



NAVIGATION SOUNDER

***ES-633***

**OPERATION MANUAL**

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## NOTES TO USERS

Thank you very much for purchasing the ES-633.

Before operating this unit, please read this manual thoroughly and understand the operation enough to prevent any trouble and injury in advance.

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# INTRODUCTION

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## NOTATION

©The following notations are used in this manual. Before using this unit, make sure to understand the meaning of the followings.



:indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



:indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



:indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

NOTICE

:indicates the contents for the user's reference.

## NOTES FOR THE OPERATION MANUAL

- ©Keep this operation manual in a place where it is easy to take.  
When you give this unit, ES-633, to someone else, make sure to give this manual, too.
- ©The safety for the using way which is not mentioned in this manual is not guaranteed.
- ©The contents in this manual are subject to change without notice or obligation.



# HOW TO TURN ON THE POWER

◎To turn on the power, press the **ON** key.

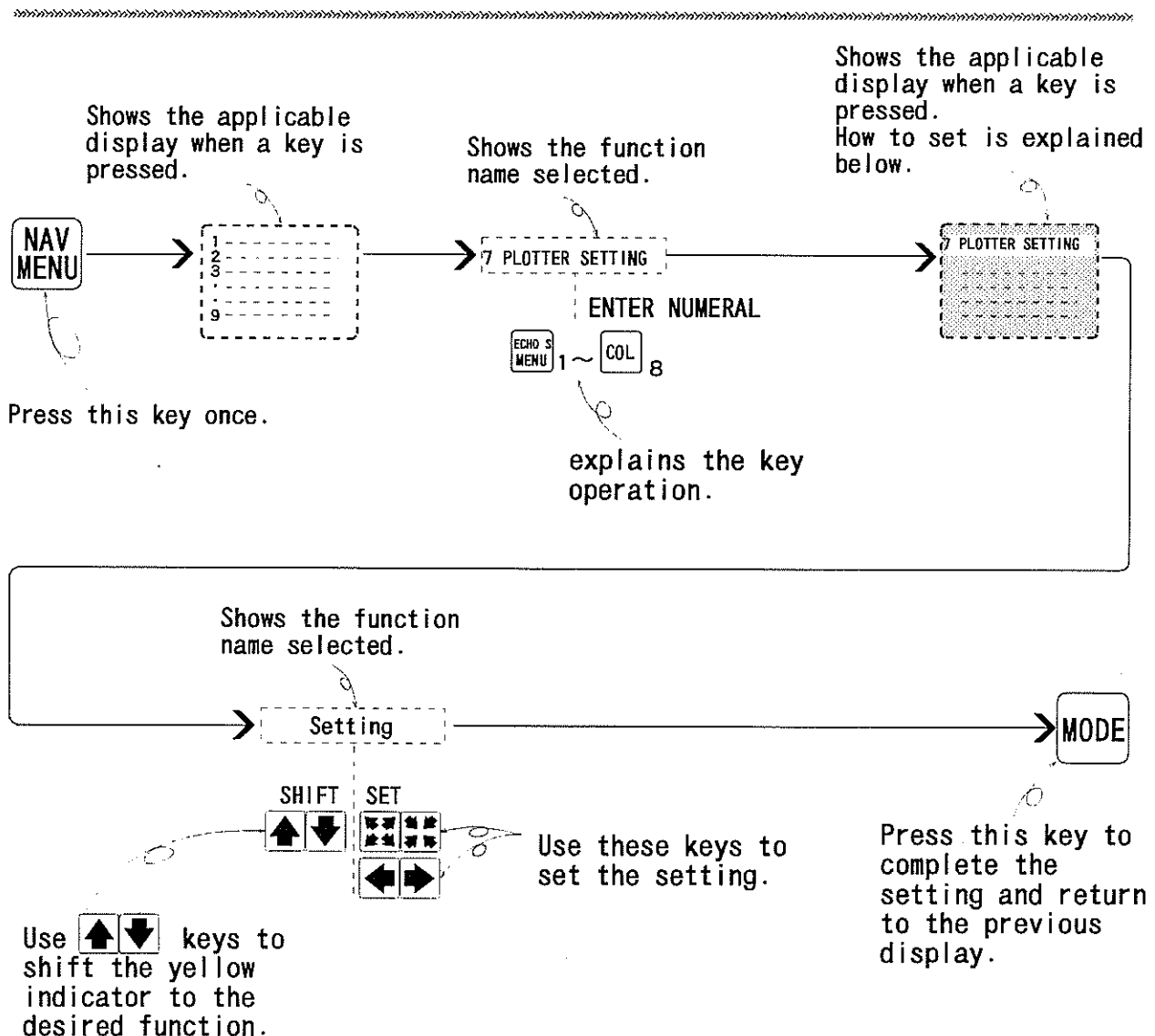
◎To turn off the power, keep pressing the **OFF** key until the unit's operation stops.

It is impossible to turn the power off by only pressing the **OFF** key.

# KEY OPERATION EXPLANATION

◎For key operating procedure, refer to "OPERATION PROCEDURE". The followings show how to explain the "OPERATION PROCEDURE".

- One short beep sounds when the correct operation is achieved.  
Three short beeps sound when the wrong operation is achieved.
- While displaying the menu mode, pressing the **NAV MENU** key returns the display to the previous one.





# **PRECAUTIONS**

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## **PLOTTER DATA**

### **⚠ DANGER**

- ◎ Plotter data, ie coastlines and lighthouse positions, should not be relied on totally for navigation. For safe navigation please use marine charts as issued by the authorities.
- 

## **INSTALLATION POSITION**

### **⚠ WARNINGS**

- ◎ Do not use in the place there is flammable gas. It could cause fire.
- 

### **⚠ CAUTIONS**

- ◎ Bad environment may cause fire, get hurt and cause electric shock.  
This equipment should be installed in a place away from the followings.
    - High temperatures. Eg direct sunlight.
    - Moisture. Eg rain, sea spray or heavy condensation.
    - Heavy vibration.
- 

## **POWER SUPPLY**

### **⚠ WARNINGS**

- ◎ The power requirement of this unit is DC10.5V ~30V. Please use correct voltage, otherwise, it could cause fire/electric shock.
- 

### **⚠ CAUTIONS**

- ◎ Make sure to turn off the power by the power "ON/OFF" key on the control panel. Turning on/off the power by the switch on the switchboard may cause a serious problem or wrong operation.
  - ◎ When starting the engine, make sure the power of this unit is turned off.
-



# **INSTALLATION**

## **⚠ WARNINGS**

- ◎ Do not install in a slant/unstable place.  
Make sure to fix this unit and the GPS antenna.  
Do not use the unit while tentatively installed.
- ◎ For wiring, pay attention to the followings. Wrong wiring could cause fire/get hurt.
  - Do not to disturb steering and walking.
  - Do not touch the revolving thing.
  - Do not bend, twist and stretch by force.
  - Do not put heavy thing on cable.

## **⚠ CAUTIONS**

- ◎ When taking out/putting in cable, make sure to turn the power off and hold the plug. Otherwise, cable may be damaged and fire and electric shock may cause.

# **HANDLING**

## **⚠ CAUTIONS**

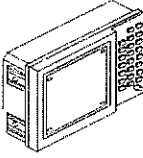
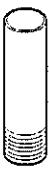
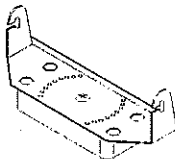
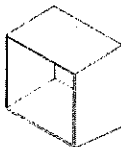
- ◎ Do not control this unit while steering.  
It may cause wrecks.
- ◎ Never open the main unit case.  
There is a high voltage component inside, and it will result in death or serious injury.  
For inspection/adjustment/parts installation/repairment, please ask to your dealer.
- ◎ When installing the transducer through an opening in the hull bottom, pay attention to intensity and waterproofing.

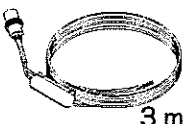
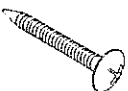



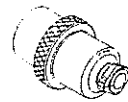
## **⚠ WARNINGS**

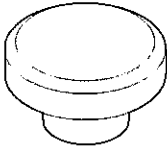

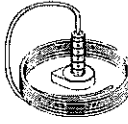
- ◎ Please use correct fuse.  
If not, it could result in serious trouble or fire.
- ◎ Please use the specified power supply cable.  
If not, it could result in fire.



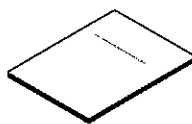


# COMPOSITION

CODE			**EX110	**EX130
ITEM	MAIN UNIT	PIPE	MOUNT BRACE	HOOD
				
PARTS#	—	33307D	33730C-Assy	33720C-Assy
QTY	1	1	1	1

CODE	**EX010					
ITEM	POWER CABLE	SCREW	KNOB BLT	GUM PLATE	GUM PLATE	3P PLUG
	 3m WITH FUSE HOLDER			 THICK	 THIN	
PARTS#	31597D-2	M5×30	33733D	33735D	33830D	FM14-3P
QTY	1	4	2	2	2	1

CODE				
ITEM	GPS ANTENNA	ANTENNA CABLE	TRANSDUCER ETC	
		 10m		
PARTS#	GP-3A	33269D	TD & related parts when required.	
QTY	1	1		

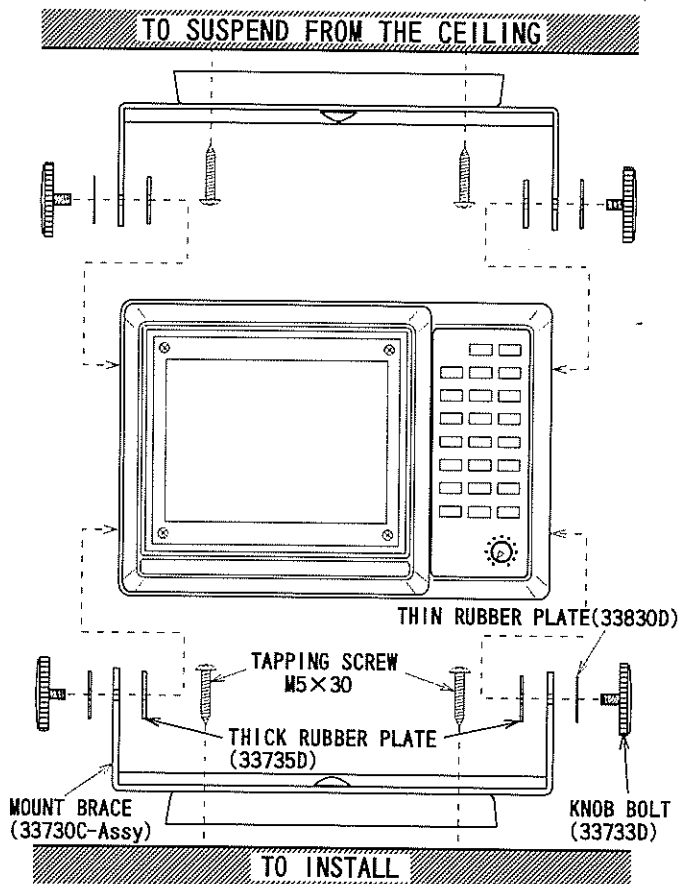
CODE	**EX120				
ITEM	FUSE	UNIT COVER	MANUAL		
	 3A				
PARTS#	-	633-COV	633-OPM-E		
QTY	3	1	1		

NOTE, the code numebr is shown on the packaging. However, \*\* indicates the lot management number.



# INSTALLATION

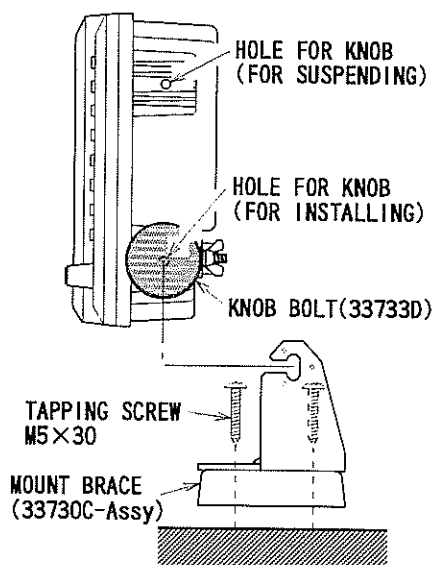
## MAIN UNIT MOUNTING



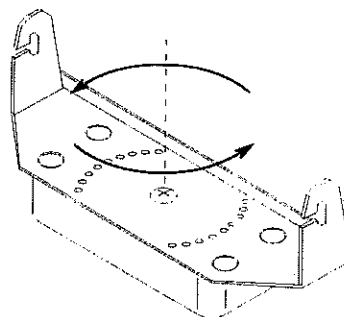
- ◎ After fixing the mounting brace in place with the tapping screws, fix the knob bolts and the rubber plates. And, after inserting the main unit from front, fasten the knob bolts.

### ⚠ WARNINGS

- Do not install in a slant/unstable place. And, make sure to fix this unit. Using under the tentative installation could result in injury.
- When suspending from the ceiling, make sure that the main unit should not fall to the gland. Never to install in a place where there are some possibilities to hit your head. It could result in injury.



- ◎ The mount brace of the main unit revolves 40° from side to side. The adjustment is available in 4 steps (every 10°). After fixing the mount brace, adjust it at your convenient degree.



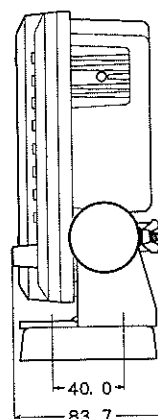
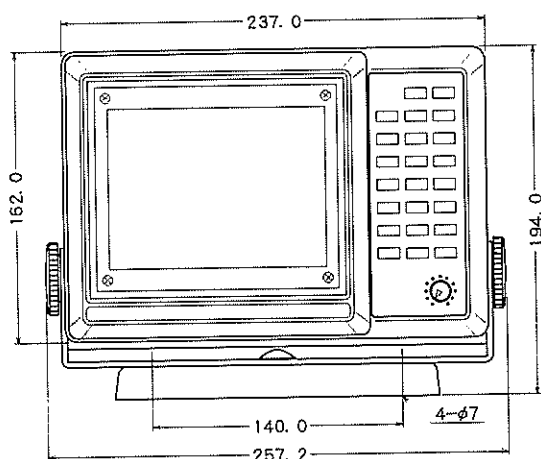


## **△CAUTIONS**

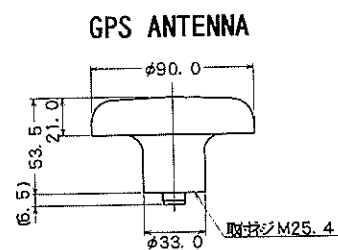
◎This equipment should be installed in a place away from the following.

- \* Equipment which transmits or is effected by magnetic field.
- \* High temperatures. Eg direct sunlight.
- \* Moisture. Eg rain, sea spray or heavy condensation.
- \* Heavy vibration.

## **DIMENSIONS**



**WEIGHT: 2.5kg(MOUNT BRACE IS INCLUDED.)**



**WEIGHT: 0.2kg**



# GPS ANTENNA MOUNTING

Take care to install the antenna in an area free from obstacles and avoid the following;

① **Rader beam (vertical beam width is 30 ~ 40 degrees)**

If the antenna is installed in the path of a radar beam the internal GPS receiver may be destroyed.

② **1 meter or more away from wireless antennas:** See below.

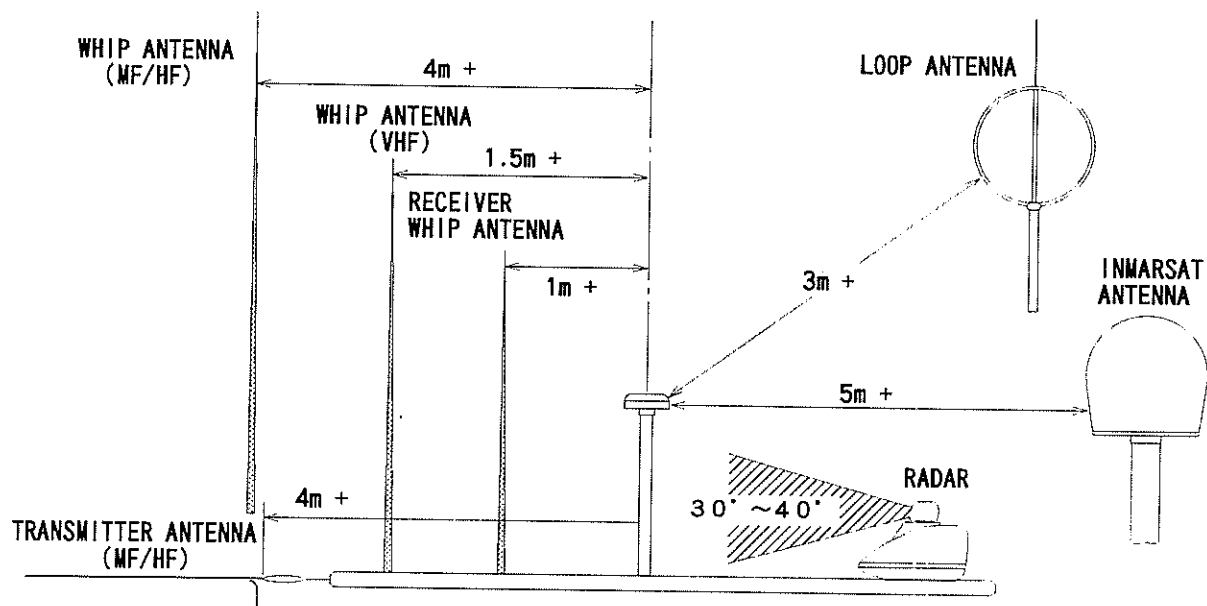
③ **At least 3 meters away from a DF loop antenna:** See below.

④ **Away from obstacles that will block satellite signals**

## **⚠ DANGER**

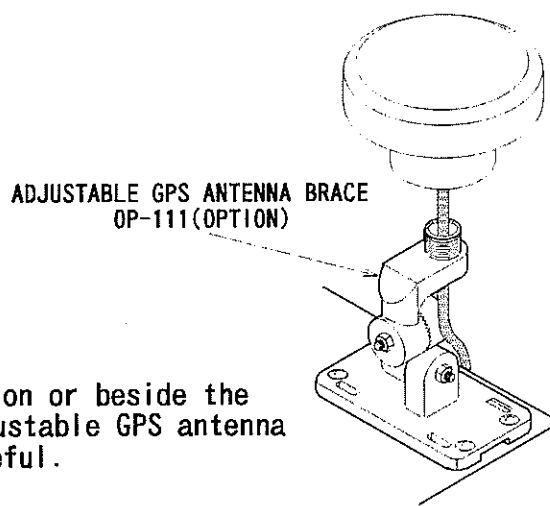
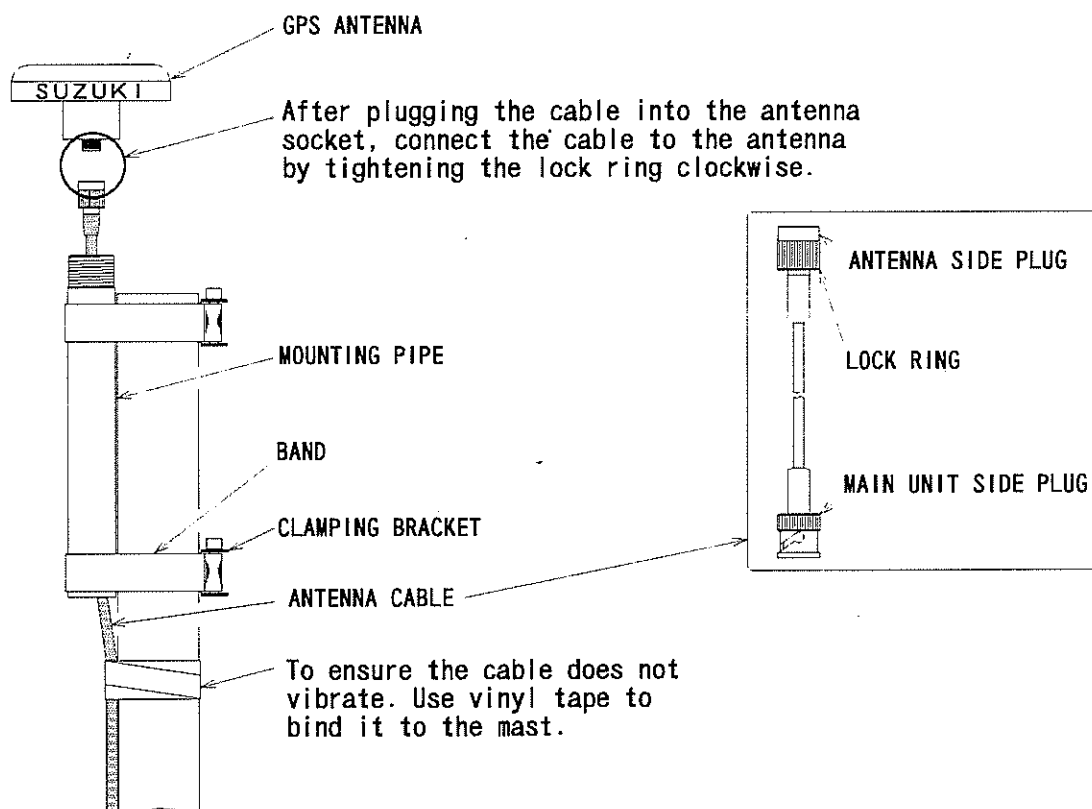
Pay attention to the GPS antenna installation/maintenance.  
And, make sure to fix the GPS antenna.

## 1. MOUNTING POSITION





## 2. ANTENNA MOUNTING



◎To mount the antenna on or beside the bridge, optional adjustable GPS antenna brace (OP-111) is useful.

### ⚠ CAUTIONS

- After connecting the antenna cable, wind adhesive tape around the plug, then wrap with vinyl tape to ensure waterproofing.



# **TRANSDUCER INSTALLATION**

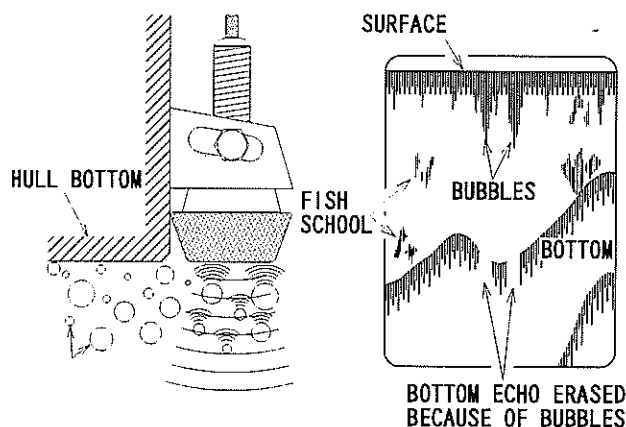
## **1. INSTALLATION PRECAUTIONS**

©As the transducer serves the same function for an echo sounder as an antenna does for a radio, it needs to be installed with great care for optimum performance of the equipment.

Please install the transducer with great care for the following conditions.

### **① BUBBLE INTERFERENCE**

The transducer transmits a sound wave and receives an echo.



When bubbles pass over the transducer face they reflect the sound wave and appear as echoes on the screen. The more bubbles the less sensitivity.

Install the transducer as follows;

1. Where bubbles will not pass over the transducer face.
2. Where there is no protrusion in the way of the transducer beam.

### **② NOISE**

To avoid noise interference, install the transducer and its cables as far away from the engine and propellor as possible. And, pay attention that the transducer cables should not be run parallel to other cables.

### **③ SHOCK**

If the transducer is subjected to excessive shock, performance may be effected. Where possible avoid subjecting the transducer to shock.

### **④ INSTALLATION DEPTH**

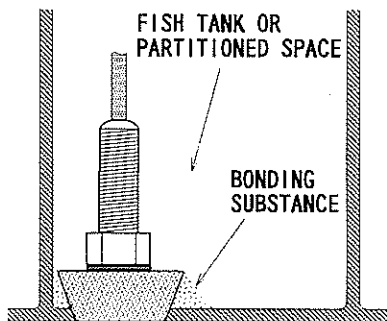
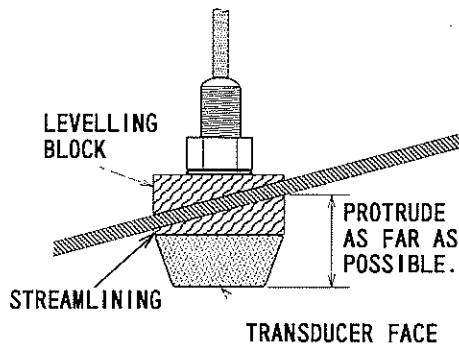
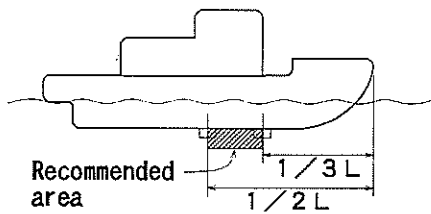
Be sure to install the transducer in such a position that the transducer is immersed in water as deep as possible and that the transducer face is parallel to the water surface.

### **⑤ PAINT AND DIRT**

To avoid reduction in the equipments performance be sure to keep the transducer face free from paint and dirt.



## 2. THROUGH HULL INSTALLATION



◎ This is the way to install the transducer through a hole in the hull bottom.

The installation way differs depending on the vessel's type, wooden, FRP, steel etc.

• Please install the transducer in accordance with the following conditions.

① To be installed  $\frac{1}{3}$  to  $\frac{1}{2}$  of the length of the vessel back from the bow, and 30cm away from the keel.

② To be protruded between 20cm and 30cm from the hull bottom.

③ Use the levelling block (fairing block) so that the transducer may be installed vertically and the sound beam will not tilt off.

• Through hull installation can also be applied inside the fish tank or a partitioned space as the picture left.

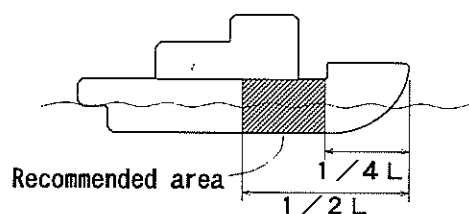
◎ The further the transducer protrudes from the hull bottom the more stable the performance that will result. However, in the case of a high speed boat, the transducer should protrude as little as possible to reduce drag and excessive force.

### ⚠ CAUTIONS

- Thorough consideration and attention should be given before making a hole in the hull bottom.
- When the transducer is installed to protrude from the hull bottom, arrange a transducer housing with FRP etc. to protect the transducer.



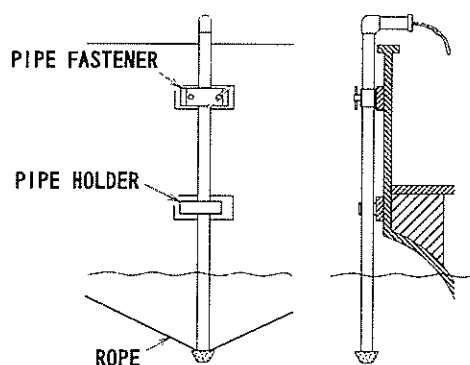
### 3. HULL-SIDE INSTALLATION



◎ This is the way to install the transducer with a pipe to the port or starboard of the hull.

This way is suitable comparatively for the small vessel.

• Please install in accordance with the following conditions.

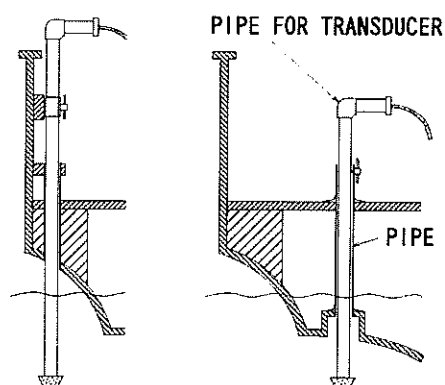


① Transducer should be installed  $1/4$  to  $1/2$  of the length of the vessel back from the bow.

② Transducer should be protruded between 1m and 1.5m from the draft.

③ Install the pipe in order to make the transducer face parallel to the sea surface. The pipe should be tightly installed so that the pipe does not vibrate while the vessel is running.

④ Pass the thin and strong rope to the portion, where the transducer and the pipe are jointed, and stretch it toward the bow and the stern.



DOUBLE PIPE METHOD

• It is possible to install the pipe double as the picture left.

◎ The pipe can be easily mounted (or dismounted) to the hull side with the metal fitting or sucking disk, and, this method allows stable performance avoiding bubbles to the transducer.

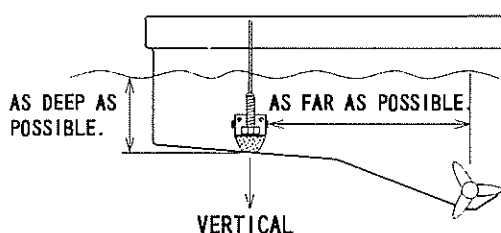
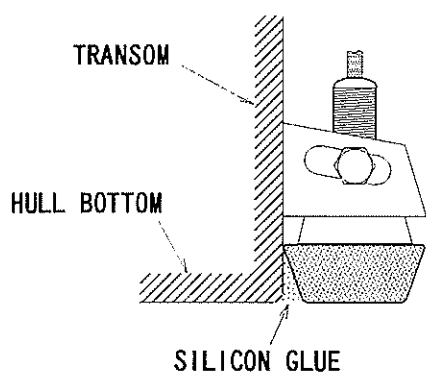
However, as the pipe is an obstacle during ship's navigation and fishing operation, it can be dismounted from the hull side when the sounder is not in use.

#### ⚠ CAUTIONS

When the transducer face rises toward the stern, it tends to catch the noise from the screw and to occur bubbles.



## 4. TRANSOM INSTALLATION



© This is the way to install the transducer at the stern.

Fit the transducer to the metal fitting and fix it with the screws so that the transducer face is in alignment with the hull bottom.

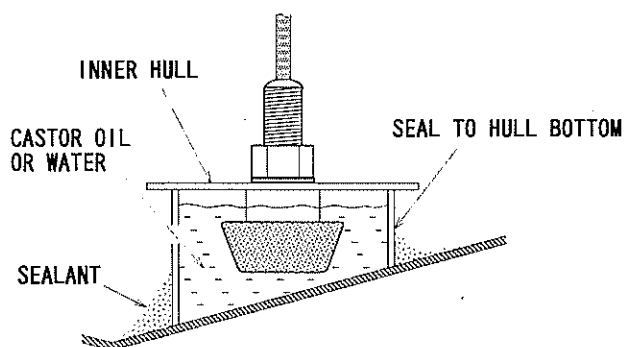
Install the transducer face horizontally.

Cover the screw with sealant.

Use the metal fitting bolt to adjust the transducer face to be in alignment with the hull bottom.

To avoid occurrence of bubbles, fill the space between hull bottom and transducer with silicone type glue and make it flat.

## 5. HOUSING BOX INSTALLATION



© This is the way to install the transducer in the bottom board using an optional in-hull kit.

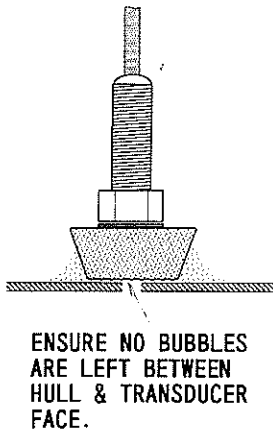
Fix the housing box on the bottom board and pour in ample water or castor oil so as the transducer face is not left exposed.

© This method can easily be done without professional skills nor damaging the hull body.

For further details, refer to optional in-hull kit manual.



## 6. INSTALLATION TO THE BOTTOM BOARD



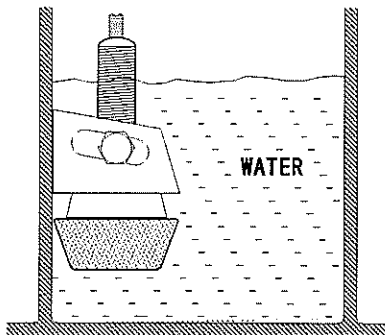
◎ This is the way to install the transducer directly to the bottom board.

Grind the place where the transducer is installed, to remove oil.

Fix the transducer face directly to the bottom board with glue.

Stick carefully so as not to remain bubbles between the transducer face and the bottom board

## 7. INSIDE TANK INSTALLATION



◎ This is the way to install the transducer using a fish tank.

Before fixing the transducer inside the tank, fill the tank with water and find out the best recording position by holding the transducer by hand.

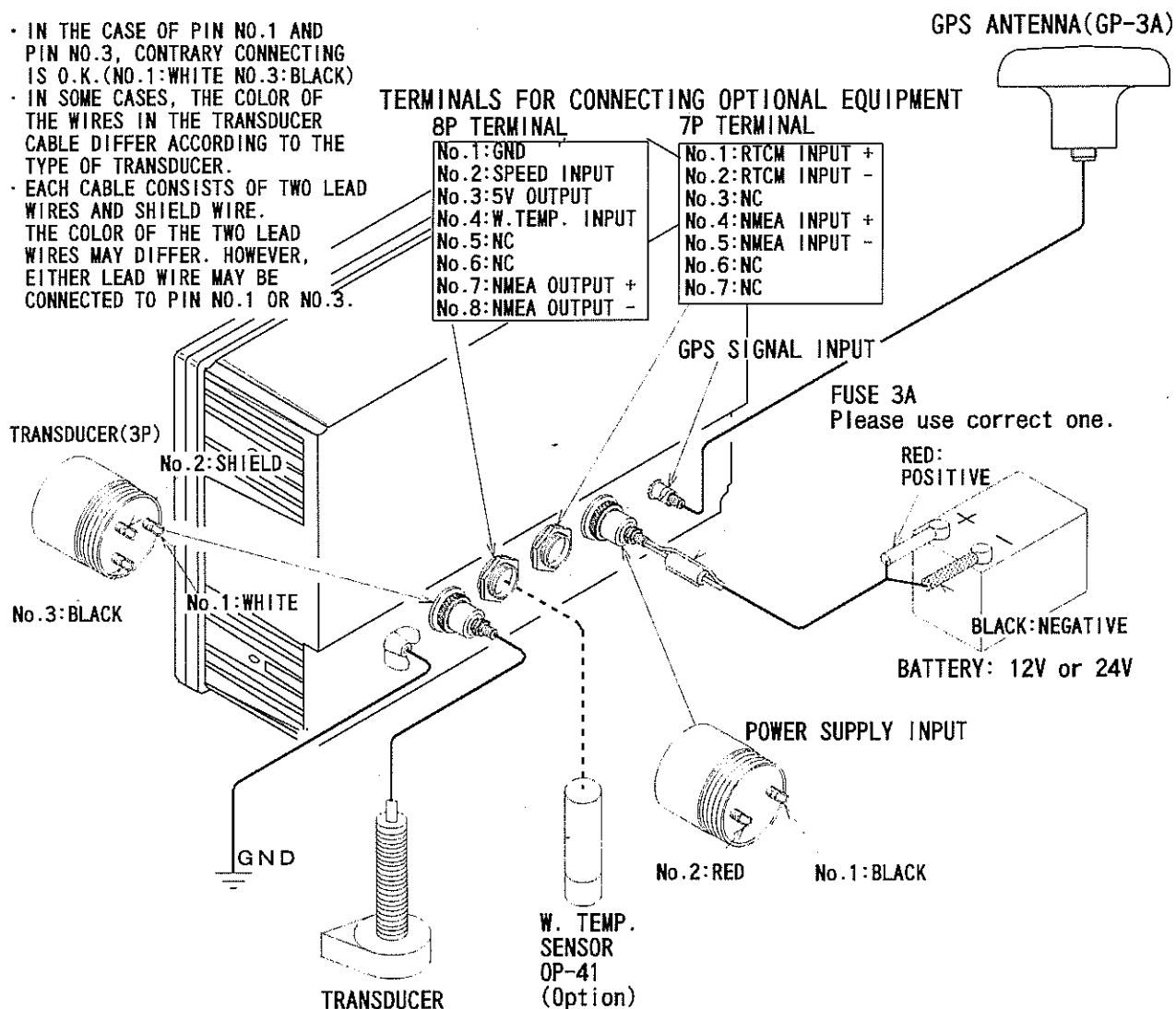
### **⚠ CAUTIONS**

- ◎ The above installation methods 5, 6 and 7 are applicable to FRP(single ply) or aluminum hull boats only.
- ◎ Install the transducer where the FRP thickness is below 10mm, and avoid the keel and ballast fin vicinity.
- ◎ The sound waves are transmitted through the hull board, the sensitivity will be inferior to those external installation methods, and also the thicker the hull board the less the sensitivity.



# INTER CONNECTION

- IN THE CASE OF PIN NO.1 AND PIN NO.3, CONTRARY CONNECTING IS O.K.(NO.1:WHITE NO.3:BLACK)
- IN SOME CASES, THE COLOR OF THE WIRES IN THE TRANSDUCER CABLE DIFFER ACCORDING TO THE TYPE OF TRANSDUCER.
- EACH CABLE CONSISTS OF TWO LEAD WIRES AND SHIELD WIRE. THE COLOR OF THE TWO LEAD WIRES MAY DIFFER. HOWEVER, EITHER LEAD WIRE MAY BE CONNECTED TO PIN NO.1 OR NO.3.



## NOTICE

- 1) RTCM means the Differential GPS.
- 2) Do not connect anything to the NC pins.

## ⚠ WARNINGS

- ⊙ The power requirement of this unit is DC10.5V~30V. Please use correct voltage, otherwise, it could cause fire/electric shock.
- ⊙ Please use the specified power supply cable. If not, it could result in fire.
- ⊙ When taking out/putting in cable, make sure to turn the power off and hold the plug. Otherwise, cable may be damaged and fire and electric shock may cause.
- ⊙ When wiring, do not disturb steering and walking. Do not bend, twist and stretch by force. And, do not put a heavy thing on cable. Wrong wiring could result in fire and injury.



## REAR PANEL

7 PIN TERMINAL FOR OPTIONAL EQUIPMENT  
PG 17

GPS ANTENNA TERMINAL  
To connect GPS antenna(GP-3A)

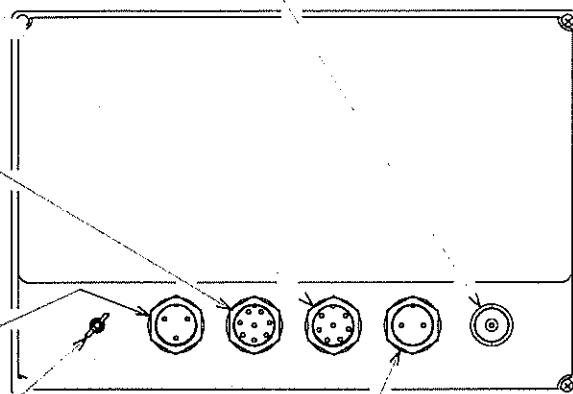
8 PIN TERMINAL FOR OPTIONAL EQUIPMENT  
PG 17

3 PIN TRANSDUCER TERMINAL

EARTH TERMINAL

2 PIN POWER SUPPLY TERMINAL

To connect the power source: 10.5~30V  
When changing the fuse please use the  
correct one. PG 17





# CONTROL PANEL KEYS

## PLOTTER MENU KEY: PG 38

To display the menu for Plotter functions.

## SHIFT KEYS: PG 27

To shift the display/cursor up/down/left/right (four kinds).

## CLEAR KEY: PG 96/100/104/105

To erase Wake/Marks.

## NAVIGATION KEY: PG 55/115

To display course/route.

## MARK KEY: PG 98/103/110

To enter Mark and Waypoint Mark.

## FUNCTION KEY: PG 99

To display color/shape in reverse order.  
To cancel the course up function.

## ECHO SOUNDER MENU KEY: PG 82

To display the menu for Echo sounder.

## GAIN CONTROL DIAL: PG 142

To control the level of gain.

## POWER SUPPLY KEY: PG 4

To turn the power supply on/off.

## MODE KEY: PG 25/131

To change the modes. Plotter, Navigation, Sounder, Plotter/Sounder.

## CURSOR KEY: PG 28

To display/not to display the cursor.

## ZOOM UP/DOWN KEYS: PG 26

To enlarge/reduce the display.

## WAKE KEY: PG 49/95

To change wake color.

## SHAPE KEY: PG 98

To change mark shape.

## COLOR KEY: PG 98

To change mark color.

## PHASED RANGE KEYS: PG 135

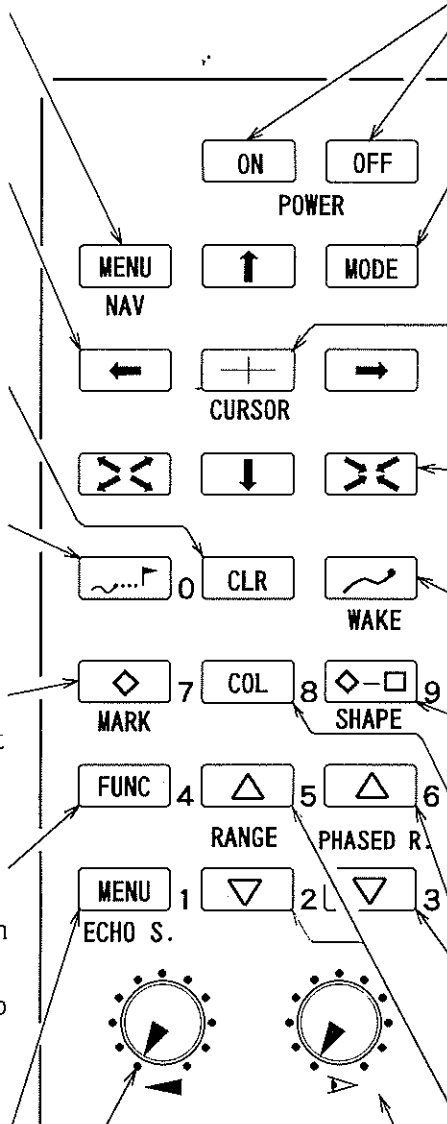
To change the phased range (upper range limit)

## RANGE KEYS: PG 135

To change the basic range.

## BRIGHTNESS CONTROL KNOB: PG 142

Turning the knob clockwise increases the brightness.

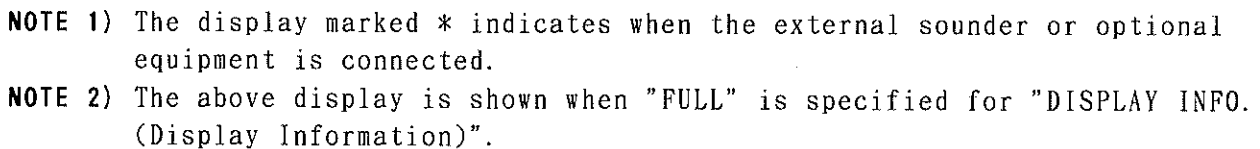


## CAUTIONS

To turn the power supply off, be sure to use the "ON/OFF" keys on the main unit's control panel. Turning the power supply off by the key on the switchboard may cause trouble.



## PLOTTER MODE



**⚠ DANGER**

- 20 -

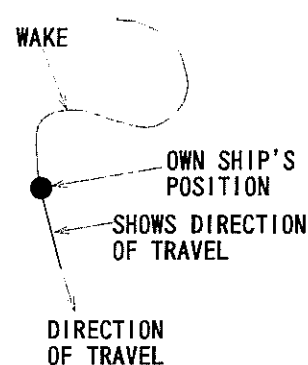


# PLOTTER MODE EXPLANATION

**OWN SHIP:** Shown as a white circle(●). Positional data (Lat/Lon) is displayed in the lower left of the screen.

A short line projecting from the own ship position is the direction of travel. Three kinds of this line can be selected.

The mark flashes at intervals of one second under normal conditions. However, if signals from the receiver should become irregular it will flash at quarter second intervals and the the color will change from white to to green.



**WAKE:** The Wake is shown as a line on the screen(as indicated in previous page). However, some wake lines are shown as a zigzag depending on the plot interval setting.

The Wake can be shown on the display in any one of seven colors, or erased completely.

## **GRID(LATITUDE/LONGITUDE LINES):**

The spacing of latitude/longitude lines depends on the scale of the display. Latitude and longitude lines are displayed in any one of seven colors, or erased completely.

**CURSORS:** Cross cursor, which can be selected in one of two sizes, and Ring Cursor are displayed in order. When cursor is displayed it's positional data are displayed in the screens upper left, and the distance, the bearing and the time from own ship's position to cursor crossing are displayed in the screens lower left.

**COAST LINES:** The coast lines you specified are memorized in the main unit. Will be indicated in any one of seven colors, or will also be erased from the display.  
The display which the land in filled color will also be available.

**DEPTH LINES:** 100m, 200m and 500m depth lines are shown on the screen. Will be displayed in any one of seven colors, or will be erased from the display.

**MARKS:** Can be used to memorize fishing reef and net positions. Eight kinds of Mark(□ · ◇ · △ · × · + · ▣ · ◆ · ✚), any one of seven colors and up to 10,000 points are displayed. The mark color/mark shape, which are selected, and the quantity of mark remaining are displayed in the screens upper.

**MARK REMAINING:** Shows the quantity of available Mark.



**CHART MARK:** Available in one of seven colors, 10,000 points are used to draw chart lines freely on the screen. The current chart mark color is indicated in the screen's upper.

**WAYPOINT MARK:** Uses the same shapes as the Marks, however, can be displayed with some comments, and can be edited in the Waypoint List display.  
Can be used to mark ports, net positions etc. The distance and bearing and time from own ship position to a waypoint are displayed.  
Eight kinds of Mark(□ · ◇ · △ · × · + · ▣ · ◆ · ++), any one of seven colors and up to 10,000 points are displayed.  
The waypoint may be used in setting routes and setting Alarm.

**MARK SHAPE/COLOR:** Shows the mark shape/color when Mark·Chart Mark·Waypoint Mark are entered.

**WAKE COLOR:** Shows the wake color.

**CURRENT TIME:** Local time according to GPS data is displayed.(User setting)  
This time can be adjusted under "TIME DIFF(Time Difference)." for "CORRECTION" display. PG 61.

**WATER TEMPERATURE:** Display the water temperature only when the optional water temperature sensor is connected.

**ALARM:** "AL" indicates when the alarm function is set.

**DISPLAY BEARING:** Shows the bearing on display with this mark.



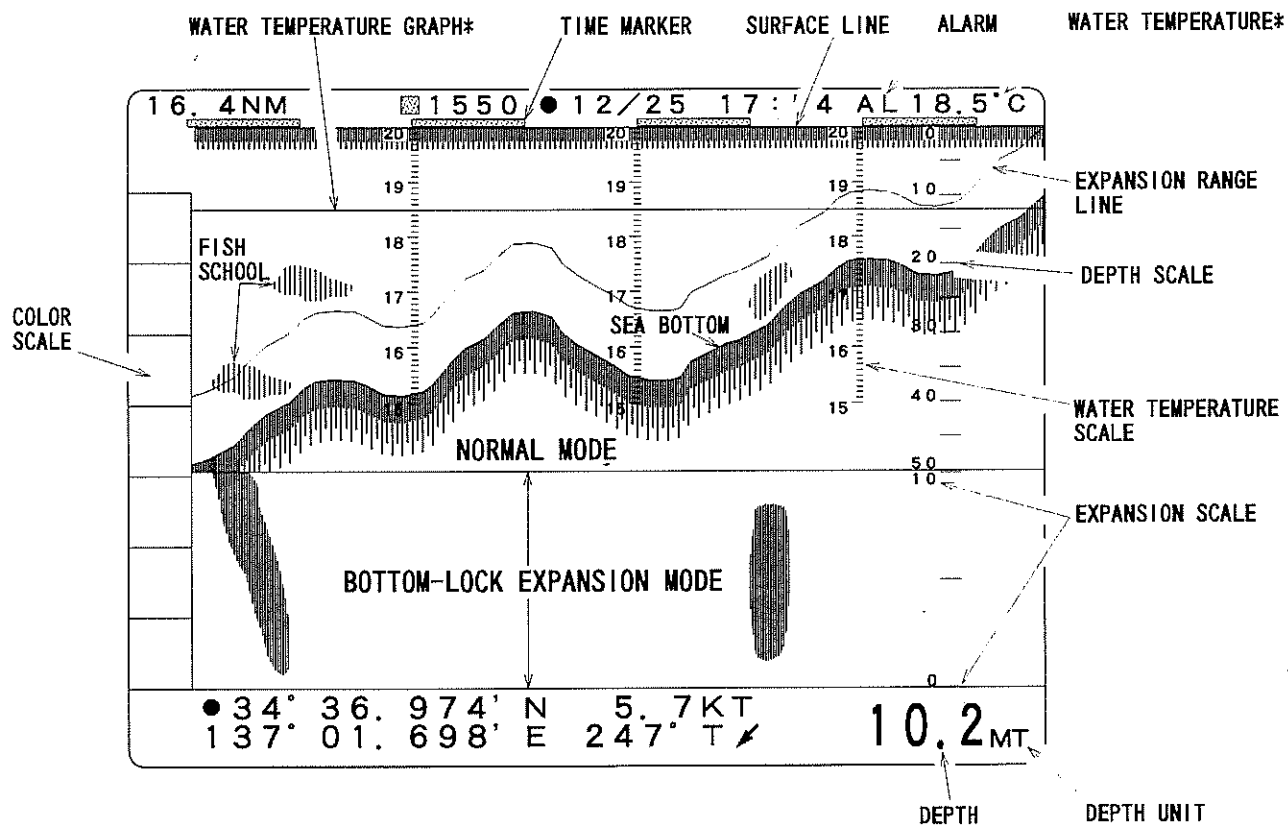

---

Plotter data, ie coast lines and lighthouse positions, should not be relied on totally for navigation. For safe navigation please use marine charts as issued by the authorities.

---

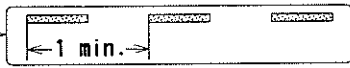


# ECHO SOUNDER MODE



(NOTE) The water temperature and the water temperature graph are displayed when the optional water temperature sensor(OP-41) is connected.

