AUTOMATIC IDENTIFICATION SYSTEM

AIS-50B

(CLASS B)

INSTRUCTION
MANUAL

삼 영 이 엔 씨 [주]
SAMYUNG ENC CO., LTD.

Contents

1

Automatic Identification System

Described AIS on this chapter.

- ❑ **Outline of AIS**
- ❑ **Technical outline of AIS**

1. Outline of AIS

Automatic Identification System is a high-tech device which is showing real time voyage information as such position, route, speed of ships. It is a device to prevent from doing collision of ships on sea as well as comply with IMO regulation. It is possible to identify position of other ships, judge the voyage routes even if status of not viewing any targets by radar and to manage more efficient secure activities as such preventing against collision, wide-range monitoring, search and rescue.

Automatic Identification System is operated at a bandwidth of VHF frequency and ITU (International Telecommunication Union) a WRC (World Radio communication Conferences) in 1997 has designated 161.975 MHz (87B channel), 162.025 MHz (88B channel) as two VHF frequencies for AIS.

2. Technical outline of AIS

It is communicated by simplex, semi-duplex, duplex using TDMA (Time Division Multiple Access) protocol and the bandwidth is less than 25kHz. It consists of A Class transceiver and B Class transceiver and it is equipped to ships in accordance with the purpose.

- **A Class Transceiver:** Installed mandatory to international passenger ships and international ships (less than 300 tonnage) and make a report for position on the voyage.
- **B Class Transceiver:** Installed to ships of less than 65 feet-height and it is not mandatory regulation.

The four information report of AIS are as followings.

- **Static Information:** IMO number, MMSI, Call sign/Name, Length/Width, Type, position of on-ship location (locations of forward, backward, leftward, rightward of ship) are reported per 6 minutes or those are reported whenever data is changed or called.
- **Dynamic Information:** It contains accurate command and ship's position in perfect condition, UTC, Course Over Ground (COG), Speed Of Ground (SOG), Heading, Voyage Status, Ratio of Turn. Those are shown in accordance with speed and heading turn as a following table.

- **Voyage Related Information:** It contains Draught, Dangerous cargo(Type), Destination / Expected Time of Arrival, Route Plan, On-board crew. Those are shown per 6 minutes or whenever data is changed or called.
- **Safety Related Message:** Respond for request of messages and it contains voyage information and weather information.

The following table is shown renewal of information between Class A and Class B.

SHIP'S VOYAGE CONDITION (A Class)	INTERVAL
At anchor or moored and not moving faster than 3 knot	3min
At anchor or moored and moving faster than 3 knot	10sec
Moving 0~14 knot	10sec
Changing a course in moving 0~14 knot	3⅓sec
Moving 14~23 knot	6sec
Changing a course in moving 14~23 knot	2sec
Moving faster than 23 knot	2sec
Changing a course in moving faster than 23 knot	2sec

SHIP'S VOYAGE CONDITION (B Class)	INTERVAL
Moving 0~2 knot	3min
Moving 2~14 knot	30sec
Moving 14~23 knot	15sec
Moving faster than 23 knot	5sec

The above-integrated contents are described as following table.

DATA	A Class	B Class
Static Information - MMSI	✓	✓
- Name of Ship	✓	✓
- Type of Ship	✓	✓
- Call Sign	✓	
- IMO number	✓	
- Location of Antenna	✓	✓
- Length / Width of Ship	✓	✓
Voyage Information - Draught of Ship	✓	
- On-board crew	✓	✓
- Dangerous cargo	✓	
- Destination / Expected Time of Arrival	✓	
Dynamic Information - Universal Time Co-ordinates (UTC)	✓	✓
- Position of Ship	✓	✓
- Course Over Ground (COG)	✓	✓
- Speed of Ground (SOG)	✓	✓
- Heading	✓	✓
- Ratio of Turn	✓	
- Voyage Status	✓	
- Speed of Ship	✓	✓
- Status of Ship	✓	✓
Messages - Alarm	✓	✓
- Safety	✓	✓

In case of inputting information of static radio department, access to website (http://www.samyungenc.com/) then download AIS information to install it with PC.
MKD is available.

2
Product Specification

Described Product Specification for AIS-50B on this chapter.

- ❑ **Specification of Main unit**
- ❑ **GPS Antenna / Receiver**
- ❑ **Component**

1. Specification of Main unit

AIS can support the management of Vessel Traffic System, effective ship's navigation and environmental protection and improve the safety of navigation by Ship's traffic control, avoidance of ship's collision and acquired information for cargo type.

FREQUENCY BAND RECEIVED	156.025 MHz-162.025 MHz Receiver 1. Default CH is 88B, AIS (162.025 MHz) Receiver 2. Default CH is 87B, AIS (161.975 MHz)
CHANNEL INTERVAL	25KHz
FREQUENCY TYPE	Simplex / Semi duplex / Deplex
ANTENNA IMPEDANCE	50Ω(TNC)
FREQUENCY STABLE	±10 PPM(-20℃ to +60℃)
BAUD RATE	38400Baud(38.4Kb)/4800 Baud
FORMAT	ITU/NMEA 0183
INPUT POWER	DC 12V/24V
CURRENT	Maximum 1.2A Max.(DC 12V)
OPERATING TEMPORATURE	-15℃ ~ +55℃
MEASUREMENT	233(W)×122.8(H)×41(D)
WEIGHT	1Kg

2. GPS Antenna / Receiver

GPS Antenna

Type : Weatherproof Microstrip patch antenna

Power Input : Receiver Modulator

Measurement / Weight : 102 x 65mm (+150mm mounting bar) 0.2kg

Receiver

Receiving Frequency : 1575.42 ± 1MHz

Receiving Method : 18 channels multiple tracking method

Receiving Channel : 18 channels

Receiving Code : C/A code(1.023 MHz chip rate)

Tracking Capacity : 12 simultaneous satellite vehicles

Receiving Sensitivity : less than -130 dBm

3. Component

■ AIS-50B basic specification

NO	NAME	SPECIFICATION	Q'TY	REMARK
1	AIS Class B	AIS-50B	1EA	
2	DC Cable	LTW8-2000-08	1EA	2M
3	Stain piece	"1"class Stain piece 4X16	4EA	
4	Serial Connector	D-SUB HOOD 9P	1lot	HDEB-9S
5	DATA CABLE	UL 2464 6C X 24 AWG	2M	
6	Install manual	AIS-50B		

■ AIS-50B optional specification

NO	NAME	SPECIFICATION	Q'TY	REMARK
1	VHF Antenna	SAN-150	1EA	
1-1	Antenna cable	RG-58C/U(TNC)	15m	
1-2	Install materials		1lot	
2	GPS Antenna	SAN-60	1EA	
2-1	Antenna cable	RG-58C/U(BNC)	10m	
3	Power Supply	SP-300AD	1EA	
3-1	AC power cable	CVV-SB 2C 2SQ	1EA	3M
3-2	DC power cable	CVV-SB 2C 2SQ	1EA	3M
3-3	AC fuse	250V/2A(20mm)	2EA	
3-4	DC fuse	250V/5A(20mm)	2EA	
3-5	Ground cable	KIV 5.5 mm^2	1EA	
3-6	Install materials		1lot	
4	MKD	SI-30D	1EA	
4-1	Cable Ass'y	DSUB25-7M-DSUB25	1EA	(OPT. 10M)
4-2	Cable Ass'y	LTW8-2000-DSUB25	1EA	
4-3	Install materials		1lot	
4-4	Install manual	SI-30-MK	1EA	
5	Ground cable	KIA 1.25 mm^2	1EA	

3

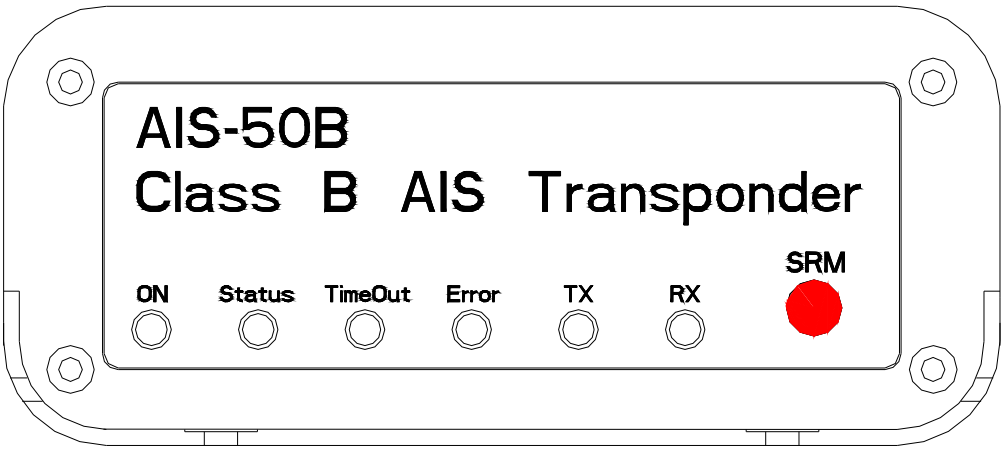
Description of Unit / How to Install

Described Description of Unit / How to Install for AIS-50B on this chapter.

