

5. Click COM PORT Setup to show the COM Port Setup screen.


FA-50/COM Port Setup
OK
Cancel
<<Initial Setup
FURUNO

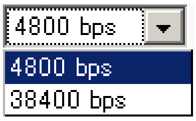
Data Type	IEC61162	(default=IEC61162)
TX Speed	38400 bps	
RX Speed	● Auto ○ Manual 4800 bps	(default=Auto)

6. The default setting for Data Type is IEC61162, which is suitable for most installations. If change is necessary, click the Data Type drop-down list and choose data type as applicable, among the following choices.


IEC61162
IEC61162
IEC61162+P-sentence
Off

IEC61162: Transmit and receive IEC61162 format data via COM port. (P sentences are received but not transmitted.)
IEC61162+ P-sentence: Transmit and receive IEC61162+P sentences format data via COM port.
Off: FA-50 transmits no data.

With the radio buttons at RX Speed, choose how RX speed is regulated, Auto or Manual. For manual, choose speed from the drop-down list.


4800 bps
4800 bps
38400 bps

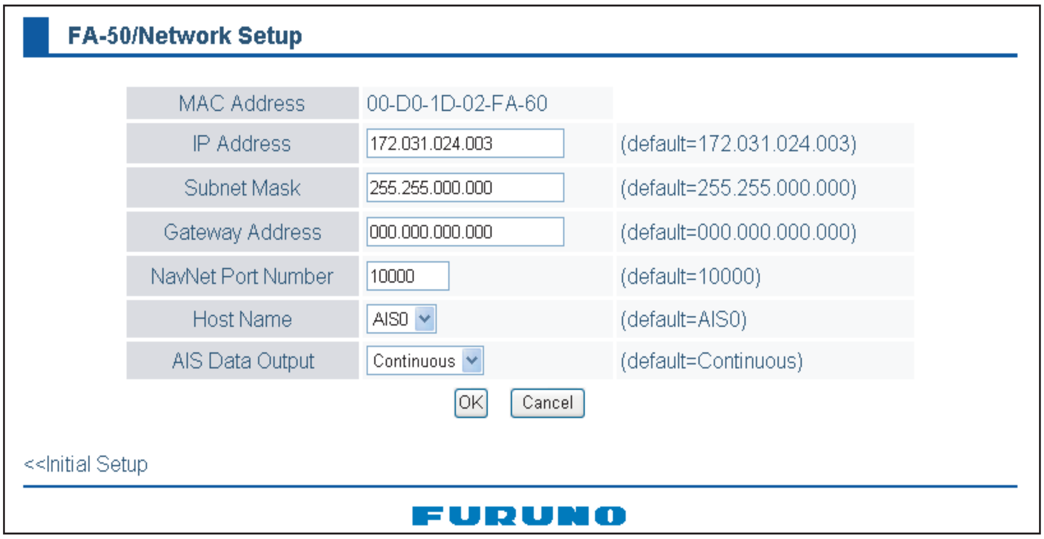
Note: Tx speed is fixed at 38400 bps.

7. Click OK to confirm setting.

8. Click "<<Port Setup" to return to the Port Setup menu.

NETWORK setup

9. Click Network Setup to show the Network Setup screen.



FA-50/Network Setup

MAC Address	00-D0-1D-02-FA-60	
IP Address	172.031.024.003	(default=172.031.024.003)
Subnet Mask	255.255.000.000	(default=255.255.000.000)
Gateway Address	000.000.000.000	(default=000.000.000.000)
NavNet Port Number	10000	(default=10000)
Host Name	AIS0	(default=AIS0)
AIS Data Output	Continuous	(default=Continuous)

10. Enter the IP address assigned to the FA-50.

11. Enter subnet mask for the network.

12. Enter gateway address.

13. For NavNet connection, enter NavNet port number at NavNet Port Number. Enter ten-thousandths and one-thousandths places

14. At Host Name, enter host name to be used in NavNet, AIS0 - AIS9.

15. At AIS Data Output, select how to output AIS data.
    Auto: Auto-detect of where to output AIS data.
    Continuous: Output data continuously. Select if interfaced with FAISPC_MX.

    Note: It is not necessary to change the settings of NavNet Port Number, Host Name and AIS Data Output. Connection is available without adjusting them.

16. Click the OK button to finish.

17. If you changed a setting, the message below appears.

> You must restart your FA-50
> before the new settings take effect.
> Do you want to restart your FA-50 now?
> (It will take about 1 minute to restart your FA-50).

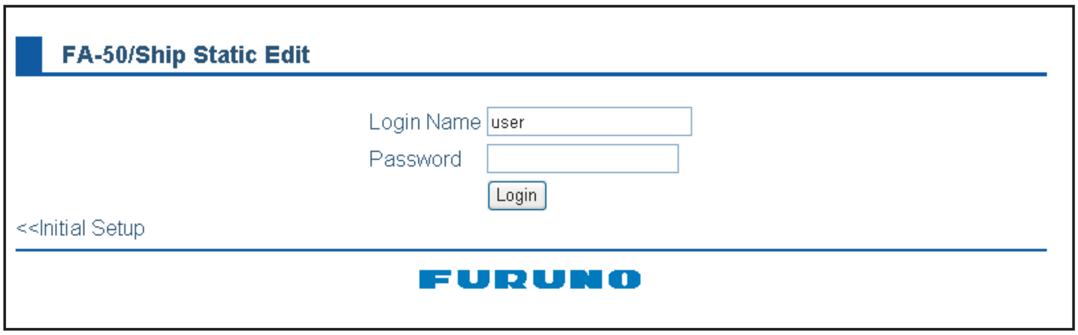
18. Click the Yes button to restart. "ER" LED on the FA-50 lights. After the LED goes off access is given.

19. The message “Please close the window.” appears. Close the browser.

After restart is completed, it is necessary to access the FA-50 using new values. For example, if you changed the IP address, use the new address to access the FA-50.

Ship static edit

20.Click Ship Static Edit to show the Network Setup menu.

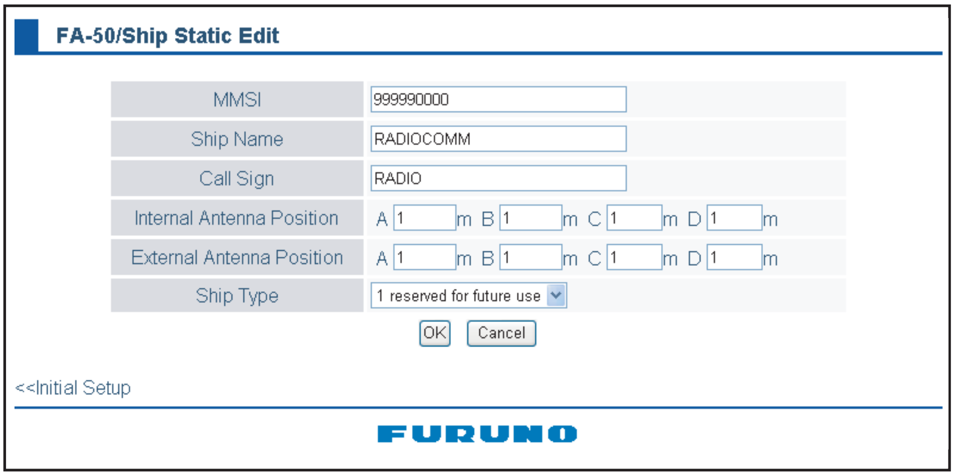


FA-50/Ship Static Edit

Login Name: user

Password:

21.Enter the password. The Ships Static Edit screen appears. Note that the password is known by only the FURUNO dealer.



FA-50/Ship Static Edit

MMSI	999990000
Ship Name	RADIOCOMM
Call Sign	RADIO
Internal Antenna Position	A 1 m B 1 m C 1 m D 1 m
External Antenna Position	A 1 m B 1 m C 1 m D 1 m
Ship Type	1 reserved for future use

22.Enter ship’s MMSI (Maritime Mobile Service Identity) in nine digits.

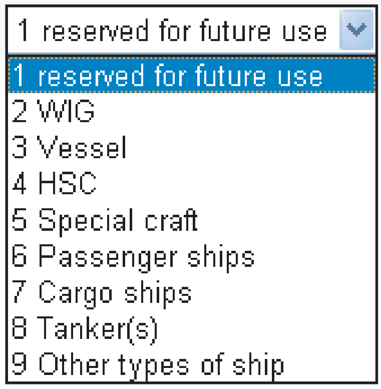
23.Enter ship’s name, using up to 20 alphanumeric characters.

24.Enter call sign, using seven alphanumeric characters.

25.Set Internal/External antenna positions as follows:

1) Enter distance for for location “A” of FA-50 GPS antenna.
   A: Distance from bow to GPS antenna position, setting range: 0-511 m
2) Enter distance for location B, C and D similar to how you did for “A” above.
   B: Distance from stern to GPS antenna position, setting range: 0-511 m
   C: Distance from port to GPS antenna position, setting range: 0-63 m
   D: Distance from starboard to GPS antenna position, setting range: 0-63 m
3) Enter distance for location of an external GPS antenna (if connected) similar to how you did for the internal GPS antenna.

