

Contents

SMR-3700 New Rev.1.0(071204)

Chapter 1. Overview	3
1.1. Equipment	3
1.2. Features	3
1.2.1. Scanner	3
1.2.2. Display Unit.....	3
1.3. Composition	3
1.4. Construction.....	3
1.5. Specifications.....	4
1.5.1. General	4
1.5.2. Scanner (RSU-3700)	4
1.5.3. Display Unit (SMR-3700)	5
1.5.4. Connection Cable.....	5
Chapter 2. How it works.....	6
2.1. What is Radar ?.....	6
2.2. Measuring of ownship position before Radar being invented.....	6
2.3. Measurement of Radar.....	6
2.4. Measurement of a Course	6
2.5. Speed of Radar waves & Antenna rotation	6
2.6. Radar Display.....	6
Chapter 3. How to operate panel and menu	7
3.1. Front Panel Buttons and Knob	7
3.1.1. Front Function.....	7
3.1.2. Directional Key	8
3.1.3. Display Characters	8
3.2. Display Description	8
3.3. Menu Functions.....	9
3.3.1. Menu Composition	9
3.3.2. MENU Functions	11
Chapter 4. How to operate the unit.....	13
4.1. General Idea	13
4.1.1. Power Input and Operation	13
4.1.2. Tuning Control.....	13
4.1.3. Image Control	13
4.1.4. Power Off.....	13
4.2. Stand-by for Processing	13
4.2.1. Brightness Change.....	13
4.2.2. Language Selection.....	13
4.3 Basic Operation	13
4.3.1. TX	13
4.3.2. TX Stop.....	13
4.3.3. Tuning Control.....	13
4.3.4. Gain Control	14
4.3.5. Rain/Snow Removal	14
4.3.6. To remove the interference of Sea Level Wave caused by the Sea Wave ..	15
4.3.7. To operate the alert function.....	15
4.3.8. To eliminate/display the scale of Range Ring	16
4.3.9. To remove the Radar Interference	16
4.3.10. To eliminate the Ship's Heading Line	16
4.3.11. To use the parallel line	17
4.3.12. To move the center of own ship.....	17
4.3.13. To measure the distance and bearing to the Target	17
4.3.14. To change distance unit.....	18
4.3.15. To change the way of direction symbol.....	18
4.3.16. To change the way of bearing display.....	19
4.3.17. To change the way of displaying bearing ine/cursor	19

4.3.18. To compensate the magnetic	20
4.3.19. To measure the time to the target.....	20
4.3.20. To display the Waypoint	20
4.3.21. To display the other ship's track line	20
4.3.22. To make intermittent transmission for suppressing electric power of Radar.....	21
4.3.23. To display ECHO image long on PPI screen.....	21
4.3.24. To change the color of PPI screen and ECHO image	21
4.4. Other convenient function	22
4.4.1. Display own ship's speed on the indicator.....	22
4.4.2. To display Ship's heading on the indicator	22
4.5. Connection to the external navigation equipment	22
Chapter 5. Screen view.....	23
5.1. The distance from the target to the height of target	23
5.2. Reflection from the target	23
5.3. Wave Path	24
5.3.1. Reflection of sea level	24
5.3.2. False Image	24
Chapter 6. Installation	25
6.1. Overview	25
6.2. Installation of Antenna.....	25
6.2.1. Selection of the installation place.....	25
6.2.2. How to install Antenna	25
6.2.3. Connection to Equipment cable	26
6.3. DISPLAY SET-UP.....	27
6.3.1. Location for installation	27
6.3.2. How to Install.....	27
6.3.3. Power Cable connection	27
6.4. Installation check	27
6.5. Operation check	27
6.6. Initial Installation	27
6.6.1. Initial Installation.....	27
6.6.2. TUNE-R SET (Tuning Set).....	28
6.6.3. TUNE SET (Tune Level Set)	29
6.6.4. BEARING ADJUST (Bearing Set)	30
6.6.5. DISPLAY TIMING (0 Mile Set)	31
6.6.6. GAIN-L SET (GAIN SET)	32
6.6.7. STC-H SET (Sea Clutter Set)	33
6.6.8. MBS SET	34
Chapter 7. Maintenance	35
7.1. General Maintenance	35
7.1.1. Cleaning.....	35
7.1.2. Check out the tightness of screw, bolt	35
7.1.3. Check the cabling	35
7.2. Scanner	35
7.2.1. Radom	35
7.2.2. Bracket	35
7.3. Display.....	35
7.3.1. Cleaning of a Display Screen.....	35
Chapter 8. Packing List.....	36
Chapter 9. Installation drawing and circuit diagram	38

Chapter 1. Overview

1.1. Equipment

SMR-3700 type radar is a small-sized raster scanning Radar, which composes Radom type transceiver with 4 KW Transmitting power and 10.4 inch color TFT LCD monitor. Completely sealed case offers one-step higher stability, and it is designed to protect from damaging out of heat, salt water and heavy impact. In addition, it adopts color LCD monitor that can offer faster recognition of all the floating information on screen.

1.2. Features

1.2.1. Scanner

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.

- (1) Transmission Output : 4KW
- (2) Max. Range : 36NM

1.2.2. Display Unit

SMR-3700 monitor is designed to receive the input signal from Scanner and displays the optimum conditions on the TFT LCD screen, based on the SAMYUNG's best digital signaling technology.

- (1) 10.4 " color TFT LCD, High Resolution of 640 X 480
- (2) One-touch keys dedicated to every function
- (3) 10 (ten)-step LCD brightness adjustments
- (4) The input of the external navigational devices such as Gyro or NMEA 0183 enables it to display the own ship position and the destination
- (5) Fixing bracket for the unit

1.3. Composition

(1) Composition and Power Supply

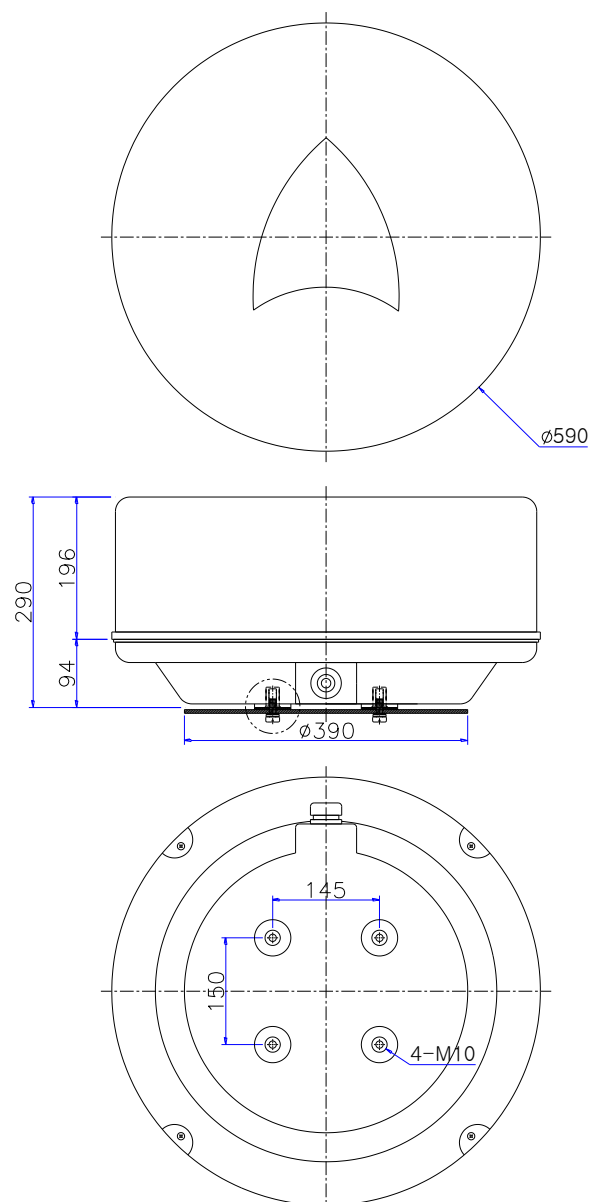
MODEL	SCANNER UNIT	DISPLAY UNIT	POWER SUPPLY
SMR-3700	RSU-3700	SMR-3700	DC 10V ~ 36V

The models are named in English as follows.

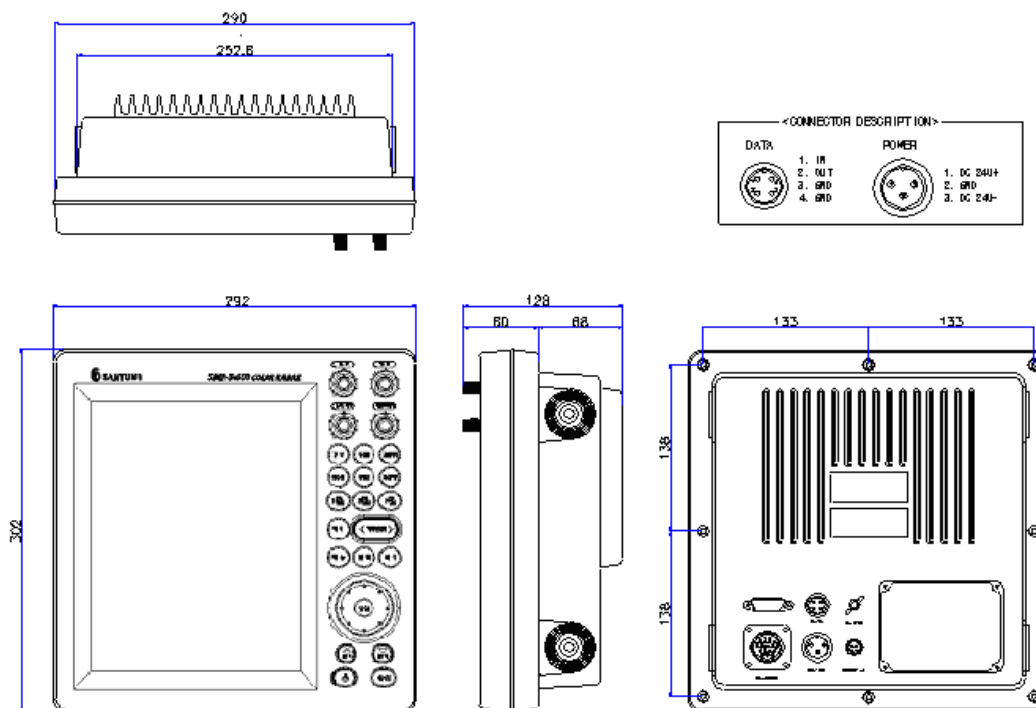
(2) Accessories

DESCRIPTION	Qt'	SAMYUNG CODE	REMARKS
MANUAL	1	SMR-3700-ME	
SCANNER-DISPLAY CABLE	1	RSU-3700-15M	15m
POWER CABLE	1	ACC-CAB-010	3m
SURGE CABLE	1	STR-595	3m

1.4. Construction



COLOR : WHITE, MASS : APPROX. 10Kg, UNIT : mm
 <Drawing 1.1> External Diagram of
 RSU-3700 SCANNER



COLOR : DARK-GRAY, MASS : APPROX. 5.8Kg, UNIT : mm
<Drawing 1.2> External Diagram of SMR-3700 DISPLAY

1.5. Specifications

1.5.1. General

- (1) Display Type : Raster Scan Type
- (2) Display Screen : 10.4" Color TFT LCD, Vertical Display
- (3) Display Color : GREEN, YELLOW, RED, WHITE, COLOUR
- (4) Display Range : 0.125, 0.25, 0.5, 0.75, 1.5, 3, 6, 12, 24, 36 NM
- (5) Distance Resolution : Within 30m
- (6) Min. Detection Range : Within 25m
- (7) Bearing Accuracy : Within $\pm 1^\circ$
- (8) Bearing Resolution : 4.2°
- (9) Bearing Input : True Bearing / Magnetic Bearing
- (10) Environmental Condition
 - a) Temperature
 - Scanner : -25°C ~ +55°C
 - Display Unit : -15°C ~ +55°C
 - b) Relative Humidity
 - Scanner : - below 95% on 35°C
 - Display Unit : - below 95% on 35°C
 - c) Relative Wind Speed : 51.5m/sec (100 knots)
- (11) Power Consumption : 60W
- (12) DC Power : DC 10V ~ 36V
- (13) Preheating Time : 90 Secs.
- (14) Preaction : Within 3 Secs.

