

**KDG-300**  
**Doppler Current Graph**  
**Instruction Manual**

Ver. 2.01

**SONIC CORPORATION**



---

---

# Contents

<b>1</b>	<b>Handling Instructions</b> .....	<b>1</b>
<b>2</b>	<b>General</b> .....	<b>3</b>
<b>3</b>	<b>Features</b> .....	<b>5</b>
<b>4</b>	<b>Measurement Modes</b> .....	<b>7</b>
4.1	Vessel Speed.....	7
4.2	Current.....	7
4.3	Current Notation Method.....	9
4.4	Deviation Current.....	10
<b>5</b>	<b>Operating Instructions</b> .....	<b>11</b>
5.1	Remote Controller Overview.....	11
5.2	Operating Procedure .....	12
5.3	Remote Controller Operating Method .....	13
5.4	Power ON & OFF .....	14
5.5	Setting the Layer Depth .....	15
5.5.1	The Simple Way to Change the Depth with the Remote Controller (without opening the menu).....	15
5.5.2	Changing the Depth on the Menu Screen .....	16
5.6	Selecting the Transmitted Pulse Width .....	17
5.7	Selecting the Display Mode .....	18
5.7.1	The Simple Way to Change the Display Mode with the Remote .....	18
5.7.2	Changing on the Menu Screen .....	19
5.8	Selecting the Track Mode .....	20
5.9	Adjusting the Gain.....	21
5.10	Setting the Alarm .....	22
5.11	Load and Save Functions.....	24
5.12	Setting the Preset key.....	25
<b>6</b>	<b>Display Modes</b> .....	<b>27</b>
6.1	Major Display Items.....	27
6.2	Display Mode.....	33
6.2.1	Vector Display Mode .....	33
6.2.2	Textual Display Mode.....	34
6.2.3	DCG-200 Compatible Display Mode.....	35
6.2.4	Vessel Speed Display Mode .....	36

6.2.5	Stereoscopic 3-D Display Mode.....	37
6.2.6	Echogram Display Mode .....	38
<b>7</b>	<b>Menus .....</b>	<b>40</b>
7.1	Display Setting (1).....	40
7.2	Display Setting (2).....	42
7.3	Display Setting (3).....	44
7.4	Display Setting (4).....	46
7.5	Memory.....	48
7.6	Alarm.....	50
7.7	Key Setting.....	52
7.8	Service (1).....	54
7.9	Service (2).....	56
7.10	Technical (1).....	58
7.11	Technical (2).....	59
7.12	Technical (3).....	60
7.13	Technical (4).....	61
7.14	OK MONITOR.....	62
<b>8</b>	<b>Specifications .....</b>	<b>63</b>
8.1	Measuring Method .....	63
8.2	Frequency in Use.....	63
8.3	Measurement of Current and Deviation Current.....	63
8.4	Ship Velocity Setting.....	63
8.5	Log Display.....	63
8.6	External Input.....	64
8.7	External Output .....	64
8.8	Power.....	64
8.9	Alarm.....	64
<b>9</b>	<b>Configuration.....</b>	<b>65</b>
9.1	Equipment Configuration .....	65
9.1.1	Standard Unit.....	65
9.1.2	Optional Equipments.....	65
9.2	Equipment Chart .....	66

# 1 Handling Instructions

When handling KDG-300 Doppler Current Graph, please pay particular attention to the following instructions:



This symbol indicates matters that “may lead to imminent risk of death or serious injury if incorrectly handled.”



This symbol indicates matters that “may lead to death or serious injury if incorrectly handled.”



This symbol indicates matters that “may lead to moderate to minor injuries or damage to the property if incorrectly handled.”

## 1.1 Do not attempt to disassemble



Do not attempt to disassemble this device. Storing and using the disassembled device can cause accidents such as failure and an electric shock. In particular, make sure not to operate the device when it is disassembled. The high voltage (such as AC100V and AC220V) section in the device can cause an electric shock, which may result in shock symptoms or death.

## 1.2 Be careful not to allow foreign matter to enter



It is dangerous to use the device if a metallic object or liquid such as water has entered the device. Be careful to prevent foreign objects from getting into the device. Do not use or store the device in locations where it may come into contact with chemicals.

Do not place the device on a paddle or wet mud, etc. Electric leakage may cause an electric shock or may cause damage to the device.

## 1.3 Be careful of vibrations and impact



Dropping or hitting the device can cause damage to the data as well as the device. The power must be turned OFF and the device must be handled with the utmost care when carrying.

Do not use or store the device while heavy objects are placed on the top of the device. When transporting the device via a door-to-door delivery service, mail, a vehicle or a truck, etc. the device must be packed in a wooden box or cardboard box with

packaging or cushioning materials to avoid vibrations and impacts. Transporting in an improper package may cause failure and damage of the device.

#### **1.4 Be careful of temperature, humidity and direct sunshine**

Storing and using at extremely high or low temperature must be avoided. Using in poorly ventilated places must also be avoided.



Do not use this device in places exposed to direct sunshine, close to equipment producing heat, or extremely humid and dusty environments. Do not bring the device suddenly into a warm room from the cold outside because condensation may occur, leading to failure of the device.

Do not leave the device in an automobile or warehouse. Sharp temperature fluctuations can cause deformation of the device, or failure of its electronic circuit.

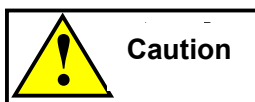
#### **1.5 Keep the device away from radio and TV sets.**



Do not use this device close to radio and TV sets and wireless devices, and do not share the same outlet with them. Noise is generated, and the device may not operate correctly. In this case, keep the device away from them and use a separate outlet.

#### **1.6 When the housing of the device gets dirty.**

Clean the housing of the device with soft cloth soaked with water or neutral detergent that is wrung out well. Note that cleaning with chemicals and organic solvents such as benzene and thinner, or using a chemical duster can discolor the paint of the housing or characters on it. Note as well that insecticides, etc. can also change the color.



#### **1.7 In the event of problems or failure**

Turn OFF the power immediately in the event of abnormalities (such as unusual odor and overheating) or failure and contact your distributor.

## 2 General

This equipment is an ultrasonic current meter, emitting ultrasonic waves from the transducer installed on the bottom of a ship to use the Doppler effects on plankton and floating objects in seawater or on the waves reflected from the bottom of the sea.

Using the pair-beam system in which 4 beams of ultrasonic waves are emitted obliquely toward the bottom of the sea in 4 directions from the bow, stern, starboard side and port side of the ship, this equipment is designed to reduce errors caused by ship oscillation such as its pitching and rolling. By inputting a heading signal from equipment such as a satellite compass, the device is also designed to ignore errors caused by the ship when it turns.

(This page is intentionally left blank.)

### 3 Features

**(1) Clear display of both currents and deviation currents of up to 5 layers**

Current values of up to 5 layers can be displayed.

The layers are displayed in different colors to clearly distinguish them.

**(2) The echogram display mode**

Plankton and floating objects in the sea displayed as an echogram can be used as a guide for the measurement setting of the current meter.

**(3) Continuous and stable measurement by the latest digital signal processing technology**

The cutting-edge digital signal processing technology provides continuous and stable current values with less missing values.

**(4) The measurement modes can be changed among the bottom mode, the water mode and the GPS mode.**

The modes for obtaining the current can be chosen from the ship to bottom mode, the water mode and the GPS mode easily with the use of the supplied remote controller (RC-20).

**(5) Six different display modes if necessary**

The display modes are available in 6 types; Vector Display, Character Display, DCG-200 Display, Velocity Display, 3-D Vector Display, Echogram Display and can be used depending on the purpose.

**(6) The 3-D Vector display mode**

The 3-D Vector Display mode can show the current values in three dimensions to enable you to obtain the currents stereoscopically, which is helpful in finding the depth when the current changes.

(This page is intentionally left blank.)

## 4 Measurement Modes

### 4.1 Vessel Speed

The current meter measures three types of vessel speed; vessel speed to the bottom, vessel speed to the water and GPS vessel speed. Each speed can be obtained as shown in Fig. 1 below:

#### ① Vessel speed to the bottom: Vessel speed to the sea bottom

Ultrasound waves are obliquely emitted toward the sea bottom, and these waves are reflected by the sea bottom, and returned to the transducer. The vessel speed to the bottom can be obtained from this signal (reflected signal).

#### ② Vessel speed to the water: Vessel speed to the seawater

This speed can be obtained from the signal (reflected signal) of the emitted ultrasound waves, which are reflected by floating objects such as plankton in the sea, and returned to the transducer.

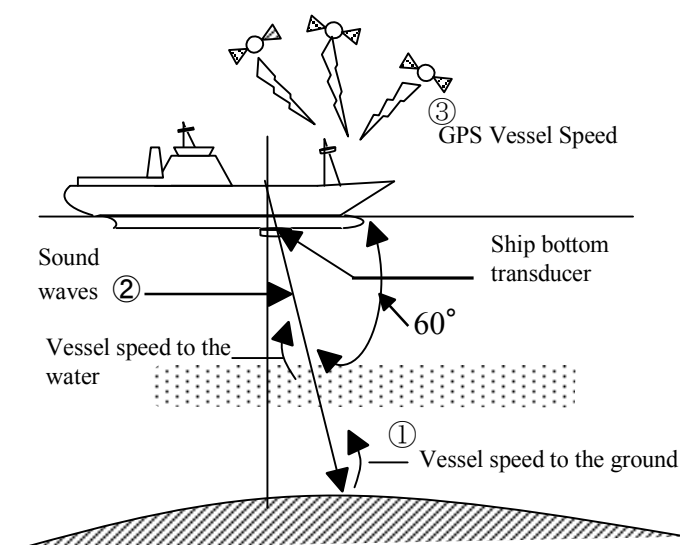


Figure 1

#### ③ GPS vessel speed: Vessel speed obtained from GPS.

This is the vessel speed obtained from the satellite.

### 4.2 Current

Like the ship velocity, currents are also available in three modes.

#### ① Bottom Mode

This measurement method is for obtaining the current when the sea bottom can be detected. This method is highly accurate because there are fewer causes of error than in the other two methods.

When obtaining the current of the A-layer in Fig. 2:

$$\text{A-layer current} = \text{Vessel speed to the bottom} \\ - \text{A-layer vessel speed to the water}$$

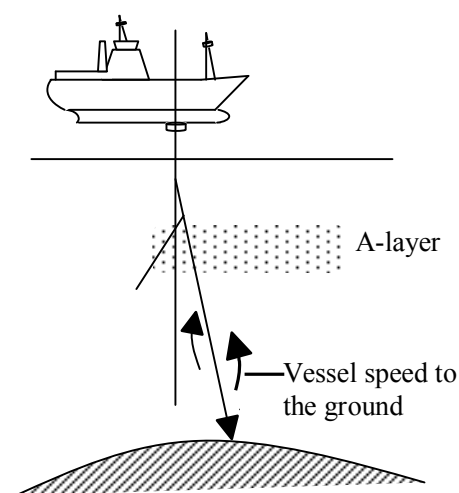


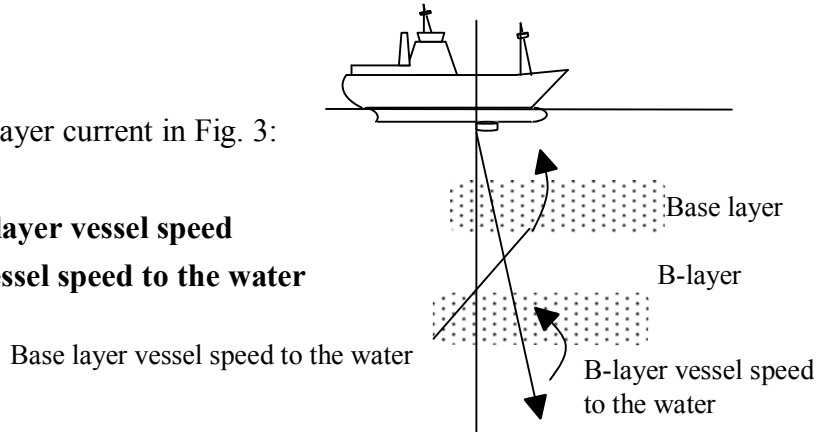
Figure 2

② **Water Mode**

This measurement method is for obtaining the current in the sea where the sea bottom is too deep to detect, by using the ship velocity to the water of the base layer.

When obtaining the B-layer current in Fig. 3:

**B-layer current = Base layer vessel speed to the water – B-layer vessel speed to the water**



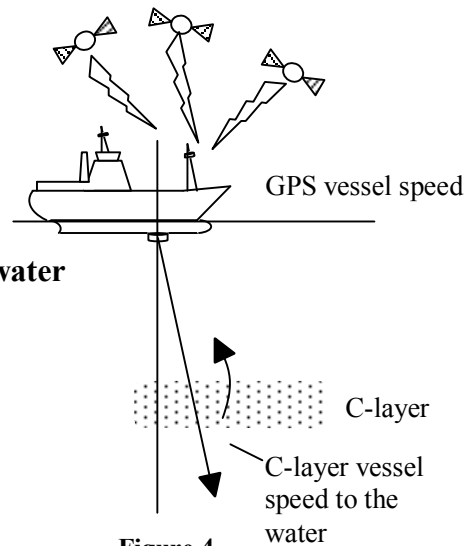
**Figure 3**

③ **GPS Mode**

This measurement method is for obtaining the current value in the deep sea where the sea bottom cannot be detected, or where the sea bottom is extremely undulating, by using the vessel speed GPS data as the vessel speed to the bottom.