- ❑ **Description of Unit**
- ❑ **How to Install**

1. Description of Unit

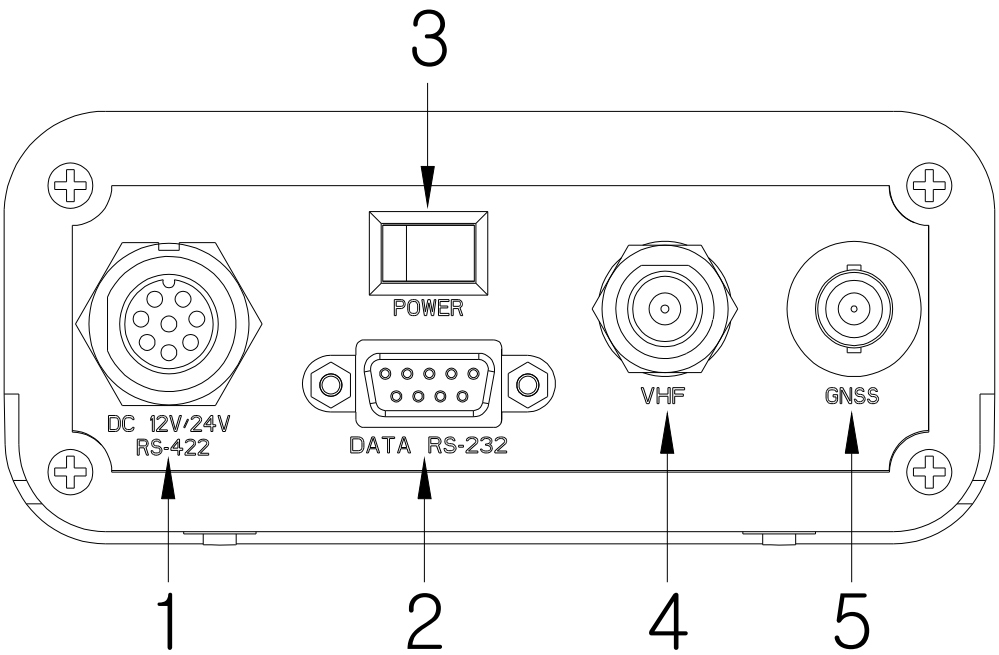
1.1 Front Panel



LED	FUNCTION	REMARK
ON	In inputting Power, LED is turned on	RED LED
STATUS	When receiving UTC Sync information into internal GPS receiver of Transponder and matching UTC Sync, Timeout Led is turned Off if this GPS Led turns On.	GREEN LED
TIMEOUT	When UTC Sync is not matched, Timeout LED turns On to show "No TX" and Status LED turns Off.	YELLOW LED
ERROR	In making internal errors or physical defects on Transponder	RED LED
TX	In transmitting AIS data normally, LED turns on.	RED LED
RX	In receiving AIS data normally, LED turns off.	GREEN LED

BUTTON	FUNCTION
SRM	In case of pressing SRM(Safety Related Message) button for 3 seconds, The LED of TX, RX, STATUS, ERROR is blinking three times per 1 second and then the SRM message is transmitted.

1.2 Back Panel



1. Communication Port of POWER / DATA (RS-422)

Inputting Power from power source or battery. DC +12V ~ 24V is available.

Port to communicate with external signal or other equipment and the type is NMEA0183 DATA.

2. DATA Communication Port (RS-232)

Port to communicate with external signal or other equipment and the type is NMEA0183 DATA.

3. Power Switch

Make Power ON/OFF by ON/OFF Switch.

4. GPS – ANT

Getting GPS signal.

5. VHF – ANT

Getting VHF signal.

※ Setup of Communication Speed **(PCB P301181 SW1)**

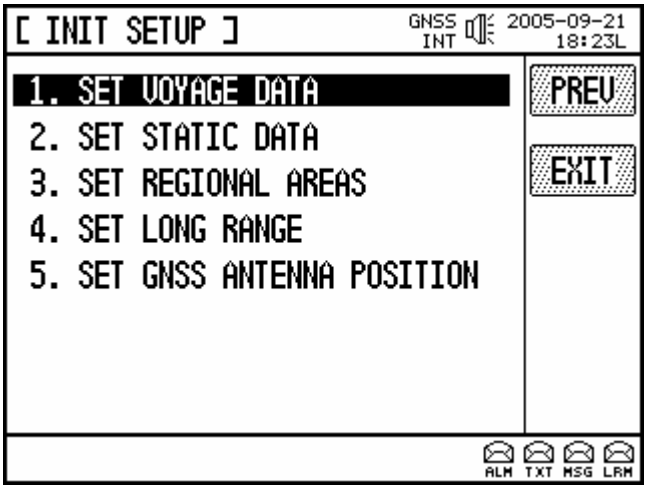
Possible to setup DATA communication port (RS-232, 422) with 4.8K/38.4K

1.3 Information Input

1. SI-30D(MKD)

To input the information as such MMSI, name of ship, type of ship, location of antenna and on-board crew, it must be interfaced with SI-30D(MKD) which we supply as an optional item. The initial setup of SI-30D is as followings. **(ask for password for access to agency or manufacturer)**

For the initial setup of the system, move the cursor to **2. INIT SETUP** in **[MENU]** screen and press button, then a following screen appears.

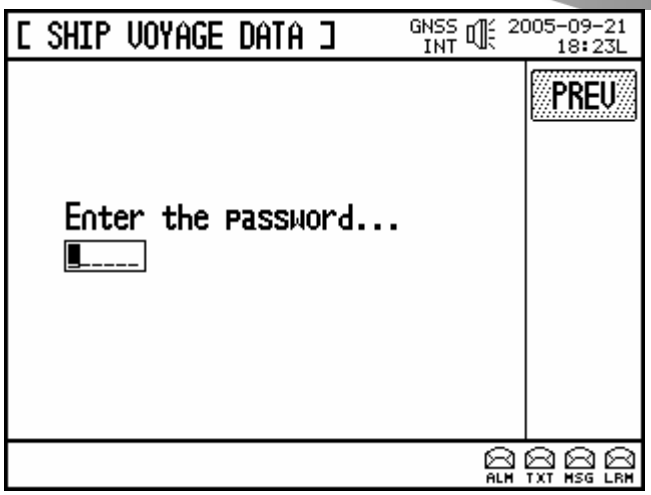


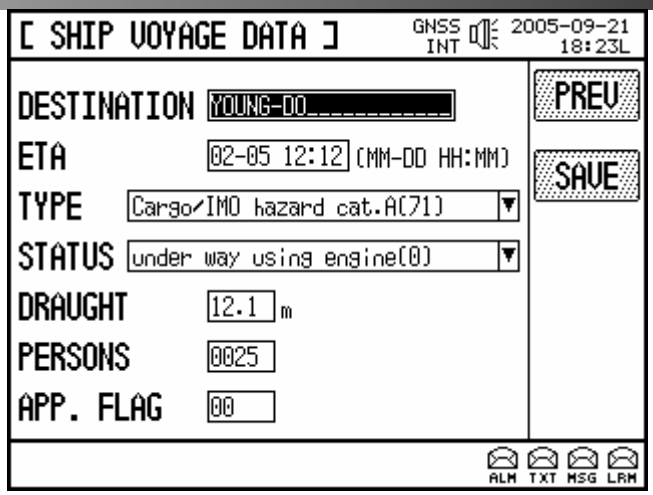
It includes SET VOYAGE DATA, SET STATIC DATA, SET REGIONAL AREAS, SET GNSS ANTENNA POSITION etc. (SET LONG RANGE is only available to Class "A")

VOYAGE DATA

Navigation related data, that is to say, destination (Max. 20 characters' input available), ETD, ETA, number of crewmen, draught, vessel type, navigation status etc. can be input.

Put a cursor onto **1. SET VOYAGE DATA** in **[INIT SETUP]** and press button, then a following screen appears. A following screen shows ready to input the password. After input password ✱✱✱✱✱✱ and press button, it switched over to the screen ready to input data.





For any change or correction, use ▼ button or ▲ button to move the wanted item. If the display is reversed, press ↵ button to erase the current value and input a new value. In the above screen, press F1 PREV button to get back to the INITIAL SETUP mode, which is the previous status. Applicable ship's type and code listed below can be referred to for choosing vessel type.

No	VESSEL TYPE	No	VESSEL TYPE
10	Future use, All vessels in this type	60	Ferry boar, All vessels in this type
11	Future use, Trans. of DG, HS, OR, MP(A)	61	Ferry boat, Trans. of DG, HS, OR, MP(A)
12	Future use, Trans. of DG, HS, OR, MP(B)	62	Ferry boat, Trans. of DG, HS, OR, MP(B)
13	Future use, Trans. of DG, HS, OR, MP(C)	63	Ferry boat, Trans. of DG, HS, OR, MP(C)
14	Future use, Trans. of DG, HS, OR, MP(D)	64	Ferry boat, Trans. of DG, HS, OR, MP(D)
15	Future use, Future use	65	Ferry boat, Future use
16	Future use, Future use	66	Ferry boat, Future use
17	Future use, Future use	67	Ferry boat, Future use
18	Future use, Future use	68	Ferry boat, Future use
19	Future use, None	69	Ferry boat, None
20	WIG All vessels in this type	70	Freighter, All vessels in this type
21	WIG Trans. of DG, HS, OR, MP(A)	71	Freighter, Trans. of DG, HS, OR, MP(A)
22	WIG Trans. of DG, HS, OR, MP(B)	72	Freighter, Trans. of DG, HS, OR, MP(B)
23	WIG Trans. of DG, HS, OR, MP(C)	73	Freighter, Trans. of DG, HS, OR, MP(C)
24	WIG Trans. of DG, HS, OR, MP(D)	74	Freighter, Trans. of DG, HS, OR, MP(D)
25	WIG Future use	75	Freighter, Future use
26	WIG Future use	76	Freighter, Future use
27	WIG Future use	77	Freighter, Future use
28	WIG Future use	78	Freighter, Future use
29	WIG None	79	Freighter, None
30	Fishing boat	80	Tanker, All vessels in this type
31	Towing	81	Tanker, Trans. of DG, HS, OR, MP(A)
32	Exceeds the length 200m of Tow or the width of 25m	82	Tanker, Trans. of DG, HS, OR, MP(B)
33	For dredging or underwater use	83	Tanker, Trans. of DG, HS, OR, MP(C)
34	For diving use	84	Tanker, Trans. of DG, HS, OR, MP(D)
35	For military use	85	Tanker, Future use
36	Yacht	86	Tanker, Future use
37	Pleasure boat	87	Tanker, Future use
38	Future use	88	Tanker, Future use