1.5.2. Scanner (RSU-3700)

- (1) Dimensions
 - a) Diameter : 590mm
 - b) Height : 290mm
- (2) Weight : 10Kg
- (3) Plane of Polarization : Horizontal Target Wave
- (4) Polar Pattern
 - a) Horizontal Beam Width: 4.0°
 - b) Vertical Beam Width : 25°
 - c) Side Lobe Level : Below -21dB
- (5) Revolution : Approx. 24 R/Min.
- (6) TX Frequency : 9410 $\pm$ 30MHZ
- (7) Emission Type: P0N
- (8) Peak Power: 4KW
- (9) Transmission Bulb : Magnetron JRC MAF1421BY
- (10) Transmission Pulse Width/Repetition Frequency
 - a) Pulse Width Setup : Short
 - 0.08 μ sec/1640Hz : 0.125, 0.25, 0.5, 0.75, 1.5NM RANGE
 - 0.25 μ sec/1160Hz : 3NM RANGE
 - 0.5 μ sec/580Hz : 6NM RANGE
 - 1 μ sec/580Hz : 12, 24, 36NM RANGE
 - b) Pulse Width Setup : Long
 - 0.08 μ sec/1640Hz : 0.125, 0.25, 0.5, 0.75NM RANGE
 - 0.25 μ sec/1160Hz : 1.5NM RANGE
 - 0.5 μ sec/580Hz : 3NM RANGE
 - 1 μ sec/580Hz : 6, 12, 24, 36NM RANGE

1.5.3. Display Unit (SMR-3700)

- | | | | |
|-----------------------|--|--------------------------------------|---------------|
| (1) Dimensions | | f) Distance Circle | : Switch |
| a) Width | : 290mm | g) Interference Rejection | : Switch |
| b) Height | : 300mm | h) Heading Line | : Switch |
| c) Depth | : 142mm | i) Parallel Line | : Switch |
| (2) Construction | : Desk Type | j) Center Movement | : Switch |
| (3) Weight | : 5.8kg | k) 1 EBL/VRM | : Switch |
| (4) Display Screen | : 10.4" Color TFT LCD | l) 2 EBL/VRM | : Switch |
| (5) Scale Zoom-In | : Less than the bigger one - 1% of used range or 70m | m) F EBL/VRM | : Switch |
| (6) VRM | : 000 ~ 64.0 NM – Digital Display | n) Cursor | : Switch |
| (7) EBL | : 000° ~ 359° - Digital Display | o) Range | : Switch |
| (8) Sync. Type | : Manual/Automatic Switchable | p) ESC | : Switch |
| (9) Bearing Scale | : 1° scale, 360° | q) Menu | : Switch |
| (10) Bearing Display | : Electronic Type | r) Enter | : Switch |
| (11) Front Panel | | s) Center | : Switch |
| a) Tune | : Knob | t) Directional Button (8 Directions) | : Switch |
| b) Gain | : Knob | u) Brightness | : Switch |
| c) Rain/Snow Removal | : Knob | v) Power | : Switch |
| d) Sea Cluter Removal | : Knob | w) Transmission | : Switch |
| e) Guard | : Switch | (12) Menu Type | : POP-UP Type |

1.5.4. Connection Cable

- (1) SCANNER Cable Length : 15m
- (2) Power Cable Length : 3m
- (3) Max. Data Cable Length : 3m

Chapter 2. How it works

2.1. What is Radar ?

• Radar stands for Radio Detection And Ranging. Radar was developed its principles while World War II, However It wasn't invented as echo of navigation equipment.

2.2. Measuring of ownship position before Radar being invented.

• Before Radar came, vessel is sailing along the coastline when foggy day, they're making noise by ringing the bell or whistle, fire-arrow etc...
A transmitter emits radio waves, which are reflected by the target and detected by a receiver, typically in the same location as the transmitter. This enables a radar to detect objects at ranges where other emissions, such as sound or visible light, would be too weak to detect

2.3. Measurement of Radar

• Measurement of Radar is measured by calculating of time difference between transmitting signal and reflected echo.
Radar Frequency speed is recognized that its speed moves 162.000nm per sec regularly.
Thus, it requires the time to check range of signal reflected as echo from obstacle & signal transmitted to obstacle. The echo is entirely coming and going, it needs to be measured only straightline from obstacle, which should be 1/2 time.
This radar is calculated automatically.

2.4. Measurement of a Course

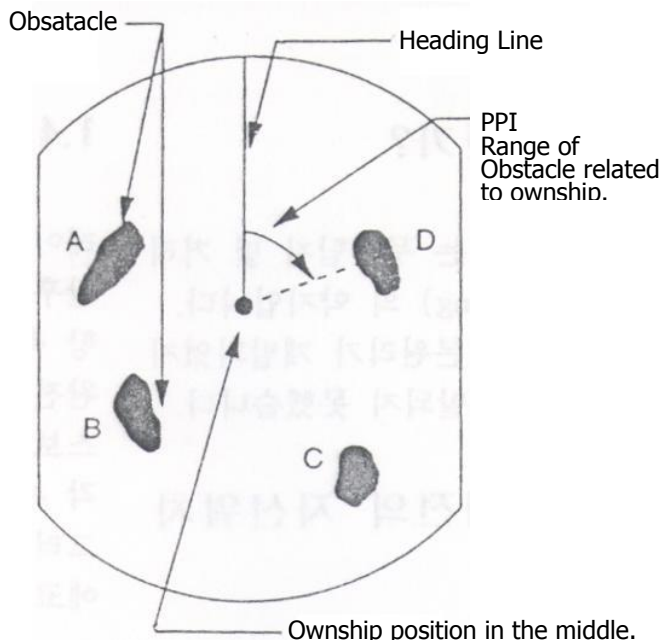
• One way to measure the distance to an object is to transmit a short pulse of radio signal (electromagnetic radiation), and measure the time it takes for the reflection to return. The distance is one-half the product of round trip time (because the signal has to travel to the target and then back to the receiver) and the speed of the signal.

2.5. Speed of Radar waves & Antenna rotation

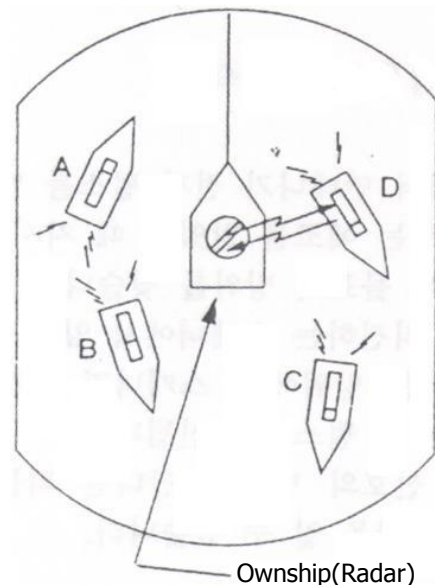
• The radar waves to obstacle and returning as echo should be compared from antenna speed very quickly.
Then, the first transmitting of very short radar pulse is returning as echo at the same time its scanner rotating.

2.6. Radar Display

• As it called PPI(Plan Position Indicator), which is displayed in distance & course from obstacle.
This display is indicated as reverse image being transmitting ownship position in the middle.
Its course, distance are displayed as echo image from center of PPI.
Continuous obstacle image is displayed, also moving of vessel which is transmitting.



< Sample Radar Screen >



< Sample : Real Radar >

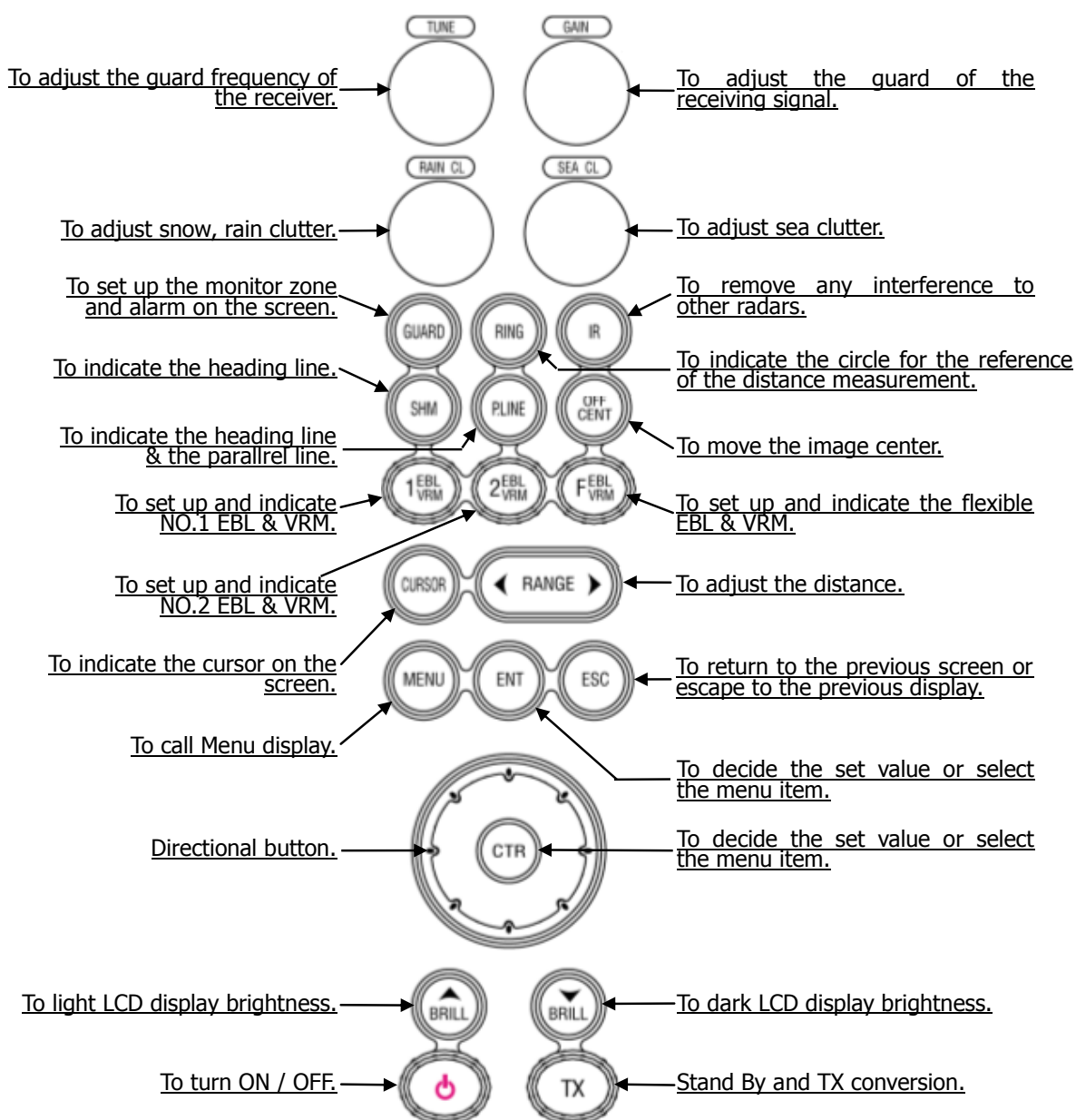
Chapter 3. How to operate panel and menu

3.1. Front Panel Buttons and Knob

It is available to display and adjust the various data on the screen by using the the control keys as follows;

- (1) Dedicated 4 (Four) Volumes
- (2) Directional key for 8 (Eight) directions and center key for moving to the display center
- (3) Dedicated 19 (Nineteen) keys
- (4) Available to select every function in Menu

3.1.1. Front Function



<Drawing 3-1> Front Knob & othe Fron Button

3.1.2. 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.

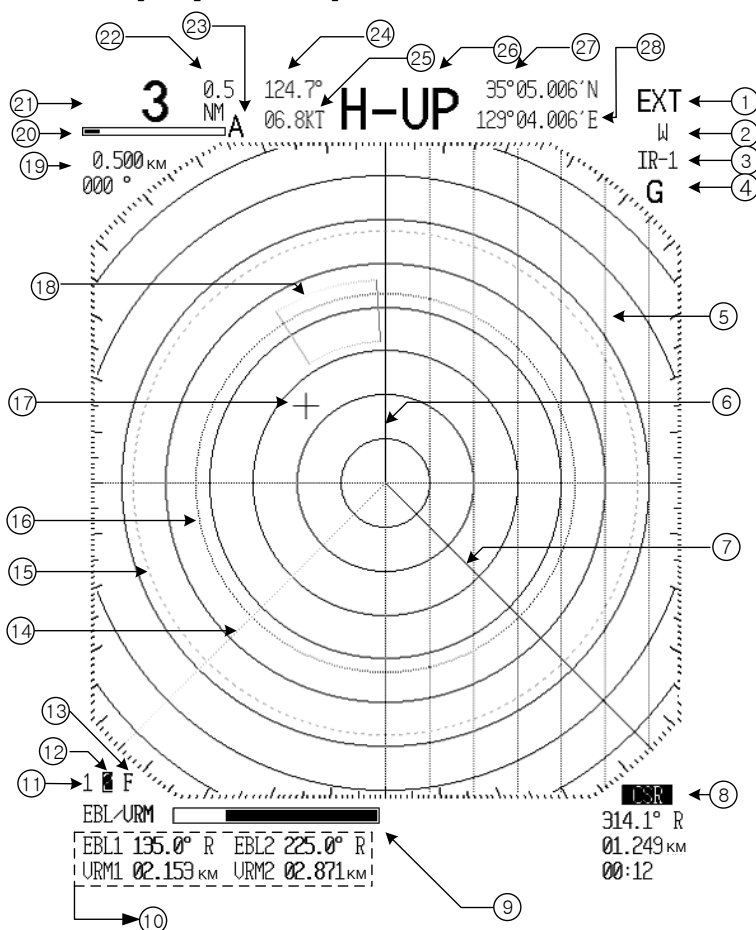
How to operate the exclusive keys

-  ⇒ 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 set up EBL/VRM
-  ⇒ To move to the sub-menu
-  ⇒ To change the adjustment value in the initial setup menu

3.1.3. Display Characters

Descptions	Position	Display Characters
Guard	Right Top	G
Interference	Right Top	IR
EBL/VRM	Left Bottom	1 2 F
Cursor	Right Bottom	CSR
Wake Point	Right Top	W
Target Extention	Right Top	EXT
Auto Tune	Left Top	A

3.2. Display Description



- (1) : Extension
- (2) : Wake
- (3) : Interference Rejection
- (4) : Guard Setup
- (5) Parallel Line
- (6) Heading Line
- (7) 1 EBL
- (8) Cursor Position Bearing / Distance / Arrival Time
- (9) Display Color
- (10) Indication of the set EBL/VRM bearing & distance
- (11) 1 EBL/VRM
- (12) 2 EBL/VRM
- (13) F EBL/VRM
- (14) 2 EBL
- (15) 2 VRM
- (16) 1 VRM
- (17) Cursor
- (18) Guard Zone
- (19) Distance & Bearing between Parallel Lines
- (20) Tuning Bar
- (21) Range
- (22) Distance between range ring
- (23) Auto Tuning
- (24) Heading Bearing
- (25) Speed
- (26) Heading Display
- (27) Latitude
- (28) Longitude

• 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.