26.Click the down-allow button for Ship Type to show the option window, and then choose a ship type. (WOIG: Wing in ground, HSC: High speed craft)

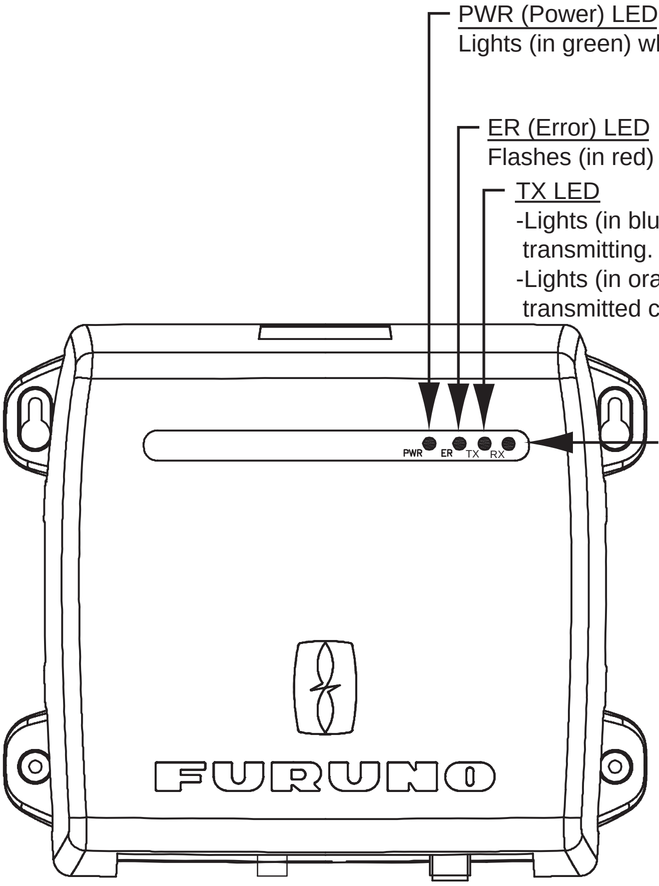

1 reserved for future use
1 reserved for future use
2 WIG
3 Vessel
4 HSC
5 Special craft
6 Passenger ships
7 Cargo ships
8 Tanker(s)
9 Other types of ship

27.After finishing all settings, Click the OK button.

2. OPERATION

2.1 AIS Transponder FA-50

The FA-50 has no power switch. Power is fed from the ship's switchboard, and a power switch on the switchboard turns the FA-50 on or off. When powered, the PWR LED (green) on the cover lights. The three other LEDs on the cover flash or light with equipment state. The ER LED (red) lights while the equipment is being initialized, and flashes when equipment error is found. The RX LED (orange) lights when receiving.The TX LED lights blue when transmitting, orange when TX time out is occurs.



PWR (Power) LED
Lights (in green) when power is on.

ER (Error) LED
Flashes (in red) for RAM, ROM, RX1+RX2 error.

TX LED
-Lights (in blue) when channel TX1/TX2 is transmitting.
-Lights (in orange) when TX1/TX2 cannot be transmitted continuously (Tx time out*.)

*Lights also when not registering MMSI.

RX LED
Lights (in orange) 50 ms when channel RX1/RX2 is receiving.

Sending/receiving 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 wan 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.

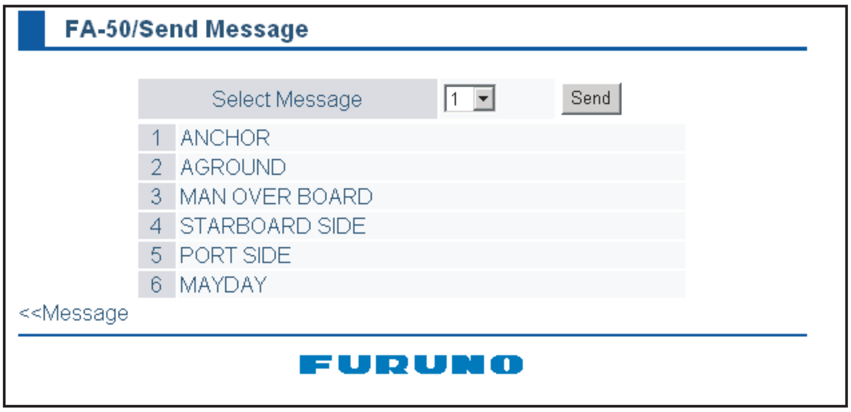
The contents of the message may be viewed on the receive message log.

2.2 Messages

2.2.1 Sending a message

14 pre-difined messages (maximum 16 characters for each message) are stored in the Send Message screen. You can send a message among from these once in a minute.

1. Click Message on the main menu.
2. Click the Send Message.

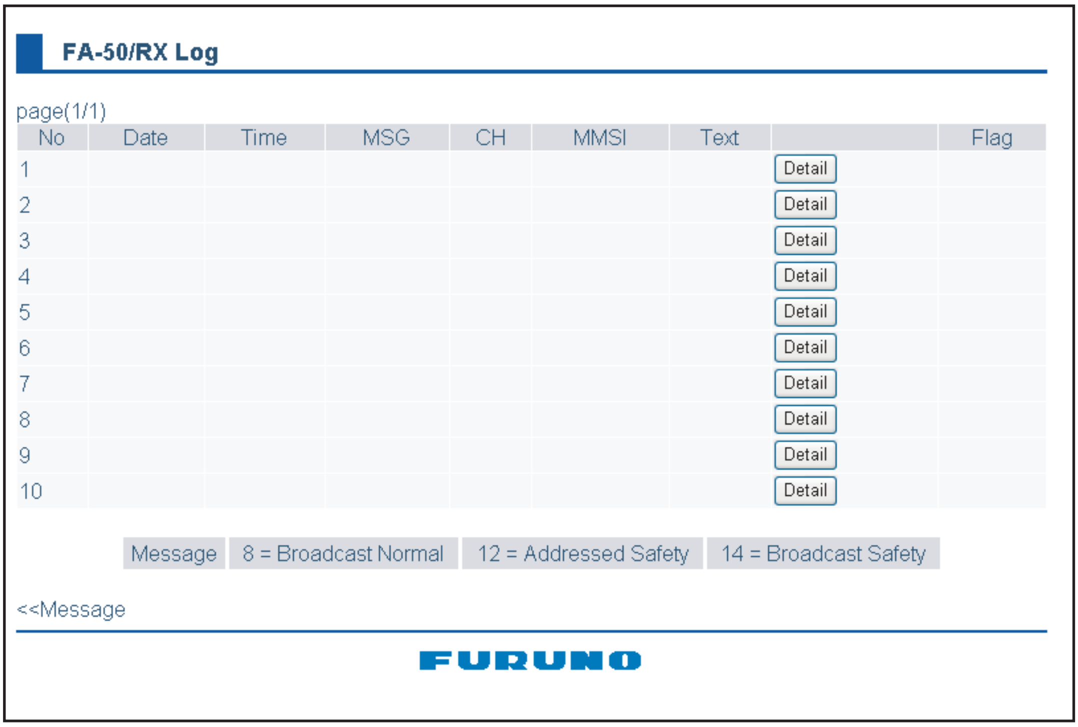

FA-50/Send Message
Select Message
1
Send
<<Message
FURUNO

1	ANCHOR
2	AGROUND
3	MAN OVER BOARD
4	STARBOARD SIDE
5	PORT SIDE
6	MAYDAY

3. Choose the message to be sent, among from No.1 to 10 pre-set.
4. Click the Send button.

2.2.2 Confirming receiving messages

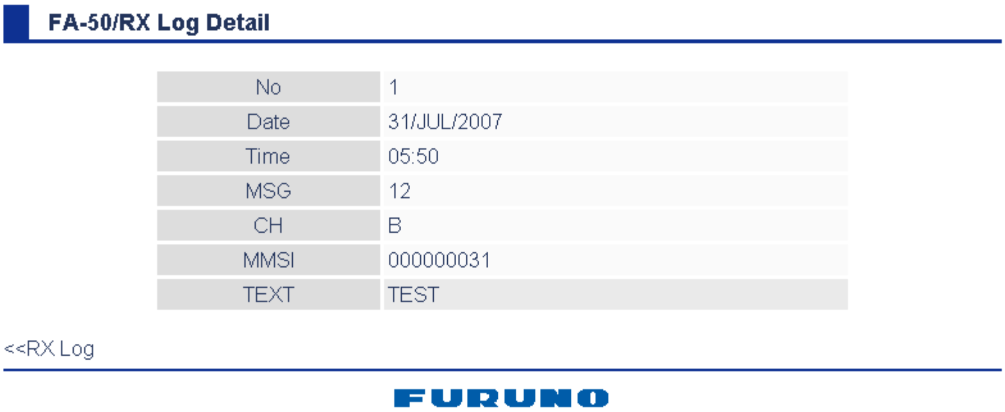
You can confirm the received messsages on the RX Log screen. Click "RX Log" on the main menu.


