

Contents

Chapter 1. Overview

1.1 Function	4
1.2 Feature	4
1.3 Composition	4
1.4 Construction	6
1.5 Specifications	8
1.5.1 General	8
1.5.2 Antenna (RSU-7200)	8
1.5.3 Display Unit (SMR-7200)	9
1.5.4 Connection Cable	10

Chapter 2. How to operate panel and menu

2.1 Front Panel Buttons and Knob	11
2.1.1 Front Function	11
2.1.2 Directional Key	12
2.1.3 Display Description	12
2.2. Display Description	13
2.3. Menu Functions	14
2.3.1 Menu Composition	14
2.3.2 MENU Functions	16

Chapter 3. How to operate the unit

3.1 General Idea	22
3.1.1 Power Input and Operation	22
3.1.2 Tuning Control	22
3.1.3 Image Control	23
3.1.4 Power Off	23
3.2 Stand-by for Processing	23
3.2.1 Brightness Change	23
3.2.2 Language Selection	23
3.3 Basic Operation	23
3.3.1 TX	23
3.3.2 TX Stop	23
3.3.3 Tuning Control	23

3.3.4 Gain Control	23
3.3.5 Rain/Snow Removal	25
3.3.6 To operate the alert function	26
3.3.7 To eliminate/display the scale of Range Ring	28
3.3.8 To remove the Radar Interference	28
3.3.9 To eliminate the Ship's Heading Line	29
3.3.10 To use the parallel line	29
3.3.11 To move the center of own ship	29
3.3.12 To measure the distance and bearing to the Target	29
3.3.13 To change distance unit	30
3.3.14 To change the way of direction symbol	31
3.3.15 To change the way of bearing display	34
3.3.16 To change the way of displaying bearing line/cursor	34
3.3.17 To compensate the magnetic	34
3.3.18 To measure the time to the target	35
3.3.19 To display the Waypoint	35
3.3.20 To display the other ship's track line	36
3.4 Connection to the external navigation equipment	36

Chapter 4. Screen view

4.1 The distance from the target to the height of target	38
4.2 Reflection from the target	39
4.3 Wave Path	39
4.3.1 Reflection of sea level.....	39
4.3.2 False Image.....	40

Chapter 5. Installation

5.1 Overview	41
5.2 Installation of Antenna.....	41
5.2.1 Selection of the installation place	41
5.2.2 How to install Antenna	42
5.2.3 Connection to Equipment cable	43
5.3 DISPLAY SET-UP	45
5.3.1 Location for installation	45
5.3.2 How to Install	45
5.3.3 Power Cable connection	45
5.4 Installation check	45

5.5 Operation check	45
5.6 Initial Installation	46
5.6.1 Initial Installation	46
5.6.2 TUNE-R SET (Tuning Set).....	47
5.6.3 TUNE SET (Tune Level Set).....	47
5.6.4 Video ADJ	47
5.6.5 MBS ADJ	47
5.6.6 Tune ADJ	48
5.6.7 MT-RPM ADJ	48
5.6.7 STC Curve min.....	48
5.6.8 Upgrading software	48
5.6.9 Setting	48
5.6.10 Factory default set	48

Chapter 6. Maintenance

6.1 General Maintenance	49
6.1.1 Cleaning	49
6.1.2 Check out the tightness of screw, bolt	49
6.1.3 Check the cabling	49
6.2 Antenna	49
6.2.1 OpenArray	49
6.2.2 Bracket	50
6.3 Display	50
6.3.1 Cleaning of a Display Screen.....	50

Chapter 7. Installation drawing and circuit diagram

Chapter 8. WARRANTY INFORMATION

Chapter 1. Overview

1.1 Function

This equipment is a small-sized raster smaying Radar, composed of OpenArray type transceiver with 6 KW Transmitting power and 10.4 inch color TFT LCD monitor.

This radar complies with the regulation of frequency law.

1.2 Feature

Antenna Unit

It emits the microwave toward targets by 4(four)-step pulse widths according to the radar scale and transfers the image signals to the monitor that are made by converting the reflected signals to 2(two)-step receiver band.

- Transmission Output: 6KW
- Max. Range : 72NM

Display Unit

SMR-7200 monitor is designed to receive the input signal from Antenna and to display at the optimum conditions on the TFT LCD screen, based on the SAMYUNG's best digital signaling technology.

- 10.4 " color TFT LCD, High Resolution of 640 X 480
- One-touch keys dedicated to every function
- 10 (ten)-step LCD brightness adjustments
- The input of the external navigational devices such as Gyro or NMEA 0183 enables it to display the own ship position and the destination

1.3 Composition

Composition and Power Supply

Model	Antenna unit	Display unit	Power supply
SMR-7200	RSU-7200	SMR-7200	DC 24V

The models are named in English as follows

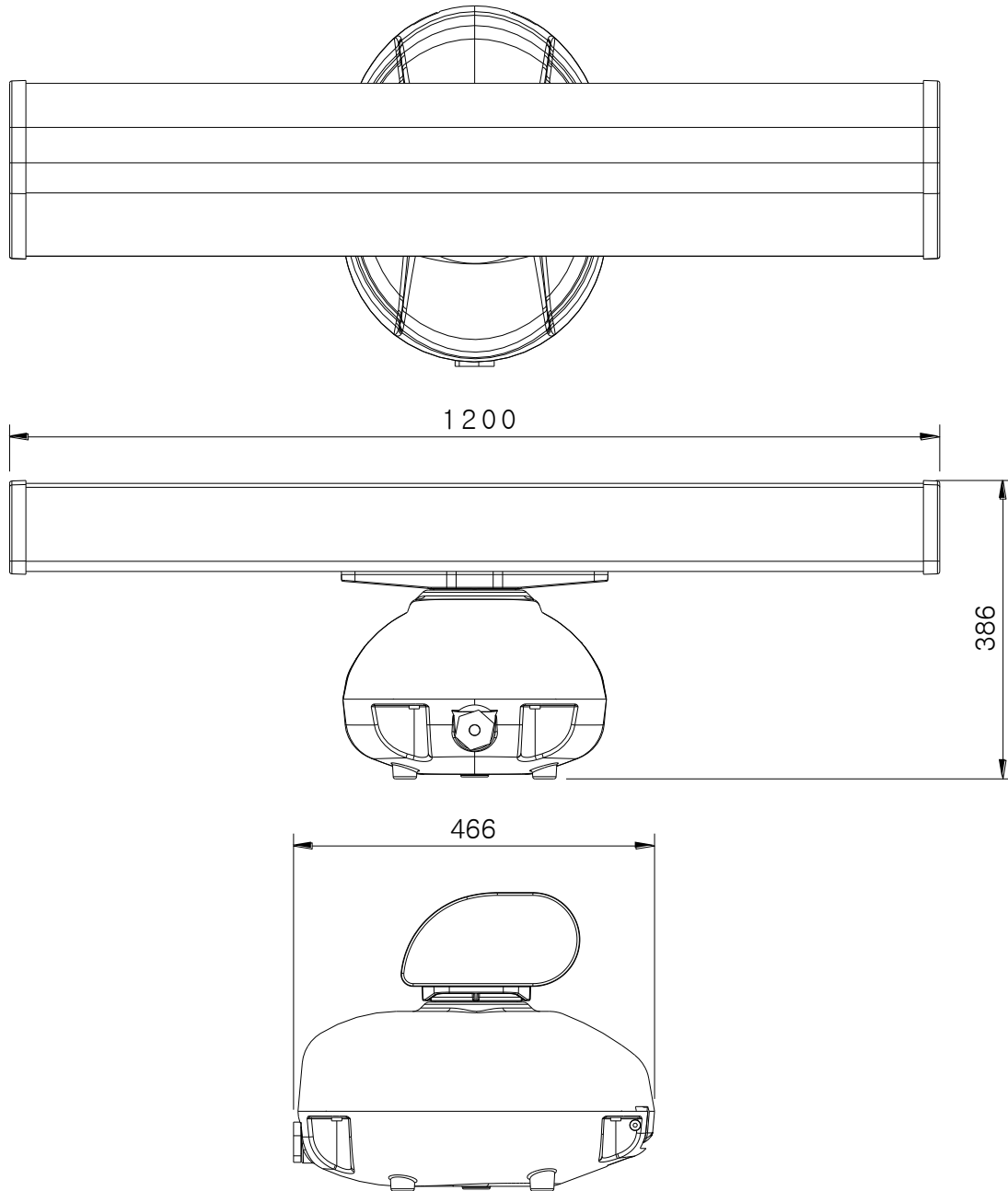
Antenna : ANTENNA UNIT

Display : DISPLAY UNIT (DC24V : FUSE 5A)

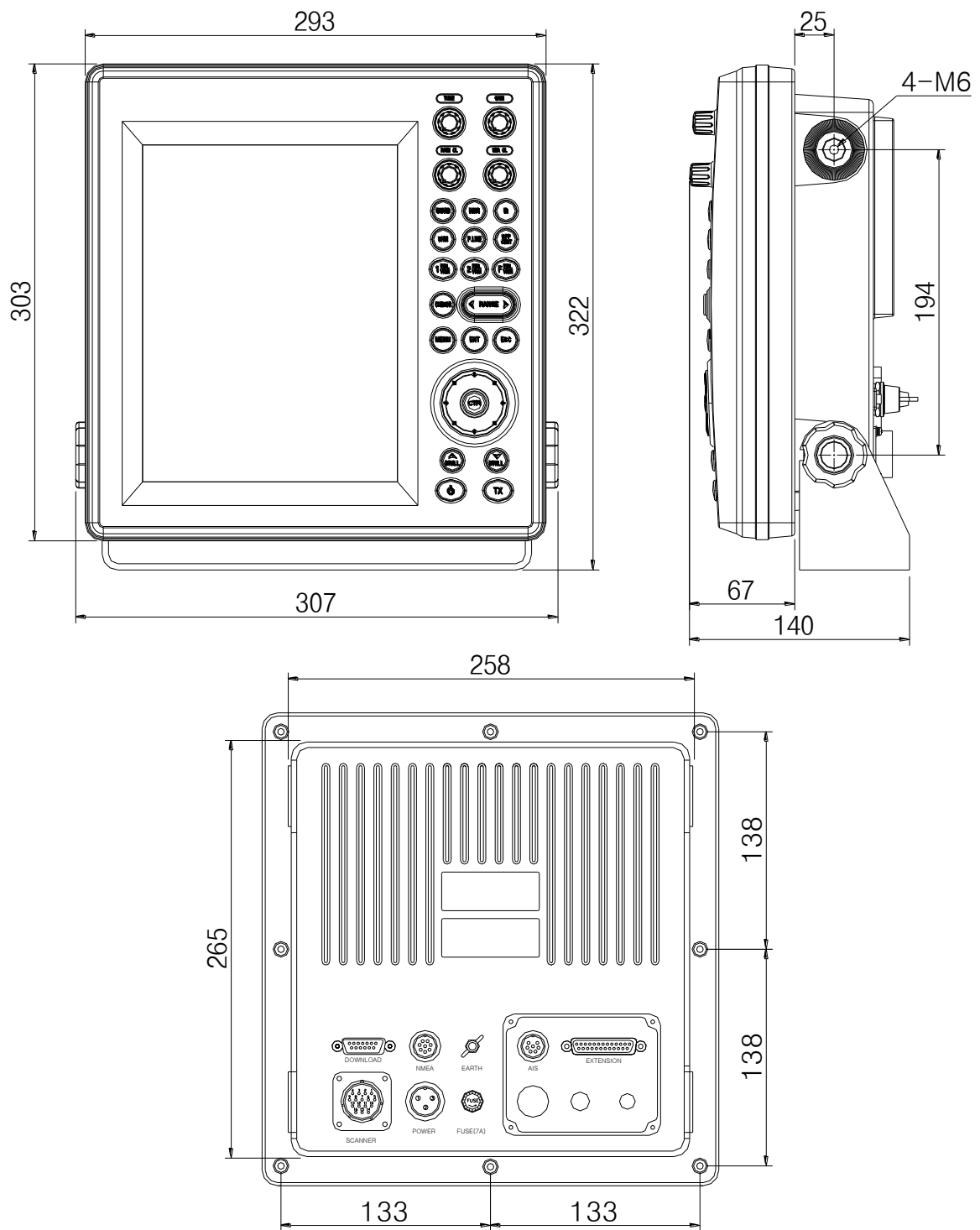
Components

Description	Q'y	Samyung CODE	Remark
Manual	1	SMR-7200-ME	
ANTENNA-DISPLAY CABLE	1	RSU-7200-15M	15m
POWER CABLE	1	ACC-CAB-010	3m
SURGE CABLE	1	STR-595	3m

1.4 Construction



[Pic. 1.1] RSU-7200 External Diagram



[Pic.1.2] SMR-7200 External diagram of Display

1.5 Specification

1.5.1. General

- Display Type : RASTER SMAY type
- Display Screen : 10.4" Color TFT LCD, Vertical Display
- Display Color : GREEN, YELLOW, RED, WHITE, COLOUR
- Display Range : 0.0625, 0.125, 0.25, 0.5, 0.75, 1, 1.5, 2, 3, 6,
12, 24, 36, 48, 64, 72NM
- Distance Resolution : within 30m
- Min. Detection Range : within 25m
- Bearing Accuracy : $\pm 1^\circ$
- Bearing Resolution : 2.1°
- Bearing Input : True Bearing / Magnetic Bearing
- Environmental Condition
 - 1) Temperature : Antenna $-25^\circ\text{C} \sim +55^\circ\text{C}$
: Display $-15^\circ\text{C} \sim +55^\circ\text{C}$
 - 2) Relative Humidity : Antenna – below 95% on 35°C
: Display – below 95% on 35°C
 - 3) Relative Wind Speed : 51.5m/sec (100knots)
- Power Consumption : 85W
- DC Power : DC18V ~ DC36V
- Preheating Time : 90 Sec.
- Preaction : within 3 Sec.