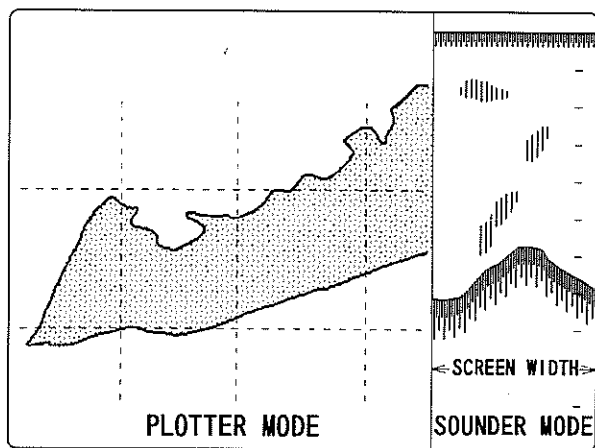
## ◎ ECHO SOUNDER MODE EXPLANATION

- TIME MARKER:** 30 second elapsed time mark.-----> 
- SURFACE LINE:** Indicates the position of the transducer face.
- DEPTH SCALE:** For measuring the depth of the echo.
- EXPANSION SCALE:** For measuring the expansion range.
- EXPANSION RANGE LINE:** Indicates the depth from which the range is expanded under expansion mode.
- DEPTH:** Indicates the water depth.
- WATER TEMPERATURE:** Indicates when the optional water temperature sensor (OP-41) is connected.
- WATER TEMPERATURE GRAPH:** Indicates the water temperature with a line.
- WATER TEMPERATURE SCALE:** For measuring the water temperature that the water temperature graph shows.
- COLOR SCALE:** Indicates the level of an echoes strength.

COLOR SCALE	
WEAK ↑ ↓ STRONG	BLUE
	CYAN
	L. GREEN
	GREEN
	YELLOW
	ORANGE
	RED



## PLOTTER/ECHO SOUNDER MODE



©The Plotter mode is displayed in the left side of the screen and the Echo Sounder mode is displayed in the right side.

- To enlarge/reduce the width of the Echo Sounder mode, press the following keys within 5 seconds after pressing the **FUNC** key.

The Echo Sounder display can be enlarged up to 3/4 area of the display.



:enlarges the Sounder area.



:reduces the Sounder area.

©The method of operation is the same for the Plotter and Sounder modes.

## NAVIGATION MODE

NAVIGATION MODE	
LAT.	34°34.880'N
LONG.	137°02.620'E
SPEED	13.2KT
COURSE	76°T→
DEPTH	28.4MT
TEMP.	18.5°C*

©The own ship's latitude/longitude, ship speed, course, depth, water temperature are displayed in large characters. PG 131.

NOTE) The water temperature is displayed when the optional water temperature sensor (OP-41) is connected.



# BASIC OPERATION

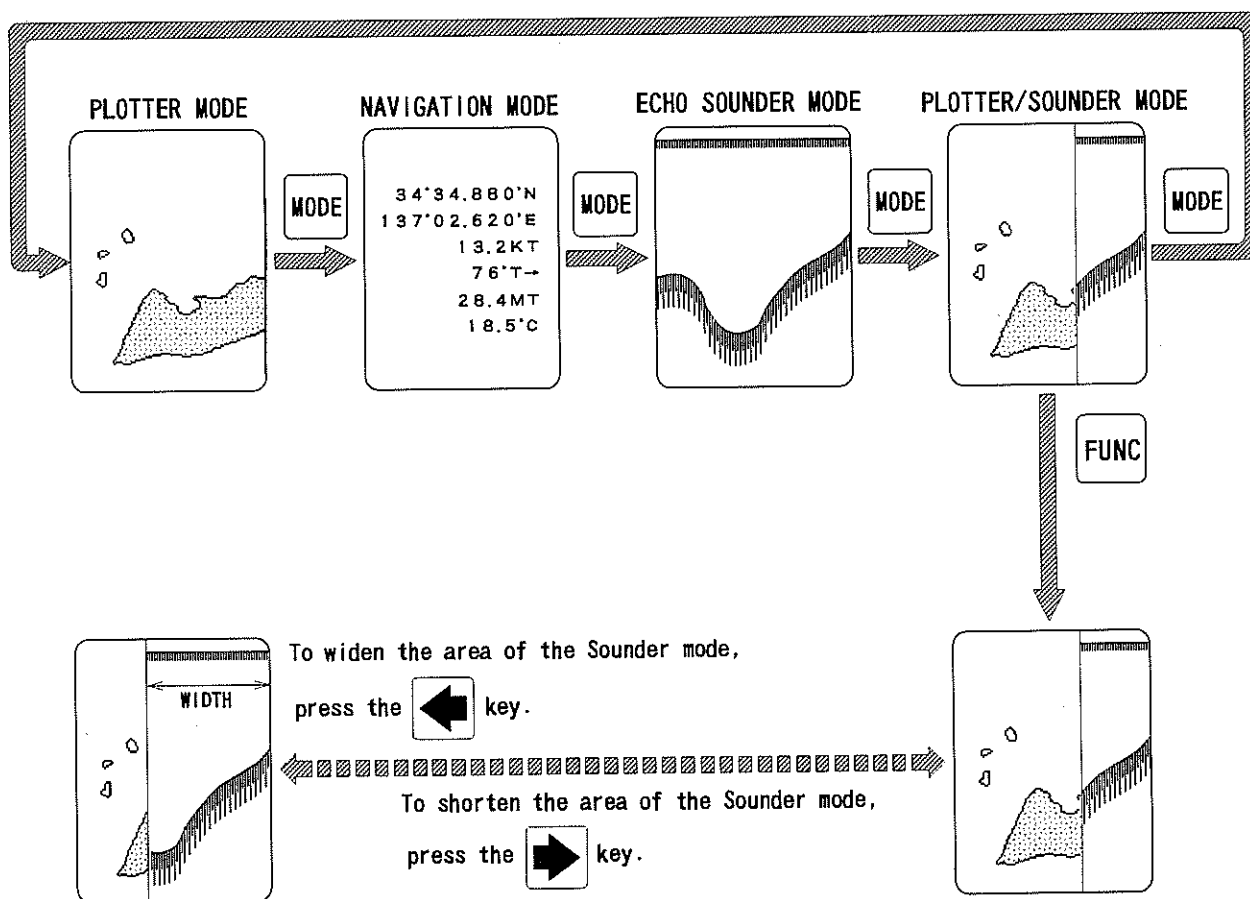
## MODE SELECTION

◎ This unit includes Plotter and Echo Sounder functions.

The display mode may be selected in the following manner.

Pressing the **MODE** key changes the mode from "PLOTTER MODE → NAVIGATION MODE → ECHO SOUNDER MODE → PLOTTER/ECHO SOUNDER MODE".

◎ For Plotter/Echo Sounder mode, the width of the Sounder display may be adjusted by pressing the **◀** or **▶** key within 5 seconds after pressing the **FUNC** key.





## SETTING OWN SHIP POSITION

©When the unit is first switched on it will display Own Ship's position at 00°00.000'N, 00°00.000'E.

- When the unit first receives own ship's normal Lat/Lon data, the display numerals will change to show it's correct Lat/Lon, and it's position will be shifted to the center of display.
- When normal signal receives, the own ship's mark will be displayed in white (●), when the irregular signal receives, it will be displayed in green.

## ZOOM UP · DOWN

©To enlarge/reduce the picture use the following keys.

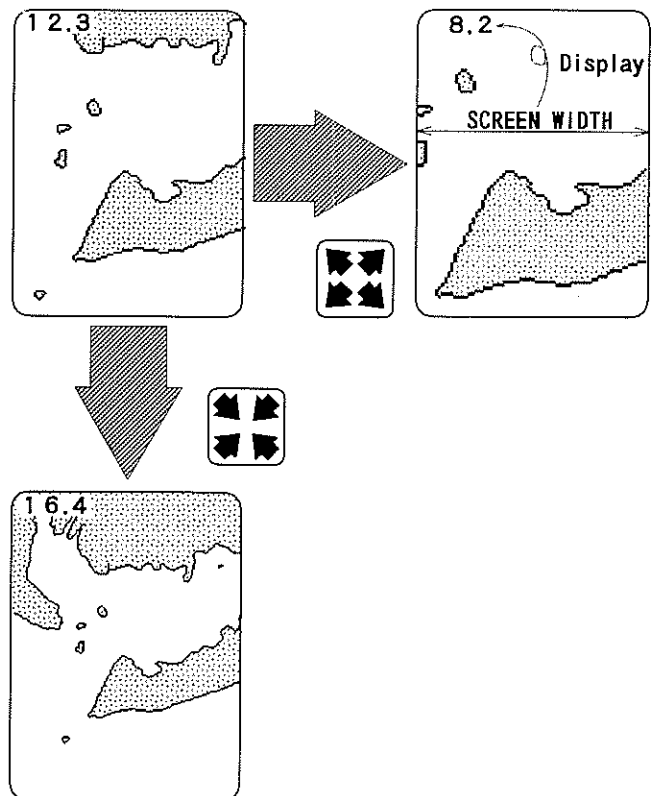


- When cursor is not displayed, the display will be enlarged centering around the own ship's position.

When cursor is displayed, the display will be enlarged centering around the cursor crossing.

- The scale varies with latitude, and the center width of the display is displayed in miles (NM).  
A scale rate for display size may be selected as an alternative.)

- To continuously enlarge/reduce the picture, press the required key continuously.







KEY ---- To Zoom up/Enlarge the picture.












KEY ---- To Zoom down/Reduce the picture.

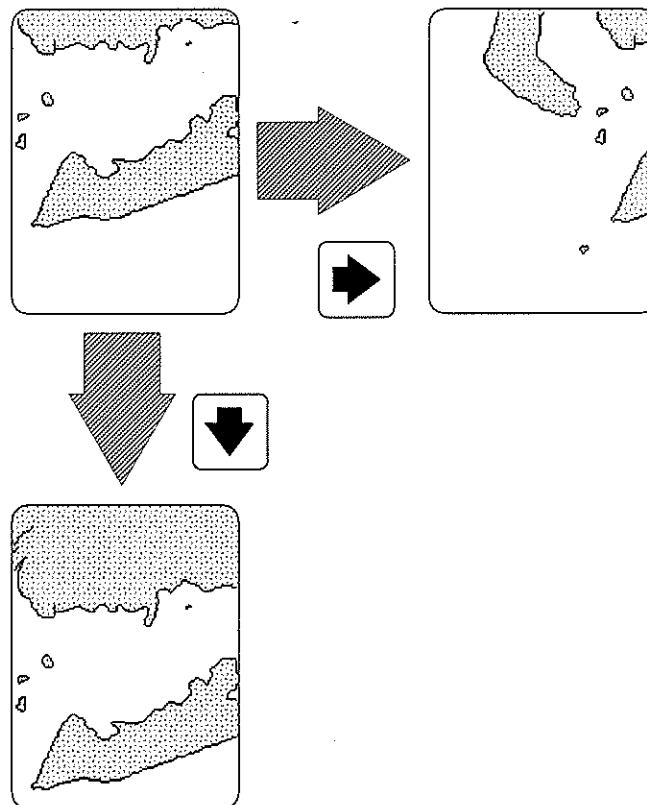


## SHIFTING DISPLAY

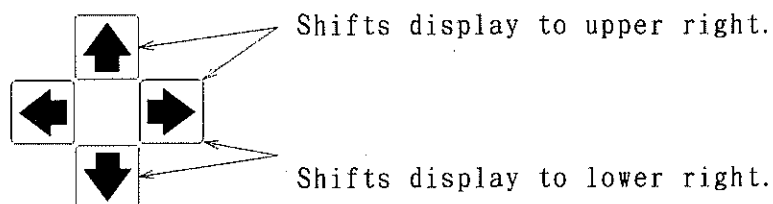
©To shift the display up/down/left/right, use the     keys.

If cursor is on the display, press  key to clear it.

- A single press of     keys shifts the display one eights(1/8) to the direction of the arrow of the key.
- Continuous pressing of     keys shift the display continuously.




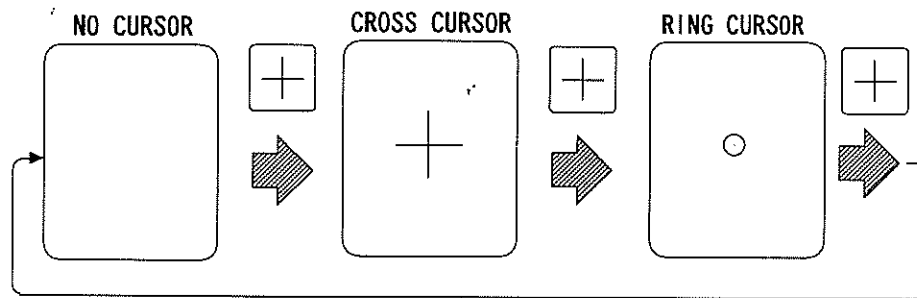
- To shift the display diagonally, press the two keys which bracket the diagonal of movement desired. See example below.











# CURSOR USE

© Each press of the  key changes the cursor display as follows.

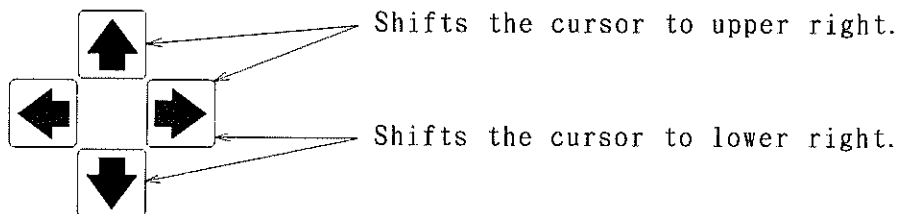


• When cursor is on the display pressing the     keys shifts it.

  keys ----- shifts the cursor up and down.

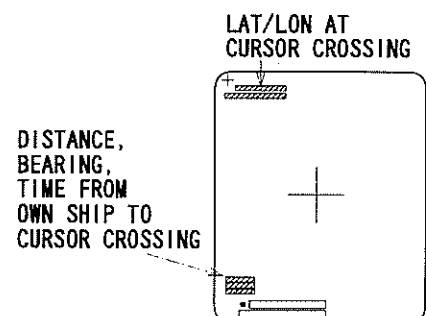
  keys ----- shifts the cursor left and right.



• When cursor is on the display pressing the two keys which bracket the diagonal of movement desired. See example below.



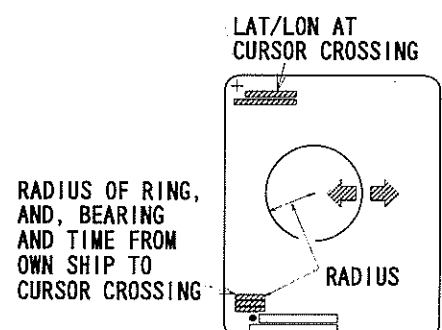
• Pressing a key/keys continuously will cause the cursor to shift continuously. When the cursor reaches the edge of the display, the display shifts automatically.

© When the **Cross Cursor** is displayed, the cursor crossing's Lat/Lon is indicated in the upper left, and the distance, bearing and the time from own ship's position to the cursor crossing are indicated in the lower left.



© To enlarge the ring of Ring Cursor, use  key.  
To reduce it, use  key.

The cursor crossing's Lat/Lon is indicated in the upper left. The radius of ring, and the bearing and the time from own ship to cursor crossing are displayed in the screen's lower.

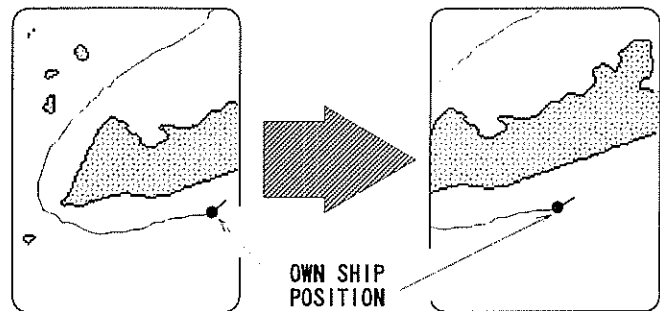





## **AUTOMATIC SHIFTING**



- ©When the own ship position reaches the edge of the display the display will automatically shift to show the own ship position in the center of the screen.

However, the display will not shift automatically if the cursor are on the display or if own ship is out of the display because of the operation of "shifting display".

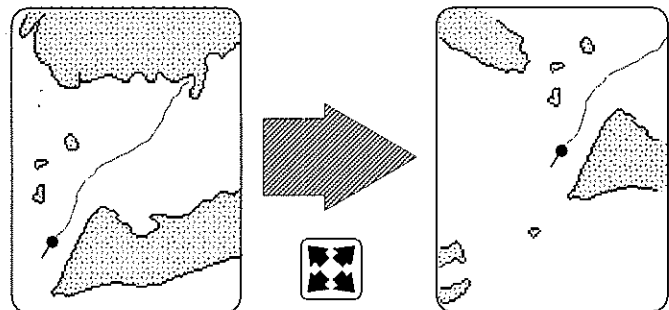


## **CENTERING OWN SHIP**


- ©Ensure the cursor is cleared from the display by pressing  key.

Press either one of   keys.



The display will shift to show the own ship position in the center of the screen.



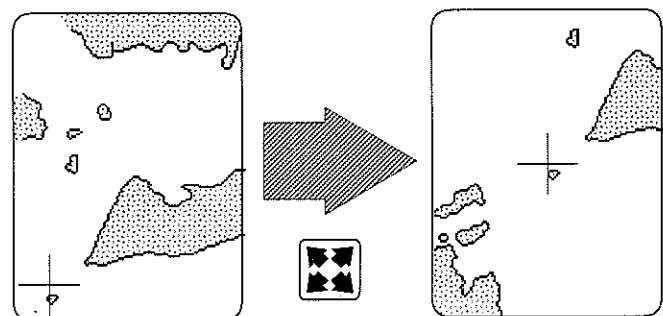
## **CENTERING CURSOR CROSSING**

- ©Ensure the cursor is on the display by pressing  key.

Shift the cursor crossing to the desired point.

Press either one of   keys.

The specified point will be shifted to the center of the screen.





# USER SETTING

This chapter provides you the explanation for the user setting.

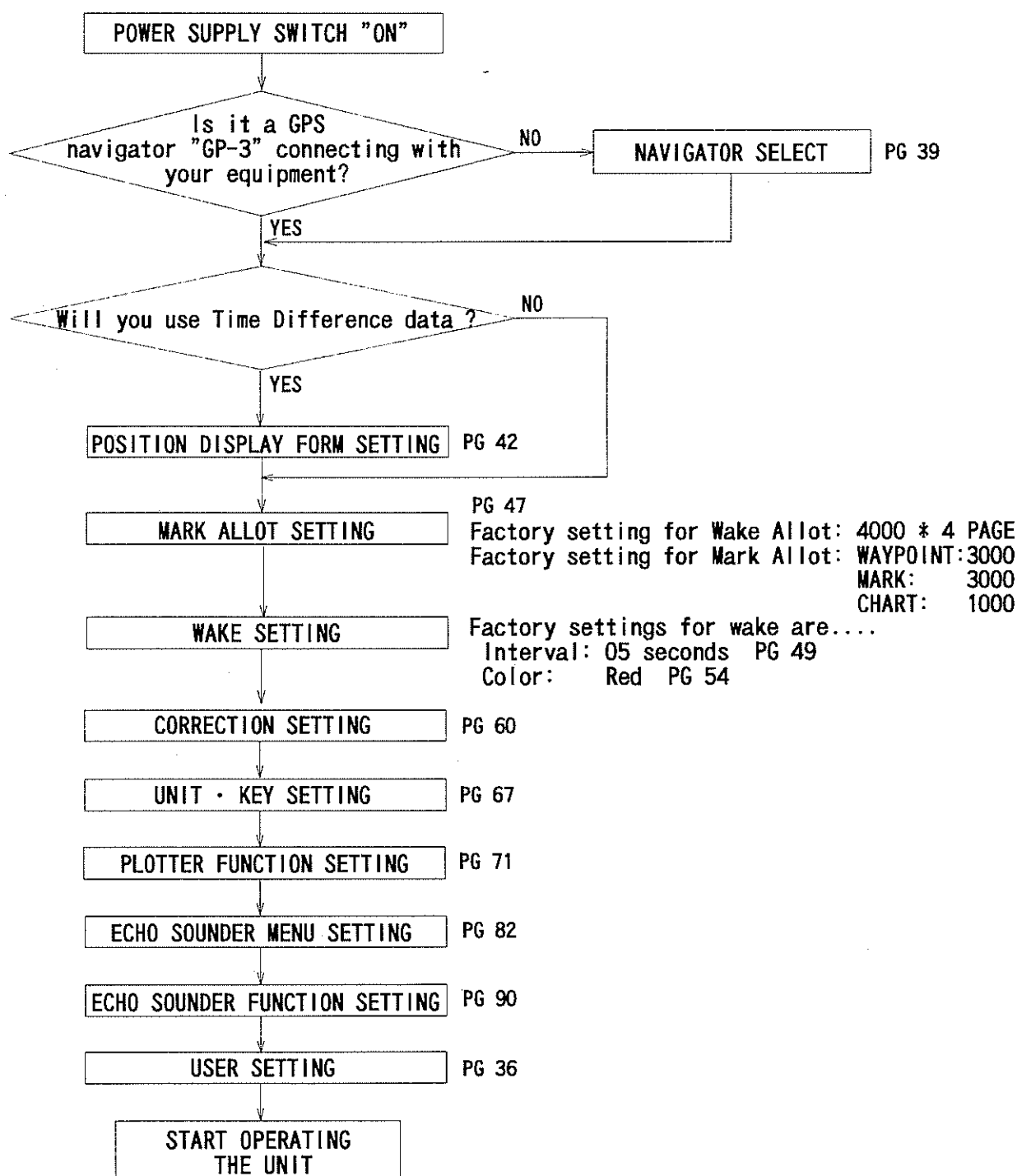
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1. TO "KEEP" THE DATA ENTERED .....	35
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# WHEN FIRST STARTING UP THE UNIT

When the equipment is connected to the standard GPS sensor (GP-3), it is only necessary to turn the power supply on by pressing the **ON** key. However, for operation of the unit at optimum performance we recommend pre-setting of all functions listed.

To assist your setting, refer to "FACTORY SETTING" in the following page.









# USER SETTING

## FACTORY SETTING










This equipment is shipped from the factory with the functions under the settings listed below.

Before using the equipment please change the functions to the desired settings.

1/3

FUNCTION		FACTORY SETTING	SETTING MENU
NAVIGATOR SELECT SERIAL OUTPUT SPEED INPUT POSITION DISPLAY FORM		INTERNAL • EXTERNAL 0183N • 0183P • CIF NAVIGATOR • SENSOR LAT/LON • LORAN C	"5 NAVIGATOR" PG 39 NAV MENU +  5
PAGE DIVISION  DISPLAY PAGE MEMORY PAGE		16000*1 • 8000*2 • 4000*4 • 2000*8 1/1 • 1/2 • 1/4 • 1/8 1/1 • 1/2 • 1/4 • 1/8	"WAKE ALLOT" PG 44 NAV MENU +  6 +  2
MARK ALLOT	WAYPOINT MARK CHART	3000 3000 1000	"MARK ALLOT" PG 47 NAV MENU +  6 + ECHO S MENU 1
WAKE MEMORY  WAKE COLOR	COLOR          TEMPERATURE       WATER DEPTH	BLUE • RED • MAGENTA • GREEN • CYAN • YELLOW • WHITE • OFF BLUE - ON • OFF RED - ON • OFF MAGENTA - ON • OFF GREEN - ON • OFF CYAN - ON • OFF YELLOW - ON • OFF WHITE - ON • OFF BLUE - 00.0-05.0 RED - 05.0-10.0 MAGENTA - 10.0-15.0 GREEN - 15.0-20.0 CYAN - 20.0-25.0 YELLOW - 25.0-30.0 WHITE - 30.0-35.0 BLUE - 0000-0010 RED - 0010-0020 MAGENTA - 0020-0030 GREEN - 0030-0040 CYAN - 0040-0050 YELLOW - 0050-0060 WHITE - 0060-0070 ON • OFF ON • OFF 00' 05"	"8 WAKE MEMORY" PG 48 NAV MENU + COL 8
DEVOID NAVIGATION DISPLAY DEVOID NAVIGATION MEMORY MEMORY INTERVAL			



FUNCTION		FACTORY SETTING	SETTING MENU
NAVIGATION		OFF • WAYPOINT • CURSOR POSITION • WAYPOINT-WAYPOINT • ROUTE NAVIGATION TIME REQUIRED • ARRIVAL TIME FIXED • RENEWAL • OFF SMALL • LARGE SHORT • LONG • SHIP SPEED FULL • LIMITED	"NAVIGATION" PG 55 
TIME DIFFERENCE SHIP SHIFT CHART SHIFT POSITION SHIFT DATUM SMOOTHING MAGNET CORRECT		+00:00 NOTHING(0.000' N 0.000' E) NOTHING(0.000' N 0.000' E) NOTHING(0.000' N 0.000' E) 0 • 1 • 2 • 3 • 4 • 5 • 6 • 7 • 8 00-00-00 OFF • AUTO • MANUAL	"CORRECTION" PG 60  +  9 +  3
TEMPERATURE UNIT TEMPERATURE DISPLAY SPEED UNIT DISTANCE UNIT KEY SETTING		°C • ° F ON • OFF KT • KM/H NM • KM WAYPOINT • MARK	"UNIT-KEY" PG 67  +  9 +  4
GRID COLOR LAND COLOR FORSHORE DEPTH LINE OTHER INFORMATION LIGHTHOUSE PLACE NAME DISPLAY BEARING SCALE DISPLAY	10 20 50 100 200 500 1000 2000 WRECK FISH REEF	BLUE • RED • MAGENTA • GREEN • CYAN • YELLOW • WHITE • OFF PUT • NOT PUT BLUE • RED • MAGENTA • GREEN • CYAN • YELLOW • WHITE • OFF PUT • NOT PUT BLUE • RED • MAGENTA • GREEN • CYAN • YELLOW • WHITE • OFF BLUE • RED • MAGENTA • GREEN • CYAN • YELLOW • WHITE • OFF BLUE • RED • MAGENTA • GREEN • CYAN • YELLOW • WHITE • OFF BLUE • RED • MAGENTA • GREEN • CYAN • YELLOW • WHITE • OFF BLUE • RED • MAGENTA • GREEN • CYAN • YELLOW • WHITE • OFF BLUE • RED • MAGENTA • GREEN • CYAN • YELLOW • WHITE • OFF BLUE • RED • MAGENTA • GREEN • CYAN • YELLOW • WHITE • OFF ON • BLINK • OFF ON • OFF EAST • SOUTH • WEST • NORTH • WAYPOINT • COURSE WIDTH • SCALE	"7 PLOTTER SETTING" PG 71  +  7












# **RETURN TO FACTORY SETTING**

## **1. TO "KEEP" THE DATA ENTERED**

Ensure the power supply switch is turned off. Then while pressing the  key press the  key. Keep pressing them until the beep stops (about 1 sec.).

This operation will return the functions to factory setting as outlined in the previous page, however, entered data such as marks, wake, routes etc will remain.

## **2. TO "CLEAR" ALL THE DATA ENTERED**

Ensure the power supply switch is turned off. Then while pressing the  key and the  key together, press the  key. Keep pressing them until the beep stops (about 1 sec.).

This operation will return the functions to factory setting as outlined in the previous page, **and all the entered data such as marks, wake, routes etc will be initialized and cleared.**

### **⚠ CAUTIONS**

- 
- No.2 operation will clear the data permanently.
  - If the keys are released before the beep stops, the return to factory setting function may not operate.
-




# **USER SETTING**

For maximum efficiency and convenient operation by the user, functions may be set by the user and memorized under User Setting.

This function is particularly useful when erroneous data is entered and the keyboard becomes inoperable as all functions may be quickly returned to the User Setting.

Please remember to set all functions under User Setting when first operating the unit.

## **1. MEMORIZE USER SETTING**

After setting each function to the desired setting, turn the power supply off by pressing the  key.

And, while pressing the  key, press the  key.


Keep pressing the  key until the beep stops.

All function settings will be memorized under user setting.

## **2. RETURN TO USER SETTING**

Make sure the power supply is turned off.

While pressing the  key, press the  key.

Keep pressing the  key until the beep stops.

All functions will return to user setting.

## **3. REVISE USER SETTING**

To revise user setting first return to factory setting using the return to factory setting as outlined on the previous page. Reset the functions as desired and memorize using the memorize user setting procedure outlined above.



## PLOTTER FUNCTION SETTING

This chapter provides you the explanation for setting each Plotter function.


For making good use of this model, please set each function before using.



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NAVIGATOR MENU .....	39	SHIP SHIFT/CHART SHIFT .....	61
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TIME DISPLAY .....	56		
LINE DISPLAY .....	57		
CURSOR SIZE .....	58		
COURSE VECTOR .....	58		
DISPLAY INFORMATION .....	59		



# MENU DISPLAY

---

© Pressing  key will display the main menu shown below. Function setting/ selecting/entering displays may be selected from this menu.

• Use the numeral keys ( 1 ~  9) to display the desired function's display.

## SET DISPLAY NUMBER

1 WAYPOINT ENTRY	-----	To enter/edit Waypoint. PG 105
2 ROUTE	-----	To set/display Route. PG 124
3 WAYPOINT-MARK DISPLAY	-----	To set Mark display. PG 102
4 ALARM	-----	To set Alarm function. PG 119
5 NAVIGATOR	-----	To set the functions which are related to Navigator. PG 39
6 DATA STORAGE	-----	To set the memory allot for Mark and Wake. PG 44
7 PLOTTER SETTING	-----	To set the functions. PG 71
8 WAKE MEMORY	-----	To set the functions which are related to Wake. PG 48
9 SPECIAL FUNCTION	-----	To display the Self Check/Receiving Status display. PG 132, 133 To set each correction/unit. PG 67.

SELECT THE NUMBER.

\* For more detailed explanation, refer to the above mentioned pages.



# NAVIGATOR MENU

©To set the functions which are related to Navigator.

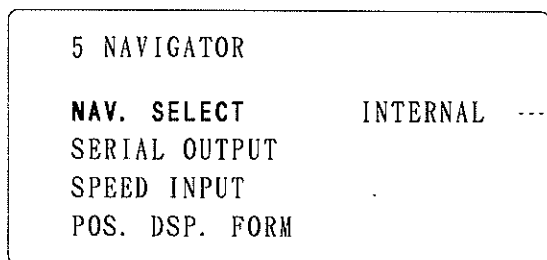
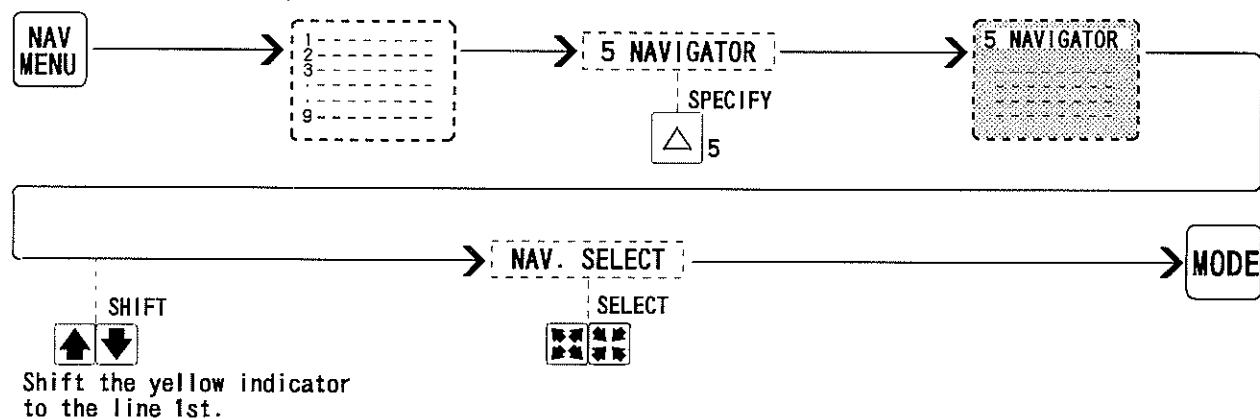
- ① NAVIGATOR SELECT ----- To select the navigation source.
- ② SERIAL OUTPUT ----- To select the output format.
- ③ SPEED INPUT ----- To select the speed input from either Speed sensor or Navigator.
- ④ POSITION DISPLAY FORM ----- To select the type of own ship's positional data which is displayed on the screen's lower.

## NAVIGATOR SELECT

©To select the navigation source from either internal or external navigator.

- To use the internal GPS navigator(GP-3) select "INTERNAL", to use the external navigator select "EXTERNAL".

### OPERATION PROCEDURE



Each press of  or  key changes the setting, "INTERNAL" "EXTERNAL."

INTERNAL: INTERNAL GPS NAVIGATOR

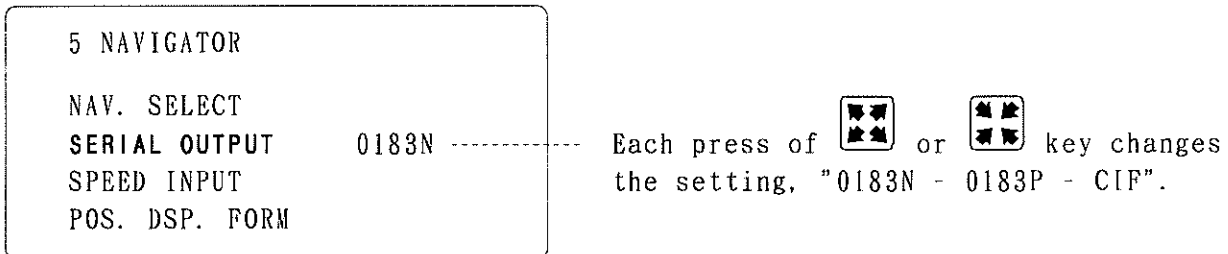
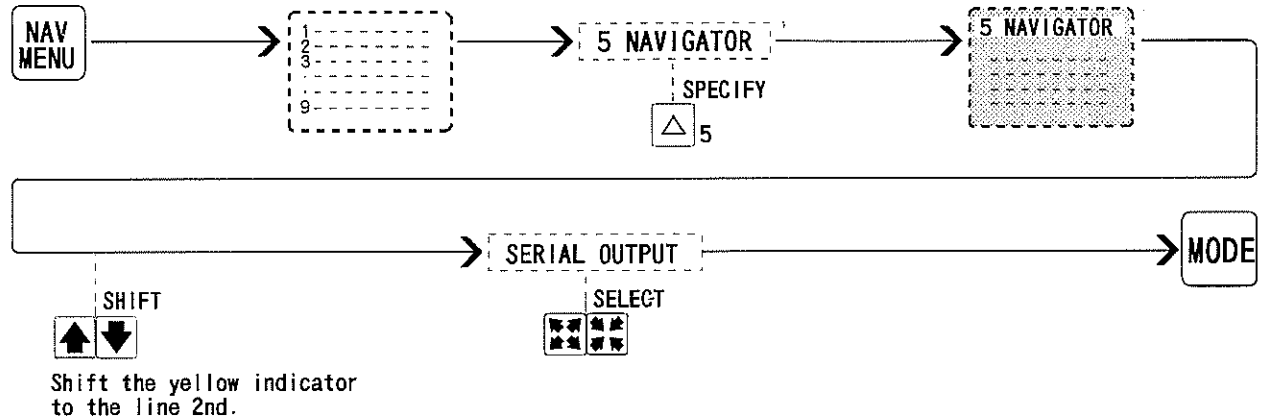
EXTERNAL: EXTERNAL NAVIGATION RECEIVER



# SERIAL OUTPUT

©To select the output format for the 8 pin optional equipment terminal in the rear panel.

## OPERATION PROCEDURE



0183N: DBT, MTW, GGA, GLL, VTG, APA, XTE, BOD are output by dividing into three blocks.

- ① DBT, MTW
- ② GGA, GLL, VTG
- ③ APA, XTE, BOD

Output period: approximately 5 seconds.

0183P: GGA, GLL, VTG, APB, BOD, ZDA, BWC, GSS are output by dividing into three blocks.

- ① GGA, GLL, VTG
- ② APB, BOD, ZDA
- ③ BWC, GSS

Output period: approximately 5 seconds.

CIF(FURUNO CIF): No.11(Date, Time), No.24(Lat, Lon), No.41(Ship speed, Bearing) are output.

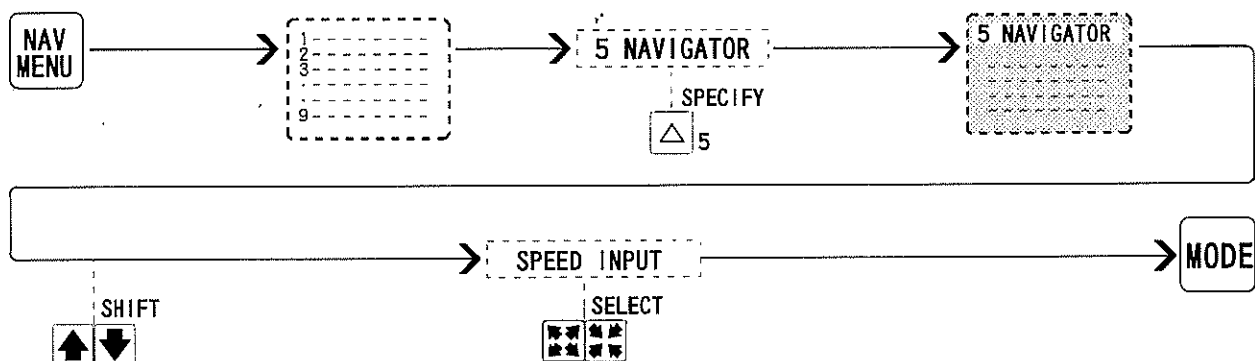
Output period: approximately 5 sec.



# **SPEED INPUT**

©To select the ship's speed input from either Speed sensor or Navigator.

## **OPERATION PROCEDURE**



SHIFT  
↑ ↓

Shift the yellow indicator  
to the line 3rd.

SELECT  
← →

\*\*\*\*\*

5 NAVIGATOR

NAV. SELECT

SERIAL OUTPUT

SPEED INPUT

POS. DSP. FORM

NAVIGATOR

Each press of  or  key changes  
the setting, "NAVIGATOR - SENSOR -".

NAVIGATOR: To show the ship speed using the signal from the external navigator.

SENSOR: To show the ship speed using the signal from Speed sensor.

## **NOTICE**

This setting is not needed when the speed sensor is not used.



# POSITION DISPLAY FORM

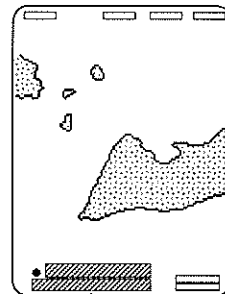
◎To specify the positional data to be displayed in either Lat/Lon or Loran C Time Difference data.

To specify Chain or Slave when the data from Loran C is displayed.

5 NAVIGATOR  
 NAV. SELECT  
 SERIAL OUTPUT  
 SPEED INPUT  
 POS. DSP. FORM      LAT/LON

Each press of  or  key changes the setting, "LAT/LON - LORAN C."

- [ LAT/LON: To display the Lat/Lon data.  
 (EX) 34°42.972'  
      137°01.695'
- [ LORAN C: To display the Loran C Time Difference data.  
 (EX) S1 18705.6  
      S2 34251.2

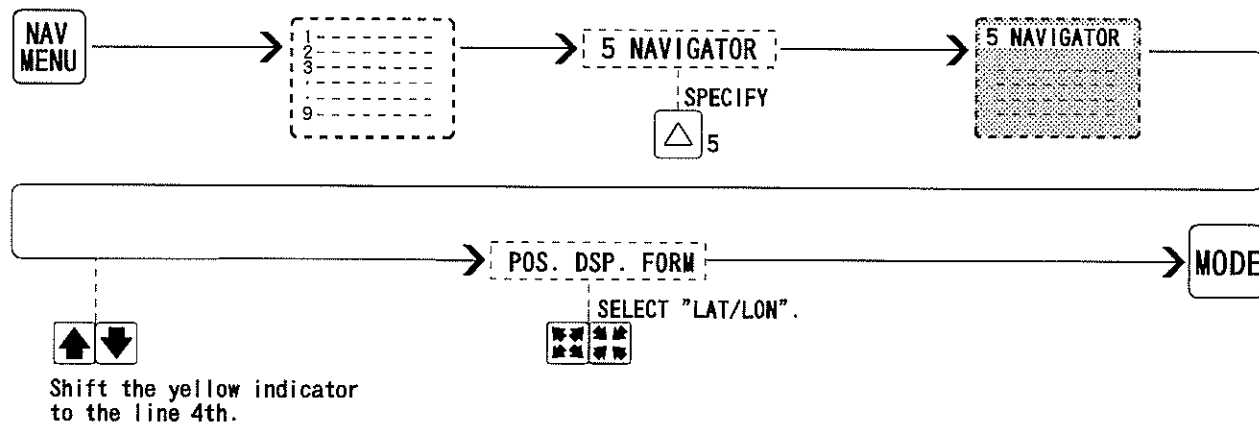


LAT/LON OR LORAN C DATA

## 1. DISPLAY IN LAT/LON DATA



◎To display the own ship's positional data in Lat/Lon in the screen's lower left.

### OPERATION PROCEDURE



5 NAVIGATOR  
 NAV. SELECT  
 SERIAL OUTPUT  
 SPEED INPUT  
 POS. DSP. FORM      LAT/LON

Each press of  or  key changes the setting, "LAT/LON - LORAN C."

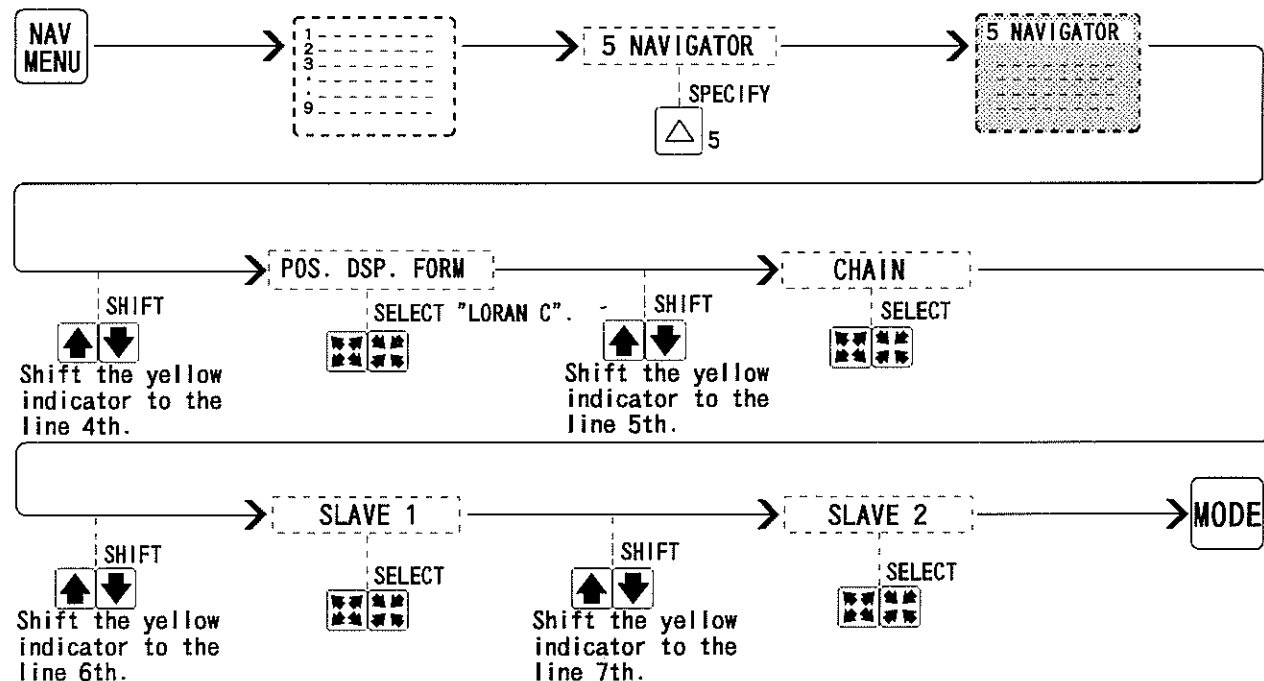
To shift the yellow indicator,  
 use  or  key.



## 2. DISPLAY IN LORAN C TIME DIFFERENCE DATA

©To display the own ship's positional data in Loran C Time Difference data in the screen's lower left.

### OPERATION PROCEDURE



5 NAVIGATOR	
NAV. SELECT	
SERIAL OUTPUT	
SPEED INPUT	
POS. DSP. FORM	LORAN C
CHAIN	9970
SLAVE 1	1
SLAVE 2	3

Each press of or key changes the setting, "LAT/LON - LORAN C."

Each press of or key changes the numerals for "CHAIN", "SLAVE 1", "SLAVE 2".

To shift the yellow indicator,  
use or key.

### NOTICE

This setting is not needed when Loran C Time Difference data is not used.



# ALLOT SETTING

©To set "WAKE ALLOT" and "MARK ALLOT" before using the Plotter function.

## ⚠ CAUTIONS

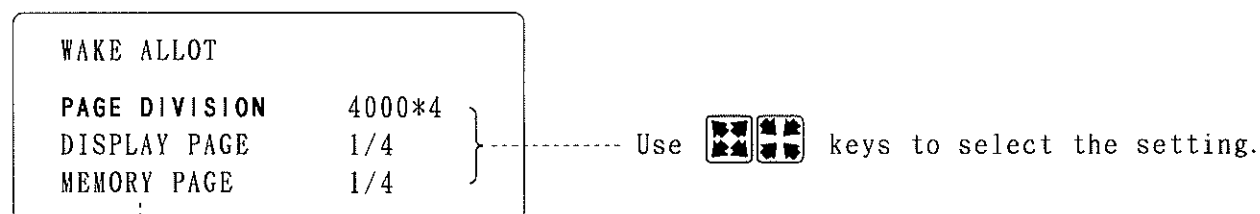
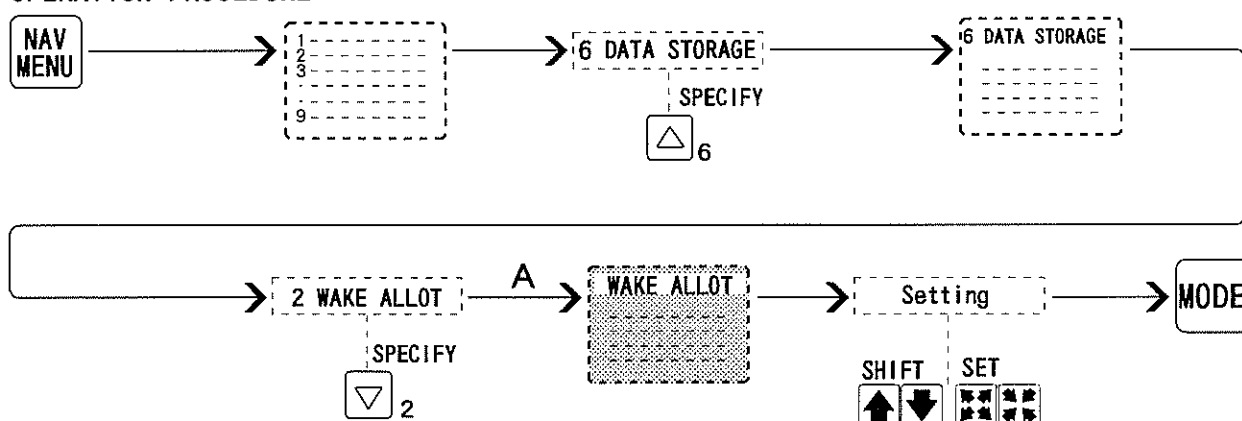
Changing the setting for "WAKE ALLOT" or "MARK ALLOT" erases the data memorized (Wake data and, Waypoint/Mark/Chart which were entered by the user.).

## WAKE ALLOT MENU

©Once the available set points have been used each new point memorized will mean the automatic erasure of the oldest point. Up to 16,000 points can be memorized in this unit.

- ①PAGE DIVISION ----- To divide the wake points.
- ②DISPLAY/MEMORY PAGE ---- To select the page the wake is displayed/memorized.

### OPERATION PROCEDURE



Use keys to shift the yellow indicator.

\* For more detailed explanation, refer to the following pages.

The operation procedure starts from the above mentioned point "A".

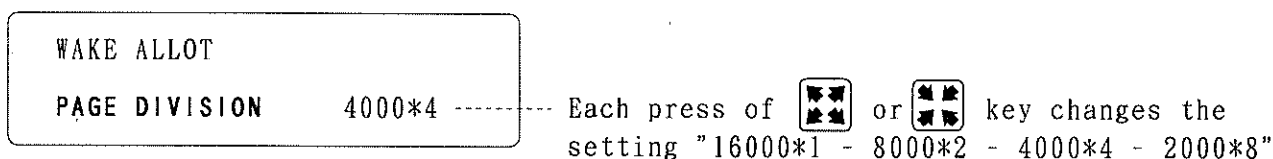
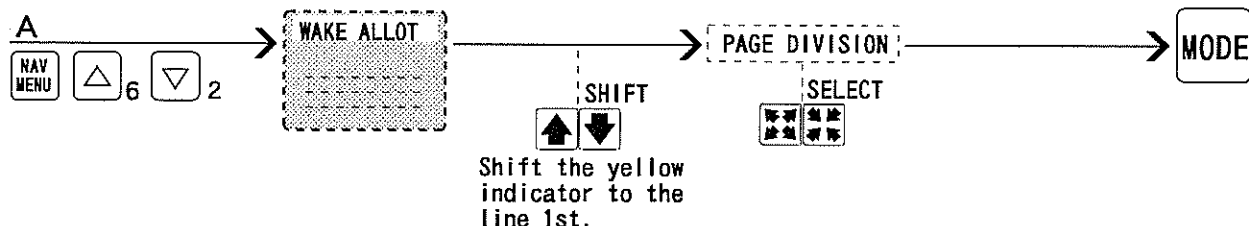


# 1. PAGE DIVISION

Up to 16,000 wake points can be memorized in this unit.

This function is for dividing these points into the pages (can be chosen from 1, 2, 4 and 8 pages).

## OPERATION PROCEDURE



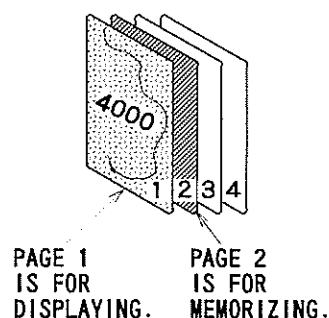
- 16000\*1 : Wake points are not divided. ----- 1 page
- 8000\*2 : Wake points are divided into two. ----- 2 pages
- 4000\*4 : Wake points are divided into four. --- 4 pages
- 2000\*8 : Wake points are divided into eight. --- 8 pages

When the display page and the memory page is set on the same page, once the available points have been used each new point memorized will mean the automatic erasure of the oldest point.