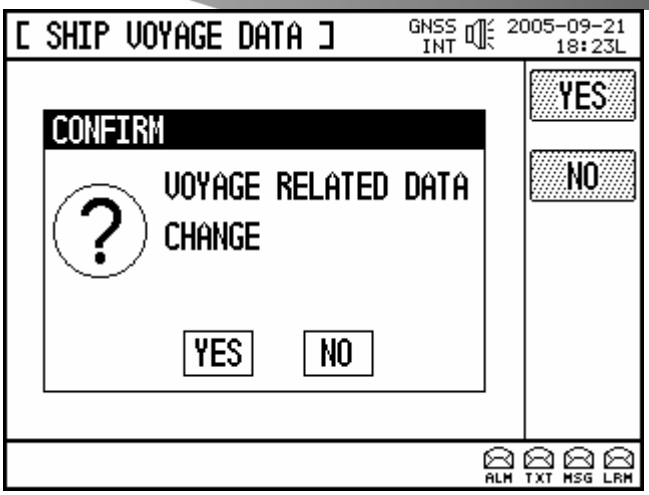
39	Future use	89	Tanker, None
40	HSC All vessels in this type	90	Other type, All vessels in this type
41	HSC Trans. of DG, HS, OR, MP(A)	91	Other type, Trans. of DG, HS, OR, MP(A)
42	HSC Trans. of DG, HS, OR, MP(B)	92	Other type, Trans. of DG, HS, OR, MP(B)
43	HSC Trans. of DG, HS, OR, MP(C)	93	Other type, Trans. of DG, HS, OR, MP(C)
44	HSC Trans. of DG, HS, OR, MP(D)	94	Other type, Trans. of DG, HS, OR, MP(D)
45	HSC Future use	95	Other type, Future use
46	HSC Future use	96	Other type, Future use

47	HSC Future use	97	Other type, Future use
48	HSC Future use	98	Other type, Future use
49	HSC None	99	Other type, None
50	Pilot	WIG : WIG vessel HSC : High speed cruise DG : Dangerous Goods HS : Harmful stuff MP : Marine Pollutants 0~9 : Undesignated	
51	Search and rescue vessel		
52	Tugboat		
53	Harbor tender		
54	Vessel with anti-pollutant facilities or equipment		
55	Law enforcement vessel		
56	Preliminary allocated to regional vessel		
57	Preliminary allocated to regional vessel		
58	Medical transporter		
59	Vessel according to Resolution 18		

For data on navigation status, select and input the code applicable in the below reference list.

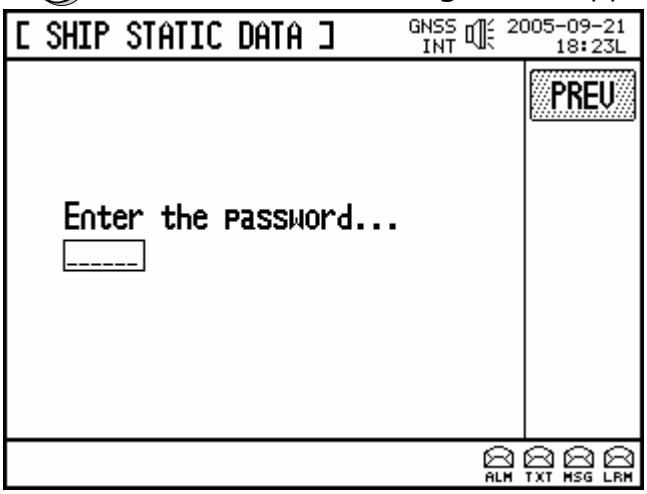
CODE NO.	NAVIGATION STATUS
00	Under way with engine in operation
01	At anchor
02	Not under command
03	Restricted adjustment
04	Constrained by draught
05	Moored
06	Aground
07	Engaged in fishing
08	Underway sailing
09	Reserved for HSC category
10	Reserved for WIG category
11~15	Reserved

After finishing of inputting navigation information, a following screen is shown and reconfirm the modification of information when press F2 SAVE button. If need modification of information, press F1 YES button and if not, press F2 NO button.

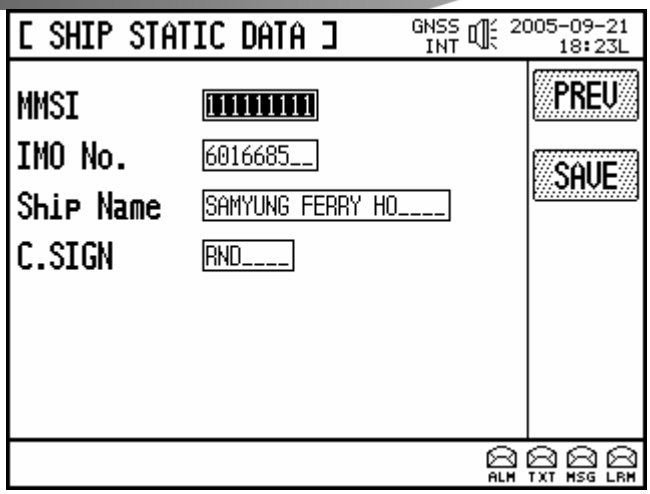


STATIC DATA

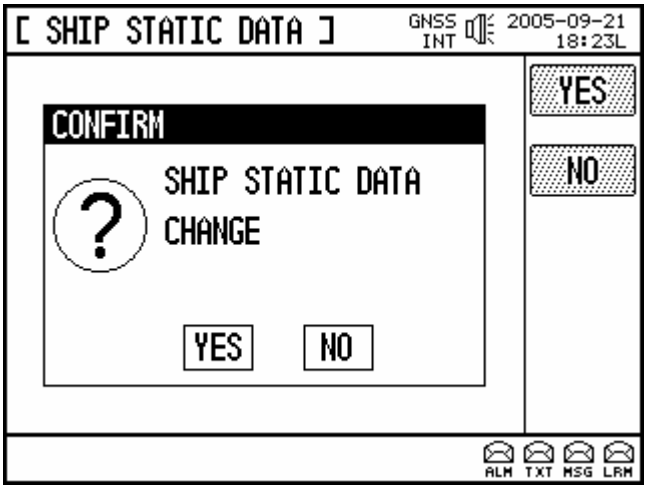
This screen is for inputting the static data on vessels that are in use. Ship name means the name of the ship (Max. 20 characters' input available) and Call Sign means the call number (Max. 7 characters' input available) respectively. The password should not be released because no one is allowed to freely change the data. Put a cursor onto 2. SET STATIC DATA in [INIT SETUP] and press button, then a following screen appears.



The above screen is ready to input password. After the user inputs password with (for example) ✱✱✱✱✱✱ and press button, it will move over to the following screen ready for inputting the data



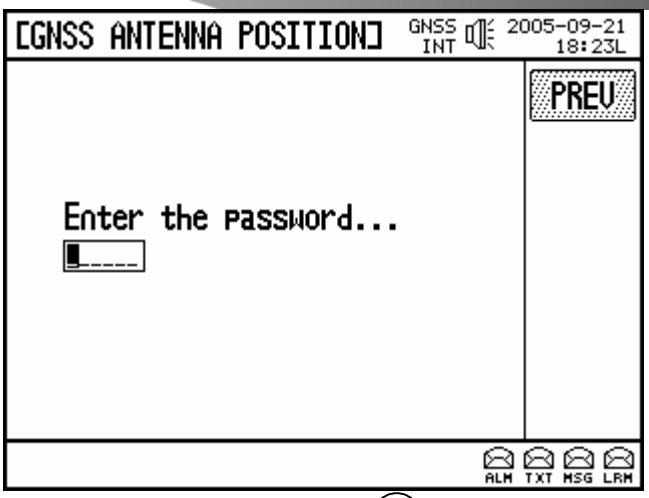
For any change or alteration, use button or button to move to the wanted item. Then the display will be reversed. Press button to erase the current value and to input the new value. In the above, press F1 PREV button to get back to the INITIAL SETUP mode, which is the previous status. Press F2 SAVE button to display the following screen. For data storage, press F1 YES button to store the changed data and press F2 NO button for getting back to [SHIP STATIC DATA] screen.



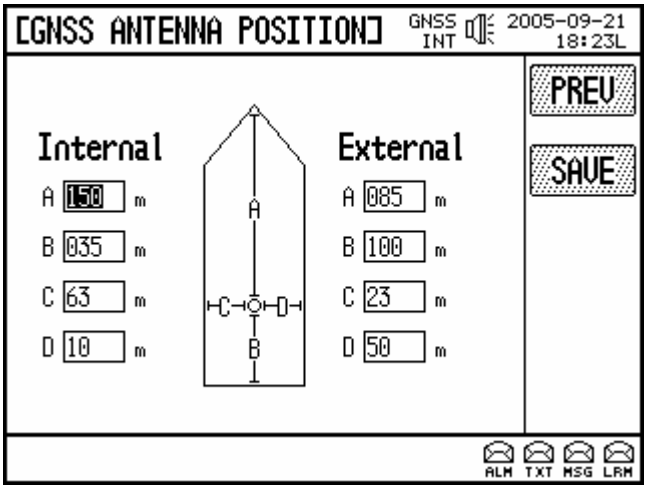
GNSS ANTENNA POSITION

The function is to set a position of internal GPS antenna and external GPS antenna.