When obtaining the C-layer current in Figure 4:

**C-layer current = GPS vessel speed – C-layer vessel speed to the water**



**Figure 4**

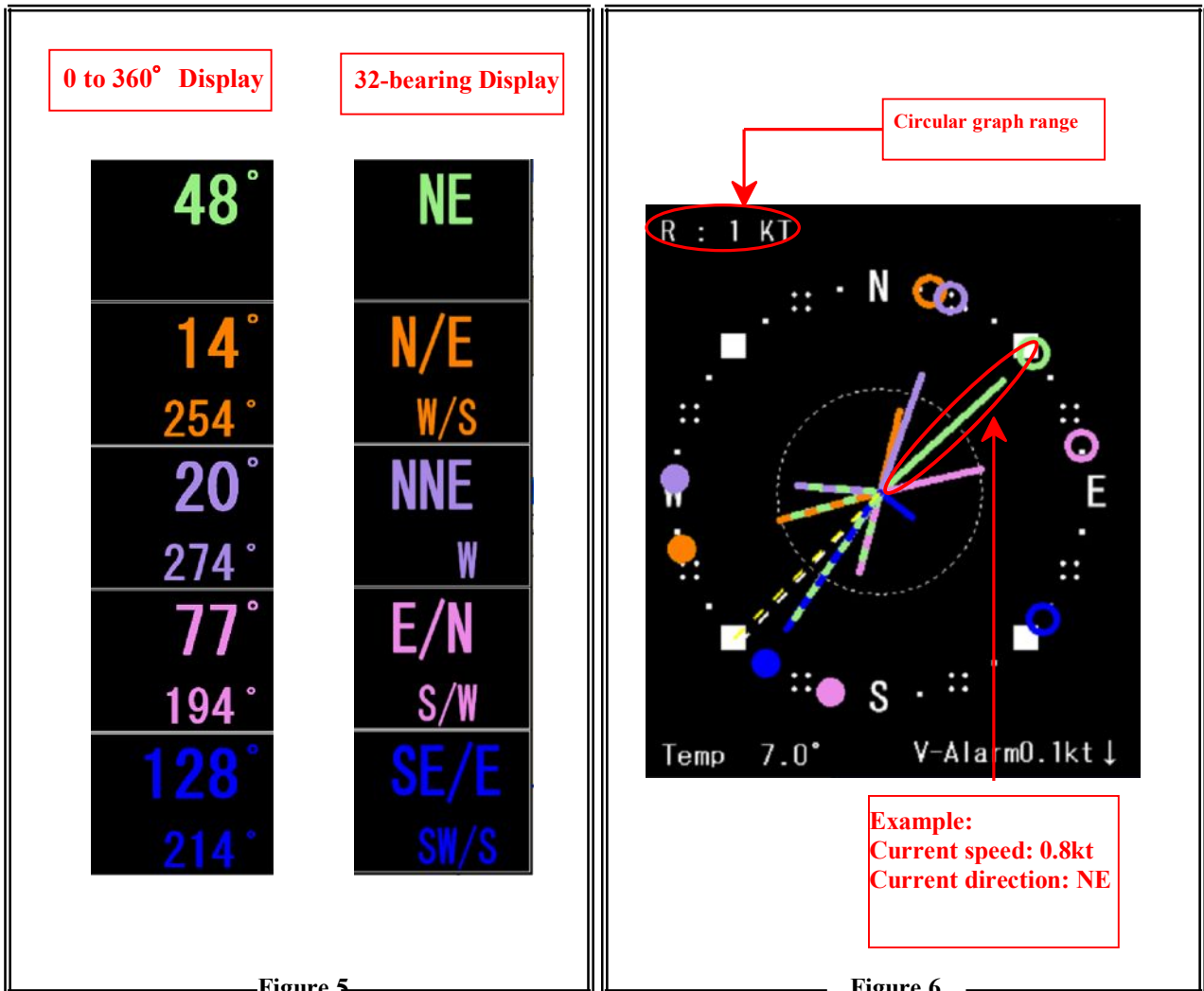
### 4.3 Current Notation Method

In currents, there are those in the northwest direction and those in the southeast direction as well.

Like currents, anything that has both a direction and magnitude (current speed in this case) is expressed by the vector.

This device allows you to select the display mode from two choices; one is the 360-degree omni-directional display mode that displays 359 degrees clockwise with the north direction to 0 degrees, and the other mode is the 32-point display such as NE and SW. (Figure 5).

The velocity of the current, or current speed can be displayed in three modes (vector display, character display and DCG200 display) in which the current is shown as the length of the vector in a circular graph as shown in Fig. 6.



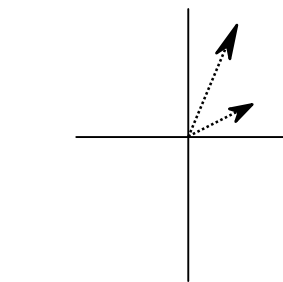
#### 4.4 Deviation Current

When setting a net in purse seine fisheries, the net cannot be stretched successfully if the current differs depending on the layer. In such a case, a deviation current becomes necessary to find the changes in the current of different layers.

The calculation method of the deviation current is described below using the following Figs. 7-1, 7-2 and 7-3.

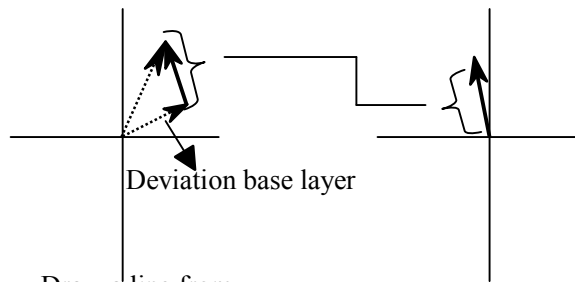
When one of two different currents is used as the deviation base layer as shown Fig. 7-1, draw a line from the tip of the vector of the deviation base layer to the tip of the vector of another current layer (Fig. 7-2).

The length of the line drawn in this way shows the magnitude (speed) of the deviation current, and the direction of the line shows the direction of the deviation current (Fig. 7-3).



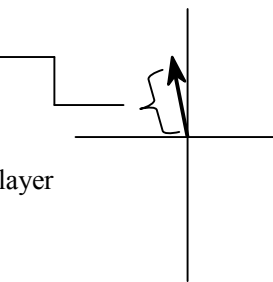
Two current vectors

**Figure 7-1**



Draw a line from the deviation base layer

**Figure 7-2**



Deviation current vector

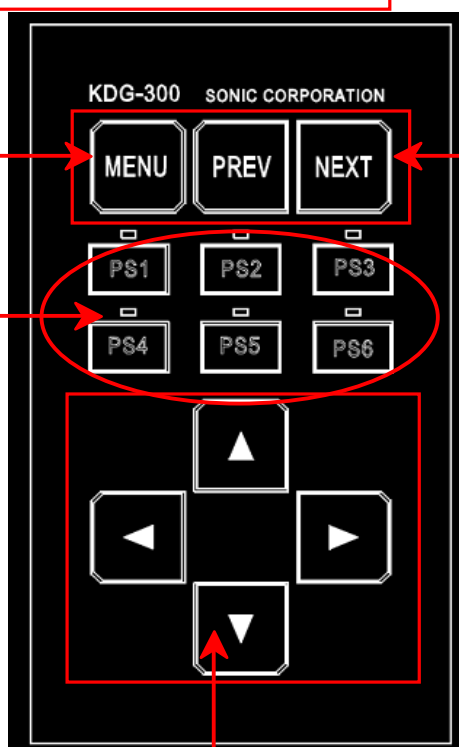
**Figure 7-3**

## 5 Operating Instructions

### 5.1 Remote Controller Overview

**PS Keys:** For storing frequently-used settings and for changing those settings in combination with the Up and Down keys, without opening the menu.

**For opening / closing the menu**



**On the normal screen:**

They are used for changing the display mode.

**On the menu screen:**

They are used for changing the menu.

Figure 8

**On the normal screen:**

- Up and Down keys ..... Press the Up key to flash the depth of the bottom layer, and press the Down key to flash the depth of the top layer. These keys are also used to move this flashing display to the desired depth layer.
- Right and Left keys ..... These keys are used to change the depth of the flashing layer.

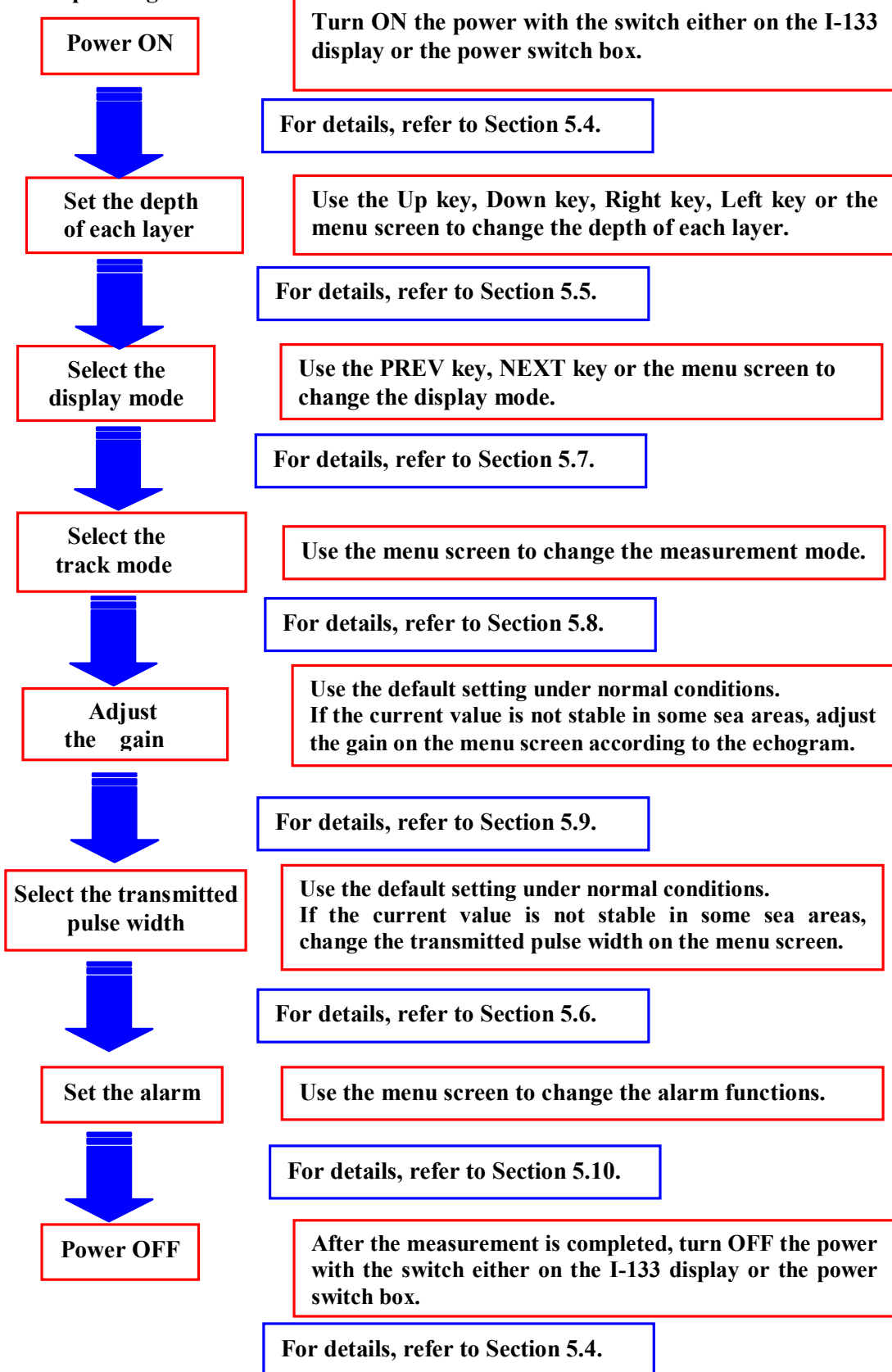
**On the menu screen:**

- Up and Down keys ..... These keys are used to move the cursor.
- Right and Left keys ..... These keys are used to change the set values.

**While an echogram is being displayed:**

- Up and Down keys ..... These keys are disabled.
- Right and Left keys ..... These keys are used to change the range.

## 5.2 Operating Procedure



### 5.3 Remote Controller Operating Method

The operating method of the RC-20 Remote Controller is described as follows:

- ① Open the menu screen with the MENU key. The menu screen has three major types; User Menu, Service Menu and Technical Menu
- ② The User Menu has menu items as shown in Fig. 9-1, the Service Menu as in Fig. 9-2, and Technical Menu as Fig. 9-3. A menu screen can be selected with the NEXT and PREV keys.