It is possible to use different pages for memory and display. This means it is possible not to erase the wake data desired by setting it on the display page. (Refer to next page for details.)

In this case, the wake will be displayed on the display, however, it will not be displayed by shifting the display because it is not memorized on that page.

WHEN "4000\*4" IS SELECTED.



## ⚠ CAUTIONS

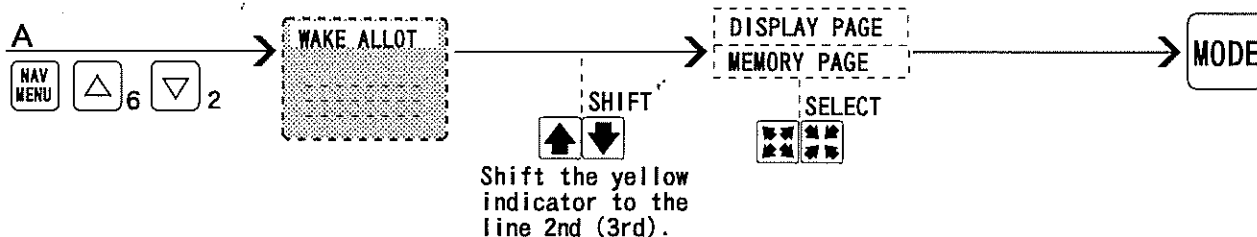
Changing the setting for "PAGE DIVISION" erases the wake data memorized. If the memorized data is needed, make sure to preserve it before changing.



## 2. DISPLAY PAGE/MEMORY PAGE



To set the display page and the memory page for wake.

### OPERATION PROCEDURE



WAKE ALLOT	
DISPLAY PAGE	1/4
MEMORY PAGE	1/4

When "4000\*4" is selected for "PAGE DIVISION"

Each press of  or  key changes the setting "1/4 - 2/4 - 3/4 - 4/4 -".

	DISPLAY PAGE	MEMORY PAGE
1/4	Page 1 will be displayed.	The wake data will be memorized in Page 1.
2/4	Page 2 will be displayed.	The wake data will be memorized in Page 2.
3/4	Page 3 will be displayed.	The wake data will be memorized in Page 3.
4/4	Page 4 will be displayed.	The wake data will be memorized in Page 4.

The settings displayed for "DISPLAY PAGE" and for "MEMORY PAGE" differs depending on the setting for "PAGE DIVISION" on the previous page.

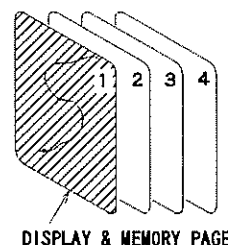
When "16000\*1" is selected, the display page and the memory page should be the same.

- 16000\*1 is selected: 1/1 is displayed.
- 8000\*2 is selected: 1/2 and 2/2 are displayed.
- 4000\*4 is selected: 1/4, 2/4, 3/4 and 4/4 are displayed.
- 2000\*8 is selected: 1/8, 2/8, 3/8, 4/8, 5/8, 6/8, 7/8 and 8/8 are displayed.

#### ◎WHEN THE SAME DISPLAY AND MEMORIZE PAGES ARE SELECTED

EG DISPLAY PAGE 1/4  
MEMORIZE PAGE 1/4

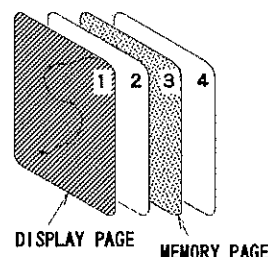
- The wake will be memorized on the page it is displayed on. Each page has 4000 points of memory once these have been used every new point memorized will mean the erasure of the oldest point.



#### ◎WHEN DIFFERENT DISPLAY/MEMORIZE PAGES ARE SELECTED

EG DISPLAY PAGE 1/4  
MEMORIZE PAGE 3/4

The wake will be memorized on one page and displayed on another.





# MARK ALLOT MENU

There are three kinds of marks (Waypoint mark/Mark/Chart mark), a total 10,000 points, available.

## ⚠ CAUTIONS

Changing the setting for "MARK ALLOT" erases all the mark data memorized. If the memorized data is needed, make sure to preserve it before changing.

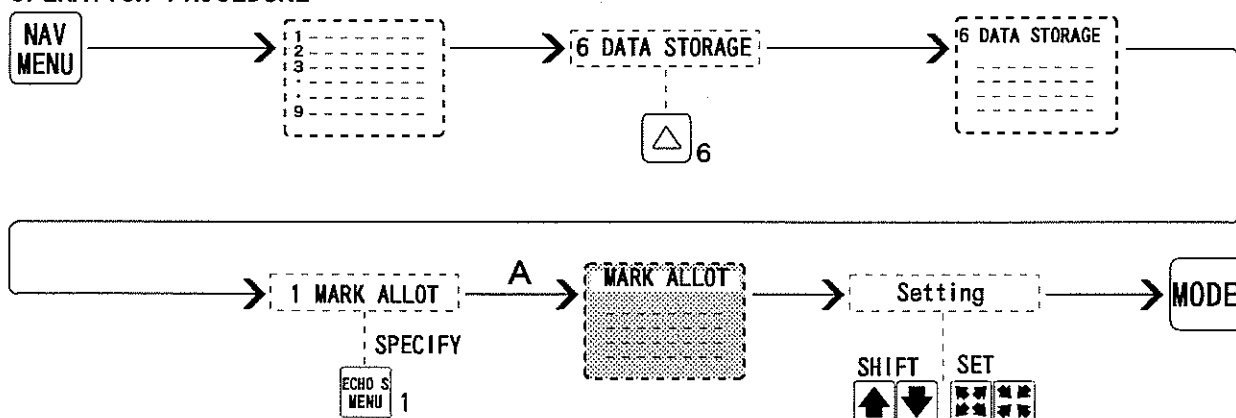
### FACTORY SETTING

Waypoint mark: 3000 points  
 Mark : 3000 points  
 Chart mark : 1000 points

Waypoint mark's allotting is prior to mark's, and mark's allotting is prior to chart mark's.

A total 10,000 points is available with this unit. However, please keep in mind a waypoint mark needs two points. In other words, if 3000 points are allotted for waypoint mark, a total 6,000 points are spent.

### OPERATION PROCEDURE



MARK ALLOT	
WAYPOINT	3000
MARK	3000
CHART	1000

Each press of or key changes the setting per 250 points.

Each press of or key changes the setting per 500 points.

Use keys to shift the yellow indicator. However, it is not shifted to "CHART".

### ◎ HOW TO SELECT

- ① Select the Waypoint mark points, and the available Mark/Chart mark points will be displayed.
- ② Select the Mark points, and the available Chart mark points will be re-displayed.



# WAKE MEMORY

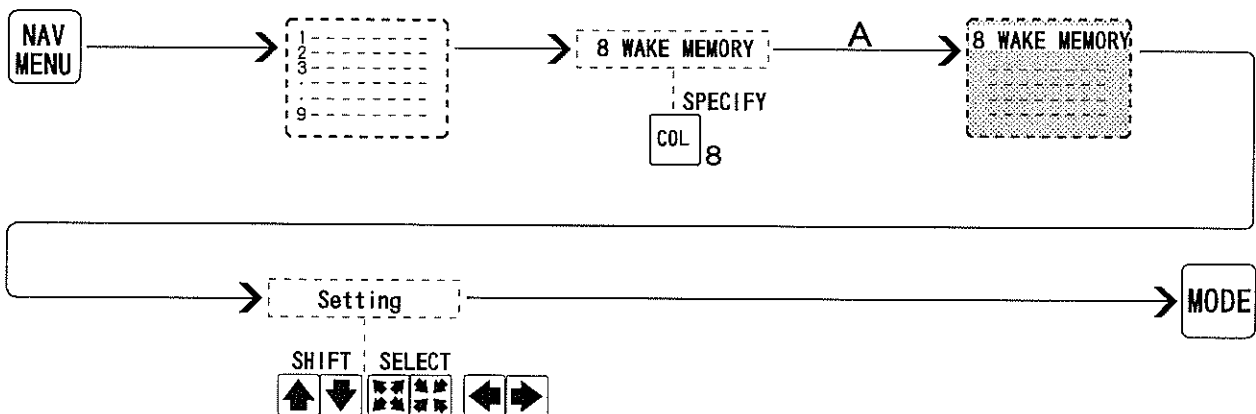
- ◎ The ship's wake is received from the navigator in a series of points. These points are displayed as a line according to the set wake memory interval and set wake color.

## WAKE MEMORY MENU

To set the settings related to Wake.

- ① WAKE MEMORY ----- To select the wake data memory On/Off.
- ② WAKE COLOR ----- To select the wake color setting method.
- ③ DEVOID NAV DSP/MEM ----- To display/memorize or not display/not memorize wake when error data is received.
- ④ MEMORY INTERVAL ----- To set the Memory interval for Wake.

### OPERATION PROCEDURE



8 WAKE MEMORY	
WAKE MEMORY	■
WAKE COLOR	COLOR ←→
DEVOID NAV DSP	ON
DEVOID NAV MEM	OFF
MEMORY INTERVAL	00'05"
MEMORIZED POINT	237
TIME REMAINING	5H13M

Use · keys to select the setting.

----- NUMBER OF POINTS BEING MEMORIZED.  
 ----- TIME REMAINING STILL AVAILABLE AT PRESENT MEMORY INTERVAL.

Use keys to shift the yellow indicator.

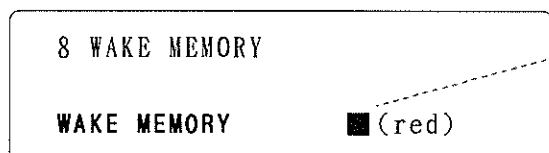
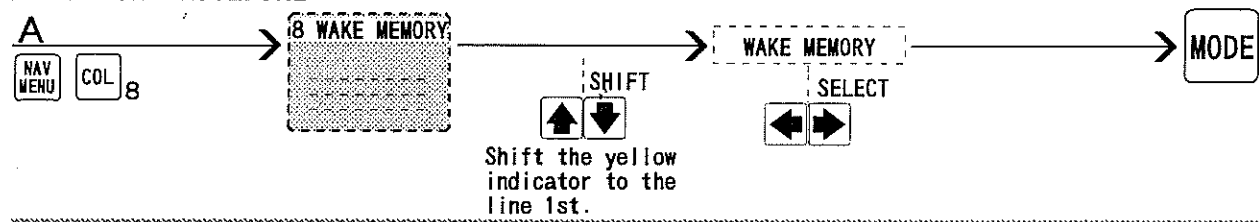
\* For more detailed explanation, refer to the following pages.  
 The operation procedure starts from the above mentioned point "A".



# 1. WAKE MEMORY

To select the wake data memory On/Off.

## OPERATION PROCEDURE



Each press of or key changes the setting, "blue - red - magenta - green - cyan - yellow - white - OFF -".

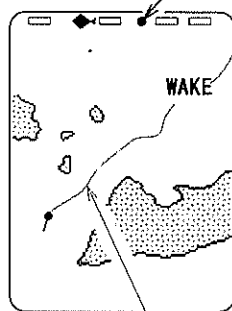
BLUE  
RED  
MAGENTA  
GREEN  
CYAN  
YELLOW  
WHITE

Will be displayed with the color selected from these.  
(will be indicated in upper.)

OFF ----- No wake display.  
(will not be indicated in upper.)

BLUE~WHITE

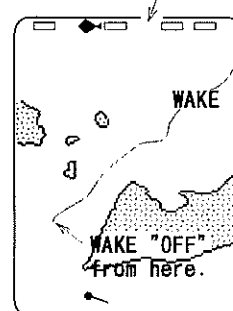
WAKE COLOR



Shows the color specified above.

OFF

No display



## WAKE KEY

Doing the following key operation provides the same effect as the one available from the setting method for the "8 WAKE MEMORY".

- Each press of key changes the wake color, "blue - red - magenta - green - cyan - yellow - white - OFF -".
- Each press of key within 5 seconds after pressing key changes the wake data memory On/Off.



## 2. WAKE COLOR

◎To select the the wake color setting method.

There are three kinds of methods as follows.

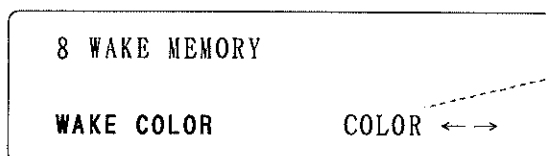
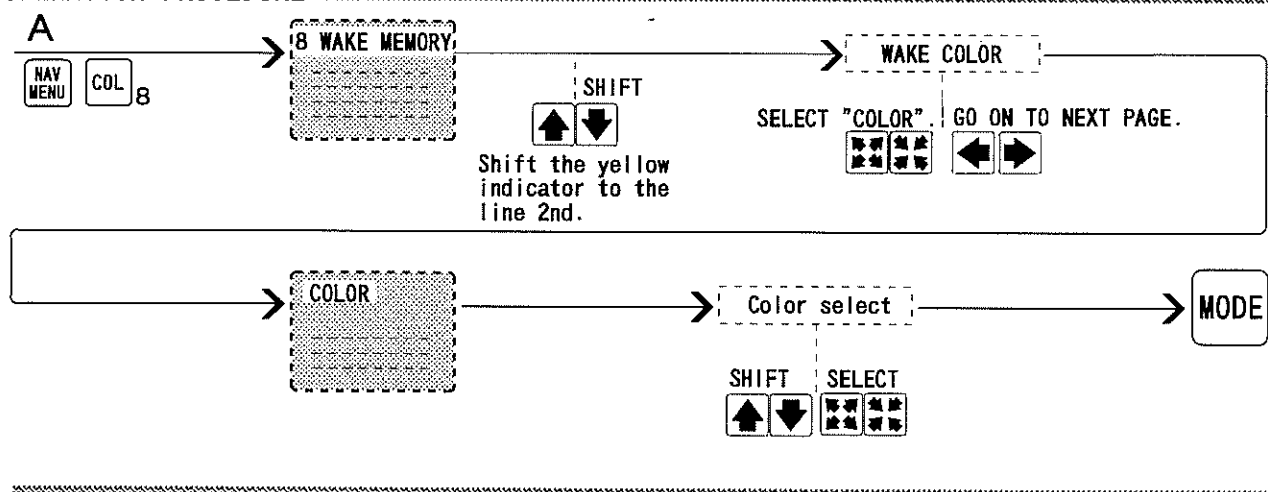
The wake color can be changed automatically according to water temperature or depth.

### ① WAKE COLOR SET BY "COLOR"

To display/memorize the wake with the color selected.

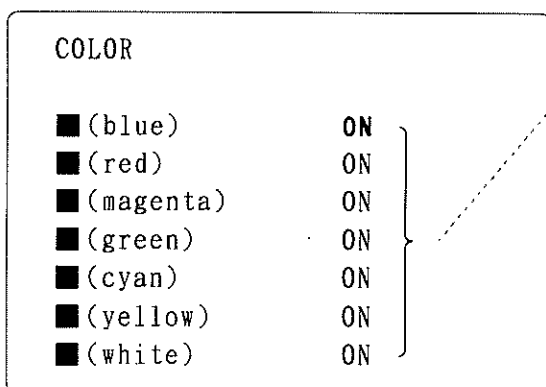
And, to select it's display On or Off.

#### OPERATION PROCEDURE



Each press of or key changes the setting, "COLOR - TEMP. - DEPTH - ".

After selecting "COLOR", press or key to go into the following menu, "COLOR".



Each press of or key changes the setting, "ON - OFF - ".

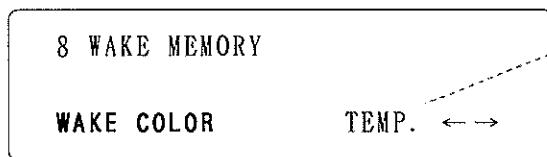
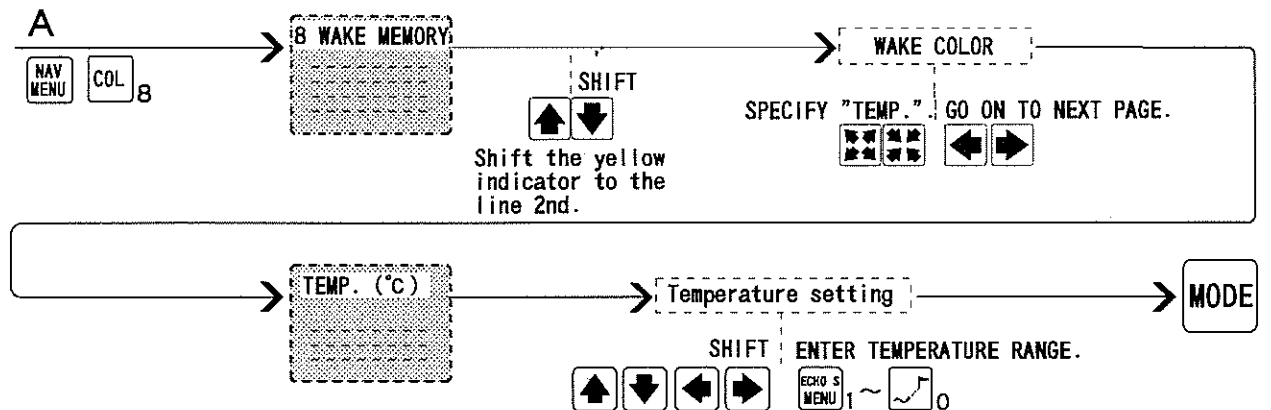
{ ON : displays the wake with this color.  
OFF : not display the wake with this color.



## ② WAKE COLOR SET BY "WATER TEMPERATURE"

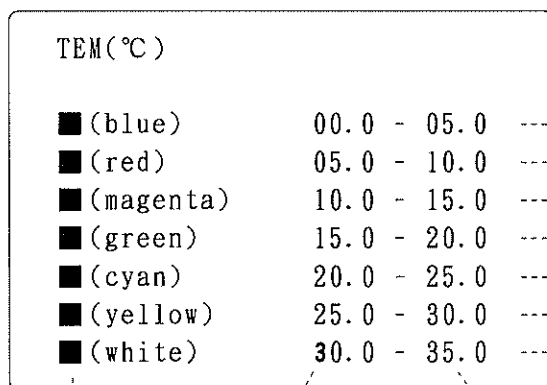
The wake color will change when the water temperature reaches the set limit.

### OPERATION PROCEDURE



Each press of or key changes the setting, "COLOR - TEMP. - DEPTH -".

After selecting "TEMP.", press or key to go into the following menu, "TEM(°C)".



(EXAMPLE) FACTORY SETTING

0°C ~ 5°C	: BLUE WAKE
5°C ~ 10°C	: RED WAKE
10°C ~ 15°C	: MAGENTA WAKE
15°C ~ 20°C	: GREEN WAKE
20°C ~ 25°C	: CYAN WAKE
25°C ~ 30°C	: YELLOW WAKE
30°C ~ 35°C	: WHITE WAKE

WAKE COLOR

Use , , , keys to shift the yellow indicator.

Use , , , keys to enter the temperature data.

### NOTICE

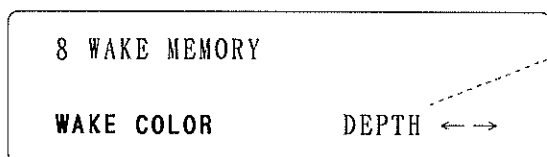
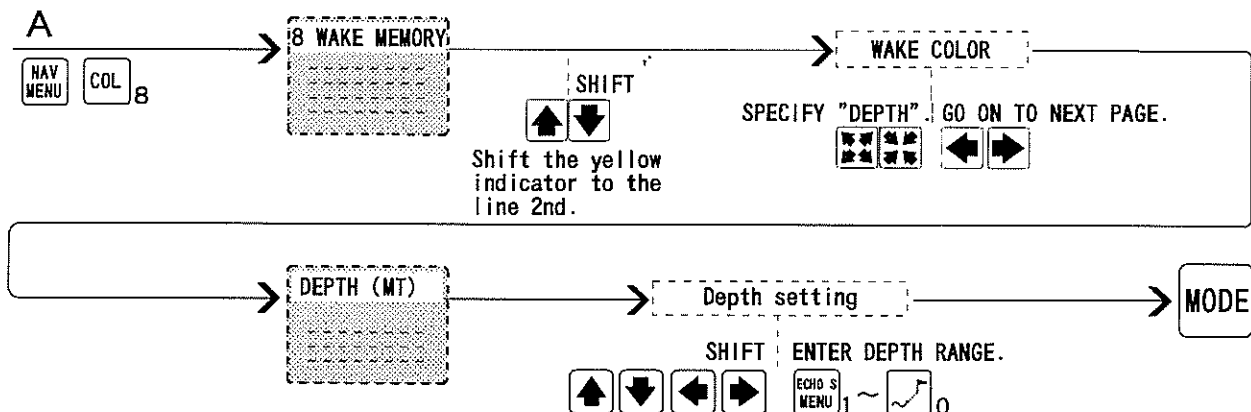
Available when the optional water temperature sensor(OP-41) is connected.



### ③ WAKE COLOR SET BY "DEPTH"

The wake color will change when the water depth reaches the set limit.

#### OPERATION PROCEDURE



Each press of or key changes the setting, "COLOR - TEMP. - DEPTH -".

After selecting "TEMP.", press or key to go into the following menu, "DEP(MT)".



DEP(MT)	
■ (blue)	0000 - 0010
■ (red)	0010 - 0020
■ (magenta)	0020 - 0030
■ (green)	0030 - 0040
■ (cyan)	0040 - 0050
■ (yellow)	0050 - 0060
■ (white)	0060 - 0070

#### (EXAMPLE) FACTORY SETTING

0m ~ 10m	: BLUE WAKE
10m ~ 20m	: RED WAKE
20m ~ 30m	: MAGENTA WAKE
30m ~ 40m	: GREEN WAKE
40m ~ 50m	: CYAN WAKE
50m ~ 60m	: YELLOW WAKE
60m ~ 70m	: WHITE WAKE

WAKE COLOR

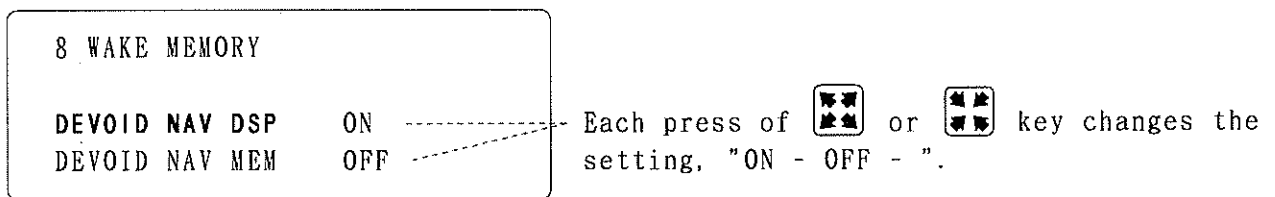
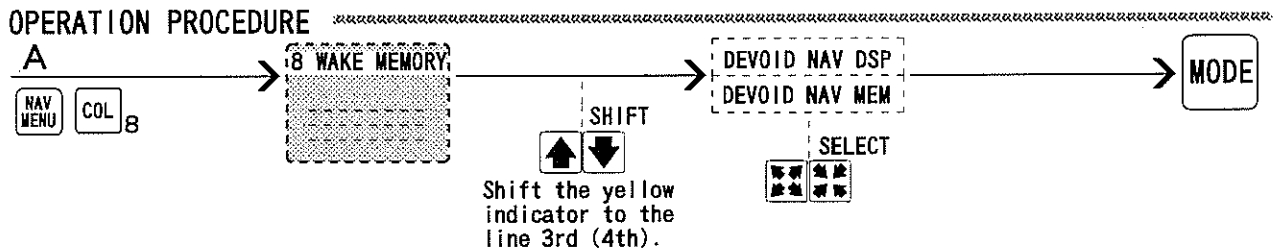
Use , , , keys to shift the yellow indicator.

Use , , , , , keys to enter the depth data.



### 3. DEVOID NAVIGATION DISPLAY/MEMORY

◎To display/memorize or not display/not memorize wake when error data is received from the GPS receiver/external navigator.



#### DEVOID NAVIGATION DISPLAY

- { ON : Displays the wake even when the error data is reveived.
- { OFF : Not display the wake when the error data is received.

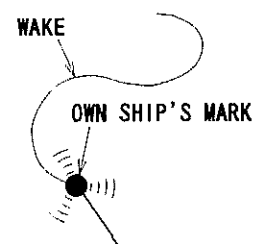
#### DEVOID NAVIGATION MEMORY

- { ON : Memorizes the wake even when the error data is received.
- { OFF : Not memorize the wake when the error data is received.

### NOTICE

Own ship mark flashes at intervals of one second under normal conditions.

However, if signals from the receiver should become irregular it will flash at quarter second intervals and the color will change from white to green.



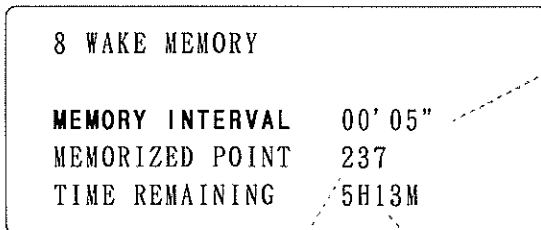
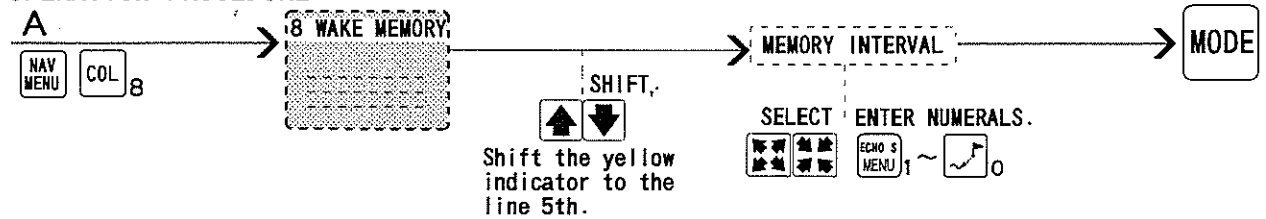
The white mark flashes under normal conditions.



## 4. MEMORY INTERVAL

©To set the Memory interval for Wake.

### OPERATION PROCEDURE



NUMBER OF POINTS  
BEING MEMORIZED

TIME REMAINING STILL AVAILABLE AT PRESENT MEMORY  
INTERVAL. (Not available when the memory interval  
is set with the distance.)

Each press of or key changes the  
setting, "00'05" - 0.01NM - ".

Use keys to enter the memory  
interval(time or distance).

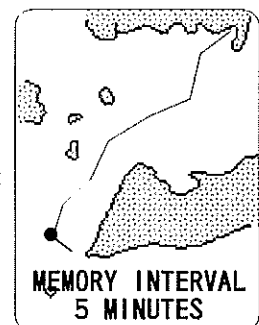
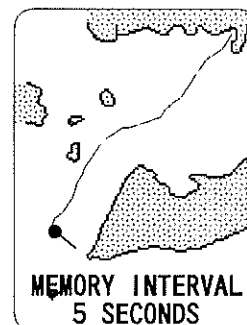
00'05" : Memorizes the wake at the specified time interval.  
Available from 5 seconds to 60 minutes.

0.01NM : Memorizes the wake at the specified distance interval.  
Available from 0.01 to 9.99NM.

## NOTICE

If the set memory interval is long the wake  
will be displayed more unevenly but time of  
wake display will be longer.

If the memory interval is short the wake  
will be displayed more evenly however the  
time of wake display will be shorter because  
the wake is limited to up to 16,000 points  
(when one page is selected.)



MEMORY INTERVAL	MAXIMUM MEMORY (PER PAGE)			
	1 PAGE 16,000 points	2 PAGES 8,000 × 2	3 PAGES 4,000 × 4	4 PAGES 2,000 × 8
5 sec.	22hrs. 13mins.	11hrs. 6 mins.	5hrs. 33mins.	2hrs. 46mins.
30 sec.	5days 13hrs.	2days 18hrs.	1day 9hrs.	16hrs. 40mins.
1 min.	11days 2hrs.	5days 13hrs.	2days 18hrs.	1day 9hrs.
10 min.	111days 2hrs.	55days 13hrs.	27days 18hrs.	13days 21hrs.
30 min.	333days 8hrs.	166days 16hrs.	83days 8hrs.	41days 16hrs.

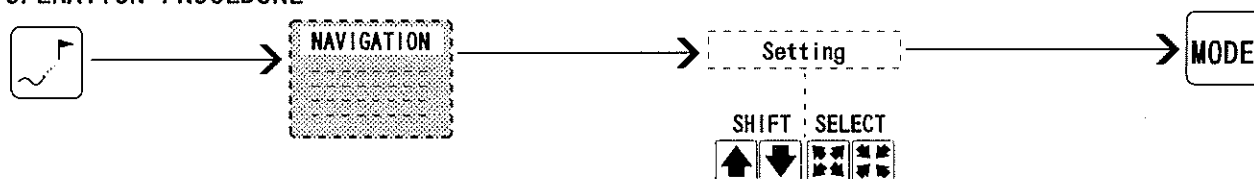


# NAVIGATION KEY

To set the settings related to Navigation.

- ① NAVIGATION ----- To display the course.
- ② TIME DISPLAY ----- To select the display way of the time from own ship position to cursor crossing or waypoint.
- ③ LINE DISPLAY ----- To specify the course line display On/Off.
- ④ CURSOR SIZE ----- To select the cursor size.
- ⑤ COURSE VECTOR ----- To select the displaying way of the course vector.
- ⑥ DISPLAY INFORMATION ----- To select the data to be displayed.

## OPERATION PROCEDURE



NAVIGATION	
NAVIGATION	OFF
TIME DISPLAY	TIME REQUIRED
LINE DISPLAY	FIXED
CURSOR SIZE	SMALL
COURSE VECTOR	SHORT
DISPLAY INFO.	FULL

Use keys to shift the yellow indicator.

Use keys to select the setting.

**\* For more detailed explanation, refer to the following pages.**



# NAVIGATION

- ©The course from own ship position to a specified waypoint or the cursor crossing will be displayed in a dotted purple line. The distance, bearing and time to this point will also be displayed in the lower left of the screen.

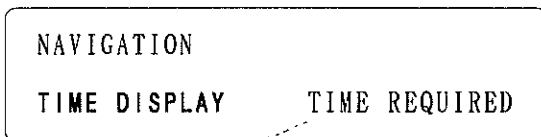
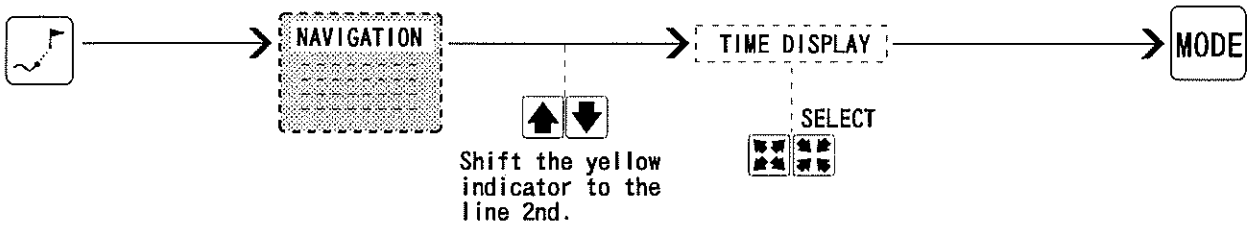
It is possible to erase the dotted course line but still have the information displayed.

For more details, refer to PG 115.

# TIME DISPLAY

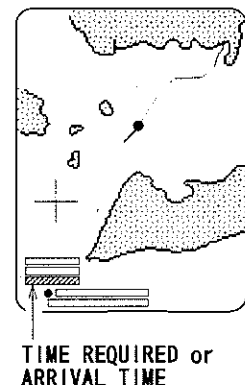
- ©To select the display way of the time from own ship position to cursor crossing or waypoint.

## OPERATION PROCEDURE



Each press of or key changes the setting, "TIME REQUIRED - ARRIVAL TIME -".

- TIME REQUIRED: displays the time to the specified point.  
EX. 01H32M ; 1 hour and 32 minutes
- ARRIVAL TIME : displays the arrival time at the specified point.  
EX. 11:15

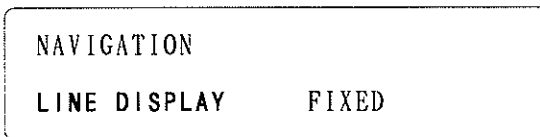
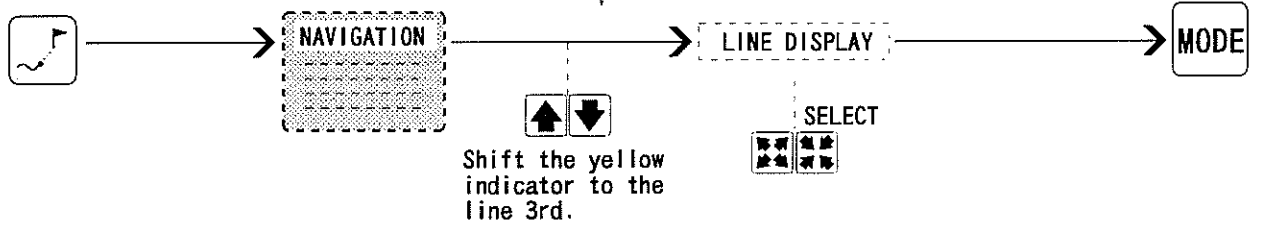




# LINE DISPLAY

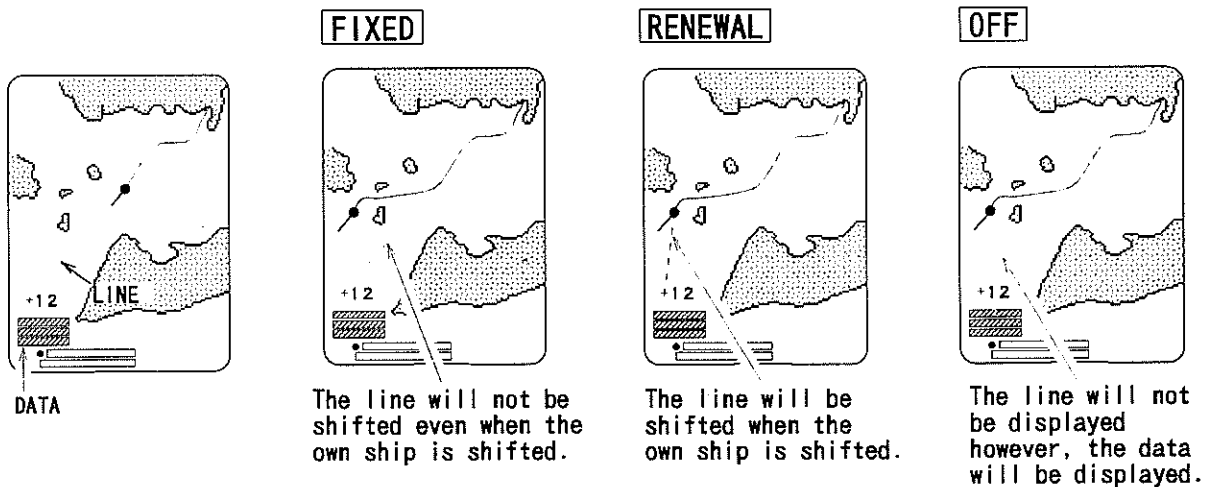
©To specify the course line(a dotted purple line) display On or Off. PG 115.

## OPERATION PROCEDURE



Each press of  or  key changes the setting, "FIXED - RENEWAL - OFF - ".

- FIXED : displays the line.
- RENEWAL: displays the line. When the own ship shifts, the line also shifts.
- OFF : not display the line, however, displays the data.

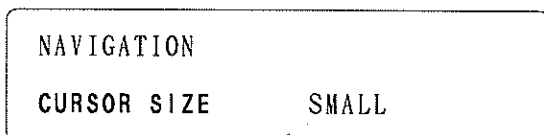
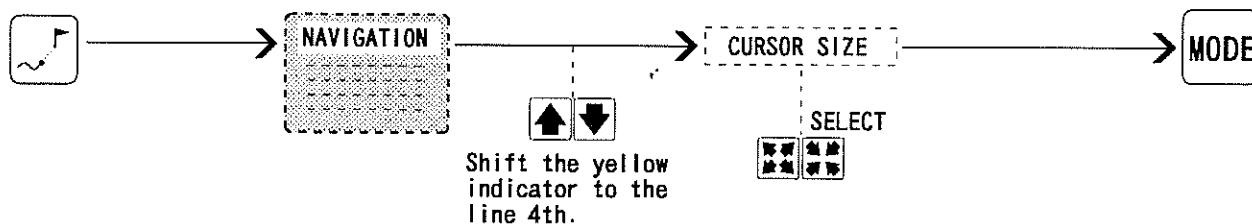




## CURSOR SIZE

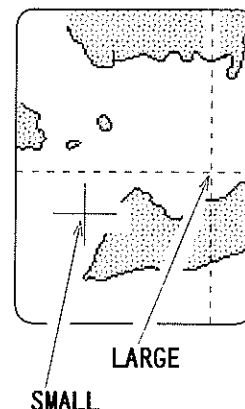
©To select the cursor size (large+small).

### OPERATION PROCEDURE



Each press of or key changes the setting, "SMALL - LARGE -".

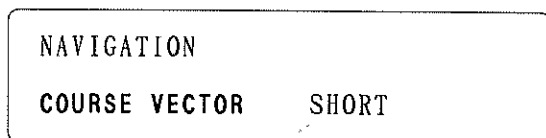
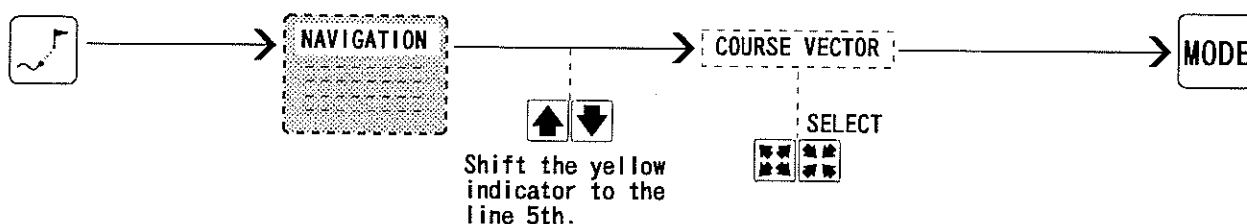
LARGE: displays the cursor on the full screen.  
SMALL: displays the cursor in "+" shape.



## COURSE VECTOR

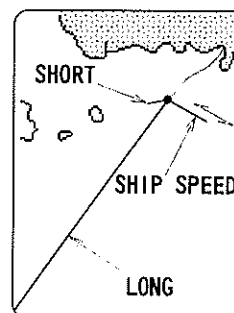
©To select the displaying way of the course vector.

### OPERATION PROCEDURE



Each press of or key changes the setting, "SHORT - LONG - SHIP SPEED -".

SHORT: displays the short route vector.  
LONG : displays the route vector on the full screen.  
SHIP SPEED: varies the route vector depending on the ship speed.

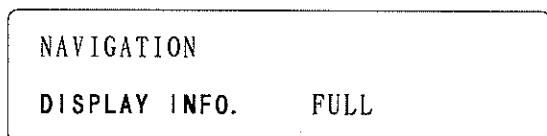
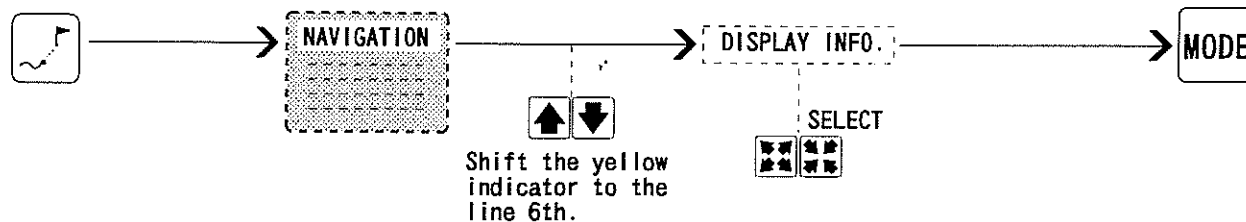




# DISPLAY INFORMATION

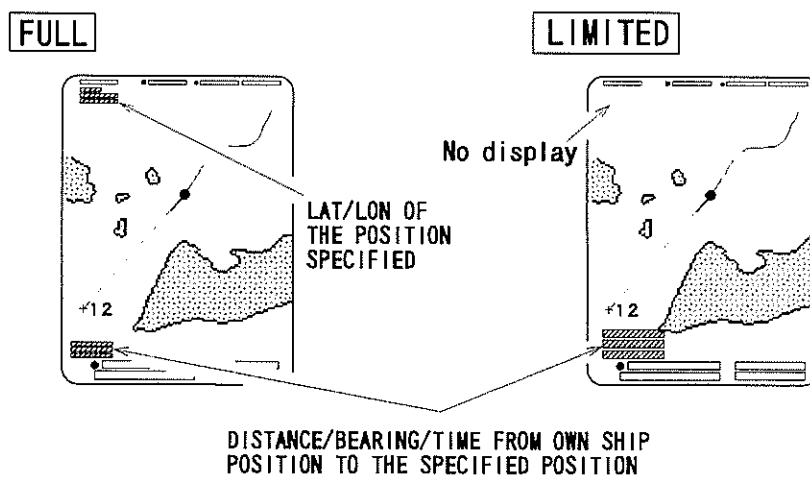
©To select the data to be displayed.

## OPERATION PROCEDURE



Each press of or key changes the setting, "FULL - LIMITED - ".

- FULL** : displays the distance, bearing and the time from own ship position to the specified point, and, displays the specified point's positional data in addition.
- LIMITED** : displays the distance, bearing and the time from own ship position to the specified point.



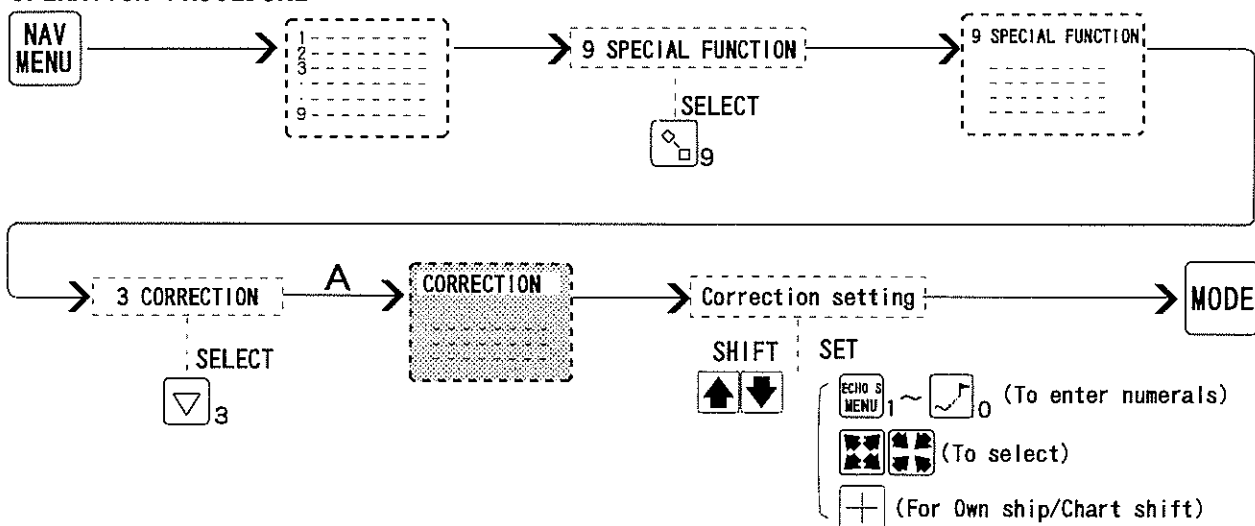


# CORRECTION MENU

©To correct the following settings.

- ① TIME DIFFERENCE ----- To correct the time displayed in the screen.
- ② SHIP SHIFT ----- To correct the own ship position.  
CHART SHIFT ----- To correct the chart position.
- ③ POSITION SHIFT(CORRECT) ----- To correct the positional data.
- ④ DATUM ----- To correct(set) to the most suitable surveying system.
- ⑤ SMOOTHING ----- To correct the errors in the navigational data of the wake, the own ship position, the ship speed and the course, by averaging them.
- ⑥ MAGNET CORRECT ----- To correct(select) the way of course.

## OPERATION PROCEDURE



### CORRECTION

TIME DIFF.	+09:00
SHIP SHIFT	0.000' N 0.000' E
CHART SHIFT	0.000' N 0.000' E
POSITION SHIFT	0.000' N 0.000' E
DATUM	2 TOKYO
SMOOTHING	00 - 00 - 00
MAGNET CORRECT	OFF

Use keys to shift the yellow indicator.

Use 1 ~ 0 • • keys to enter the numeral/to select the setting.

\* For more detailed explanation, refer to the following pages.

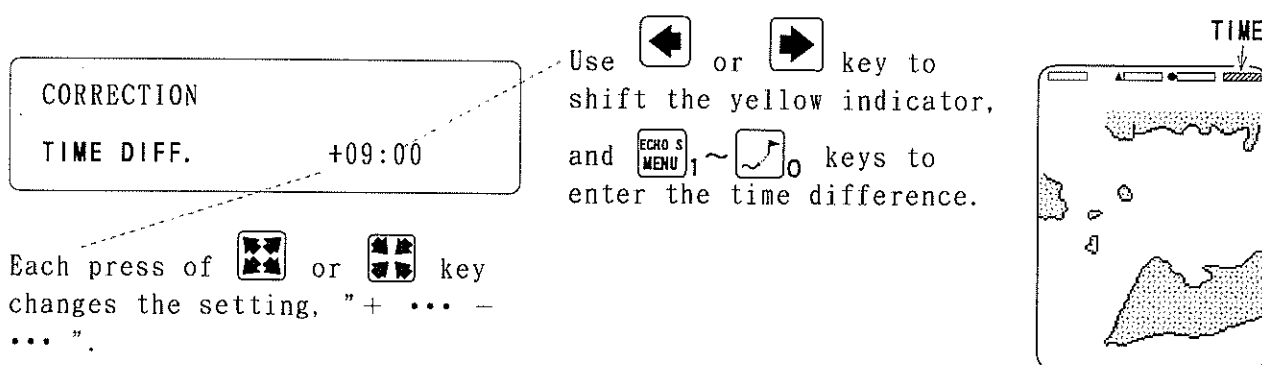
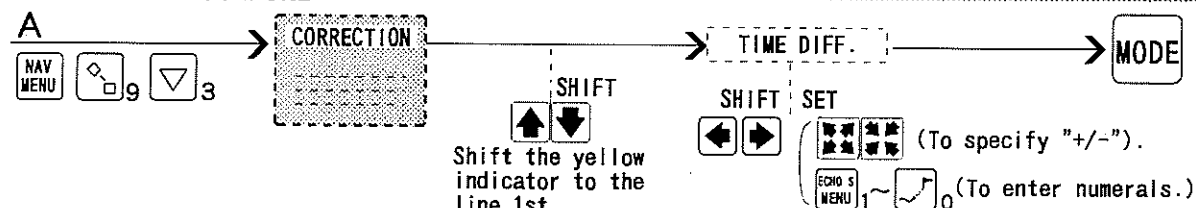
The operation procedure starts from the above mentioned point "A".



# TIME DIFFERENCE

- ◎To correct the time displayed in the upper right of the screen to your local time. Enter the time difference between your local time and the standard time as follows.

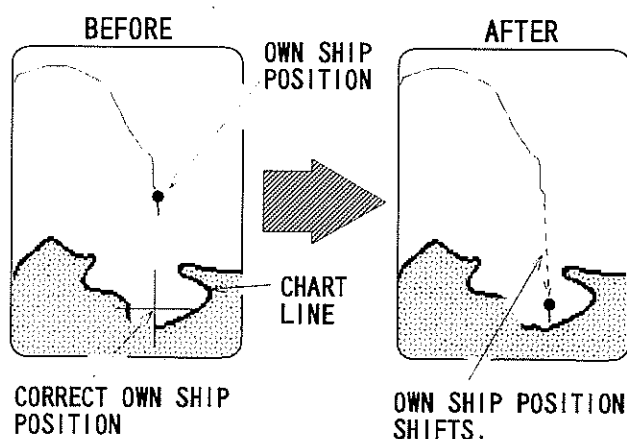
## OPERATION PROCEDURE



# SHIP SHIFT/ CHART SHIFT

- ◎To correct Own Ship or Chart(Coast line) position.

## SHIP SHIFT

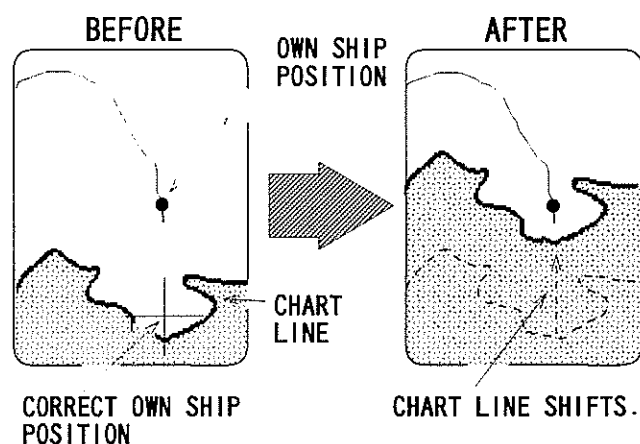


When the Own Ship position is incorrect.

Display the Cursor Lines on the screen and move the Cursor Crossing to the correct Own Ship position. Do the SHIP SHIFT operation to shift the own ship position and the own ship positional data will be corrected. (The data before operating will not be corrected.)