Put a cursor onto 5. SET GNSS ANTENNA POSITION in [INIT SETUP] and press button, then a following screen appears.

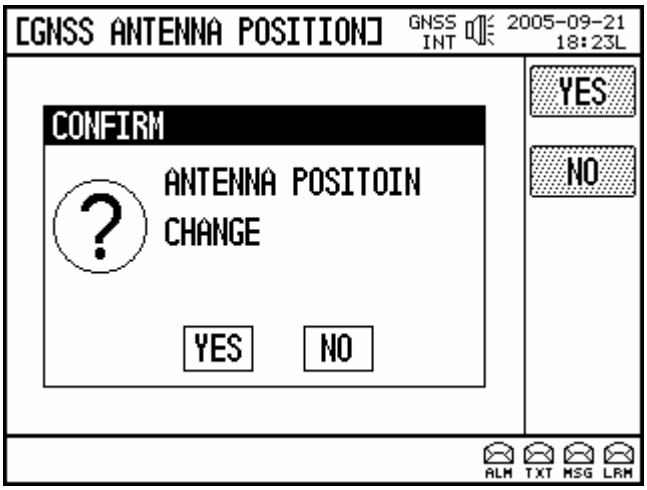


Input any wishful password ✱✱✱✱✱✱ at button on PASSWORD INPUT list, it changes to screen for inputting information.



The internal means a position of internal GNSS antenna and the external on right side means a position of external GNSS antenna.

As for input method, move to each item by using ▼ or ▲ button and press button to delete existing information and get ready to input new information.



Press F2 SAVE button to save data and press F2 NO button if not.

2.AIS-50SET

AIS-50SET program can setup ship's information of AIS-50 series and additionally, show GPS receiving sensitivity, other ships' information equipped with AIS.

The program can be downloaded from our website www.samyungenc.com.

Specification for Program installation

PC OS : Microsoft Windows 98, 2000, XP

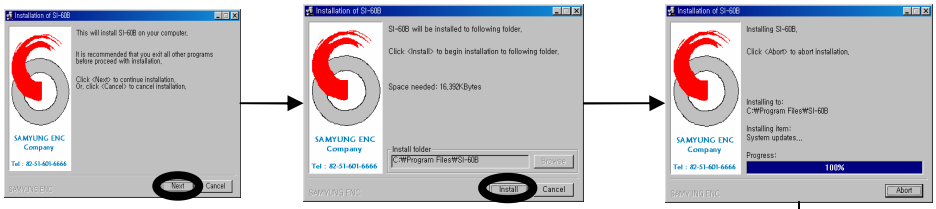
PC resloution : 1024 x 768

PC I/O : RS-232 Serial port

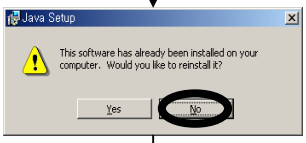
In case of no RS232 Serial port, purchase an item, which can converse USB to Serial port. (Available after setting USB Serial Converter)

How to setup AIS-50SET into PC

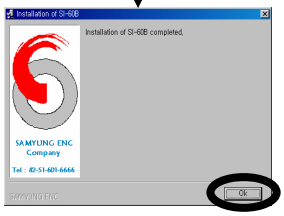
1. Execute program double-clicking install file.
2. Press Next button at install screen after execution.
3. It is installed into a normal program folder and press install button.
4. Accept if it is required to install JAVA. **(Not required to accept against a question if JAVA program is installed)**



Press No button in installing program reinstallation or JAVA installed



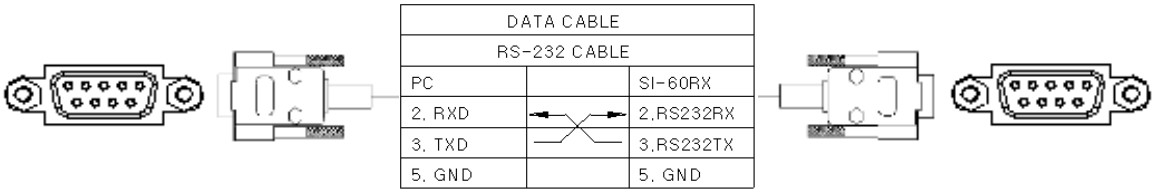
Press Agree button in an initial installation



HOW TO OPERATE OF AIS-50SET INTO PC

1. Connecting unit, PC serial port

DATA Communication port (RS-232) of the unit communicates with PC by type of NMEA0183 and the connection is as followings.



After connecting cables, select port on PC among a list of Select serial port and press Connect button then the message "Connected" is displayed on the bottom of left. In case of connecting failure, the message "Error" is displayed then you need to check out the connected cable again.

2. Execution of Program : Start -> Program -> double clicking AIS-50SET icon

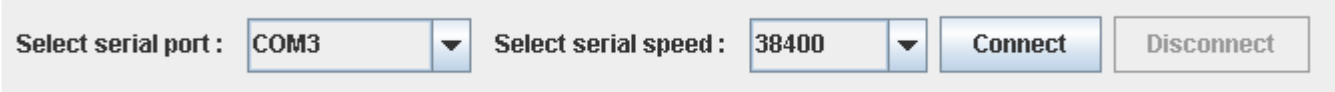
Select Serial port of PC to be connected to a unit in Select serial port. In case of no list of Serial port, there is no Serial port at PC so that it needs to be reinstalled Program. On process of reinstallation, press "No" button if the question of JAVA installation has.

3. Connecting AIS unit with Program

① Select an available Port among Serial ports in PC.

② Select "Select Serial speed" at a PORT to be connected. (Initial setup:38400)

③ Press "Connect" button.



④ If success, the message "Connected" is displayed.

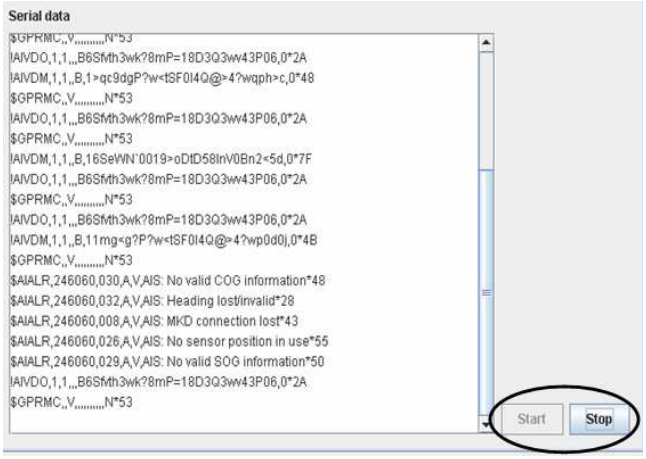
- Connecting success : Connected
- Connecting failure : Fail
- Connecting processing : Connecting
- Connecting disconnecting : Disconnected

4. Program operation(planning additional functions)

-Serial data-

① If it is connected with success, Tap menu is activated as followings.

② Press "Start" button to display NMEA0183 data on a screen of Serial data and press "Stop" button to stop it.

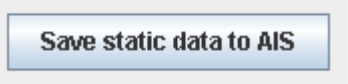


-Static data-

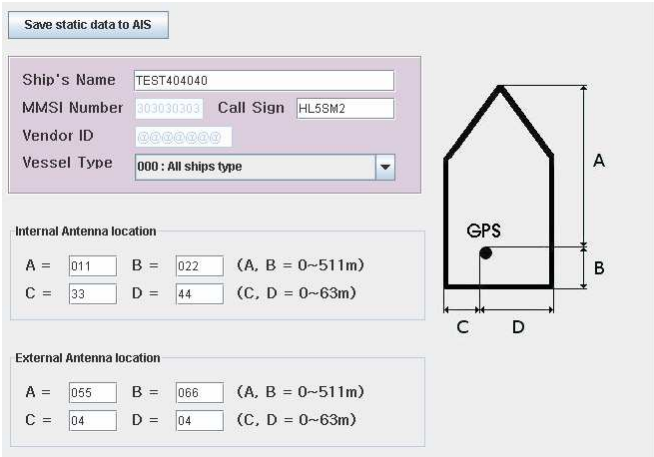
① Press "Static data" tap menu to change information relating to MMSI / Ship's information.

② Press "Read static data" button to read following information.

③ Input Ship's name, MMSI number, Call sign, Vessel type, Antenna location and press "Save static data to AIS" button to save new data to a unit. (MMSI can be setup once initially)



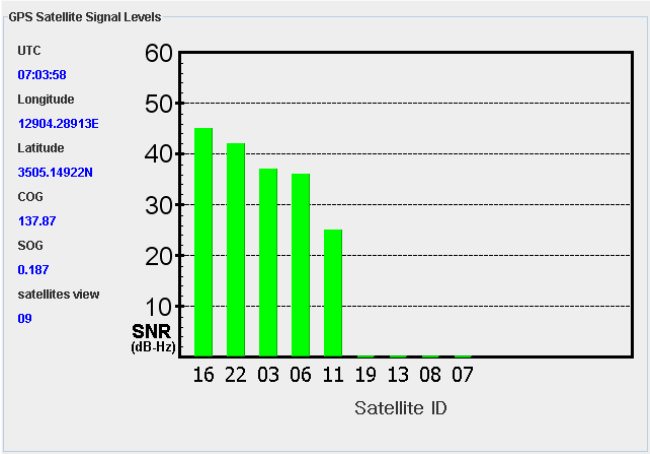
④ Setting screen of "Static data". (MMSI Number on initial supply : 000000000)



-GPS status -

① Press "GPS status" tap menu to see information as such Satellite ID, GPS sensitivity, Lat/Lon, UTC etc.