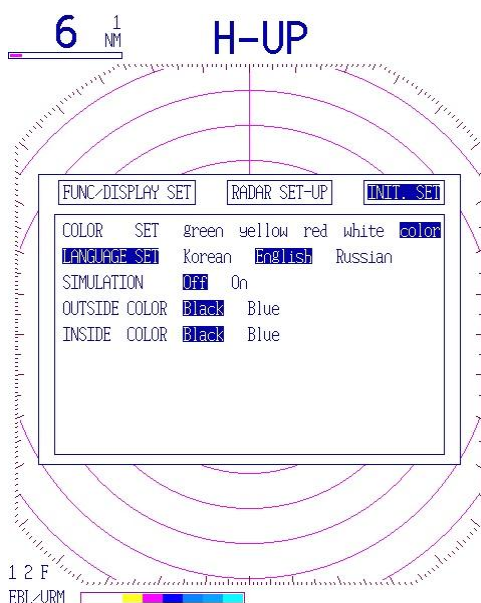
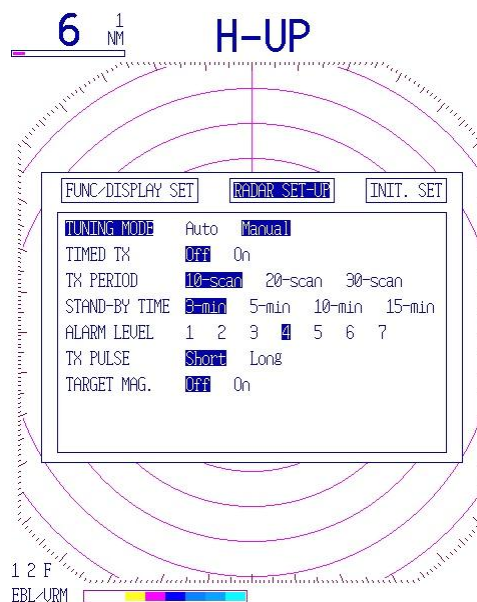
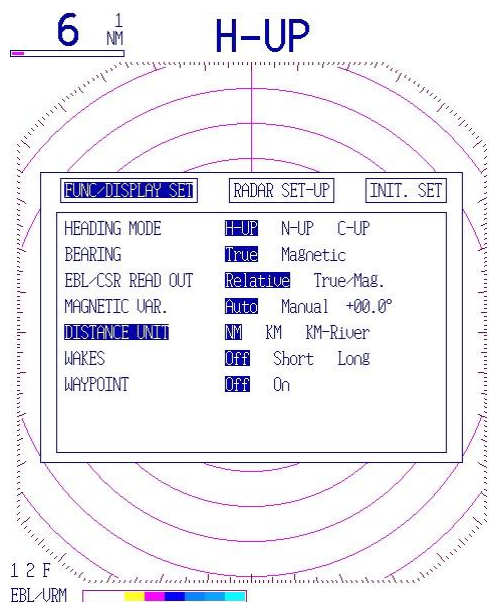
3.3. Menu Functions

- In addition to the functions used by the front panel keys, SMR-3700 has the functions to enable user to control with menu.

3.3.1. Menu Composition

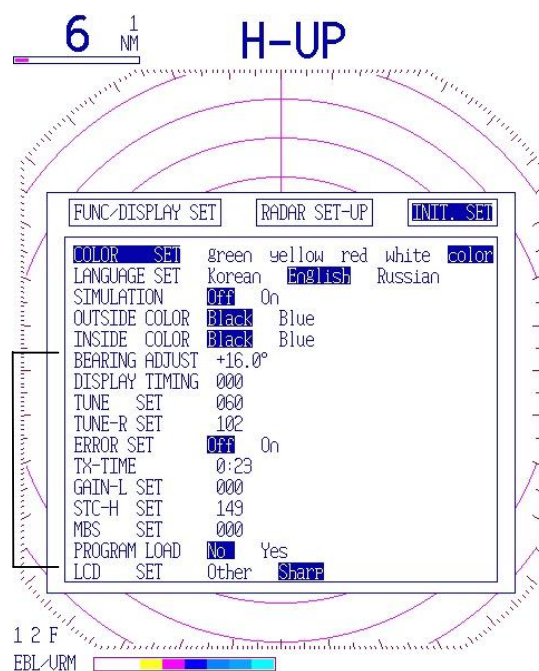
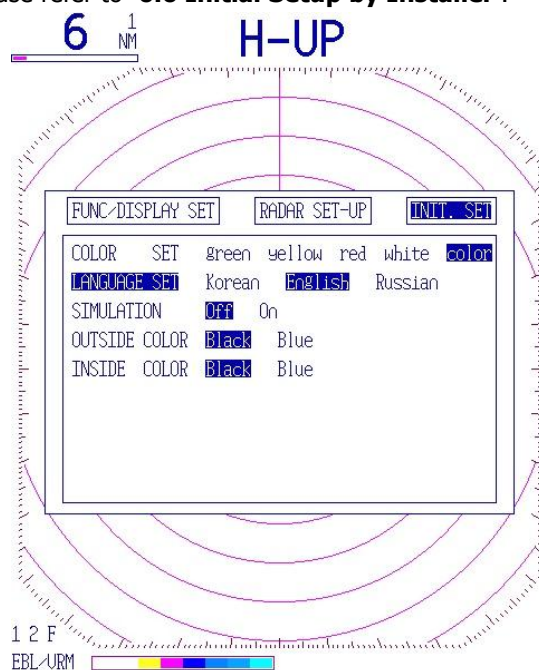
- It is available to converse the display language to Korean, English, Russian, Chinese.
- For the conversion of the display language, please refer to '4.2.2 How to converse the language'.

(1) Press  button by using     to select any wishful setup menu.



(2) Initial Setup Menu for installer

- At **INIT. SET** of 'MENU', press     button, the following display will appear.
- For any additional item, please refer to '6.6 Initial Setup by Installer'.



Initial Setup
by Installer
Additional Item

3.3.2. MENU Functions

- To use the functions attached with '※', it is required to get connected with **external navigational** device.

FUNC/DISPLAY

FUNC/DISPLAY SET	RADAR SET-UP	INIT. SET
HEADING MODE	H-UP N-UP C-UP	
BEARING	True Magnetic	
EBL/CSR READ OUT	Relative True-Mag.	
MAGNETIC VAR.	Auto Manual +00.0°	
DISTANCE UNIT	NM KM KM-River	
WAKES	Off Short Long	
WAYPOINT	Off On	

※ HEADING MODE : To select the display of the own ship heading.

※ BEARING : To select the display of PPI image bearing.

※ EBL/CSR READ OUT : To decide whether the bearing and the cursor are to be displayed 'Relative' or 'True'.

※ Megnetic Correction : To adjust the magnetic correction value.

DISTANCE UNIT : To select the unit of the distance measured by VRM or Cursor.
 NM : Nautical Mile
 KM : Kilometer caculated from NM
 KM-River: Displav a distance unit for River

WAKES : To indicate the track of the moving target according to the time intervals.
 Short : 5 Circles, Long : 10 Circles

※ WAYPONT : To display the position of the target on the screen.

RADAR SET-UP

FUNC/DISPLAY SET	RADAR SET-UP	INIT. SET
TUNING MODE	Auto Manual	
TIMED TX	Off On	
TX PERIOD	10-scan 20-scan 30-scan	
STAND-BY TIME	3-min 5-min 10-min 15-min	
ALARM LEVEL	1 2 3 4 5 6 7	
TX PULSE	Short Long	
TARGET MAG.	Off On	

TUNING MODE : To select 'Automatic' or 'Manual'.

TIMED TX : To decide the automatic repetition of the TX status and the stand-by for saving the power.

TX PERIOD : To set up the TX intervals by the number of the rotations

STAND-BY TIME : To set up the time of the stand-by status

ALARM LEVEL : To indicate the level of the image to make an alarm.
 Even if the level becomes lower, it is designed rings by the weak image signal and reacts sensitivelv.

TX PULSE : To set up the TX pulse width.
 Short : The resolution is good.
 Long : The gain is good.

TARGET MAG. : To expand the image size freelv on the screen.

INIT. SET

FUNC/DISPLAY SET		RADAR SET-UP		INIT. SET	
COLOR SET	green yellow red white	color			
LANGUAGE SET	Korean English Russian				
SIMULATION	Off On				
OUTSIDE COLOR	Black Blue				
INSIDE COLOR	Black Blue				

COLOR SET : To set up PPI image color.

LANGUAGE SET : To set up the language in use.

SIMULATION : To show the simulation.

OUTSIDE COLOR : To set up the external desktop color of the screen.

INSIDE COLOR : To set up the internal desktop color of the screen.

- At **INIT. SET** of 'MENU', press   button, the following display will appear.

Initial Setup by Installer

FUNC/DISPLAY SET		RADAR SET-UP		INIT. SET	
COLOR SET	green yellow red white	color			
LANGUAGE SET	Korean English Russian				
SIMULATION	Off On				
OUTSIDE COLOR	Black Blue				
INSIDE COLOR	Black Blue				
BEARING ADJUST	+16.0°				
DISPLAY TIMING	000				
TUNE SET	060				
TUNE-R SET	102				
ERROR SET	Off On				
TX-TIME	0:24				
GAIN-L SET	000				
STC-H SET	149				
MBS SET	000				
PROGRAM LOAD	No Yes				
LCD SET	Other Sharp				

BEARING ADJUST : To adjust the PPI image bearing.

DISPLAY TIMING : To adjust the PPI image distance.

TUNE SET : To adjust the status of the tuning bar. (Fixed at 060)

TUNE-R SET : To adjust the tuning volume.

ERROR SET : To adjust the error status.

TX-TIME : To indicate the TX time.

GAIN-L SET : To adjust the gain volume. (Fixed at 000)

STC-H SET : To adjust the sea clutter volume.

MBS SET : To adjust MBS distance.

PROGRAM LOAD : Function to upgrade program.

LCD SET : Setting based on LCD version.



CAUTION

For the initial setup by installer, users must not make any adjustment to avoid any vital functional problems as the installer normally adjusts it to the optimum conditions according to the situation of the ship.



Chapter 4. How to operate the unit

4.1. General Idea

4.1.1. Power Input and Operation

(1) Power Input

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

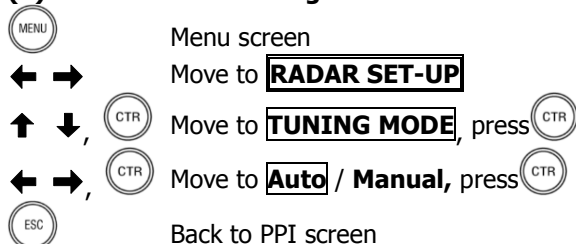
(2) TX

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

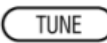
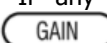
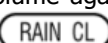
4.1.2. Tuning Control

- 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, "A" is displayed next to the tuning bar.

(1) Conversion of Tuning Mode



(2) Adjustment of Tuning Volume

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

4.1.3. Image Control

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

- Press  button to convert the processing range of the image.

4.1.4. Power Off

(1) TX stop.

- Press  button to convert to the stand-by status.

(2) Turn off the power.

- Press and hold on  button for 1~2 secs, the radar operation will stop and all the performances will stop, too.

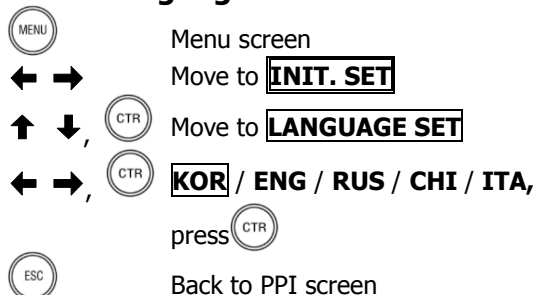
4.2. Stand-by for Processing

4.2.1. Brightness Change

- Press  button, the screen will get brighter.
- press  button to have the darker screen.