To change the User Menu to the Service Menu, turn ON the Service Menu of “Display Setting (4).” To change the Service Menu to the Technical Menu, turn ON the Technical Menu of “Service (2).”

- ③ With the Up and Down keys, move the cursor up and down to place it over the desired menu item. (Fig. 10-2).
- ④ With the Right and Left keys, change the setting value on the item you want to change (Fig. 10-3).

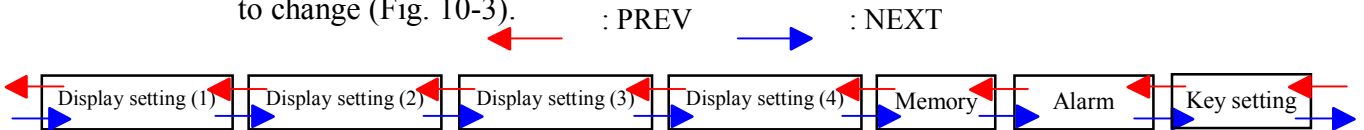


Figure 9-1

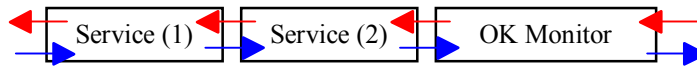


Figure 9-2

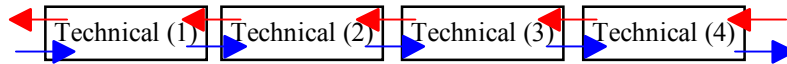


Figure 9-3

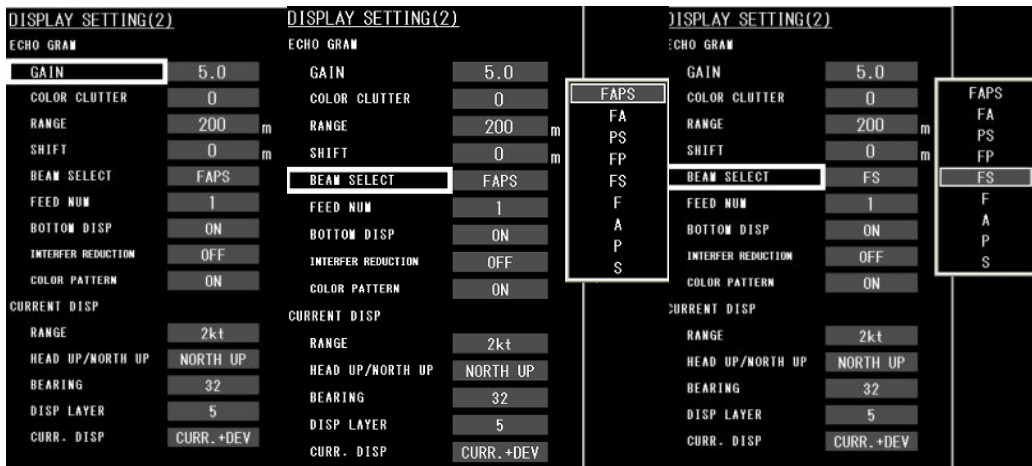


Figure 10-1

Figure 10-2

Figure 10-3

For details of each setting, refer to Chapter 9.

## 5.4 Power ON & OFF

### Caution

When turning ON the power again after the power was turned OFF, wait for about 10 seconds before turning ON the power.

If this interval is too short, the device may not start correctly.

#### ▪ Power ON

Turn ON the power switches on the display to start the device.

The screen shown below (this is the vector display mode) appears in about 2 to 3 minutes after the power is turned ON.



Figure 11

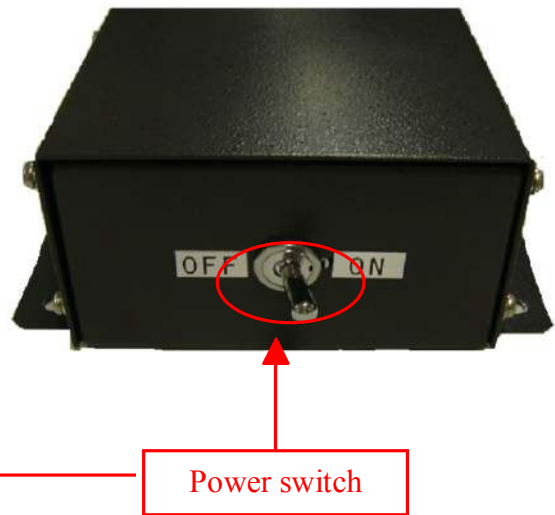


Figure 12

The initial screen shown above is the screen that was displayed when the power was turned OFF last time.

#### ▪ Power OFF

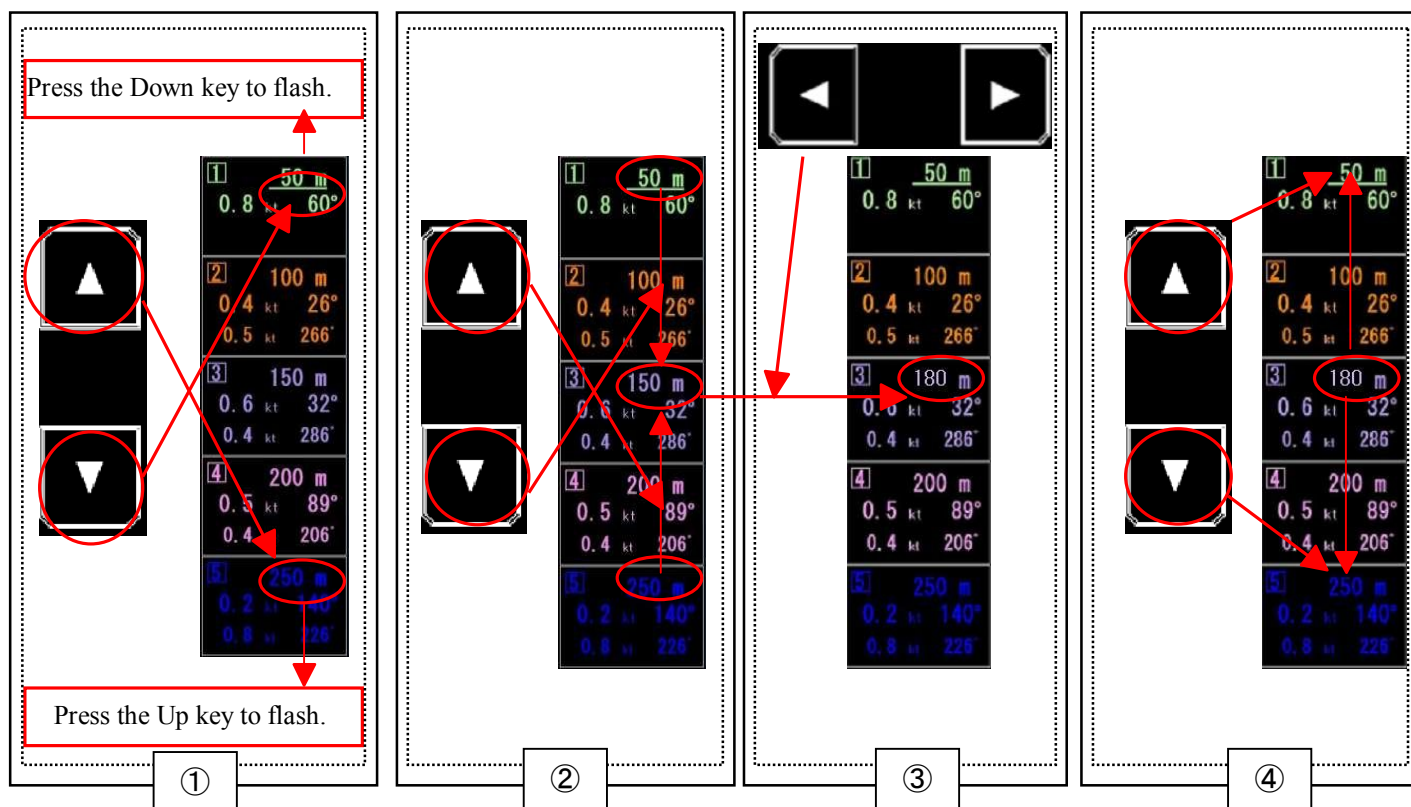
Turn OFF the power switches on the display to shutdown the device.

When the power box is used, turn ON or OFF the power switch on the power box shown in Fig. 12 to start or shutdown the device.

## 5.5 Setting the Layer Depth


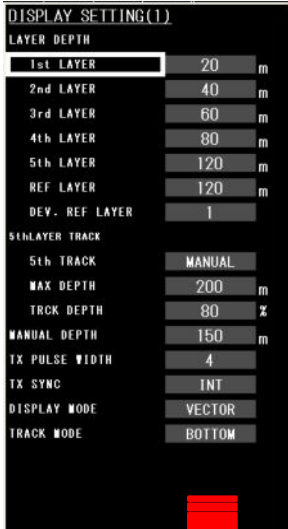

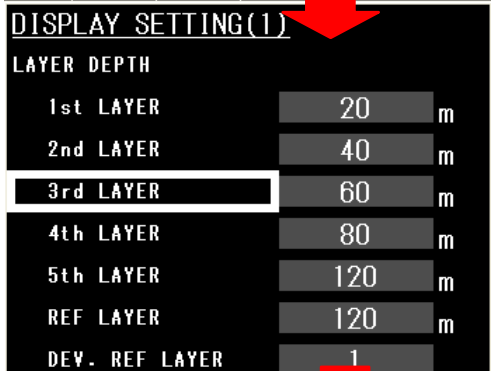

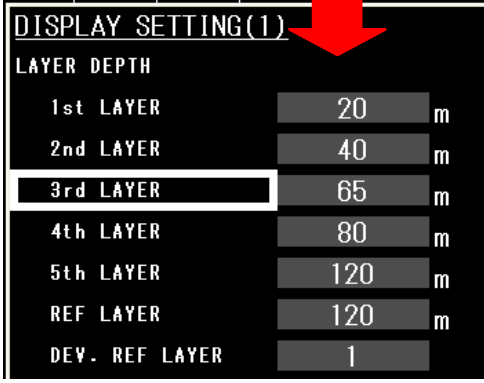
### 5.5.1 The Simple Way to Change the Depth with the Remote Controller (without opening the menu)

- ① On the normal screen where the menu is not displayed, press the Up key to flash the bottom layer (5th layer when 5 layers are selected), and press the Down key to flash the 1st layer.
- ② To change the depth (m) of other layers, use the Up and Down keys.
- ③ Move the cursor over the layer to change its depth, and set the depth with the Right and Left keys.
- ④ After the setting is changed, move the cursor to the bottom layer and press the Down key, or move the cursor to the 1st layer and press the Up key to complete the setting of the depth.






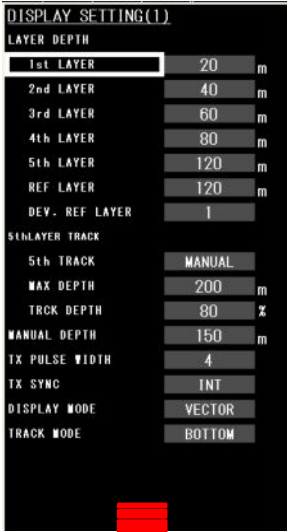


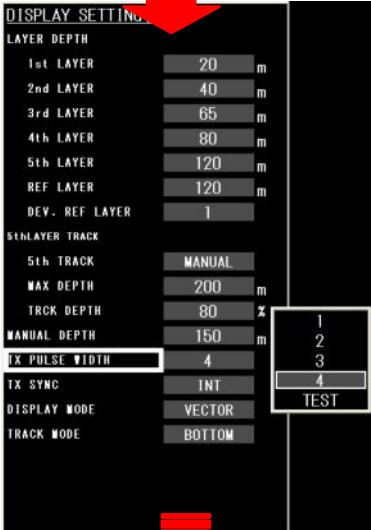


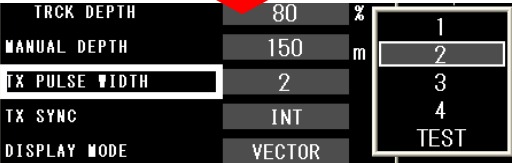
### 5.5.2 Changing the Depth on the Menu Screen

- ① Press the “MENU” button of RC-20, and press either the PREV key or the NEXT key to display the Display Setting (1) screen.
- ② With the Up or Down key, move the cursor to the layer to change its depth.
- ③ Use the Right key to increase the number (depth (m)), and use the Left key to Decrease the depth (m).

Buttons in Use	Screen in Use
<p>①</p>  <p>PREV OR NEXT</p>	
<p>②</p> 	
<p>③</p> 	

### 5.6 Selecting the Transmitted Pulse Width

- ① Press the “MENU” button on RC-20, and press either the PREV key or the NEXT key to display the Display Setting (1) screen.
- ② Use the Up or Down key to move the cursor to the Transmitted Pulse Width.
- ③ Use the Right key to move the cursor up, and use the Left key to move it down, and set the transmitted pulse width.