FA-50/RX Log
page(1/1)
<<Message
FURUNO

No	Date	Time	MSG	CH	MMSI	Text		Flag
1							Detail	
2							Detail	
3							Detail	
4							Detail	
5							Detail	
6							Detail	
7							Detail	
8							Detail	
9							Detail	
10							Detail	

Message	8 = Broadcast Normal	12 = Addressed Safety	14 = Broadcast Safety

For detailed information about a messgae, click appropriate “Detail” to show the RX Log Detail screen.

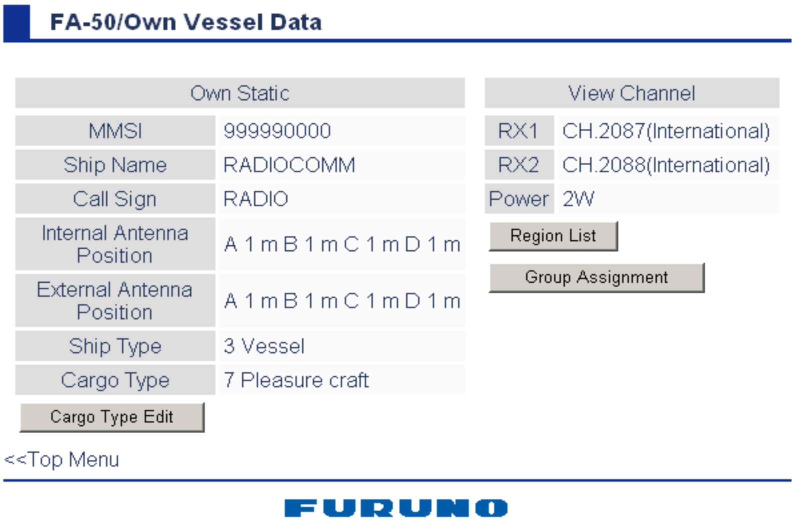

FA-50/RX Log Detail
<<RX Log
FURUNO

No	1
Date	31/JUL/2007
Time	05:50
MSG	12
CH	B
MMSI	000000031
TEXT	TEST

2.3 Own Vessel Data Display

The Own Vessel Data display shows your ship’s MMSI No., RX channel Nos., and channel selection method.

1. Show the main menu.
2. Click Own Vessel Data.

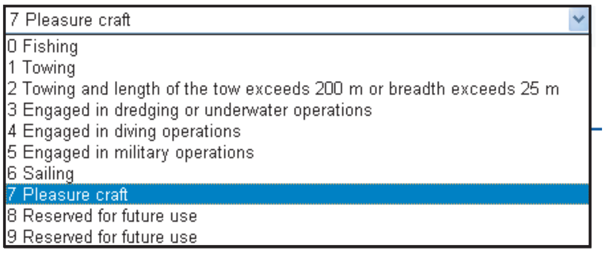

FA-50/Own Vessel Data
Region List
Group Assignment
Cargo Type Edit
<<Top Menu
FURUNO

Own Static	
MMSI	999990000
Ship Name	RADIOCOMM
Call Sign	RADIO
Internal Antenna Position	A 1 m B 1 m C 1 m D 1 m
External Antenna Position	A 1 m B 1 m C 1 m D 1 m
Ship Type	3 Vessel
Cargo Type	7 Pleasure craft

View Channel	
RX1	CH.2087(International)
RX2	CH.2088(International)
Power	2W

Description of own vessel data

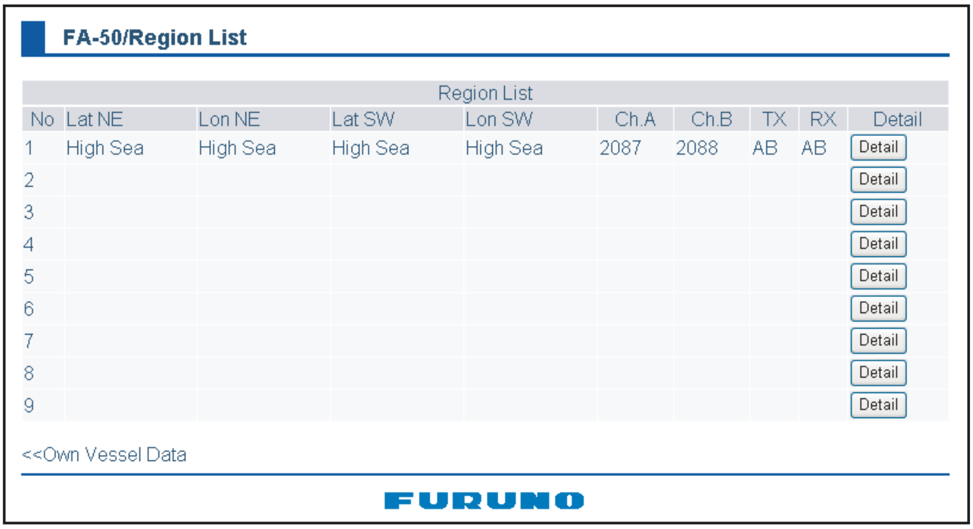
MMSI: MMSI number (nine-digit number).
Ship Name: Ship's name (20 characters)
Call Sign: Call signe (7 characters)
Internal/External Antenna Position: Shows antenna posiiton.
Ship Type: The ship type is shown by a digit number.
Cargo Type: Choose the cargo type as below.
1) Click the Cargo Type Edit button to show the Cargo Type screen.
2) Choose a type, and then click the OK button.



7 Pleasure craft

0 Fishing
1 Towing
2 Towing and length of the tow exceeds 200 m or breadth exceeds 25 m
3 Engaged in dredging or underwater operations
4 Engaged in diving operations
5 Engaged in military operations
6 Sailing
7 Pleasure craft
8 Reserved for future use
9 Reserved for future use

RX1: Channel (four digits) received over RX1. Channel type (International, Local) is shown in parentheses.
RX2: Channel (four digits) received over RX2. Channel type (International, Local) is shown in parentheses.
Power: Shows the power (2W).
Region List: Click this button to shwo the region list

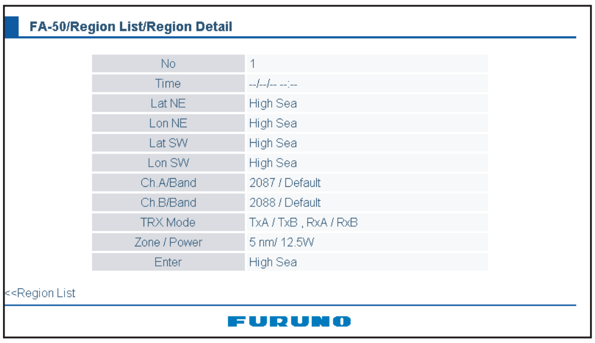


FA-50/Region List

Region List

No	Lat NE	Lon NE	Lat SW	Lon SW	Ch.A	Ch.B	TX	RX	Detail
1	High Sea	High Sea	High Sea	High Sea	2087	2088	AB	AB	Detail
2									Detail
3									Detail
4									Detail
5									Detail
6									Detail
7									Detail
8									Detail
9									Detail

"Detail" button shows the detailed information of the desired region.



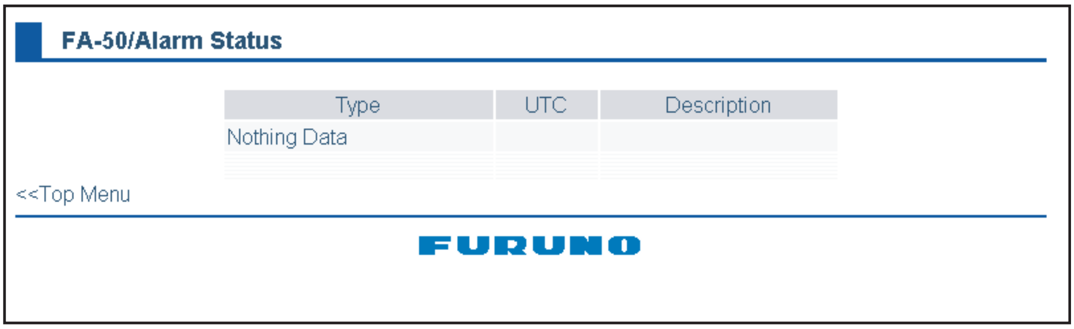
FA-50/Region List/Region Detail

No	1
Time	--/--/-- --:--
Lat NE	High Sea
Lon NE	High Sea
Lat SW	High Sea
Lon SW	High Sea
Ch.A/Band	2087 / Default
Ch.B/Band	2088 / Default
TRX Mode	TxA / TxB , RxA / RxB
Zone / Power	5 nm/ 12.5W
Enter	High Sea

Time: Time to enter the region
Lat NE: Latitude for the right-upper corner (North-East) of the region
Lon NE: Longitude for the right-upper corner (North-East) of the region
Lat SW: Latitude for the left-lower corner (Soutgh-West) of the region
Lon SW: Longitude for the left-lower corner (North-East) of the region
Ch A/Band, Ch B/Band: Channel No./Band
TRX Mode: TRX mode
Zone/Power: Trans zone/Power
Enter: Registered route;
High Sea (Default), MSG22 (Adr) (Message 22 for individual),
MSG 22 (Message 22 for all ships), DSC (DSC)

2.4 Alarm Status

The alarm status log shows the latest 25 dates and times alarms were violated. Click "Alarm Status" on the main menu to show the alarm status log.