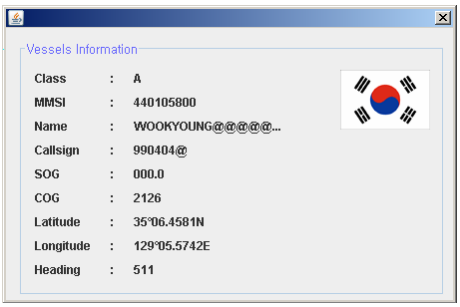
② Screen of GPS information.



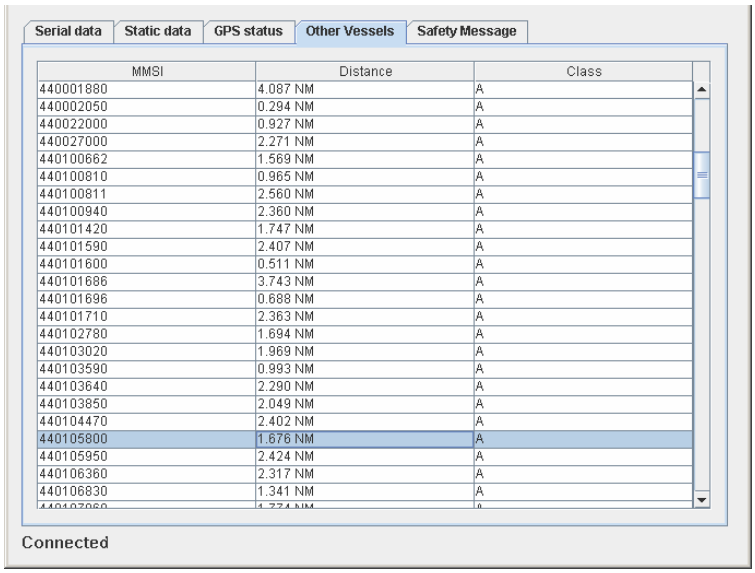
-Other Vessels-

① Select "Other Vessels" tap menu to see other vessels' AIS information.

② It is sorted in order of MMSI and you need to click to see detail information as followings.



③ It is a screen for Other Vessels.

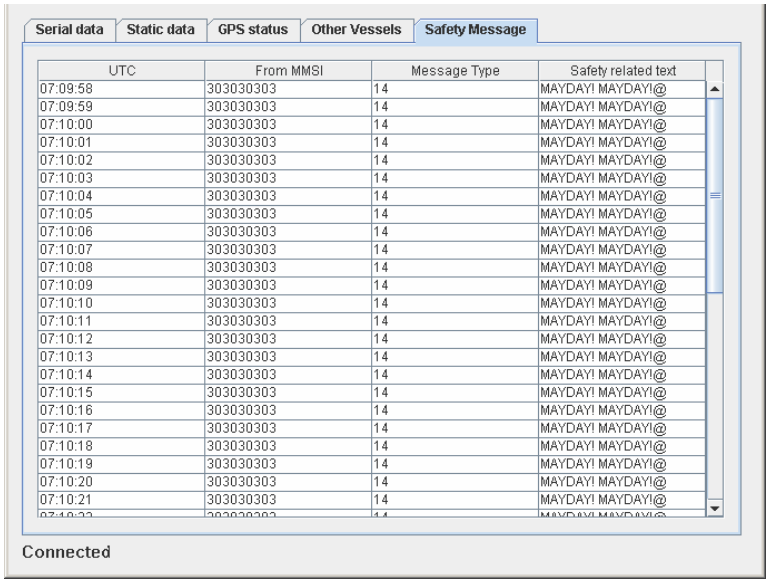


MMSI	Distance	Class
440001880	4.087 NM	A
440002050	0.294 NM	A
440022000	0.927 NM	A
440027000	2.271 NM	A
440100662	1.569 NM	A
440100810	0.965 NM	A
440100811	2.560 NM	A
440100940	2.360 NM	A
440101420	1.747 NM	A
440101590	2.407 NM	A
440101600	0.511 NM	A
440101686	3.743 NM	A
440101696	0.688 NM	A
440101710	2.363 NM	A
440102780	1.694 NM	A
440103020	1.969 NM	A
440103590	0.993 NM	A
440103640	2.290 NM	A
440103850	2.049 NM	A
440104470	2.402 NM	A
440105800	1.676 NM	A
440105950	2.424 NM	A
440106360	2.317 NM	A
440106830	1.341 NM	A

-Safety Message-

① Select "Safety Message" tap menu to see AIS Safety Message.

② It is sorted in order of inputting Message as followings.



UTC	From MMSI	Message Type	Safety related text
07:09:58	303030303	14	MAYDAY! MAYDAY!@
07:09:59	303030303	14	MAYDAY! MAYDAY!@
07:10:00	303030303	14	MAYDAY! MAYDAY!@
07:10:01	303030303	14	MAYDAY! MAYDAY!@
07:10:02	303030303	14	MAYDAY! MAYDAY!@
07:10:03	303030303	14	MAYDAY! MAYDAY!@
07:10:04	303030303	14	MAYDAY! MAYDAY!@
07:10:05	303030303	14	MAYDAY! MAYDAY!@
07:10:06	303030303	14	MAYDAY! MAYDAY!@
07:10:07	303030303	14	MAYDAY! MAYDAY!@
07:10:08	303030303	14	MAYDAY! MAYDAY!@
07:10:09	303030303	14	MAYDAY! MAYDAY!@
07:10:10	303030303	14	MAYDAY! MAYDAY!@
07:10:11	303030303	14	MAYDAY! MAYDAY!@
07:10:12	303030303	14	MAYDAY! MAYDAY!@
07:10:13	303030303	14	MAYDAY! MAYDAY!@
07:10:14	303030303	14	MAYDAY! MAYDAY!@
07:10:15	303030303	14	MAYDAY! MAYDAY!@
07:10:16	303030303	14	MAYDAY! MAYDAY!@
07:10:17	303030303	14	MAYDAY! MAYDAY!@
07:10:18	303030303	14	MAYDAY! MAYDAY!@
07:10:19	303030303	14	MAYDAY! MAYDAY!@
07:10:20	303030303	14	MAYDAY! MAYDAY!@
07:10:21	303030303	14	MAYDAY! MAYDAY!@

2. How to Install

AIS-50B is designed for easy installation into a decorated bridge of ship and you can view the common arrangement of the system on external connecting diagram of the attached Appendix.

The installation can be divided by the following two categories.

- Installation of Main unit
- Installation of VHF antenna

We would like to recommend you to install components as such VHF antenna, PLOTTER, MKD in accordance with following instructions.

2.1 Installation of Main unit

AIS-50B AIS is integrated designed for easy installation at a bridge and it needs only small spot due to the simple design.

The installation of AIS-50B AIS is as followings.

- You had better install AIS-50B AIS considering of space for convenient interfacing to other equipments.
- The 3P connector on the back panel is for inputting power. The number 1 is (+) and number 3 is (-).
- IEC/NMEA DATA cable can be connected to data port on back panel. (Refer to external connecting diagram at AIS-50B AIS Appendix)

2.2 Installation of VHF Antenna

The role of well-installed VHF antenna is supporting stable communication of AIS-50B AIS and some of importance facts are as followings.

- Generally, VHF antenna should be installed at higher location of ship and at far away from other equipment.

- VHF antenna should be far away from structure of magnetic material and installed a high location at least 2M height. In addition, avoid installation for closer space of big vertical objects and there should not be any barriers at horizontal viewing of antenna.
- VHF antenna should be installed more than 2 meter far away from objects omitting high energy sources as such radar equipment or transmitting radio antenna and also far away from transmitting beam.

- More than 1 Antenna should not be installed at same height position and if same VHF antennas installed at same height position, those should be installed at least far than 2 meters away.

VHF antenna should be installed as following instructions.

- Location of antenna bracket
  - It should be installed at concrete location.
- Antenna should be installed on a mount.
- Coaxial cable of VHF antenna reach at location of main unit. It is high quality RG-8U cable and to reduce attenuation of current, keep cable length a short.
- Make loosen cable length towards main unit.
- Attach a connector to end of coaxial cable.
- Use a connector in case of connecting the cable to main unit.

4
Application of AIS

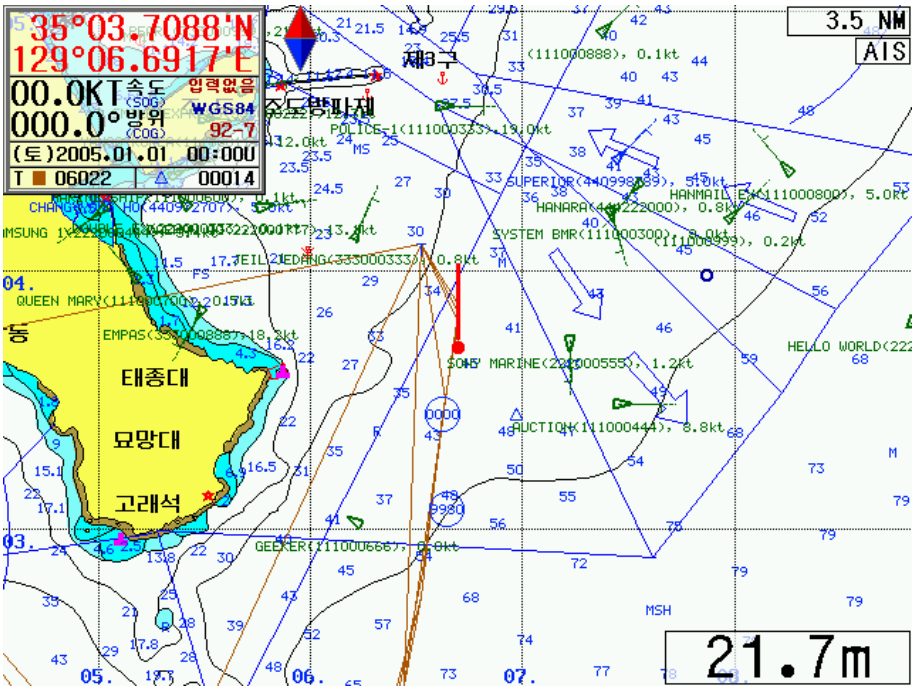
Described application of AIS on this chapter.