## CHART SHIFT

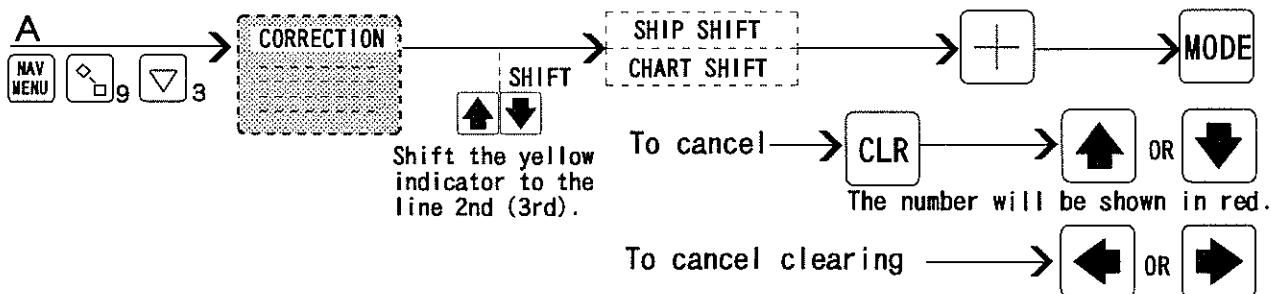


When the Chart(Coast Line) position is incorrect. Display the Cursor Lines on the screen and move the Cursor Crossing to the correct Own Ship position. Do the CHART SHIFT operation to shift the chart. The own ship positional data is as same as the data before operation.

## OPERATION PROCEDURE





Press this key and shift the cursor crossing to the actual own ship's position on the display.  
(Zoom the display up for accuracy.)




### CORRECTION

SHIP SHIFT	0.000' N	0.000' E
CHART SHIFT	0.000' N	0.000' E

Press  key to display the shift data, and the own ship position/chart will be shifted.

To cancel this operation, press  key.

## NOTICE

To reset SHIP SHIFT/CHART SHIFT first press  key to cancel the shift operation and set again.

SHIP SHIFT/CHART SHIFT should not only be done when the GPS receiver is in a normal, stable condition.

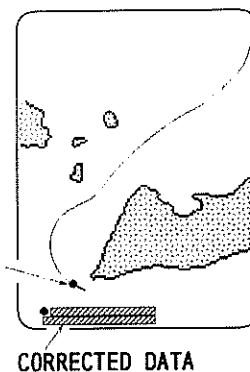


## POSITION SHIFT(CORRECT)

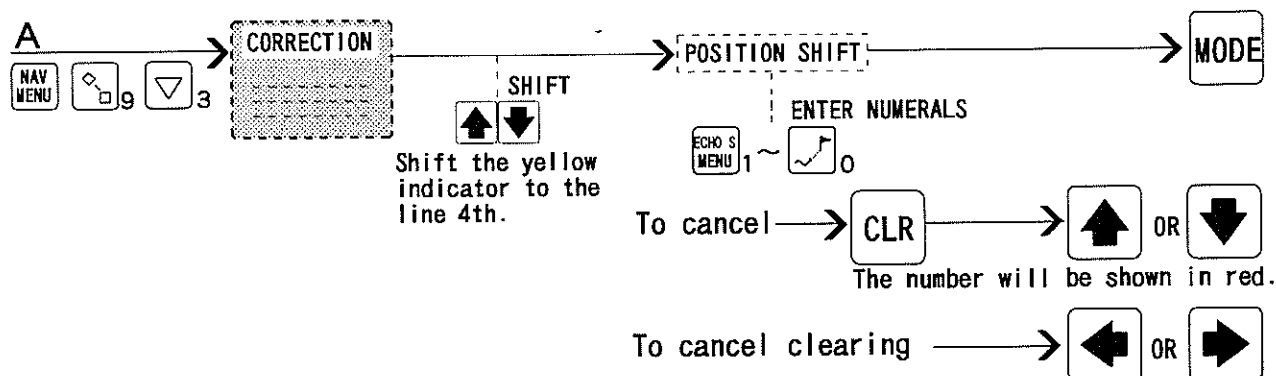
◎To correct the positional data of this unit and to display the same data of the external navigation when each data is different.

Only the own ship positional data on the lower left of the screen will be corrected by this operation.

Own ship position will be displayed using old data.



### OPERATION PROCEDURE



### When "LAT/LON" is selected for "POS. DSP. FORM(position display form)" (PG42)

CORRECTION		
POSITION SHIFT	0:000°N	0.000'E

Each press of or key changes the setting, "N - S - " or "E - W - ".

Use or key to shift the yellow indicator and use keys to enter the data to be corrected.

To cancel, press key.

### When "LORAN C" is selected for "POS. DSP. FORM(position display form)" (PG43)

CORRECTION		
POSITION SHIFT	+00.0	+00.0

Each press of or key changes the setting, "+... - ...".

Use or key to shift the yellow indicator and use keys to enter the data to be corrected.

To cancel, press key.



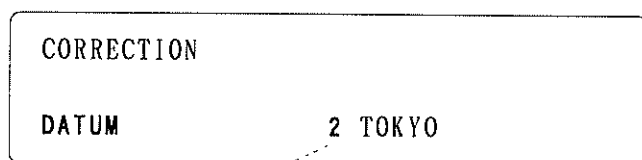
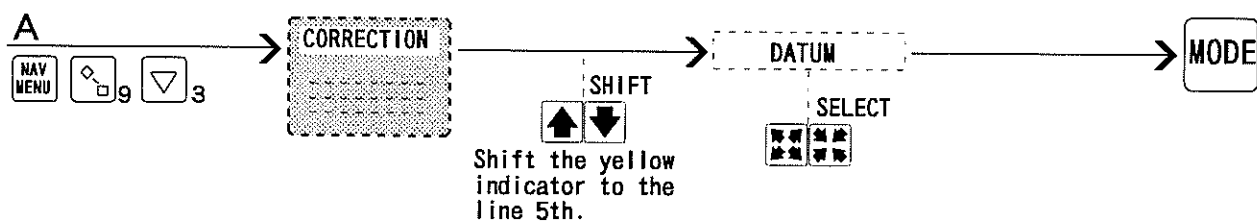
# DATUM

©To select the most suitable surveying (Lat/Lon) system from the following.

- 0: OFF
- 1: WGS-72(LORANC•NNSS)
- 2: TOKYO
- 3: NORTH AMERICA
- 4: ALASKA/CANADA
- 5: EUROPE
- 6: AUSTRALIA
- 7: SOUTH ASIA
- 8: SOUTH AMERICA

2:TOKYO is as the same datum as that on the display.

## OPERATION PROCEDURE



Each press of or key changes the setting, "0 - 1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 -".

Or use 0 • 1 ~ 8 keys for direct setting.

## NOTICE

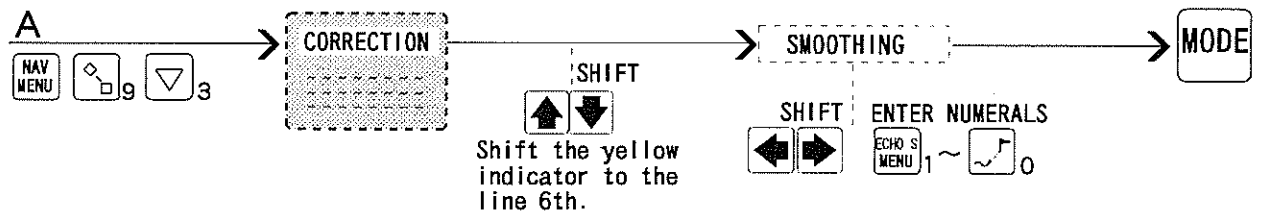
This function will operate only when this unit is operated by internal GPS.  
PG39



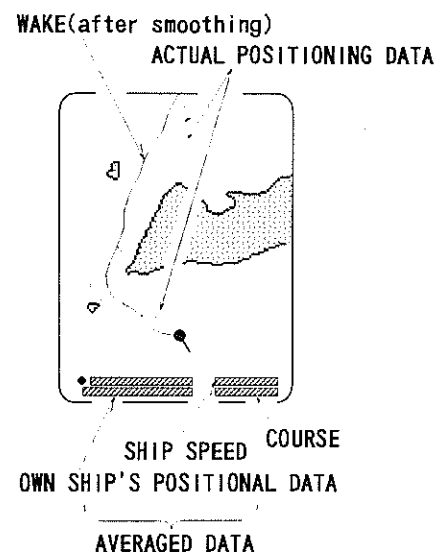
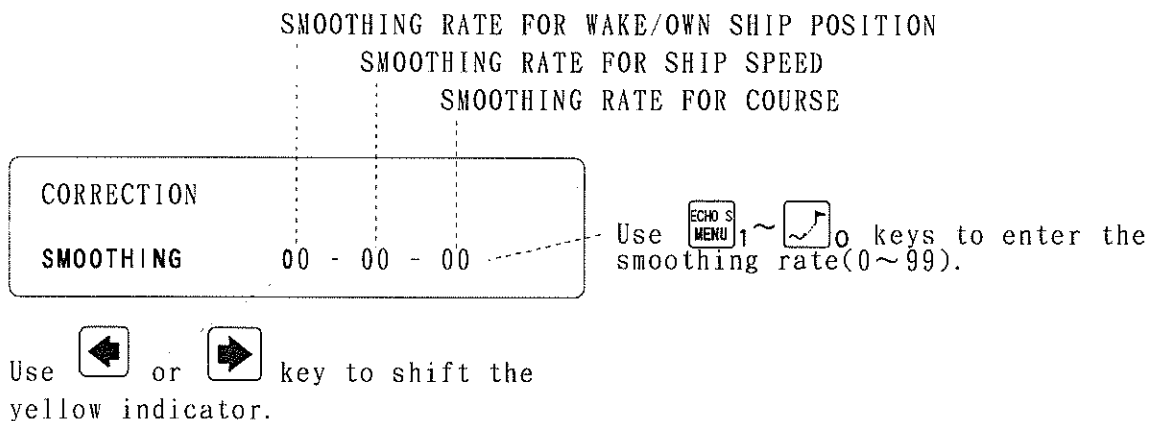
# SMOOTHING

- ©Errors in the navigational data will cause errors in own ship position and wake display.
- By averaging (smoothing) wake, own ship position, speed and course, these errors may be reduced.
- Smoothing may be set from 0(no smoothing) ~ 9(the highest level of smoothing)
- First set to 0 and increase the level gradually in relation to the errors.

## OPERATION PROCEDURE



\*\*\*\*\*



## NOTICE

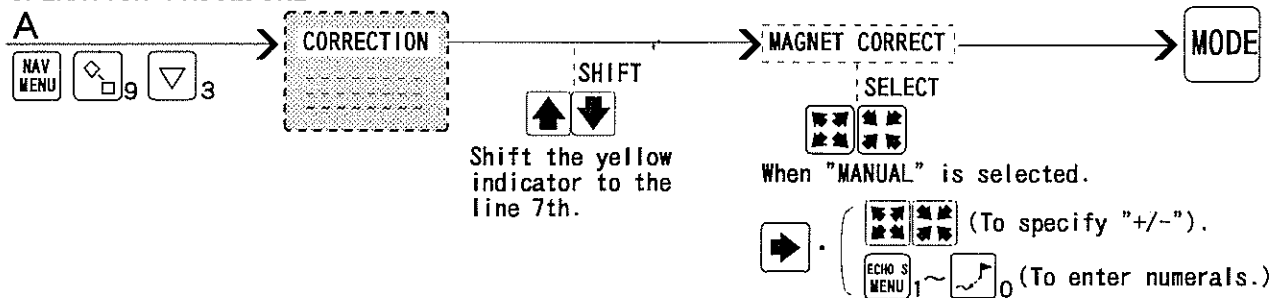
When this unit is operated by the external navigation use the smoothing function of the external navigation.



# MAGNET CORRECT

©To correct(select) the display way of course.

## OPERATION PROCEDURE



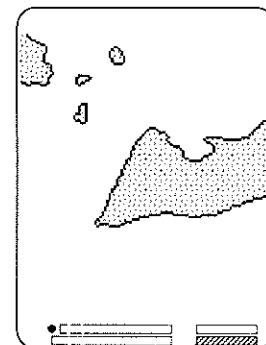
CORRECTION

MAGNET CORRECT    OFF

Each press of or key changes the setting, "OFF - AUTO - MANUAL".

- OFF:        displays the true direction.  
            ("T" will be displayed in the lower right.)
- AUTO:      displays the magnet direction automatically corrected.  
            ("M" will be displayed in the lower right.)
- MANUAL:    displays the magnet direction manually corrected.

To enter the correct rate, press key and use the keys or keys.




"T(OFF)" or "M(AUTO)"

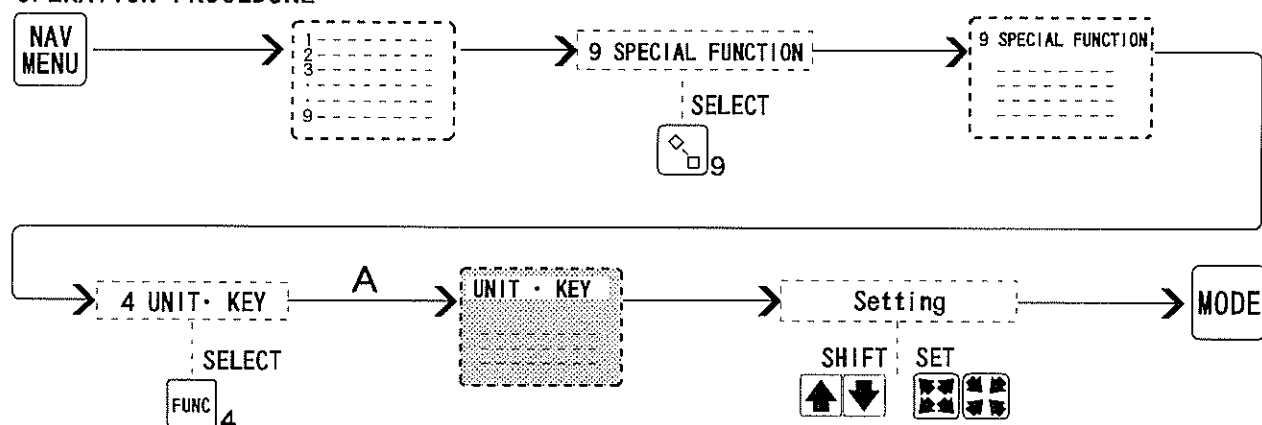


# UNIT • KEY MENU


◎To set the unit for each setting.


- ① TEMPERATURE UNIT ----- To select the temperature unit when the temperature is displayed.
- TEMPERATURE DISPLAY ----- To select the temperature display ON/OFF.
- ② SPEED UNIT ----- To select the speed unit when the ship speed is displayed.
- ③ DISTANCE UNIT ----- To select the distance unit when the distance is displayed.
- ④ KEY SETTING ----- To select the kind of mark which is displayed when  key is pressed.

## OPERATION PROCEDURE



UNIT • KEY	
TEMP. UNIT	°C
TEMP. DISPLAY	OFF
SPEED UNIT	KT
DISTANCE UNIT	KM
KEY SETTING	WAYPOINT

Use  keys to select the setting.

Use  keys to shift the yellow indicator.

\* For more detailed explanation, refer to the following pages.

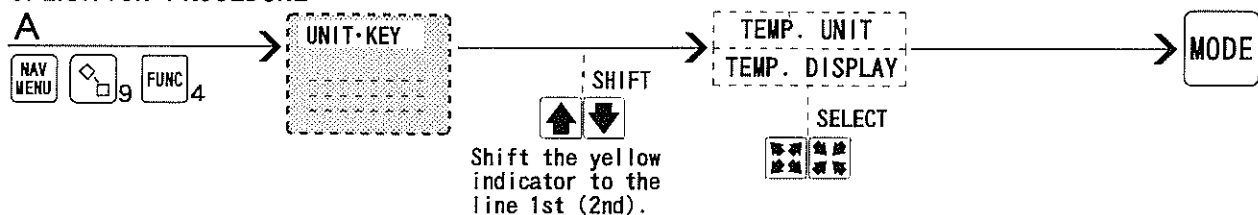
The operation procedure starts from the above mentioned point "A".



# TEMPERATURE UNIT/TEMPERATURE DISPLAY

©To select the temperature unit to be displayed in the screen's upper right, and to select the temperature unit display ON/OFF.

## OPERATION PROCEDURE

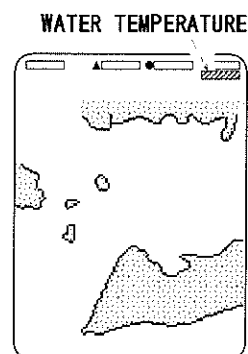


UNIT-KEY	
TEMP. UNIT	°C
TEMP. DISPLAY	OFF

Each press of or key changes the setting, "°C - °F - ".  
 { °C  
 ° F

Each press of or key changes the setting, "ON - OFF - ".

{ ON: Displays the water temperature.  
 OFF: No display.



## NOTICE

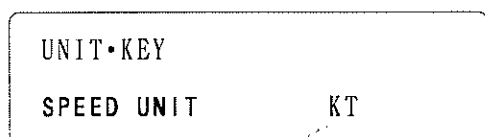
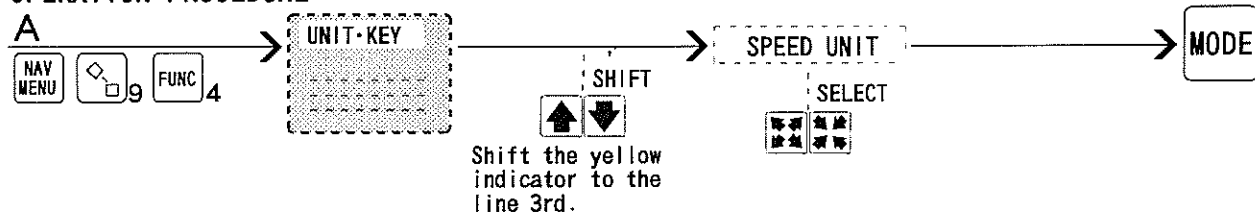
The optional Temperature Sensor OP-41 must be connected to the rear panel for temperature display. PG 17.



## SPEED UNIT

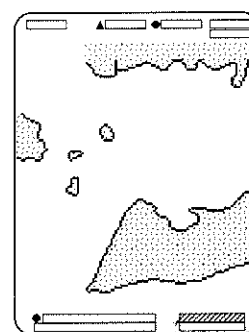
©To select the speed unit to be displayed screens lower right.

### OPERATION PROCEDURE



Each press of or key changes the setting, "KT - KM/H - ".

{ KT : Knots  
KM/H: Kilometer(s) per hour

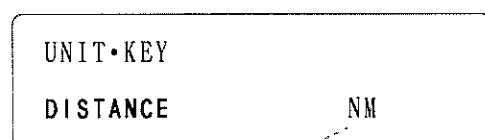
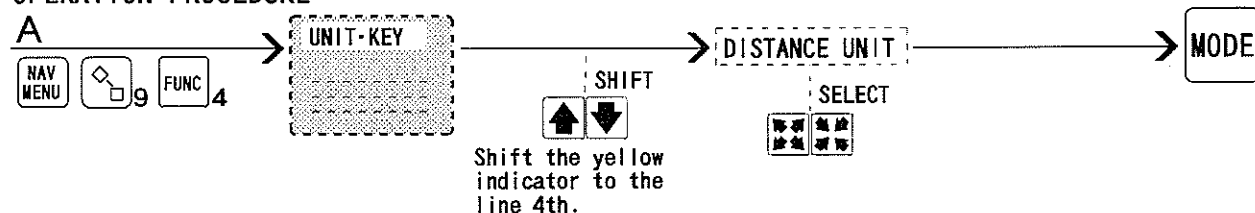


SHIP SPEED

## DISTANCE UNIT

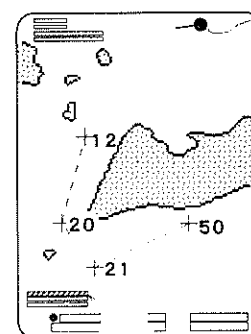
©To select the distance unit to be displayed screens upper left.

### OPERATION PROCEDURE



Each press of or key changes the setting, "NM - KM - ".


{ NM: Nautical mile. (1NM=1.8Km)  
KM: Kilometer(s)



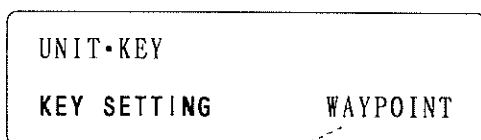
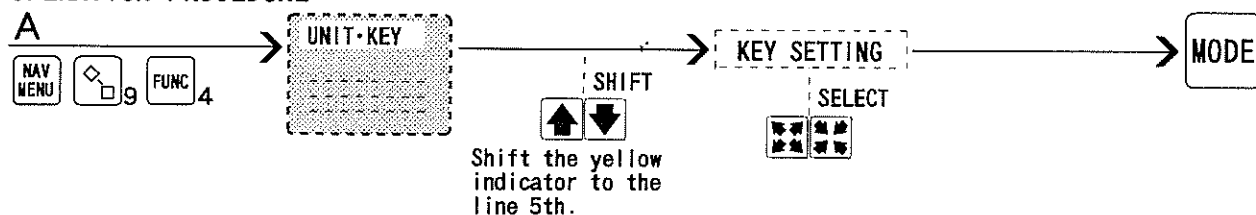
DISTANCE






## KEY SETTING


©To select the kind of mark which is displayed when  key is pressed.

### OPERATION PROCEDURE





Each press of  or  key changes the setting, "WAYPOINT - MARK -".

WAYPOINT: Waypoint mark will be displayed when  key is pressed.

MARK: Mark will be displayed when  key is pressed.

## HOW TO USE

 +  KEYS

©By pressing  key within 5 seconds after pressing  key will display the other mark which is not selected for the above "KEY SETTING".

When "WAYPOINT" is selected for "KEY SETTING", Mark will be displayed.

When "MARK" is selected, Waypoint will be displayed.

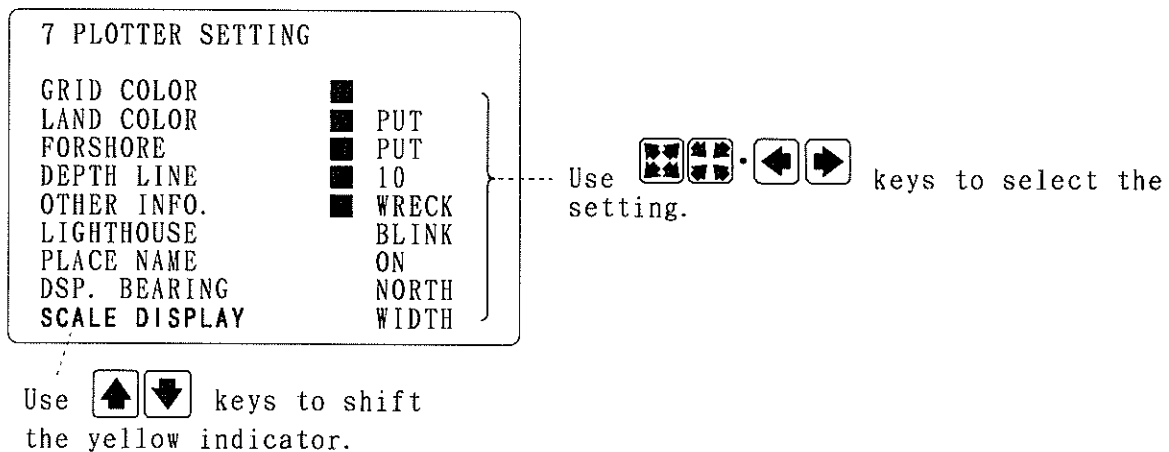
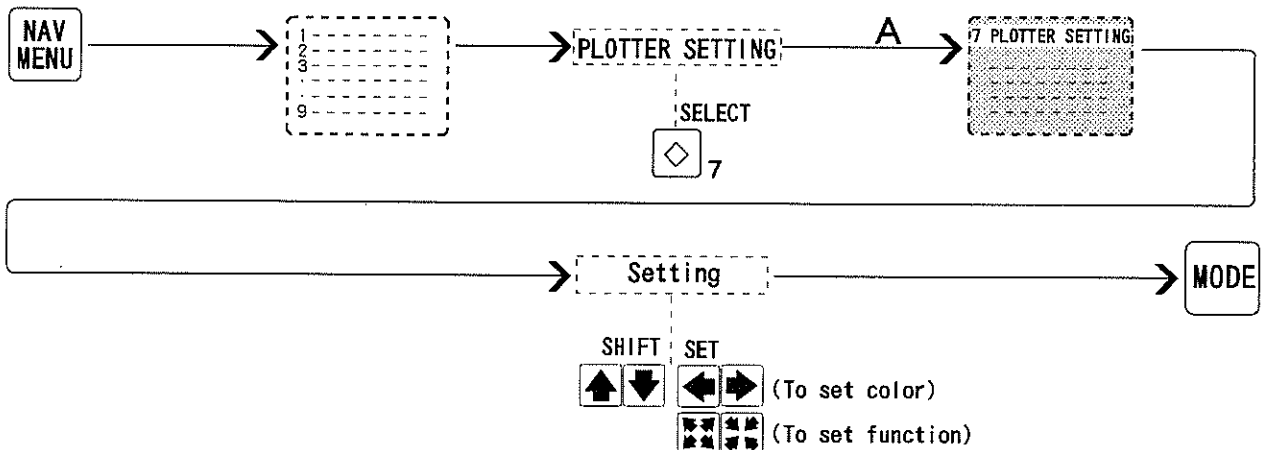


# PLOTTER SETTING MENU

© "7 PLOTTER SETTING" menu is for setting the following functions.

- ① GRID COLOR ----- To select the color of the grid to be displayed, or to select the grid display Off.
- ② LAND COLOR ----- To select the color of the land to be displayed, or to select the land display Off.
- ③ FORSHORE ----- To select the color of the forshore to be displayed, or to select the forshore display Off.
- ④ DEPTH LINE ----- To select the color of the depth line to be displayed, or to select the depth line display Off.
- ⑤ OTHER INFORMATION ----- To select the color of the wreck/fishing reef to be displayed, or to select the wreck/fishing reef display Off
- ⑥ LIGHTHOUSE ----- To select the lighthouse display On(in blinking) or Off
- ⑦ PLACE NAME ----- To select the place name display On or Off.
- ⑧ DISPLAY BEARING ---- To change the display bearing.
- ⑨ SCALE DISPLAY ----- To select the scale display type.

## OPERATION PROCEDURE



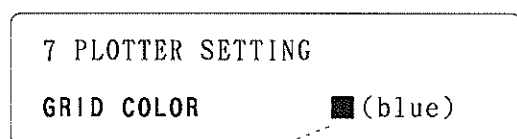
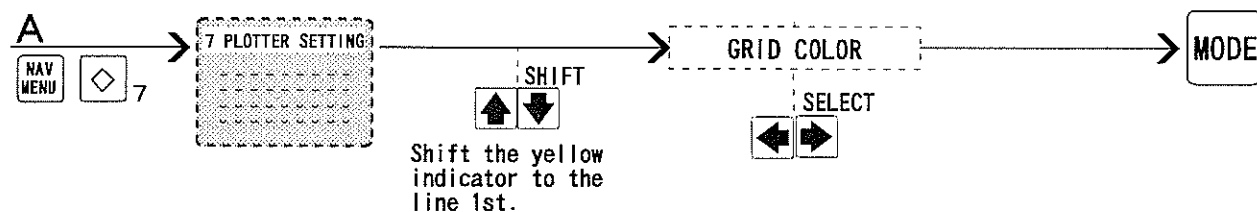
\* For more detailed explanation, refer to the following pages.  
The operation procedure starts from the above mentioned point "A".



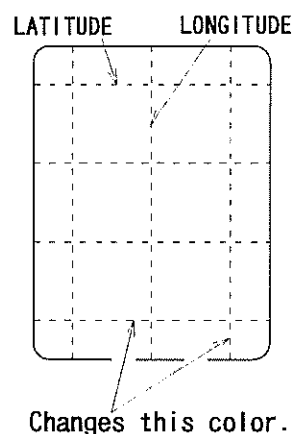
## GRID COLOR

©To select the color of the grid(latitude/longitude lines) to be displayed, or to select the grid display "OFF".

### OPERATION PROCEDURE



Each press of or key changes the setting, "■(blue) - ■(red) - ■(magenta) - ■(green) - ■(cyan) - ■(yellow) - ■(white) - □(No grid display) - ", and it will be displayed with the color selected.



## NOTICE

The color explanation besides ■ is not actually displayed on the menu.

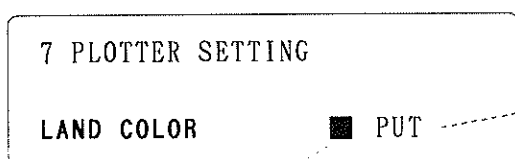
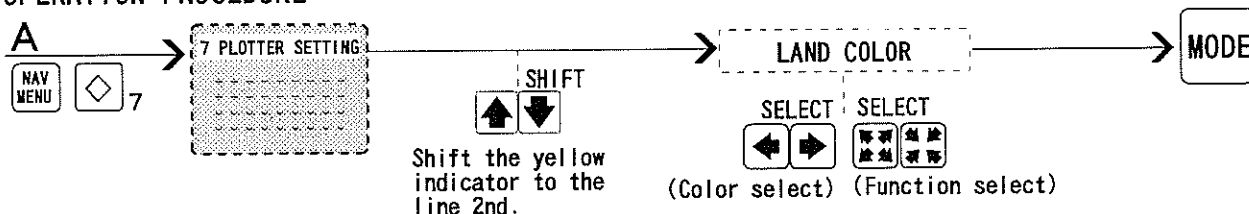


# LAND COLOR

©To select the color of the land to be displayed, or to select the land(chart) display "OFF".

To select either the land to be displayed in filled color or the map to be displayed using coast lines (without color).

## OPERATION PROCEDURE

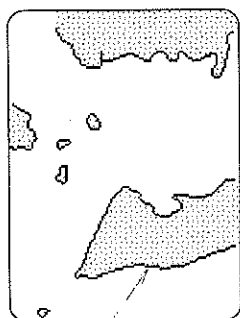


Each press of or key changes the setting, "PUT - NOT PUT -".

PUT : displays the land in filled color.

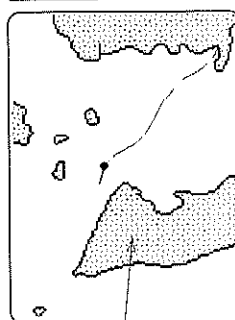
NOT PUT : displays the land using coast lines(chart).

Each press of or key changes the setting, "■(blue) - ■(red) - ■(magenta) - ■(green) - ■(cyan) - ■(yellow) - ■(white) - □(No land display) - ", and it will be displayed with color selected.



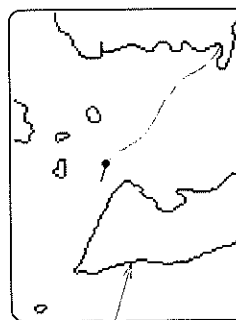
Changes this color.

PUT



Land is displayed with color.

NOT PUT



Land is displayed with chart lines.

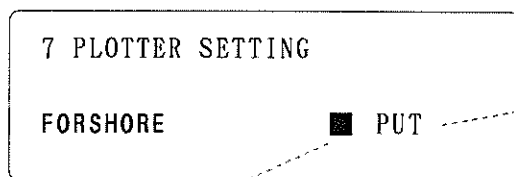
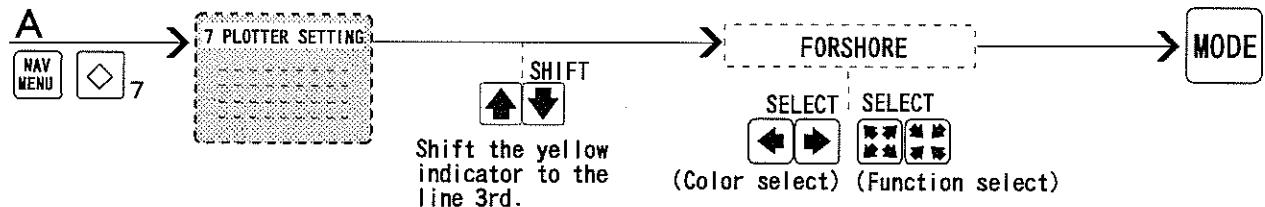


# FORSHORE

◎To select the color of the forshore to be displayed, or to select the forshore display "OFF".

To select either the forshore to be displayed in filled color or to be displayed using a line (without color).

## OPERATION PROCEDURE

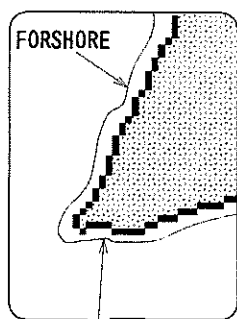


Each press of or key changes the setting, "■(blue) - ■(red) - ■(magenta) - ■(green) - ■(cyan) - ■(yellow) - ■(white) - □(No forshore display) - ", and it will be displayed with the color selected.

Each press of or key changes the setting, "PUT - NOT PUT - ".

Each press of or key changes the setting, "PUT - NOT PUT - ".

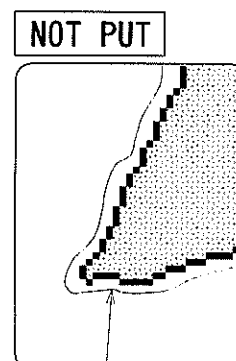
PUT : displays the forshore in filled color.  
NOT PUT : displays the forshore using a line.



Changes this color.



Forshore is displayed with color.



Forshore is displayed with a line.

## ⚠ CAUTIONS

Forshore data is optional.

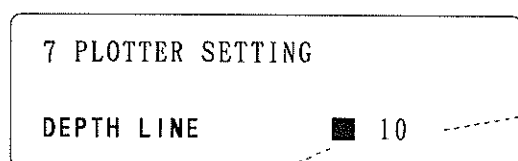
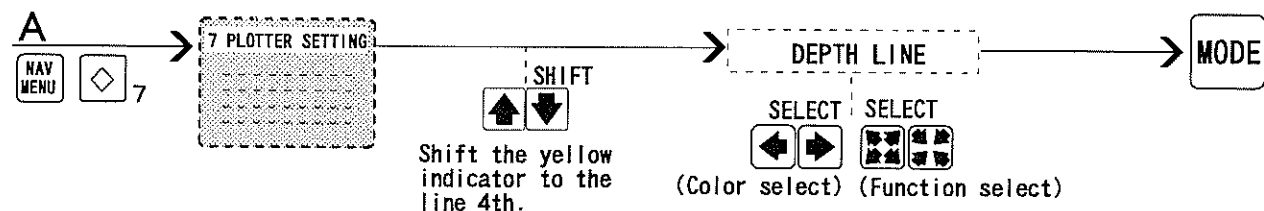


# DEPTH LINE

© To select the color of the depth line to be displayed, or to select the depth line display "OFF".

This function is available when the depth line data is included in this unit.

## OPERATION PROCEDURE



Each press of or key changes the setting, "10 - 20 - 50 - 100 - 200 - 500 - 1000 - 2000 -".

Each press of or key changes the setting, "■ (blue) - ■ (red) - ■ (magenta) - ■ (green) - ■ (cyan) - ■ (yellow) - ■ (white) - □ (No depth line display) - ", and it will be displayed with the color selected.

© On the above menu, select the depth line to be

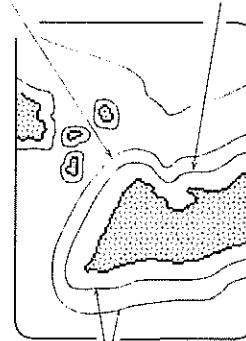
displayed using or key first, and

select it's color using or key.

The color can be differed depending on the depth line.

When the depth line is not displayed, select "□".

20M DEPTH LINE 10M DEPTH LINE



Changes On/Off and color.

## CAUTIONS

The 100/200/500m depth line data are available as standard however, the others are optional.

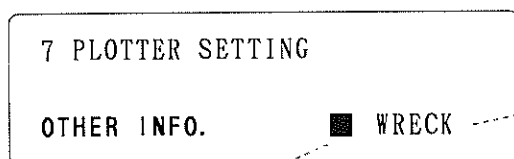
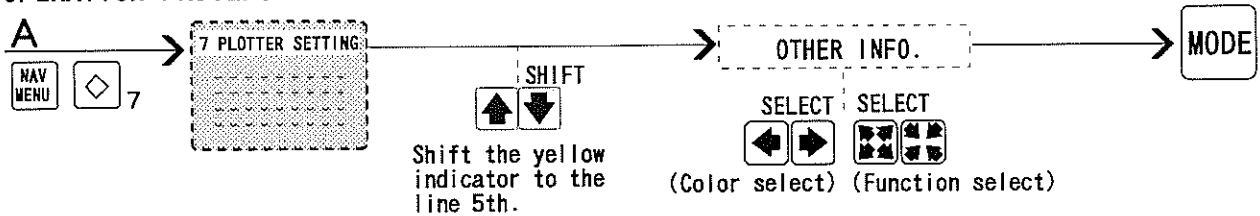


## OTHER INFORMATION

◎To select the color of the wreck/fishing reef to be displayed, or to select the wreck/fishing reef "OFF".

This function is available when the wreck/fishing reef data are included in this unit.

### OPERATION PROCEDURE

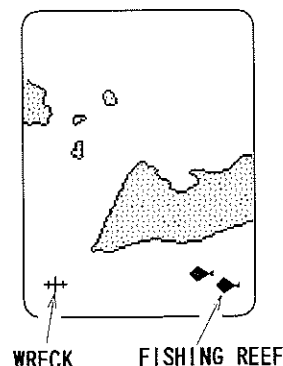


Each press of or key changes the setting, "WRECK - FISH REEF -".

Each press of or key changes the setting, "■(blue) - ■(red) - ■(magenta) - ■(green) - ■(cyan) - ■(yellow) - ■(white) - □(No wreck/fishing reef display) -", and they will be displayed with the color selected.

◎On the above menu, select the wreck/fishing reef to be displayed using or key first, and select it's color using or key.

When the wreck/fishing reef is not displayed, select "□".



## NOTICE

The wreck/fishing reef data is optional.

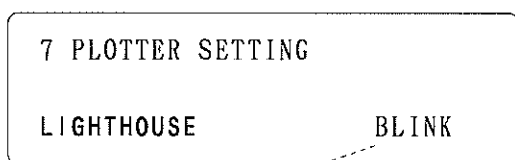
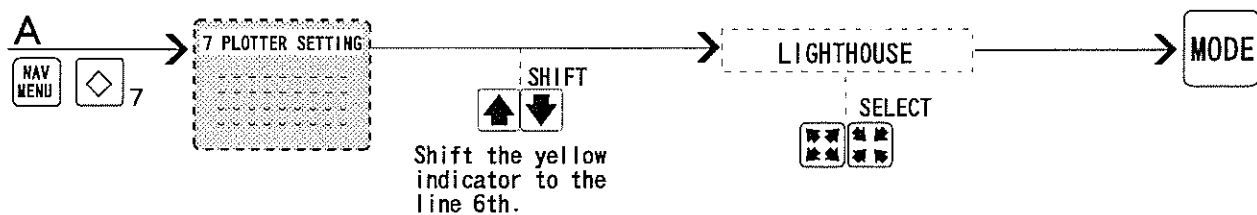


# LIGHTHOUSE

◎To select the lighthouse display On, On(in blinking) or Off.

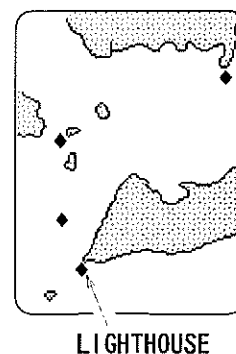
This function is available when the lighthouse data are included in this unit.

## OPERATION PROCEDURE



Each press of  or  key changes the setting, "ON - BLINK - OFF - ".

- ON : displays the lighthouse.
- BLINK : displays the lighthouse in blinking.
- OFF : not display the lighthouse.



## NOTICE

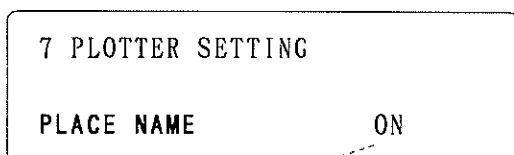
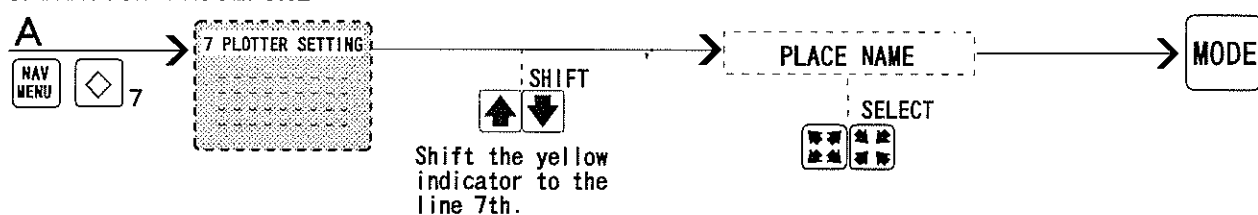
The lighthouse will automatically disappear from the screen when the screen width becomes more than 40NM.





# PLACE NAME

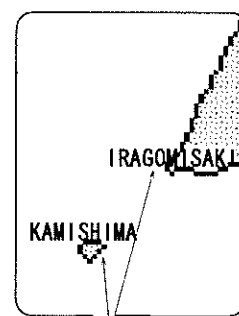
©To select the place name (port/island/peninsular etc.) display On or Off.

## OPERATION PROCEDURE



Each press of  or  key changes the setting, "ON - OFF -".

- { ON : displays the place name.
- { OFF : not display the place name.



PLACE NAME'S ON/OFF

## NOTICE

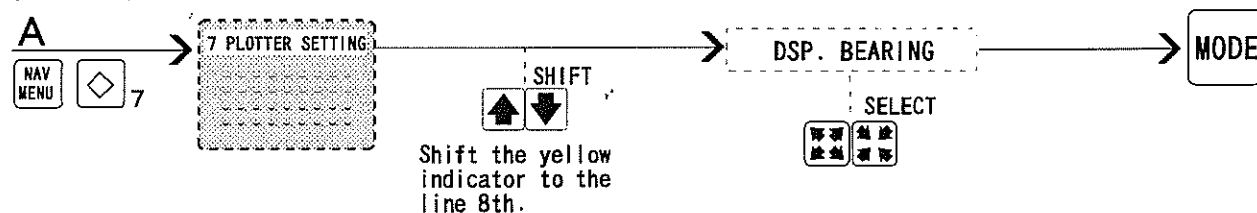
The place name will be displayed only when the screen width is less than about 8NM even though "ON" is selected.



# DISPLAY BEARING

©To change the display bearing. The chart revolves in sectors of 90°(4 settings).

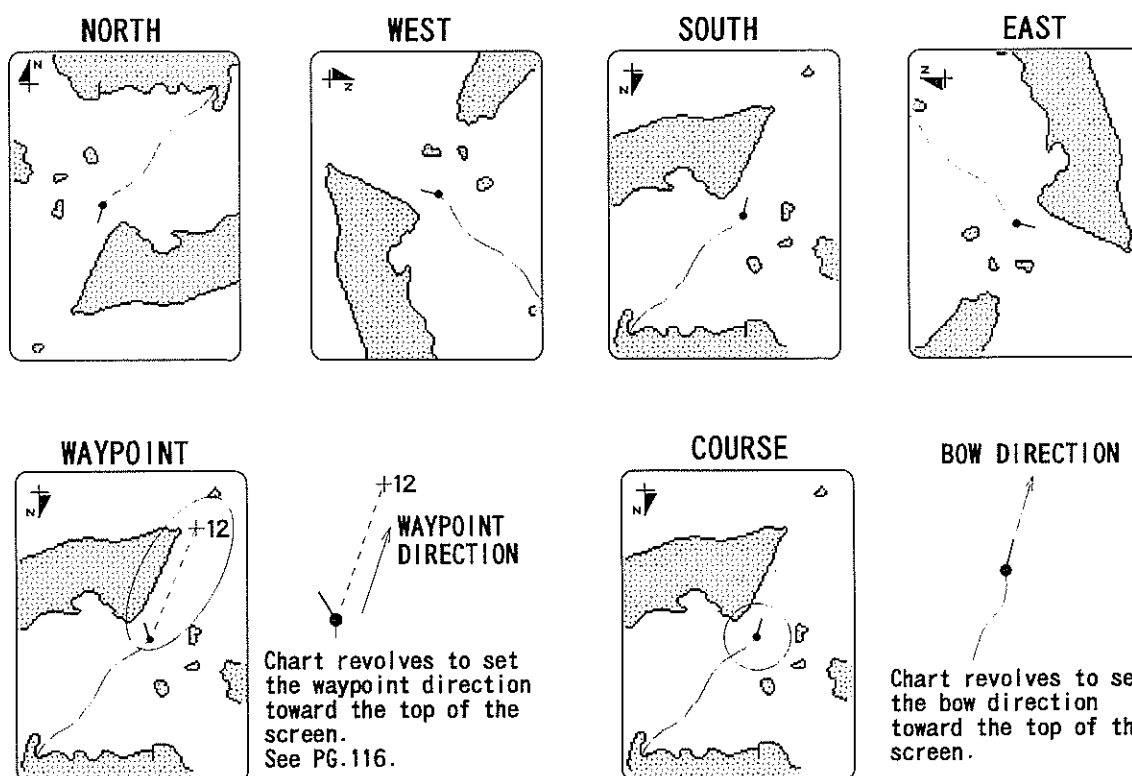
## OPERATION PROCEDURE



7 PLOTTER SETTING	
DSP. BEARING	NORTH

Each press of or key changes the setting, "NORTH - WEST - SOUTH - EAST - WAYPOINT - COURSE - ".

- |          |       |  |
|----------|-------|--|
| NORTH    | ----- | The chart is displayed with the compass point selected toward the top of the screen.                     |
| WEST     | ----- |  |
| SOUTH    | ----- |  |
| EAST     | ----- |  |
| WAYPOINT | ----- | The chart is displayed setting the bearing, from Own Ship to the waypoint, toward the top of the screen. |
| COURSE   | ----- | The chart is displayed setting Own Ship's course toward the top of the screen.                           |

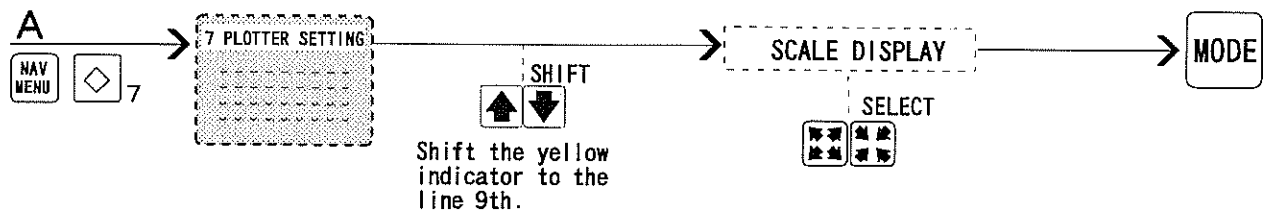




# SCALE DISPLAY

©To select the scale display in the upper left corner as being Scale(the scale of reduction of the displayed chart) or Width(the width of the center of the displayed chart in nautical miles.)

## OPERATION PROCEDURE



7 PLOTTER SETTING

SCALE DISPLAY

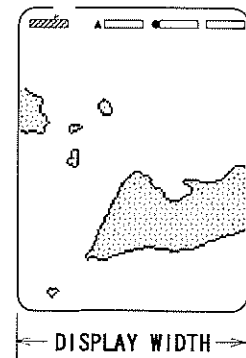
WIDTH

Each press of  or  key changes the setting, "WIDTH - SCALE -".

WIDTH : displays the width of the center of the displayed chart in nautical miles (NM).

SCALE : displays the scale of reduction of the displayed chart.

SCLAE or WIDTH





# ECHO SOUNDER FUNCTION SETTING

This chapter provides you the explanation for setting each Echo Sounder function.

For making good use of this model, please set each function before using.

SOUNDER MENU (1)	82
AUTO MODE	83
TX OUTPUT	84
BOTTOM-LOCK EXPANSION	85
PICTURE FEED	86
THRESHOLD	87
NOISE REJECT	88
CLUTTER	89
SOUNDER SET MENU (2)	90
DEPTH UNIT	91
SPLIT IMAGE	91
TVG	92
WHITE LINE	92
TEMPERATURE GRAPH	93
COLOR SELECT	93

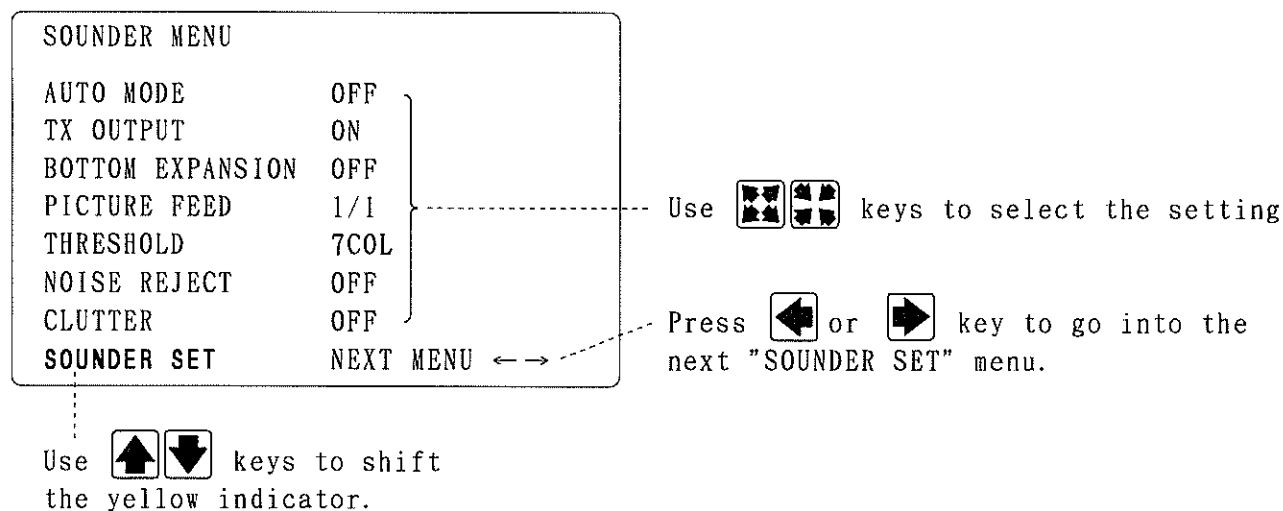
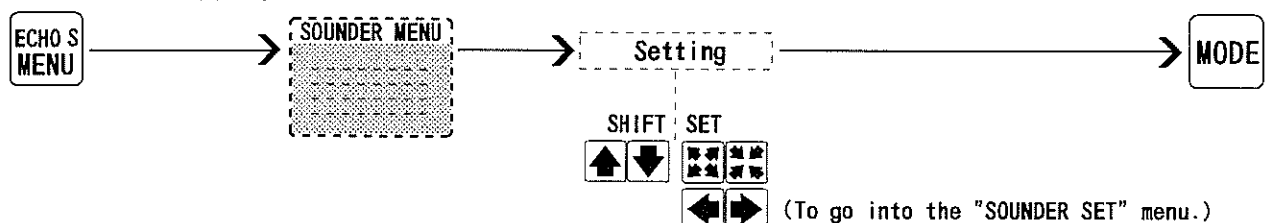


# SOUNDER MENU (1)

©Pressing  key displays the "SOUNDER MENU" for setting the following Echo Sounder functions.