FA-50/Alarm Status

Type	UTC	Description
Nothing Data		

Description of Alarm Status indications

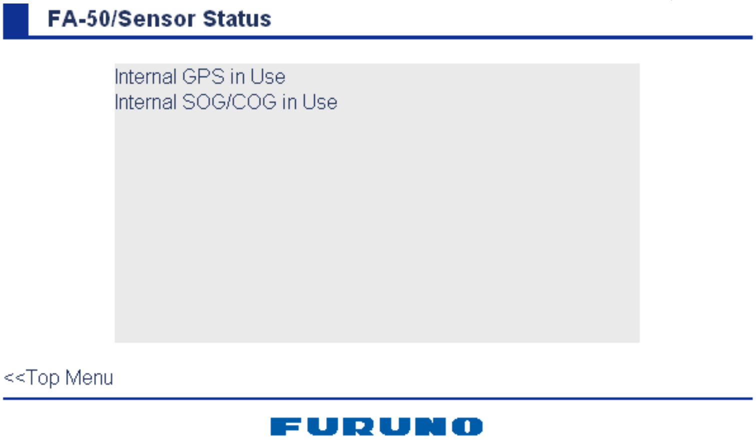
Alarm Status Indication	Meaning
TX	TX malfunction (and Error LED lights.)
CH1	TDMA RX1 Board trouble. TX stopped on corresponding TX channel.
CH2	TDMA RX2 Board trouble. TX stopped on corresponding TX channel
COG	Invalid COG data.
EPFS	No data from external navigator. Continued operation possible.
HDG	Invalid/nonexistent HDG data
L/L	No L/L data
SOG	Invalid SOG data

Note: When the transmitting is contuned more than one second, the equipment cut it off.

2.5 Sensor Status

The sensor status display provides information about sensors connected to the FA-50.

1. Show the main menu.
2. Click Sensor Status. The illustration below shows typical sensor status indications.



FA-50/Sensor Status

Internal GPS in Use
Internal SOG/COG in Use

Description of sensor status indications

Indication	Meaning	Remarks
DGPS in use (Internal/external)	DGPS currently in use	See *1
GPS in use (Internal/External)	GPS currently in use	See *1
SOG/COG in use (Internal/External)	SOG/COG currently in use	
Heading valid	Valid heading data	
Channel Management Parameters Changed	Channel parameters have been changed.	See *2

*1 Whichever navigator is in use.

*2 Displayed for 30 seconds after changing channel parameters. (It is necessary to update the display.)

3 MAINTENANCE, TROUBLESHOOTING

⚠ WARNING

Do not open the equipment unless totally familiar with electrical circuits and service manual.

Only qualified personnel should work inside the equipment.

NOTICE

Do not apply paint, anti-corrosive sealant or contact spray to coating or plastic parts of the equipment.

Those items contain organic solvents that can damage coating and plastic parts, especially plastic connectors.

3.1 Maintenance

Regular maintenance helps maintain good performance. Check the items listed below at least monthly to help keep your equipment in good working order.

Maintenance table

Item	Check point, remedy
Wiring	Check that each cable and wire are securely fastened. Refasten if necessary.
Ground	Check ground point for rust. Clean if necessary.
VHF antenna	Check VHF antenna and its cabling for damage. Replace if necessary.
Cabinet	Dust and dirt should be removed from the cabinet with a soft, dry cloth. Do not use chemical-based cleaners; they can remove paint and markings.

3.2 Replacing the Fuse

The fuse (4A) inside the FA-50 protects it from overcurrent and equipment fault. If the unit cannot be powered, that is, the PWR (power) LED is off, the fuse may have blown. If this happens, turn off the power to the FA-50, open the cover and check the fuse. If the fuse has blown, find out the reason before replacing it. If it blows again after replacement, contact a FURUNO agent or dealer for advice.

Part	Type	Code No.
Fuse (4A)	FGMB AC125V 4A PBF	000-157-482-10

⚠ WARNING

Use the proper fuse.

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

3.3 Troubleshooting

The troubleshooting table below provides typical operating problems and the means to restore normal operation. If you cannot restore normal operation, do not attempt to check inside the receiver; there are no user serviceable parts inside the receiver.

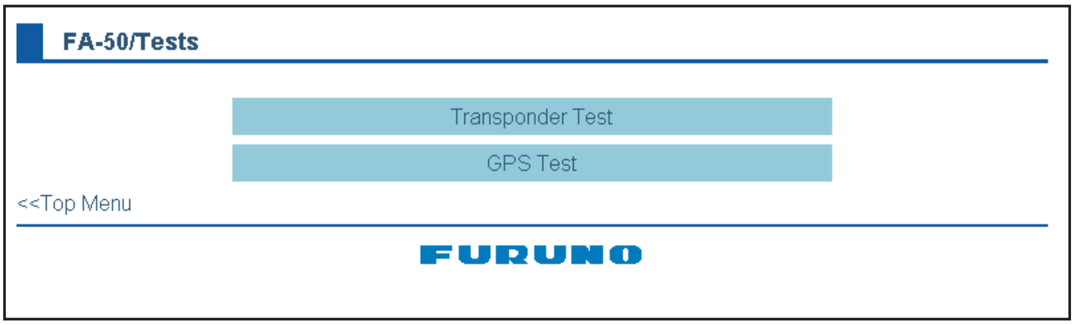
Troubleshooting table

Symptom	Problem	Remedy
Receiver cannot be powered.	Fuse inside the receiver may have blown.	Replace the fuse.
Cannot receive.	• VHF antenna may have loosened. • Antenna or its cabling may be damaged. • Rx channel is malfunctioning.	• Check if the antenna is firmly fastened. • Check the antenna and its cabling for damage. • Confirm the channel setting.

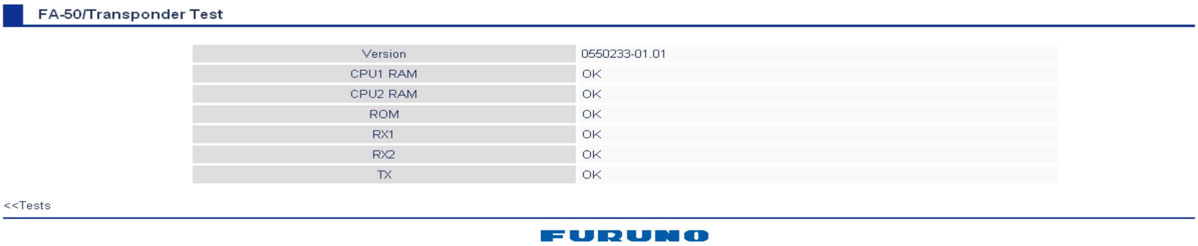
3.4 Diagnostics

The built-in diagnostic facility displays program version no. and checks RAM, ROM, RX channels and GPS antenna for proper operation.

1. Open Internet Explorer and show the main menu.
2. Click Test to show the Test display.

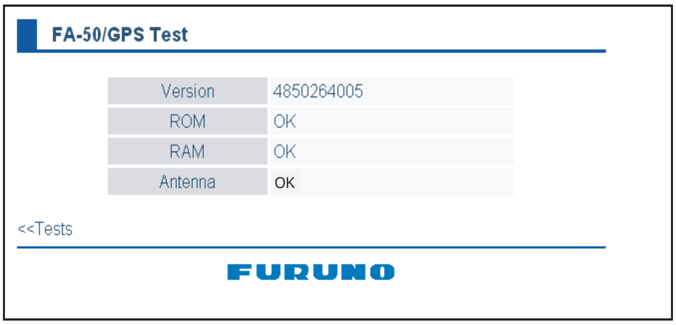

FA-50/Tests
Transponder Test
GPS Test
<<Top Menu
FURUNO

3. Click “Transponder Test” or “GPS Test” to show the appropriate test screen.


FA-50/Transponder Test
<<Tests
FURUNO

Version	0550233-01.01
CPU1 RAM	OK
CPU2 RAM	OK
ROM	OK
RX1	OK
RX2	OK
TX	OK

Transponder test: The program version number appears on the first line. The CPU1 RAM and CPU2 RAM, ROM and the two RX channels and TX are checked for proper operation, and the results are displayed as OK or NG (No Good). For any NG, try re-setting the power and checking connections. If NG condition persists, contact your dealer for advice.


FA-50/GPS Test
<<Tests
FURUNO

Version	4850264005
ROM	OK
RAM	OK
Antenna	OK

GPS test: The program version number appears on the first line. The ROM, RAM and connection with antenna (including power line), and the results are displayed as OK or NG (No Good). For any NG, try resetting the power and checking connections. If NG condition persists, contact your dealer for advice.