1.5.2. Antenna(RSU-7200)

- Dimensions
 - 1) Diameter : 1200mm
 - 2) Height : 386mm
- Weight : 25.0Kg (without cable)
- Plane of Polarization : Horizontal Target Wave
- Polar Pattern
 - 1) Horizontal Beam Width: 2.0°
 - 2) Vertical Beam Width: 25°
 - 3) Side Lobe Level : Below -21dB
- Revolution : Approx. 24 R/Min
- TX Frequency : $9410 \pm 30\text{MHZ}$
- Emission Type : P0N

- Peal Power : 6KW
- Transmission Bulb : Magnetron JRC MAF1421BY
- Pulse Width Setup :Short

0.1 μ sec / 2100Hz – 0.0625, 0.125, 0.25, 0.5, 0.75, 1NM

0.3 μ sec / 1650Hz – 1.5, 2, 3NM

0.5 μ sec / 1200Hz – 6NM

0.9 μ sec / 600Hz – 12, 24, 36, 48, 64, 72NM

1.5.3. Display Unit (SMR-7200)

- Dimensions
 - 1) Width : 307mm
 - 2) Height : 332mm
 - 3) Depth : 140mm
- Construction : Desk Type
- Weight : 4.7kg
- Display Screen : 10.4" Color TFT LCD
- Scale Zoom-In : Less than the bigger one – 1% of used range or 70m
- VRM : .000 ~ 72.0 NM– Digital
- EBL : .000° ~ 359° Digital Display
- Sync. Type : Manual/Automatic Switchable
- Bearing Scale : 1° scale, 360°
- Bearing Display : Electronic Type
- Front Panel
 - 1) Tune : Knob
 - 2) Gain : Knob / Switch
 - 3) Rain/Snow Removal : Knob / Switch
 - 4) Sea Cluter Removal : Knob / Switch
 - 5) Guard : Switch
 - 6) Distance Circle : Switch
 - 7) Interference Rejection : Switch
 - 8) Heading Line : Switch
 - 9) Parallel Line : Switch
 - 10) Center Movement : Switch
 - 11) 1 EBL/VRM : Switch

- | | |
|-------------------------------------|---------------|
| 12) 2 EBL/VRM | : Switch |
| 13) F EBL/VRM | : Switch |
| 14) TEAIL | : Switch |
| 15) Distance Circle | : Switch |
| 16) Menu | : Switch |
| 17) Cursor | : Switch |
| 18) ESC | : Switch |
| 19) Enter | : Switch |
| 20) Direction Button (8 Directions) | : Switch |
| 21) Brightness | : Switch |
| 23) Power | : Switch |
| 24) Transmission | : Switch |
| • Menu Type | : POP-UP Type |

1.5.4. Connection Cable

- ANTENNA Cable Length : Standard 15m / Max 30m
- Power Cable Length : 3m

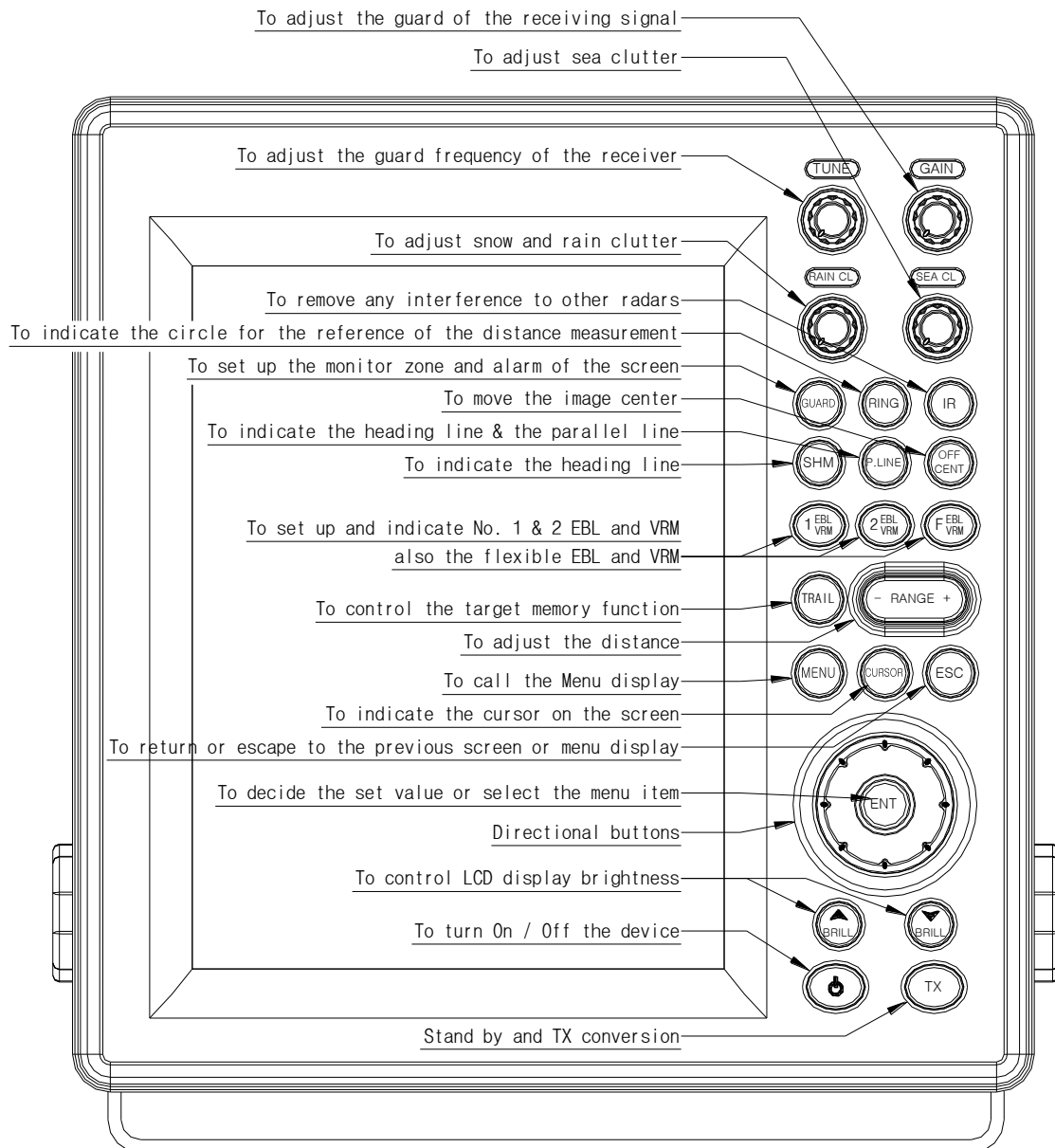
Chapter 2. How to operate panel and menu

2.1 Front Panel Buttons and Knob

You may adjust the various data on the screen by using the the control keys as follows.

- Dedicated 4 (Four) Volumes
- Directional key for 8 (Eight) directions and center key for moving to the display center
- Dedicated 20 (Twenty) keys
- Available to select every function in Menu

2.1.1 Front & Knob Function



[Picture 2-1] Front Knob & othe Fron Button

2.1.2 Directional Key

They are used to move the cursor, turn the EBL, change the VRM size and move to any of the sub-menu. They are used to operate the following functions.

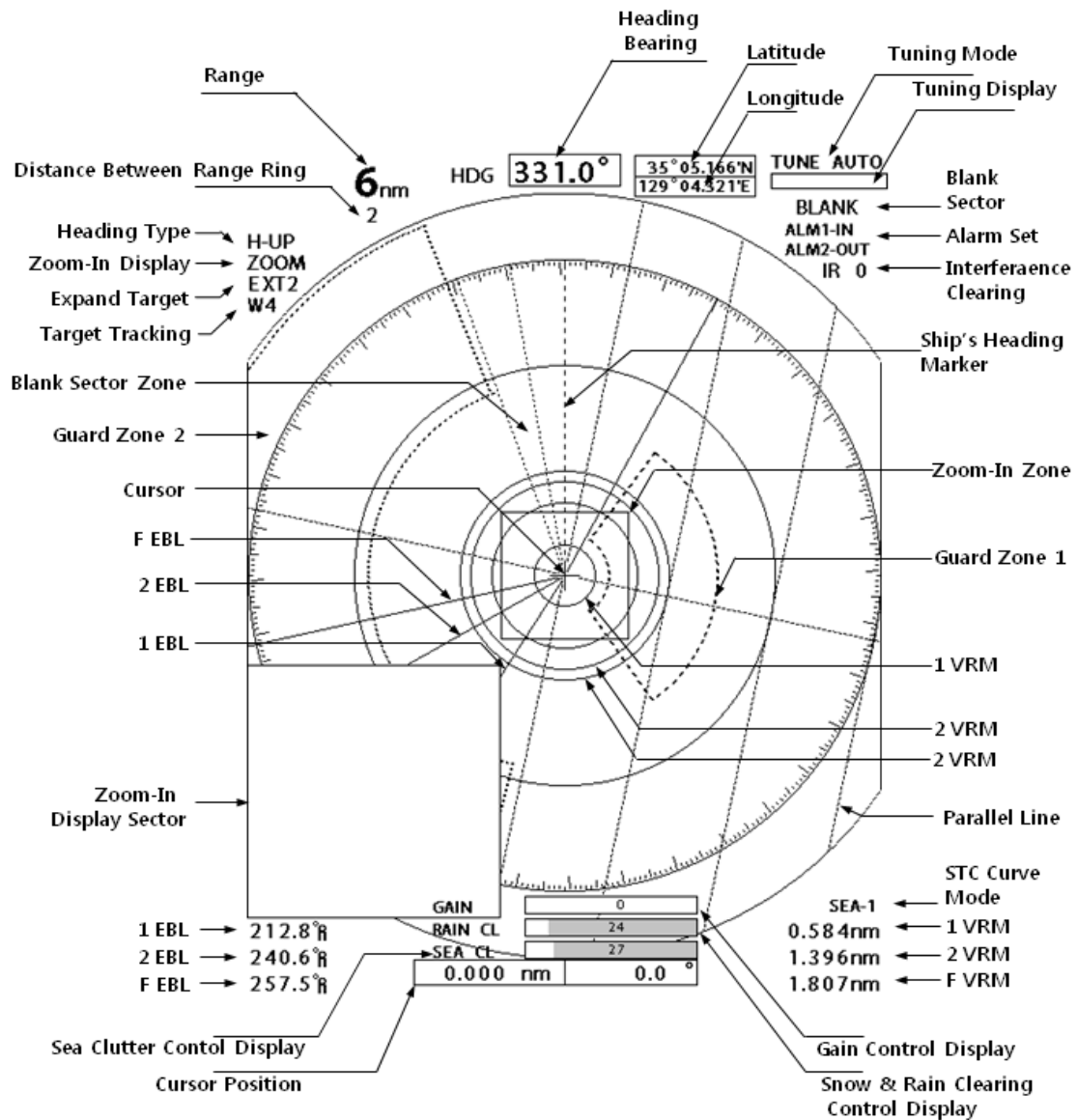
-  ⇒ To set up the alarm zone
-  ⇒ To set up the distance & bearing between parallel lines
-  ⇒ To set up the center movement point
-  ⇒ To move the cursor
- 
-  ⇒ To set up EBL/VRM
- 
-  ⇒ To move to the sub-menu

Following is how to operate the exclusive keys.

2.1.3 Display Description

Description	Position	Display Characters
ALARM	Right, Top	ALM1, ALM2
Interference	Right, Top	IR0, IR1, IR2
Sector Blank	Right, Top	BLANK
Auto Tunning	Right, Top	TUNE AUTO
Manual Tunning	Right, Top	TUNE MAN
Target Zoom-In	Left, Top	EXT1, EXT2
Waypoint Memory	Left, Top	W1, W2, W3, W4
Heading Display Mode	Left, Top	H-UP, N-UP, C-UP
Screen Zoom-In	Left, Top	ZOOM
Heading Bearing	Middle, Top	HDG
Gain	Middle, Bottom	GAIN
Rain & Snow Clearing	Middle, Bottom	RAIN CL
Sea Clutter Clearing	Middle, Bottom	SEA CL
Auto Gain	Right, Bottom	GAIN-A
Auto Rain & Snow Clearing	Right, Bottom	RAIN-A
Auto Sea Clutter Clearing	Right, Bottom	SEA-A

2.2 Display Description



- The bearing, speed, latitude, longitude on the top of the screen and the destination setup on the right bottom of the screen are displayed only when the signal from Gyro and GPS is input data port.

2.3 Menu Functions

In addition to the functions used by the front panel keys, SMR-7200 has the functions controllable from menu..

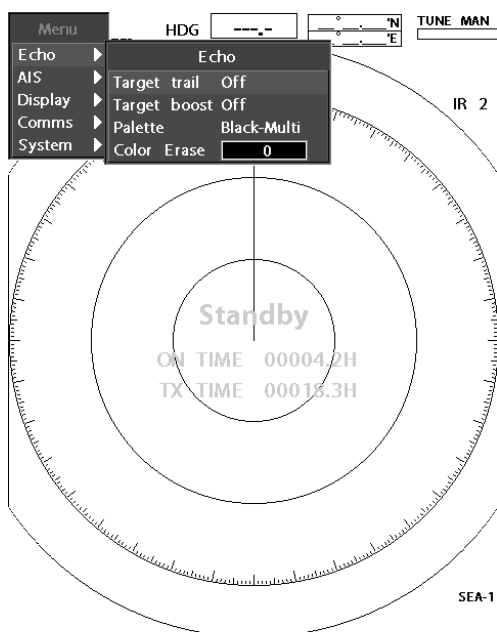
2.3.1 Menu Composition

You may change the language to Korean, English and others.

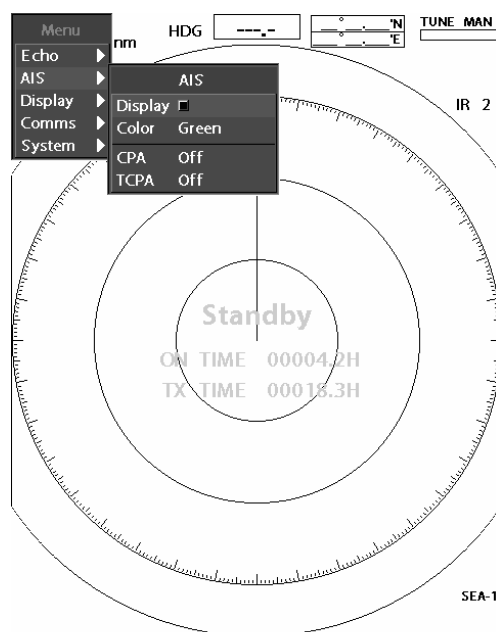
Press **MENU** and select any wishful setup menu by using direction button.