- ❑ **AIS display**
- ❑ **Setup of Communication speed**

1. AIS Display

1.1 Description of screen

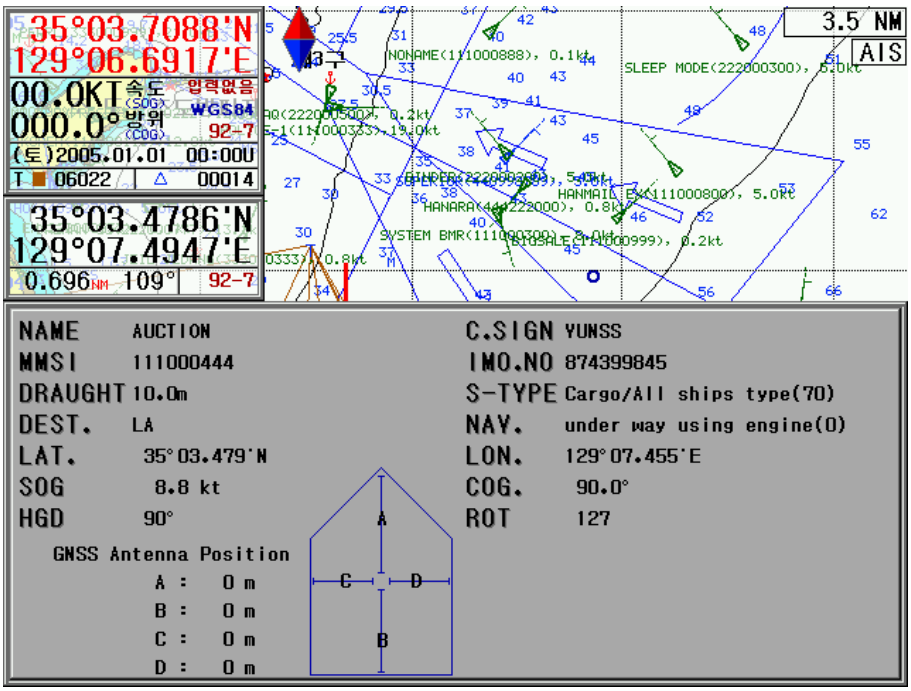
The following figures show AIS function mode on NAVIS screen and the mode interfaced to PC.



Basic information of AIS on screen of NAVIS and PC.

- **Name of Ship** : Name to be attached mark of ship
- **MMSI** : Marine identification number for identification of ship
- **SOG** : Voyage speed of current ship
- **COG** : Voyage route of current ship

In case of selecting ships on NAVIS screen, following detail information is shown as following figure.



AIS detail information on screens of NAVIS, PC.

- **NAME** : Name of Ship
- **MMSI** : ID number of IMO
- **DRAUGHT**: Draught
- **DEST.** : Destination
- **LAT.** : Latitude
- **SOG** : Voyage speed
- **HDG** : Heading
- **C.SIGN** : Call Sign
- **IMO.NO** : IMO number
- **S-TYPE** : Type of ship
- **NAV.** : Current voyage status
- **LON.** : Longitude
- **COG.** : Voyage route
- **ROT** : Rotate ratio of ship
- **GNSS Antenna Position** : GPS Antenna location onto a ship

1.2 Description of AIS marks

There are four types of marks and the functions are as followings.

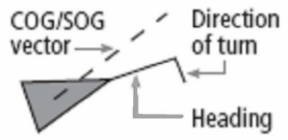
(1) : Mark of not moving status

(2) : Mark of moving status

(3) : Mark in case of selecting a ship

(4) : Mark of dangerous status

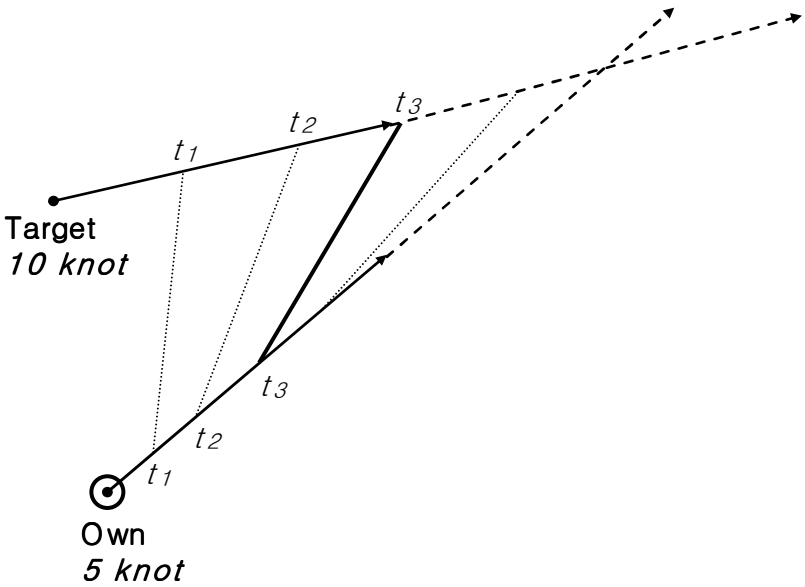
The meaning of the marks are as followings.



- COG/SOG : Bearing of speed, route
- Heading : Heading bearing of ship
- Direction of turn : Rotate bearing of ship

In case of marking a dangerous ship, you should distinguish in accordance with CPA/TCPA and the definition of CPA/TCPA is as followings.

- CPA/TCPA : CPA(Closest Point to Approach) means the closest point to approach own vessel and target vessel. And TCPA means time to reach to CPA.



While own vessel moves at 5 knot speed and a target vessel moves at 10 knot speed on the picture above, we are able to know the distance between own vessel and target vessel in accordance with each time. At the time *t1*, *t2*, *t3*, ..., *tn*,,If we solve the distance between each point, the distance will be the closest point at *t3.* And, the closest point is CPA and the time to reach at CPA, *t3,* isTCAP.

2. Setup of Communication speed

Possible to setup communication speed with 4.8K/38.4K by using SW1 into the unit.

■ Setup of NAVIS-PLOTTER (800, 2600, 3100, 5100)

❑ Setup of External port

- Function to set up output port interfacing to other equipment

메뉴 ➡ [3.System] ➡ [4.System setup] ➡ [2.Output port setup] ➡ Select NMEA available with other equipment ➡ Select speed(bps) ➡ Select Time interval (sec.)

❑ Working setup of AIS information marks

- Function to show AIS information to Plotter screen

메뉴 ➡ [3.System] ➡ [4.System setup] ➡ [3.AIS setup] ➡ [1.ON/OFF] (Whenever it was pressed, the『ON/OFF) is selected repeatedly)

■ Setup of NAVIS-PLOTTER (3700)

❑ Setup of External port

- Function to set up output port interfacing to other equipment

[MENU] ➡ [4.Initial setup] ➡ [7.Data form<Input/Output>] ➡ [Input/Output] (Whenever "Switch" button was pressed, the『Input/Output) is selected repeatedly)

❑ Working setup of AIS information marks

- Function to show AIS information to Plotter screen

[MENU] ➡ [4.Initial setup] ➡ [7.Data form<Input/Output>] ➡ [Input/Output] ➡ [5. RCV-3800] ➡ Select between [1.4800 / 4.38400] ➡ Working setup of AIS information marks

5
Maintenance and Troubleshooting

Described Maintenance and Troubleshooting of AIS on this chapter.

- ❑ **Maintenance and Troubleshooting of System**
- ❑ **Troubleshooting**

1. Maintenance and Troubleshooting of System

It is quite necessary to do periodical maintenance and troubleshooting for keeping performance of unit in good order. It means periodical unit test, and software upgraded if necessary but which following items should be included.

ITEM	CONTENT
Connector/Terminal	✓Check if the connection of connector and terminal is properly connected from rear part of transponder unit and MKD unit.
Cable	✓Check conditions of all cables. Replace it immediately with new one if something wrong has been founded.
Ground port and Ground cable	✓Check condition of ground terminal. Replace it or clean cables if it is decayed or rusted. Check the connection of ground cable.
Keep it clean	The dust on unit should be cleaned by using a clear for prevent LCD from damage. In case of having dot of salt or dust on the unit, it must be cleaned by cleaning tissues or cotton, but not by any chemical acid that may spoil the paint on surface of unit.

2. Troubleshooting

The following table shows general defective symptom and solution for the defects.
Even though users cannot restore the equipment with general methods, don't even try to look into the inside of the equipment. Whatever the issue is, the equipments must be checked by technical specialists.

A/S PIC ☏ : 051-601-5570~5574

SYMPTOMS	ACTIONS TO BE TAKEN
NO TURN ON	✓Check if power connector is fixed well. ✓Check power supply / fuse.
No receiving Satellite information	Check if GPS antenna, cables, connectors have defects on connection.

Appendix

Described Appendix of AIS operation on this chapter.