APPENDIX

Menu Tree

- Initial Setup
  - COM Port Setup
    - Data Type (***IEC61162***, IEC61162+P-sentence, Off)
    - Tx Speed (***38400 bps***)
    - RX Speed (***Auto***, Manual (***4800 bps***, 38400 bps))
  - Network Setup
    - MAC Address
    - IP Address (***172.031.024.003***)
    - Subnet Mask (***255.255.000.000***)
    - Gateway Address (***000.000.000.000***)
    - NavNet Port Number (***10000***)
    - Host Name (AIS0-AIS9, ***AIS0***)
    - AIS Data Output (***Continuous***, Auto)
  - Ship Static Edit (Required a password.)
  - User Clear (Yes, No)
- Own Vessel Data
  - Own Static (MMSI, Ship Name, Call Sign, Internal Antenna Position,
  - External Antenna Position, Ship Type,
  - Cargo Type (0-7, ***7 Pleasure craft***))
  - View Channel (RX1, RX2, Power, Region List, Group Assignment)
- Message
  - Send Message (shows pre-defined 10 messages, ***1***)
  - Tx Log
  - Rx Log
- Alarm Status
- Sensor Status
  - Transponder Test (Version, CPU1RAM, CPU2RAM, ROM, RX1, RX2)
  - GPS Test (Version, ROM, RAM, Antenna)
- For Service (Required a password.)

VHF CHANNEL LIST

International mode

Ch No.	Frequency (MHz)	Ch No.	Frequency (MHz)
1001	156.05	1088	157.425
1002	156.1	2001	160.65
1003	156.15	2002	160.7
1004	156.2	2003	160.75
1005	156.25	2004	160.8
6	156.3	2005	160.85
1007	156.35	2007	160.95
1018	156.9	8	156.4
1019	156.95	9	156.45
1020	157	10	156.5
1021	157.05	11	156.55
1022	157.1	12	156.6
1023	157.15	13	156.65
1024	157.2	14	156.7
1025	157.25	15	156.75
1026	157.3	16	156.8
1027	157.35	17	156.85
1028	157.4	2018	161.5
1060	156.025	2019	161.55
1061	156.075	2020	161.6
1062	156.125	2021	161.65
1063	156.175	2022	161.7
1064	156.225	2023	161.75
1065	156.275	2024	161.8
1066	156.325	2025	161.85
67	156.375	2026	161.9
68	156.425	2027	161.95
69	156.475	2028	162
70	156.525	2060	160.625
71	156.575	2061	160.675
72	156.625	2062	160.725
73	156.675	2063	160.775
74	156.725	2064	160.825
75	156.775	2065	160.875
76	156.825	2066	160.925
77	156.875	2078	161.525
1078	156.925	2079	161.575
1079	156.975	2080	161.625
1080	157.025	2081	161.675
1081	157.075	2082	161.725
1082	157.125	2083	161.775
1083	157.175	2084	161.825
1084	157.225	2085	161.875
1085	157.275	2086	161.925
1086	157.325	2087	161.975
1087	157.375	2088	162.025

USA mode

Ch No.	Frequency (MHz)	Ch No.	Frequency (MHz)
1001	156.05	1088	157.425
		2001	160.65
1003	156.15	2002	160.7
		2003	160.75
1005	156.25	2004	160.8
6	156.3	2005	160.85
1007	156.35	2007	160.95
1018	156.9	8	156.4
1019	156.95	9	156.45
1020	157	10	156.5
1021	157.05	11	156.55
1022	157.1	12	156.6
1023	157.15	13	156.65
1024	157.2	14	156.7
1025	157.25	15	156.75
1026	157.3	16	156.8
1027	157.35	17	156.85
1028	157.4	2018	161.5
		2019	161.55
1061	156.075	2020	161.6
		2021	161.65
1063	156.175	2022	161.7
1064	156.225	2023	161.75
1065	156.275	2024	161.8
1066	156.325	2025	161.85
67	156.375	2026	161.9
68	156.425	2027	161.95
69	156.475	2028	162
70	156.525	2060	160.625
71	156.575	2061	160.675
72	156.625	2062	160.725
73	156.675	2063	160.775
74	156.725	2064	160.825
75	156.775	2065	160.875
76	156.825	2066	160.925
77	156.875	2078	161.525
1078	156.925	2079	161.575
1079	156.975	2080	161.625
1080	157.025	2081	161.675
1081	157.075	2082	161.725
1082	157.125	2083	161.775
1083	157.175	2084	161.825
1084	157.225	2085	161.875
1085	157.275	2086	191.925
1086	157.325	2087	161.975
1087	157.375	2088	162.025

(CH16 operates on 1W)

Parts List

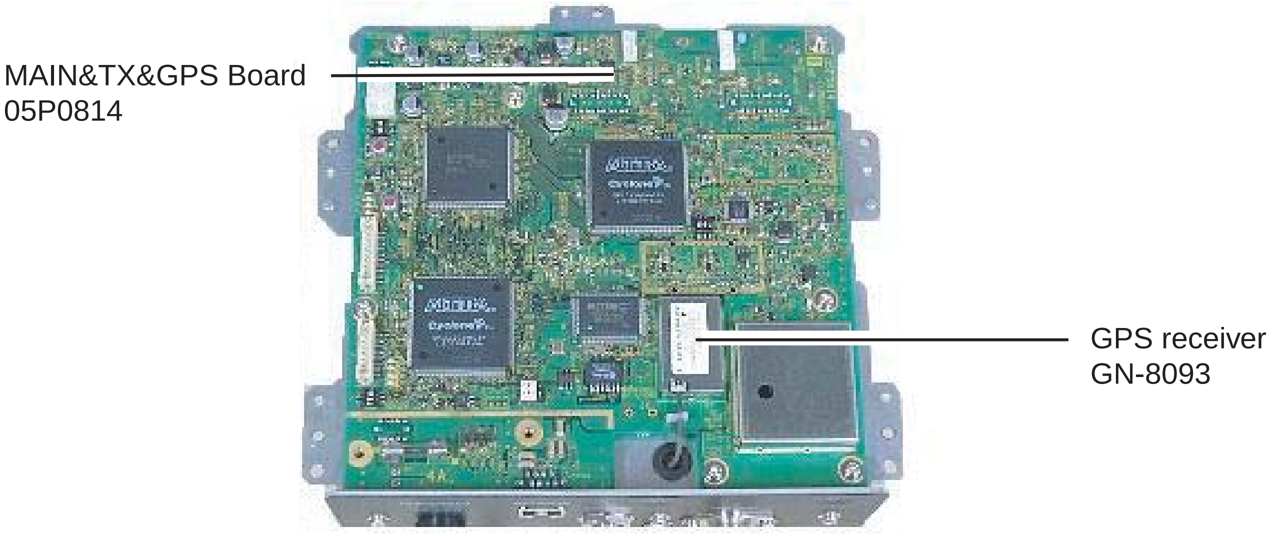
This equipment contains complex modules in which fault diagnosis and repair down to component level are not practical (IMO A.694(17)/8.3.1). Only some discrete components are used. FURUNO Electric Co., Ltd. believes identifying these components is of no value for shipboard maintenance; therefore, they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

FURUNO	Model	FA-50	
	Unit	Tranponder	
ELECTRICAL PARTS LIST			
	Blk.No.		

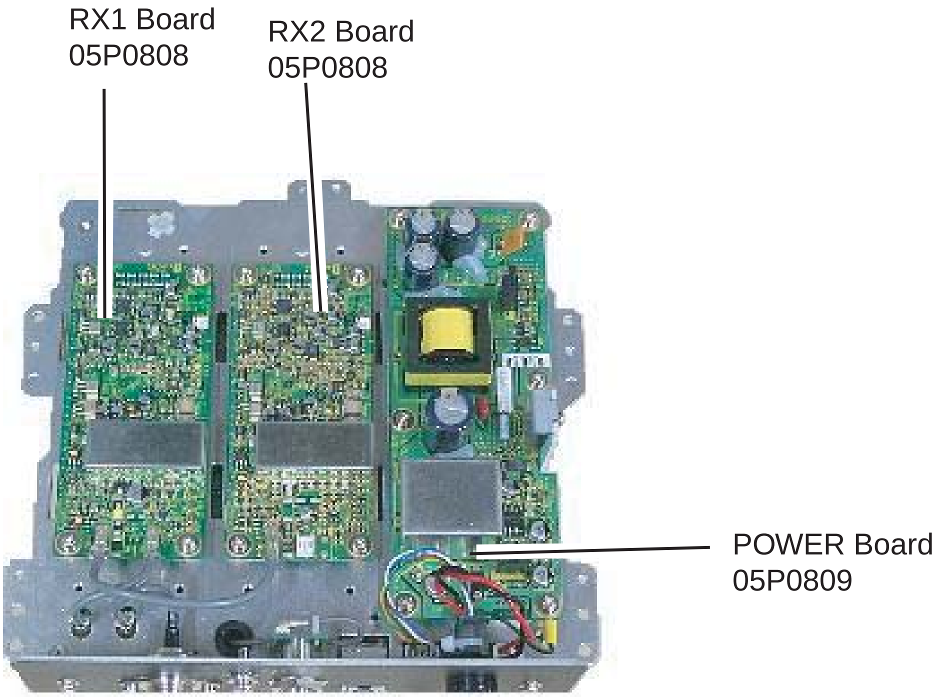
NAME	**TYPE**
PRINTED CIRCUIT BOARD	
MAIN&TX&GPS	05P0814
POWER	05P0809
RX1	05P0808
RX2	05P0808