There are total of five (5) different menus and each menu function explained as following;

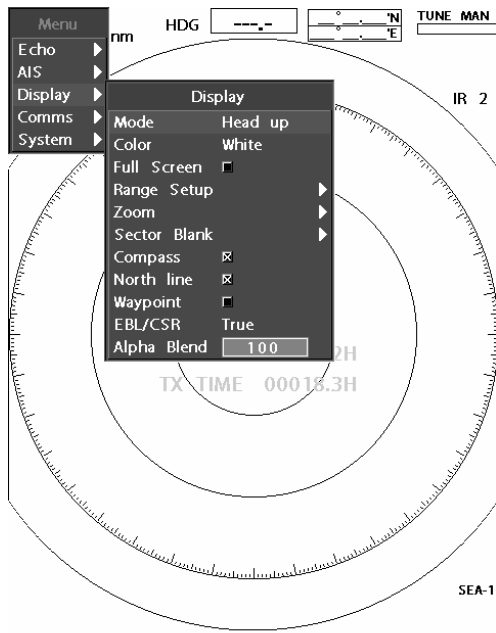
- ⊙ Echo Menu : Menu setting for the target display
- ⊙ AIS Menu : Menu setting for the AIS display
- ⊙ Display Menu : Menu setting for the display colors and other functions.
- ⊙ Comms (Communication) Menu : Menu setting for external devices and communication speed or usage.
- ⊙ System Menu : Sets languages and equipment's initial setting menu



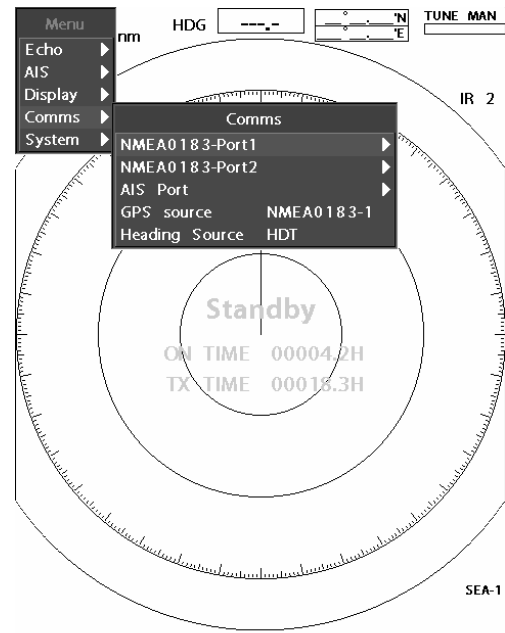
[Echo Menu]



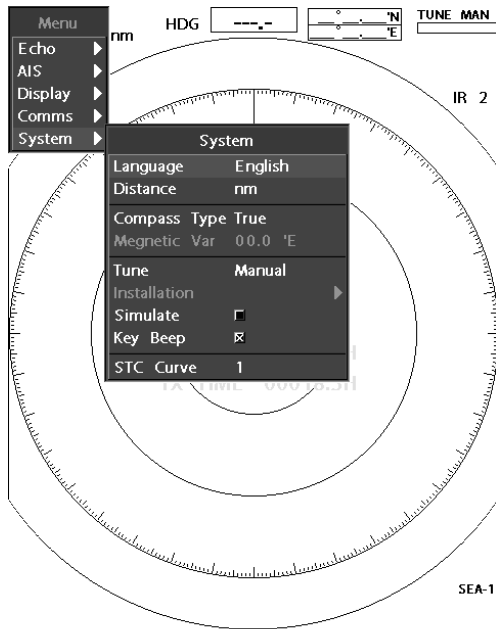
[AIS Menu]



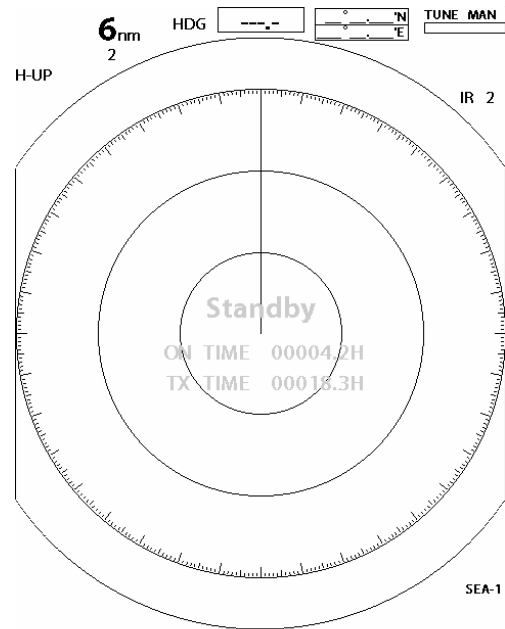
[Display Menu]



[Communication Menu]



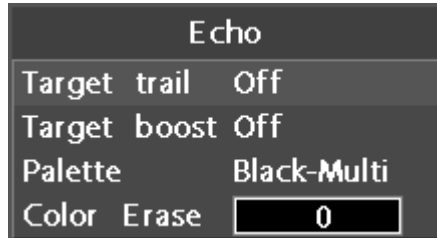
[System Menu]



[Initial Display]

2.3.2 Menu functions

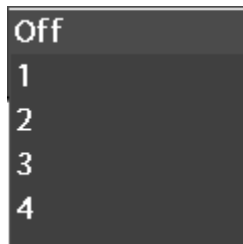
2.3.2.1 Echo Settings



- **Target track**

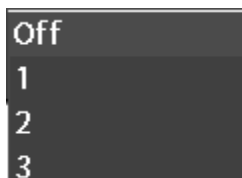
This function is to track target and will display the target during set value of RPM and will change colour at different levels leaving target's trail

This function will operate by pressing **TRAIL**. RPM may be adjusted from Off to 4. Current setting status of "W1~W2" will be displayed on the upper left corner of the screen



- **Target boost**

Set and adjust the target boost size with two (2) different levels.



- **Palette Color Selection**

User may select a favorite color from five (5) different colors of the target.

Example) Black-Multi: Black background color with any color of target.



- **Color removal**

You may remove the target color displayed, by the level from 0~16.

2.3.2.2 AIS Setting

AIS	
Display	☒
Color	White
CPA	Off
TCPA	Off

- **Display**

May decide to display AIS or not.

- **Colors**

Selecting a color of AIS target; you may choose Green, Red, Blue, White, or Black.

Green
Red
Blue
White
Black

- **CPA, TCPA (AIS Alarm Setting)**

To set the collision alarm of AIS target. CPA is the distance setting and TCPA is setting for estimated time before collision.

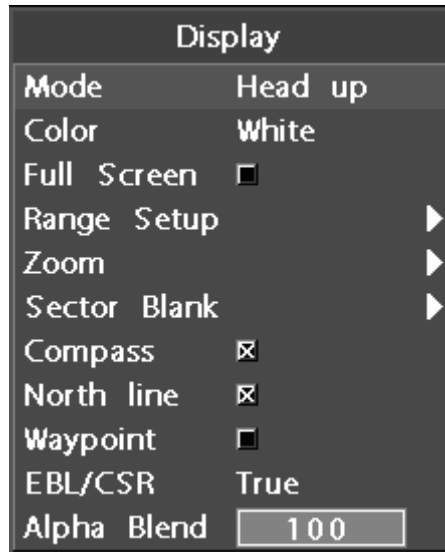
Off
0.5 nm
1 nm
2 nm
3 nm
5 nm
6 nm

(CPA Menu)

Off
30 s
1 min
2 min
3 min
4 min
5 min
6 min
12 min

(TCPA Menu)

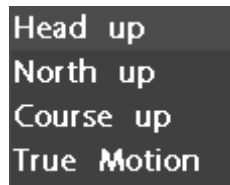
2.3.2.3 Display setting



- **Mode**

This menu allows to display bow, N-UP, C-UP and True Motion.
Bow mode only available when there is no external signal, If there is an external signal of bow, it is available to select N-UP, C-Up and True Motion mode

※ Course means the waypoint set externaly



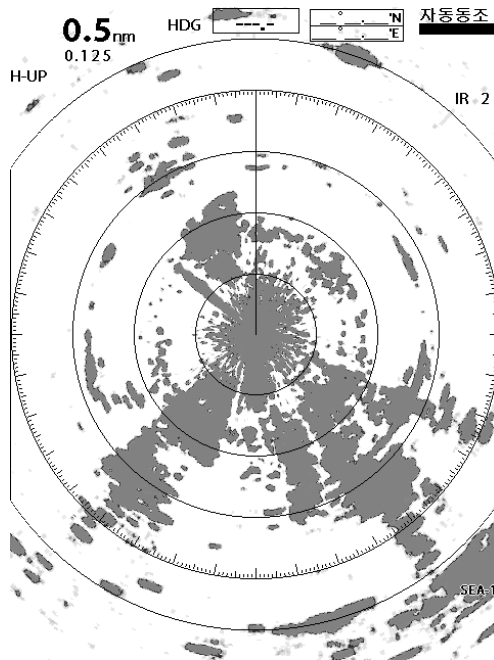
- **Color**

Select the colour between white, green, red for letters.



- **FULL SCREEN**

Target display gets displayed as FULL SCREEN



- **Distance setting**

You may set the distance unit from 0.0625, 0.125, 0.25, 0.5, 0.75, 1, 1.5, 2, 3, 6, 12, 24, 36, 48, 64 to 72 but when 0.0625 is not available to use with km(kilometers) – mode.

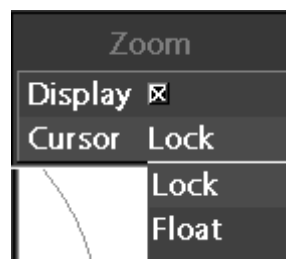
- **Zoom**

This function is to zoom up and may zoom up to x 2 and shows on the left or right bottom corner of the display

There are two display functions, Cursor Lock and Cursor Float

Cursor Lock : Zooms up the area around the cursor you have entered.

Cursor Float : Zoom up where the cursor is.



- **Sector Blank**

You may set Sector Blank in the radius 360° by 1 degree.

It will be displayed with blue broken lines.

Sector Blank

Enable ☒

From 030 °

Sector 030 °

From

000 °

Minimum=000
Maximum=360

↑↓ To change

Sector

001 °

Minimum=001
Maximum=120

↑↓ To change

- **Compass**

You may turn on/off the compass function in the screen.

- **North line**

You may turn on/off the North line in the screen.

- **Way point**

You may turn on/off the way points from other equipment.

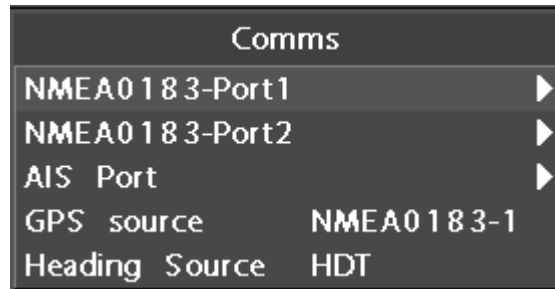
- **EBL/CSR**

You may select EBL/CSR to be Relative or True.

- **Alpha Blend**

You may set transparency of POP-UP menu between 50 to 100.

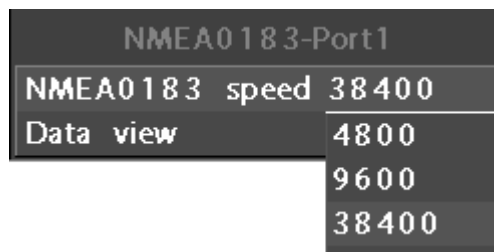
2.3.2.4 Communication setting



- **NMEA0183-Port**

This is a menu to set NMEA0183 port, you may check the transmission speed and communication status. It provides Communication speed at 4800, 9600 and 38400.

Unit will display the communication status coming from the external equipment.



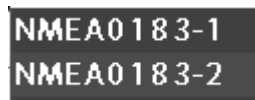
- **AIS**

A function to check the communication condition to other equipment.



- **GPS Input**

A function to select GPS input port.



- **Heading Source**

It is a function which selects AIS heading standard as HDT or COG



2.3.2.5 System setting

System	
Language	English
Distance	nm
Compass Type	True
Magnetic Var	00.0 'E
Tune	Manual
Installation	▶
Simulate	☐
Key Beep	☒
STC Curve	1

- **Language setting**

User may select a language

- **Distance unit**

You may choose among nm, mi, km

- **Compass Type**

You may select radar image with true heading or self heading.

Self adjustment is to adjust information of self heading.

System	
Language	English
Distance	nm
Compass Type	True
Magnetic Var	True
Tune	Magnetic
Installation	▶
Simulate	☐
Key Beep	☒
STC Curve	1

Magnetic Variation	
00.1 'W	
Minimum=99.9 'W	
Maximum=99.9 'E	
↑↓ To change	

- **Tuning**

You may set Auto/Manual a way of setting TX and RX.

- **Installation Setting**

A function to set equipment, please refer to 5.6.

※ The unit is not activated once power has been input, please refer to 5.6.1 “Initial Setting Menu’ to activate the equipment.

- **Simulation**

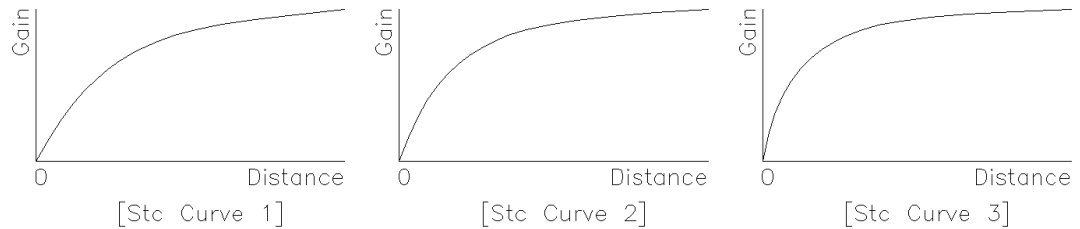
A function to check operation without antenna unit

- **Key beep**

You may turn on/off the beep.

- **STC Curve**

The following drawings show the curve between Distance to Gain shown as the following drawings.



You must set the figures considering the reflected wave on surface of the sea status caused by antenna's installation location.

On average, antenna is installed at the height of 5m, when wave's height is at 1m, the setted value must be at Curve 1.

2~4, is when wave height at 2~4m, where reflected wave on surface of the sea is severe.

If antenna's at height of 10m and wave at 1m, the curve must be set as 2.

Chapter 3. How to operate the unit

3.1 General Idea

3.1.1 Power input and Operation

1. Power input

- To power on, press **POWER** button.
- After power on, Count Down Timer is displayed on SAMYUNG Logo screen, it will be on stand-by status in 1 min. 30 secs.
- As the TX time is consolidated and displayed, user may judge the ideal time for repair..
- It indicates the version of the program.

[Refer] When unit does not turn off due to programme failure,
Please push OFF switch for 10 seconds so that you may shut it down
by force.

2. TX

- Press  button to enable the transmission at the stand-by status.
- Press  button again to convert the TX status to the stand-by status.

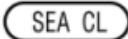
3.1.2 Tuning control

It is required to control the tuning of the unit both manually and automatically.
The conversion is selectable in the setup of MENU.
For the automatic tuning, “Auto Tuning” is displayed next to the tuning bar.

1. Change tuning mode

- **Menu** → **System** → **Tuning** → **Auto / Manual** → **Input** → **Return**

2. Control tuning volume

- In case of the manual tuning mode, turn the volume to adjust to the biggest image.
- Adjust to the maximum movement of the tuning bar.
- In case of the automatic tuning mode, it is needless to turn the volume.
- If image doesn't appear, adjust the volume again or turn the volume of  /  (rain/snow) removal.

3.1.3 Image control

 the volume of the tuning/gain of  (sea clutter),
 (rain/snow), removal to display the optimum image.

3.1.4 Power off

1. Stop transmission (TX).

- Push  key to be ready to transmit.

2. Turn off the Power.

- Push  key for 3 seconds then power will be turned off.