- ① AUTO MODE ----- To change the basic range/phased range automatically in order to always show the sea bottom in lower half area of the display.
- ② TX OUTPUT ----- To select the transmit output of echo sounder should be carried out ("ON") or not ("OFF").
- ③ BOTTOM-LOCK EXPANSION ----- To display the normal mode in the screens upper 2/3 area (or right half) and the bottom-lock expansion mode in the screens lower 1/3 (or left half).
- ④ PICTURE FEED ----- To change the picture feed rate.
- ⑤ THRESHOLD ----- To erase and recall weaker echoes from the color scale.
- ⑥ NOISE REJECT ----- To reject the noise interference from nearby fishing vessels.
- ⑦ CLUTTER ----- To suppress mild interference covering the whole screen.
- ⑧ SOUNDER SET ----- To display the following "SOUNDER SET" menu.

## OPERATION PROCEDURE



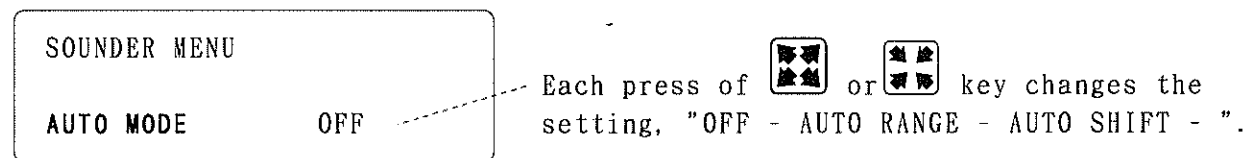
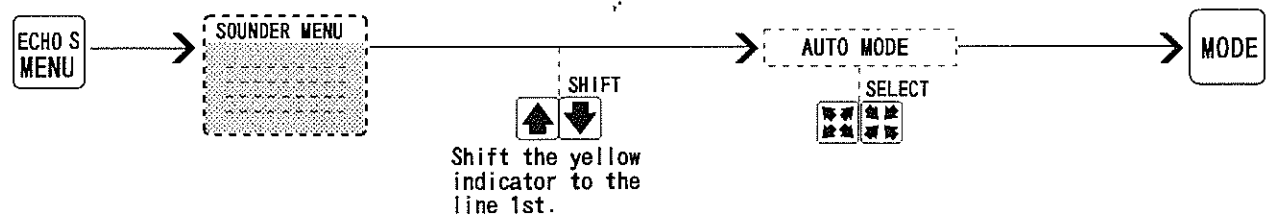
\* For more detailed explanation, refer to the following pages.



# AUTO MODE

©To change the basic range/phased range automatically in order to always show the sea bottom in lower half area of the display.

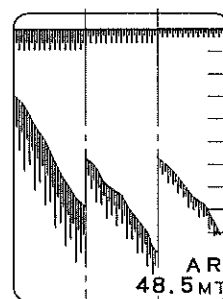
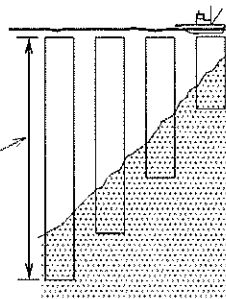
## OPERATION PROCEDURE



- OFF : Even though the depth of the sea bottom changes, the range will not change.
- AUTO RANGE : The basic range will change automatically to always show the full depth from the transducer face to the sea bottom in the lower half of the display regardless of changes in depth.
- AUTO SHIFT : The phased range will change automatically to always track the bottom in the specified range and to display it in the lower half of the display.

### AUTO RANGE

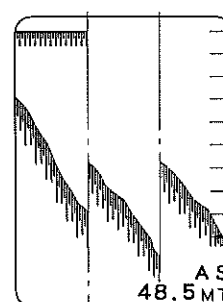
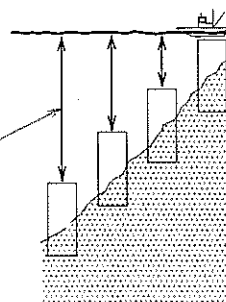
Changes this range (Basic Range) automatically.



"AR" will be indicated here while this function is activated.

### AUTO SHIFT

Changes this range (Phased Range) automatically.



"AS" will be indicated here while this function is activated.



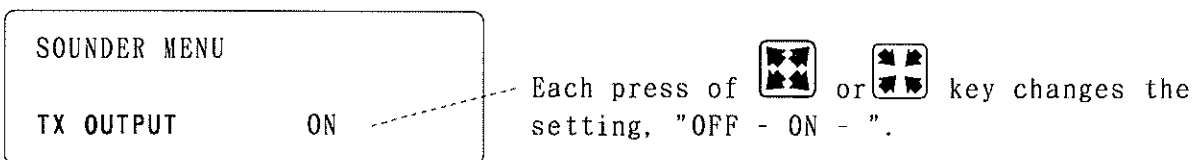
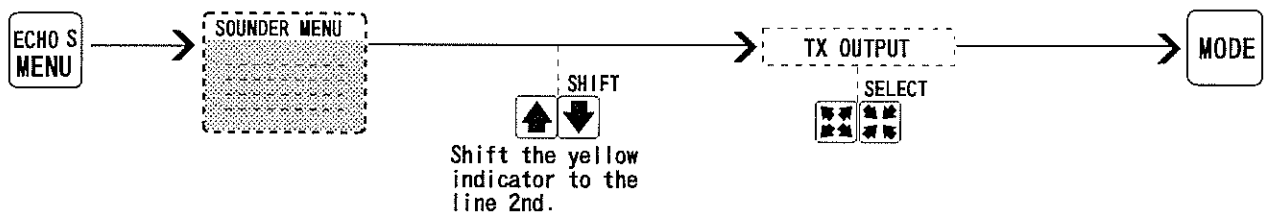
## NOTICE

- For Auto Range, and Auto Shift to function successfully, the sea bottom echo must be in red or orange. The two strongest scale colors.
- Even when the sea bottom echo is in red or orange, if there is interference due to bubbles etc. the function may not be able to track the bottom. In this case, if the bottom is not located after 16 transmissions, the depth scale will return to 0 and start searching again. If the function is unable to locate the bottom the scale still continue to fluctuate.

## TX OUTPUT

©To select the transmit output of echo sounder should be carried out ("ON") or not ("OFF") when the plotter mode is displayed.

### OPERATION PROCEDURE



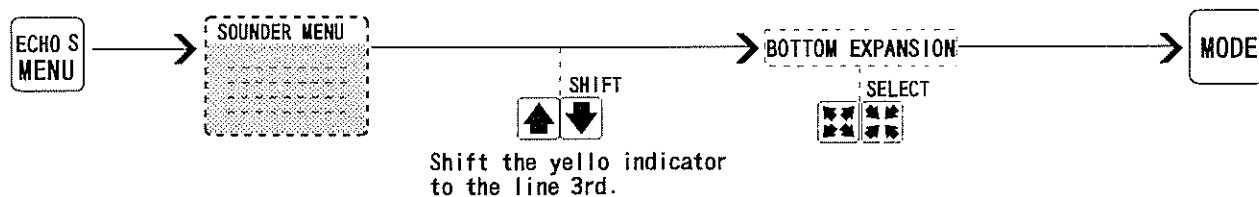
- ON : Displays the depth on the plotter mode because the transmit output of echo sounder is carried out.
- OFF : Not display the depth on the plotter mode because the transmit output of echo sounder is not carried out.



## BOTTOM-LOCK EXPANSION

©To display the normal mode in the screens upper 2/3 area (or right half) and the bottom-lock expansion mode in the screens lower 1/3 (or left half).  
And to select the range for the bottom-lock expansion mode. PG 91.

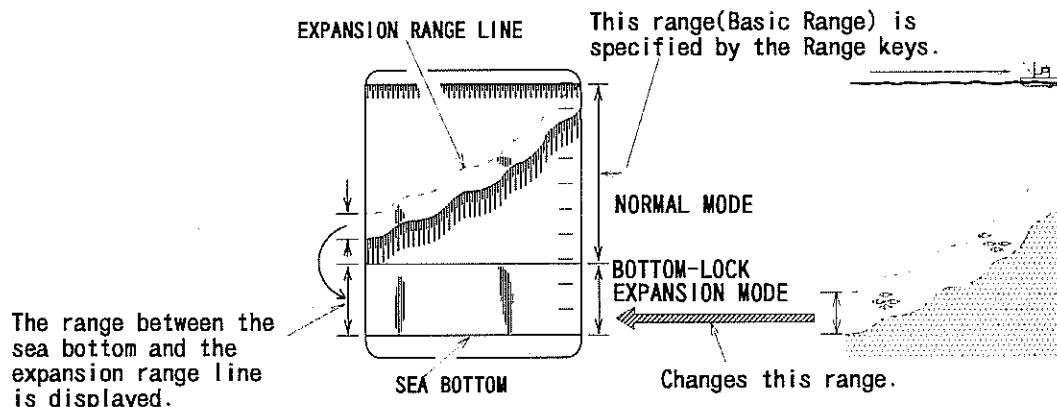
### OPERATION PROCEDURE



Each press of or key changes the setting. "OFF - 1 - 2.5 - 5 - 10 - 20 - 50 - 100 - 250 - OFF - "(MT, BR, FM) or "OFF - 5 - 10 - 20 - 50 - 100 - 250 - 500 - 1000 - OFF - "(FT).

{ OFF : Displays Normal mode.  
1~250 MT, BR, FM or 5~1000 FT : Displays Normal/Bottom-lock Expansion mode

When "HORIZONTAL" is selected for "SPLIT IMAGE".



### HOW TO USE + 2 5 KEYS

While Sounder mode is displayed, doing the following key operation provides the same effect as the one available from the setting method for the above mentioned "BOTTOM-LOCK EXPANSION".

- Pressing 2 key within 5 seconds after pressing key displays the Normal/Bottom-lock Expansion mode.

Each press of 2 key changes the setting. "1 - 2.5 - 5 - 10 - 20 - 50 - 100 - 250 - (MT, BR, FM)" or "5 - 10 - 20 - 50 - 100 - 250 - 500 - 1000 (FT)".

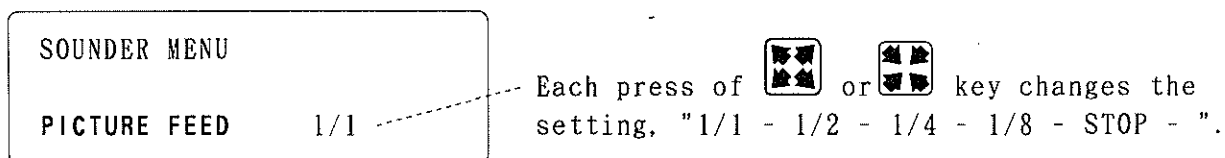
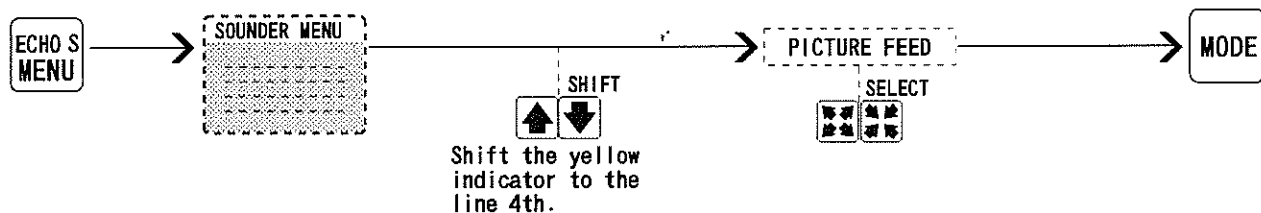
On the contrary, each press of 5 key changes the setting in reverse order.  
PG 136.



# PICTURE FEED

©To change the picture feed rate.

## OPERATION PROCEDURE



$\left. \begin{matrix} 1/1 \\ 1/2 \\ 1/4 \\ 1/8 \end{matrix} \right\}$  The picture shifts at the left rates from right to left.  
 STOP : Stops the picture shifting.

## WHAT IS "PICTURE FEED" ?

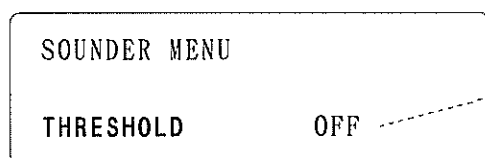
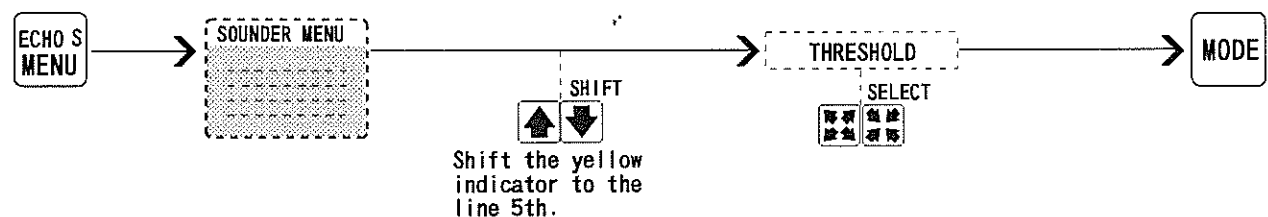
Picture feed rate refers to the speed the picture travels from right to left on the screen. 1/1 refers to 1 vertical line of picture per 1 sound transmission, 1/2 refers to 1 line of picture per 2 sound transmissions etc. There is no relation to ship speed.



# THRESHOLD

©To erase and recall weaker echoes from the color scale.

## OPERATION PROCEDURE



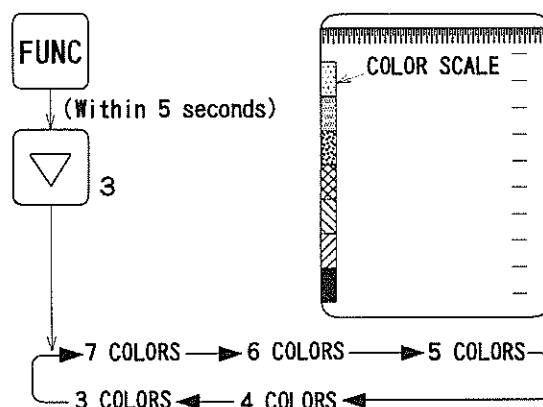
Each press of or key changes the setting, "7COL. - 6COL. - 5COL. - 4COL. - 3COL. -".

- Unwanted echoes, such as noise and plankton, may be erased for clearer definition of the target echoes.
- Each time or key is pressed the weakest color will be erased. On the fifth press all colors will be recalled.

## HOW TO USE + KEYS

While the Sounder mode is displayed, doing the following key operation provides the same effect as the one available from the setting method for the above mentioned "THRESHOLD".

Pressing key within 5 seconds after pressing key changes the setting, "7COL. - 6COL. - 5COL. - 4COL. - 3COL. -".



## WHAT IS "THRESHOLD" ?

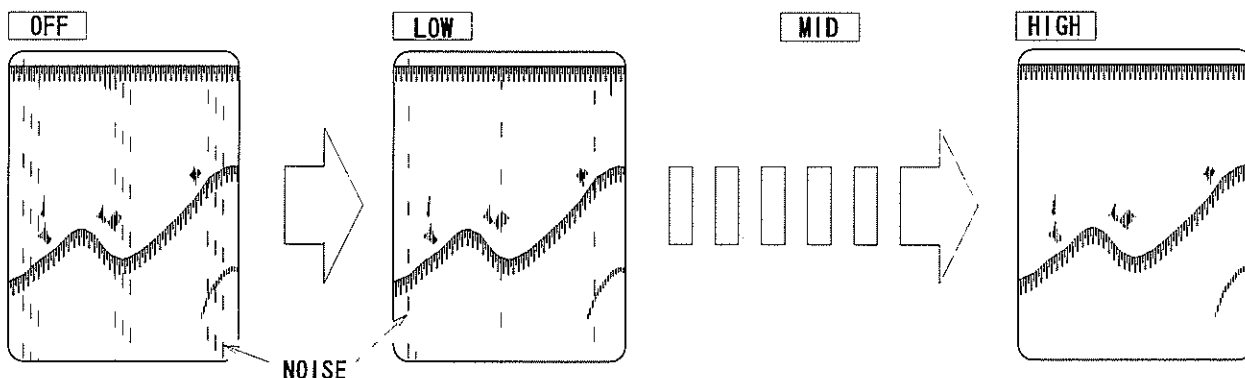
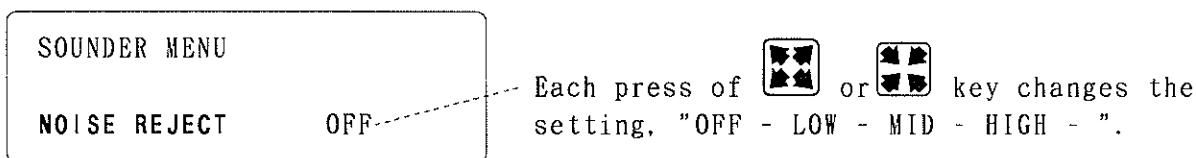
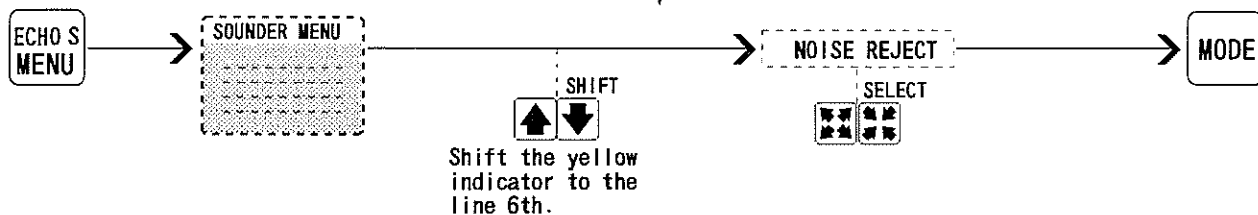
The equipment will pick up and display unwanted echoes from small objects in the water. With the threshold function it is possible to eliminate these unwanted echoes.



# NOISE REJECT

©To reject the noise interference from nearby fishing vessels.

## OPERATION PROCEDURE



## WHAT IS "NOISE" ?

Noise appears like rain on the screen, as shown above, when the sounder receives sound waves from a neighboring ship's equipment.

## ⚠️ CAUTIONS

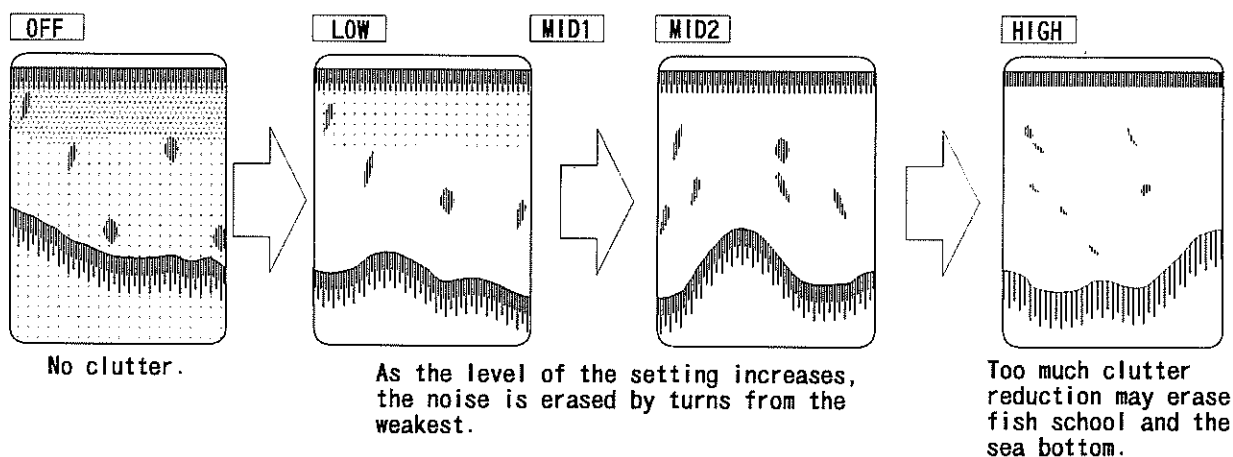
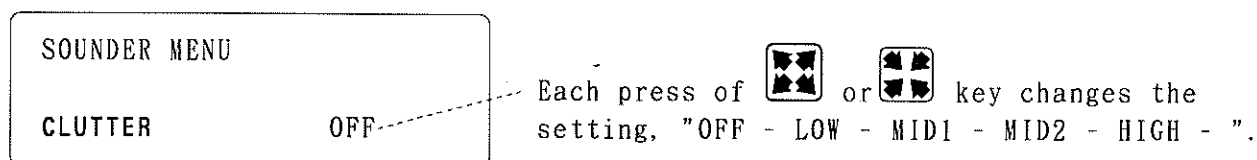
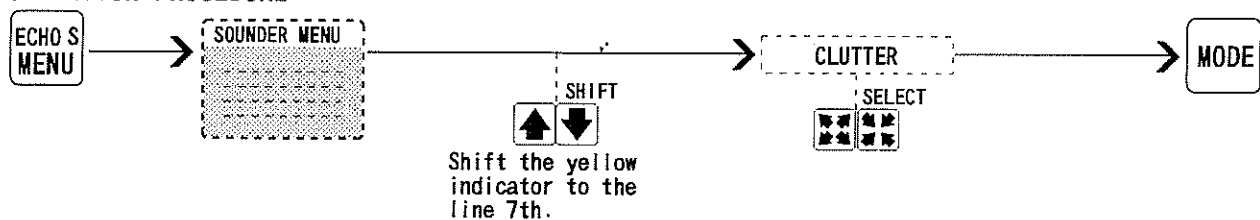
Some types of noise interference may not be rejected.



# CLUTTER

©To suppress mild interference covering the whole screen.

## OPERATION PROCEDURE




## SOUNDER SET





©To display the "SOUNDER SET" menu.

Refer to the following pages for the details.



# SOUNDER SET MENU (2)

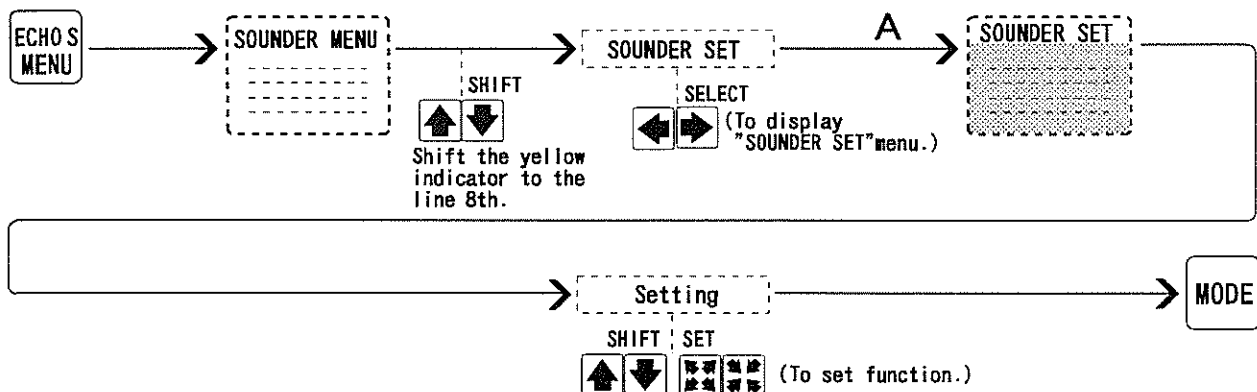
© Press  key to display the "SOUNDER MENU".

Use  or  key to shift the yellow indicator to the line 8th, "SOUNDER SET", and press  or  key to display the "SOUNDER SET" menu.



To set the following functions, use  or  key to shift the yellow indicator to the desired one, and press  or  key.



- ① DEPTH UNIT ----- To select the depth unit for the depth scale and the depth display.
- ② SPLIT IMAGE ----- To select the division way, vertically or horizontally, for the Normal/Bottom-lock Expansion mode.
- ③ TVG ----- To select the level of the TVG function.
- ④ WHITE LINE ----- To display the sea bottom in a line.
- ⑤ TEMPERATURE GRAPH To display the water temperature with a graph.
- ⑥ COLOR SELECT ----- To select the background color of the display.

## OPERATION PROCEDURE



SOUNDER SET	
DEPTH UNIT	MT
SPLIT IMAGE	HORIZONTAL
TVG	OFF
WHITE LINE	OFF
TEMP. GRAPH	OFF
COLOR SELECT	A-1

Use   keys to select the setting

Use   keys to shift the yellow indicator.

\* For more detailed explanation, refer to the following pages.

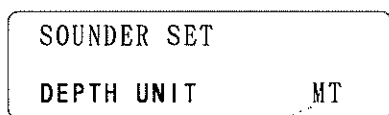
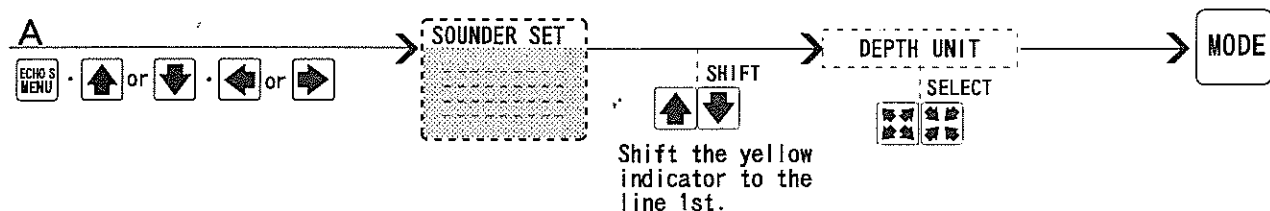
The operation procedure starts from the above mentioned point "A".



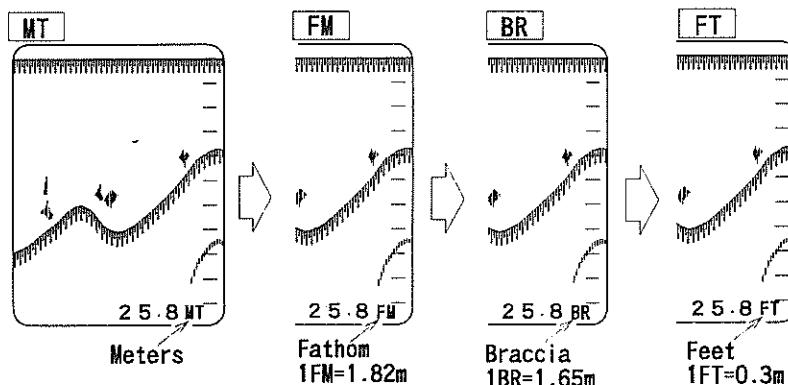
## DEPTH UNIT

©To select the depth unit for the depth scale and the depth display.

### OPERATION PROCEDURE



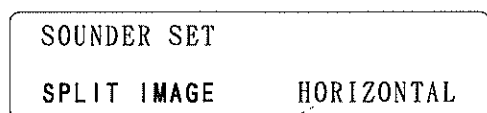
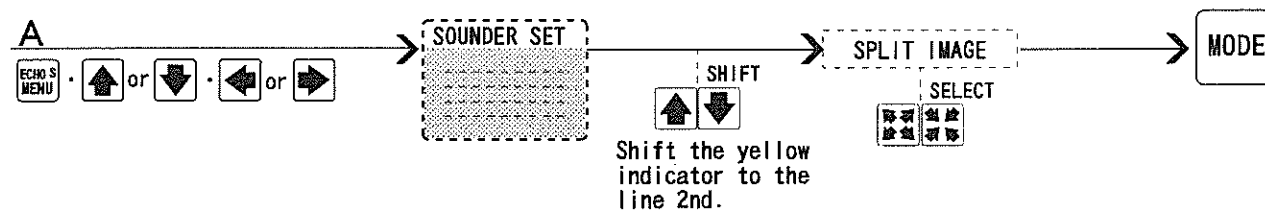
Each press of or key changes the setting, "MT - FM - BR - FT - ".



## SPLIT IMAGE

©To select the division way of echo sunder display, vertically or horizontally, for the Normal/Bottom-lock Expansion mode.

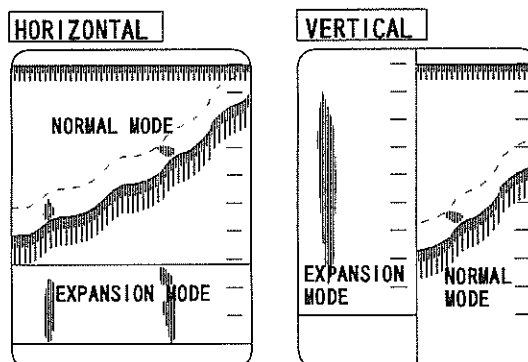
### OPERATION PROCEDURE



Each press of or key changes the setting, "HORIZONTAL - VERTICAL - ".

**HORIZONTAL:** Displays the Normal mode in the upper half and the Bottom-lock Expansion mode in the lower half.

**VERTICAL:** Displays the Normal mode in the right half and the Bottom-lock Expansion mode in the left half.

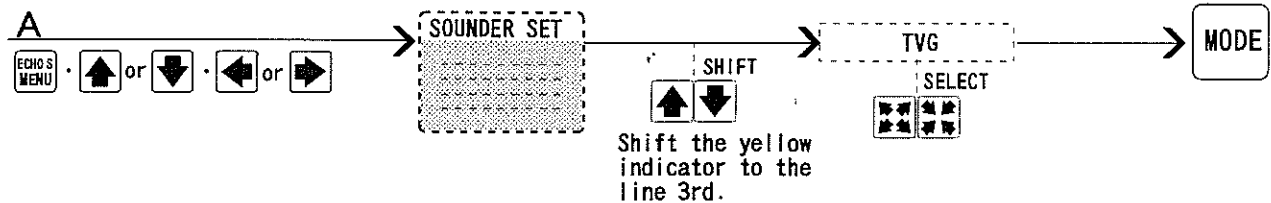




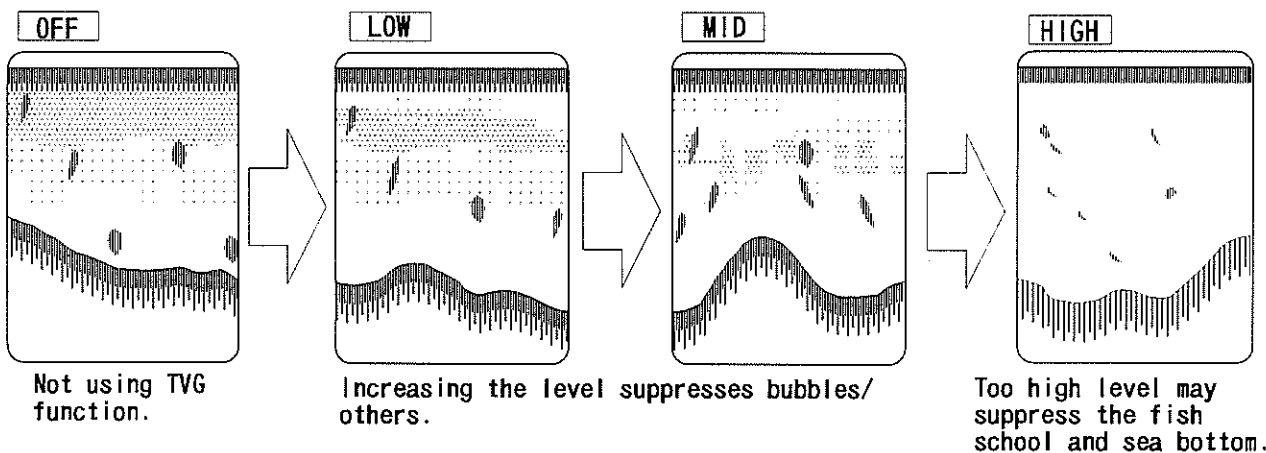
## TVG

©To suppress unnecessary echoes near the water surface such as bubbles and floating matter, select the level of this function.

### OPERATION PROCEDURE



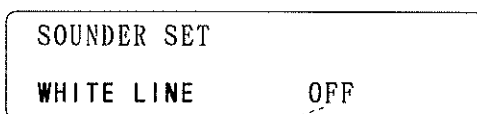
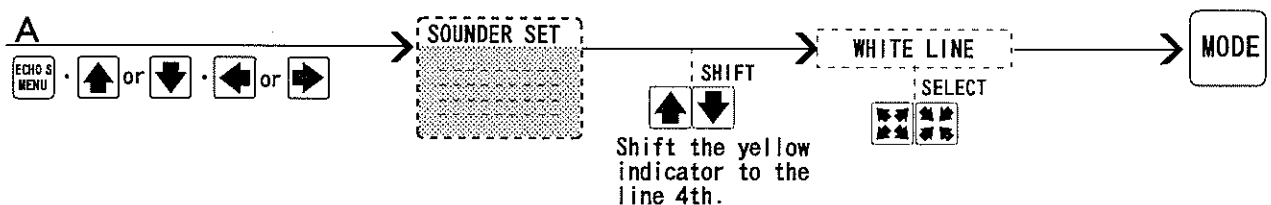
Each press of or key changes the setting, "OFF - LOW - MID - HIGH -".



## WHITE LINE

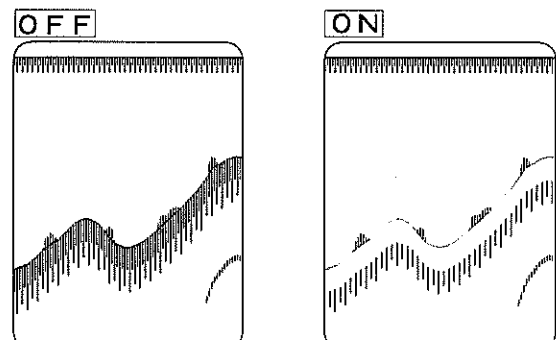
©To display the sea bottom highlighted against the display background making it easier to see fish on, or just above, the bottom.

### OPERATION PROCEDURE



Each press of or key changes the setting, "OFF - ON -".

- { OFF : Displays the bottom with a belt.
- { ON : Displays the bottom with a line.

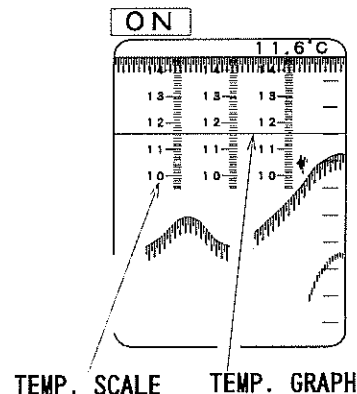
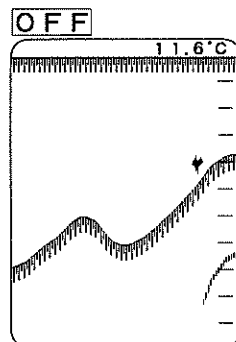
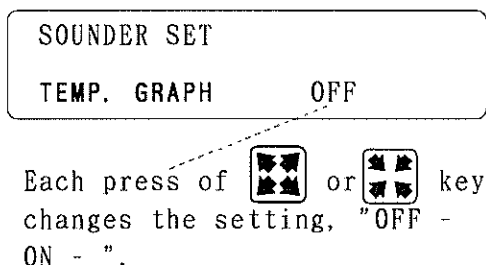
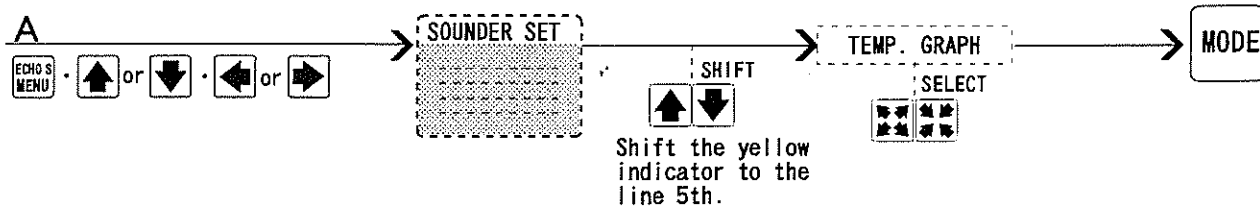




## TEMPERATURE GRAPH

©To select the water temperature scale/water temperature graph display's On/Off.

### OPERATION PROCEDURE



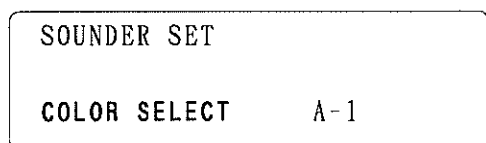
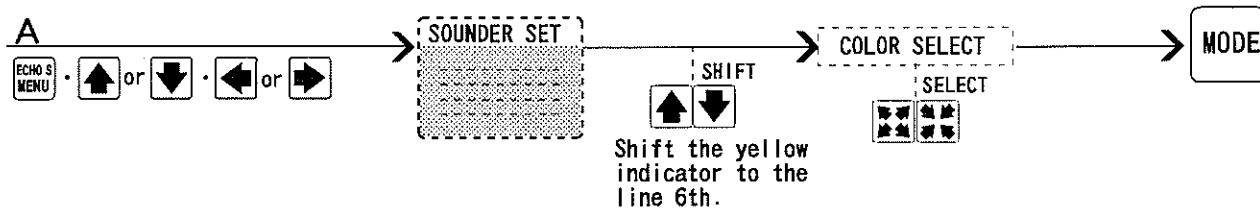
## CAUTIONS

- The water temperature graph is displayed only when the optional water temperature sensor (OP-41) is connected. PG 17.
- When the water temperature sensor is not connected, select "OFF" for "TEMP. GRAPH". PG 68.

## COLOR SELECT

©To select the background color of the display, black or blue.

### OPERATION PROCEDURE



Each press of or key changes the setting, "A-1" - "A-2" - "...".

- { A-1 : Background color is blue.
- { A-2 : Background color is black.



## HOW TO USE PLOTTER FUNCTION

This chapter provides you how to enter/clear Waypoint/Marks/Course/Route.

<b>WAKE</b> .....	95	<b>COURSE DISPLAY</b> .....	115
WAKE DISPLAY/MEMORY .....	95	COURSE NAVIGATION .....	115
1. WAKE COLOR CHANGE .....	95	1. COURSE FROM OWN SHIP TO WAYPOINT	
2. WAKE DATA MEMORY .....	95	.....	116
CLEAR WAKE .....	96	2. OWN SHIP TO CURSOR CROSSING ---	117
1. CLEAR WAKE BY COLOR OR		3. COURSE BETWEEN TWO WAYPOINTS	118
CLEAR ALL WAKE .....	96		
2. NOT DISPLAYED ON THE SCREEN		<b>ALARM</b> .....	119
(BUT MEMORIZED) .....	97	ALARM SETTING .....	119
<b>MARK</b> .....	98	1. ARRIVAL ALARM .....	120
INPUT MARK .....	98	2. ANCHOR WATCH ALARM .....	121
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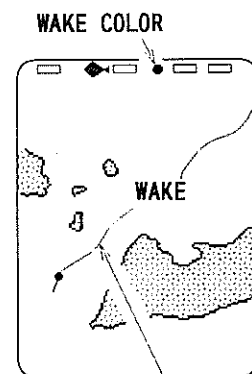
# WAKE

## WAKE DISPLAY/MEMORY

©While using the plotter function, the following key operations are useful for quick wake color changing/wake memory On/Off selection.



### 1. WAKE COLOR CHANGE


- ©Pressing the  key changes the wake color.  
Each press of this key changes the setting "Blue - Red - Magenta - Green - Cyan - Yellow - White -".  
The selected color will be indicated in the screen's upper right, and the wake will be displayed/memorized in it.



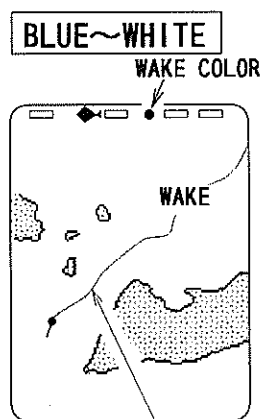
Wake is displayed with the color above indicated.

### 2. WAKE DATA MEMORY

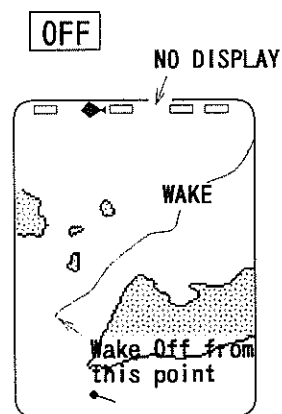
- ©Pressing the  key within 5 seconds after pressing the  key changes the wake memory setting On/Off. When the wake has been memorized, the wake will not be memorized. On the contrary, when the wake has not been memorized, the wake will be memorized.

Each press of the  key changes the memory setting, on - off.

When the wake has been memorized, it's color has also been indicated in the screen's upper. On the contrary, when it has not been memorized, it's color has not been indicated.



Wake is displayed with the color



## NOTICE

"WAKE MEMORY" setting in the "8 WAKE MEMORY" menu provides the same effect as the above operation. (Refer to PG 49).



## CLEAR WAKE

◎ It is possible to clear wake from the display and the memory or it may be cleared from the display only and stored in the memory.

• The two methods of clearing Wake are as follows.....

- ① Clear wake only of a specified color or clear all wake
- ② Not displayed on the screen (but memorized)

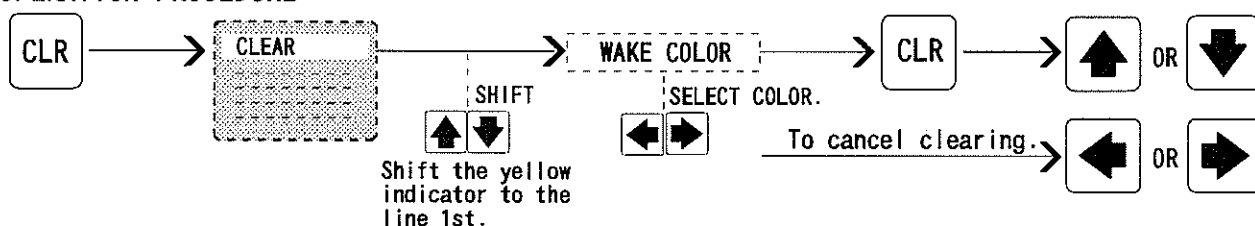
### ⚠ CAUTIONS

Clearing by the above functions 1 and 2 will mean the mark is permanently erased and may not be re displayed.

## 1. CLEAR WAKE BY COLOR OR CLEAR ALL WAKE

◎ To clear Wake only of a specified color.

### OPERATION PROCEDURE



CLEAR	
WAKE COLOR	■
MARK SHAPE	
MARK COLOR	
MARK S/C	
ALL MARK	
CHART COLOR	
ALL WAYPOINT	

Each press of or key changes the setting, "■(blue) - ■(red) - ■(magenta) - ■(green) - ■(cyan) - ■(yellow) - ■(white) - ALL COL. - ".

- When the color is specified, "WAKE COLOR" will be indicated in red by pressing key. Then, press either one of or key to erase the wake of a specified color.
- When "ALL COL" is selected, "WAKE COLOR" will be indicated in red by pressing key. Then, press either one of or key to erase all the wakes.

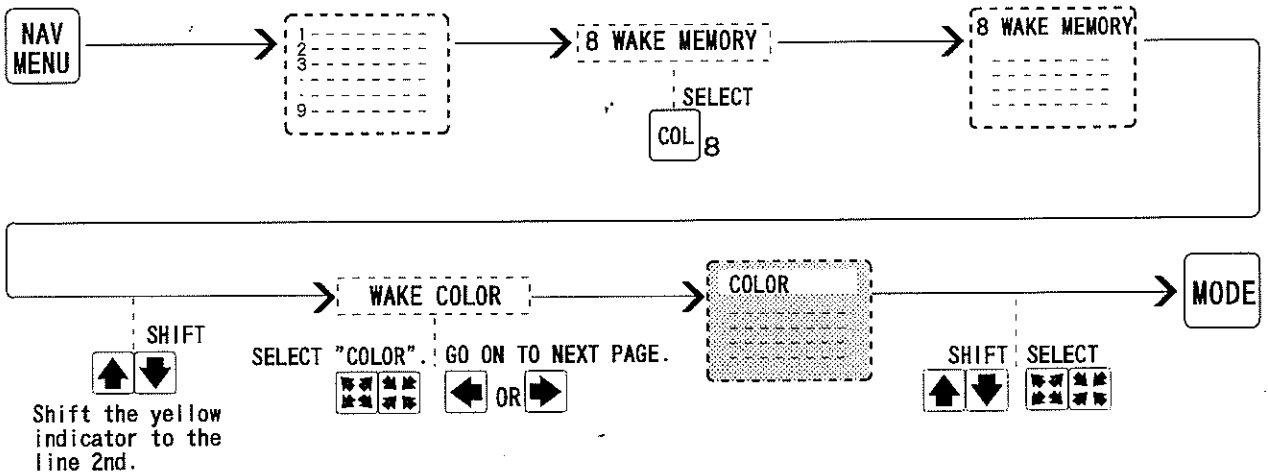
### NOTICE

- When the wake color is changed automatically according to water temperature or depth, the wake will not be cleared by this method.
- Before pressing key to display "CLEAR" menu be sure to clear the cursor from the display.





## 2. NOT DISPLAYED ON THE SCREEN (BUT MEMORIZED)

### OPERATION PROCEDURE



COLOR	
■ (blue)	ON
■ (red)	ON
■ (magenta)	ON
■ (green)	ON
■ (cyan)	ON
■ (yellow)	ON
■ (white)	ON

Each press of  or  key changes the setting, "ON - OFF -".

ON : displays the wake.  
OFF : not display the wake.

### NOTICE

When the wake color is changed automatically according to water temperature or depth, the wake display can not be erased.





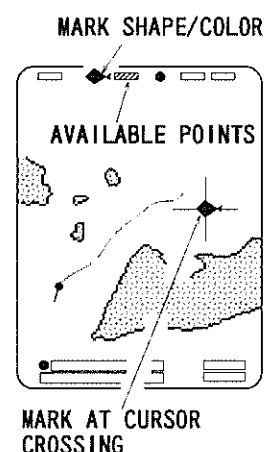
# MARK






## INPUT MARK

- ◎ Mark is useful to memorize fishing reefs, sunken rocks, etc.
- Up to 10,000 points marks are available in eight shapes (□ · ◇ · + · × · △ · ▣ · ◆ · ⦶) and seven colors.
- Mark may be set in the following two ways.
  - ① Set at cursor crossing position
  - ② Set at own ship position

### 1. SET AT CURSOR CROSSING POSITION

- Ensure the cursor is displayed with the  key.  
Shift the cursor crossing to the desired position.  
Press the  key.  
The mark will be entered in the shape/color indicated above.  
(When "MARK" is selected for "KEY SETTING". PG 70)



- Before entering,  
Specify the shape with the  key. Each press of it changes the setting, "□ - ◇ - + - × - △ - ▣ - ◆ - ⦶ - - -".  
Specify the color with the  key. Each press of it changes the setting, "Blue - Red - Magenta - Green - Cyan - Yellow - White".
- Pressing the  key before specifying the shape/color reverses the setting order as follows.  
 key : "□ - - - ◆ - ⦶ - ◆ - ▣ - △ - × - + - ◇ - "  
 key : "Blue - White - Yellow - Cyan - Green - Magenta - Red - "

The quantity of the available marks will be indicated on the display.


## NOTICE

The mark, specified "OFF" on the "3 WAYPOINT·MARK DISPLAY", will display when entering, however, will not be displayed when the display shifts. PG 102

The shape, "◆" and "- ", should be used for chart mark. PG 103

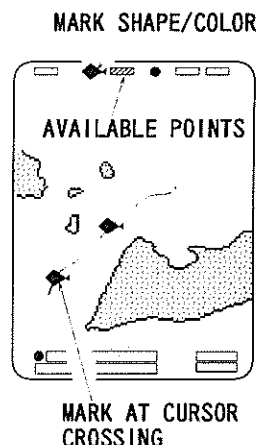


## 2. SET AT OWN SHIP POSITION











- When the cursor is displayed, ensure it is cleared by pressing the  key.

Press the  key.


The mark will be entered in the shape/color indicated above.  
(When "MARK" is selected for "KEY SETTING". PG 70)



- Before entering,

Specify the shape with the  key. Each press of it changes the setting, "□ - ◇ - + - × - △ -  -  -  -  -  -  -  -  -  -  -

Specify the color with the COL key: Each press of it changes the setting.  
"Blue - Red - Magenta - Green - Cyan - Yellow - White".

- Pressing the  key before specifying the shape/color reverses the setting order as follows.

key : "□ - - - ◆ - ⦶ - ◆ - ♣ - △ - × - + - ◇ - "









COL key : "Blue - White - Yellow - Cyan - Green - Magenta - Red - "

The quantity of the available marks will be indicated on the display.

**FUNC. FUNCTION KEY**

For five seconds after pressing the  key, the indication of screen width (or scale) in the screen's upper left will be in red.

Pressing the following keys while showing the indication in red will activate as follows.

-  key : displays the other mark which was not selected for "KEY SETTING". PG 98.
-  key : reverses the setting order of mark shape. PG 98.
-  key : reverses the setting order of mark color. PG 98.
-  key : changes the wake memory setting, On or Off. PG 95.
- <sub>2</sub><sub>5</sub> : widens/shortens the range for Bottom-lock Expansion Mode. PG 136.
- <sub>6</sub> key : sets the phased range to "0". PG 135.
- <sub>3</sub> key : erases the display color for Echo Sounder Mode from the weakest. PG 137.



# CLEAR MARK

©It is possible to clear the mark from display and memory, or the mark can be cleared from the display only and retained in the memory.


• The three methods of clearing simple mark are as follows.





- ① Clear only one mark
- ② Clear marks by shape/color or clear all marks.
- ③ Clear marks from the display only (retains in the memory).