Parts Location

Transponder


MAIN&TX&GPS Board
05P0814
GPS receiver
GN-8093

Transponder, cover opened (upper)


RX1 Board
05P0808
RX2 Board
05P0808
POWER Board
05P0809

Transponder, cover removed (lower)

Digital Interface

Sentence data

Input sentences

ACK, AIQ, BBM, DSC, DSE, DTM, GBS, GGA, GLL, GNS, HDT, OSD, RMC, SSD, VBW, VSD, VTG

Output sentences

ABK, ACA, ACS, ALR, TXT, VDM, VDO

Transmission interval

ABK: With each event
ACA, ACS: At RX/Switch information ion the region
ALR: 25 s during alarm, 2 min normally no alarm
TXT: Status is changed.
VDM: At RX VHF
VDO: 1 s

Load requirements as listener

Isolation: opto coupler
Input Impedance: 470 ohms
Max. Voltage: ±15 V
Threshold: 3 mA (In case of FURUNO device talker connection)

Output drive capability

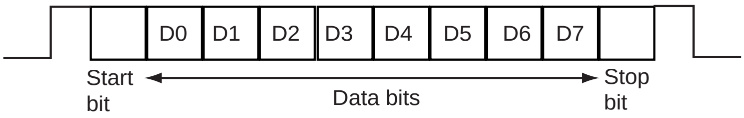
Differential driver output
R=54 ohm 1.1 v min.
R=60 ohm 1.1 V min.

Driver short-circuit current
250 mA max.

Data transmission

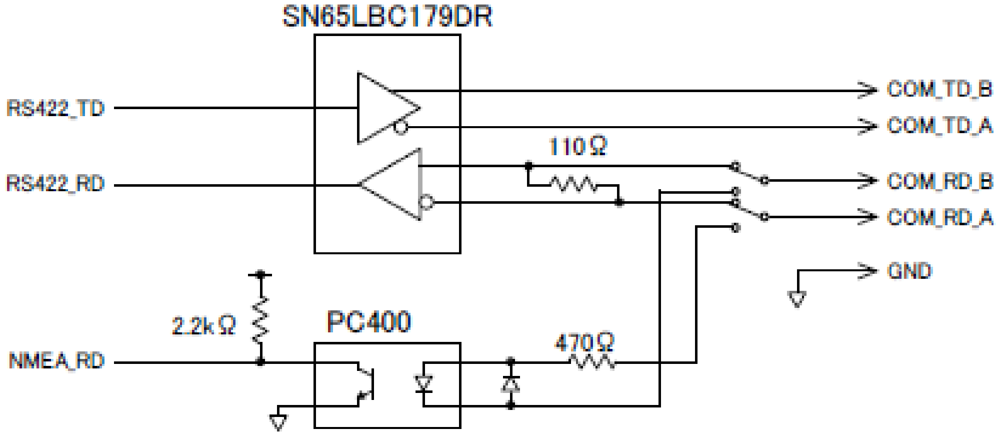
Data format and protocol are transmitted in serial asynchronous form in accordance with the standard referenced in 2.1 of IEC 61162-1. The first bit is a start bit and is followed by data bits, least-significant-bit as illustrated below.

The following parameters are used:
Baud rate: 38.4 Kbps /4800 bps
Data bits: 8 (D7 = 0), parity none
Stop bits: 1



Serial interface I/O circuit

Input/Output Buffer


SN65LBC179DR
RS422_TD
RS422_RD
COM_TD_B
COM_TD_A
110Ω
COM_RD_B
COM_RD_A
GND
2.2kΩ
PC400
NMEA_RD
470Ω

Sentence description

Input sentences

ACK - Acknowledge alarm

```
$--ACK,xxx*hh<CR><LF>
       |   +-------------------- 2
       +----------------------- 1
```

1. Local alarm number(identifier)
2. Checksum

AIQ – AIS query

```
$--AIQ,ccc,*hh<CR><LF>
       |   |
       |   |
       |   +---------------------------- 2
      +---------------------------------- 1
```

1. Query data
2. 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

DSC – Digital selective calling information

```
$--DSC,xxxxxxxxxx,xx,xx,xx,xx,xx,x*hh<CR><LF>
          |       | | | | |||
          |       | | | | || +------- 8
          |       | | | | | +--------- 7
          |       | | | |  +----------- 6
          |       | | |  +-------------- 5
          |       | |  +----------------- 4
          |       |  +-------------------- 3
          |       +----------------------- 2
          +------------------------------ 1
```

1. Maritime mobile service identity(MMSI)
   (see note 3)
2. Format specifier(see note 2)
3. Categry(see note 2)
4. Nature of distress(see note 2)
5. First telecommand(see note 2)
6. Second telecommand(see note 2)
7. Acknowledgement type(see note 1)
8. Checksum

NOTES

1 Acknowledgement type:R - Acknowledge RQ
B - Acknowledge BQ
S - End of sequence of EOS

2 Last two digits of symbol number described in ITU-R M.493-6, Table 3.

3 MMSI of the called station for a DSC call to be initiated; MMSI of the calling station in a received DSC call.

DSE – Expanded digital selective calling

```
$--DSE,x,x,a,xxxxxxxxxx,xx,c--c,.......,xx,c--c*hh<CR><LF>
      |||     |     | |    |     | |  |
      |||     |     | |    |     | |  +------- 8
      |||     |     | |    |     +--+----------- 7
      |||     |     | |    +--------------------- 6
      |||     |     +--+-------------------------- 5
      |||     +------------------------------------ 4
      ||+------------------------------------------ 3
      |+-------------------------------------------- 2
      +--------------------------------------------- 1
```

1. Total number of messages
2. Message number
3. Query/reply flag
4. Vessel MMSI
5. Data set '1'
6. Additional data sets
7. Data set 'n'
8. Checksum

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

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

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.

SSD - UAIS ship static data

```
$--SSD,c--c,c--c,xxx,xxx,xx,xx,c, aa*hh<CR><LF>
        |    |    |   |  |  |  |  |  |
        |    |    |   |  |  |  |  |  +--9
        |    |    |   |  |  |  |  +--- 8
        |    |    |   |  |  |  +----- 7
        |    |    |   |  |  +------- 6
        |    |    |   |  +---------- 5
        |    |    |   +-------------- 4
        |    |    +------------------ 3
        |    +---------------------- 2
        +--------------------------- 1
```

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

VBW - Dual ground/water speed

```
$--VBW,x.x,x.x,A,x.x,x.x,A,x.x,A,x.x,A*hh<CR><LF>
        |   |  |  |   |  |  |  |  |  | |
        |   |  |  |   |  |  |  |  |  | +--- 11
        |   |  |  |   |  |  |  |  |  +----- 10
        |   |  |  |   |  |  |  |  +-------- 9
        |   |  |  |   |  |  |  +----------- 8
        |   |  |  |   |  |  +-------------- 7
        |   |  |  |   |  +----------------- 6
        |   |  |  |   +-------------------- 5
        |   |  |  +------------------------ 4
        |   |  +--------------------------- 3
        |   +------------------------------ 2
        +---------------------------------- 1
```

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

VSD - UAIS voyage static data

```
$--VSD,x.x,x.x,x.x,c--c,hhmmss.ss,xx,xx,x.x,x.x*hh<CR><LF>
        |   |   |   |    |        |  |   |   |  |
        |   |   |   |    |        |  |   |   |  +--- 10
        |   |   |   |    |        |  |   |   +------ 9
        |   |   |   |    |        |  |   +---------- 8
        |   |   |   |    |        |  +------------- 7
        |   |   |   |    |        +---------------- 6
        |   |   |   |    +----------------------- 5
        |   |   |   +------------------------------ 4
        |   |   +----------------------------------- 3
        |   +--------------------------------------- 2
        +------------------------------------------- 1
```

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

VTG - Course over ground and ground speed

```
$--VTG,x.x,T,x.x,M,x.x,N,x.x,K,a*hh<CR><LF>
        |  |  |  |  |  |  |  | | |
        |  |  |  |  |  |  |  | | +------- 6
        |  |  |  |  |  |  |  | +--------- 5
        |  |  |  |  |  |  +--+----------- 4
        |  |  |  |  +--+----------------- 3
        |  |  +--+----------------------- 2
        +--+----------------------------- 1
```

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

NOTE Positioning system Mode indicator:

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

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

Output sentences

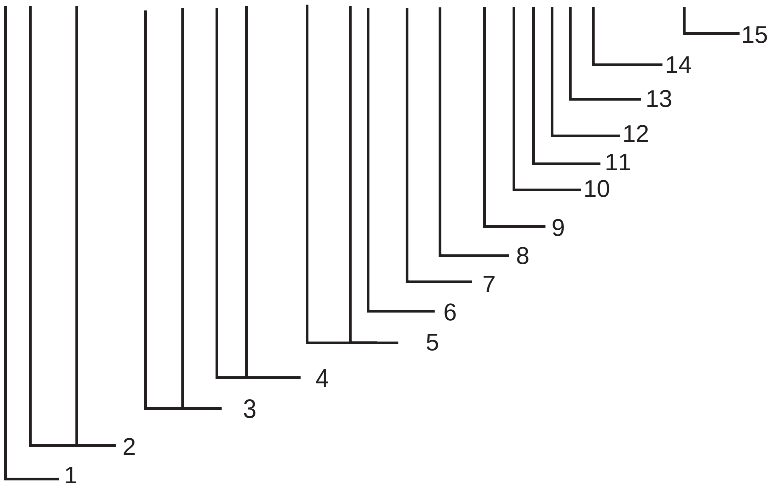
ABK - UAIS addressed and binary broadcast acknowledgement

```
$--ABK,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 – AIS channel assignment message

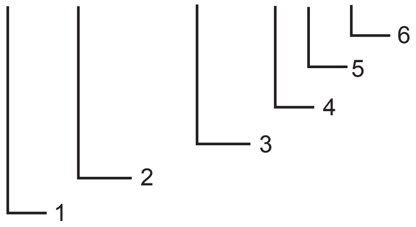
$--ACA,x,llll.l, a,yyyyy.y,a,llll.l,a,yyyyy.y,a,x,xxxx,x,xxxx,x,x,x,a,x,hhmmss.s*hh<CR><LF>



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

ACS - Channel management information source

$--ACS,x,xxxxxxxxx,hhmmss.ss,xx,xx,xxxx*hh<CR><LF>



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

ALR - Set alarm state

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

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

SPECIFICATIONS OF CLASS B AIS TRANSPONDER
FA-50

1 GENERAL

1.1	Type	Class B AIS Transponder
1.2	RX capacity	2250 report/minute, 1channel 4500 report/minute, 2channel
1.3	RX system	CSTDMA dual wave simultaneous reception
1.4	Synchronous framing	Indirect synchronize from external oscillator
1.5	Operating mode	Autonomous, Assigned, polled/interrogation response
1.6	Frequency switching	Automatic
1.7	Prevention of abnormal TX	Auto-suspend for detecting TX more than 1 second
1.8	Regulations	IMO MSC.140 (76), IEC 62287-1, ITU-R M.1371-2, DSC ITU R M.825-3, IEC 60945 ed.4 adopted

2 TRANSMITTER

2.1	Frequency range	156.025 MHz to 162.025 MHz (F1D)
2.2	Output power	1W/2W
2.3	Channel interval	25 kHz
2.4	Frequency deviation	±3 ppm or less
2.5	Transmit speed	9600 bps ± 50 ppm
2.6	Spurious Emission	9 kHz to 1 GHz, -36 dBm or less 1 GHz to 4 GHz, -30 dBm or less

3 AIS RECEIVER

3.1	Frequency range	156.025 MHz to 162.025 MHz (DSC: 156.525 MHz)
3.2	Oscillator frequency	1st local oscillator: f + (51.136/51.236 MHz) 2nd local oscillator: 51.1/51.2 MHz
3.3	Intermediate frequency	1st: 51.136/51.236 MHz, 2nd: 36 kHz
3.4	Receiving system	Double-conversion superheterodyne
3.5	Sensitivity	-107 dBm (PER 20% or less)
3.6	Error at high input level	-7 dBm
3.7	Co-channel rejection	10 dB
3.8	Adjacent channel selectivity	70 dB
3.9	Spurious response	70 dB (50 MHz to 520 MHz)
3.10	Inter-modulation	65 dB
3.11	Sensitivity suppression	86 dB (±5 MHz, ±10 MHz)

4 DSC RECEIVER (TIMESHARING SYSTEM)

4.1	Frequency	156.525 MHz (CH70)
4.2	Sensitivity	-107 dBm or less
4.3	Error at high input level	-7 dBm

4.4	Co-channel rejection	10 dB
4.5	Adjacent channel selectivity	70 dB
4.6	Spurious response	70 dB
4.7	Inter-modulation	65 dB
4.8	Sensitivity suppression	84 dB

4 GPS RECEIVER

4.1	Receiving frequency	1575.42 MHz
4.2	Tracking code	C/A code
4.3	Number of channel	12 channels parallel, 12 satellites
4.4	Position fixing method	All in view, 8-state Kalman filter
4.5	Position accuracy	10 m approx., 95% of the time, (HDOP ≤ 4) DGPS: 5m approx., 95% of the time
4.6	Tracking velocity	900 kts
4.7	Position fixing time	Warm start: 36 s typical, Cold start: 43 s typical
4.8	Geoids	WGS84
4.9	Position update interval	1 s
4.10	DGPS data correcting	By AIS information

5 INTERFACE

5.1	COM I/O	
	Input:	RS-422 (38.4kbps) / IEC61162-1 (4800bps) ACK, BBM, DTM, GBS, GGA, GLL, GNS, HDT, OSD, RMC, SSD, VBW, VSD, VTG, AIQ, DSC, DSE, PFEC