Ex) A complete disconnection of power is necessary when unit is not in use for long as parts for power supply are under operation even the power has been turned of.

3.2 Stand by for processing

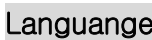
3.2.1 Brightness change

- Press brightness key.

Push  key to brighten the screen, push  key to darken the screen.

You may adjust in 10 levels

3.2.2 Language Selection

-  →  →  →  →  → 
 Select language.

3.3 Basic Operation

3.3.1 TX

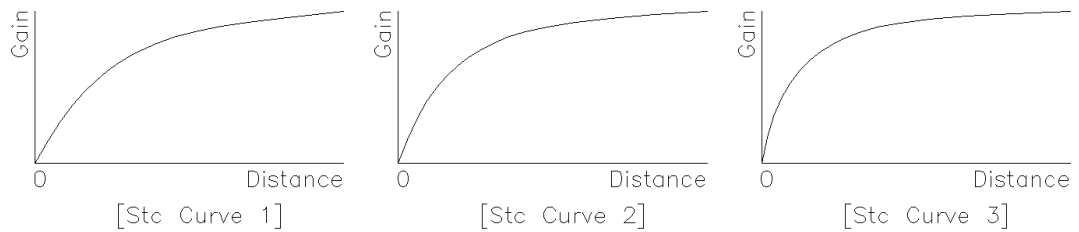
- Press  button, it will be converted to TX from the stand-by status.

3.3.2 TX Stop

- Press  button again at the TX, it will be the stand-by status.

3.3.2.1 STC Curve

The following drawings show the curve between Distance to Gain shown as the following drawings.



You must set the figures considering the reflected wave on surface of the sea status caused by antenna's installation location.

On average, antenna is installed at the height of 5m, when wave's height is at 1m, the setted value must be at Curve 1.

2~4, is when wave height at 2~4m, where reflected wave on surface of the sea is severe.

If antenna's at height of 10m and wave at 1m, the curve must be set as 2.

3.3.3 Tuning Control

- Please refer to [3.1.2 Tuning Control].

3.3.4 Gain control

ATTENTION

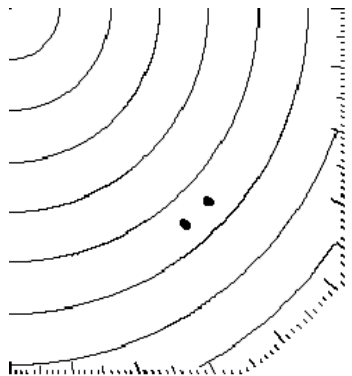
- ※ It should be always observed by adjusting the optimum conditions.
- ※ If the gain is too low, the targets may not be displayed.
- ※ If too high, it may be an obstacle in observation due to the noise increase on the display.

- Turn gain key.

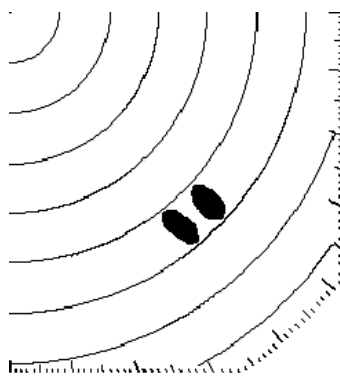
When you turn key left, decreases the gain, when you turn right, increases the gain.

- The optimum gain

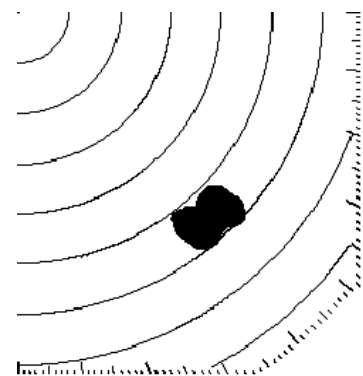
Is when the target's ECHO display is at its maximum size, and when close by targets are not touching on ECHO display



Small image by low gain



Optimum gain



2 Images contact by high gain

- Auto gain setting

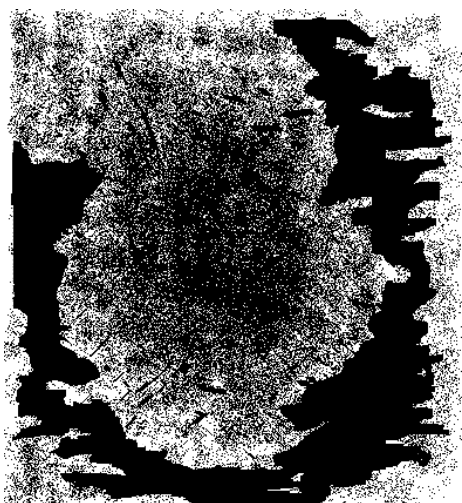
When you push the switch in the gain volume, it will be displayed AUTO in the bottom centre of the screen, it will be displayed GAIN-A in the right bottom corner of the screen.

This function adjusts the gain at its optimum level, however may be affected by environment.

3.3.5 In order to remove the interference of rain/snow

	ATTENTION
	※ Too much adjustment of rain/snow removal will restrain the target of ships or hazards as well as any images by rain/snow. This can be the cause of image analysis. ※ In case of use of rain/snow removal, the optimum conditions should always be set.

- Under heavy rain/snow, the target may be difficult to analyze since ECHO (Rain Clutter) caused by rain and snow may be displayed.
- Turn Rain CL volume right to remove the echo image by snow and rain.



Reflected wave of rain/snow



Removed rain/snow
(Target is restricted, too.)

- Auto setting rain/snow

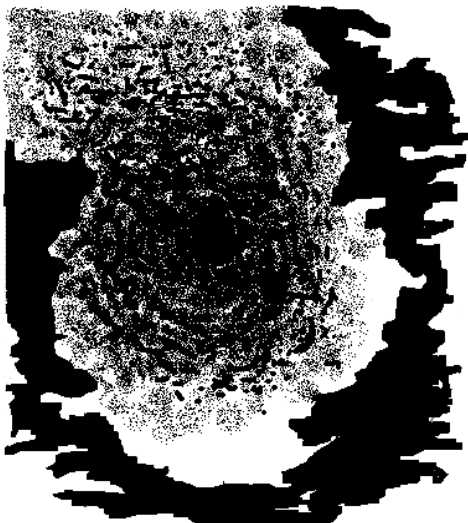
When you push the switch in the volume for removal rain/snow, 'AUTO' will be displayed in Rain CL in the bottom center of the screen, and RAIN-A will show on the bottom right corner of the display.

This function is only to use under circumstances where the user wants to automatically remove the snow/rain. Hence do not use this function if not required as it will make target smaller than usual.

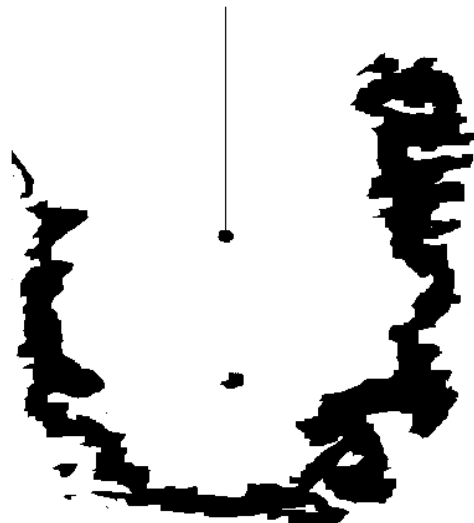
3.3.6 To remove the interference of Sea Level Wave caused by the Sea Wave

	ATTENTION
	※ If you set the removal function of Sea Level Wave up to removal of all Sea Level Reflection at short distance, it causes interference in detecting images due to the target of vessel and dangerous things as well as the wave images being suppressed. ※ When you use the removal function of Sea Level Wave, you make sure it should be the optimistic set of suppression

- When the wave becomes high due to heavy wind, the ECHO(Sea clutter) due to the wave is displayed on the screen, then it will be difficult to detect the image of the target.
- Turn Sea Clutter key to the right to remove the echo image by wave.



The status that shows Sea Level Reflection is strong due to Wave.



The status that shows Sea Level Reflection is being suppressed.

(The target is also suppressed)

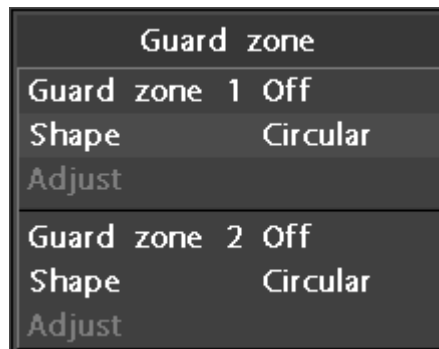
- Auto Sea Clutter removal setting

When you switch on Sea Clutter remove" AUTO" will show in the Centre of bottom of screen, and "SEA-A" will show in the bottom right corner of the screen.

This function automatically sets the optimum display, however it is not necessary to set it when there's no need to remove the Sea Clutter as the target will be shown smaller than usual.

3.3.7 To operate the alert function

- Set the guard zone in order to use the alert.
- Guard Zone means [Zone] to be set on PPI screen



1. Guard Zone Setting

- Place the cursor on the location you wish to set.
- Press the **Guard** key
- POP-UP Menu will be appeared to set up two different guard zones on the screen.
- Select incursion or separation of guard zone.
- Incursion means the target enters into the zone and separation means the target come out of the zone. In each case, the alert sound will come out.
- Select Ring or Fan
Ring function will create ring-shaped guide zone and Fan function will create Fan-shaped guard zone.
- Press Adjust and then move the cursor to set up the guard zone.
- Press the **input** key.
- After a desired guard zone is done then exit

2. Occurrence and Stoppage of the alert sound

- After setting up the guard zone, the alert sound will come out once the target enter into the zone.
- To stop the alert sound, press any key on the device.

3. Termination of the alert

- To terminate the alert status, press the alert key and then select the alert zone off.

3.3.8 To eliminate/display the scale of Range Ring

1. Press the Range Ring Key

- The brightness of ON/OFF will be adjusted.

3.3.9 To eliminate the radar interference

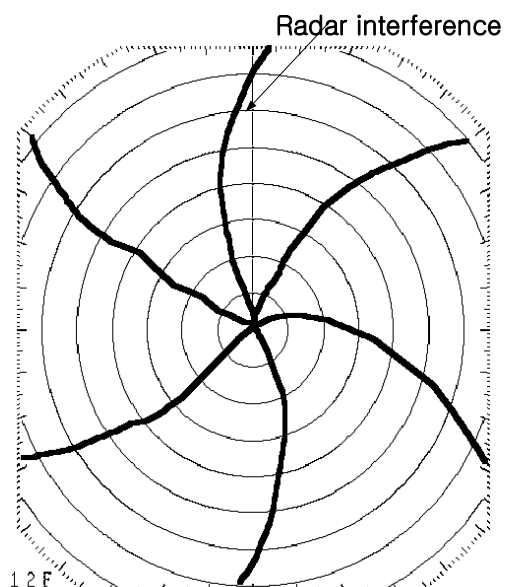
Caution

- ※ When using the function of Intereference Removal, weak image such as a dangerous thing may happen to be removed.
- ※ Stop the function of interference removal when you see Radar BEACON and SART signal.

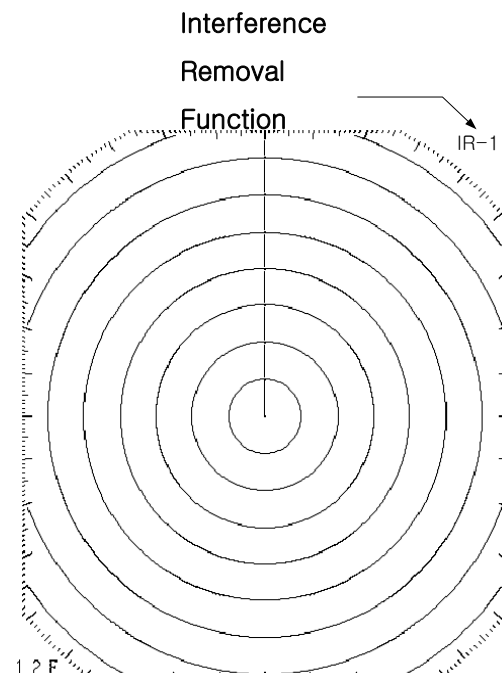
Radar Interferene means Micowave transmitted by other ship's Radar directly which affects own ship's Radar air line hence gets displayed on PPI screen.

1. Press the **Interference removal** key

- Whenever pressing  button, it marks with **IR-1**, **IR-2**, **IR-3** in order in the top-right screen.



Before Interference Removal



After Interference Removal

3.3.10 To change the color of the ship's heading line.

1. Press the ship's heading line key

- Ship's heading line is indicating own ship's heading direction.
- When the key is pressed, the brightness will be adjusted in 3 different levels

3.3.11 To use the parallel line

1. Press the **Parallel line** key

2. To adjust the distance and the bearing, use the diagonal key as follows;

-   key may adjust the bearing of the parallel line.
-   key may adjust the distance of the parallel line.

3.3.12 To move the center of own ship

It may be used for securing the wider sight to the specific direction from the center of own ship.

1. Move the cursor to a desirable position.

2. The center of own ship moves to the position of the cursor by pressing **Center movement**.

- It may be moved up to 60 percent of the screen.

3. Once **Center movement** key is pressed, it will turn back to the original position.

3.3.13 To measure the distance and bearing to the target.

Method 1. By using **EBL/VRM**, the distance and bearing of target may be measured.

EBL means Electronic Bearing Line.

VRM means Variable Range Maker.

Method 2. By using cursor, the distance and bearing of the target may be measured.

1. Measurement of the distance and bearing by using **1 EBL/VRM**

- Press the **1 EBL/VRM** key.
- VRM & EBL are shown at the center of the screen
- By pressing  , it may move the EBL.
- By pressing  , it may move the VRM.
- Distance/Bearing value appears on the bottom of the screen.
- To exit, press ESC key.

2. Measurement of the distance and bearing by using **2 EBL/VRM**

- The method will be same as 1 EBL/VRM.

3. Measurement of the distance and bearing by using **F EBL/VRM**

- Press the **F EBL/VRM** key.
 - EBL/VRM will appear on the radar screen.
 - Once the cursor is appeared, move to the desired position.
 - By pressing **Center Movement** key, the center of F EBL/VRM will be shifted and will be back to the original position by repressing the key.
 - By pressing cursor, cursor will be disappeared and then use the direction key to move EBL/VRM to the desired position.
 - The value of distance and bearing will appear on the bottom end of the screen..
 - To exit, press the **Esc** key.
- [Ref] F EBL/VRM may be used to indicate EBL/VRM on the specified position.

4. Measurement of the distance and bearing by using **Cursor**

- By using **Cursor**, cross shaped cursor will be appeared on the radar screen.
- The value of distance and bearing will appear at the bottom end of the screen, where the cursor is located.