## ⚠ CAUTIONS

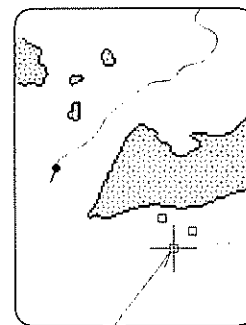
Clearing by the above functions ① and ② will mean the mark is permanently erased and may not be re displayed.

## 1. CLEAR ONLY ONE MARK

• Press  key to display the cursor.

Shift the cursor crossing with the  keys to the mark to be erased.

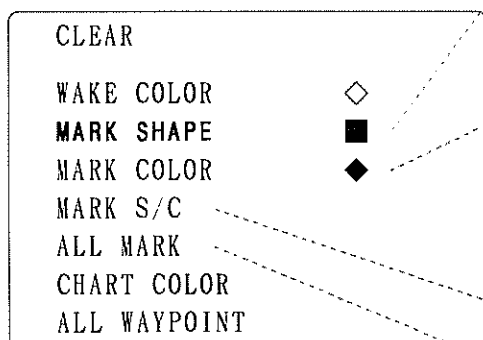
Press the  key.





Set mark at cursor crossing.

## 2. CLEAR MARKS BY SHAPE/COLOR OR CLEAR ALL MARKS



©Before displaying "CLEAR" menu, be sure to clear the cursor from the display.



To specify the mark shape to be erased.

Each press of the  or  key changes the setting, "□ - ◇ - + - × - △ - ■ - ◆ - ⦶ - ⦶ - ⦶ - ⦶".

To specify the mark color to be erased.

Each press of the  or  key changes the setting, "Blue - Red - Magenta - Green - Cyan - Yellow - White - ALL COL. -".

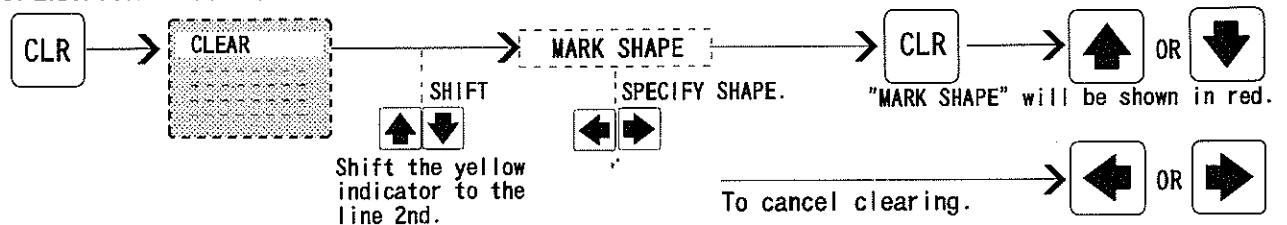
To specify the mark shape/color.

To erase all marks.



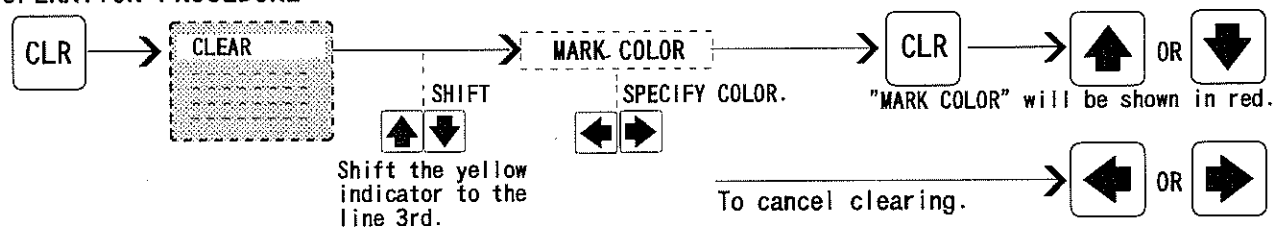
① MARK SHAPE ----- To clear all the marks of that shape.

#### OPERATION PROCEDURE



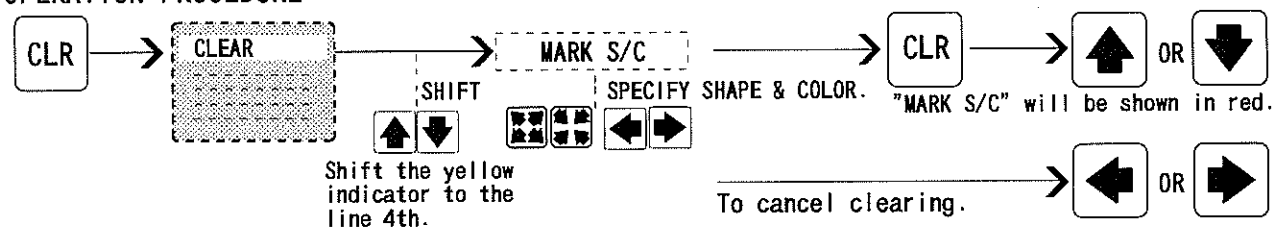
② MARK COLOR ----- To clear all the marks of that color.

#### OPERATION PROCEDURE



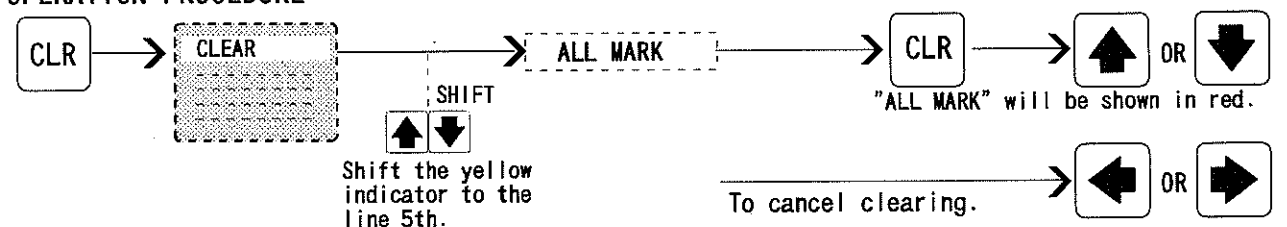
③ MARK SHAPE/COLOR ----- To clear all the marks of that shape and color.

#### OPERATION PROCEDURE



④ ALL MARK ----- To clear all the marks.

#### OPERATION PROCEDURE



## NOTICE

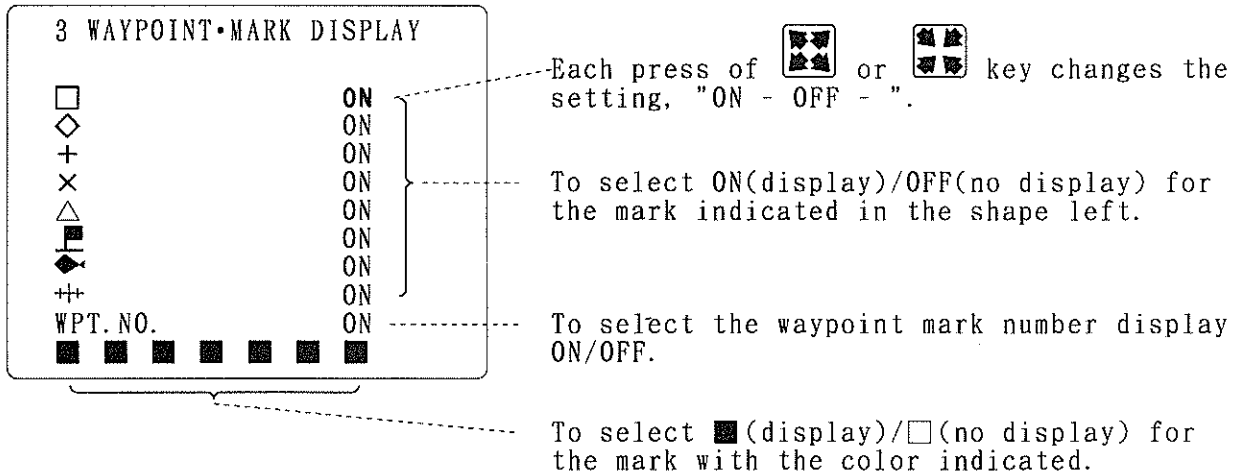
- Before pressing **CLR** key to display "CLEAR" menu be sure to clear the cursor from the display.



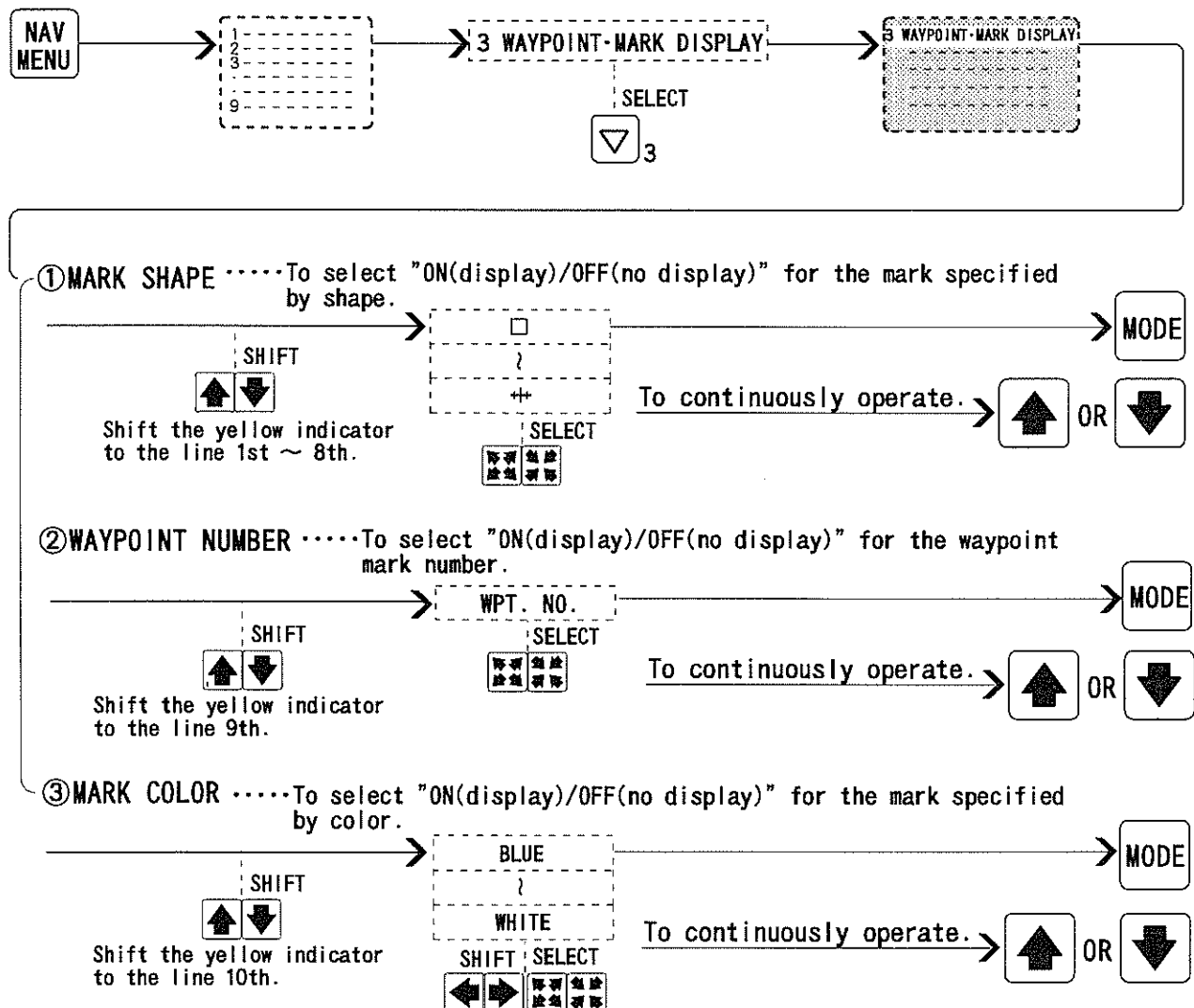
### 3. CLEAR MARKS FROM THE DISPLAY ONLY

(RETAINS IN THE MEMORY)

- ◎Mark can be set to be displayed or not to be displayed according to shape and color.  
 Displaying/not displaying the number of the waypoint mark can also be selected.



#### OPERATION PROCEDURE







# CHART MARK

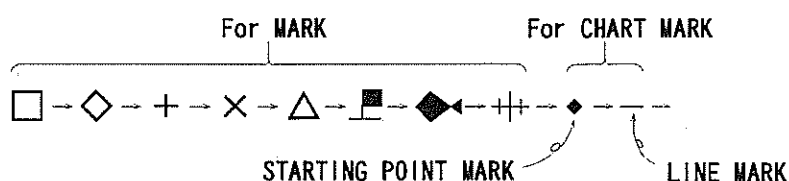
## INPUT CHART MARK


② Chart mark is useful to draw boundary and coast lines by yourself.



• Chart mark may be selected from seven colors and there are up to 10,000 chart marks available. PG 47.


① Keep pressing the  key till the mark on the screen's upper center will be indicated in "◆".



Each press of the  key changes the setting. "□ - ◇ - + - × - △ - ▣ - ◆ - ++ - ◆ - - - -".



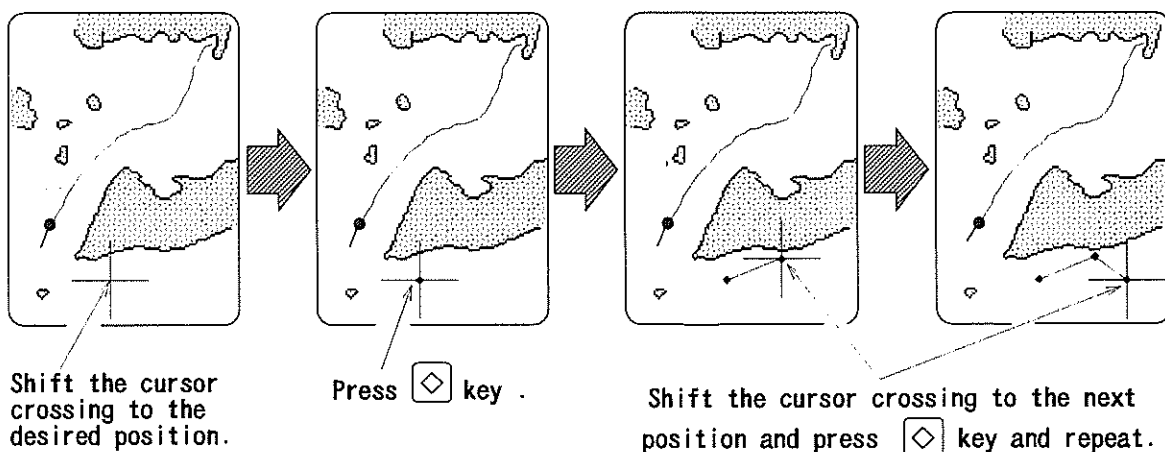
② Specify the desired color of chart mark by pressing the  key.

③ Press the  key to display the cursor on the screen and shift the cursor crossing to the desired position, then press the  key to set the chart mark. (When "MARK" is selected for "KEY SETTING". PG 70)

④ Repeating the procedure of shifting the cursor crossing and pressing the  key draws a line(chart line) linking each mark. From the second chart mark, they will be changed(indicated) automatically.

⑤ To make a break in the chart line, press the  key to change the mark to "◆" and press the  key.

⑥ If the cursor is erased and the  key is pressed, a chart mark will be indicated at the own ship's position.











# CLEAR CHART MARK

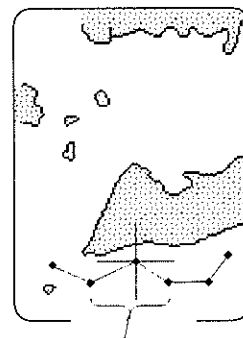
- ◎ It is possible to clear chart mark from display.
- The two methods of clearing chart marks are as follows.....
  - ① Clear a portion of the chart mark
  - ② Clear chart mark by color

## CAUTIONS

Clearing by the above methods will mean that chart mark is permanently erased and may not be re displayed.

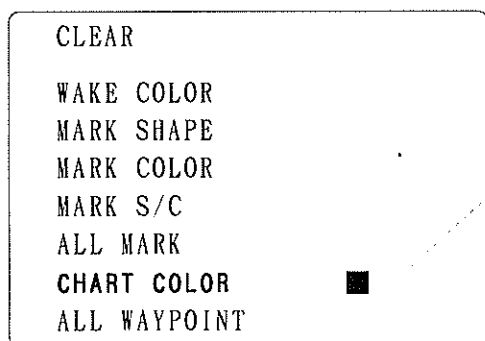
## 1. CLEAR A PORTION OF CHART MARK



- Press  key to display the cursor and move the cursor crossing to the portion of the mark to be erased with     keys.
- Press  key to erase that portion.



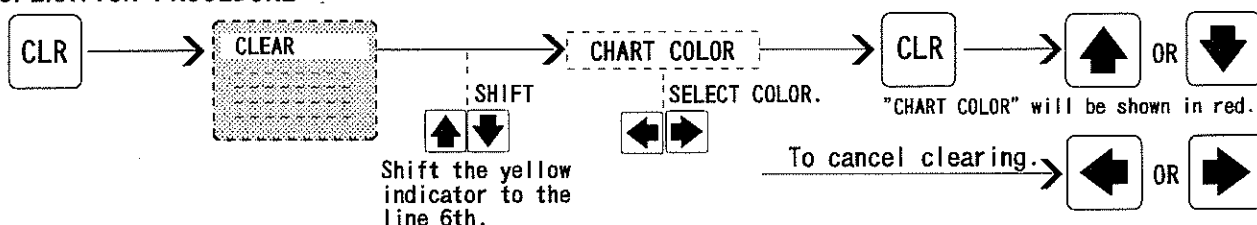
Clear this portion.

## 2. CLEAR CHART MARK BY COLOR




Each press of  or  key changes the setting, "■(blue) - ■(red) - ■(magenta) - ■(green) - ■(cyan) - ■(yellow) - ■(white) - ALL COL. -".

## OPERATION PROCEDURE



## NOTICE

- The marks that "OFF" are set on the mark setting display will be displayed when entering, however, they will be erased by doing the Shifting Display operation etc. PG 102.
- Before pressing  key to display "CLEAR" menu be sure to clear the cursor from the display.



# WAYPOINT MARK

## INPUT WAYPOINT MARK

◎ Waypoint mark is useful to indicate the position of ports, net positions etc.

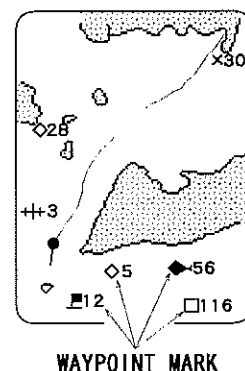
• The distance, bearing and time from own ship's position to a waypoint may be displayed and alarms and routes may be set with the waypoint mark.

• Up to 5,000 point marks are available in eight shapes (□ · ◇ · + · × · △ · ▣ · ◆ · ++ ) and seven colors. PG 47.

The number(1~) and the comment(8 characters) can be added to the waypoint mark.

• To set waypoint mark the following methods are available.

- ① Set by positional(Lat/Lon) data
- ② Set by positional(LORAN C) data
- ③ Set by the waypoint key
- ④ Set with the "WAYPOINT ENTRY LIST"  
(entering, correcting, erasing etc.)



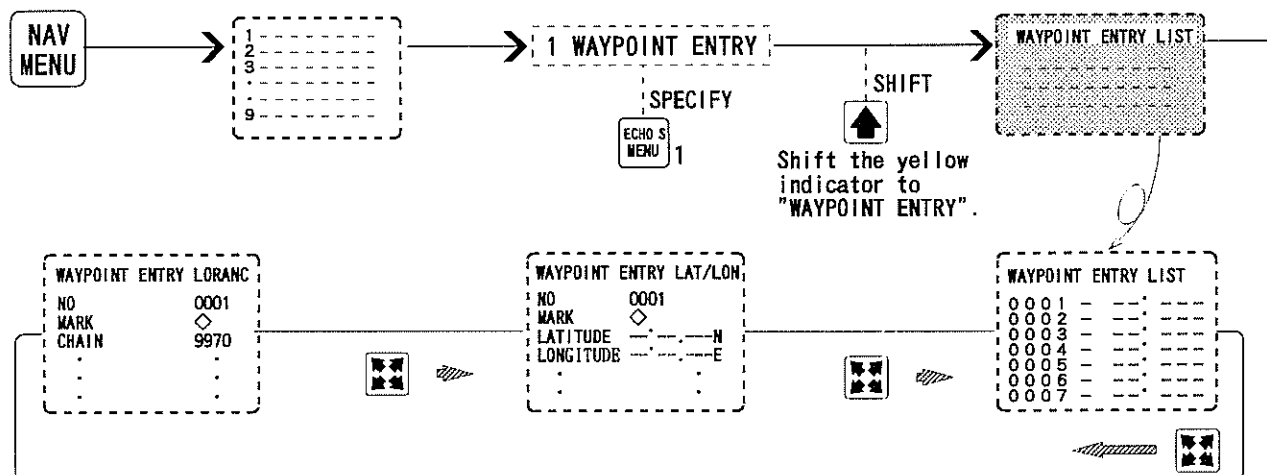
## HOW TO CHANGE THE "WAYPOINT ENTRY" DISPLAY

① Use keys to shift the yellow indicator to "WAYPOINT ENTRY".

② Press key to change the display as follows.

③ Keep pressing key to display the desired display.

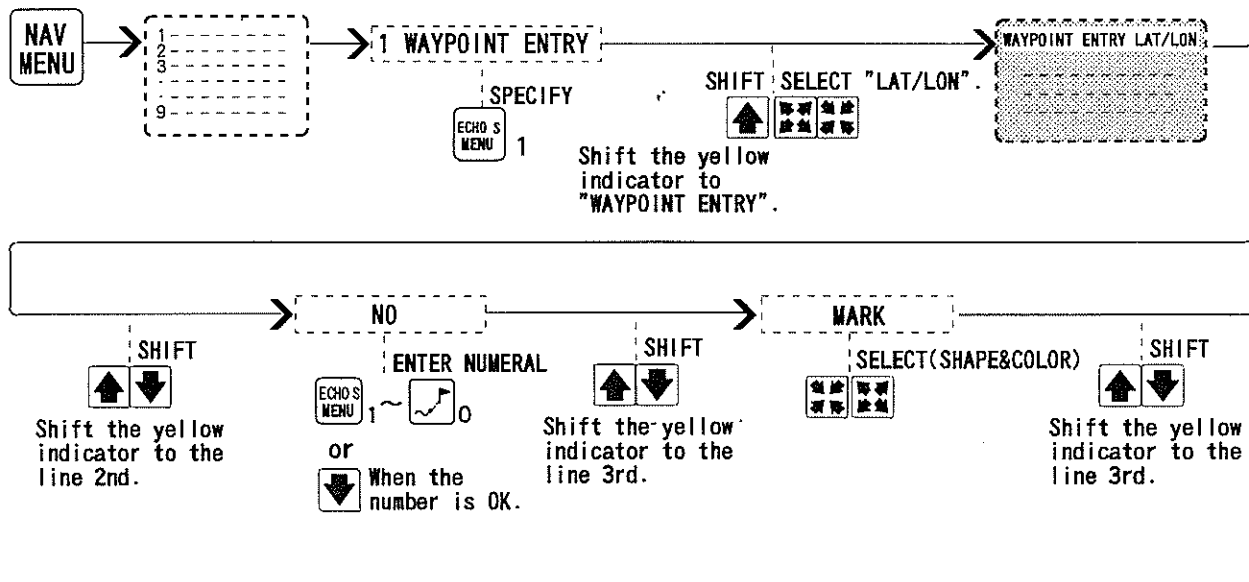
Pressing key changes the display order in the opposite direction.



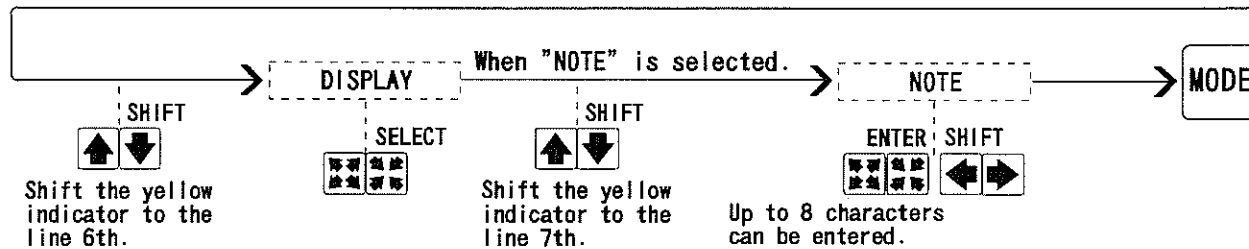
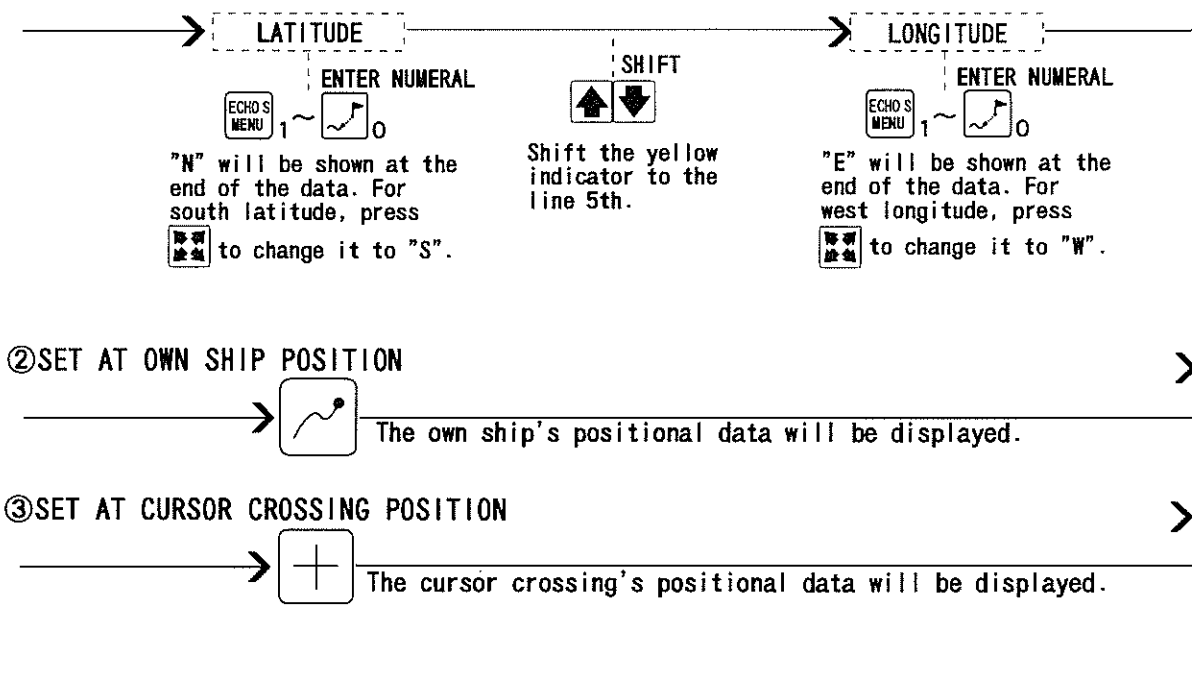


## 1. SET BY POSITIONAL (LAT/LON) DATA

## OPERATION PROCEDURE





①SET BY POSITIONAL(LAT/LON) DATA






















<To be continued on the next page.>









Use the   keys to shift the yellow indicator. ①

WAYPOINT ENTRY LAT/LON	
NO	0001
MARK	◇
LATITUDE	____° ____' N
LONGITUDE	____° ____' E
DISPLAY	NUMBER
NOTE	[-----]

⑧

- ① Each press of the  or  key changes the setting, "LIST - LORANC - LAT/LON - ".  
Select "LAT/LON".  
 { LIST : uses the list to enter by Lat/Lon data.  
 { LORANC : enters by LORANC data.  
 { LAT/LON : enters by Lat/Lon data.
- ② Enter the number with the numeral keys (  1 ~  ).
- ③ Select the shape/color with the  /  keys.
- ④ For South Latitude data, use the   keys to change to "S".
- ⑤ For West Longitude data, use the   keys to change to "W".
- ⑥ Enter the positional data with the  1 ~  keys.  
 Pressing the  key will display the own ship's positional data.  
 Pressing the  key will display the cursor crossing's data.
- ⑦ Each press of the  or  key changes the setting, "NUMBER - NOTE - OFF"  
 { NUMBER : attaches the mark's number  
 { NOTE : attaches the comment.  
 { OFF : not display the mark.
- ⑧ Each press of the  or  key enters a character.  
 • After entering a character, press the  key to shift the yellow indicator to the next.  
 • Enter characters from the left without a space.

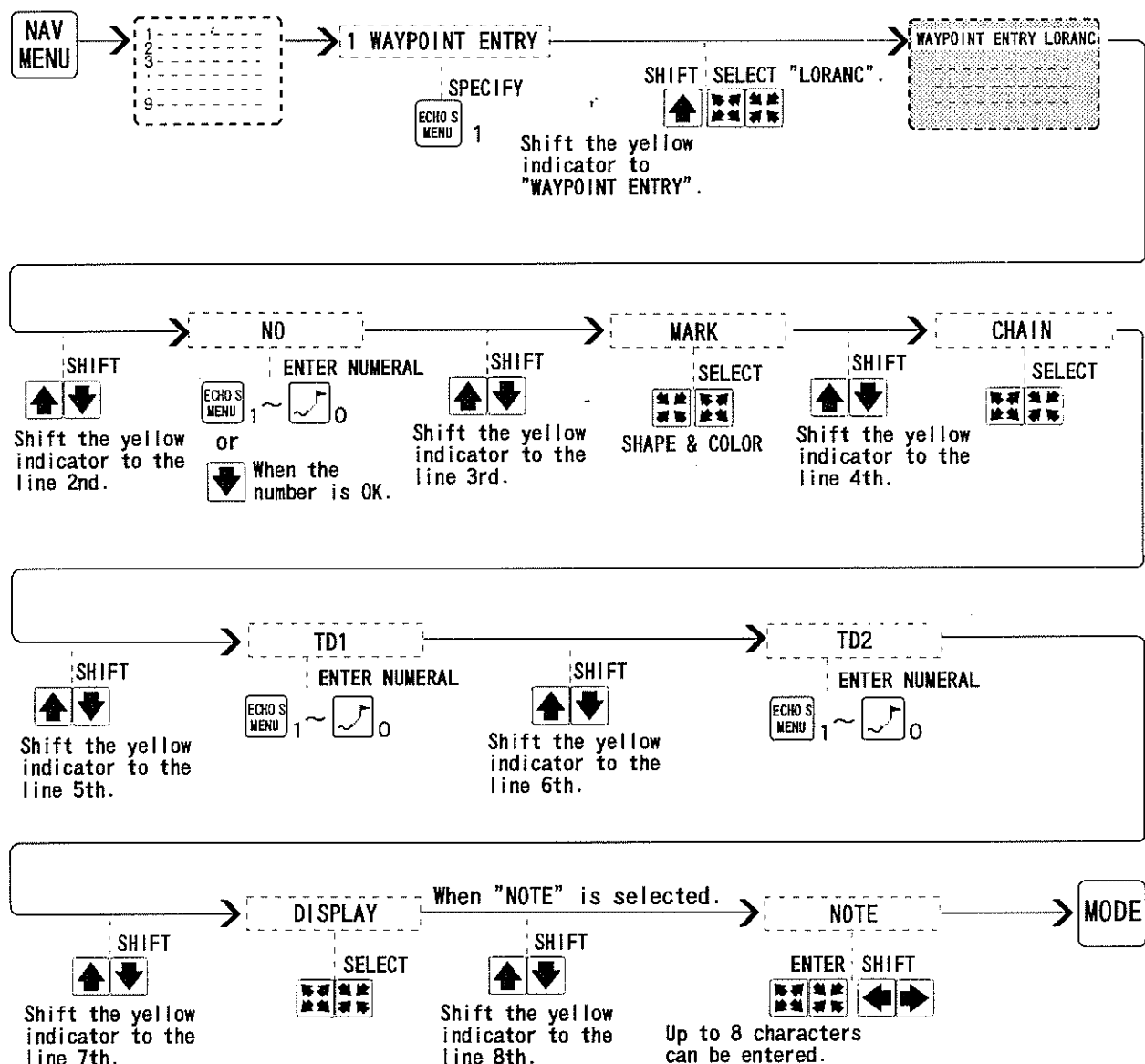
## NOTICE

- 
- To correct any mistaken entry shift the yellow indicator to the mistake with     keys and enter the correct information.
  - When entering the waypoint mark at the cursor crossing, shift the cursor crossing to the desired position first.
  - When setting mark by Lat/Lon data, specify the compass with the   keys.
-



## 2. SET BY LORAN C DATA


### OPERATION PROCEDURE





To be continued on the next page.

### NOTICE
















© It is impossible to enter mark at the own ship position or at the cursor crossing with this menu, "WAYPOINT ENTRY LORAN".

When entering at the own ship position or the cursor crossing, use the  key. PG 110.







Use the   keys to shift the yellow indicator. ①

WAYPOINT ENTRY LORANC	
NO	0001 ----- ②
MARK	◇ ----- ③
CHAIN	990 ----- ④
TD1	--- -- . -- μs ----- ⑤
TD2	--- -- . -- μs ----- ⑤
DISPLAY	NUMBER ----- ⑥
NOTE	[-----] ----- ⑦


- ① Each press of the  or  key changes the setting, "LIST - LORANC - LAT/LON - ".  
Select "LORANC".  
 { LIST : uses the list to enter by Lat/Lon data.  
 { LORANC : enters by LORANC data.  
 { LAT/LON : enters by Lat/Lon data.
- ② Enter the number with the numeral keys ( 1 ~  0).
- ③ Select the shape/color with the  /  keys.
- ④ Select the chain with the   keys.
- ⑤ Enter the positional data with the  1 ~  0 keys.
- ⑥ Each press of the  or  key changes the setting, "NUMBER - NOTE - OFF"  
 { NUMBER : attaches the mark's number  
 { NOTE : attaches the comment.  
 { OFF : not display the mark.
- ⑦ Each press of the  or  key enters a character.
  - After entering a character, press the  key to shift the yellow indicator to the next.
  - Enter characters from the left without a space.

## NOTICE




- 
- When pressing the  key, the characters will be displayed in alphabetical order. When pressing the  key, they will be displayed in the opposite order.
  - When entering the numerals, use  1 ~  0 keys.
-








### 3. SET WITH MARK KEY

◎Pressing the  key enters the waypoint mark at the own ship position or the cursor crossing.

#### WHEN "WAYPOINT" IS SELECTED FOR "KEY SETTING"

- To set waypoint mark at own ship's position when you want to set, press the  key.
- To set waypoint mark at cursor crossing position when you want to set, press the  key to display the cursor on the screen and shift the cursor crossing to the desired point, then press the  key.
- That waypoint mark will be displayed with the shape/color indicated above. PG70.
- The smallest mark number which has not been used will automatically be attached.

#### WHEN "MARK" IS SELECTED FOR "KEY SETTING"





- To set waypoint mark at own ship's position when you want to set, press the  key within 5 seconds after pressing the  key.
- To set waypoint mark at cursor crossing position when you want to set, press the  key to display the cursor on the screen and shift the cursor crossing to the desired point, then press the  key within 5 seconds after pressing the  key.
- That waypoint mark will be displayed with the shape/color indicated above. PG70.
- The smallest mark number which has not been used will automatically be attached.

### 4. WAYPOINT ENTRY LIST


◎Under this function, "WAYPOINT ENTRY LIST", it is possible to confirm the data entered for the waypoint marks, and is also possible to list, edit, erase and enter waypoint mark data.

- Up to 5,000 waypoint marks are available.
- The data of up to 20 marks may be displayed on one screen (page).

◎To shift from page to page the following three methods are available.

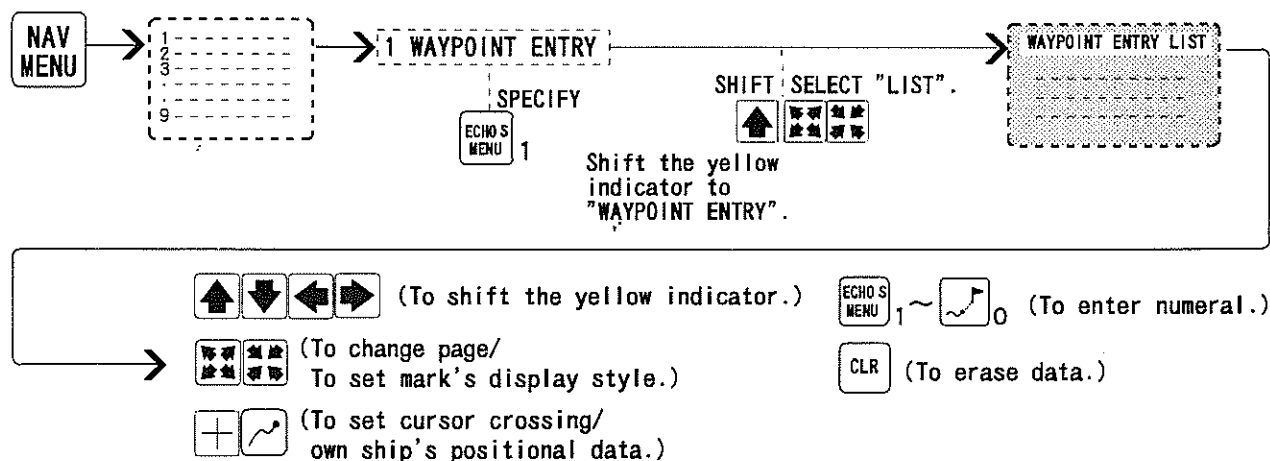
①Shift the yellow indicator with   keys to a number entry point and enter the desired mark number with  1~ 0 keys. That number's page will be displayed.

②Press  key and the mark list will change to the next page.

③Press  key and the mark list will change to the previous page.



## OPERATION PROCEDURE



Each press of the or key changes the setting.  
N → S → N, E → W → E.

WAYPOINT ENTRY LIST										
0 0 0 1	◆	3 4 °	3 9 .	6 3 3 ' N	1 3 7 °	3 5 .	9 7 6 ' E	N		
0 0 0 2	■	3 4 °	3 5 .	1 8 7 ' N	1 3 8 °	1 4 .	3 3 5 ' E	N		
0 0 0 3	—	—	—	—	—	—	—	N		
~~~~~										
0 0 1 9	⬆	3 4 °	4 0 .	1 0 8 ' N	1 3 7 °	1 2 .	3 4 2 ' E	C		
0 0 2 0	◆	3 4 °	4 2 .	8 7 3 ' N	1 3 7 °	0 7 .	2 4 6 ' E	X		

MARK NUMBER

LATITUDE DATA

LONGITUDE DATA

MARK SHAPE/COLOR

WAYPOINT MARK DISPLAY STYLE

N: displays with the number.

C: displays with the comment.




















X: not display the waypoint mark

## 1. CHANGE DATA






- Shift the yellow indicator with keys to the data to be changed. Enter the new data with keys and press key to complete the setting.







## 2. INPUT NEW DATA

- To change to the page for the desired mark number, use the   keys to shift the yellow indicator to the line of the desired mark number or, use the   keys to shift the yellow indicator to the mark number to be changed then use the     keys to enter the number of the mark to be changed. That numbers page will automatically be displayed.
- Enter the data by changing the shape by the   key and changing the color by the   key and entering the number by the     keys.  
Press the  key to complete the setting.
- Instead of entering positional (Lat/Lon) data,  
if the  key is pressed after displaying the cursor on the screen the data of the cursor crossing will be entered.  
If the  is pressed the data of the own ship's position will be entered.





## 3. CLEAR DATA

- Shift the yellow indicator to the data to be cleared and press  key.  
The red color will cover the whole line of the data, then press  or  key to clear the line.  
To cancel the clear operation, press  or  key.

## 4. CLEAR FROM DISPLAY

- Shift the yellow indicator to desired line's mark display style (right end character) and press  or  key one or two times to change it to "X", and its waypoint mark will be erased from the display.
- On the contrary, if  or  key is pressed when "X" is displayed, it will change to "N" or "C" and its waypoint mark will be displayed.
  - N: displays the waypoint mark with the number.
  - C: displays the waypoint mark with the comment.
  - X: not display the waypoint mark.

## 5. CONTINUE DATA EDIT

- After any entry, change, clear of the data, pressing  key will return to the plotter mode. However, if  or  key is pressed instead of  key it is possible to continue editing data.

## NOTICE

In the "WAYPOINT ENTRY LIST", the data which was entered by Time Difference will be displayed in the Lat/Lon data.



# CLEAR WAYPOINT MARK

③ It is possible to clear the waypoint mark from the display and the memory, or waypoint mark may be cleared from the display only and retained in the memory.

The three methods of clearing waypoint mark are as follows.

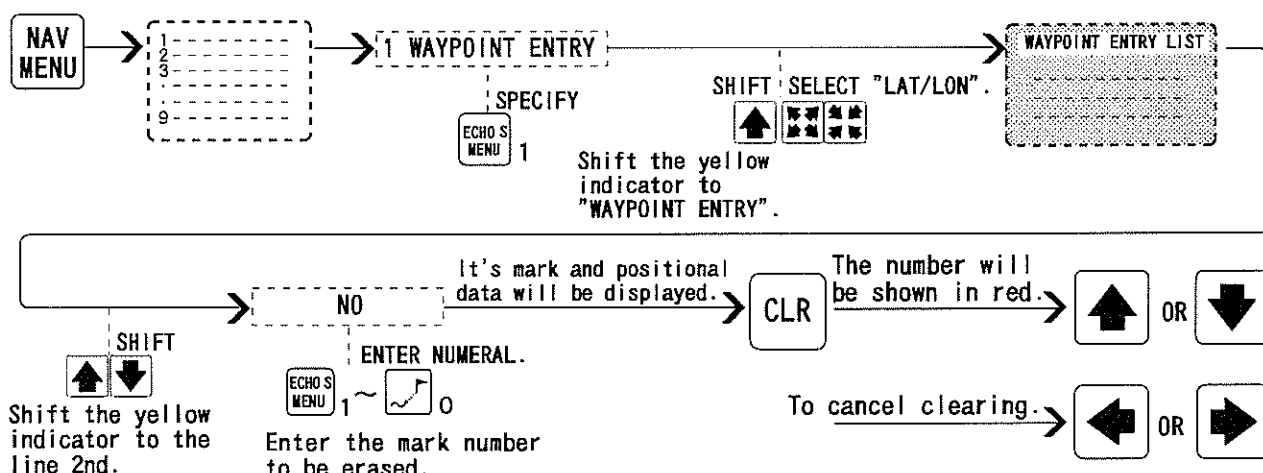
- ① Clear from "WAYPOINT ENTRY LAT/LON" menu
- ② Clear from "WAYPOINT ENTRY LIST" menu
- ③ Clear mark from the display only (retained in the memory)

## CAUTIONS

Clearing by the above method ① or ② will mean the mark is permanently erased and may not be re displayed.

## 1. CLEAR FROM "WAYPOINT ENTRY LAT/LON" MENU

### OPERATION PROCEDURE



WAYPOINT ENTRY LAT/LON	
NO.	0015
MARK	◇
LATITUDE	____° ____' ____"
LONGITUDE	____° ____' ____"
DISPLAY	NUMBER
NOTE	[-----]

The specified number's data.

Entering the mark number to be

erased with **ECHO S MENU** 1 ~ **0** keys will display its data.

Press **CLR** key, and the mark number specified will be displayed in red.

Press **↑** or **↓** key to clear it.

## NOTICE

In the case of "WAYPOINT ENTRY LORANC" menu, display is not same as above but clearing method is the same.

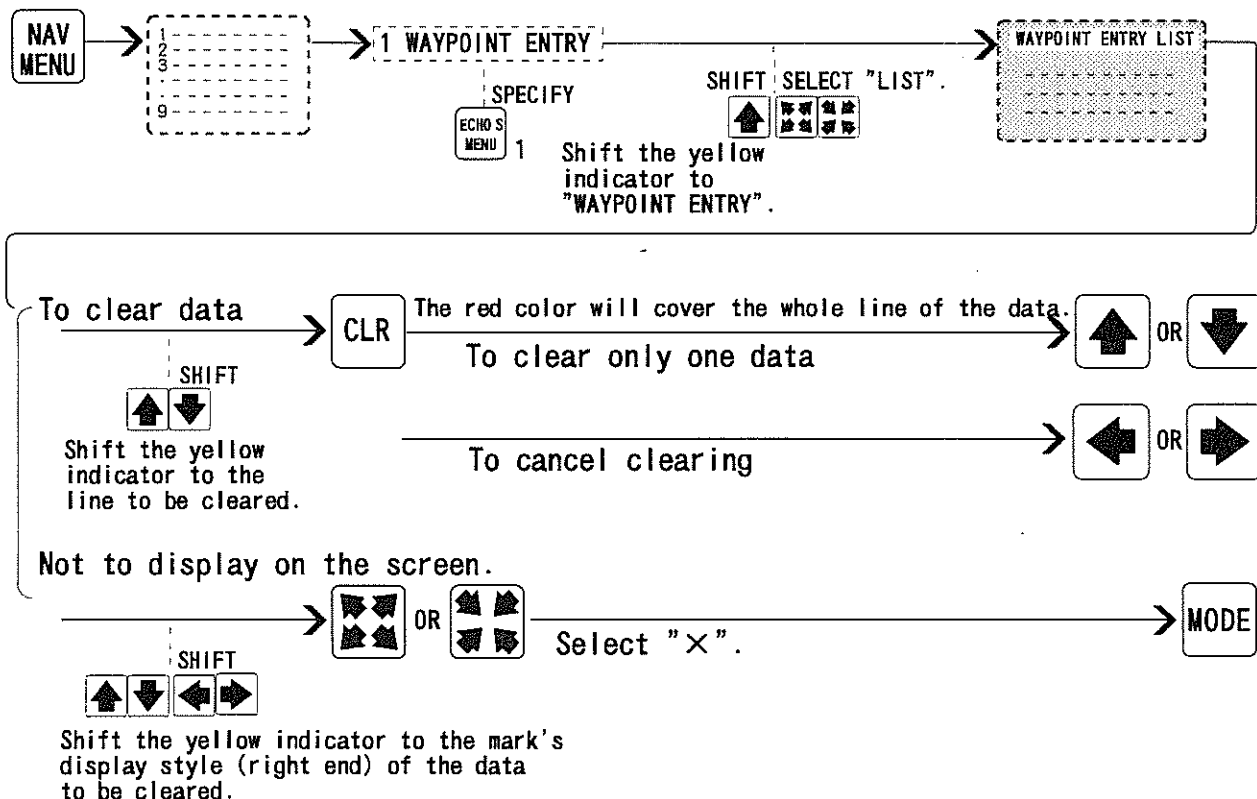


## 2. CLEAR FROM "WAYPOINT ENTRY LIST" MENU OR CLEAR FROM DISPLAY

©Using "WAYPOINT ENTRY LIST" menu makes it possible to confirm the data to be cleared.(Refer to PG 112)

And it is possible to set not to display the waypoint on the screen.

### OPERATION PROCEDURE



WAYPOINT ENTRY LIST									
0 0 0 1	◆	3 4° 3 9.	6 3 3' N	1 3 7° 3 5.	9 7 6' E	N			
0 0 0 2	■	3 4° 3 5.	1 8 7' N	1 3 8° 1 4.	3 3 5' E	N			
~~~~~									
0 0 1 9	▣	3 4° 4 0.	1 0 8' N	1 3 7° 1 2.	3 4 2' E	C			
0 0 2 0	◆	3 4° 4 2.	8 7 3' N	1 3 7° 0 7.	2 4 6' E	X			

MARK NUMBER

LATITUDE DATA

LONGITUDE DATA

MARK SHAPE/COLOR

WAYPOINT MARK DISPLAY STYLE

N: displays with the number.

C: displays with the comment.

X: not display the waypoint mark



# COURSE DISPLAY

## COURSE NAVIGATION

©The course from own ship position to a specified waypoint or the cursor crossing may be displayed in a dotted purple line. The distance, bearing and time to this point are displayed in the lower left of the screen.

It is possible to clear the dotted course line but still have the information displayed. PG 57.


The course between two specified waypoints may also be displayed.

- The following four course displays are available.
  - (1) Course display from own ship to waypoint
  - (2) Course display from own ship to cursor crossing
  - (3) Course display between two waypoints
  - (4) Route display (Refer to PG 130)
- This is useful to set the alarm range. Refer to PG 119.




### NAVIGATION KEY

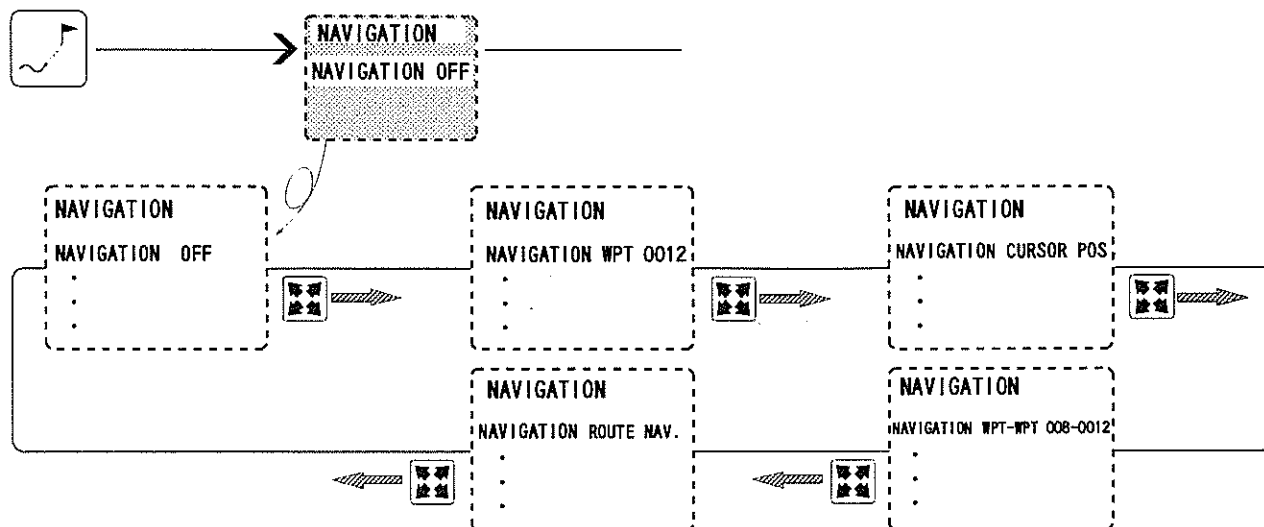
©Pressing this key will display the navigation menu which is for setting the desired course.