Buttons in Use	Screen in Use
<p>①</p> <div style="text-align: center;">  </div> <div style="text-align: center; margin-top: 20px;">  <span style="margin: 0 10px;">OR</span>  </div>	
<p>②</p> <div style="text-align: center;">     </div>	
<p>③</p> <div style="text-align: center;">  <span style="margin: 0 10px;">▶</span>  </div>	

## 5.7 Selecting the Display Mode

### 5.7.1 The Simple Way to Change the Display Mode with the Remote Controller (without opening the menu)

On the normal screen, use the PREV key or the NEXT key to change the display mode as shown in Fig. 13 below:

← : PREV      → : NEXT

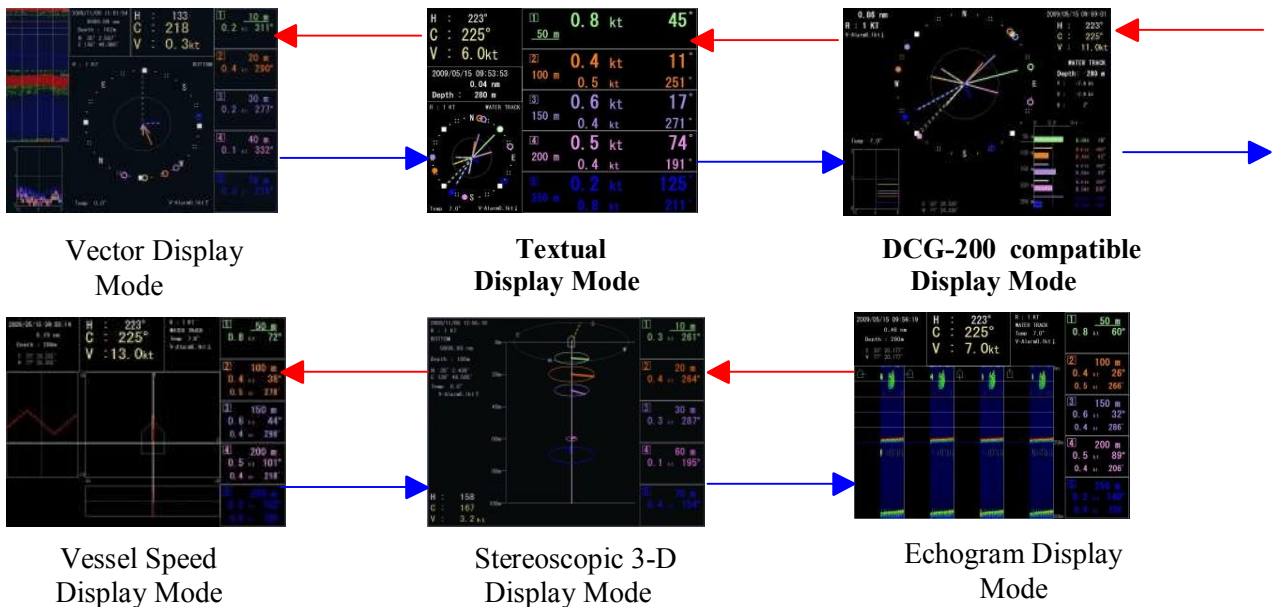

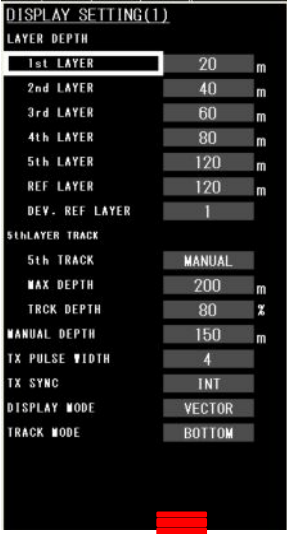

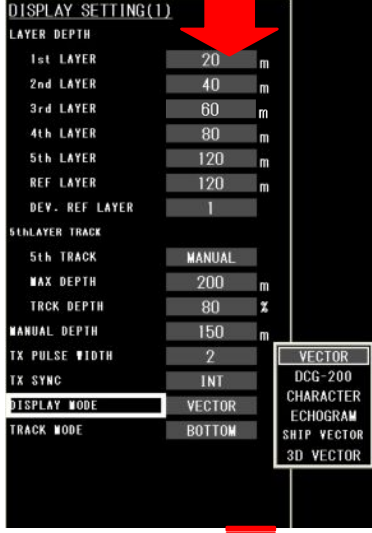

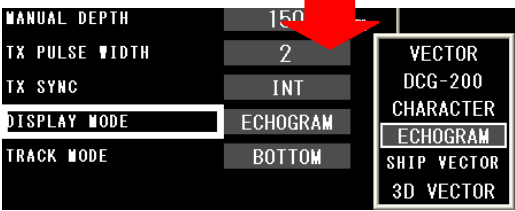


Figure 13


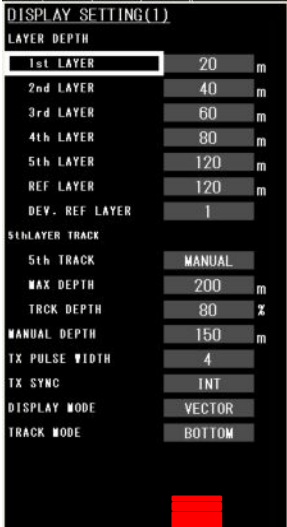

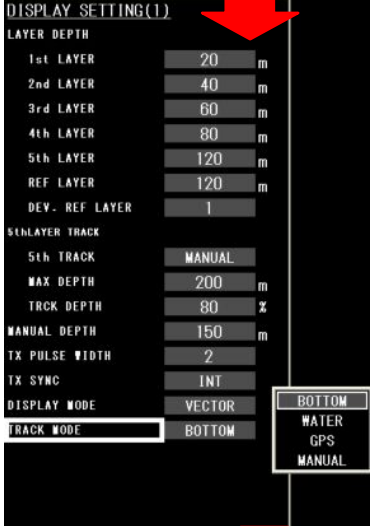


### 5.7.2 Changing on the Menu Screen

- ① Press the “MENU” button on RC-20, and press either the PREV key or the NEXT key to display the Display Setting (1) screen.
- ② Use the Up or Down key to move the cursor to the Display Mode.
- ③ Use the Right key to move up and use the Left key to move down, and set the display mode.

Buttons in Use	Screen in Use
<p>①</p>  <p>PREV OR NEXT</p>	
<p>②</p> 	
<p>③</p> 	


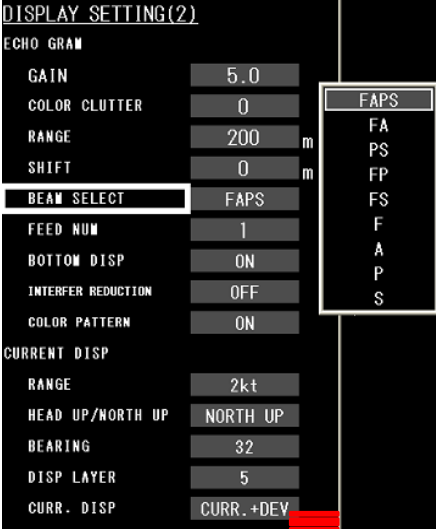

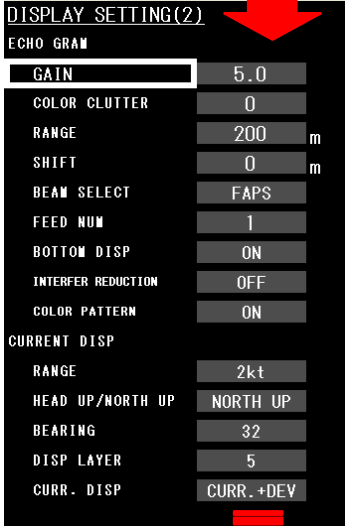


## 5.8 Selecting the Track Mode

- ① Press the “MENU” button on RC-20, and press either the PREV key or the NEXT key to display the Display Setting (1) screen.
- ② Use the Up or Down key to move the cursor to the Track Mode.
- ③ Use the Right key to move up, and use the Left key to move down, and set the track mode.

Buttons in Use	Screen in Use
<p>①</p>  <p>PREV OR NEXT</p>	
<p>②</p> 	
<p>③</p> 	

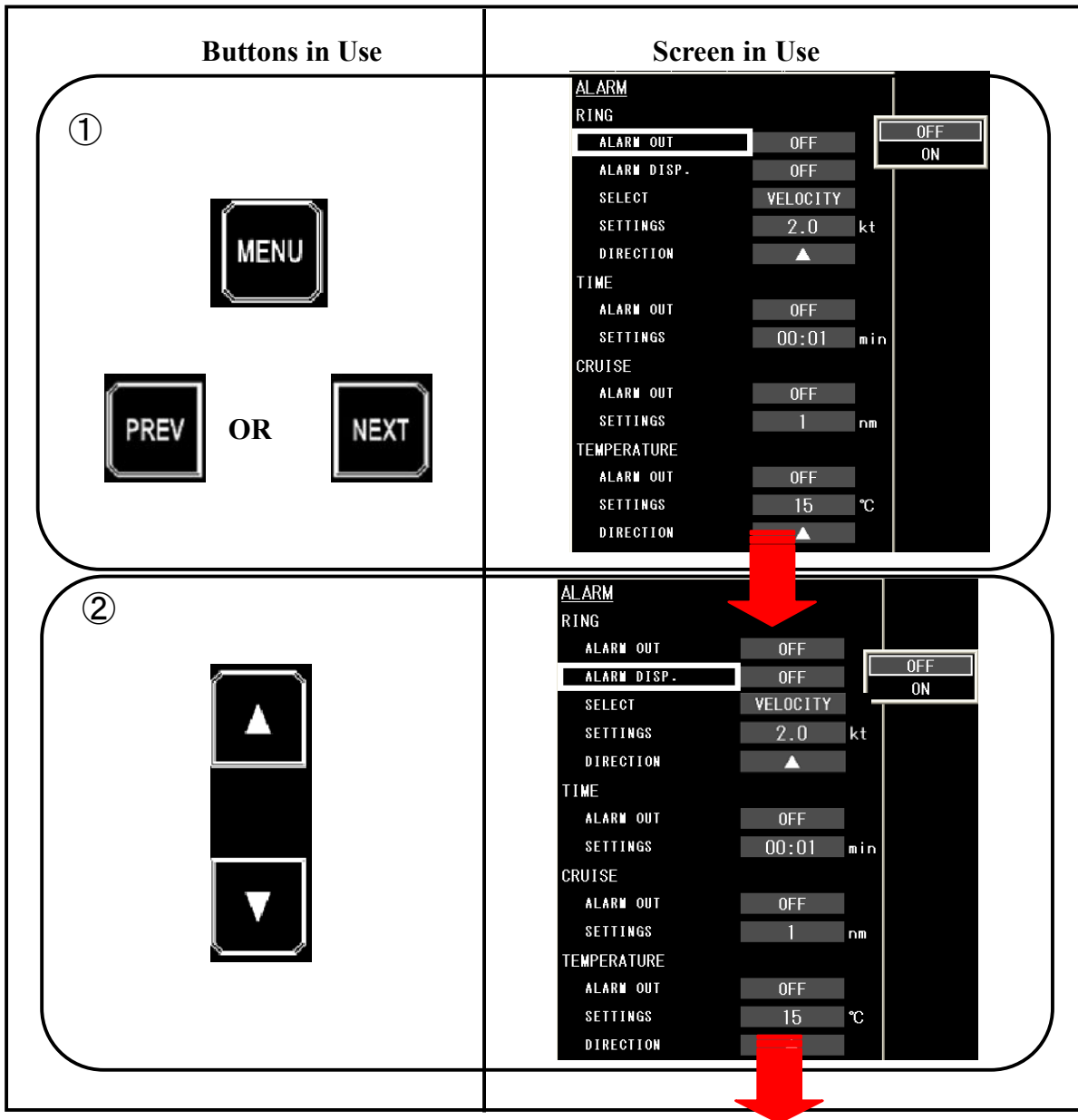
## 5.9 Adjusting the Gain

- ① Press the “MENU” button of RC-20, and press either the PREV key or the NEXT key to display the Display Setting (2) screen.
- ② Use the Up or Down key to move the cursor to the Receiver Gain.
- ③ Use the Right key to increase the gain and use the Left key to decrease the gain. Adjust the gain while watching the echogram.