[Ref.]  There are 10 (ten) stages adjustable in the brightness.

4.2.2. Language Selection



4.3 Basic Operation

4.3.1. TX

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

4.3.2. TX Stop

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

4.3.3. Tuning Control

- Please refer to '4.1.2, Tuning Control'.

4.3.4. Gain Control



ATTENTION

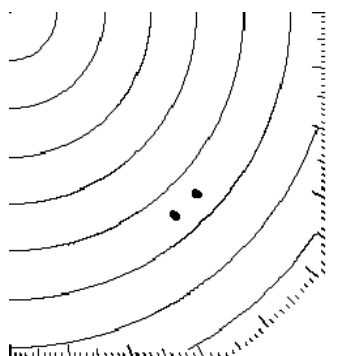
- ※ It should be always observed by adjusting the optimum conditions.
- ※ If the gain is too low, the targets may not be displayed.
- ※ If too high, it may be an obstacle in observation due to the noise increase on the PPI display.

(1) How to control Gain Control

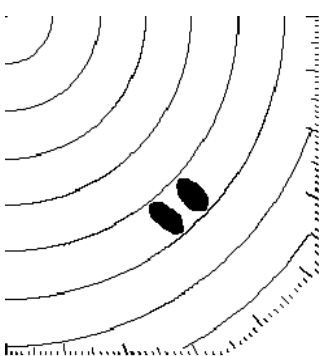
- Turn **GAIN** to the left to decrease the Gain and to the right to increase the Gain.

(2) To adjust the optimum gain

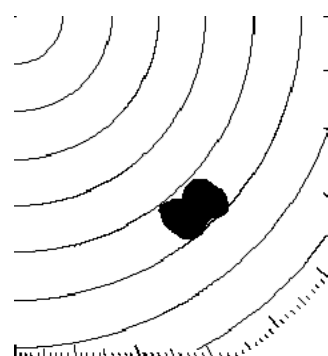
- The echo image size by target is the biggest and any targets nearby do not contact the echo image.



Small Image by Low Gain



Optimum Gain



2- images contact by high gain

4.3.5. Rain/Snow Removal

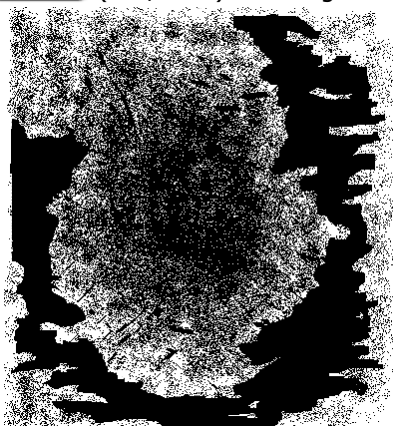


ATTENTION

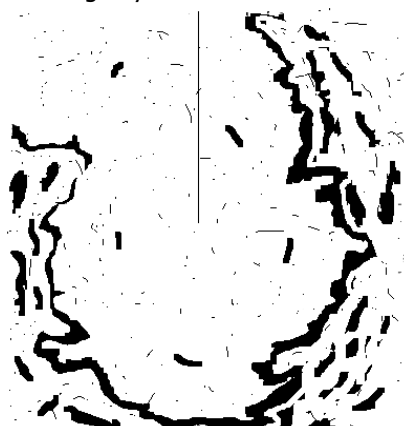
- ※ Too much adjustment of rain/snow removal will restrain the target of ships or hazards as well as any images by rain/snow. This can be the cause of image analysis.
- ※ In case of use of rain/snow removal, the optimum conditions should always set up.

(1) If much rain/snow, it is difficult to analyze the wishful target image as the echo by rain/snow clutter appears on the PPI display.

(2) Turn **RAIN CL** (rain/snow) to the right to remove the echo image by snow and rain.



Reflected Wave of Rain/Snow



Removed Rain/Snow
(Target Retricted, too)

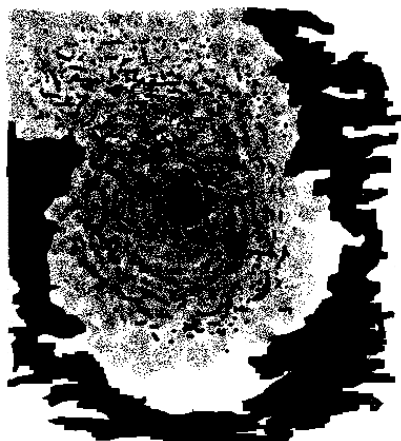
4.3.6. To remove the interference of Sea Level Wave caused by the Sea Wave

ATTENTION

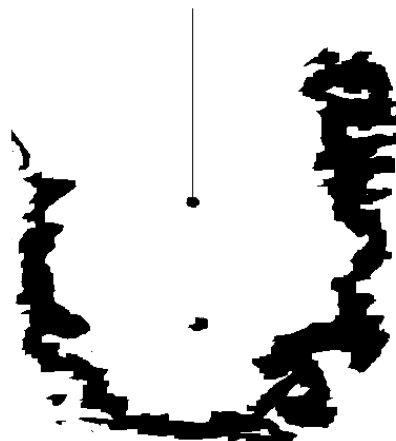
- ※ If you set the removal function of Sea Level Wave up to removal of all Sea Level Reflection at short distance, it causes interference in detecting images due to the target of vessel and dangerous things as well as the wave images being suppressed.
- ※ When you use the removal function of Sea Level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

(1) When the wave becomes high due to heavy wind, the ECHO(Sea Clutter) due to the wave is displayed on PPI screen, then it will be difficult to detect the image of the target.

(2) Turn **SEA CL** (Sea Clutter) 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)

4.3.7. To operate the alert function

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

(1) Guard Zone Setting



In bottom of the screen, the function of **GUARD:Ring↔Fan** is shown and in bottom-right of the screen, **CRS** Data is shown with the distance & bearing of the cursor based on the position of own ship.

Press  to select **Ring** or **Fan** function.

a) How to set up Alert Zone based on the position of own ship as selecting **Ring** function.



The message of **Press ENT to set** is shown onto a screen with a red-ring mark.



Adjust the Alert Zone controlling the rea-ring.



The alert zone is set up and the sound is ringing, if it has a target in the zone.

b) By selecting **Fan** function, how to set up a specific zone onto a heading of PPI screen.



Put the cursor onto top-left in a specific zone to be controlled by using a bearing button.



Press ENT to set is shown in a screen.



Move the cursor to bottom-right in a specific zone to mark the fanning-shape.



The alert zone is set up and the sound is ringing, if it has a target in the zone.

(2) Change of the alert level

- Menu screen
- Move to **RADAR SET-UP**
- Move to **ALARM LEVEL**, press
- Move to **1 / 2 / 3 / 4 / 5 / 6 / 7**, press
- Back to PPI screen

[Ref.] Alarm level **1 ~ 7** represents Image Level (ECHO Level) sounding the alert.

1 Being selected, it gives the alert sound to all images shown in Screen.

7 Being selected, it gives the alert sound to the strongest image displayed in the screen.

(3) Occurrence and Stoppage of the alert sound

- a) When pressed the button, the alert sound is stopped.
- b) If you press the button again, alert sound is coming.

(4) Termination of the alert

- When button is pressed, all alerted status is terminated.

4.3.8. To eliminate/display the scale of Range Ring

(1) Press button three times.

- The brightness of Range Ring is adjusted in 3 steps.

4.3.9. To remove the Radar Interference

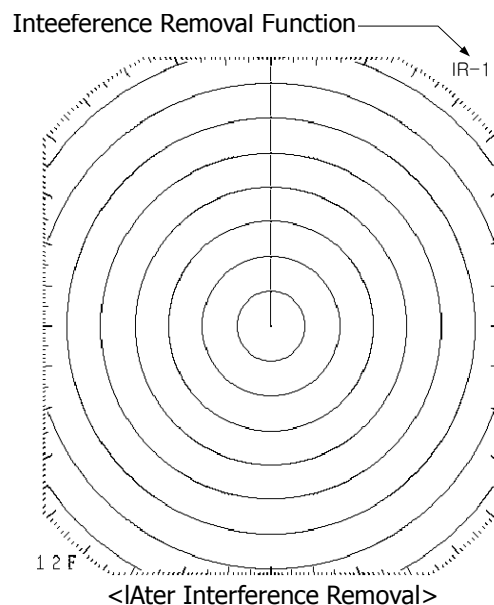
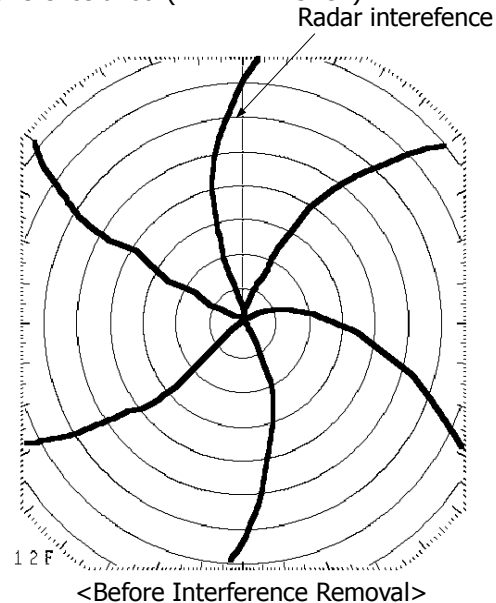
ATTENTION

- ※ 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 an SART signal.

• Radar Interferene means Micowave transmitted by other ship's Radar is displayed on PPI screen, which is directly affecting to own ship's Radar air line.

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

(2) **IR-3** is the status that shows Radar interference a lot. (IR=INT REJECT)



4.3.10. To eliminate the Ship's Heading Line

(1) Press button.

- a) Ship's Heading Line is indicating own ship's heading direction.
- b) When you are pressing button continuously, ship's Heading Line is off and it is displayed again when you hand the key off.

4.3.11. To use the parallel line



Length-parallel line for distance and width-parallel line for bearing are shown as one line at PPI screen and the bearing & distance for the between parallel lines are marked in the top-left of the screen.



button can adjust the parallel lines bearing.



button can adjust the distance of the parallel line.

4.3.12. To move the center of own ship

- It can use for securing the wider sight to the specific direction from the center of own ship.



Shows "+" cursor in a center of PPI screen.



Move the cursor to a desirable position.



The center of own ship moves to the position of the cursor.



Return to the original position.

[Ref.]  To the forward and afterward direction, 80% of screen can be moved while 60% of screen can be moved to the left and right side.

4.3.13. To measure the distance and bearing to the Target

- a) Use    button.

EBL means Electronic Bearing Line.

VRM means Variable Range Maker.

- b) Use  button.

- c) Use  button.

(1) How to measure the distance & bearing for targets by using EBL/VRM function



VRM & EBL are shown from the center of the PPI screen. Values for bearing & distance are shown at the bottom-left of the screen.



Able to adjust EBL.



Able to adjust VRM.



Function is end.

(2) Press button.

- The method of adjustment is same as '1 EBL/VRM'.

(3) How to measure bearing & distance from a target to target by using F EBL/VRM function.



VRM & EBL are shown at the top-right of the PPI screen.



Shows **Press ENT to set** on a screen and a cursor and values for distance & bearing are shown at the bottom-left of the screen. **CRS** Data is shown with the distance & bearing of the cursor based on the position of own ship.



Move the cursor to a desirable position.



EBL & VRM is moved.



Function is end.

(4) The purpose to use '1 EBL/VRM', '2 EBL/VRM' functions both

- Two different colored EBL and VRM appears on the Screen.
- Use for measuring distance/ bearing for more than one target.
- It displays Function key which is currently using at **1 2 F** on the left bottom of screen.
- For termination, you may press the currently using function key once more.

[Ref.]  '1 EBL/VRM', '2 EBL/VRM' in case of using the functions both, in case of using 'F EBL/VRM' function, '2 EBL/VRM' function is disappeared and '1 EBL/VRM' & 'F EBL/VRM' functions can be available.

(5) How to measure the distance & bearing for targets by cursor function.



Distance/Bearing value along with **CSR** display appears on the right bottom of screen.



Cursor / Data is disappeared.

(6) Press Parallel line key.

- Please refer to how to use '4.3.11. To use the parallel line'.

4.3.14. To change distance unit

- (MENU) Menu screen
 ← → Move to **FUNC/DISPLAY SET**
 ↑ ↓, (CTR) Move to **DISTANCE UNIT**,
 press (CTR)
 ← →, (CTR) Move to **NM / KM / KM-River**,
 press (CTR)
 (ESC) Back to PPI screen

(1) NM(Mile, Nautical Mile)

- Cursor, VRM, Distance of Parallel Line represents **NM**.

(2) KM(Killo Meter)

- Cursor, VRM, Distance of Parallel Line represents **KM**.