To display the desired course, after pressing  key to display the navigation menu,

①Shift the yellow indicator by  or  key to the line first.  
"NAVIGATION".

②Keep pressing  key to the desired course display. See below for display order.

Pressing  key instead of  key will reverse the order.



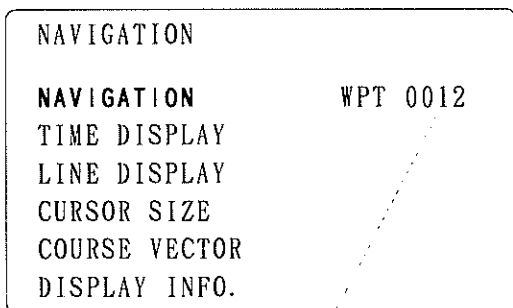
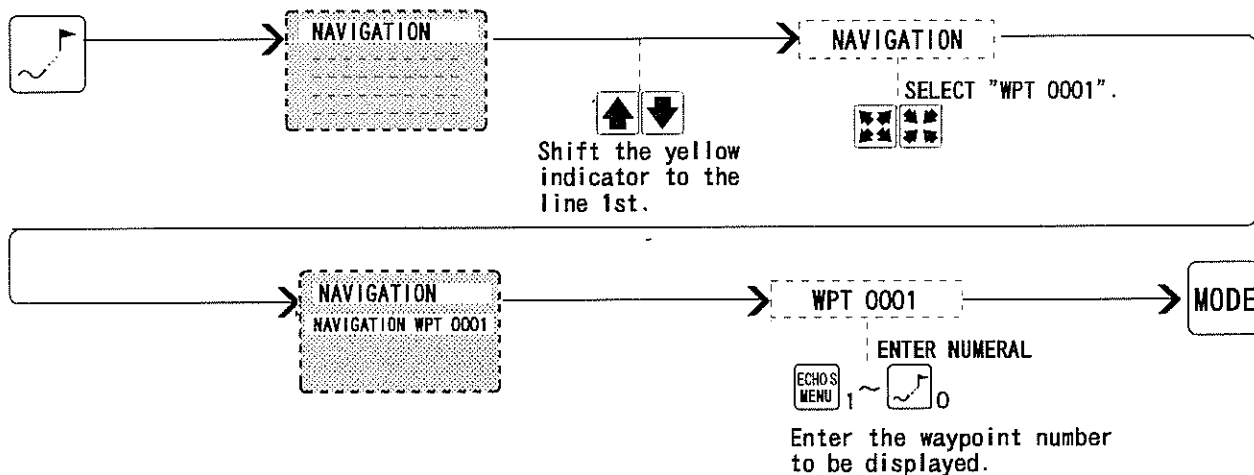


# 1. COURSE FROM OWN SHIP TO WAYPOINT

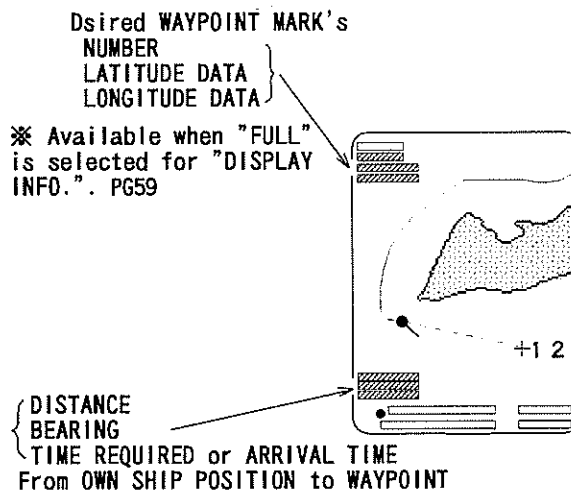
◎ The course from own ship position to a specified waypoint will be displayed in a dotted purple line.

The specified waypoint number and its positional data will be displayed in the screen's upper left, and the distance, bearing and time from own ship to it will also be displayed in the screen's lower left.

## OPERATION PROCEDURE

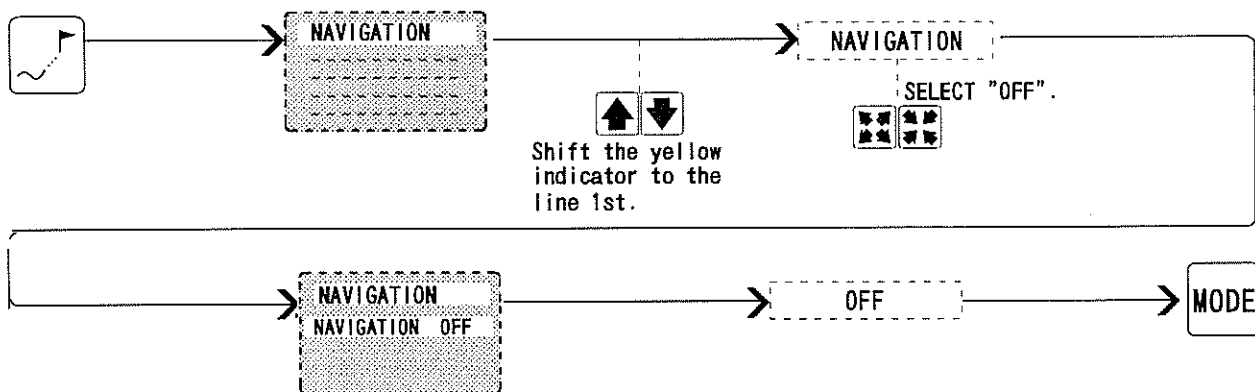


To enter the waypoint number, use the **ECHO'S MENU** 1 ~ 0 keys. Make sure to enter it in four digits. EX No.16→0016



## ◎ CLEAR A COURSE

### OPERATION PROCEDURE



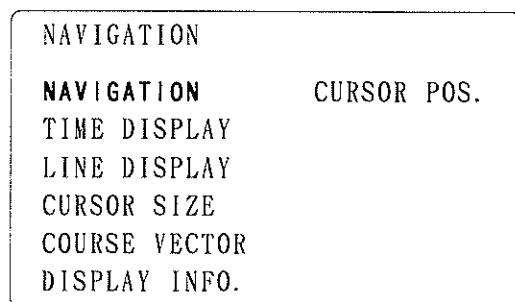
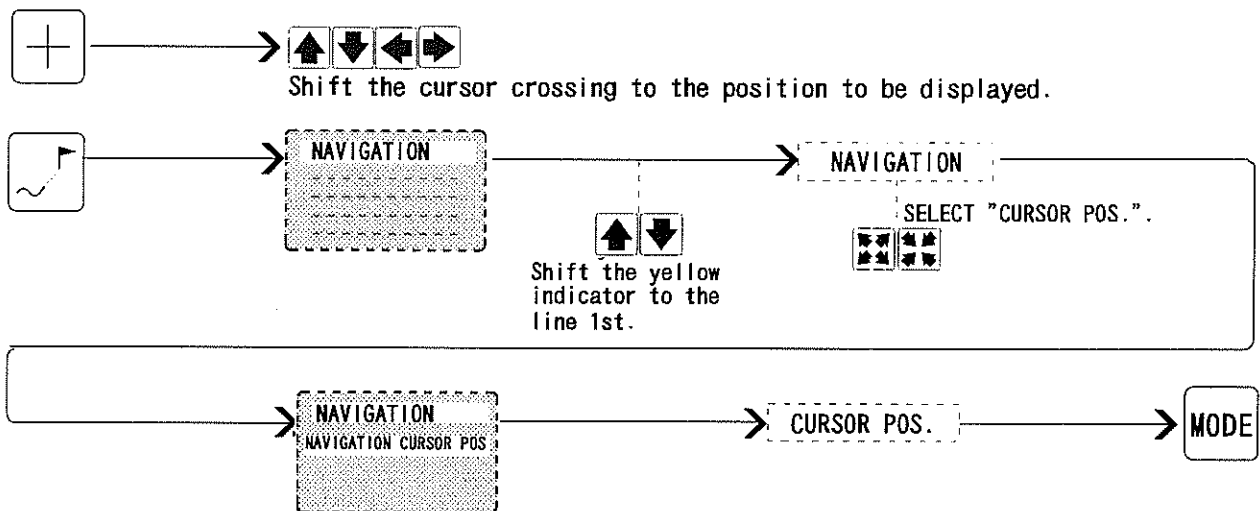


## 2. OWN SHIP TO CURSOR CROSSING

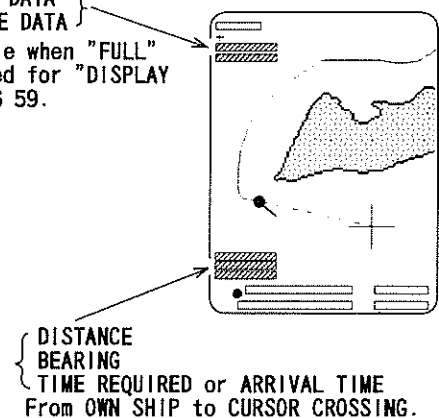
◎ The course from own ship position to cursor crossing will be displayed in a dotted purple line.

The specified cursor crossing's positional data will be displayed in the screen's upper left, and the distance, bearing and time required(or arrival time) from own ship to it will also be displayed in the screen's lower left.

### OPERATION PROCEDURE

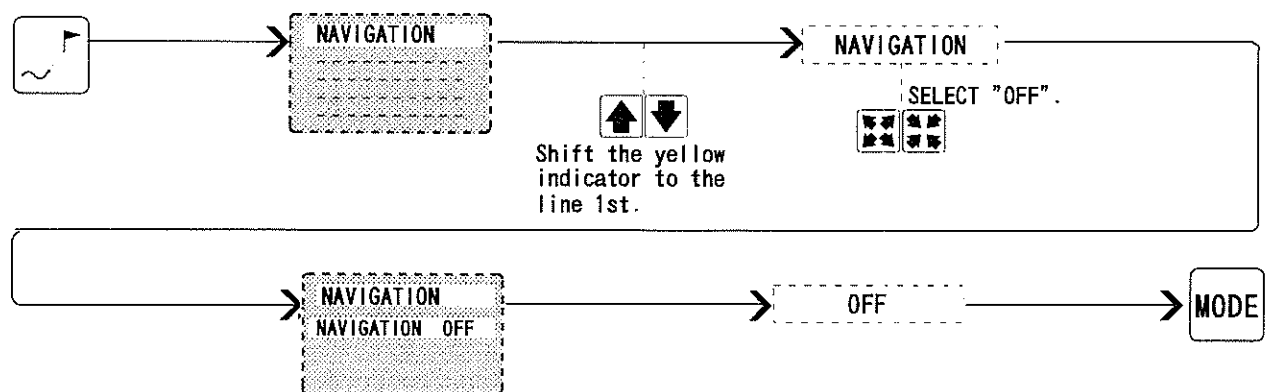


Desired CURSOR CROSSING's  
LATITUDE DATA  
LONGITUDE DATA  
※Available when "FULL"  
is selected for "DISPLAY  
INFO.". PG 59.



## ◎ CLEAR A COURSE

### OPERATION PROCEDURE

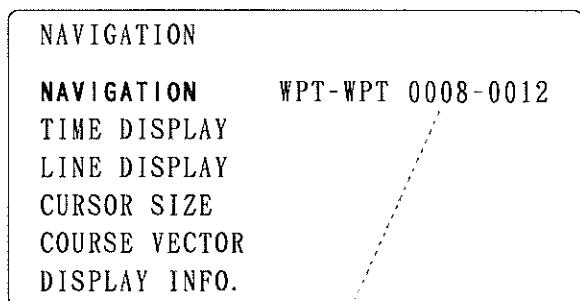
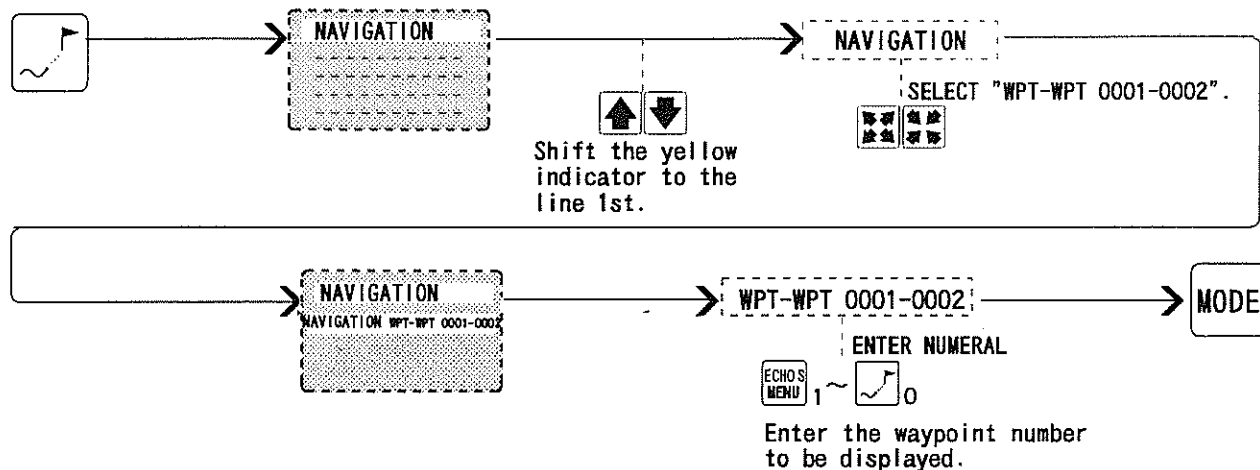




### 3. COURSE BETWEEN TWO WAYPOINTS

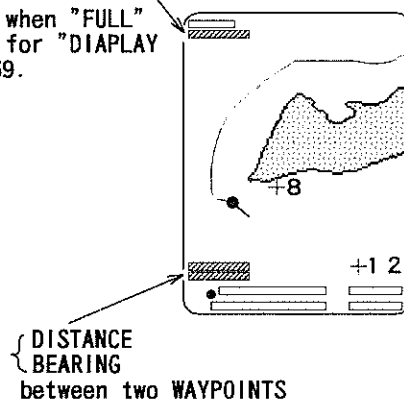
- ◎ The course from waypoint to waypoint will be displayed in a dotted purple line. The number of that two waypoints, the distance and the bearing from the first waypoint to the second waypoint are displayed in the upper left of the screen.

#### OPERATION PROCEDURE



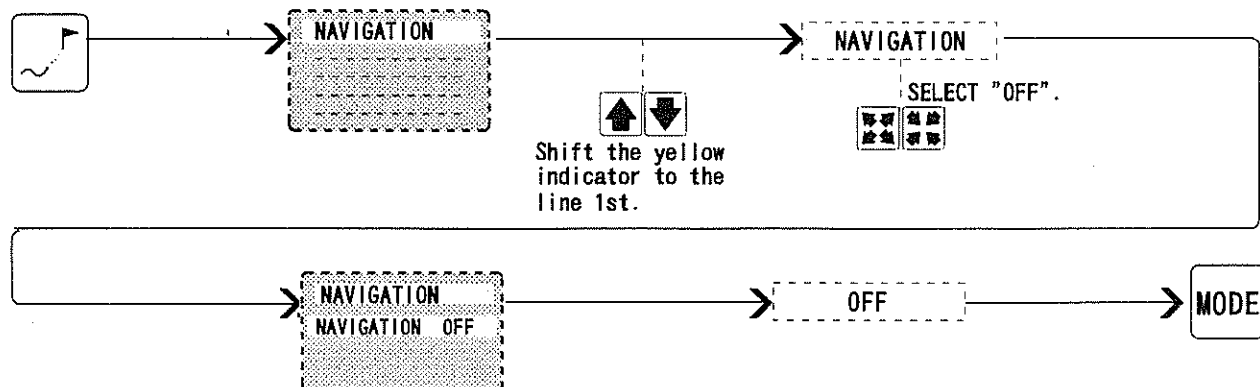
To enter the waypoint number, use the keys. Make sure to enter it in four digits. EX No.16→0016

WAYPOINT MARK's NUMBER  
※Available when "FULL" is selected for "DIAPLAY INFO.". PG 59.



### ◎ CLEAR A COURSE

#### OPERATION PROCEDURE





# ALARM

## ALARM SETTING

◎The alarm function may be set for when own ship enters or departs a specified area or for when own ship departs from a specified course.

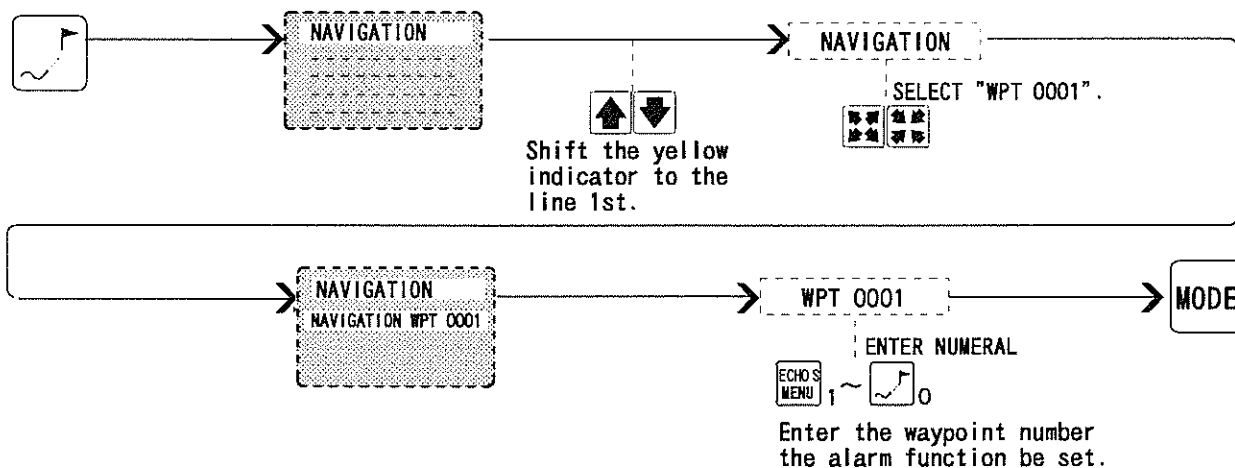
The four alarm settings are as follows.

- ① Own ship arrives at a specified distance from a waypoint
- ② Own ship moves a specified distance away from a waypoint
- ③ Own ship moves a specified distance from a set course
- ④ Own ship crosses a specified border

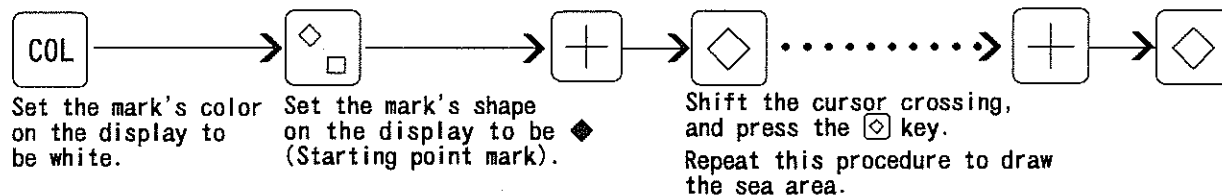
## COURSE DISPLAY OPERATION

◎Before setting the alarm function, be sure to display the course using the following procedure.

• Before setting the above ①, ② and ③



• Before setting the above ④



## HOW TO STOP ALARM

◎When the alarm sounds, set the alarm function "OFF" by referring to "CANCEL THE ALARM FUNCTION" on the following pages.



# 1. ARRIVAL ALARM

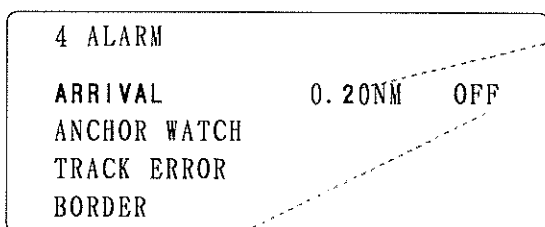
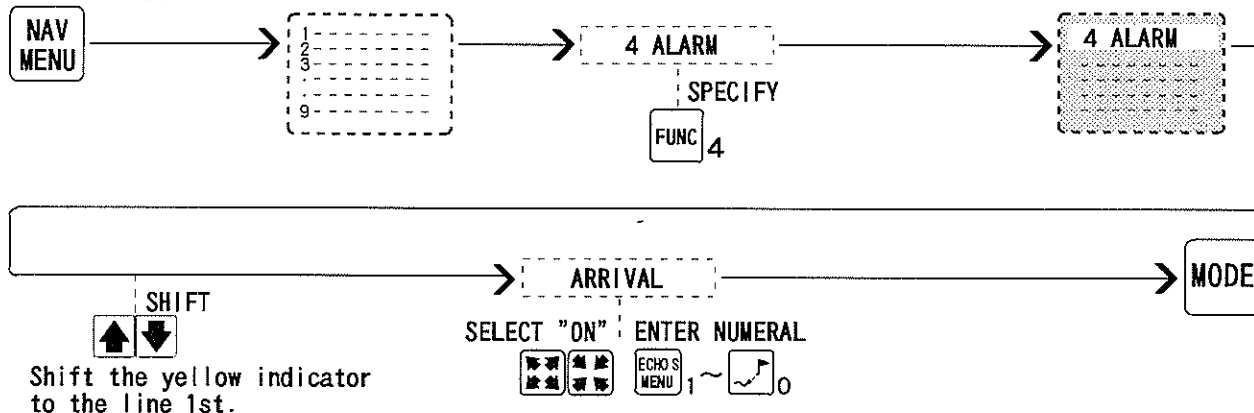
## (OWN SHIP ARRIVES AT A SPECIFIED DISTANCE FROM WAYPOINT)

◎ Alarm sounds when own ship arrives at a specified distance from waypoint.

- Before setting alarm, ensure to display the course from own ship to the desired waypoint as follows.

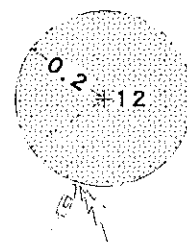
### OPERATION PROCEDURE

Before doing the following procedure, ensure to display the course from own ship to the desired waypoint. Refer to PG 116 for details.



Enter the alarm range with **ECHO S MENU** 1 ~ **0** keys

The range is set 0.2NM from waypoint No.12.

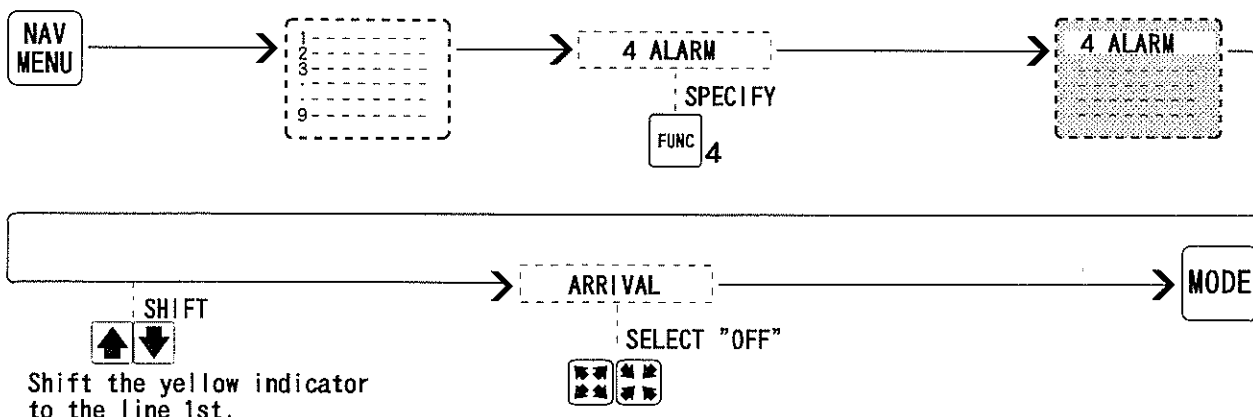


Each press of **ON** or **OFF** key changes the setting, "ON - OFF -".

{ ON : sets the alarm.  
OFF: cancels the alarm.

## ◎ CANCEL THE ALARM FUNCTION

### OPERATION PROCEDURE





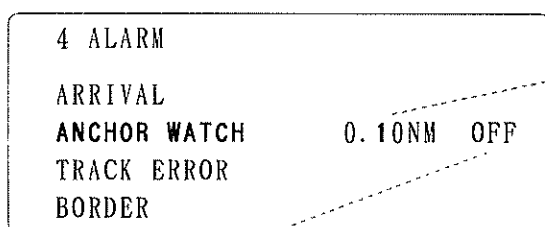
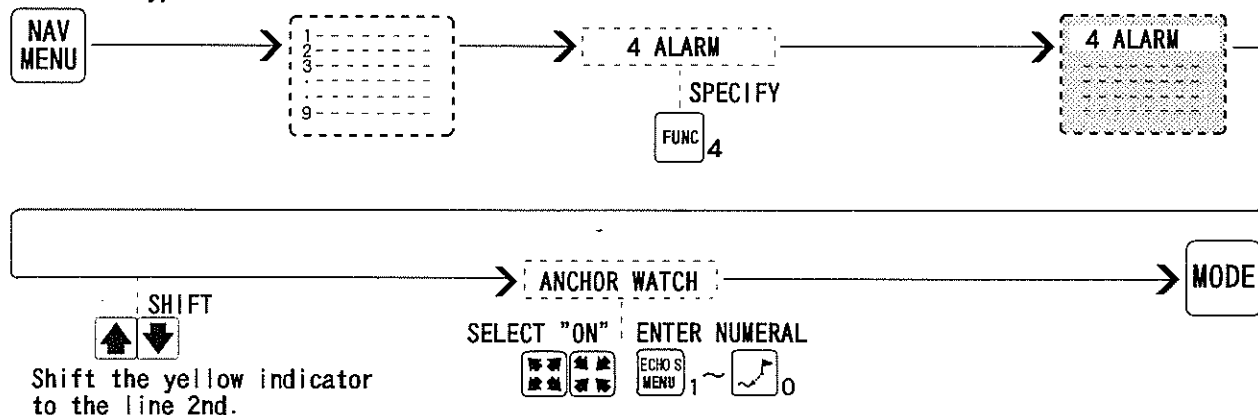
## 2. ANCHOR WATCH ALARM

### (OWN SHIP MOVES A SPECIFIED DISTANCE AWAY FROM A WAYPOINT)

- ◎ Alarm sounds when own ship moves a specified distance away from a waypoint.
- Before setting alarm, ensure to display the course from own ship to the desired waypoint as follows.

#### OPERATION PROCEDURE

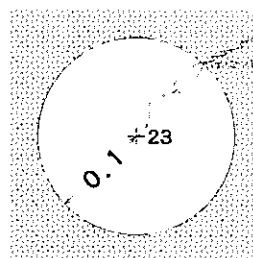
Before doing the following procedure, ensure to display the course from own ship to the desired waypoint. Refer to PG 116 for details.



Enter the alarm range with ECHO S MENU 1 ~ 0 keys

Each press of or key changes the setting, "ON - OFF - ".

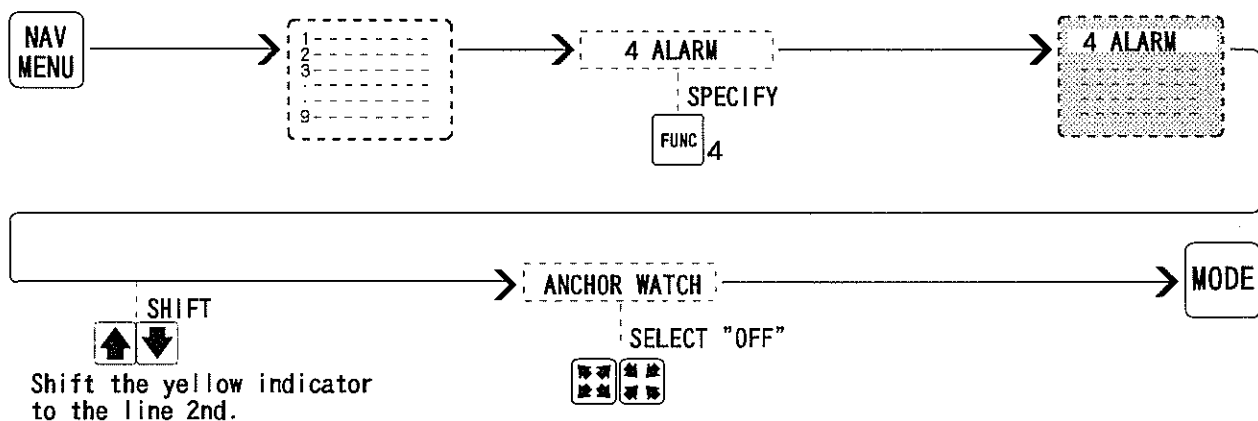
{ ON : sets the alarm.  
OFF: cancels the alarm.



The range is set 0.1NM from waypoint No.23.

## ◎ CANCEL THE ALARM FUNCTION

#### OPERATION PROCEDURE





### 3. CROSS TRACK ALARM

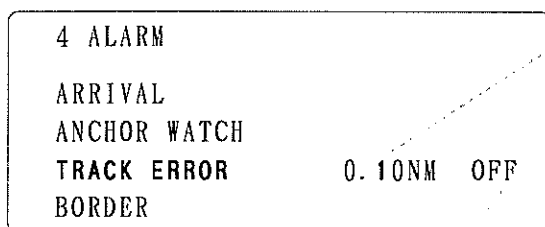
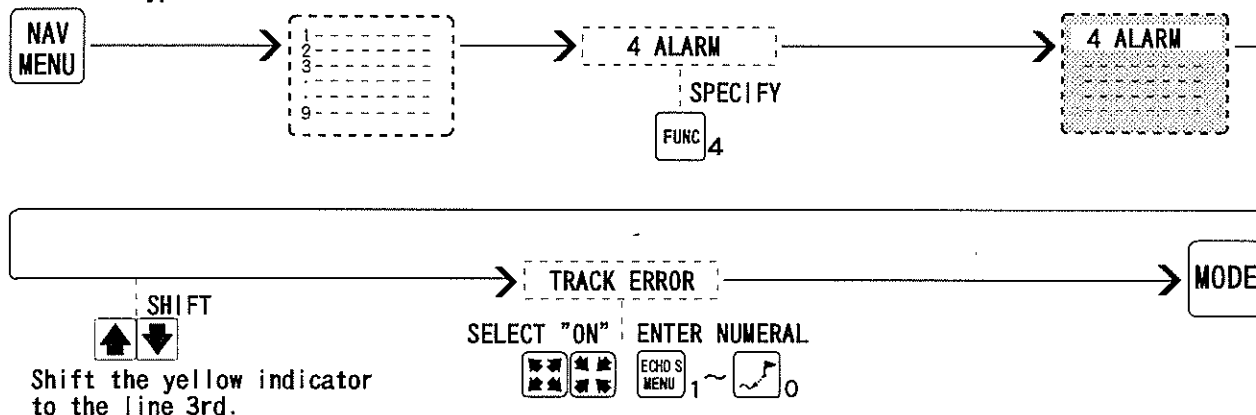
#### (OWN SHIP MOVES A SPECIFIED DISTANCE FROM A SET COURSE)

◎ Alarm sounds when own ship moves a specified distance from a set course.

- Before setting alarm, ensure to display the course from own ship to the desired waypoint as follows.

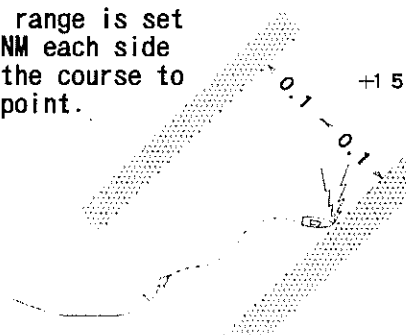
#### OPERATION PROCEDURE

Before doing the following procedure, ensure to display the course from own ship to the desired waypoint. Refer to PG 116 for details.



Enter the alarm range with ECHO S MENU 1 ~ [graph icon] 0 keys

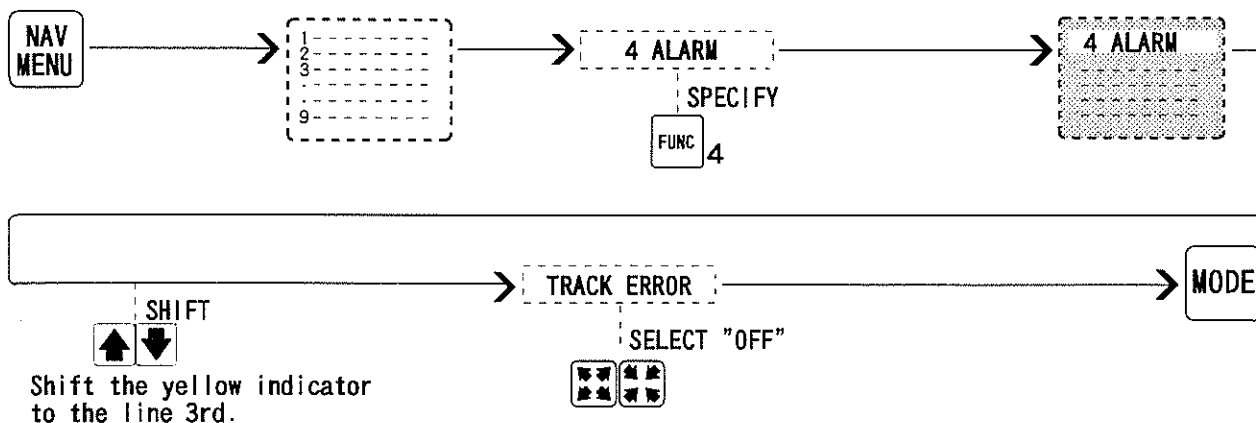
The range is set 0.1NM each side of the course to waypoint.



Each press of [left arrow] or [right arrow] key changes the setting. "ON - OFF - ".  
 { ON : sets the alarm.  
 { OFF: cancels the alarm.

### ◎ CANCEL THE ALARM FUNCTION

#### OPERATION PROCEDURE



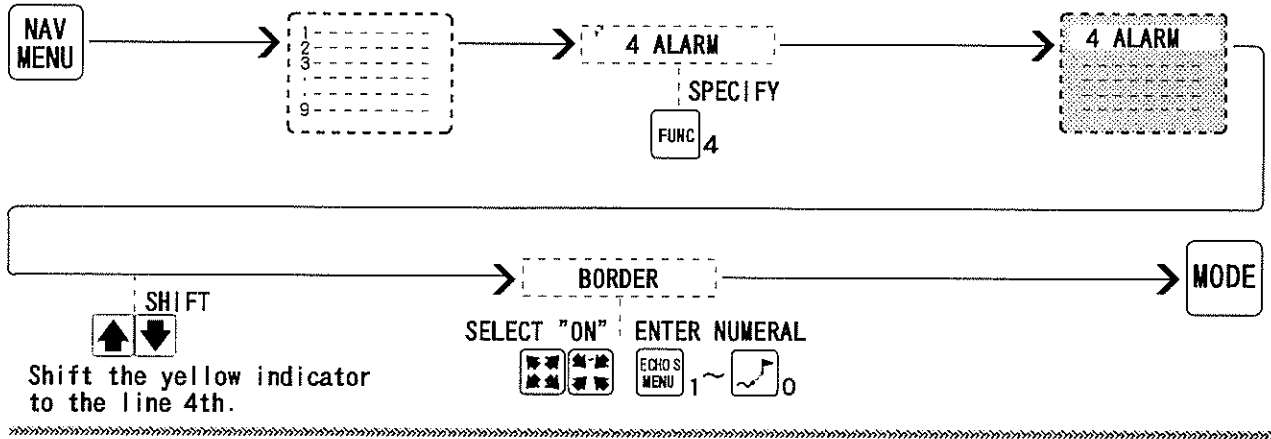


## 4. BORDER ALARM (OWN SHIP CROSSES A SPECIFIED BORDER)

◎ Alarm sounds when own ship crosses a specified border.

### OPERATION PROCEDURE

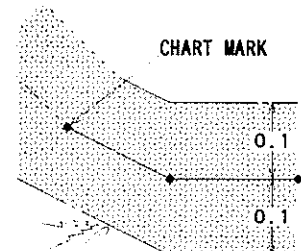
Before doing the following procedure, ensure to draw the chart where the alarm function should be activated. Refer to PG 103 for details.



4 ALARM
ARRIVAL
ANCHOR WATCH
TRACK ERROR
BORDER 0.10NM OFF

Enter the alarm range with ECHO S MENU 1 ~ 0 keys

The range is set 0.1NM from the white chart mark line.



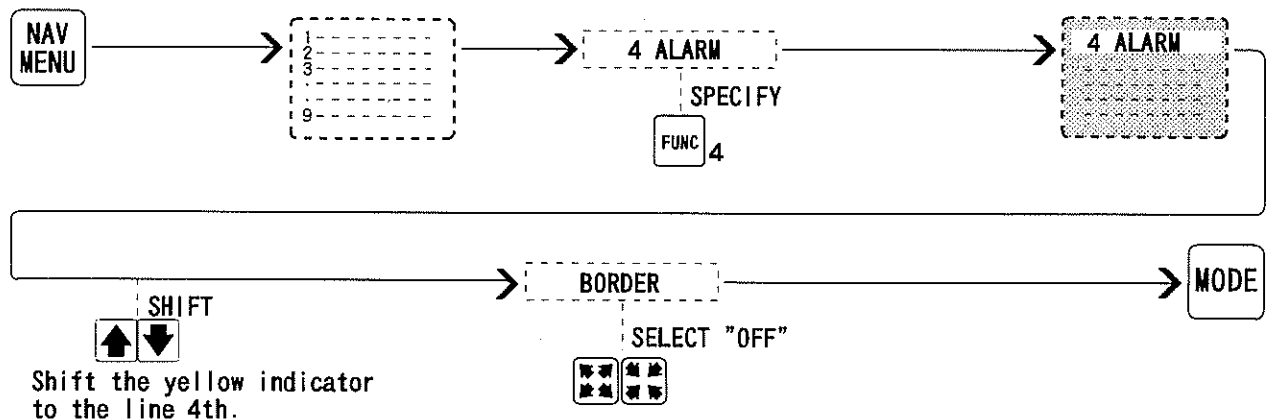
Each press of or key changes the setting, "ON - OFF -".

{ ON : sets the alarm.

{ OFF: cancels the alarm.

## ◎ CANCEL THE ALARM FUNCTION

### OPERATION PROCEDURE



## ⚠ CAUTIONS

Ensure the chart mark color is white, or this function will not be available.



# ROUTE NAVIGATION

◎ "COURSE" means the straight line from own ship position to a specified waypoint or to the cursor crossing.

"ROUTE" means a serial line which starts from the own ship position to connect a number of waypoint marks.

- This route is displayed as a dotted purple line and the distance, the time required and the bearing will be displayed in the screens lower.  
The route may also be cleared from the screen. Refer to "LINE DISPLAY" on PG 57.
- A route can contain up to 20 waypoint marks and up to a total of 50 routes will be set. Up to 5 routes can be displayed at one time.

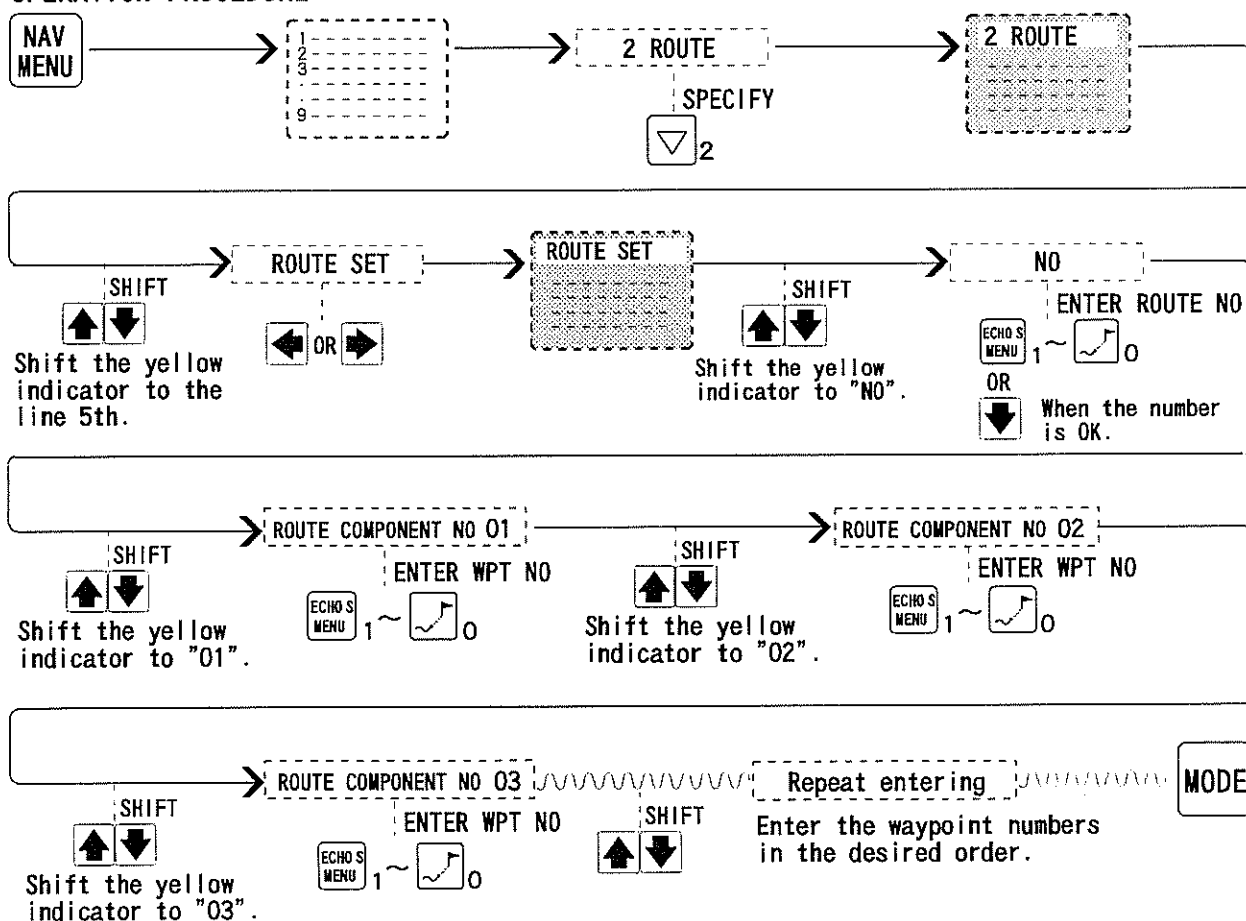
## ROUTE SET

### 1.ROUTE INPUT

◎ To set waypoint marks to display a route.

- After entering the desired route number (1~50) for a route, enter the waypoints in the desired order for the route.
- The route set will be displayed as follows. (After selecting under ROUTE SELECT function and setting the route display.)

#### OPERATION PROCEDURE



To be continued on the next page.



2 ROUTE

ROUTE NO

WPT. ORDER

START POINT



WPT. CHANGE

ROUTE SET


NEXT MENU ←→



Use the  or  key to go into the next menu, "ROUTE SET".

Use the   keys to shift the yellow indicator.

Use the  1 ~  0 keys to enter the route number(01~50).

To change to the next number, press the  key.

To change to the previous number, press the  key.

Use the  1 ~  0 keys to enter the waypoint number (01~50) in the desired order.

ROUTE SET													
NO	0 1												
0 1	0 0	1 2	3 4°	3 8.	6 4	4',	N	1 3	7°	0 1.	5 2	3',	E
0 2	0 0	2 0	3 4°	3 3.	8 6	6',	N	1 3	7°	0 0.	1 1	0',	E
0 3	0 0	2 1	3 4°	3 0.	7 4	0',	N	1 3	7°	0 3.	6 3	2',	E
0 4	0 0	5 0	3 4°	3 4.	1 9	6',	N	1 3	7°	0 9.	0 2	3',	E
0 5	— —	— —	— —°	— —.	— —	— —',	—	— —	— —°	— —.	— —	— —',	—
⋮	⋮												
1 7	— —	— —	— —°	— —.	— —	— —',	—	— —	— —°	— —.	— —	— —',	—
1 8	— —	— —	— —°	— —.	— —	— —',	—	— —	— —°	— —.	— —	— —',	—
1 9	— —	— —	— —°	— —.	— —	— —',	—	— —	— —°	— —.	— —	— —',	—
2 0	— —	— —	— —°	— —.	— —	— —',	—	— —	— —°	— —.	— —	— —',	—

ROUTE COMPONENT NUMBER

Use the   keys to shift the yellow indicator.







As each waypoint number is entered its Lat/Lon data will be displayed.


## HOW TO USE ROUTE NAVIGATION


- ① Enter the waypoint marks which compose a route. PG 105.
- ② Enter the route number and enter the waypoint mark numbers which compose a route. (Route set)
- ③ Select the route number to be displayed, and specify the route display method. (Route selection)
- ④ Display the route. (Route display)








## 2. CHANGE DATA IN "ROUTE SET" MENU



©To change from one route list to another, shift the yellow indicator with  keys to "NO" and enter the route number with  1 ~  0 keys. The list will automatically be changed to the list on which the specified route is set.

To change to the next list, press  key.


To change to the previous list, press  key.

©Shift the yellow indicator with  keys to the waypoint data to be changed and enter the new data. However, latitude/longitude data may not be changed.


©To erase the data of a waypoint mark, shift the yellow indicator to the desired route component number and press  key, and the waypoint mark number will be shown in red.



Press  or  key to erase the data.



©To insert/clear a line for entering/erasing a waypoint mark, shift the yellow indicator to the desired route component number and operate as explained below.

To insert a line, press  key.

To erase the desired line, press  key to show the number in red and press  or  key.

©To erase a page of data from the route list, shift the yellow indicator to the desired route number and press  key, and the route number will be shown in red.

Press  or  key to erase a page of data.

To cancel erasing, press either  or .

### NOTICE

---

Under "ROUTE SET" function, if the waypoint number is not entered or if the waypoint number is entered but the latitude/longitude information is not entered, the data of a route component number will not be displayed.

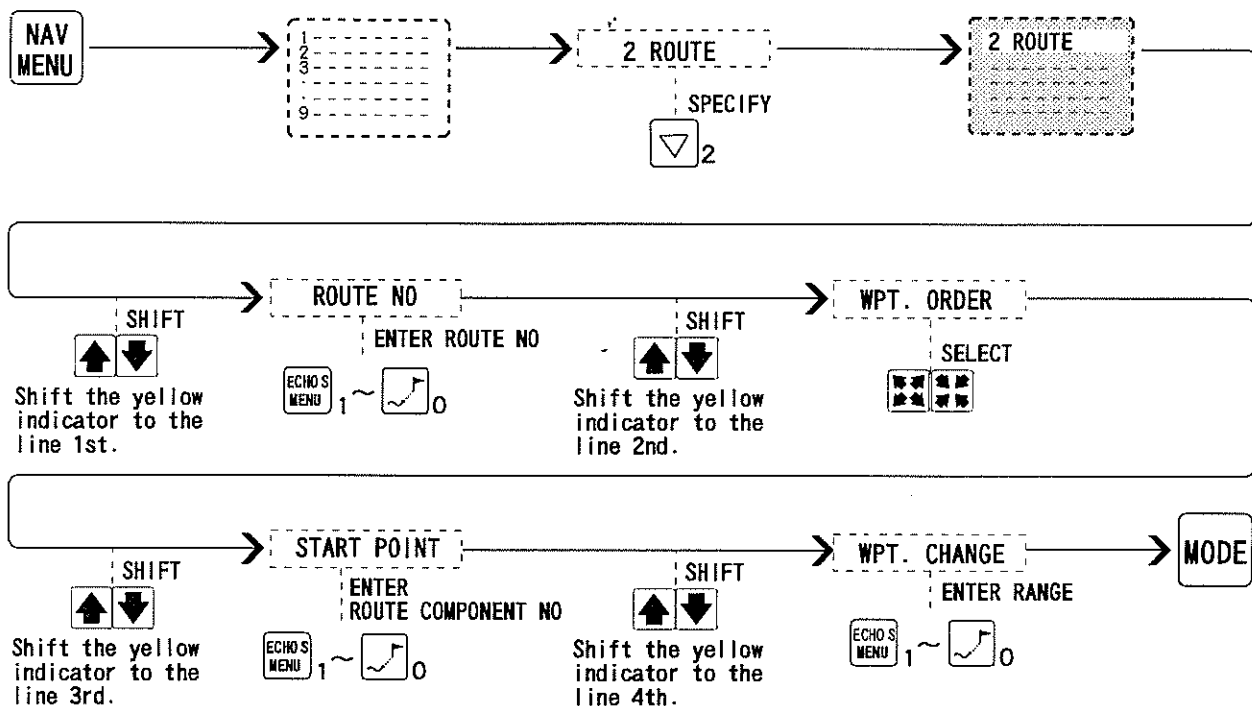
---



# ROUTE SELECTION

◎To display a route and to select the route point order.

## OPERATION PROCEDURE



Use the keys to shift the yellow indicator.

2 ROUTE		
ROUTE NO	01 00 00 00 00	Enter the route number to be displayed.
WPT. ORDER	FORWARD	Select the display order of route.
START POINT	01	Enter the start route component number (not waypoint number). PG 129.
WPT. CHANGE	0.10NM	Enter the range (distance) that changes to show the waypoint.
ROUTE SET	NEXT MENU ←→	

\* For more detailed explanation, refer to the following pages.

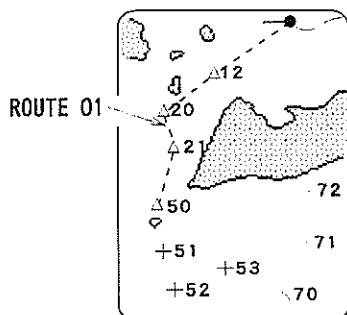


## 1. ROUTE NO.

◎Enter the desired route number to be displayed from the route numbers entered in "ROUTE SET"(PG 124).

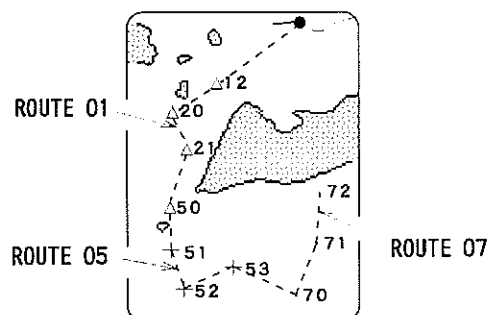
- Up to 5 routes may be displayed at once. Set from left to right.