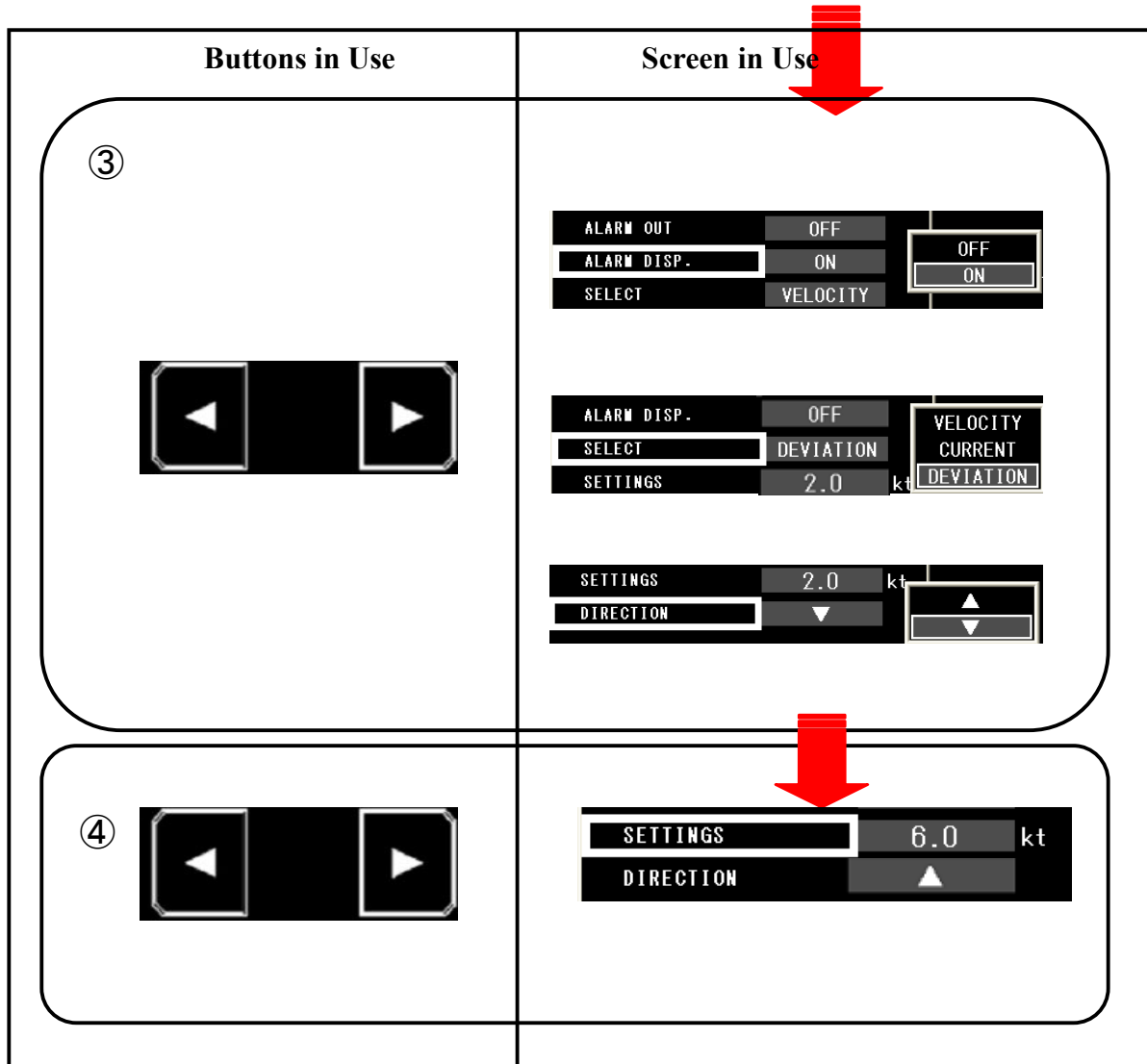
Buttons in Use	Screen in Use
<p>① — 1</p>  <p>PREV OR NEXT</p>	 <p>DISPLAY SETTING(2)</p> <p>ECHO GRAM</p> <p>GAIN 5.0</p> <p>COLOR CLUTTER 0</p> <p>RANGE 200 m</p> <p>SHIFT 0 m</p> <p>BEAM SELECT FAPS</p> <p>FEED NUM 1</p> <p>BOTTOM DISP ON</p> <p>INTERFER REDUCTION OFF</p> <p>COLOR PATTERN ON</p> <p>CURRENT DISP</p> <p>RANGE 2kt</p> <p>HEAD UP/NORTH UP NORTH UP</p> <p>BEARING 32</p> <p>DISP LAYER 5</p> <p>CURR. DISP CURR. +DEV</p>
<p>②</p> 	 <p>DISPLAY SETTING(2)</p> <p>ECHO GRAM</p> <p>GAIN 5.0</p> <p>COLOR CLUTTER 0</p> <p>RANGE 200 m</p> <p>SHIFT 0 m</p> <p>BEAM SELECT FAPS</p> <p>FEED NUM 1</p> <p>BOTTOM DISP ON</p> <p>INTERFER REDUCTION OFF</p> <p>COLOR PATTERN ON</p> <p>CURRENT DISP</p> <p>RANGE 2kt</p> <p>HEAD UP/NORTH UP NORTH UP</p> <p>BEARING 32</p> <p>DISP LAYER 5</p> <p>CURR. DISP CURR. +DEV</p>
<p>③</p> 	 <p>ECHO GRAM</p> <p>GAIN 7.0</p> <p>COLOR CLUTTER 0</p>

## 5.10 Setting the Alarm

- ① Press the “MENU” button on RC-20, and press either the NEXT key or PREV key to display the Alarm screen.
- ② Use the Up or Down key to move the cursor to the alarm item to be set.
- ③ Use the Right or Left key to choose the RING, to turn ON or OFF both the Alarm Output and the Alarm Display, and to set  $\Delta$  or  $\nabla$  that indicates either above or below the setting value.
- ④ Use the Right key to increase the setting value, and use the Left key to decrease the setting value.



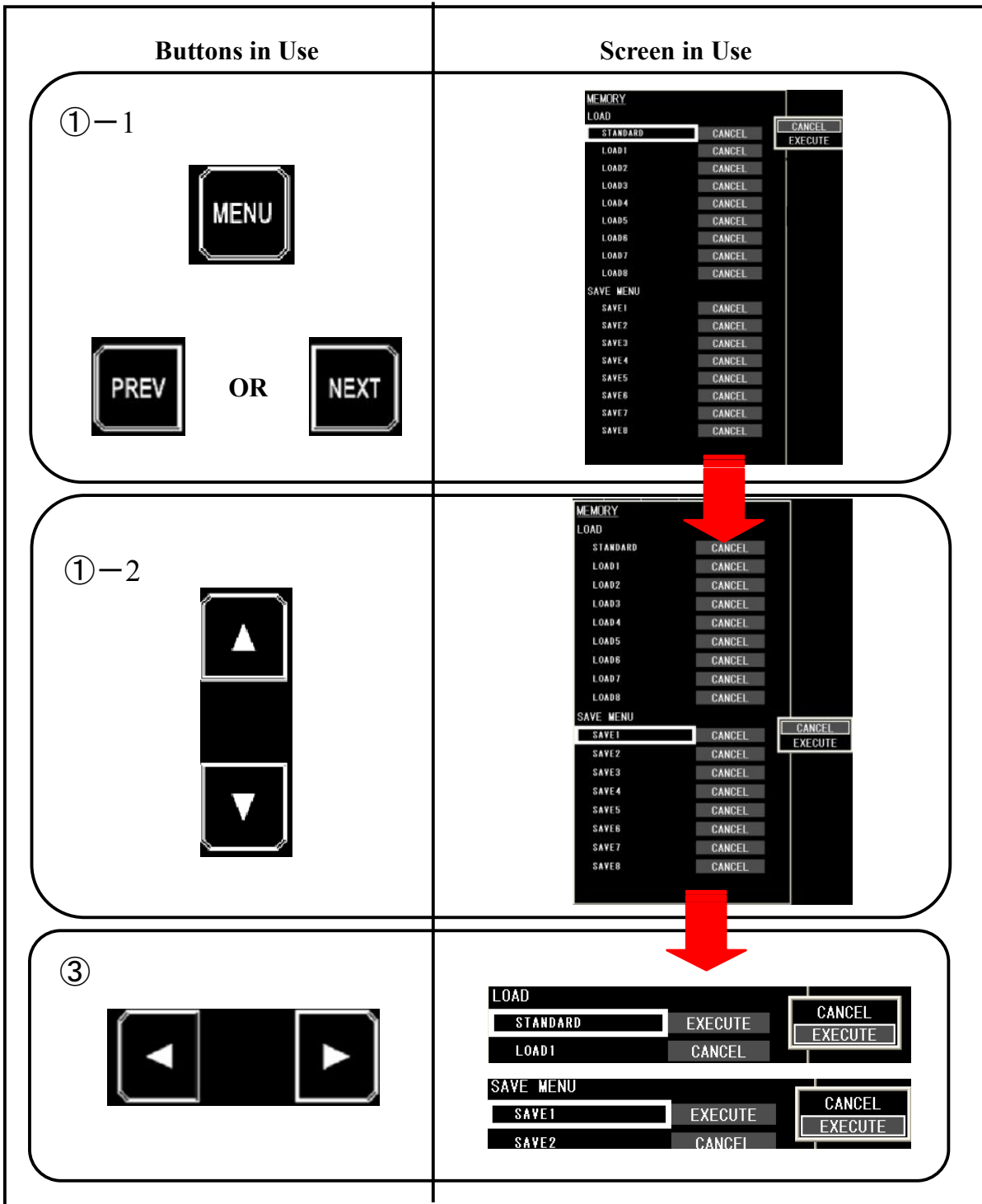
Continued on the next page



※A speaker sold separately is necessary for the output of the alarm.

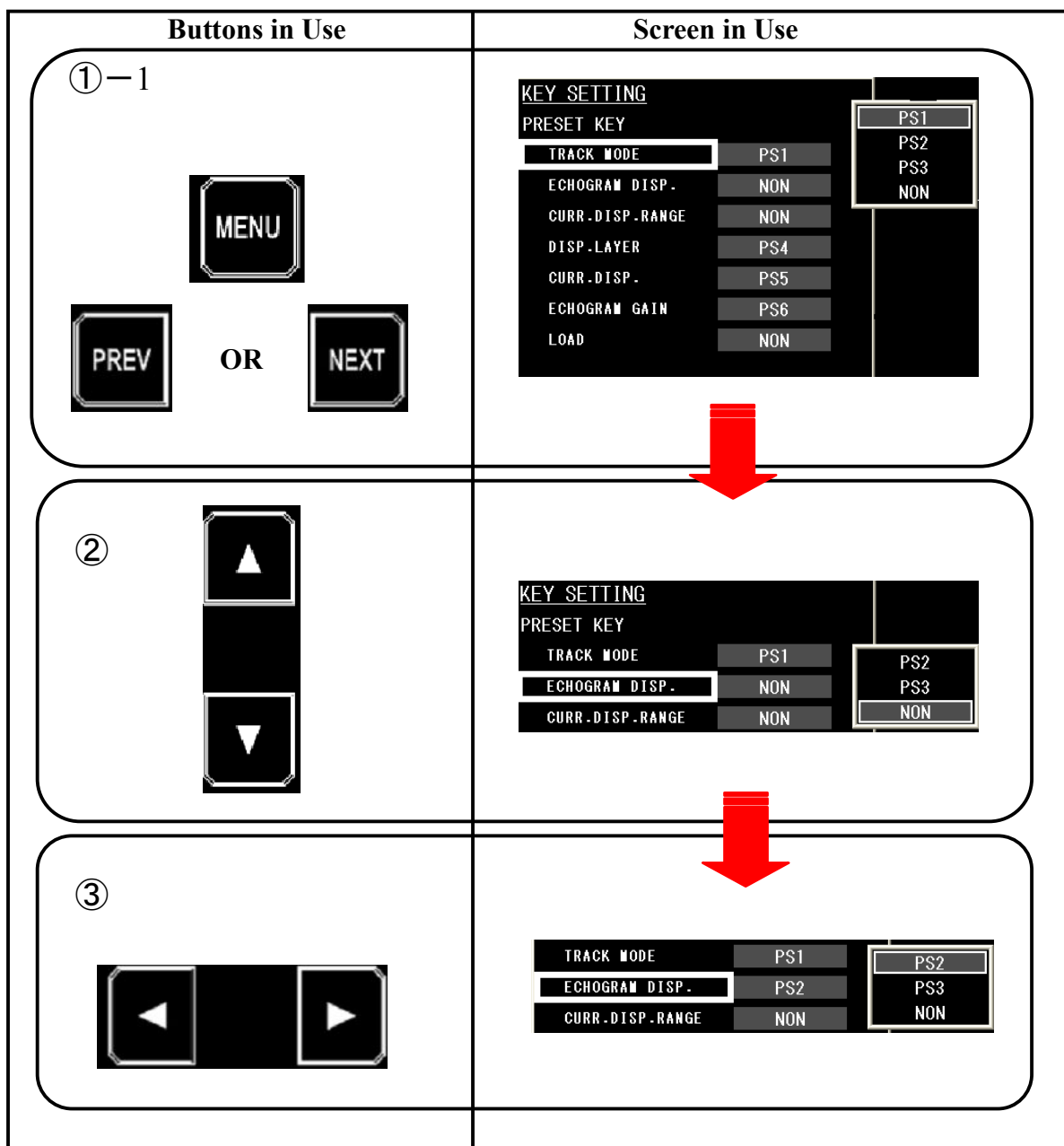
### 5.11 Load and Save Functions

- ① The “MENU” button on RC-20, and press either the PREV key or the NEXT key to display the Memory screen.
- ② Use the Up or Down key to move the cursor to the desired load or save number.
- ③ Use the Right or Left key to choose EXECUTE for load or save.



### 5.12 Setting the Preset key

- ① Press the “MENU” button of RC-20, and press either the PREV key or the NEXT key to display the Key Setting screen.
- ② Use the Up or Down key to move the cursor to the preset key item to be set.
- ③ Use the Right or Left key to choose the Preset key.