(3) KM-River(For river vessels)

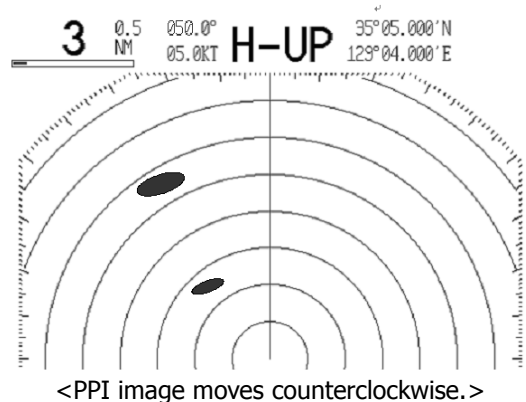
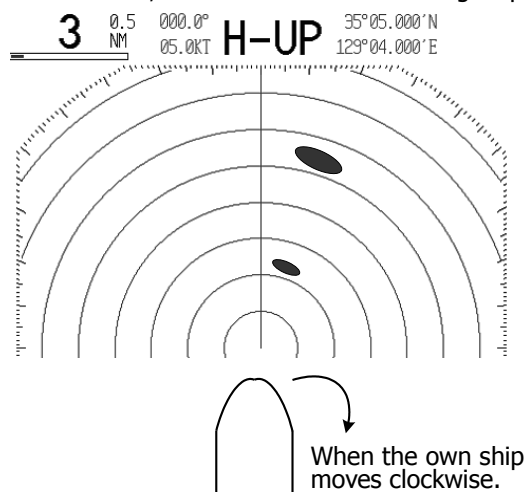
- Radar for river vessel represents **Range**.

4.3.15. To change the way of direction symbol

- (MENU) Menu screen
 ← → Move to **FUNC/DISPLAY SET**
 ↑ ↓, (CTR) Move to **HEADING MODE**,
 press (CTR)
 ← →, (CTR) Move to **H-UP/N-UP/C-UP**,
 press (CTR)
 (ESC) Back to PPI screen

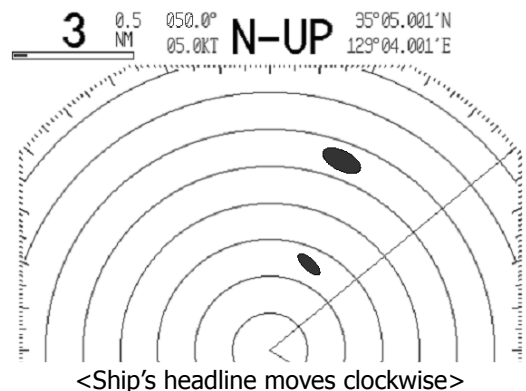
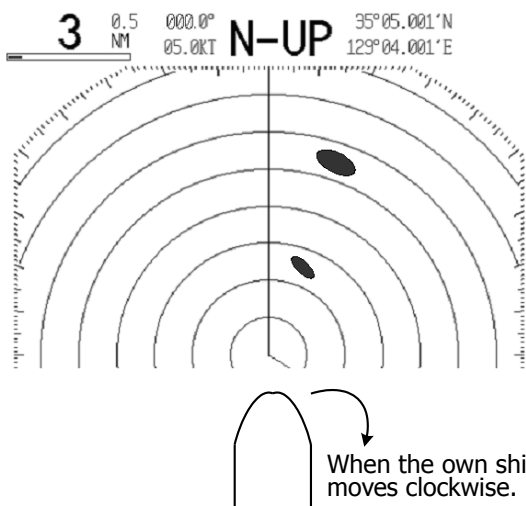
(1) HEAD-UP

- Ship's head is displayed to the HEAD UP (Its bearing scale is 0) on PPI screen.
- If ship's head is changed, ECHO image bearing on 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.



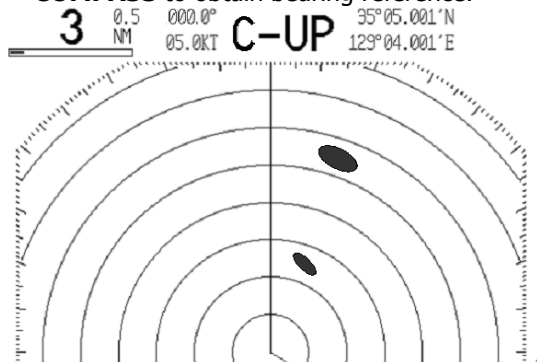
(2) NORTH-UP

- Make the North on the chart indicate the real North on the screen.
- Even though the ship's headline is changed, the bearing on the screen would not change.
- It requires the equipment like **GYRO COMPASS** to obtain bearing reference.

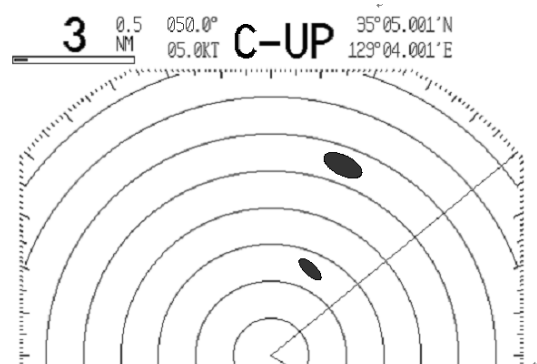


(3) COURSE-UP

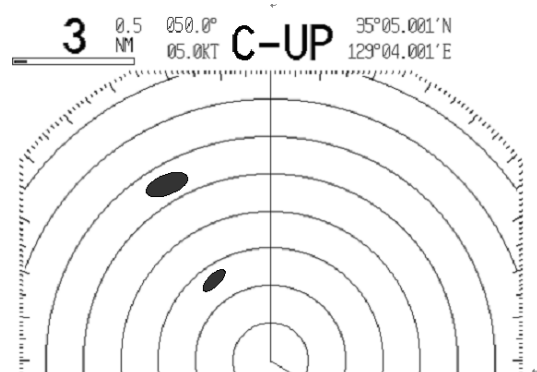
- Make the ship's head bearing always indicate Course-up when the course is set.
- Even though ship's head direction is changed, ECHO image bearing does not change but ship's head moves as much as the variation of ship's head bearing.
- When you change the track widely, set the course up again from the MENU.
- It requires the equipment like **GYRO COMPASS** to obtain bearing reference.



When the own ship moves clockwise.



<Ship's head line moves clockwise>



<In case that Course-up is reset>

4.3.16. To change the way of bearing display

- MENU** Menu screen
- ← →** Move to **FUNC/DISPLAY SET**
- ↑ ↓**, **CTR** Move to **BEARING**, press **CTR**
- ← →**, **CTR** Move to **True** / **Magnetic**, press **CTR**
- ESC** Back to PPI screen

(1) True Bearing

- True bearing indication is set based on True North with Scale 0.
- It requires the equipment like **GYRO COMPASS** to obtain bearing reference.

(2) Magnetic Bearing

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

4.3.17. To change the way of displaying bearing ine/cursor

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

- MENU** Menu screen
- ← →** Move to **FUNC/DISPLAY SET**
- ↑ ↓**, **CTR** Move to **EBL/CSR READ OUT**, press **CTR**
- ← →**, **CTR** Move to **Relative** / **True/Mag.**, press **CTR**
- ESC** Back to PPI screen

(1) 'Relative' indication

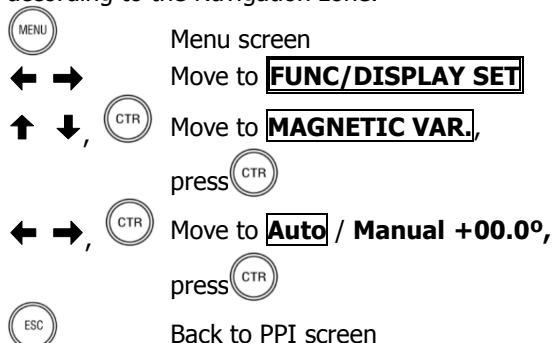
- Make the Cursor, and the Bearing value of EBL indicate based on Ship's headline (Ship's head Line is "0°")

(2) True North Indication

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

4.3.18. To compensate the magnetic

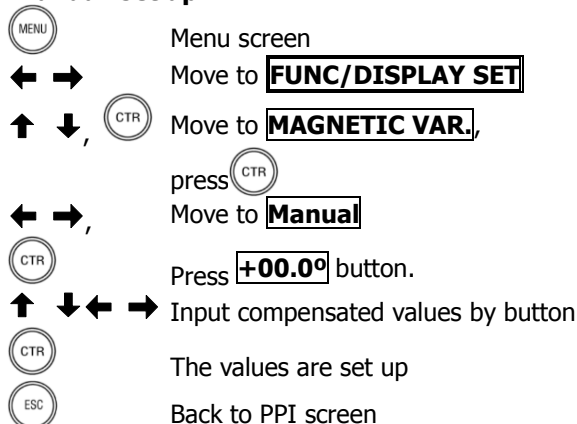
- Input the value of compensation because Magnetic North Bearing is little bit different according to the Navigation zone.



(1) In case of setting 'Automatic',

- Status of no compensated values.

(2) How to input compensated values by 'Manual' set up

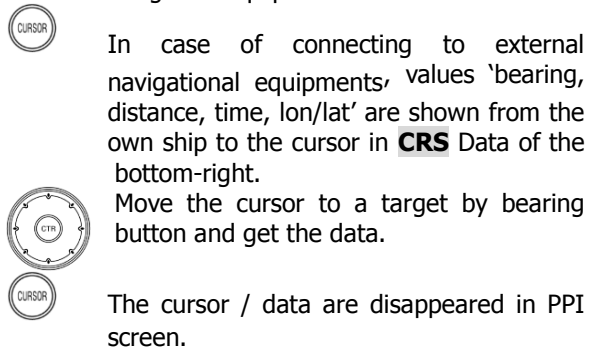


[Ref.]  **Adjust Range : - 99.9° ~ + 99.9°**

↑ ↓ : ± 0.1 Step Adjust
← → : ± 1.0 Step Adjust

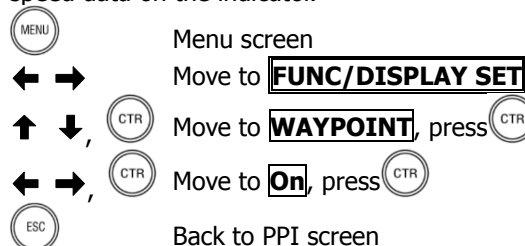
4.3.19. To measure the time to the target

- Use the cursor function.
- In needs the input of own ship's speed data from external navigation equipment.



4.3.20. To display the Waypoint

- To use this function, it needs the input of bearing data, distance data to go waypoint and own ship's speed data on the indicator.



(1) Waypoint set

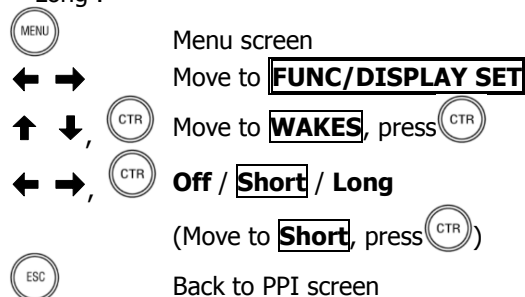
- In case of setting **On**, values 'distance, bearing, lon/lat for waypoint' (Connecting to external navigational equipments) are shown.

(2) Remove Waypoint

- In case of setting **Off**, the data is disappeared.

4.3.21. To display the other ship's track line

- It can ascertain the other ship's movement in track line distance and direction and it facilitates to avoid collision of the ship.
- The longer target track line is displayed, the faster the other ship's speed is. The shorter, the slower.
- The length of the track line is displayed "Short, Long".



(1) Track Line Memory 'Short'

- PPI image is added to Screen until 5 revolutions of Antenna comes.
- The color of moving target track line is changed by every 5 revolutions passed.

(2) Track Memory 'Long'

- PPI image is added until 10 revolutions of Antenna comes.
- The color of moving target track line is changed by every 5 revolutions passed.

4.3.22. To make intermittent transmission for suppressing electric power of Radar.

⚠ ATTENTION

※ Pay consideration to the surrounding condition as there is high potentiality in collision with a fast moving dangerous thing or vessels when the Radar is on Stand-by at intermittent transmitting set.

- a) 'TIMED TX' consists of 'TX PERIOD' / 'STAND-BY TIME'.
- b) In case of setting 'TX PERIOD' for **10-SCAN**, 'STAND-BY TIME' for **3-min**, 'TIMED TX' for **On**,
- After the scanner rotate 10 times, the screen is changed to **ST-By** and it is counted after 3 minutes later, returned to PPI screen. In a ST-By screen, the scanner (air cable) / monitor is stopped.

(1) Transmit interval set-up

- Transmit interval is set by the revolution of Antenna.

Menu screen

Move to **RADAR SET-UP**

Move to **TX PERIOD**, press

10-SCAN, 20-SCAN, 30-SCAN
(Move / select for desirable values)

Back to PPI screen

(2) Stand-by interval set

- Stand-by time is set by 3, 5, 10, 15 min.