◎WHEN ONE ROUTE IS SELECTED.  
(EX)1:ROUTE NO. 01 00 00 00 00



◎WHEN CONTINUOUS ROUTES ARE SELECTED.  
(EX)1:ROUTE NO. 01 05 07 00 00

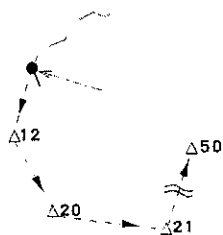
Set from left to right.



## 2. WAYPOINT ORDER

◎To select the display order of set waypoints which are set on the above 1.

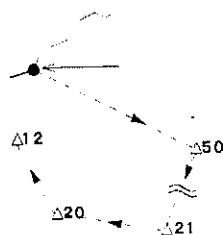
FORE



Displays the route with component No's 01→02→03 in numerical order.

When the waypoint numbers are set as 012→020→021~  
~~~→050. See left picture.

BACK



Displays the route with component No's 20→19→18 in reverse numerical order.

| ROUTE SET |                      |
|-----------|----------------------|
| NO        | 01                   |
| 01        | 0012 34°38.644N 137° |
| 02        | 0020 34°33.866N 136° |
| 03        | 0021 34°32.145N 136° |
| 04        | ----                 |
| 05        | ----                 |
| 19        | ----                 |
| 20        | 0050 34°28.100N 137° |

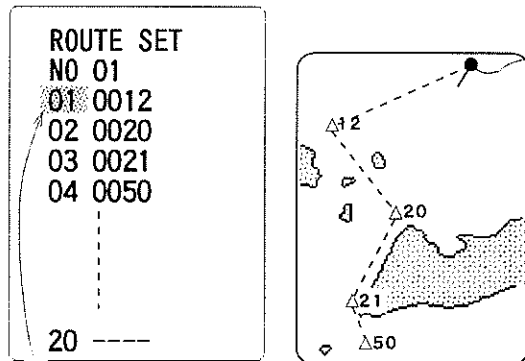
ROUTE COMPONENT NUMBER



### 3. START POINT

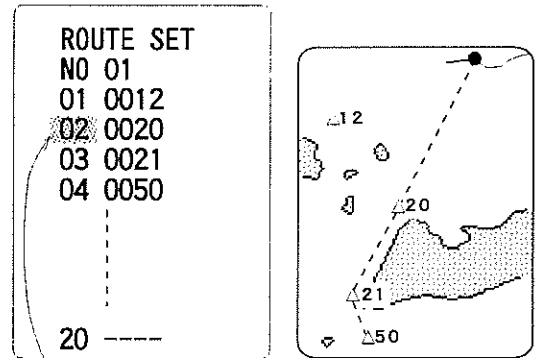
◎To select the route component number from which the route display will start.

WHEN "01" IS SPECIFIED.



Displays from this line.

WHEN "02" IS SPECIFIED.

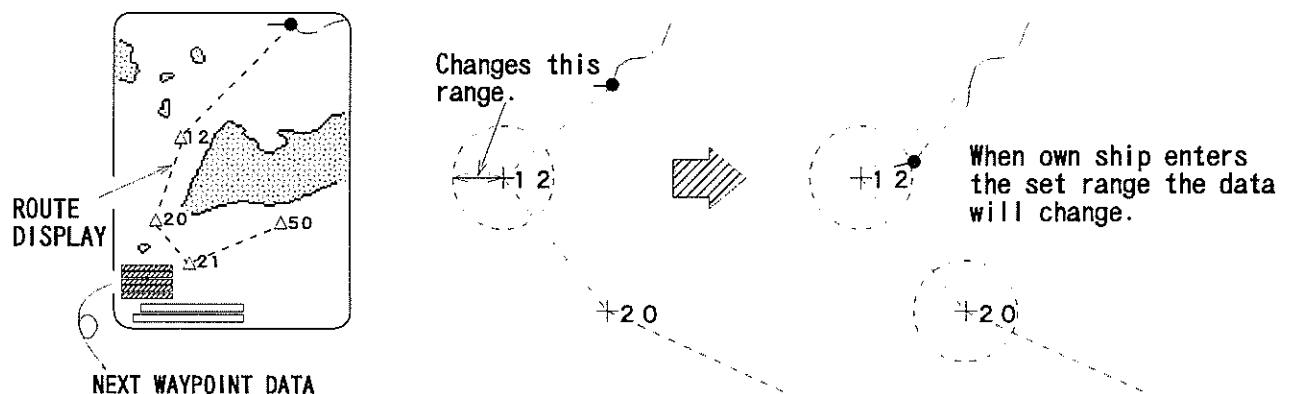


Displays from this line.

### 4. WAYPOINT CHANGE

◎When the route is displayed the distance from own ship to the next waypoint will be displayed in the lower part of the screen. When the own ship nears this waypoint the display will change to show the distance from own ship to the following waypoint.

The range from the waypoint to own ship that the display will change is selected in the following manner.



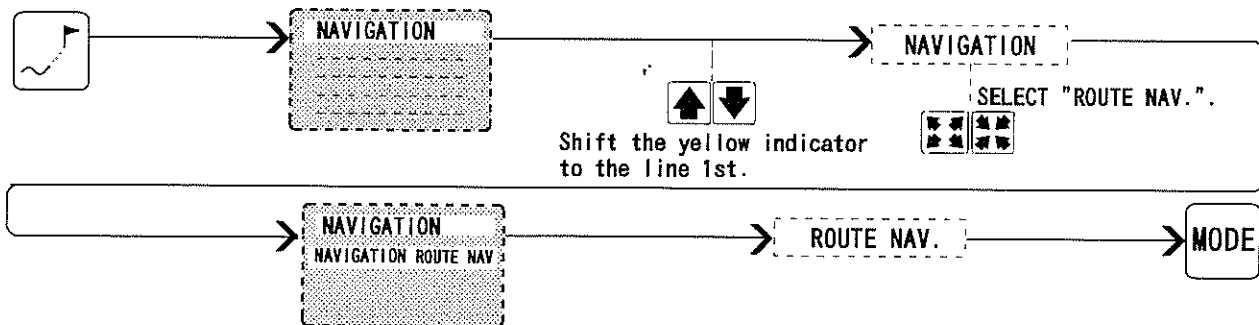
When own ship enters the specified range the data in the lower left of the screen indicating next waypoint will change to indicate the data of the waypoint specified. However, the route line may not be changed.



## ROUTE DISPLAY

©To display the route, specified under "2 ROUTE" function on the menu mode, in a purple dotted line.

### OPERATION PROCEDURE

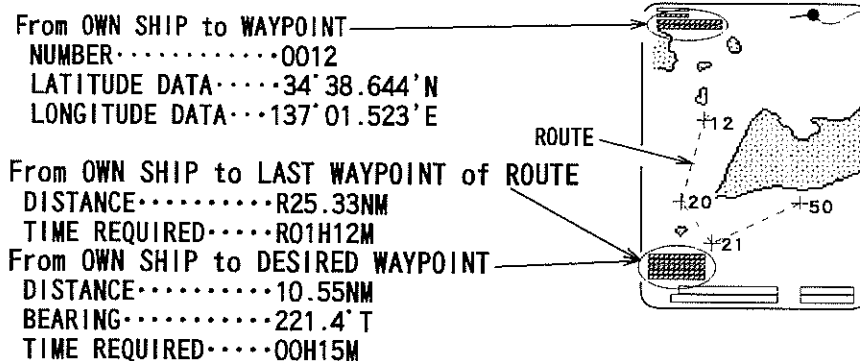


NAVIGATION

NAVIGATION  
TIME DISPLAY  
LINE DISPLAY  
CURSOR SIZE  
COURSE VECTOR  
DISPLAY INFO.

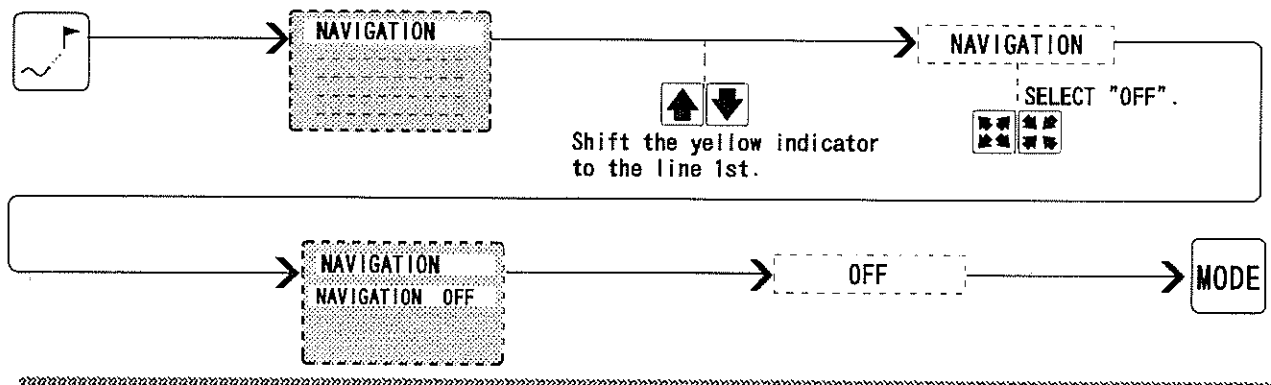
ROUTE NAV. ----- Select "ROUTE NAV."

©The set route will be displayed as the picture right.  
However, it is the one when "FULL" is selected for the display information.  
When "LIMITED" is selected, the data displayed in the screens upper will not be displayed. PG 59.



## © CLEAR A COURSE

### OPERATION PROCEDURE





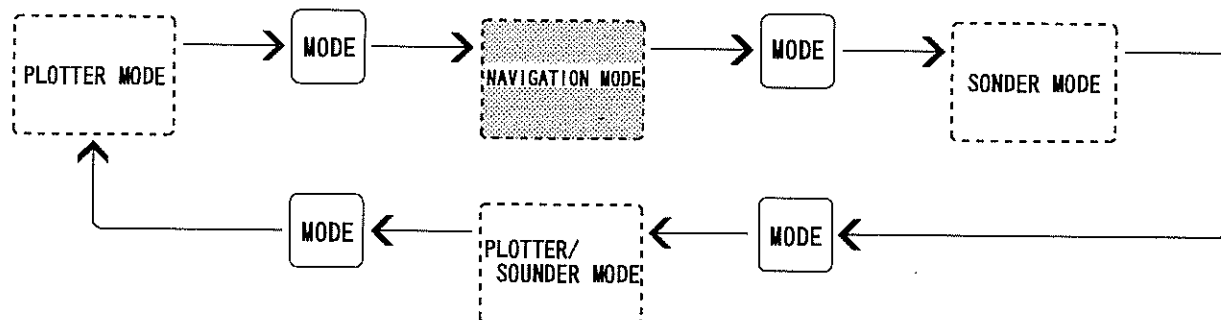
# INFORMATION MODES

## NAVIGATION MODE

©The own ship's latitude/longitude(Time difference), ship speed, bearing, water temperature will be displayed in large characters.

This makes it easier to see from a distance.


### OPERATION PROCEDURE



| NAVIGATION MODE |              | ERROR |
|-----------------|--------------|-------|
| LAT.            | 34°34.880'N  |       |
| LONG.           | 137°02.620'E |       |
| SPEED           | 13.2KT       |       |
| COURSE          | 76°T→        |       |
| DEPTH           | 28.4MT       |       |
| TEMP.           | 18.5°C*      |       |

appears in red when the unit receives the irregular signals from the navigator when the normal signals receive, this will not be displayed.

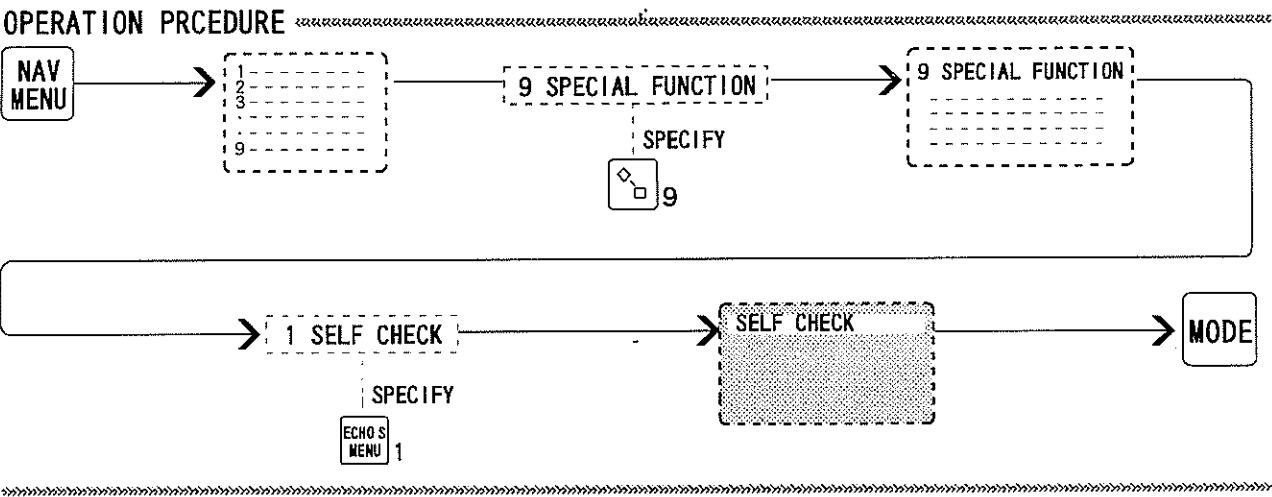
appears when the optional water temperature sensor(OP-41) is connected.

©To return to the plotter mode, press the  key.



# SELF CHECK MODE

©This mode is for checking and displaying the condition of the following internal units.



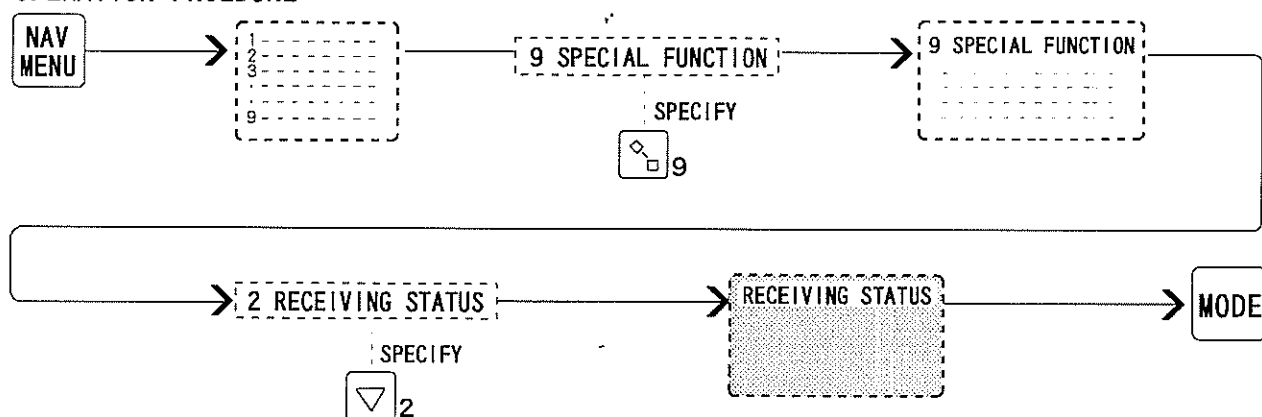
| SELF CHECK |          |       |                          |
|------------|----------|-------|--------------------------|
| ROM        | VER3.4E  | ----- | MAIN ROM VERSION         |
| MAP        | VER10.0  | ----- | MAP ROM VERSION          |
| RAM        | OK       | ----- | RAM CHECK                |
| VRAM       | OK       | ----- | V-RAM CHECK              |
| NAVIGATOR  | INTERNAL | ----- | EXTERNAL NAVIGATOR CHECK |



# RECEIVING STATUS MODE

© This mode is for checking the receiving status of the navigator connected to the unit.

## OPERATION PRCEEDURE



| RECEIVING STATUS |      |     |     |     |     |
|------------------|------|-----|-----|-----|-----|
| DOP              | 01.8 |     |     |     |     |
| STATUS           | OK   |     |     |     |     |
| TR. SAT.         | 08   |     |     |     |     |
| SAT. NO.         | 01   | 20  | 21  | 05  | 23  |
| S/N              | 51   | 50  | 51  | 51  | 45  |
| ELEV.            | 71   | 78  | 38  | 38  | 17  |
| AZIMUTH          | 330  | 062 | 216 | 045 | 182 |
| SAT. NO.         | 25   | 09  | 12  | --  | --  |
| S/N              | 45   | --  | --  | --  | --  |
| ELEV.            | 32   | --  | --  | --  | --  |
| AZIMUTH          | 286  | --  | --  | --  | --  |

## ©RECEIVING STATUS

- DOP ----- DOP rate  
The smaller the rate is the higher the accuracy is, alternately, the larger the rate is the lower the accuracy is.  
00.0: Not yet tracking
- STATUS ----- Receiving status  
OK: Now tracking  
NG:(No good) Not yet tracking
- TR. SAT. ----- The number of the satellites now being tracked
- SAT. NO. ----- The satellite numbers
- S/N ----- The S/N rate for each satellite
- ELEV. ----- The elevation of each satellite in use
- AZIMUTH ----- The azimuth of each satellite in use



# HOW TO USE ECHO SOUNDER FUNCTION

This chapter provides you how to use Echo Sounder function.

|                                         |     |
|-----------------------------------------|-----|
| MAIN UNIT KEYS AND DIALS .....          | 135 |
| RANGE KEYS .....                        | 135 |
| PHASED RANGE KEYS .....                 | 135 |
| NORMAL/BOTTOM-LOCK EXPANSION MODE ..... | 136 |
| THRESHOLD FUNCTION .....                | 137 |
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| SPECIFICATIONS .....                    | 143 |



# MAIN UNIT KEYS AND DIALS

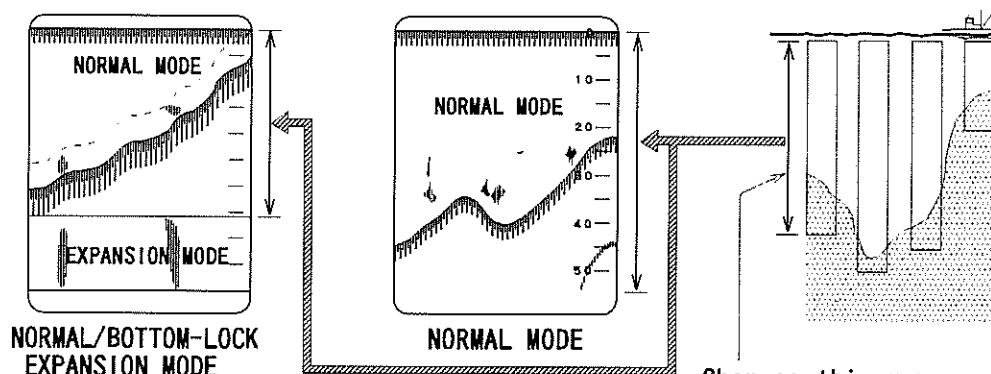
## RANGE KEYS

©To select the basic range for the Normal mode.

A total 17 basic range is available as follows.

0~5~10~15~20~30~40~50~60~80~100~150~200~300~500~1000 Meters,  
Fathoms, Braccia.

0~15~20~30~40~50~60~80~100~150~200~300~500~1000~2000~3000 Feet



Changes this range.



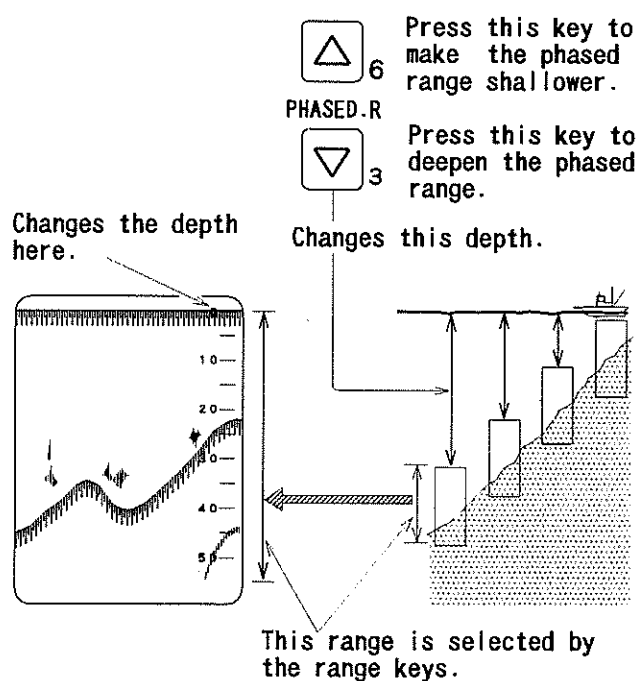
Press this key to shorten the range.



Press this key to widen the range.

## PHASED RANGE KEYS

©To change the depth at the top of the display to show the range therefrom on the screen.



Press this key to make the phased range shallower.

PHASED.R




Press this key to deepen the phased range.

• The phased range is shifted in 11 steps. Each step is 2/5 of the basic range (full range of the screen) selected by the basic range keys.

However, the available phased range are from 0 to 1999 in steps of meters, fathoms, braccia or feet.

• By shifting the phased range, the desired area expanded in the specific range can be seen.

• Pressing **FUNC** key within 5 seconds after pressing  key sets the phased range to "0".



# NORMAL/BOTTOM-LOCK EXPANSION MODE

© To display the Normal mode in the upper 2/3 area of the screen (or right half) and the Bottom-lock Expansion mode in the lower 1/3 area (or left half). PG 91  
And to select the range for the Bottom-lock Expansion mode.

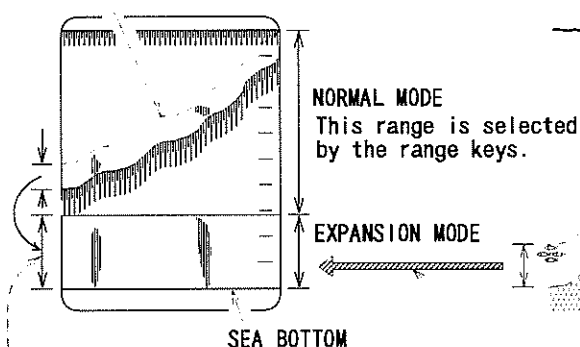
- Pressing  $\nabla_2$  key within 5 seconds after pressing **FUNC** key displays the Normal Bottom-lock Expansion mode.

Each press of  $\nabla_2$  key changes the setting, "1 - 2.5 - 5 - 10 - 20 - 50 - 100 - 250 (MT, BR, FM)" or "5 - 10 - 20 - 50 - 100 - 250 - 500 - 1000 (FT)".

On the contrary, each press of  $\triangle_5$  key changes the setting in reverse order.

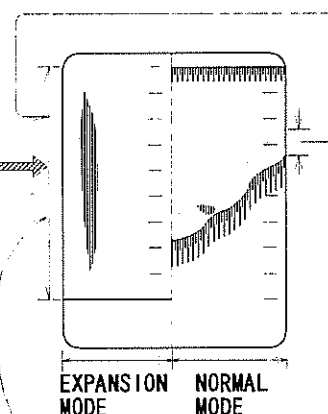
WHEN "VERTICAL" IS SELECTED FOR "SPLIT IMAGE".

EXPANSION RANGE LINE



This is the range, selected by the above mentioned operation, between the sea bottom and the expansion range line.

WHEN "HORIZONTAL" IS SELECTED FOR "SPLIT IMAGE".



This is the range, selected by the above mentioned operation, between the sea bottom and the expansion range line.

Changes this range.

**FUNC**

↓ (Within 5 seconds)

$\triangle_5$

Press this key to widen the expansion range.

RANGE

$\nabla_2$

Press this key to shorten the expansion range.

OFF · 1 · 2.5 · 5 · 10 · 20 · 50 · 100 · 250 Meters/Fathoms/Braccia

OFF · 5 · 10 · 20 · 100 · 250 · 500 · 1000 · 2000 Feet

↑  
NORMAL MODE

NORMAL/BOTTOM-LOCK EXPANSION MODE



## NOTICE

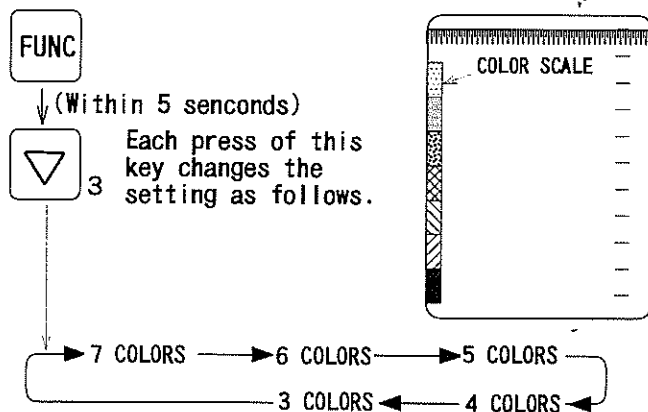
The above mentioned key operation provides the same effect as the one available from the setting for the "BOTTOM EXPANSION" on the "SOUNDER MENU". PG 85.




## THRESHOLD FUNCTION

©To erase and recall weaker echoes from the color scale.

- Pressing  key within 5 seconds after pressing  key changes the setting, "7COL. - 6COL. - 5COL. - 4COL. - 3COL. -".



- Unwanted echoes, such as noise and plankton, may be erased for clearer definition of the target echoes.
- Each time  key is pressed the weakest color will be erased.

### NOTICE

The above mentioned key operation provides the same effect as the one available from the setting for the "THRESHOLD" on the "SOUNDER MENU". PG 87.

## ALARM SETTING

©The alarm sounds when the water becomes shallower/deeper than the set depth as well as when the echoes are recorded within the set area.

### ① SHALLOW ALARM

It starts buzzing when the sea bottom becomes shallower than the set depth.

### ② DEEP ALARM

It starts buzzing when the sea bottom becomes deeper than the set depth.

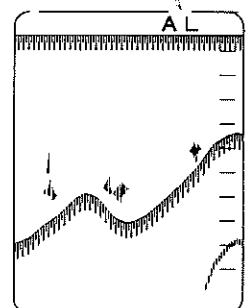
### ③ THRESHOLD LEVEL

It starts buzzing when the echoes are recorded within the set area (between the depth set for "SHALLOW ALARM" and the depth set for "DEEP ALARM").

And, it is able to start buzzing when the echoes corresponding with the color scale are recorded with this function.

- "AL" will be indicated when the alarm is set.

"AL" will be indicated here while the alarm is set.



### HOW TO STOP ALARM

©When the alarm sounds, set the alarm function "OFF" by referring to "CANCEL THE ALARM FUNCTION" on the following pages.

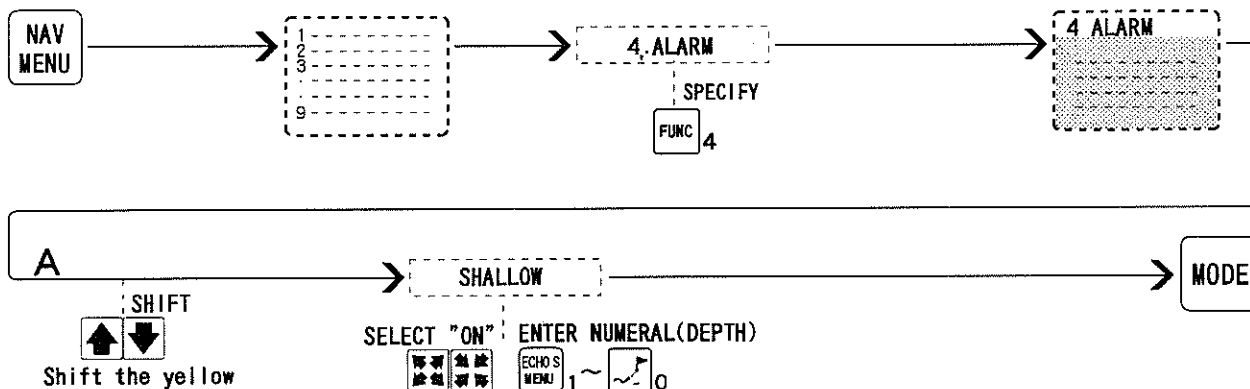


# 1. SHALLOW ALARM

(WHEN THE SEA BOTTOM BECOMES SHALLOWER THAN THE SET DEPTH)

◎ It starts buzzing when the sea bottom becomes shallower than the set depth.

## OPERATION PROCEDURE



Shift the yellow indicator to the line 5th.

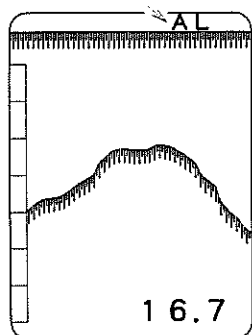
SELECT "ON": ENTER NUMERAL(DEPTH)

4 ALARM  
SHALLOW 0020 MT OFF  
DEEP  
THRESHOLD LEV.

Each press of or key changes the setting, "ON - OFF -".  
ON : Sets the alarm function.  
OFF : Cancels the alarm function.

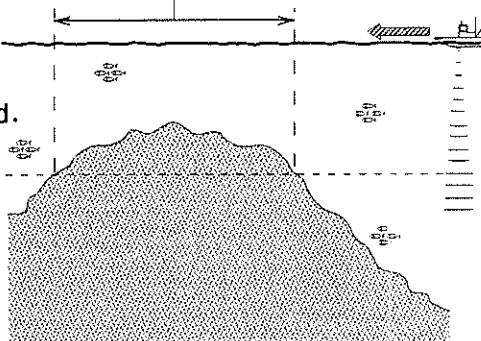
Use 1 ~ 0 keys to enter the set depth.

Indicates when "ON" is selected.



When the sea bottom becomes shallower than the set depth, the alarm will sound.

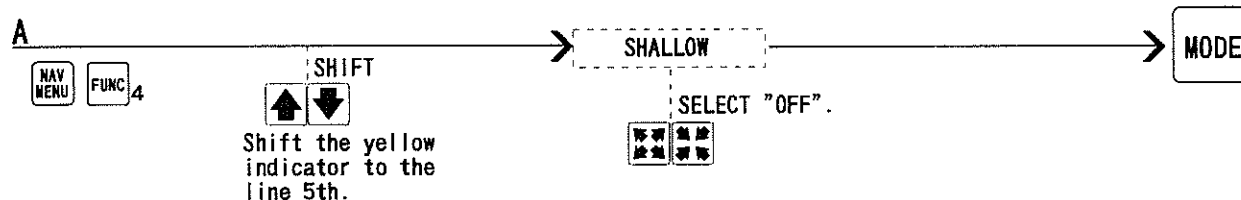
Alarm sounds in this area.



20 MT  
(The depth set for "SHALLOW".)

## ◎ CANCEL THE ALARM FUNCTION

### OPERATION PROCEDURE



Shift the yellow indicator to the line 5th.

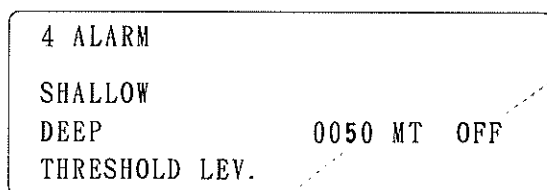
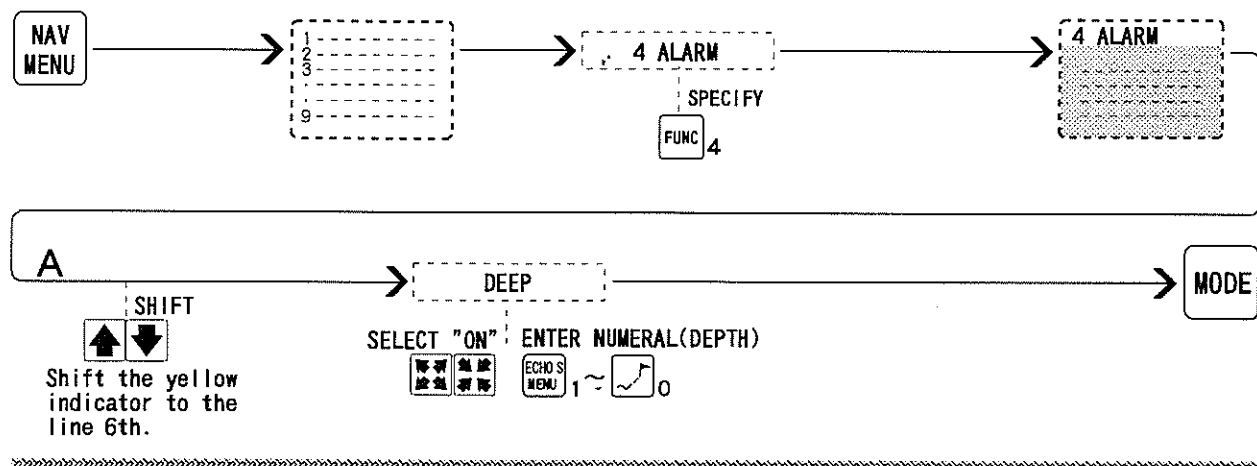


## 2. DEEP ALARM

(WHEN THE SEA BOTTOM BECOMES DEEPER THAN THE SET DEPTH)

◎ It starts buzzing when the sea bottom becomes deeper than the set depth.

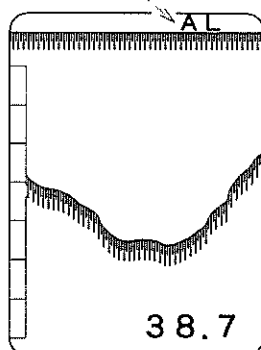
### OPERATION PROCEDURE



Each press of or key changes the setting, "ON - OFF -".  
ON : Sets the alarm function.  
OFF : Cancels the alarm function.

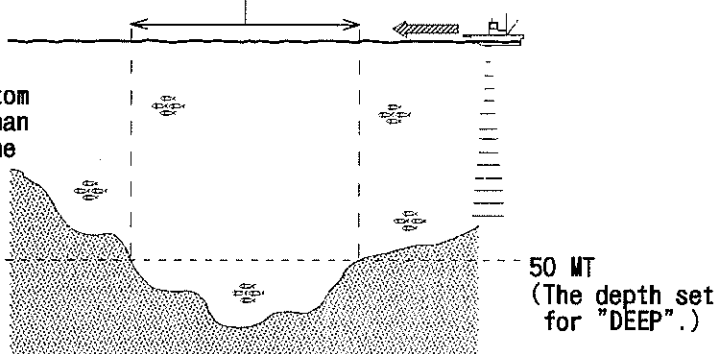
Use 1 ~ keys to enter the set depth.

Indicates when "ON" is selected.



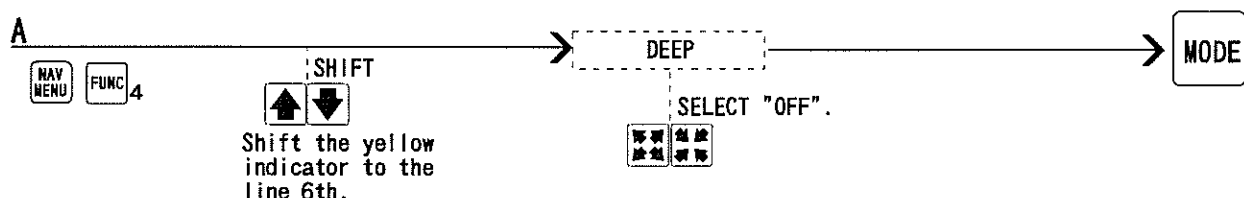
When the sea bottom becomes deeper than the set depth, the alarm will sound.

Alarm sounds in this area.



## ◎ CANCEL THE ALARM FUNCTION

### OPERATION PROCEDURE



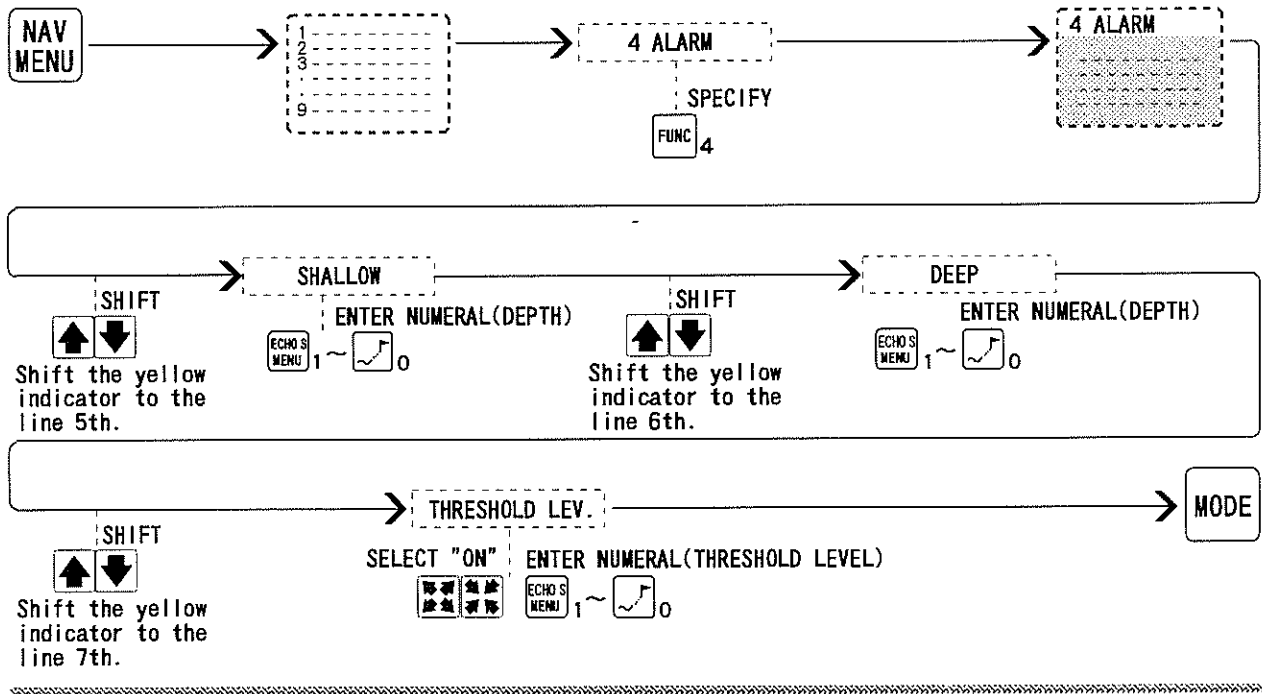


### 3. THRESHOLD LEVEL ALARM

(WHEN THE ECHOES ARE RECORDED BETWEEN THE SET AREA)

- ◎ It starts buzzing when the echoes are recorded within the set area (between the depth set for "SHALLOW ALARM" and the depth set for "DEEP ALARM". And, it is able to start buzzing when the echoes corresponding with the color scale are recorded under this function.

#### OPERATION PROCEDURE



Use 1 ~ keys to set the upper limit depth to make the the alarm sound.

Use 1 ~ keys to set the lower limit depth to make the alarm sound.

|                |         |     |
|----------------|---------|-----|
| 4 ALARM        |         |     |
| SHALLOW        | 0020 MT | OFF |
| DEEP           | 0050 MT | OFF |
| THRESHOLD LEV. | 3       | OFF |

Each press of or key changes the setting. "ON - OFF -".

ON : Sets the alarm function.

OFF : Cancels the alarm function.

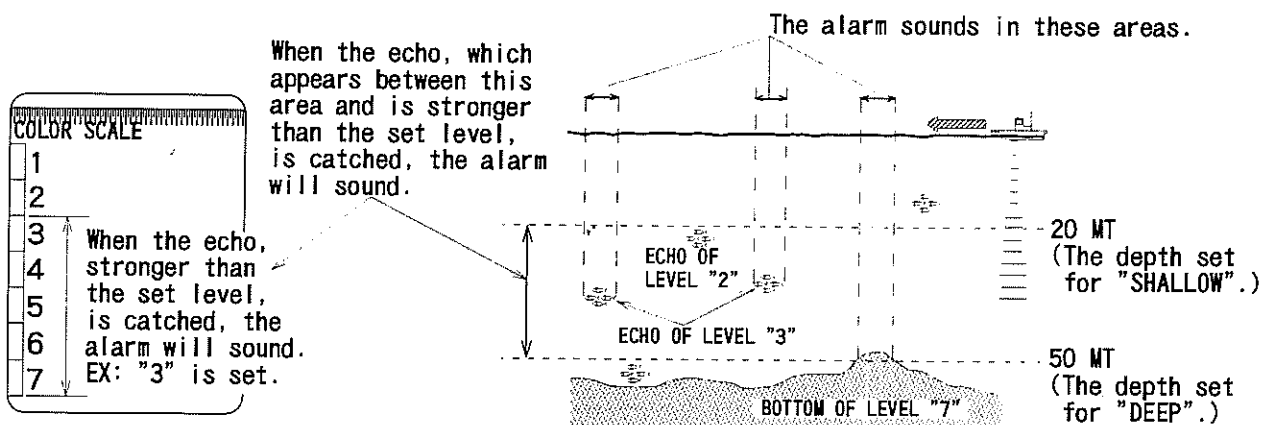
Use 1 ~ keys to set the echo threshold level.  
There are seven selections (1~7).

- 1 : 1~7
- 2 : 2~7
- 3 : 3~7
- 4 : 4~7
- 5 : 5~7
- 6 : 6 and 7
- 7 : 7

The alarm sounds when the echoes corresponding with the color number mentioned left of the color scale are recorded.  
Refer to the picture on the next page for the color number.

To be continued on the next page.



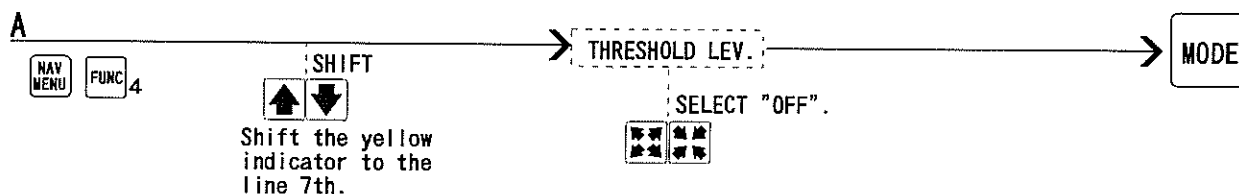


## NOTICE

When "ON" is selected for the "THRESHOLD LEV.", the "ON" settings for "SHALLOW" and "DEEP" alarm functions will not be effective.

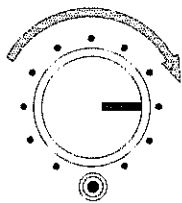
## ◎ CANCEL THE ALARM FUNCTION

### OPERATION PROCEDURE





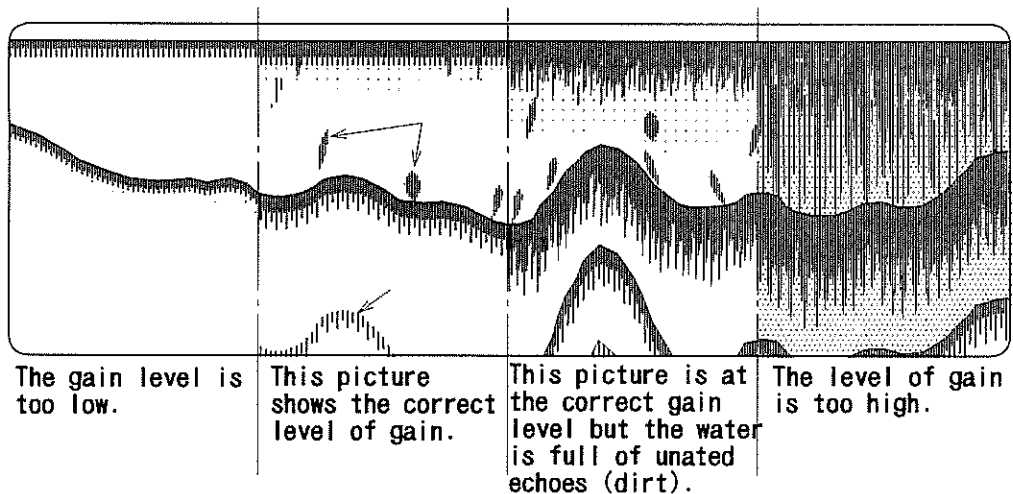
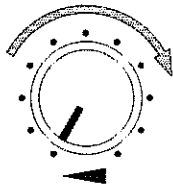
## **BRIGHTNESS CONTROL DIAL**



©Turning the dial clockwise increases the brightness of the screen.

## **GAIN CONTROL DIAL**

©Adjust the gain to show the picture at the correct receiving level.  
Turning the dial clockwise increases the level.



- The strongest echo appears in red, and the next strongest echo is in Orange → Yellow → Green → Yellow-green → Cyan → Light blue.
- In the case of detecting the sea bottom only, as the sea bottom is very reflective, it can be seen at a low gain level.
- For detecting fish schools, the gain level has to be slightly increased. However, increasing the gain will pick up other floating matter in the water too.
- When it is difficult to get the bottom echo due to the bad sea bottom condition, for example, sludge and too much seaweed, increase the gain level.
- When passing over the transducer face, bubbles may reflect the sound wave and appear as echoes on the screen.



# SPECIFICATIONS

---

## ① GPS SENSOR(GP-3)

- |                        |                                                                                    |
|------------------------|------------------------------------------------------------------------------------|
| 1. RECEIVING FREQUENCY | 1575.42MHz(C/A code) L1                                                            |
| 2. RECEIVING CHANNEL   | 8 channel simultaneous view format                                                 |
| 3. ACCURACY            | Position 30mRMS(HDOP<3), (Without selective availability),<br>Differential-ready * |

## ② PLOTTER

- |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. PROJECTION      | Mercators projection                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 2. CHART RANGE     | Below 85° Latitude                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 3. SCALE           | 1/3,400~1/12,000,000.<br>Display width 0.2~737 miles at 35° Latitude.                                                                                                                                                                                                                                                                                                                                                                               |
| 4. WAKE FUNCTION   | (1)Memory interval: 5 seconds to 60 minutes<br>Navigating distance set: 0.01~9.99 miles<br>(2)Total points: 16,000<br>(3)Colors: Blue•Red•Magenta•Green•Cyan•Yellow•White<br>(4)Wake color set(7 colors) by water temperature*<br>(5)Wake color set(7 colors) by water depth*                                                                                                                                                                       |
| 5. MARK FUNCTION   | (1)Types: Waypoint•Mark•Chart(3 types)<br>(2)Shapes: 8 types (□•◇•×•+•△•■•◆•++)<br>(3)Comment: Up to 8 characters can be entered.<br>(4)Routes: 50 routes (20 Waypoints per route)<br>(5)Total points: Max 10,000<br>(6)Colors: Blue•Red•Magenta•Green•Cyan•Yellow•White                                                                                                                                                                            |
| 6. DATA DISPLAY    | (1)Own Ship position(Lat/Lon or Time Difference(LORAN C))<br>(2)Lat/Lon at Cursor Crossing<br>(3)Distance, Bearing & Time to Cursor Crossing or Waypoint<br>(4)Waypoint mark list<br>(5)Coast line(displaying land in filled color)•Place name•<br>Fishing reef*•Wreck*<br>(6)Current date or Lunar calendar<br>(7)Display center width or scale<br>(8)Wake color•Mark color•Quantity of remaining marks<br>(9)Ship speed•Course•Water temperature* |
| 7. DISPLAY SELECT  | (1)Course vector(short•long•ship speed)<br>(2)Bearing(true direction or magnet direction)<br>(3)Cursor shape(cross cursor(large or small)•Ring cursor)                                                                                                                                                                                                                                                                                              |
| 8. ALARM FUNCTION  | (1)Arrival (2)Anchor Watch (3)Cross Track Error (4)Border                                                                                                                                                                                                                                                                                                                                                                                           |
| 9. OTHER FUNCTIONS | (1)Depth line* (2)Lighthouse* (3)Differential GPS*                                                                                                                                                                                                                                                                                                                                                                                                  |



### ③ ECHO SOUNDER

- |                          |                                                                                                                                                                                   |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. PHASED RANGE          | The upper range limit may be set in 11 steps per 2/5 of the basic range between 0~1999.                                                                                           |
| 2. BASIC RANGE           | 0~5•10•15•20•30•40•50•60•80•100•150•200•300•500•1000 meters, fathoms, braccia.<br>0~15•20•30•40•50•60•80•100•150•200•300•500•1000•2000•3000 feet.                                 |
| 3. PARTIAL EXPANSION     | Available as a combination of the above 1 & 2.                                                                                                                                    |
| 4. BOTTOM-LOCK EXPANSION | 0~1•2.5•5•10•20•50•100•250 meters, fathoms, braccia.<br>0~5•10•20•100•250•500•1000•2000 feet.                                                                                     |
| 5. FREQUENCY             | 50KHz or 200KHz                                                                                                                                                                   |
| 6. DISPLAY MODES         | (1)Normal (2)Partial expansion<br>(3)Normal/Bottom-lock expansion                                                                                                                 |
| 7. DISPLAY DATA          | (1)Digital Depth Scale (2)Water depth<br>(3)Water Temperature Scale* (4)Water temperature*                                                                                        |
| 8. FUNCTION DISPLAY      | Auto Range ON/OFF•Auto Shift ON/OFF•Alarm                                                                                                                                         |
| 9. ADDITIONAL DISPLAY    | Color Scale•30 Seconds Time Marker•<br>Water Temperature Graph•                                                                                                                   |
| 10. ADDITIONAL FUNCTIONS | TVG•Clutter•Threshold•White line•Noise reject•<br>Color select(2 options)•Auto range•Auto shift•<br>Shallow alarm•Deep alarm•Fish alarm•<br>Picture speed adjust(stop + 4 speeds) |

### ■ OTHERS

- |                      |                                                                              |
|----------------------|------------------------------------------------------------------------------|
| 1. INPUT DATA        | DGPS data(RTCM SC104 format)•NMEA-0183 format*•<br>Water Temperature Sensor* |
| 2. OUTPUT DATA       | NMEA-0183 format                                                             |
| 3. SCREEN            | 6 inch high resolution colour screen.<br>240×300 pixels                      |
| 4. POWER REQUIREMENT | DC10.5~30V•Power consumption 20W                                             |

NOTE, An asterisk \* requires the optional equipment.