## 6 Display Modes

### 6.1 Major Display Items

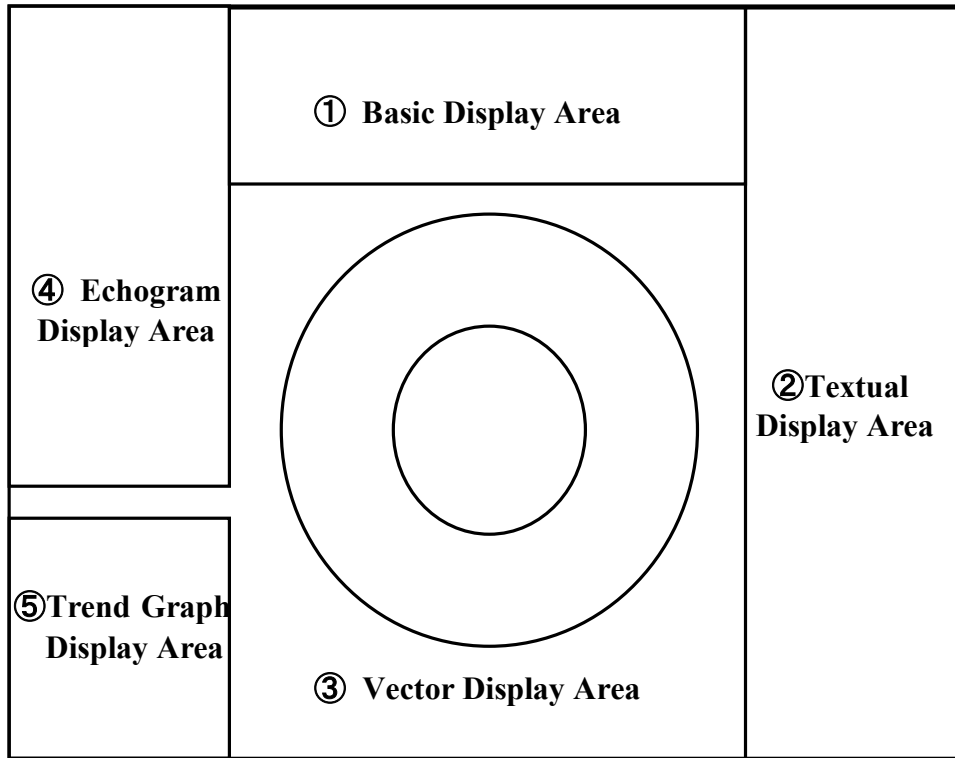


Figure 14

Figure 14 shows a schematic diagram of the Vector Display mode.  
This mode is displayed for all modes except the Current 3-D Display.

①Basic Display Area

This area shows information on the ship such as the position and velocity, and information on sailing such as its date. This area is shown for all six-display modes. (Only the DCG 200 Display has a different format.)

Date and Time : Show the date and time that are set inside the device.  
 For details, refer to Section 7.8.

Distance : Shows the sailing distance.  
 For details, refer to Section 7.4.

Depth (m) : Shows the depth of the sea.

Latitude and Longitude : Shows the ship position based on the GPS data.



Figure 15

H (Heading) : Shows the direction of the bow of the ship.

C (Course) : Shows the course of the ship.

V (Velocity) : Shows the speed of the ship.

For the Course and Velocity, the display mode can be selected from the Bottom Mode, the Water Mode and the GPS mode. Both the Ship to Bottom Mode and the GPS Mode are shown in yellow (Figure 15), and the Water Mode is shown in red.

② Textual Display Area

The current speed of the current values is shown in figures, and its direction is shown in either 0 to 359 degrees or 32-point system such as NE and SE.

This display shows for all six modes. (Only the DCG-200 Display has a different format. Characters in the Character Display mode are enlarged.)

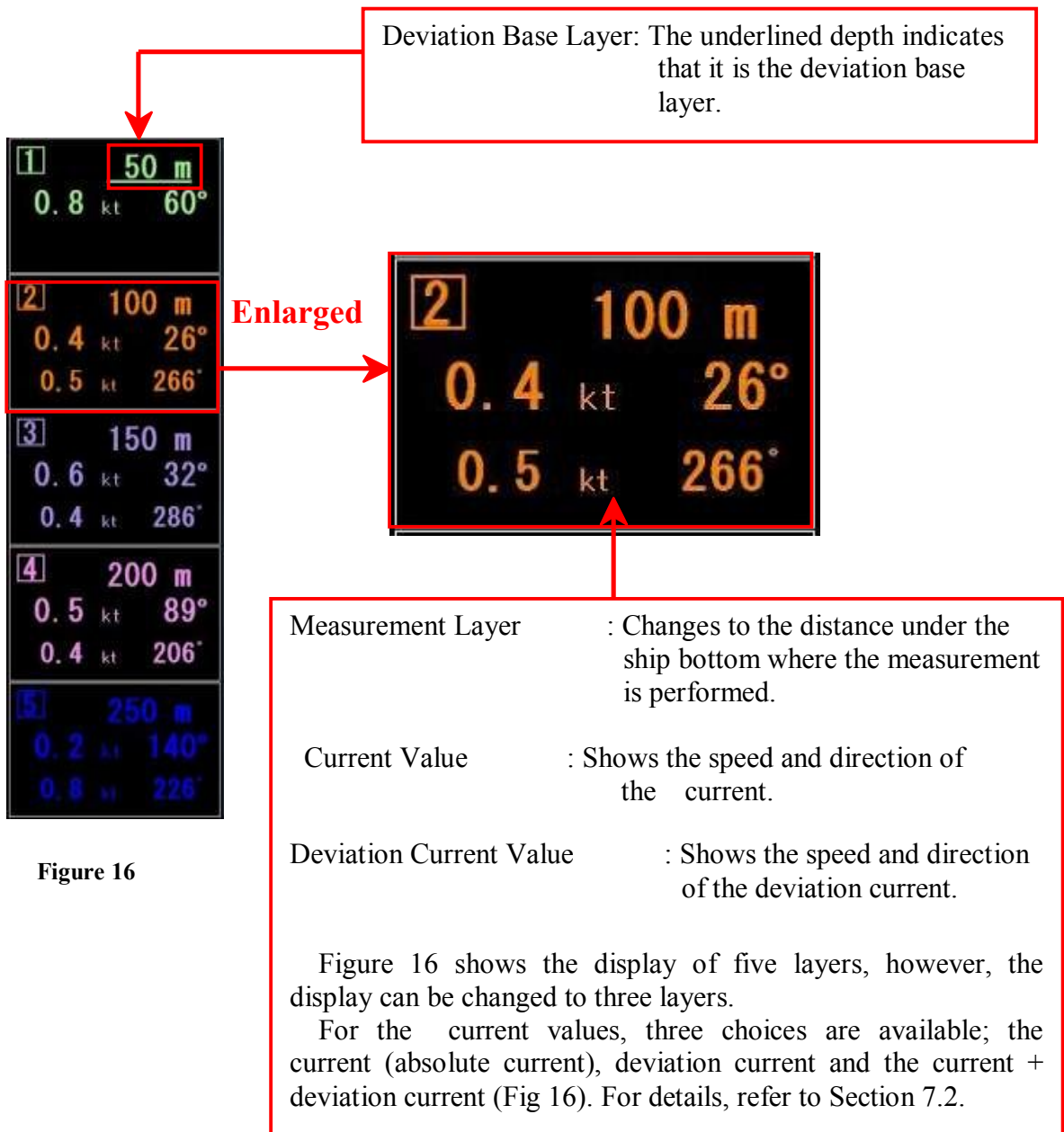


Figure 16

### ③ Vector Display Area

The current value is shown in a circle graph. The measurement mode chosen between the Bottom Mode and the Water Modes, alarm setting values and the water temperature of the surface layer are also displayed.

The vector display is shown for 3 modes; the vector display mode, text display mode and DCG compatible display modes.