	Output:	RS-422 (38.4kbps) ABK, ACA, ACS, ALR, VDM, VDO, TXT, PFEC
5.2	NETWORK	Ethernet 10BASE-T/100BASE-TX
	Input:	ACK, BBM, DTM, GBS, GGA, GLL, GNS, HDT, OSD, RMC, SSD, VBW, VSD, VTG, AIQ, DSC, DSE, PFEC
	Output:	ABK, ACA, ACS, ALR, VDM, VDO, TXT, PFEC
5.3	Function alarm	LED indication, series data output

6 POWER SUPPLY

12-24 VDC: 2.0-1.0 A

7 ENVIRONMENTAL CONDITIONS

7.1	Ambient temperature	
	Antenna unit	-30°C to +70°C
	Transponder	-15°C to +55°C
7.2	Relative humidity	93% at +40°C
7.3	Degree of protection	
	Antenna unit	IPX6

	Transponder	IP20
7.4	Bearing vibration	IEC 60945

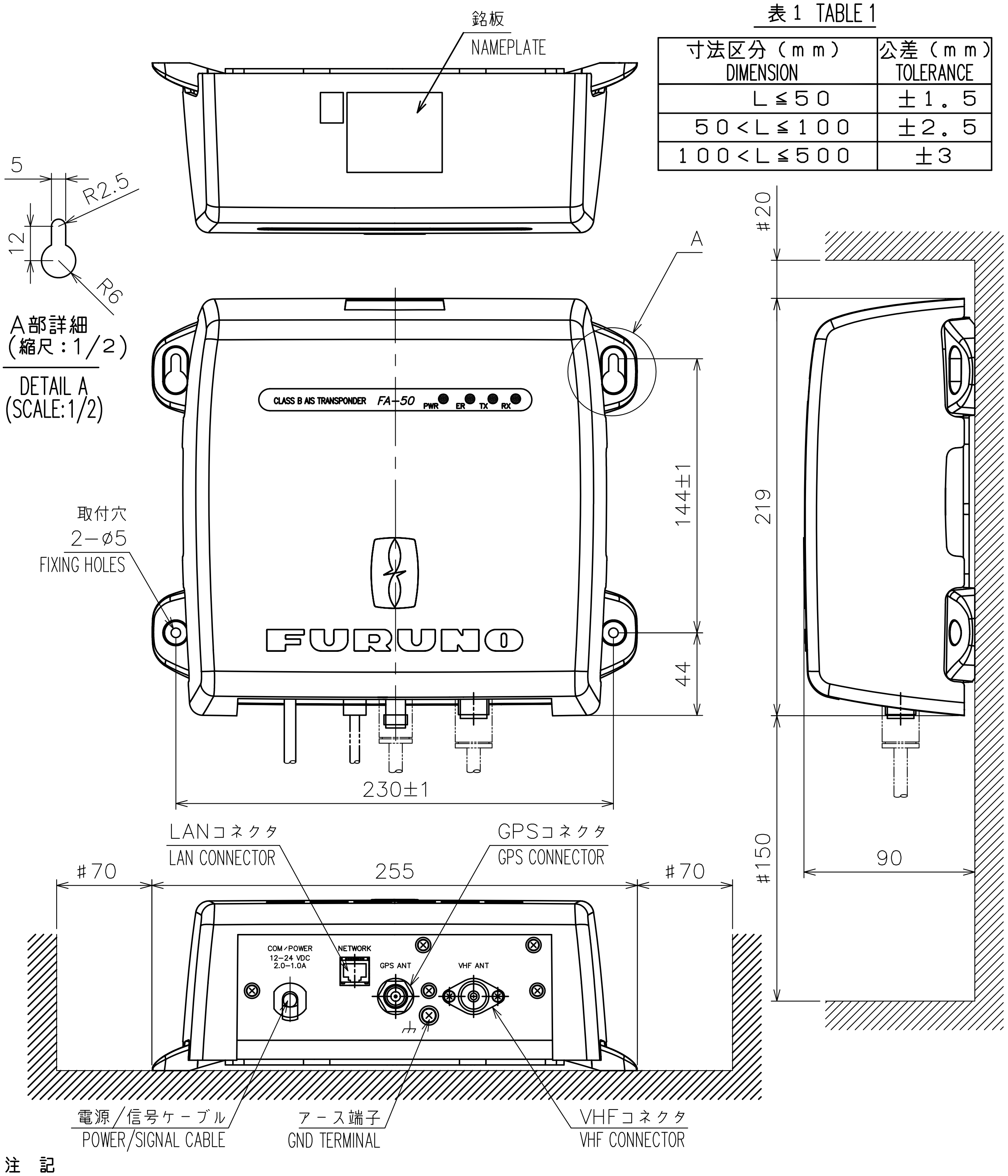
8 COATING COLOR

8.1	GPS antenna unit	N9.5
8.2	Transponder	N2.5

FURUNO

表１ TABLE 1

寸法区分（ｍｍ） DIMENSION	公差（ｍｍ） TOLERANCE
Ｌ≦５０	±１．５
５０＜Ｌ≦１００	±２．５
１００＜Ｌ≦５００	±３


銘板
NAMEPLATE
5
R2.5
12
R6
A部詳細
（縮尺：1/2）
DETAIL A
(SCALE:1/2)
A
#20
CLASS B AIS TRANSPONDER FA-50
PWR
ER
TX
RX
FURUNO
取付穴
2−ø5
FIXING HOLES
144±1
219
44
230±1
LANコネクタ
LAN CONNECTOR
GPSコネクタ
GPS CONNECTOR
#70
255
#70
#150
90
COM/POWER
12−24 VDC
2.0−1.0A
NETWORK
GPS ANT
VHF ANT
電源/信号ケーブル
POWER/SIGNAL CABLE
アース端子
GND TERMINAL
VHFコネクタ
VHF CONNECTOR

注　記

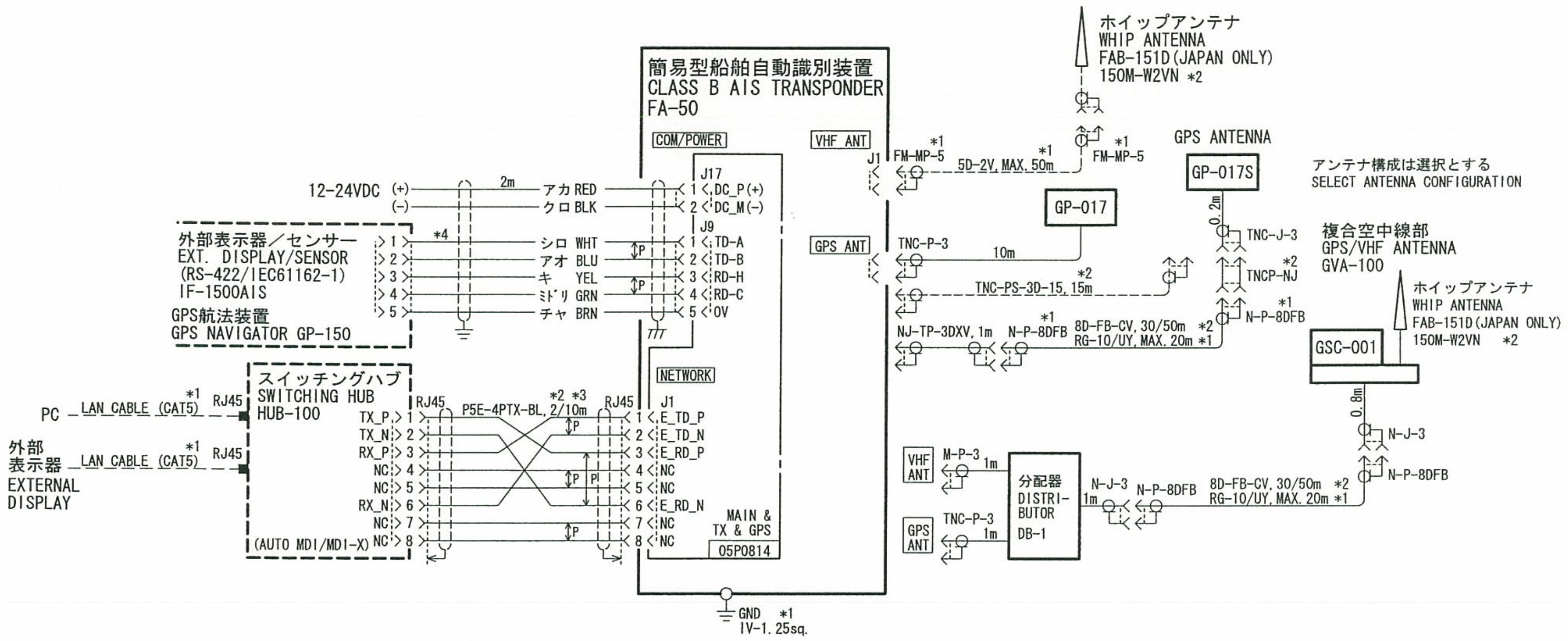
1）　#印寸法は最小サービス空間寸法とする。
2）　指定外の寸法公差は表１による。
3）　取付ネジは＋トラスタッピンネジ4x20とする。

NOTE

1. #: MINIMUM SERVICE CLEARANCE.
2. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
3. USE TAPPING SCREWS 4x20 FOR FIXING THE UNIT.

DRAWN	Aug. 24 '07 T.YAMASAKI		TITLE	FA-50
CHECKED	Aug. 24 '07 T.TAKENO		名称	簡易型船舶自動識別装置
APPROVED	**Aug.30'07 R.Esumi**			外寸図
SCALE	1/3	MASS 1.7 ±10% kg	NAME	CLASS B AIS TRANSPONDER
DWG.No.	C4442-G01-1	REF.No. 05-097-299G-2		OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.


簡易型船舶自動識別装置
CLASS B AIS TRANSPONDER
FA-50
COM/POWER
VHF ANT
GPS ANT
NETWORK
J17
1 DC_P(+)
2 DC_M(-)
J9
1 TD-A
2 TD-B
3 RD-H
4 RD-C
5 0V
J1
1 E_TD_P
2 E_TD_N
3 E_RD_P
4 NC
5 NC
6 E_RD_N
7 NC
8 NC
MAIN & TX & GPS
05P0814
12-24VDC (+) (-)
2m
アカ RED
クロ BLK
シロ WHT
アオ BLU
キ YEL
ﾐﾄﾞﾘ GRN
チャ BRN
P
*4
外部表示器／センサー
EXT. DISPLAY/SENSOR
(RS-422/IEC61162-1)
IF-1500AIS
GPS航法装置
GPS NAVIGATOR GP-150
スイッチングハブ
SWITCHING HUB
HUB-100
TX_P 1
TX_N 2
RX_P 3
NC 4
NC 5
RX_N 6
NC 7
NC 8
(AUTO MDI/MDI-X)
RJ45
P5E-4PTX-BL, 2/10m *2 *3
PC
LAN CABLE (CAT5) *1
外部表示器
EXTERNAL DISPLAY
GND *1
IV-1.25sq.
FM-MP-5 *1
5D-2V, MAX. 50m *1
ホイップアンテナ
WHIP ANTENNA
FAB-151D (JAPAN ONLY)
150M-W2VN *2
GPS ANTENNA
GP-017
GP-017S
TNC-P-3
10m
TNC-PS-3D-15, 15m *2
0.2m
TNC-J-3
TNCP-NJ *2
N-P-8DFB *1
NJ-TP-3DXV, 1m
8D-FB-CV, 30/50m *2
RG-10/UY, MAX. 20m *1
アンテナ構成は選択とする
SELECT ANTENNA CONFIGURATION
複合空中線部
GPS/VHF ANTENNA
GVA-100
GSC-001
0.8m
N-J-3
VHF ANT
GPS ANT
M-P-3
1m
分配器
DISTRIBUTOR
DB-1

注 記

＊1）造船所手配。

＊2）オプション。

＊3）Auto MDI/MDI-X対応でないHUBのときは、ストレートケーブルを使用する。

＊4）COMラインを使用しないときは、芯線がショートしないようテープで絶縁する。

NOTE

*1: SHIPYARD SUPPLY.

*2: OPTION.

*3: USE STRAIGHT LAN CABLE WHEN A HUB W/O AUTO MDI/MDI-X FUNCTION IS USED.

*4: IF COM LINES ARE NOT USED, TAPE THEM TO PREVENT SHORT-CIRCUIT.

DRAWN Aug. 1 '07 T. YAMASAKI		TYPE	FA-50
CHECKED Aug. 2 '07 T. TAKENO		名 称	簡易型船舶自動識別装置
APPROVED Aug. 3'07 R. Esumi			相互結線図
SCALE	MASS kg	NAME	CLASS B AIS TRANSPONDER
DWG. No. C4442-C01- 1	REF. No. 05-097-2002-0		INTERCONNECTION DIAGRAM

FURUNO ELECTRIC CO., LTD.