3.3.14 To change the distance unit

1. NM (Nautical Mile)

Menu → **System** → **Distance unit** → **Input** → **NM** → **Input** → **Esc**

- Cursor, VRM, Distance of parallel line represents NM.

2. Mile

Menu → **Sytem** → **Distance unit** → **Input** → **Mi** → **Input** → **Esc**

- Cursor, VRM, Distance of parallel line represents Mi

3. Kilometer (Km)

Menu → **System** → **Distance unit** → **Input** → **KM** → **Input** → **Esc**

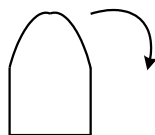
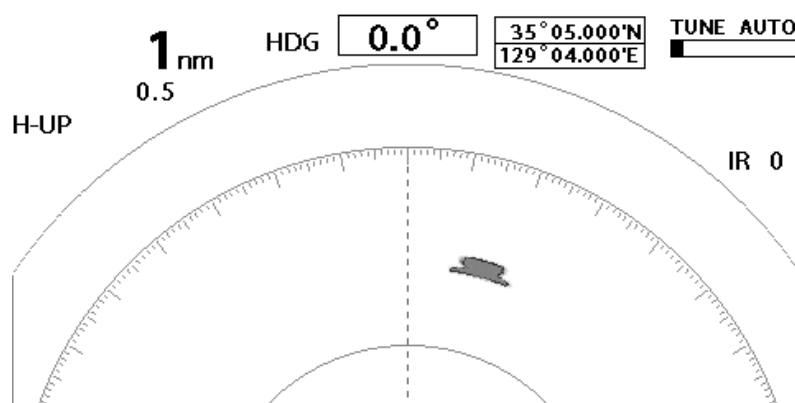
- Cursor, VRM, Distance of parallel line represents KM.

3.3.15 To change the way of direction symbol

1. Indication of ship's head line (H-UP)

Menu → **Indication** → **Mode** → **Input** → **Head** → **Input** → **Esc**

- Ship's head is displayed to the HEAD UP.
- If ship's head is changed, ECHO image bearing on the screen is also changed.
- If you could not obtain bearing reference from external navigation equipment like **Gyro Compass**, it sets out with this bearing display.



When the own ship turn right to 45 degree

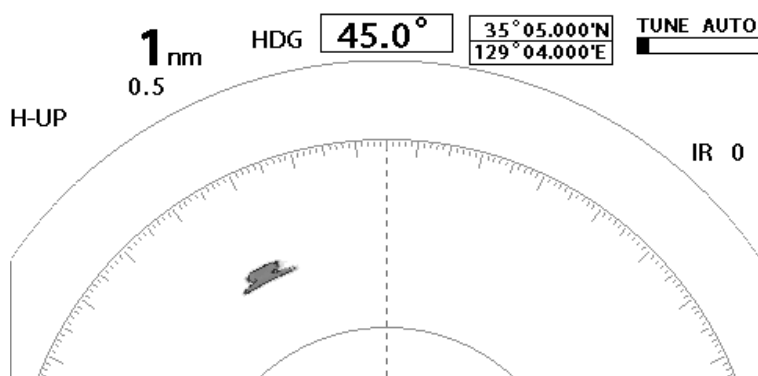
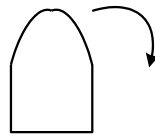
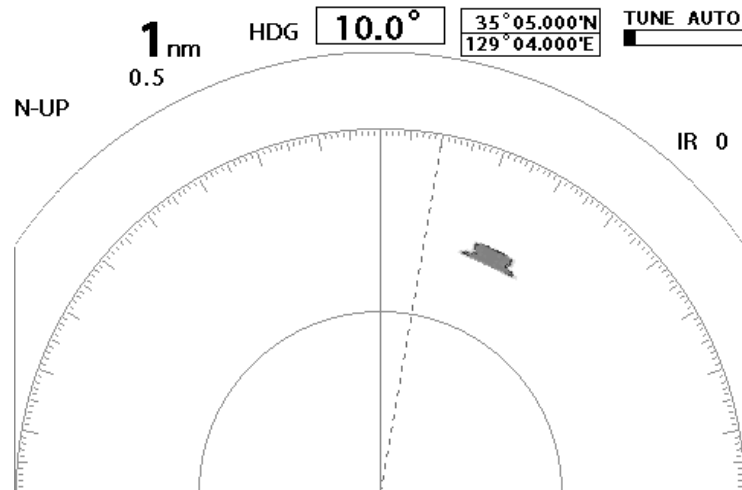


Image moves to the left.

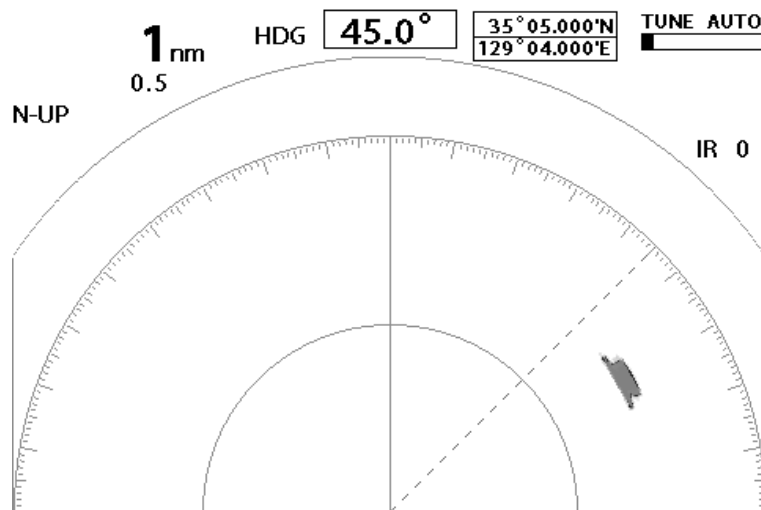
2. Indication of North direction

Menu → **View** → **Mode** → **Input** → **North** → **Input** → **Esc**

- The vertical line will indicate the direction of the North, the line to 10 degree indicates the ship's heading line.
- The angle of bearing will be changed based on the North direction on the screen.
- It requires the equipment like GYRO COMPASS to obtain bearing information.



When the own ship turn right to 35 degree.

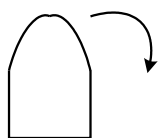
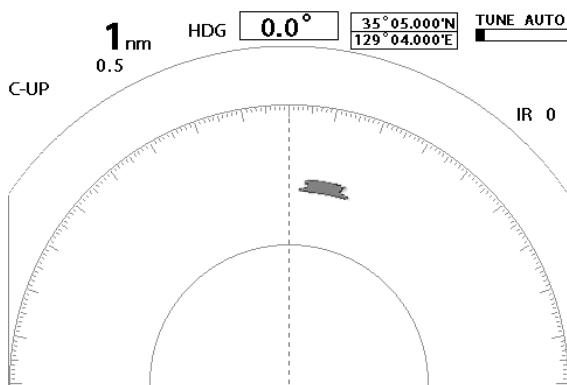


Ship's heading moves to the right.

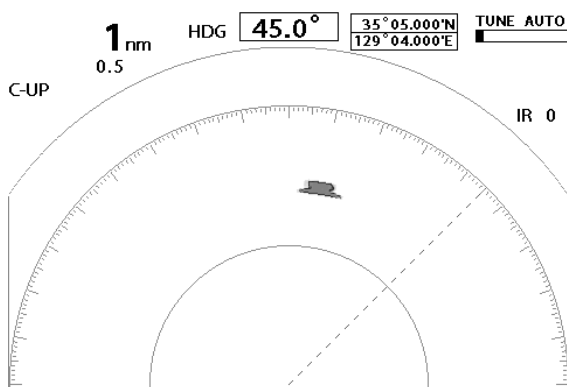
3. Indication of course-up (C-UP)

Menu → **View** → **Mode** → **Input** → **Course** → **Input** → **Esc**

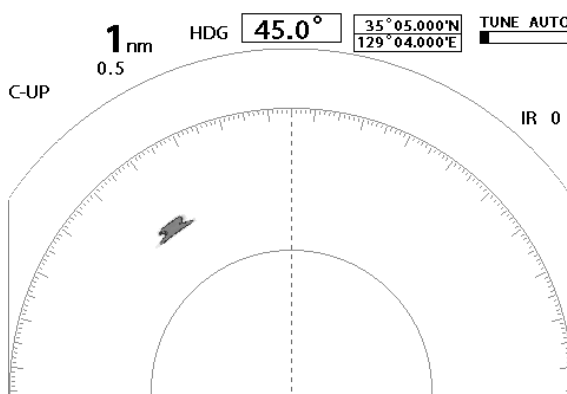
- Make the ship's head line on the screen when the course-up is excuted.
- Even though ship's head direction is changed, Echo image bearing moves as much as the variation of ship's heading bearing.
- When you change the track widely, set the course up again from the MENU.
- It requires the equipment like **GYRO COMPASS** to obtain bearing information.



When the own ship turn right to 45 degree



Head Line moves to the right.



When the course up is reset

3.3.16 To change the way of bearing display

1. True Bearing

Menu → **System** → **Bearing Display** → **Input** → **True Bearing** → **Input** → **Esc**

- True bearing indication is set based on true north with scale 0.
- It requires the equipment like GYRO COMPASS.

2. Magnetic Bearing

Menu → **System** → **Bearing Display** → **Input** → **Magnetic Bearing** → **Input** → **Esc**

- Magnetic Bearing indication is set based on Magnetic North with Scale 0.
- MAGNET COMPASS is needed.

3.3.17 To change the way of displaying bearing line/cursor.

When you display the value of EBL bearing, select between the own ship and True North as a base.

1. 'Relative' Indication

Menu → **View** → **EBL/Cursor** → **Input** → **Relative** → **Input** → **Esc**

- Make the cursor and the bearing value of EBL indicate based on ship's heading line (Ship's head line is 0)

4. True North Indication

Menu → **View** → **EBL/Cursor** → **Input** → **True North** → **Input** → **Esc**

- Make the cursor, the bearing value of EBL indicate based on True North (True North is "0")

3.3.18 To compensate the magnetic

Enter the value of compensation because Magnetic North Bearing is slightly different according to the navigation zone.

Menu → **System** → **Magnetic Compensation** → **Input** → Enter the value by cursor
→ **Input** → **Esc**

- Enter the value manually.
- Enter the value using direction key.(99.9 'W ~ 99.9 'E)
- Direction key will shifted by ± 0.1 with $\uparrow \downarrow$ and ± 1.0 with $\leftarrow \rightarrow$.

3.3.19 To display the trace of the target.

- It may ascertain the other ship's movement in track line distance and direction. It facilitates to avoid collision of the ship.
- The longer target track line is displayed, the faster the other ship's speed is and vice versa.
- The length of the track line is displayed ranging from 1 to 4 cycles.

1. Activation of the target trace

Menu → **Echo** → **Target trace** → **Input** → **1~4** → **Input** → **Esc** or **TRAIL**

- The revolution of the Antenna will be displayed from 1 to 4 cycles.
- The color of the target track line will be changed in each cycle.
- On the upper left side of the screen, the status (W1~W4) will be displayed.

2. Deactivation of the target trace

Menu → **Echo** → **Target Trace** → **Input** → **OFF** → **Input** → **Esc** or **TRAIL**

3.3.20 To display ECHO image wider on the radar screen.

Caution

※ When designating the target magnification and wider transmit pulse width, the images over two targets accessed from fore and after direction and angle direction.

To expand the ECHO image, use the following steps

- Use the function of the target expansion.
- Set the width of TX Pulse long.

1. Activation of the target expansion

Menu → **Echo** → **Target Expansion** → **Input** → **1~2** → **Input** → **Esc**

- The size of the target on the screen will be doubled.

2. Deactivation of the target expansion

Menu → **Echo** → **Target Expansion** → **Input** → **OFF** → **Input** → **Esc**

- It will turn back to the original status,

3.3.21 To change the color of the radar screen and ECHO image.

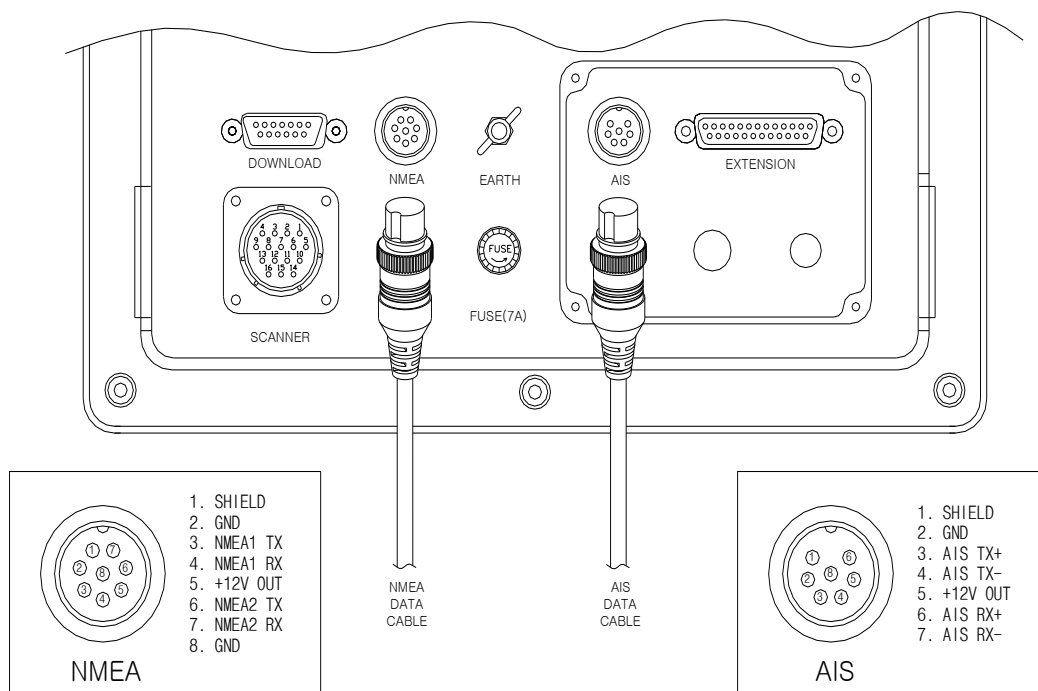
1. Configuration of the color of ECHO image and background.