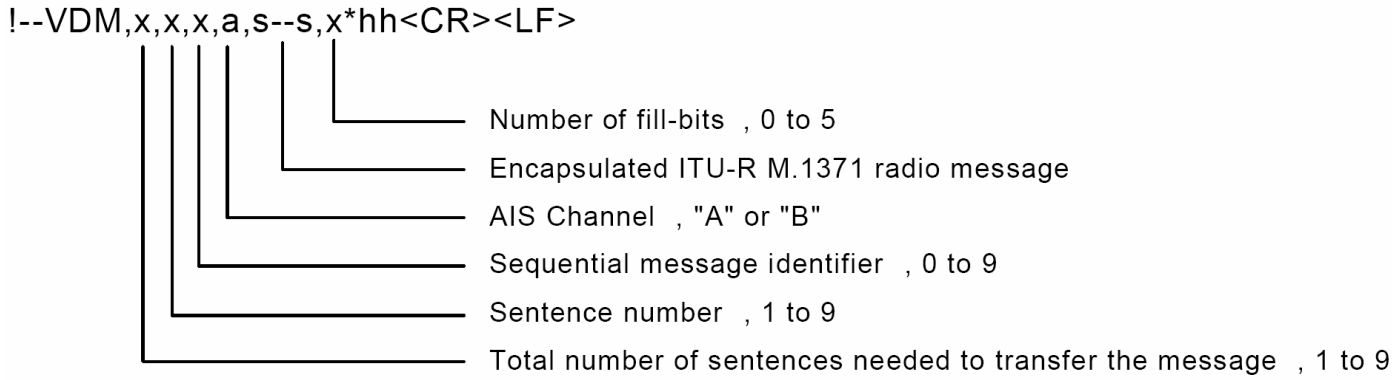
- ❑ **Appendix 1. Description of Messages**
- ❑ **Appendix 2. Packing List**

Appendix 1. Description of Messages

Brief description about common messages of **SI-60B** is as followings.
All following comments are referred by regulations of ITU-R M.1371, IEC-61993-2, NMEA 0183 Specification and more detail comments are indicated in ITU-R M.1371, IEC-61993-2, NMEA 0183.

■ VHF Data Link Messages(NMEA 0183 VDM)

VDM Message format



VDM Message type

Data was encapsulated in position "S--S" of VDM. These contents contain following types and more detail contents are indicated in ITU-R M. 1371.

VDL Message number	VDM Message description
AIS target information	
1, 2, 3, 9, 18, 21	Reporting position information
4	Reporting information of Base station
5	Voyage related data
19	Class B – Extended data information
Treatment of safety message	
12	Addressed related safety message
14	Broadcast related safety message
Treatment of external application	
6	Binary addressed
8	Binary broadcast
System Control	
7	Binary acknowledge

10	UTC and data inquiry
11	UTC and data response
13	Safety related ack
15	Interrogation
16	Assignment mode command
17	DGNSS corrections
20	Data link management
22	Channel management

■ VHF data link own vessel messages(NMEA 0183 VDO)

VDO Message format

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

- Number of fill-bits , 0 to 5
- Encapsulated ITU-R M.1371 radio message
- AIS Channel , "A" or "B"
- Sequential message identifier , 0 to 9
- Sentence number , 1 to 9
- Total number of sentences needed to transfer the message , 1 to 9

VDO Message type

VDO Message number	VDO Message description
AIS target information	
13	Positive related safety respond
18	Reporting position information of standard Class B. (Contain MMSI, SOG, Lat, Long, COG etc.)
24a	Static data port A of Class B"CS" (Contain MMSI, ship name)
24b	Static data port B of Class B"CS" (Contain MMSI, ship type, cargo type, call sign etc.)

■ Regional Assignment Channel Assignment Messages(NMEA 0183 ACA)

$--ACA,x,llll.ll,a,yyyyy.yy,a,llll.ll,a,yyyyy.yy,a,x,xxxx,x,xxxx,x,x,x,a,x,hhmmss.ss*hh<CR><LF>

- Time of "in-use" change
- In-Use Flag
- Information source
- Power level control
- Tx/Rx mode control
- Channel B bandwidth
- Channel B
- Channel A bandwidth
- Channel A
- Transition Zone Size
- Region Southwest corner longitude – E/W
- Region Southwest corner latitude – N/S
- Region Northeast corner longitude – E/W
- Region Northeast corner latitude – N/S
- Sequence Number , 0 to 9

■ Channel management information source messages(NMEA 0183 ACS)

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

- UTC year
- UTC month, 01 to 12
- UTC day, 01 to 31
- UTC at receipt of regional operating settings
- MMSI of originator
- Sequence number , 0 to 9

■ AIS Alarm Messages(NMEA 0183 ALR, Text)

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

- Alarm's description text
- Alarm's acknowledge state, A = acknowledged
  V = unacknowledged
- Alarm condition (A = threshold exceeded, V = not exceeded)
- Local alarm number (identifier) [identification number of alarm source]
- Time of alarm condition change, UTC

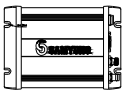
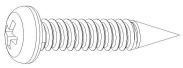
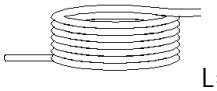
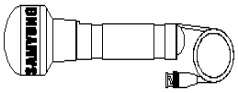
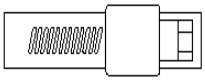
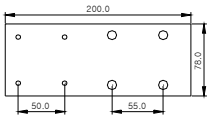
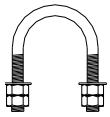
■ Own vessels GPS information (NMEA 0183)

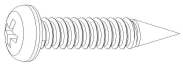
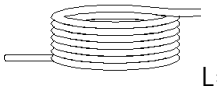
$--RMC, hhmmss.ss, A, llll.ll,a, yyyyy.yy, a, x.x, x.x, xxxxxx, x.x,a, a*hh<CR><LF>

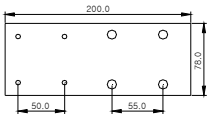
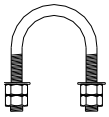
- Mode indicator
- Magnetic variation, degrees, E/W
- Date: dd/mm/yy
- Course over ground, degrees true
- Speed over ground, knots
- Longitude, E/W
- Latitude, N/S
- Status A = data valid V = navigation receiver warning
- UTC of position fix

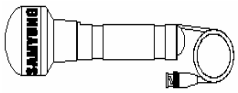
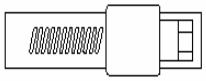
Appendix 2. Packing List

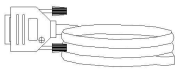
■ AIS-50B

AIS-50B BASIC SPECIFICATION-K							
NO.	ITEM	DESCRIPTION	MODEL		Q'TY	CHECK	REMARK
1	MAIN UNIT		AIS-50B		1		
			CODE NO.	E01-2000-00			
2	DC POWER CABLE		LTW8-2000-08		1	A-01	2 M
			CODE NO.	574-0897-01			
3	STAIN PIECE		Stain Piece 4X16		4		
			CODE NO.	904-0049-11			
4	SERIAL CONNECTOR		D-SUB HOOD 9P		1		
			CODE NO.	595-0109-1K			
5	D-Sub Connector		HDEB-9S		1		
			CODE NO.	584-2009-2V			
6	DATA CABLE	 L=2M	UL 2464 6C X 24 AWG		1	A-04	2M
			CODE NO	567-2406-1K			
7	GPS ANTENNA	 L=10M	SAN-60		1	A-03	RG58C/U BNC
			CODE NO	SPR-1403			
8	STAIN BAND		Ø65		2		
			CODE NO	SPR-1404			
9	VHF ANTENNA		SAN-150		1		
			CODE NO.	STR-585			
10	VHF ANT. CABLE	 L=15M	PL259-15M(RG58)-TNC		1	A-02	TNC
			CODE NO.	AIS-50B2			
11	ANT BRACKET		78 X 200		1		
			CODE NO.	STR-586			
12	U-BOLT		Ø63 X 80mm		2		
			CODE NO.	STR-601			
13	MANUAL		AIS-50B		1		
			CODE NO.	AIS-50BMK			

AIS-50B BASIC SPECIFICATION-K							
NO.	ITEM	DESCRIPTION	MODEL		Q'TY	CHECK	REMARK
1	MAIN UNIT		AIS-50B		1		
			CODE NO.	E01-2000-00			
2	DC POWER CABLE		LTW8-2000-08		1	A-01	2 M
			CODE NO.	574-0897-01			
3	STAIN PIECE		Stain Piece 4X16		4		
			CODE NO.	904-0049-11			
4	SERIAL CONNECTOR		D-SUB HOOD 9P		1		
			CODE NO.	595-0109-1K			
5	D-Sub Connector		HDEB-9S		1		
			CODE NO.	584-2009-2V			
6	DATA CABLE	 L=2M	UL 2464 6C X 24 AWG		1	A-04	2M
			CODE NO	567-2406-1K			
13	MANUAL		AIS-50B		1		
			CODE NO.	AIS-50BME			