Menu screen

Move to **RADAR SET-UP**

Move to **STAND-BY TIME**,
press

3-min, 5-min, 10-min, 15-min
(Move / select for desirable values)

Back to PPI screen

(3) Intermittent transmit

Menu screen

Move to **RADAR SET-UP**

Move to **TIMED TX**, press

On : According to 'TX PERIOD' / 'STAND-BY TIME' values, the intermittent transmit is started.
Off : End.



Back to PPI screen

4.3.23. To display ECHO image long on PPI 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 can be displayed in one image on screen.

- Use the following functions to display ECHO image large.

- a) Use the function of target magnification.
b) Set Tx pulse width long.

(1) The Target Magnification Function

Menu screen

Move to **RADAR SET-UP**

Move to **TARGET MAG.**, press

On : The target size displayed on Screen is magnified twice.
Off : It returns to the first screen.



Back to PPI screen

(2) TX Pulse Width Change Function

- Defaulting Set is 'Short' and if you select, 'Long', the target on the screen is displayed Long.

Menu screen

Move to **RADAR SET-UP**

Move to **TX PULSE**, press

Long : TX PULSE width can be changed at 1.5, 3, 6 mile.
Short : It returns to the first screen.



Back to PPI screen

4.3.24. To change the color of PPI screen and ECHO image

(1) Set the color of ECHO image

Menu screen

Move to **INIT. SET**

Move to **COLOR SET**, press

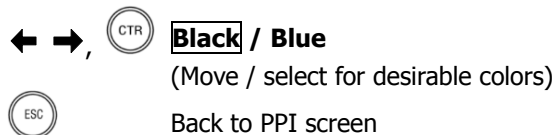
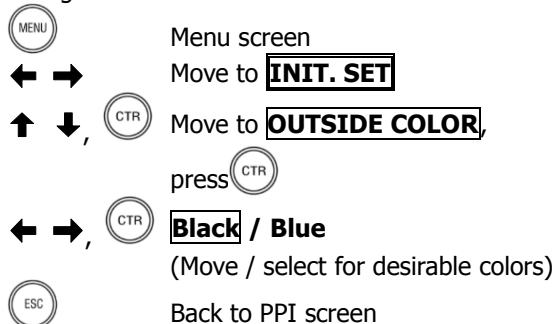
green/yellow/red/white/color
(Select desirable colors to show a display to adjust color levels in a screen.)



Back to PPI screen

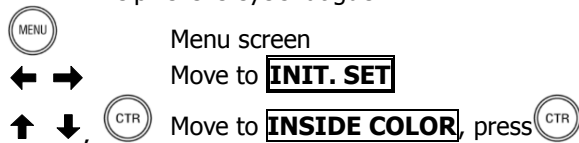
(2) Set the outside color

- The outside color of PPI image not displayed is changed.



(3) Set the inside color

- Outside color displayed with PPI image is changed.
- During night navigation, make outside color dark and set the LCD brightness to low level, it will help relieve eye's fatigue.



4.4. Other convenient function

4.4.1. Display own ship's speed on the indicator

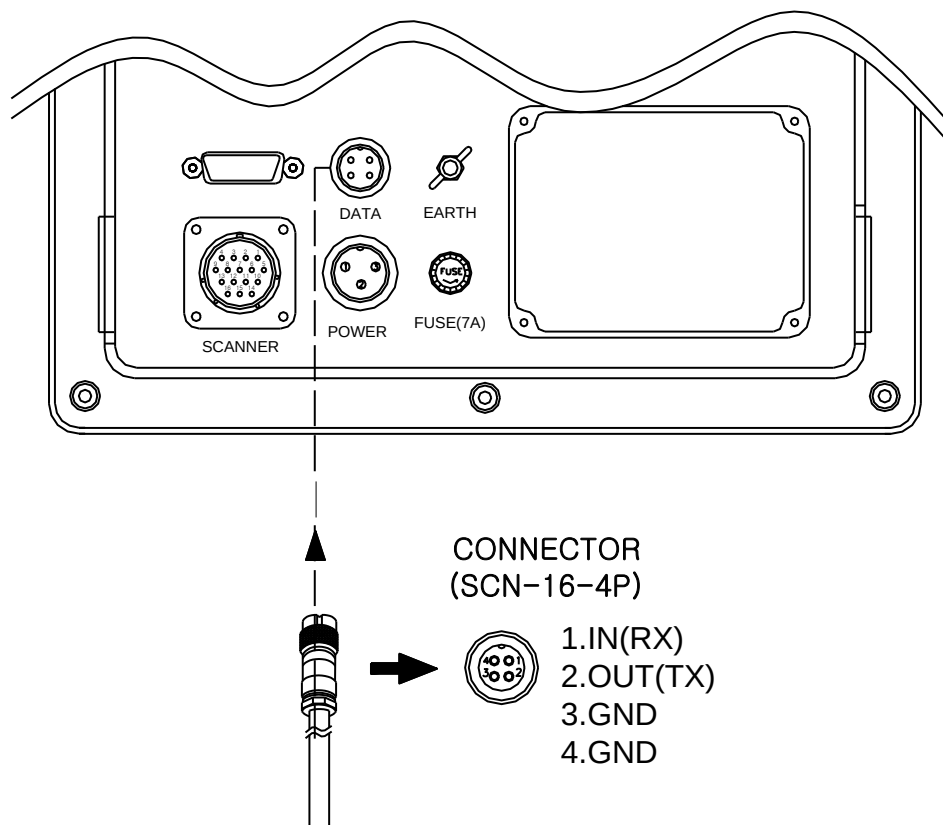
- To use this function, own ship's speed data is needed to the indicator.
- The own ship's speed data is shown at a center of the display in the indicator.

4.4.2. To display Ship's heading on the indicator

- To use this function, it needs to input bearing data into the indicator.
- The bearing data for heading is shown at a center of the display in the indicator.

4.5. Connection to the external navigation equipment

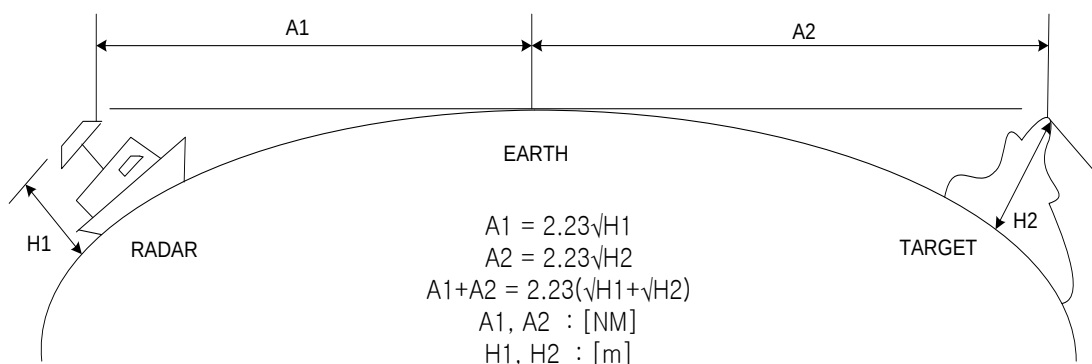
- At the rear side of the indicator, connect to the external navigation equipment through data terminal.



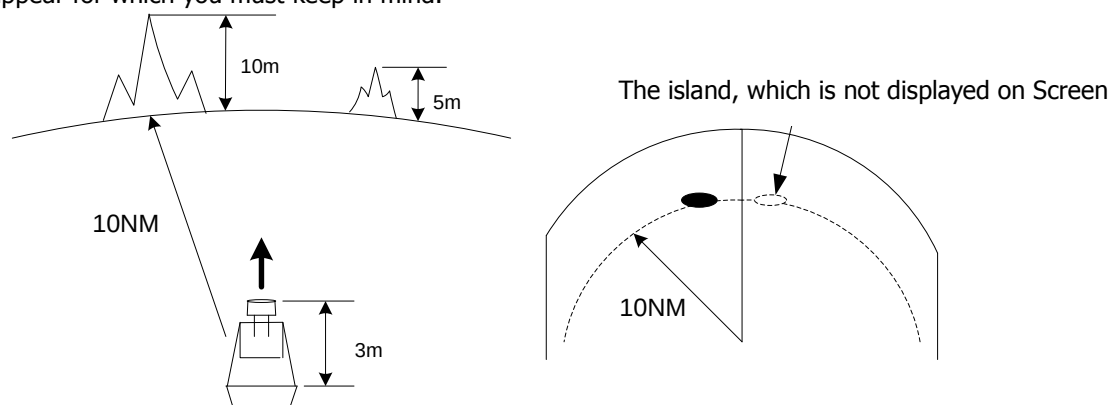
Chapter 5. Screen view

5.1. 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 not affected by a round earth.

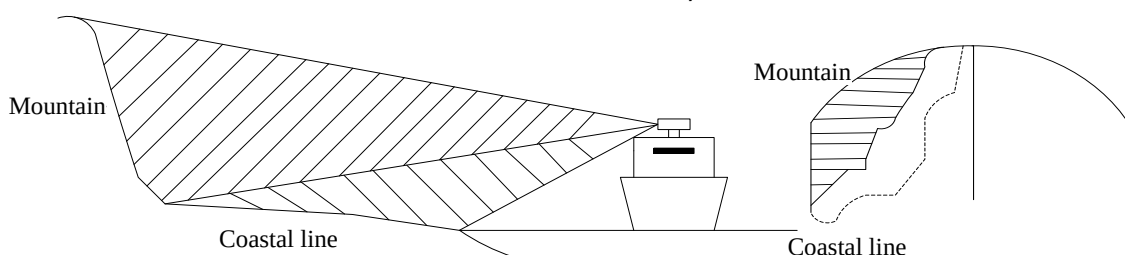


- For example, when the height of antenna is 3 meters above sea level, the ECHO image of island of 10 meters' height and 10 miles away from the antenna can be displayed on Screen but the 5 meter's height with same distance is not displayed on screen since Radar signal transmitted does not reach. But,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



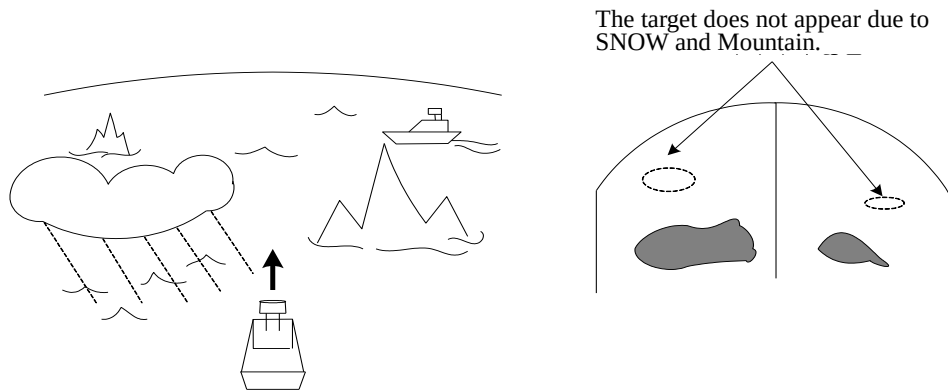
5.2. Reflection from the target

- The strength of reflection from the target is related to not only the size of the target but the shape of 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.



5.3. 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.



5.3.1. 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 save, range and the direction of wind.

5.3.2. 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

- Depending 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 shadow direction may not be shown on the screen.

The existence of such a 'shadow' can 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 radars 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 can be distinguished from target image.

For the radar interference('IR' button), select 'ON' in the function to diminish or get rid of it.

Chapter 6. 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.

6.1. Overview

- (1) 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.
- (2) Antenna should be installed as high as possible after considering its weight.
- (3) Indicator should be installed inside Wheel House in order make observation efficiently.
- (4) 15m standard cable should be used between Antenna and Indicator.

6.2. Installation of Antenna

6.2.1. 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 hardly forecast the danger.
- ※ The place where there is a near Funnel can cause the decrease in performance, the defect due to haet, therefore it should be installed away from such Funnel as far 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 said cables with Radar one)

6.2.2. 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.