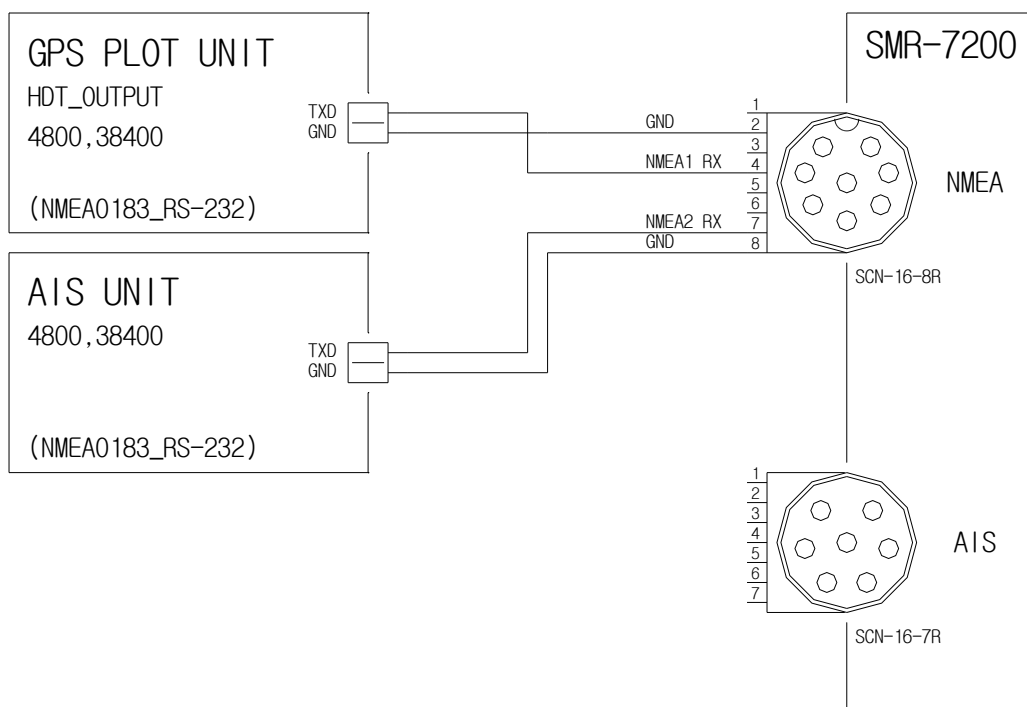
Menu → **Echo** → **Color Selection** → **Input** → Choose the color → **Input** → **Esc**

- On the bottom left of the screen, color level will appear.
- During the night navigation, make background color dark and set the LCD brightness to the low level, it will help relieving eye's fatigue.

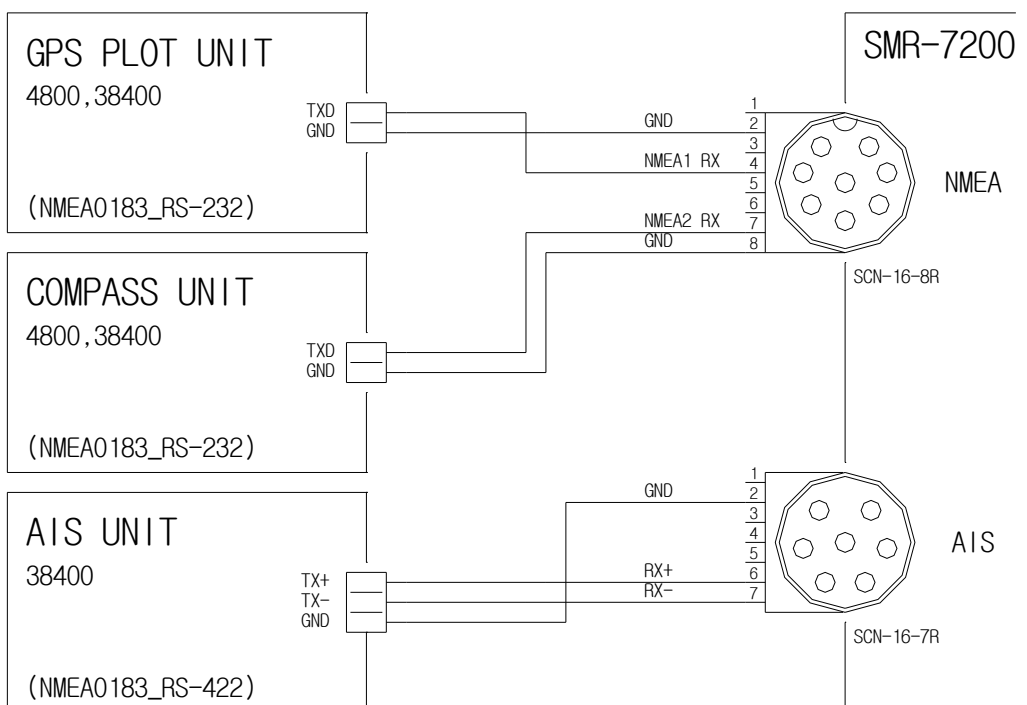
3.4 Connection to the external navigation equipment

- At the rear side of the indicator, connect to the external navigation equipment through data terminal.





[If Compass is not installed in vessel]

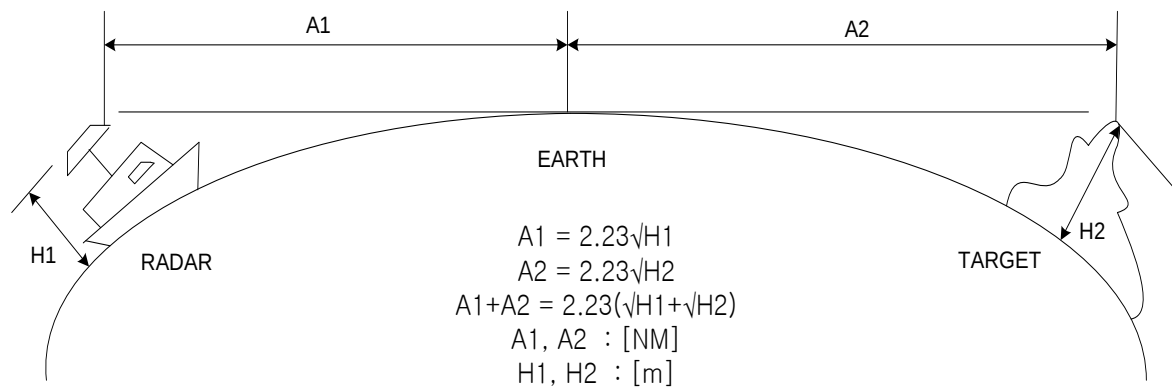


[If compass is installed in vessel]

Chapter 4. Screen view

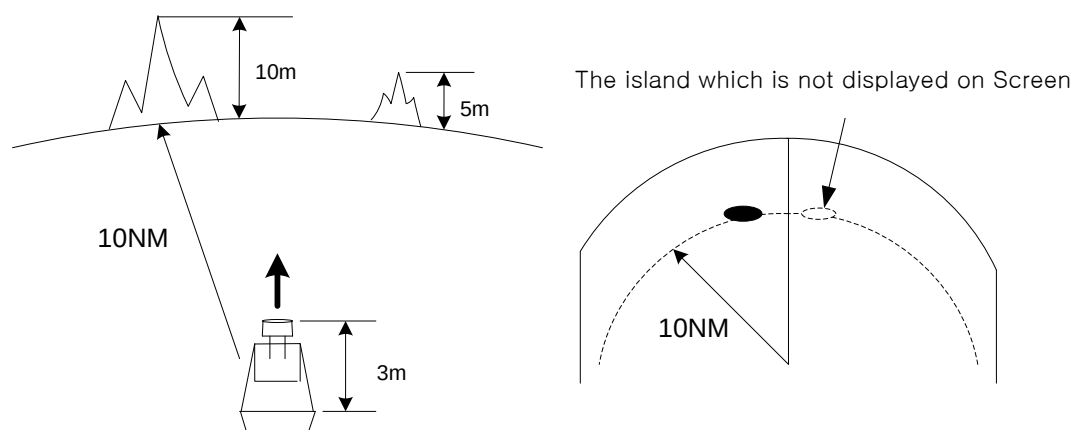
4.1 The distance from the target to the height of target

The longest distance observable to the target is depending on the height of target, the distance to the target and the height of antenna other than the matter of performance like TX power, antenna beam width and receiving sensitivity. Radar signal is linear nature that is affected by a round earth.



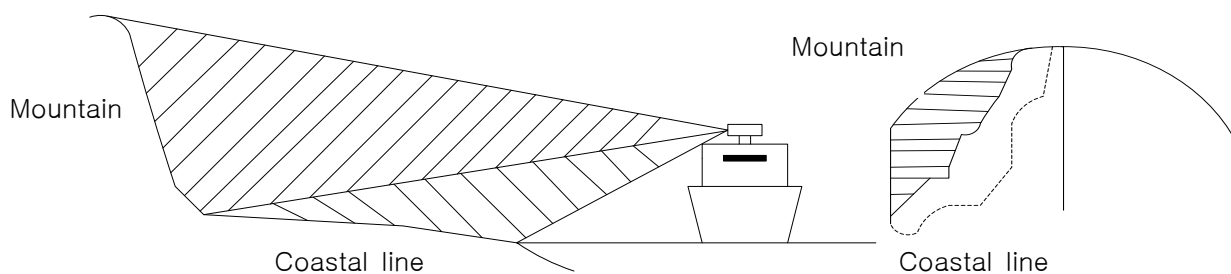
For example, when the height of antenna is 3 meters above sea level, the ECHO image of island of 10 meters' height and 10 miles away from the antenna may be displayed on Screen but the 5 meter's height with same distance is not displayed on screen since Radar signal transmitted does not reach.

But, these are of theoretical value and would not be constant due to environmental condition. In theory, the target 10 miles away from the antenna requires 7.6 meters' height, if it is lower than 7.6 meter, ECHO image would not appear for which you must keep in mind.



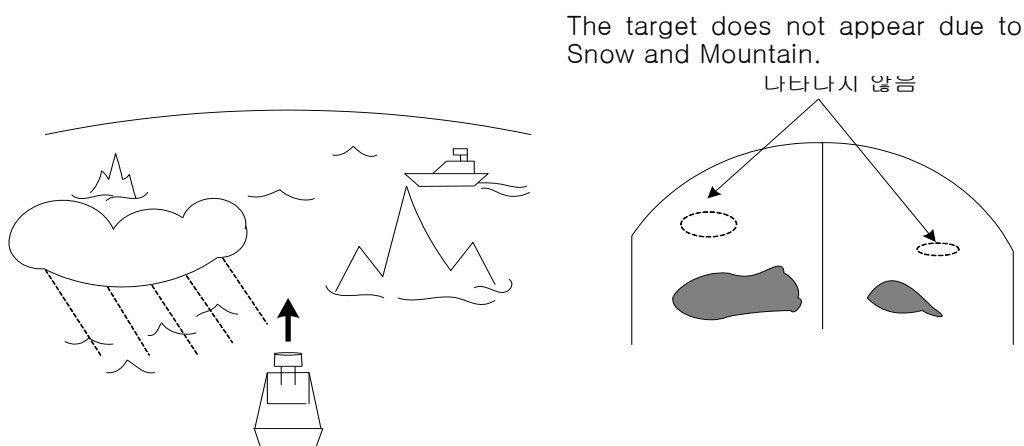
4.2 Reflection from the target

- The strength of reflection from the target is related to not only the size of the target but the shape and the materials composed of it. Therefore the strength of reflection is not considered to be relative to the size of the target.
- Especially it is dependant to the geographical condition in coastal line. If the coastal line is flat slide, the only mountain summit is displayed on the screen as an image, you should pay attention to the calculation of distance upto the coastal line.
- The ECHO reflected from flat land is so weak that it is unlikely to observe such land.



4.3 Wave Path

- In case there is an obstruction in the course of wave path like Mountain, Rain and Snow, the target behind of them may not be observed.



4.3.1 Reflection of sea level

- On the sea surface where are made, white and broad images are displayed on the screen center. This is a reflection created from the sea level and occurs as a different image mainly depending on the size of wave, range and the direction of wind.

4.3.2 False Image

There is a possibility that non-existing targets may be shown or any existing targets may not be shown through the image. This image is called 'virtual image'. What mainly causes such false image as follows;

1. Shadow

Dipending on the installation position of antenna, the reflection may come back after colliding against the funnel or mast, which may create 'shadow' causing the virtual image on PPI screen. In this case, the targets that are located at the shodow direction may not be shown on the screen.

The existence of such a 'shadow' may be figured out by checking if there is any dim image or any unseen part, based on the reflection of sea level.

If the 'shadow' occurs, the user needs to memorize the direction in order to observe the targets with care.

2. Side echo

There may be an image of arc wave line in the same distance from target image on the screen. This is caused by the side lobe of which beam is radiated from the antenna.

For this phase, it is easy to make a judgment when targets are fixed.

3. Secondary reflection

Fake images may be displayed as their directions are changed through being reflected against the funnel or mast, which create shadow.

In this case, the images of targets are located at the mast direction that reflects the radar wave.

4. Multi-reflection image

Where there are any structures or big-sized vessels that are hidden behind gigantic vertical line, multiple images by multi-reflection appear.

These images come out at intervals of every lamp line and among the lines, the closest line to the own ship is the actual image of target.

5. Radar interference

If there is any radar closely located that uses the same frequency, the interference image by the radar appears on PPI screen. This interference turns into various spots and appear in forms of many images but as the interference does not appear in the same place, it may be distinguished from target image.

For the radar interference( button), select 『ON』 in the function to diminish or get rid of it

Chapter 5. Installation

	CAUTION
	*The specialist from Head Office or Local distributor should carry out installation work. *Installation works carried out by unauthorized person can cause out of order. performance failure Electric shock.

5.1 Overview

- Proper installation of Radar ensures the performance and safety of it during operation and facilitates the maintenance and repair of it, you should carefully pay attention to the proper of installation according to the instruction.
- Antenna should be installed as high as possible after considering its weight.
- Indicator should be installed inside Wheel House in order make observation efficiently.
- 15m standard cable should be used between Antenna and Indicator.

5.2 Installation of Antenna

5.2.1 Selection of the installation place

	Caution
	※ The place where there is no big obstructions on the level of ship's fore and afterside. ※ If there is a obstacle on the same level of antenna, it may cause a virtual image. ※ Especially when the virtual image appears on ship's fore and after side, it will be difficult to observe and forecast the danger. ※ Avoid installing near funnel as it may cause the decrease in performance, the defect due to heat, therefore it should be installed as far away from the funnel as possible. ※ Please keep in mind that direction finding antenna and VHF antenna should be far away from Radar Antenna. (Please avoid the situation from tying up other cables with radar one)

5.2.2 How to install Antenna

1. Take a caution when antenna is installed on High Speed Vessel

Generally the head of High Speed Vessel will be up float when ship is in full speed. Due to this, in case the Antenna being installed in even level and trim (angle of ship's stem while running) being over $1/2$ of vertical beam width (θ), the Echo from this target is hardly displayed as image because the front of the ship is off the beam range that causes the electric wave reflecting from the target becomes weak. In opposition, at the stern of the ship the wave reflecting from the sea surface becomes strong. It will not affect the image at the port and starboard side of the ship.

Therefore, in case the ship that of trim is over $1/2$ of vertical beam width (θ), it is recommended to install the Antenna in slant toward the ship's stem.