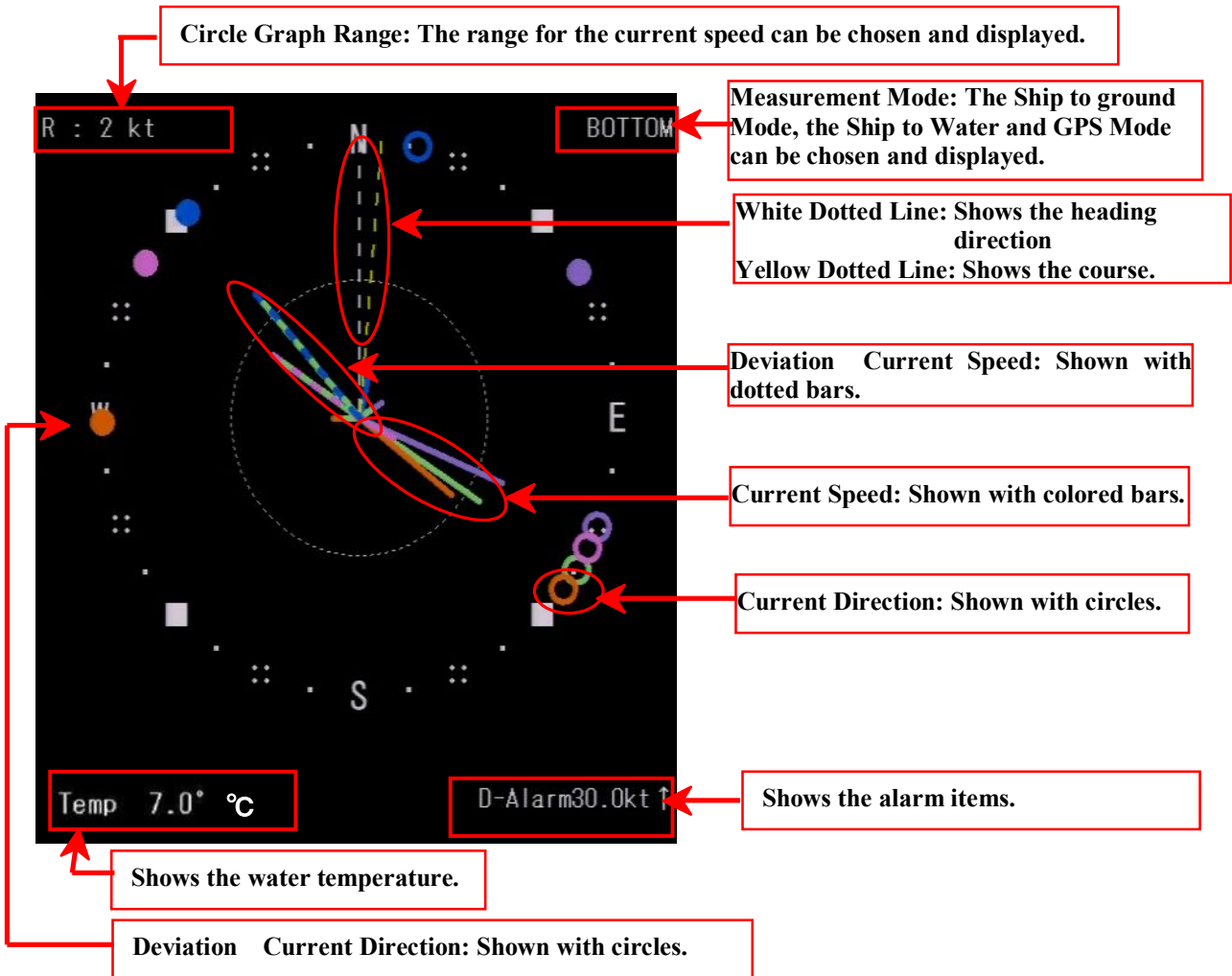


Figure 17

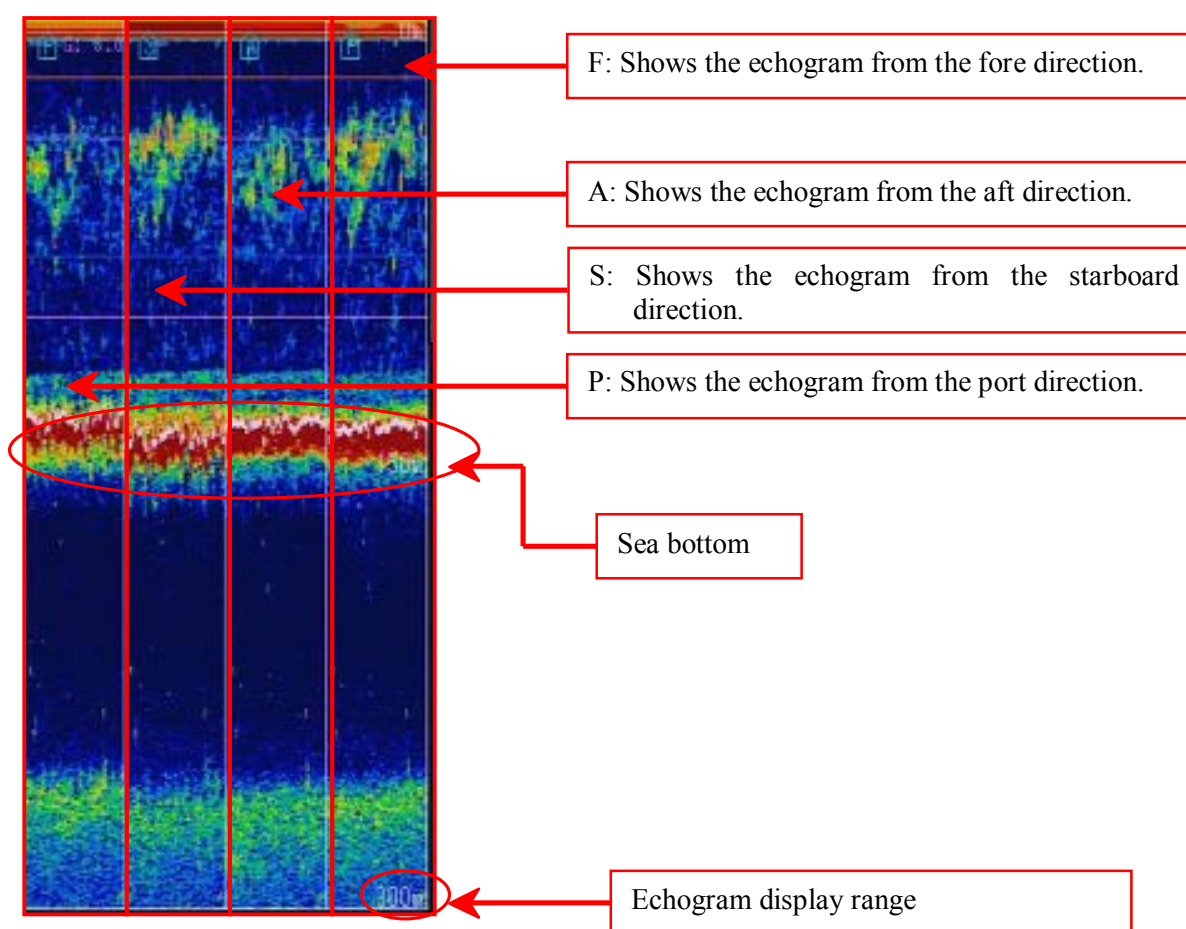
The colors are synchronized with the text display, showing the 1st layer in green, the 2nd layer in orange, the 3rd layer in purple, the 4th layer in pink and the 5th layer in blue.

\* The color of the dots of the dotted bar that shows the deviation current is the color of the deviation base layer. The color of the dots of the dotted bar in Fig. 17 is shown in green because the 1st layer is selected here.

#### ④ Echogram Display Area

The colors of the plankton and floating objects shown in the echogram display can be used as a guide for setting the measurement of the current meter.

The echogram display is shown for two modes; the vector display mode and echogram display mode.



**Figure 18**

The echogram display setting is described in Section 9.4.

The lines in the echogram are synchronized with the text display, showing the 1st layer in green, the 2nd layer in orange, the 3rd layer in purple, the 4th layer in pink and the 5th layer in blue.

### ⑤ Trend Graph Display

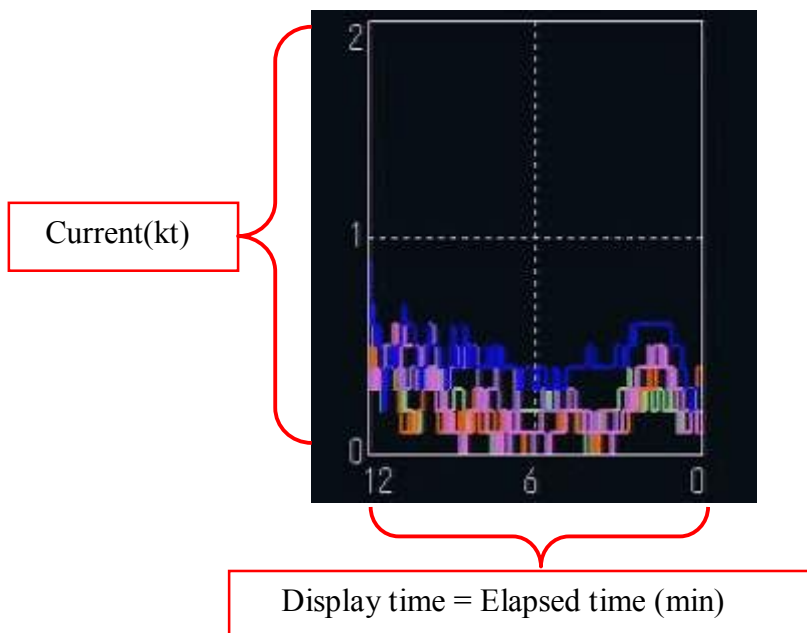
The values before the certain period of time are shown for the items set in the trend graph.

The trend graph display is shown for two modes; the vector display mode and the DCG-200 display mode.

The trend graph can display five items; water temperature, current, deviation current, depth, and vessel speed. For details, refer to Section 7.3.

Figure 19 below shows an example of the current trend.

The horizontal axis shows the display time and the vertical axis shows the display units.



**Figure 19**

The lines in the trend graph are synchronized with the character display, showing the 1st layer in green, the 2nd layer in orange, the 3rd layer in purple, the 4th layer in pink and the 5th layer in blue.

## 6.2 Display Mode

### 6.2.1 Vector Display Mode

This mode shows the speed and direction of the current value and those of the deviation current value of up to five layers.

The Vessel Speed, ship position, course, echogram, and trend graph can be seen on one screen.

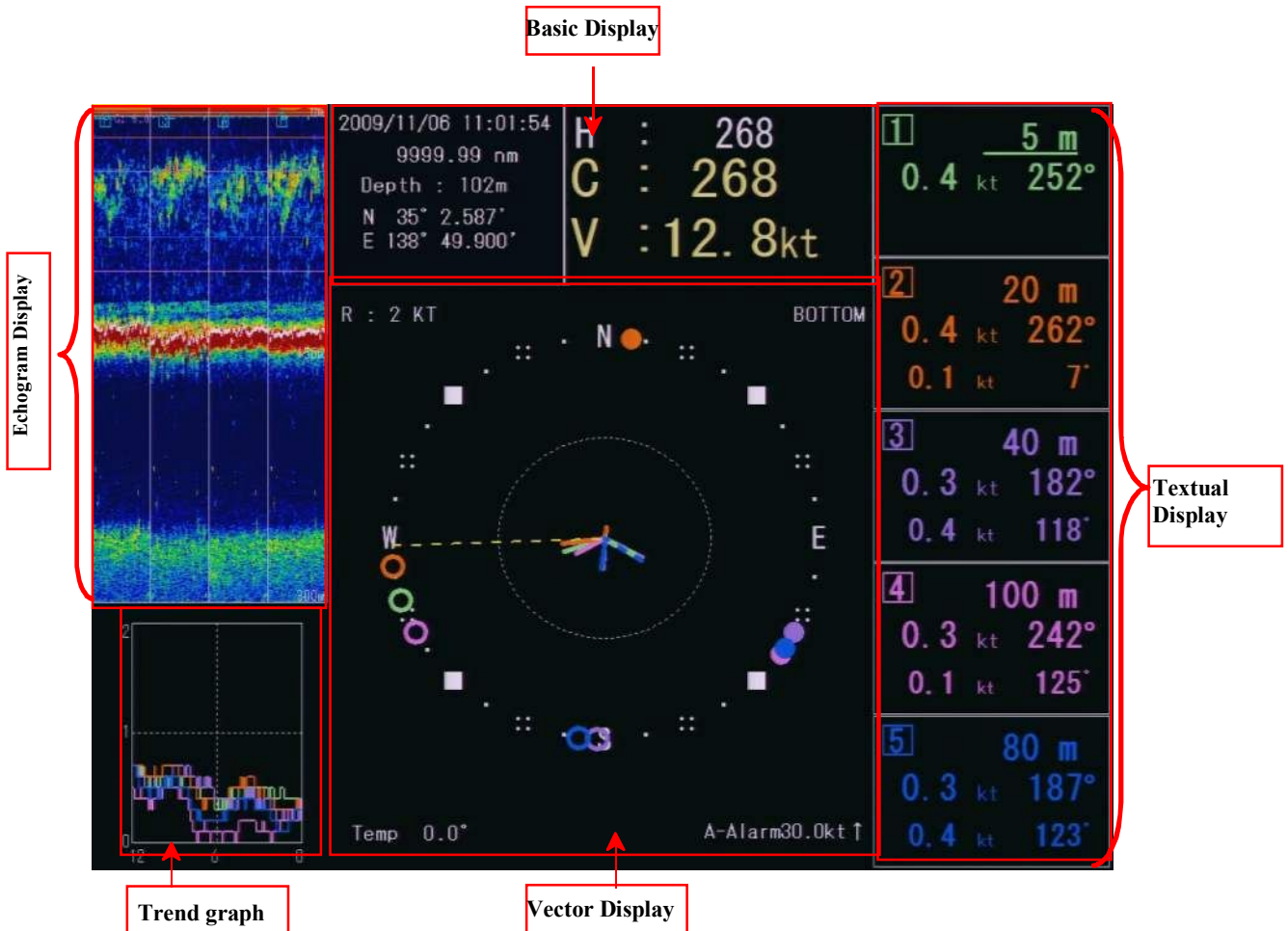


Figure 20

### 6.2.2 Textual Display Mode

The characters are enlarged in this mode.

The current value you wish to see can be recognized at a glance even from a distance.



Figure 21

\* The basic display of this mode does not show the latitude and longitude.

### 6.2.3 DCG-200 Compatible Display Mode

The screen display of this mode is the same as that of the conventional DCG-200 model.

It is recommended that users who are familiar with the conventional model use this display mode.

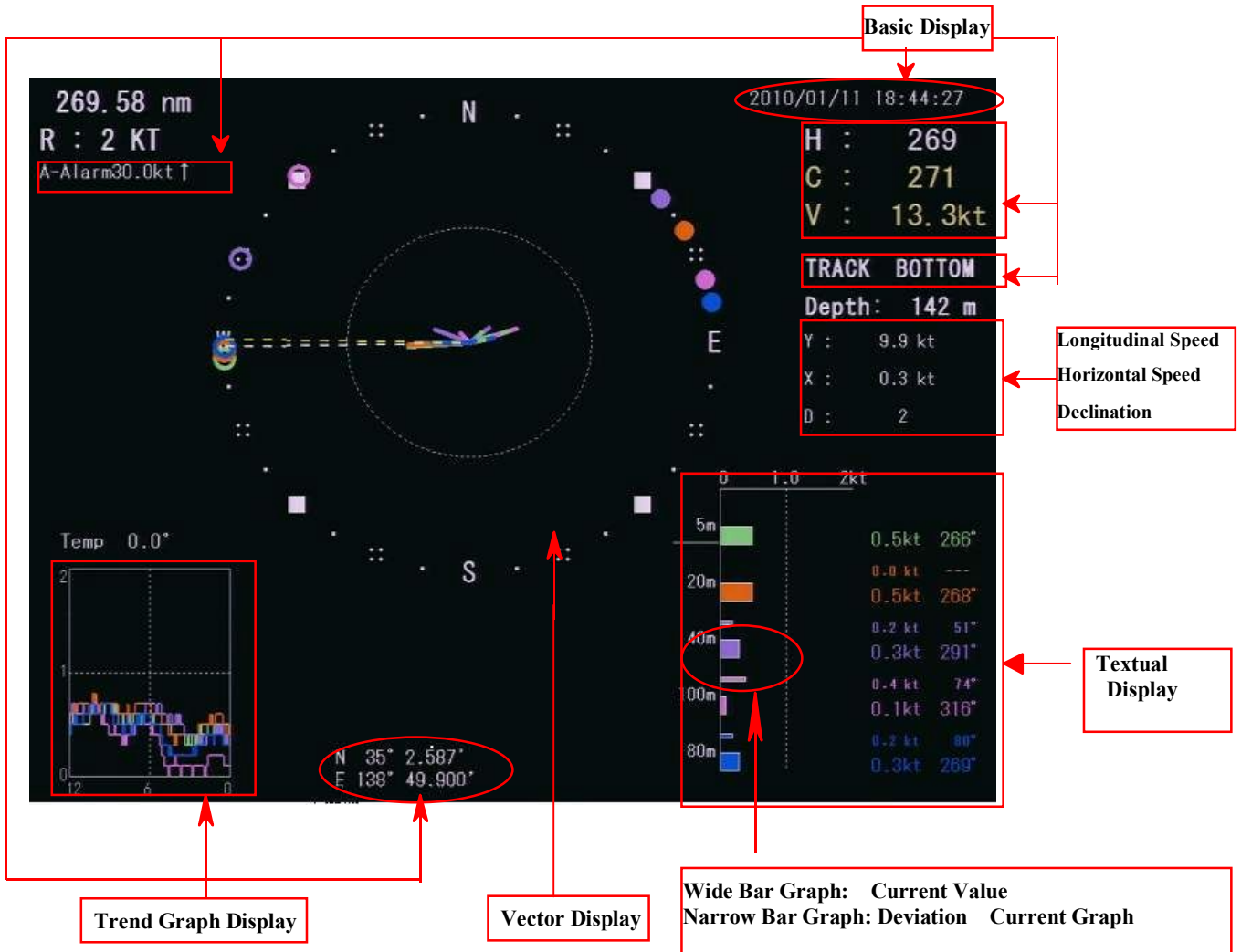


Figure 22

- Longitudinal Vessel Speed ..... “+” shows moving forward and “-” Shows moving backward.
- Horizontal Vessel Speed ..... “+” shows moving rightward and “-” shows moving leftward.
- Declination ..... The difference between the course and heading.