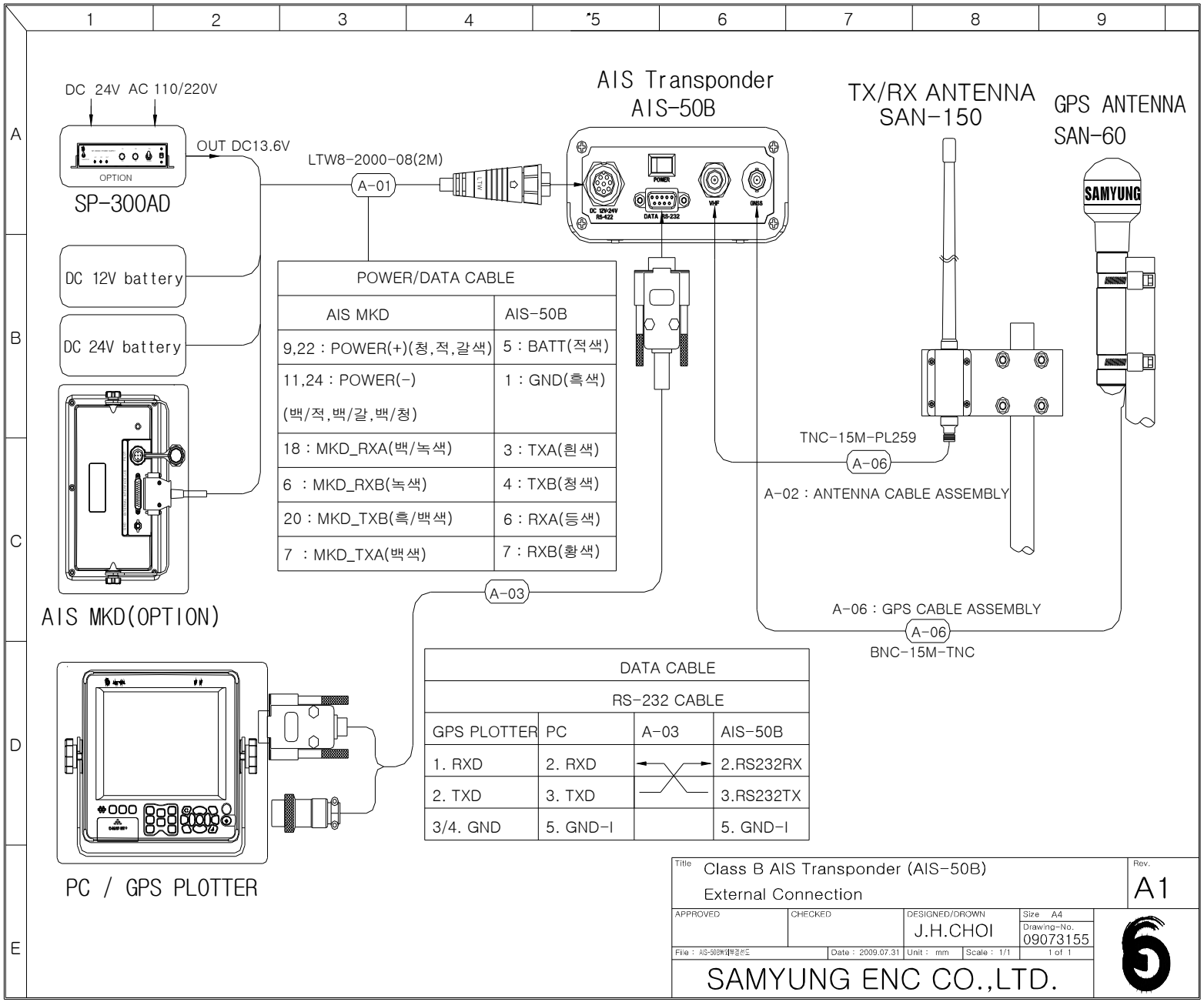
AIS-50B BASIC COMPONENT-EA							
NO.	ITEM	DESCRIPTION	MODEL		Q'TY	CHECK	REMARK
9	VHF ANTENNA		SAN-150		1		
			CODE NO.	STR-585			
10	VHF ANT. CABLE	 L=15M	PL259-15M(RG58)-TNC		1	A-02	TNC
			CODE NO.	AIS-50B2			
11	ANT BRACKET		78 X 200		1		
			CODE NO.	STR-586			
12	U-BOLT		Ø63 X 80mm		2		
			CODE NO.	STR-601			

AIS-50B OPTIONAL COMPONENT-EB							
NO.	ITEM	DESCRIPTION	MODEL		Q'TY	CHECK	REMARK
1	GPS ANTENNA	 L=10M	SAN-60		1	A-03	RG58C/U BNC
			CODE NO.	SPR-1403			
2	STAIN BAND		Ø65		2		
			CODE NO.	SPR-1404			

AIS-50B OPTIONAL COMPONENT-EC							
NO.	ITEM	DESCRIPTION	MODEL		Q'TY	CHECK	REMARK
1	MKD		SI-30D		1		
			CODE NO.	SI-30-2			
2	MKD BRACKET		ACC-SIS5-001		1		
			CODE NO.	SIS-5-3			
3	HANDSET BOLT		ACC-6X17MM-002		2		
			CODE NO.	SIS-5-2			
4	Cable Ass'y		DSUB25-7M-DSUB25		1	A-06	OPT. 10M
			CODE NO.	574-0166-01			
5	Cable Ass'y		LTW8-2000-DSUB25		1	A-05	
			CODE NO.	574-0996-01			
5	STAIN PIECE		4 x 16mm		5		
			CODE NO.	SIS-5-11			

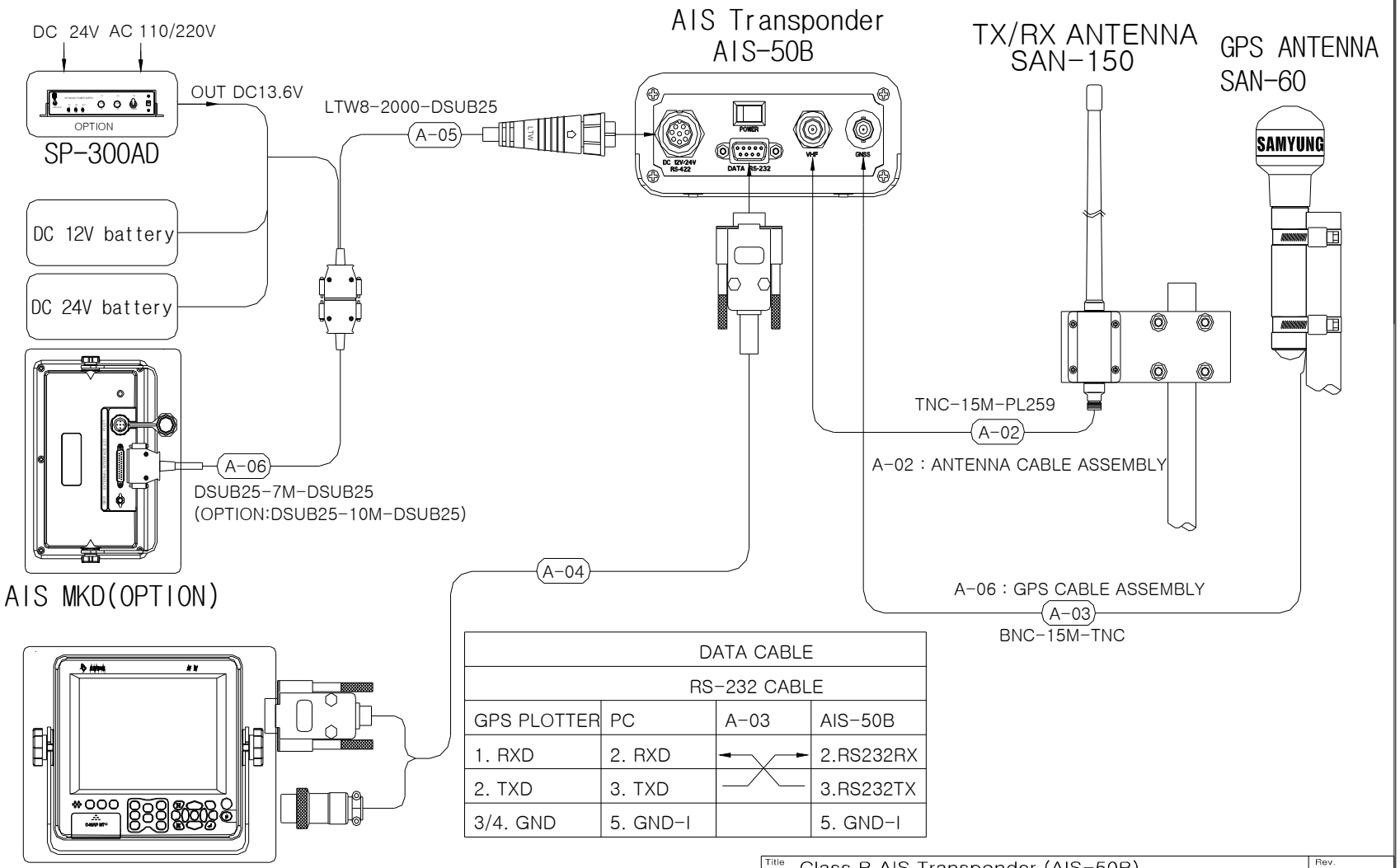
Appendix 3. Drawings

External Connection



POWER/DATA CABLE	
AIS MKD	AIS-50B
9,22 : POWER(+)(청,적,갈색)	5 : BATT(적색)
11,24 : POWER(-) (백/적,백/갈,백/청)	1 : GND(흑색)
18 : MKD_RXA(백/녹색)	3 : TXA(흰색)
6 : MKD_RXB(녹색)	4 : TXB(청색)
20 : MKD_TXB(흑/백색)	6 : RXA(등색)
7 : MKD_TXA(백색)	7 : RXB(황색)

DATA CABLE			
RS-232 CABLE			
GPS PLOTTER	PC	A-03	AIS-50B
1. RXD	2. RXD		2.RS232RX
2. TXD	3. TXD		3.RS232TX
3/4. GND	5. GND-I		5. GND-I



DATA CABLE			
RS-232 CABLE			
GPS PLOTTER	PC	A-03	AIS-50B
1. RXD	2. RXD		2.RS232RX
2. TXD	3. TXD		3.RS232TX
3/4. GND	5. GND-I		5. GND-I

Title: Class B AIS Transponder (AIS-50B) MKD External Connection			Rev. A1
APPROVED	CHECKED	DESIGNED/DROWN J.H.CHOI	Size A4 Drawing-No. 09073155
File : AIS-50BW외부결선도	Date : 2009.07.31	Unit : mm / Scale : 1/1	1 of 1
SAMYUNG ENC CO.,LTD.			