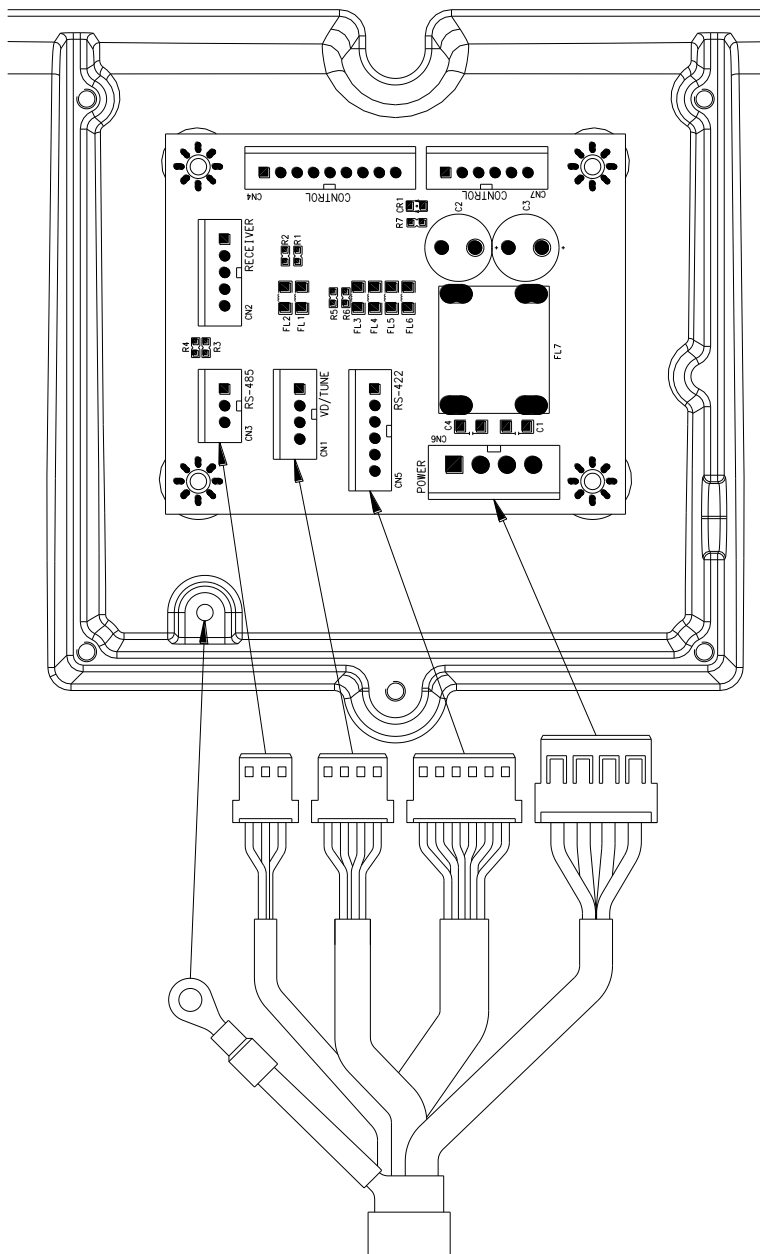
2. Caution while the Antenna is installed in Yacht

It is apt to be sliding in slant toward the counter windy side while the yacht is navigating when the wind is blowing to the extent. In case the slanted angle being over $1/2$ of beam width, the electric wave reflecting from the target becomes weak since the ship structure is off the range of beam and Echo from this target is hardly displayed as an image. In opposiiton, the opposite side of the wind, surface reflecting becomes strong since the electric wave contacting sea surface becomes strong. But it will hardly affect the images of fore and after side of ship.

Therefore, in case Yacht that of slant is over $1/2$ of vertical beam width (θ), it is recommended to install the mounting bracket in order that antenna may be slanted in right and left side according to the angle of slant.

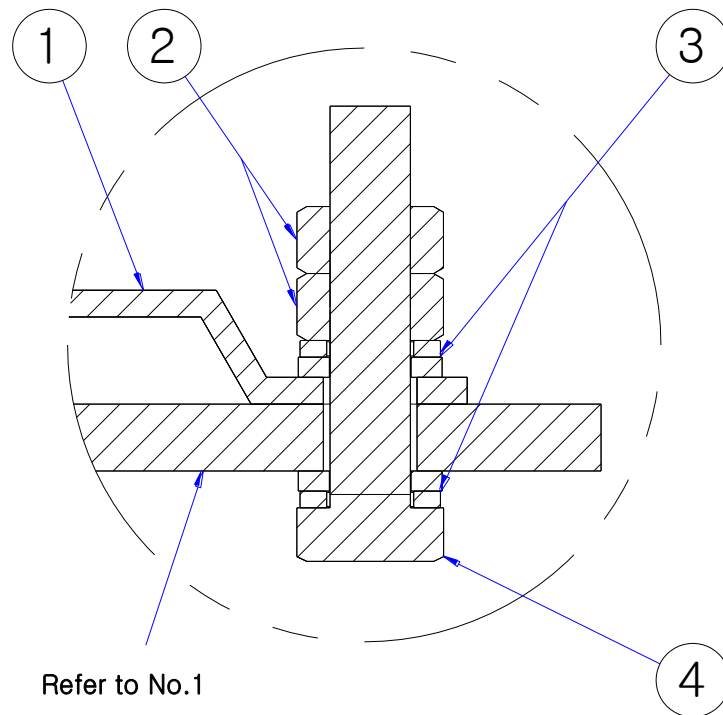
5.2.3 Connection to Equipment Cable

1. Antenna (RSU-7200)



Caution

※ Don't bend the connector too much when input the cable into the scanner for preventing from the damage



- ① RSU-7200 INSTALLER ($\Phi 10 \times 25\text{mm}$)
- ② Stainless Nut ($\Phi 12$)
- ③ Spring Washer ($\Phi 12$), Plain Washer ($\Phi 12$)
- ④ Hexagonal Bolt ($\Phi 12 \times 60\text{mm}$)

Refer to No.1: Use less than 5mm in a Antenna fix-up panel.

In case of over 5mm, hexagonal bolt should be changed for installation.

5.3. DISPLAY SET-UP

5.3.1. Location for installation



ATTENTION

- ※ A display must be installed 1 meter away from a magnet compass.
- ※ It may be harmful to the magnet compass in case of closer installation.

- Select the location for easy-investigation and maintenance.

5.3.2 How to Install

- (1) Install the display according to the Block Diagram.
- (2) Refer to the installation diagram.

5.3.3. Power Cable connection

- (1) Connect a Power cable to **[POWER]** of the back-pannel.
- (2) Connect an Aired-cable to **[ANTENNA]** of the back-pannel.
- (3) Connect an earth cable to **[EARTH]** of the back-pannel.

5.4. Installation check

- After installation, check that all job has followed the instruction. The serious check points are the cable connection, tight connection of each units, aired-cable, the connection of cable shield.

5.5. Operation check

- (1) Before the operation check, it needs to check if the internal voltage is in an acceptable voltage range.
- (2) Check all parts of the radar in detail after operation check.
- (3) Readjustment should be according to the manual even though the operation check is O.K.

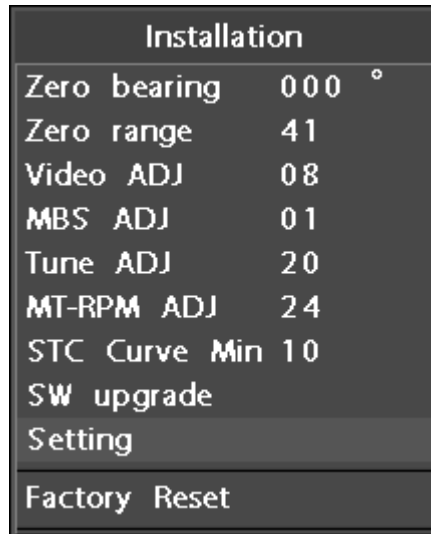
5.6. Initial Installation

- In case of the first time, it must be executed an initial adjustment.

5.6.1 Initial Installation

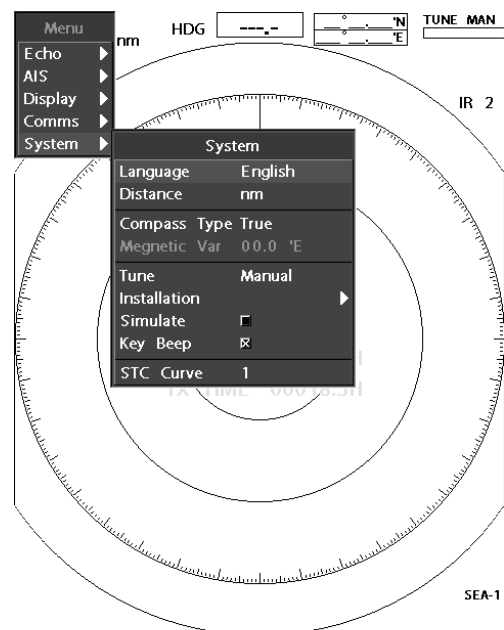
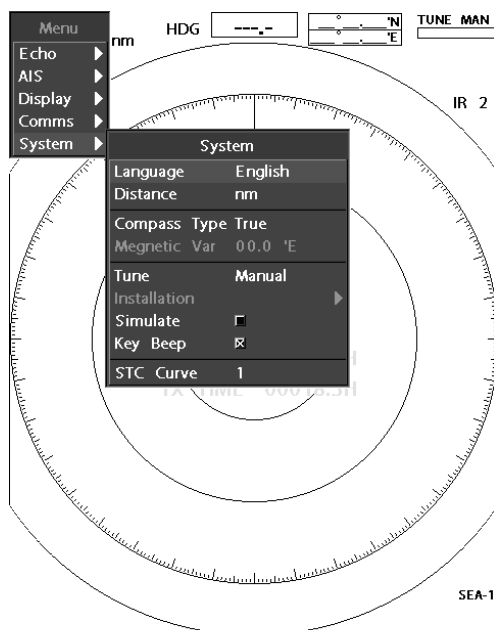
Following is how to go to Initial setup menu

Menu → **System** → **Int. Set** → **Enter** after press these keys will show following display.



※ Installation menu activate procedure:

At **Menu** in **System** list, press **Cursor** **Off Cent** **Cursor** **Off Cent** keys within 5 seconds then following screen will show:



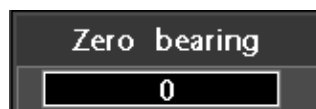
[Screen before activation of installation menu] [Screen after activation of installation menu]

ATTENTION

- ※ The initial-setting should be executed in transmitting condition.
- ※ Without the initial setting, the target mark, distance and direction may be wrong.

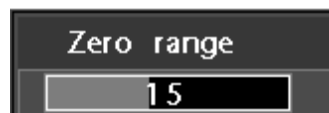
5.6.2 Bearing Adjustment

After installed the Antenna, you may adjust vessel's heading/bearing degree from 0 ° to 360 ° degrees, and change it by 1° degree.



5.6.3 0 Mile Set

After installed the Antenna, it depends on cable and/or device you may adjust a real distance and target distance by adjusting 0 Mile Set menu. Control level is divided by 36 different levels.



5.6.4 Video ADJ

After installed the Antenna, it depends on cable length video signal may be adjusted and control level is divided by 36 different levels.



5.6.5 MBS (Main Bang Suppression) ADJ

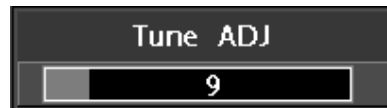
It may be Main Bang phenomenon in a center of the indicator in a short range and may be adjusted by 32 different levels. If value is increased then Main Bang phenomenon frequency will decrease.



5.6.6 Tune ADJ

On the front, there is key control knob for Tuning and may be adjusted by 64 different levels.

For setting procedure, make Tune VR to the center and set target object and Tune knob to the maximum.



5.6.7 MT-RPM ADJ

This is how to set for the Antenna's motor RPM.

Motor rotation will display with RPM measurement, normal operating rotate per minute is 24 RPM.

ATTENTION) When you operating in high speed then targeting object accuracy will decrease and system speed may be decrease.

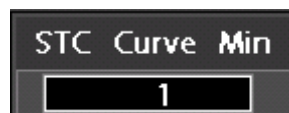


5.6.8 Software Upgrade

This menu will upgrade previous software program.

5.6.8.1 Stc Curve Min

STC Curve setting's minimum value is as 1~255



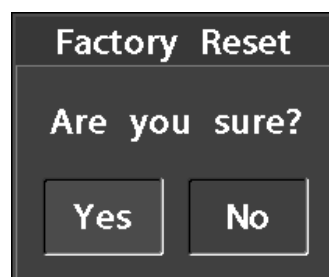
5.6.9 Default manufacturing Setting

This menu will reset the default manufacturing settings.

ATTENTION) This menu is limited to use by end-users.

5.6.10 Default basic manufacture set-up

This menu will reset device to basic set up from the manufacturer.





ATTENTION



Device came out with fully adjusted. For resetting for default basic manufacture is limited to end-users. Not recomannding for adjusted by end-users all the time.

Chapter 6. Maintenance

6.1. General Maintenance

- (1) A regular maintenance is required for the radar to perform in a good order.
- (2) The unexpected troubles would be less by paying proper attention to timely maintenance.
- (3) A common maintenance for each component is as follows.

6.1.1. Cleaning

- (1) Clean out the dust, salt water adhered to the unit.
- (2) Use dry cloth.

6.1.2. Check out the tightness of screw, bolt

- Check the tightness of screw or bolt, attached on the unit.

6.1.3. Check the cabling

- Check and maintain the cabling between units periodically. (Antenna–Display, Display–Power, Display–Option).

ATTENTION
※ To avoid electric shock when checking the units, power must be turned off. ※ In case of using rectifier, cut off the power on monitor because electricity still runs even Radar has stopped.

6.2. Antenna

- When maintaining scanner, cut off the power of display unit. Don't place watch or electronic card to the area of modulation, since it is equipped with Magnetron.

6.2.1. OpenArray

- (1) In case OpenArray surface being contaminated by dust, paint, it may arise the attenuation or reflection of electric wave and may cause decrease of the performance of Radar, it should be cleaned out by a soft cloth with alcohol to keep it cleaned at all times.

CAUTION
※ Don't use Benzene, Gasoline, Tricrene, Keltone and any solvents other than alcohol.

(2) Check periodically the tightness of the attached bolts.