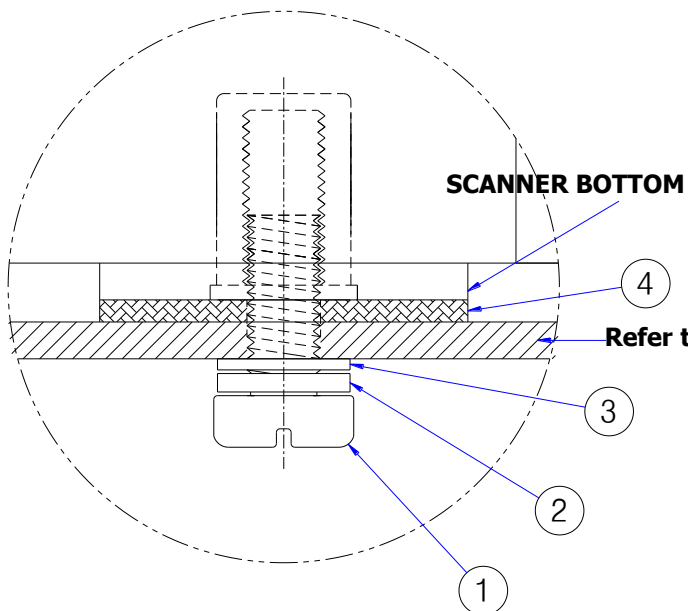
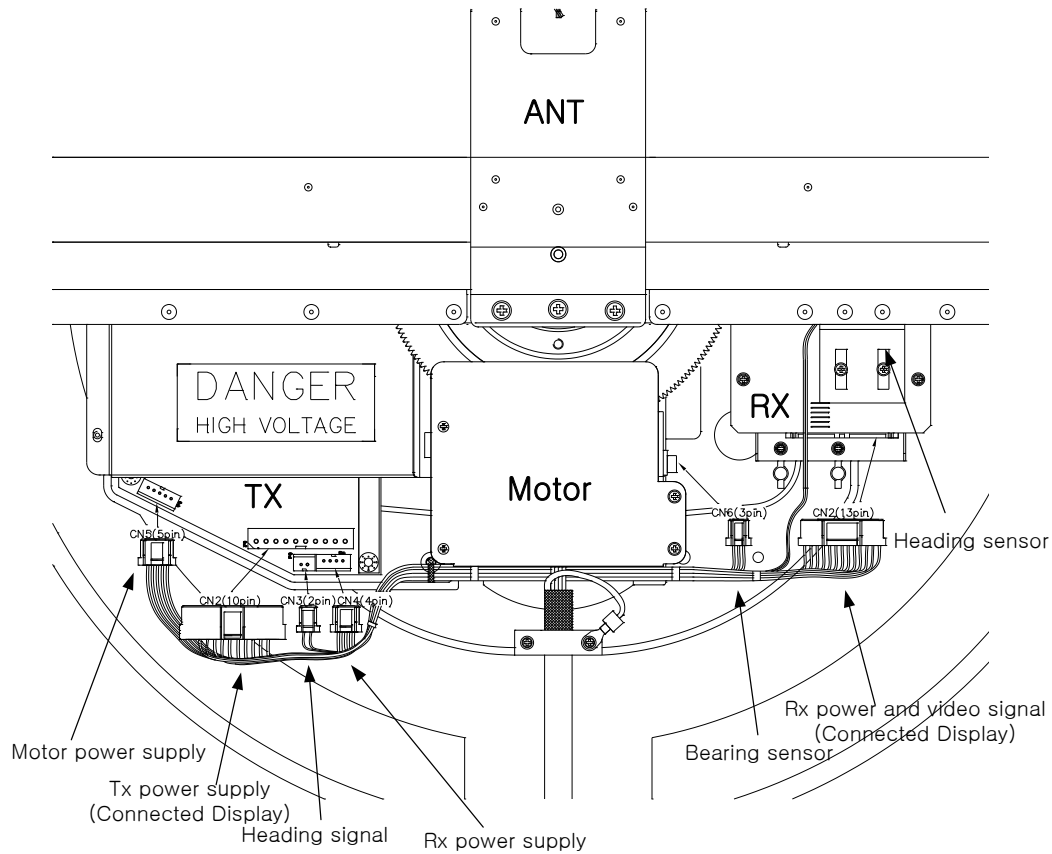
Therefore, in case the ship that of trim is over 1/2 of vertical beam width (θ), it is recommended to install the Antenna in slant toward the ship's stem.

(2) Caution while the Antenna is installed in Yaucht

• It is apt to be sliding in slant toward the counter windy side while the yaucht 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. It will hardly affect the images of fore and after side of ship.

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

6.2.3. Connection to Equipment cable (1) SCANNER (RSU-3700)



ATTENTION

- ※ Fix the cable with tie.
- ※ Don't bend the connector too much when input the cable into the Radome for preventing from the damage.

- ① Hexagonal Bolt (Φ10 X 25mm)
- ② Spring Washer (Φ10)
- ③ Plain Wahser (Φ10)
- ④ Rubber Pad for fix-up a radome (Φ50 X 3mm)

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

6.3. DISPLAY SET-UP

6.3.1. Location for installation

 ATTENTION
※ A display must be installed far away over than 1 meter 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.

6.3.2. How to Install

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

6.3.3. Power Cable connection

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

6.4. Installation check

- After installation, check whether the condition is O.K based on the instruction. The serious check points are the cable connection, tight connection of each units, aircable, the connection of cable shield.

6.5. 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.

6.6. Initial Installation

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

6.6.1. Initial Installation

- In order to shift Initial Installation Menu, at **INIT.**

SET of 'MENU', press     button, the following display will appear.

- BEARING ADJUST
- DISPLAY TIMING
- TUNE SET
- TUNE-R SET
- ERROR SET
- TX TIME (Transmit Time)
- GAIN-L SET
- STC-H SET
- MBS SET
- PROGRAM LOAD
- LCD SET

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

6.6.2. TUNE-R SET (Tuning Set)



Wait for approx. 5 min.
in a PPI screen.

(Adjust after magnetron is enough preheated)



Put it to a center



Set it to Max



, Set it to Minimum



Menu screen



Move to **RADAR SET-UP**



Move to **TUNING MODE**, press



Move to **Manual**, press



Move to **INIT. SET**



Push buttons one after another,
It is displayed additional menu
out of default(setting) menu.



Move to **TUNE-R SET**



Select, PPI screen comes up and
displayed number in the **middle** of
top screen. The distance range is
auto-changed to **6NM**.



Adjust it to make a target of PPI
screen maximum size.

[Ref.] **Adjust Range : 000 ~ 255**



: 1 Step Adjust



: 10 Step Adjust



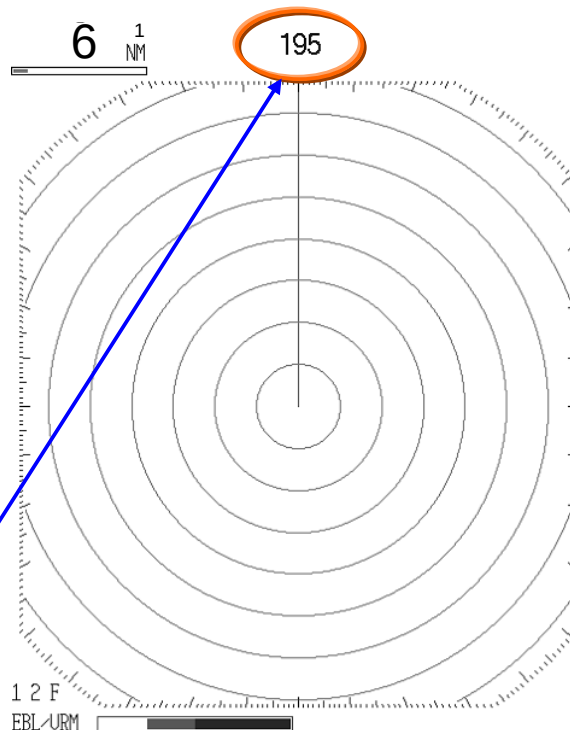
Check if the display is maximized in a
less than **3NM** distance.



Set by adjusted value which has
been completed.



Return to ordinary PPI screen.



CAUTION



- ※ Values of the picture may not be 195.
- ※ The adjust was set when it is supplied from a manufacturer and if adjusted unnecessarily, the tuning error may be taken place.
- ※ Must adjust it in case of replace a scanner.

6.6.3. TUNE SET (Tune Level Set)

- TUNE-R setting should be finished completely.

 Menu screen
  Move to **INIT. SET**
    Push buttons one after another,
 It is displayed additional menu
 out of default(setting) menu.
  Move to **TUNE SET**,
 Select, PPI screen comes up and
 displayed number in the **middle** of
 top screen. The distance range is
 auto-changed to **6NM**.
    The Tune level is adjusted to 7~8
 steps.

[Ref.]  **Adjust Range : 000 ~ 255**

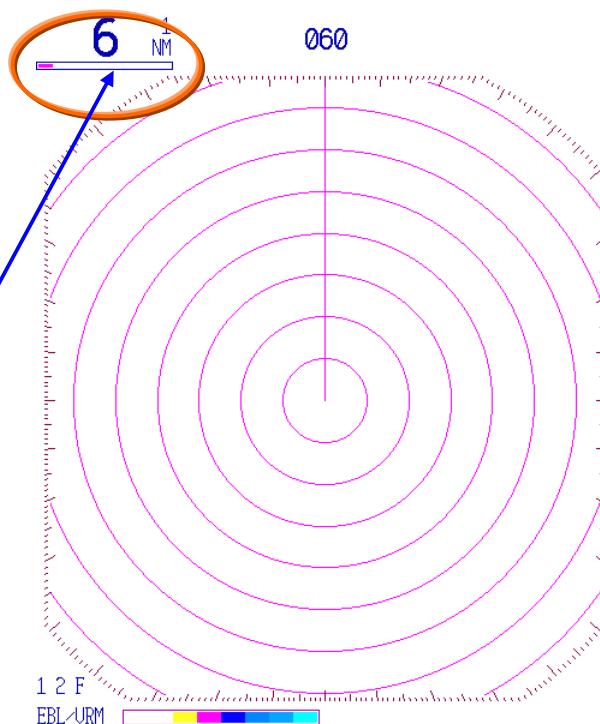
  : 1 Step Adjust
  : 10 Step Adjust

 Rotate the controller from a center
 to the left/right and make the bar of
 the Tune indicator to max in a middle
 of point.

 Set by adjusted value which has
 been completed.

 Return to ordinary PPI screen.

- Check if the Tune / Tune indicator is optimum in
 all range of the PPI screen.



 CAUTION	
	※ The adjust was set when it is supplied from a manufacturer and if adjusted unnecessarily, the tuning error may be taken place.
	※ this set value is set as 060 when it is delivered from factory.

6.6.4. BEARING ADJUST (Bearing Set)

- An adjust to fix a real bearing for a target in a PPI screen. (In a transmitting)

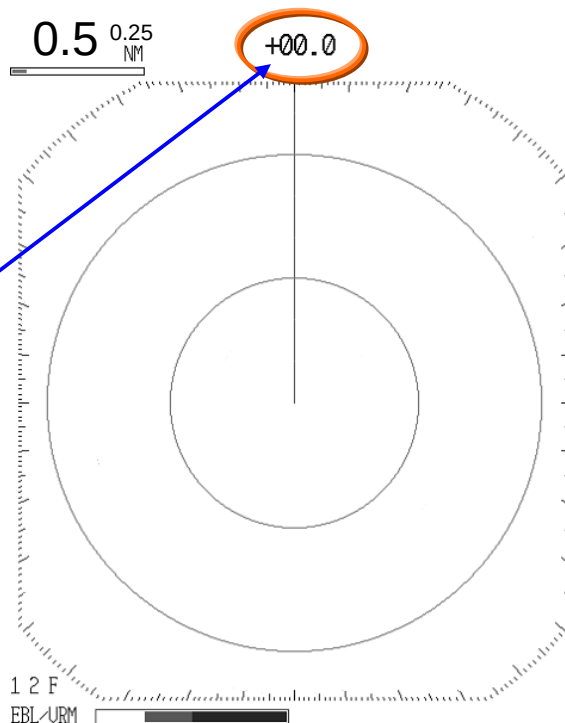
 Menu screen
  Move to **INIT. SET**
    Push buttons one after another,
 It is displayed additional menu
 out of default(setting) menu.
  Move to **BEARING ADJUST**,
 Select, PPI screen comes up and
displayed number in the **middle** of
top screen.
 **RANGE**
    Set it to 0.5~2NM for distance range.
 Able to check it with an eye after the
 target of waypoints is set as a
 display of heading nearby
 0.5~1.5NM and adjust to locate the
 target on a heading line of the PPI
 screen.

[Ref.] Adjust Range : -90.0° ~ +90.0°

  : 60.1° Step Adjust
  : 61.0° Step Adjust

- In case of increasing the compensated values, the left target is moved to the right side.

 Set by adjusted value which has
 been completed.
 Return to ordinary PPI screen.



! ATTENTION

- ※ As set already by a drawing of heading sensor in a scanner this set value is set as **+16.0** when it is delivered from factory.
- ※ If the heading of the scanner is not same with a real bearing, it needs to be adjusted.
- ※ Don't make the wrong position of target after wrong adjustment.

6.6.5. DISPLAY TIMING (0 Mile Set)

(1) An adjust to fix a real distance and target distance of the PPI screen. (In a transmitting)

(2) If the real distance is 0.2NM for non-moving target, while the PPI target is marked on 0.18NM, adjust it as followings.