6.2.2. Bracket

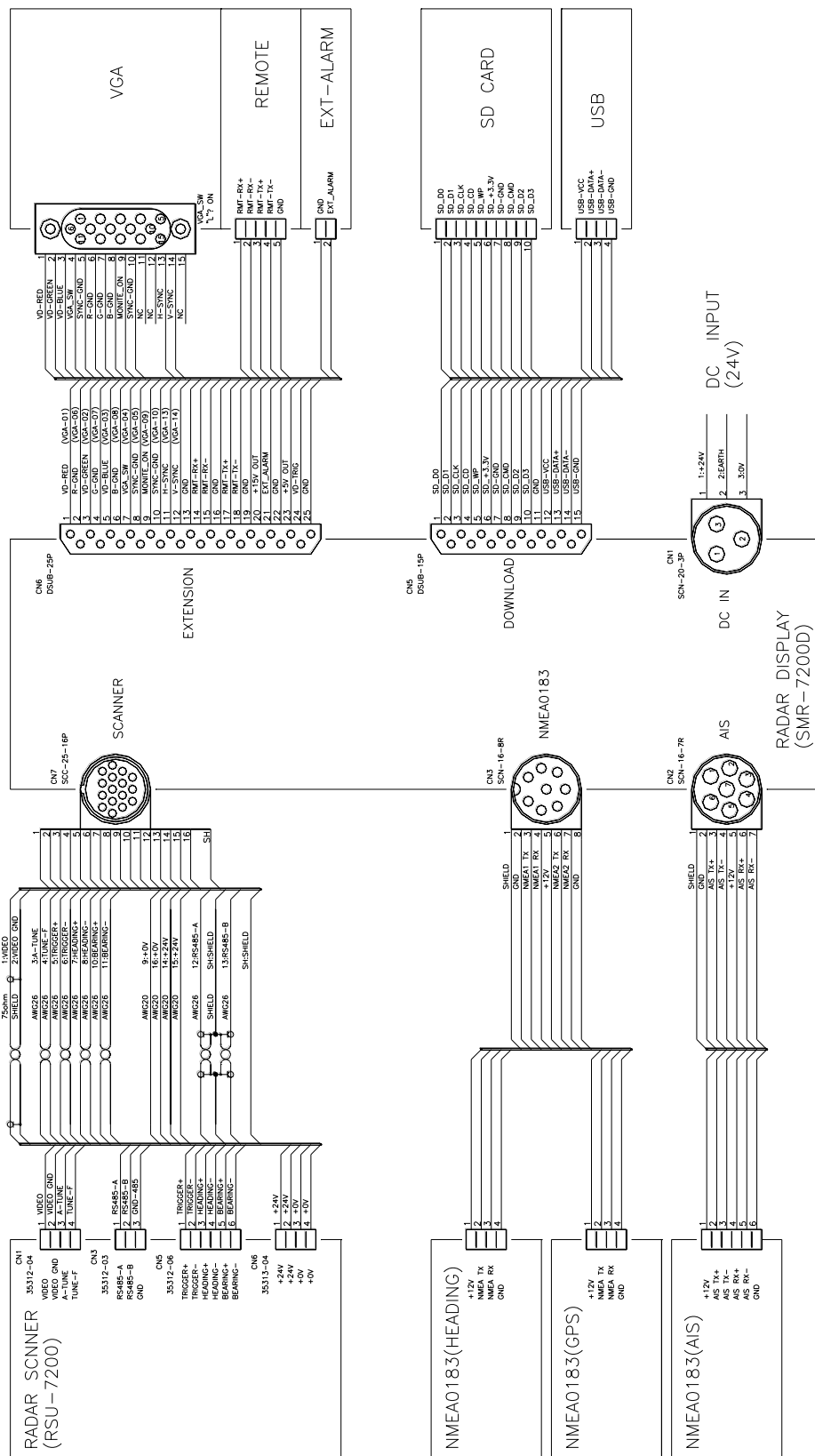
- Check the mounting of Antenna and do painting every half-year to prevent from being rusted.

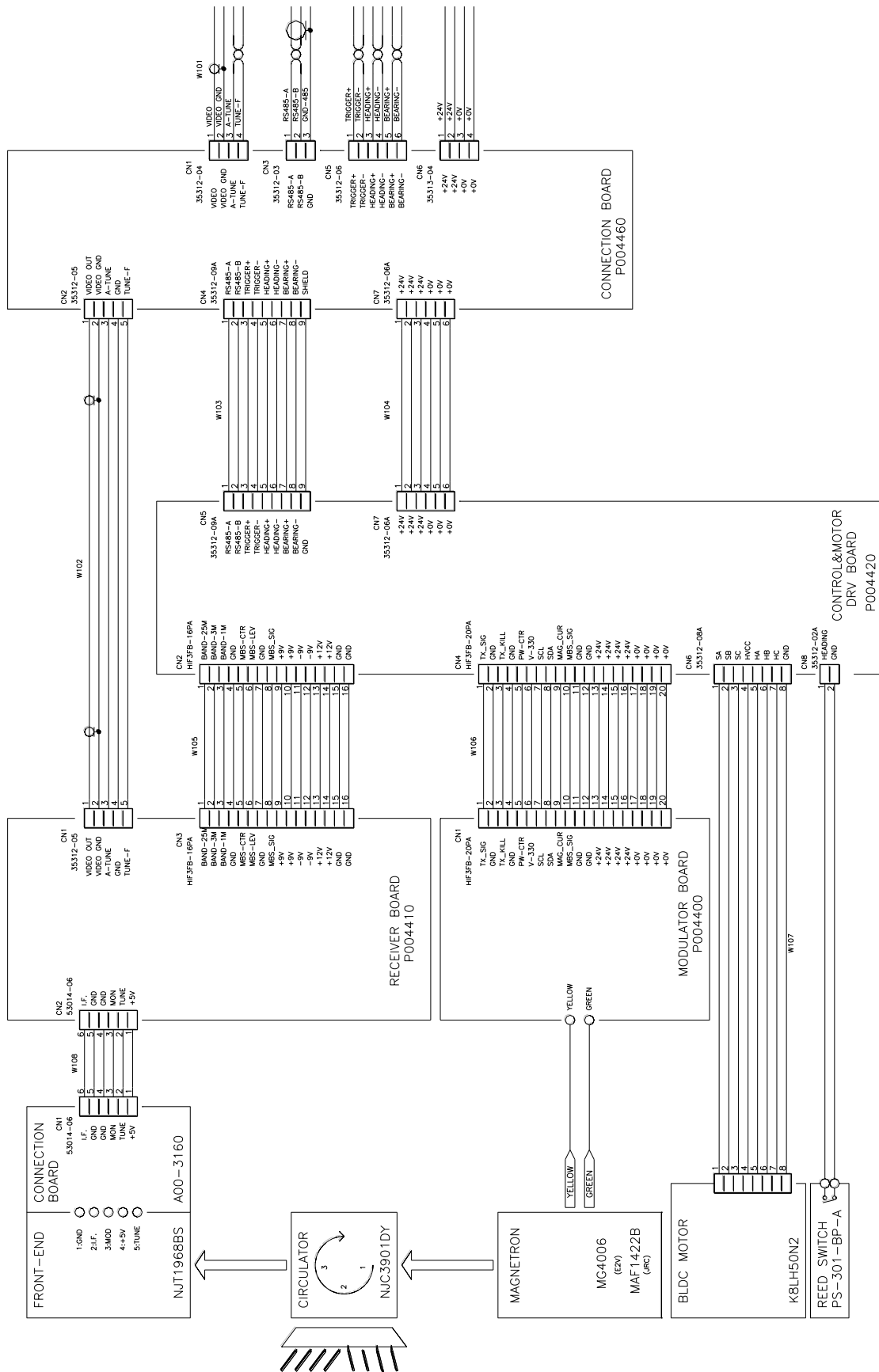
6.3. Display

6.3.1. Cleaning of a Display Screen

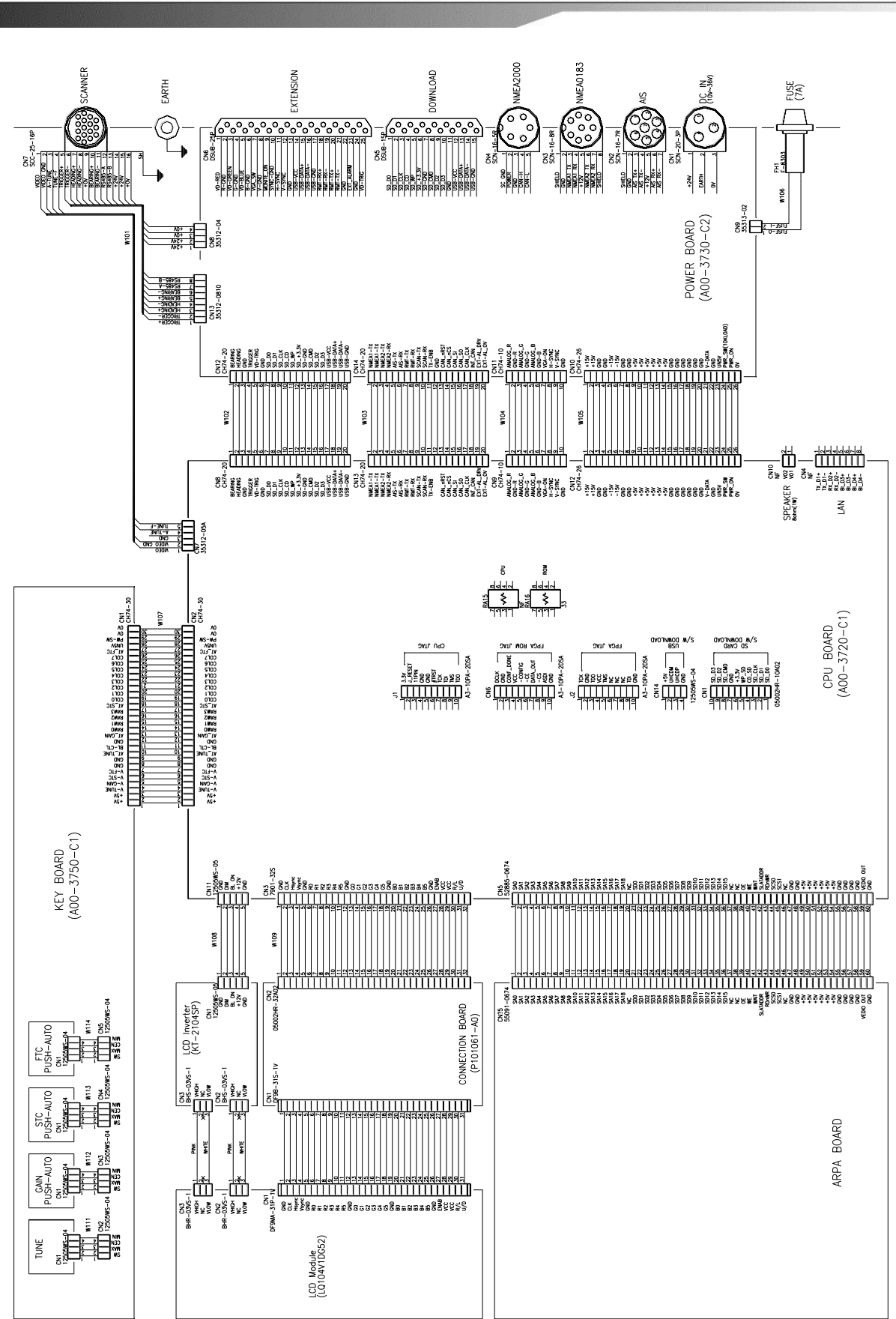
- (1) In case a stain adhered to LCD screen, it deteriorates the transparency of LCD screen.
- (2) Do cleaning with a soft cloth (100% cotton).
- (3) Use antistatic agent but don't rub it strongly.

Chapter 7. Installation drawing and circuit diagram

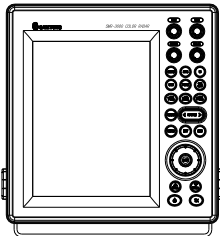
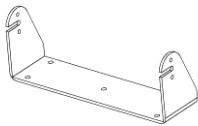
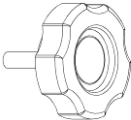
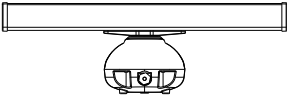
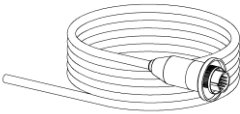
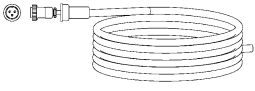


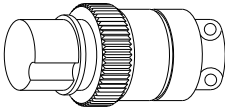
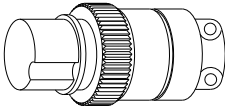
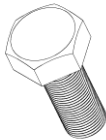
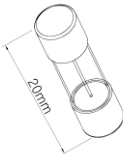


[Antenna Unit(RSU-7200)]



Chapter 7. Packing list

SMR-7200 (72Mile Marine RADAR)						
NO.	Item	External Drawing	Dimension		Qty	Chk Remark
1	Display		SMR-7200		1	
			CODE NO.	SMR-7200		
2	Bracket				1	
			CODE NO.	ACC-RADAR-001		
3	Knob		Ø6 × 20		2	
			CODE NO.	ACC-6X18MM-002		
4	Antenna		RSU-7200		1	
			CODE NO.	RSU-7200		
5	Antenna Cable		SAMYUNG Ø11 X 16C		1	Cap SRCN2A 25-16P L=15m
			CODE NO	RSU-7200-15M		
6	Power Cable		CVV-SB2.0 SQ X 2C		1	Cap SCN20- 3P L=3m
			CODE NO.	ACC-CAB-010		
7	Ground Cable		KIV 5.5mm ²		1	L=3m
			CODE NO.	STR -595		

8	Stainless Piece		Ø4 X 16		5		
			CODE NO.	SPR-1407			
9	Connector, 7pin		SCN-16-7P		1		
			CODE NO.				
10	Coconnector, 8pin		SCN-16-8P		1		
			CODE NO.				
RSU-7200 (Antenna Installation Material)			CODE NO.	ACC-PAK-001			
11	Hexagon Bolt		Ø12 X 60		4		
			CODE NO.	ACC-SC-001			
12	Spring Washer		Ø12		4		
			CODE NO.	ACC-WA-001			
13	Flat Washer		Ø12		4		
			CODE NO.	ACC-WA-002			
14	Fuse		7A		2		
			CODE NO.	ADD-FUSE-001			
15	Manual				1		
			CODE NO.	SMR-7200-MK			
16	Antenna Dwg. Install'n				1		
			CODE NO.	RSU-7200-DK			

Chapter 8 Warranty Information

Thank you for purchasing Samyung ENC LTD's SMR-7200. This manual includes the proper way of operating and installing the unit and warnings. Please keep this manual in a safe place. Please pass the manual in case of selling or handing over to a new owner.

1 year warranty is given from the date of purchase. BUT break-down caused by the user's inappropriate use will be charged.

HEAD OFFICE A/S	
ADDRESS	65-20, Namhang-Dong 2 Ga, Youngdo-Gu, Busan, Korea
COMPANY	SAMYUNG ENC LTD. A/S TEAM
CONTACT	TELEPHONE : 82) 1577-0198
	F A X : 82) 051-406-5515
Please send us the model name, serial number and status over the phone or the fax, and we will respond as soon as possible.	

A/S	
NAME	
CONTACT	TELEPHONE:
	MOBILE PHONE:
Record the name and contact details of salesperson	