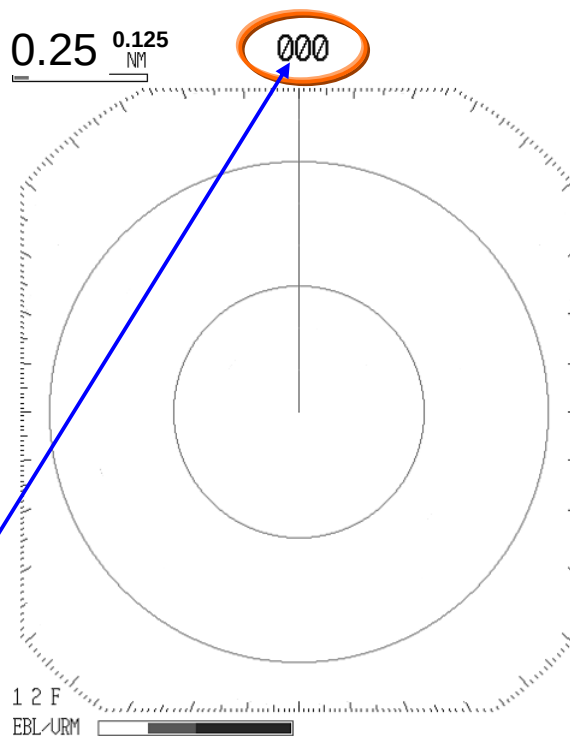
-  Set to 0.25NM for distance range.
-  **Select 1 EBL/VRM function.**
(Function to measure distance / bearing for targets)
-  Set VRM to 0.2NM.
-  Menu screen.
-  Move to **INIT. SET**
-  Push buttons one after another, It is displayed additional menu out of default(setting) menu.
-  Move to **DISPLAY TIMING**
-  Select, PPI screen comes up and displayed number in the **middle** of top screen.
-  Adjust the target of waypoint to reach at the real distance (0.2NM), VRM position.

[Ref.]  **Adjust Range : 000 ~ 255**

-  : 1 Step Adjust
-  : 10 Step Adjust

• If the compensated values are increased, the distance for target is closer from own ship.

-  Set by adjusted value which has been completed.
-  Return to ordinary PPI screen.



 CAUTION	
	※ The adjust was set when it is supplied from a manufacturer and if adjusted unnecessarily, the distance error may be taken place.
	※ This set value is set as 000 when it is delivered from factory.

6.6.6. GAIN-L SET (GAIN SET)

- A function to adjust a Gain of the PPI screen.
(In a transmitting)

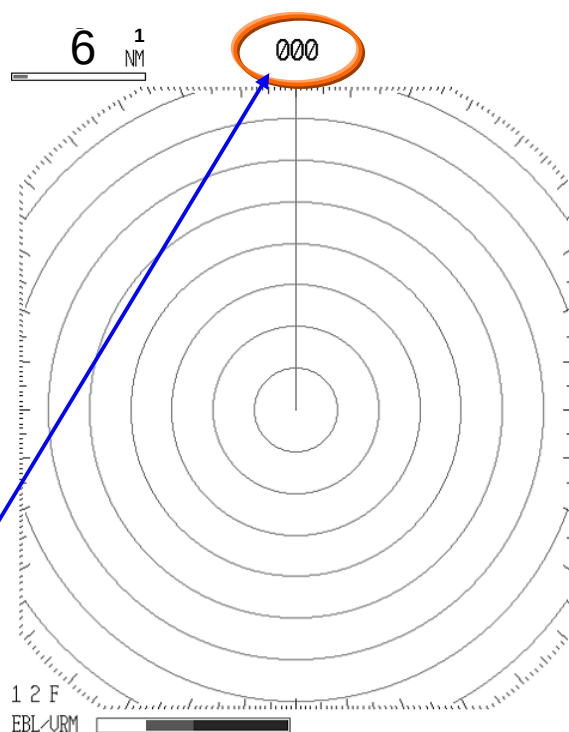
TUNE Put it to a center.
GAIN Set it to Max.
RAIN CL , **SEA CL** Set it to Minumum.
RANGE Set it to 6NM for distance range.

MENU Menu screen
← → Move to **INIT. SET**
IR **PLINE** **IR** **PLINE** Push bottoms one after another,
 It is displayed additional menu
 out of default(setting) menu.
↑ ↓ Move to **GAIN-L SET**,
CTR Select, PPI screen comes up and
displayed number in the **middle** of
top screen.

[Ref.] **Adjust Range : 000 ~ 255**

↑ ↓ : 1 Step Adjust
← → : 10 Step Adjust

ENT Set by adjusted value which has
 been completed.
ESC Return to ordinary PPI screen.



CAUTION	
	※ The adjust was set when it is supplied from a manufacturer and if adjusted unnecessarily, the error may be taken place.

6.6.7. STC-H SET (Sea Clutter Set)

- Adjust distance for removal sea reflection to identify targets marked as small spots.

(In a transmitting)

- GAIN** Set it to Max.
- RAIN CL** Set it to Minimum
- SEA CL** Set it to Max.
- RANGE** Set it to 6NM for distance range

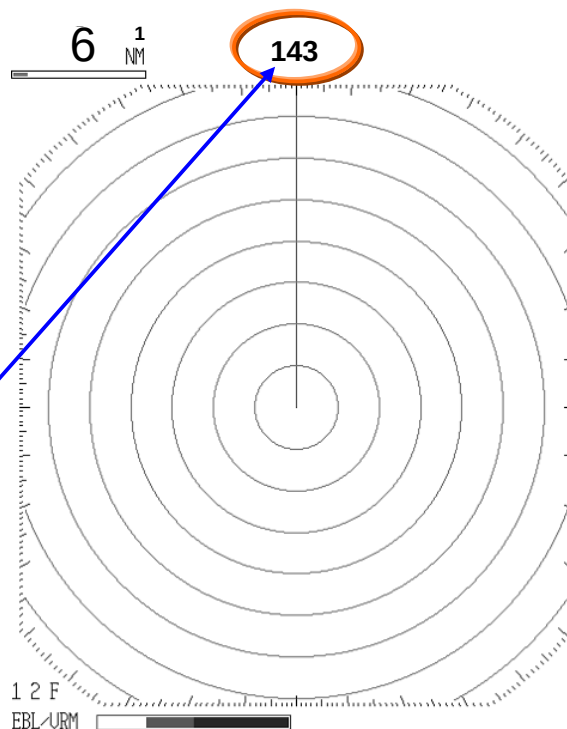
- MENU** Menu screen
- ← →** Move to **INIT. SET**
- IR** **PLINE** **IR** **PLINE** Push buttons one after another, It is displayed additional menu out of default(setting) menu.
- ↑ ↓** Move to **STC-H SET**,
- CTR** Select, PPI screen comes up and displayed number in the **middle** of top screen.
- ↑ ↓ ← →** Adjust to disapper noise to 6NM. (Adjust to have little noise in a ring of 6NM)

[Ref.]  **Adjust Range : 000 ~ 255**

- ↑ ↓** : 1 Step Adjust
- ← →** : 10 Step Adjust

- If the values are set with too high, the targets are hided by STC-H function and, if with too low, it may be difficult to identify targets as showing targets / sea reflection together.

- ENT** Set by adjusted value which has been completed.
- ESC** Return to ordinary PPI screen.



⚠ CAUTION	
	※ The adjust was set when it is supplied from a manufacturer and if adjusted unnecessarily, the error may be taken place.

6.6.8. MBS SET

(1) MBS = Main Bang Suppression

(2) It may be Main Bang phenomenon in a center of the indicator in a short range and can be suppressed as followings. (In a transmitting)

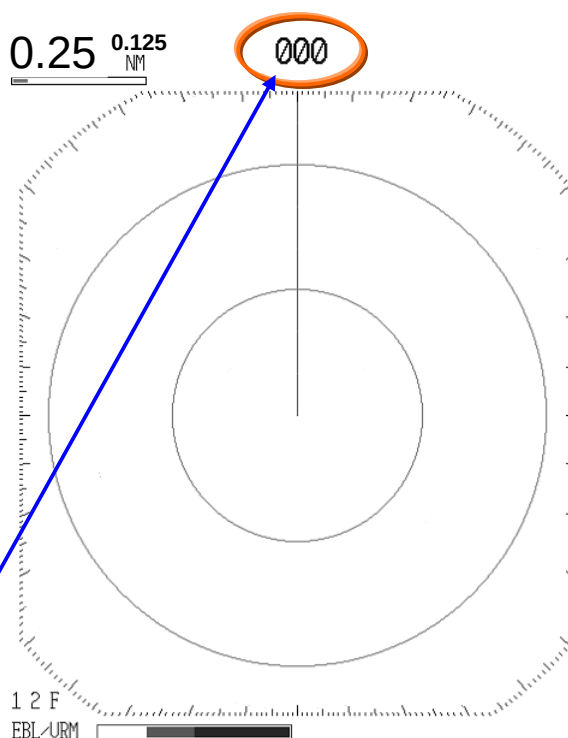
- GAIN** Adjust it till the noise is suppressed.
- RAIN CL** Adjust it with optimum.
- SEA CL** Adjust it with optimum.
- RANGE** Set it to 0.125NM for distance range.

- MENU** Menu screen
- ← →** Move to **INIT. SET**
- IR PLINE IR PLINE** Push buttons one after another, It is displayed additional menu out of default(section) menu.
- ↑ ↓** Move to **MBS SET**,
- CTR** Select, PPI screen comes up and displayed number in the **middle** of top screen.
- ↑ ↓ ← →** Suppress the signal of Main Bang to the desirable distance.

[Ref.] **Adjust Range : 000 ~ 117**

- ↑ ↓** : 1 Step Adjust
- ← →** : 10 Step Adjust

- ENT** Set by adjusted value which has been completed.
- ESC** Return to ordinary PPI screen.



⚠ CAUTION

※ Above function must be cared extremely because the collision may take place due to the objects near by own vessel are disappeared as such MBS signal.

※ **An error showing, trans-time, program load and LCD set must not be adjusted without notice.**

Chapter 7. Maintenance

7.1. General Maintenance

- (1) In order to get Radar performed in good order, a periodical maintenance should be done properly.
- (2) The unexpected troubles would be less by paying proper attention to timely maintenance.
- (3) A common maintenance for each component is as follows.

7.1.1. Cleaning

- (1) Do cleaning out the dust, salt water adhered to the unit.
- (2) Cleaning with dry cloth.

7.1.2. Check out the tightness of screw, bolt

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

7.1.3. Check the cabling

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

 ATTENTION
※ In case of the check of units, please make sure to turn off the power to protect from electric shocking. ※ In case of using rectifier, cut off the power on monitor because it is still excited even Radar stopped.

7.2. Scanner

- When maintained a wireline, cut off the power of monitor and then protect the power supplied into the wireline. Don't place watch or electronic card to the area of modulation, which equips with Magnetron.

7.2.1. Radom

- (1) In case Radome surface being contaminated by dust, paint, it may arise the attenuation or reflection of electric wave and cause to decrease 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.

7.2.2. Bracket

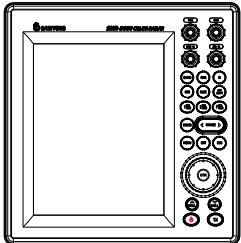
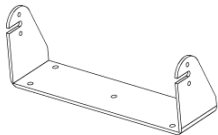
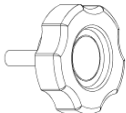
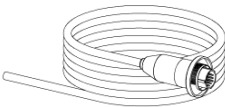
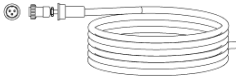
- Check the mounting of scanner and do painting every half-year to prevent from being rusted.

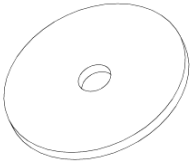
7.3. Display

7.3.1. 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.
- (3) Don't rub it strongly.

Chapter 8. Packing List

SMR-3700 (36Mile Marine RADAR)						
No.	Item	External Drawing	Dimension		Q'ty	Ch. Remark
1	Display		SMR-3700		1	
			CODE NO.	SMR-3700		
2	Bracket				1	
			CODE NO.	ACC-RADAR-001		
3	Knob		Ø6 × 20		2	
			CODE NO.	ACC-6X18MM-002		
4	Scanner		RSU-3700		1	
			CODE NO.	RSU-3700		
5	Scanner Cable		SAMYUNG Ø11 X 16C		1	Cap SRCN2A25-16P L=15m
			CODE NO.	RSU-3700-15M		
6	Power Cable		CVV-SB2.0 SQ X 2C		1	Cap CN20-3P L=3m
			CODE NO.	ACC-CAB-010		
7	Earth Cable		KIV 5.5mm ²		1	L=3m
			CODE NO.	STR -595		
8	Stainless Piece		Ø4 X 16		5	
			CODE NO.	SPR-1407		

No.	Item	External Drawing	Dimension		Q'ty	Ch.	Remark
RSU-3700 (Scanner Installation Material)			CODE NO.	ACC-PAK-001			9,10,11,12clause packings
9	6Angle Bolt		Ø10 X 25		4		
			CODE NO.	ACC-SC-001			
10	Spring Washer		Ø10		4		
			CODE NO.	ACC-WA-001			
11	Plain Washer		Ø10		4		
			CODE NO.	ACC-WA-002			
12	Bottom Pad		Ø50		4		
			CODE NO.	ACC-PAD-001			
13	Fuse		7A		2		
			CODE NO.	ACC-FUSE-001			
14	Manual		CODE NO.	SMR-3700-MK	1		
15	Scanner Dwg. Install'n		CODE NO.	RSU-3700-DK	1		

Chapter 9. Installation drawing and circuit diagram