### 6.2.4 Vessel Speed Display Mode

The back and forth movement as well as right and left movement of the ship are shown as the velocity, and its trend is shown in a graph.

This display mode allows you to easily know the state of your ship.

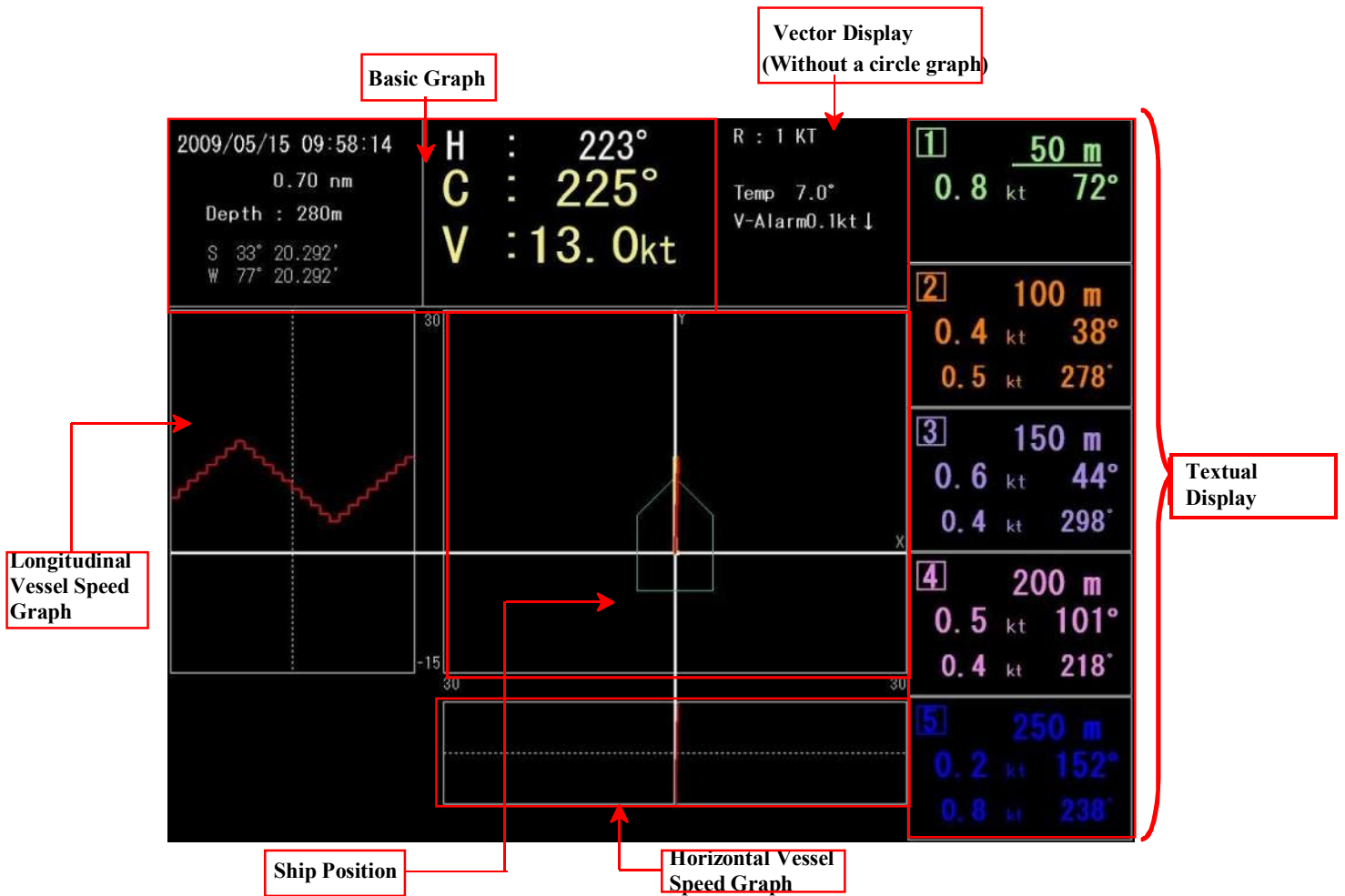


Figure 23

Longitudinal Vessel Speed .....“+” shows moving forward and “-” Shows moving backward.

Horizontal Vessel Speed ..... “+” shows moving rightward and “-” shows moving leftward.

Ship Position ..... The direction of the red line shows the course, and the length of the red line shows the ship velocity.

The yellow line shows those before vector synthesis.

### 6.2.5 Stereoscopic 3-D Display Mode

The data obtained from each layer are shown in 3D. For details, refer to Section 7.3.

This mode can show the current stereoscopically to allow you to imagine the casting net, etc. easily.

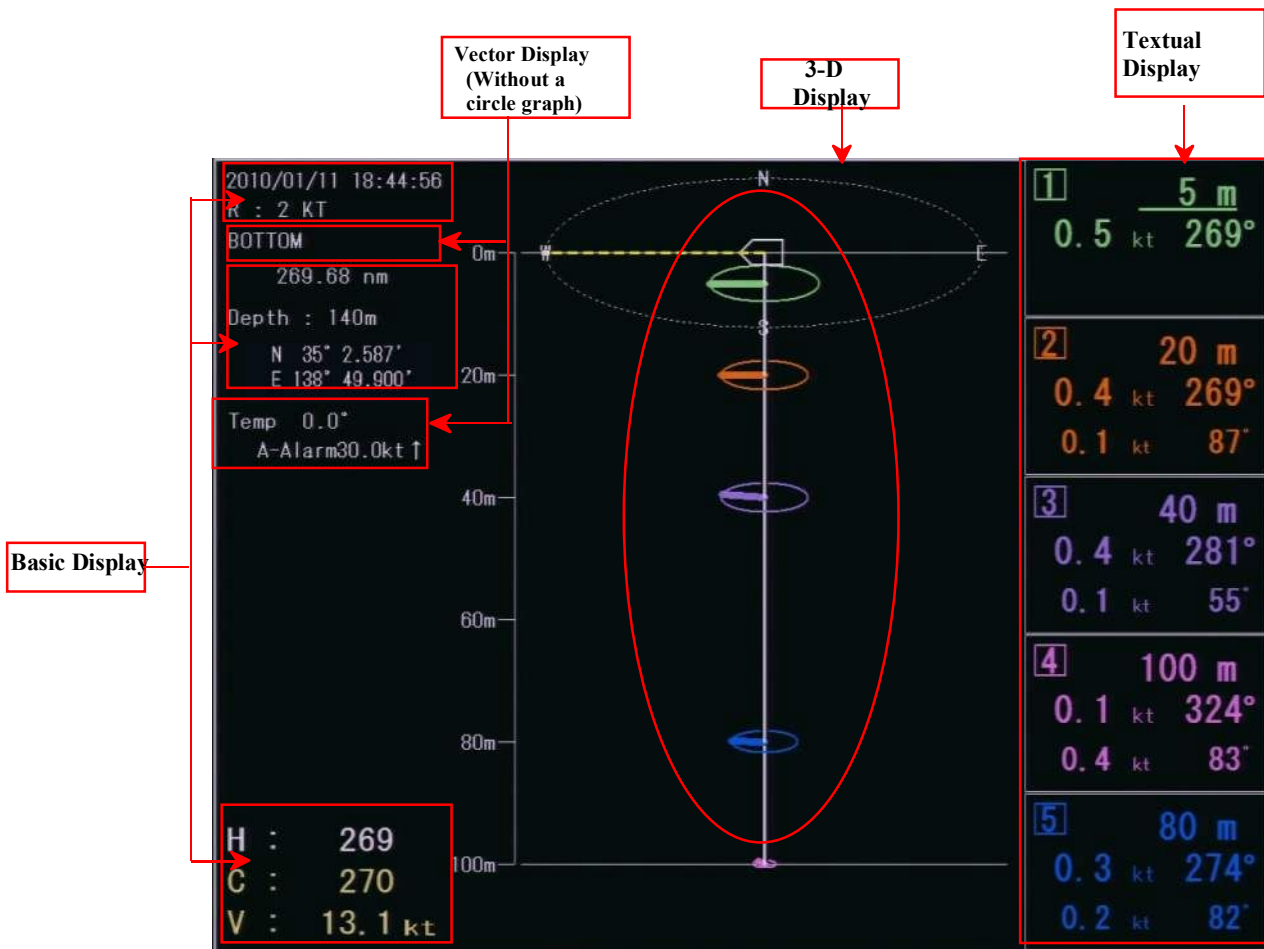


Figure 24

3-D Display..... The circle size shows: Current speed  
 The bar direction shows: Current direction

### 6.2.6 Echogram Display Mode

The echogram display mode allows you to use the display colors of the plankton and floating objects in the sea as a guide for setting the measurement of the current meter.

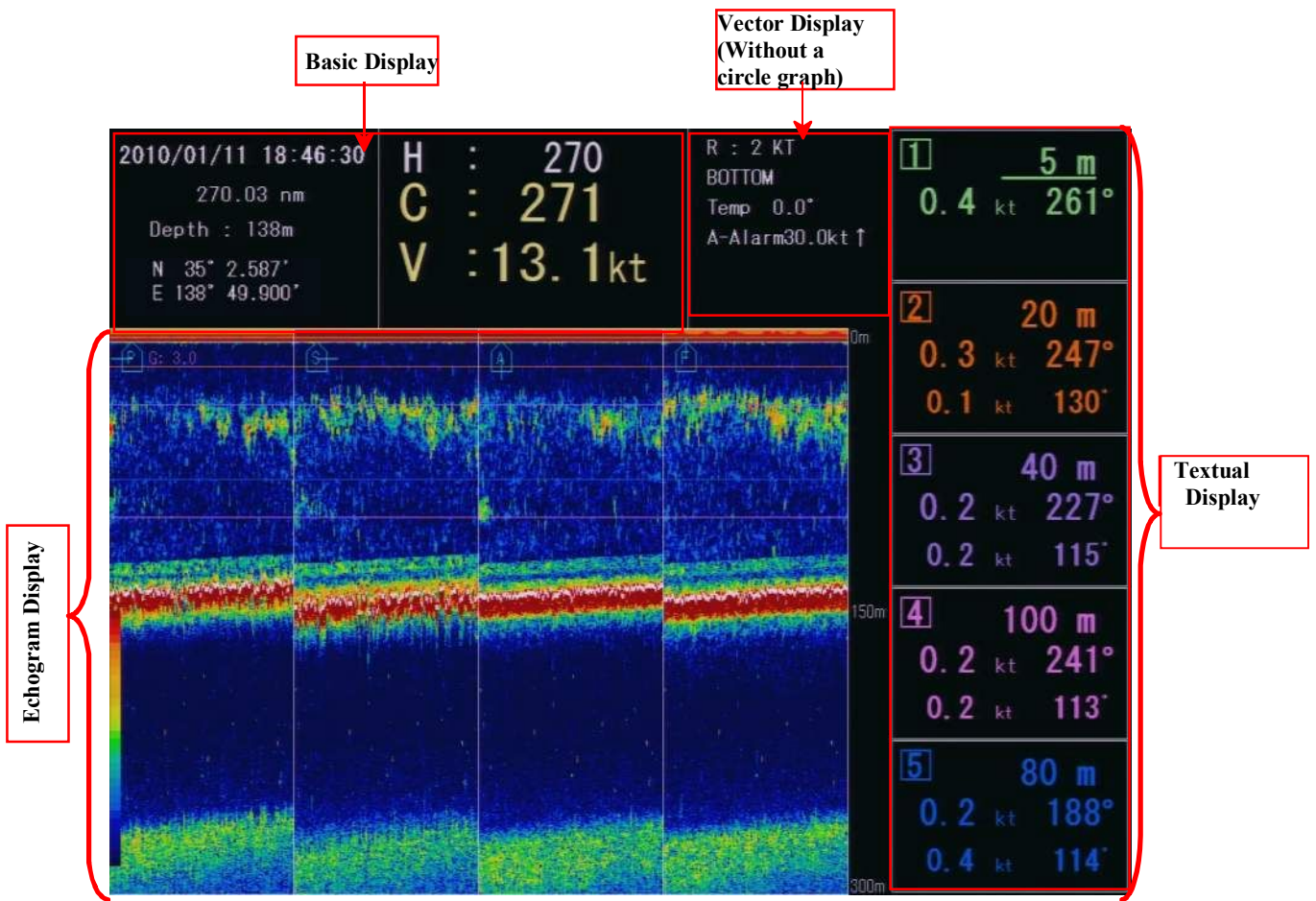


Figure 25



## 7 Menus

### 7.1 Display Setting (1)

On this setting screen, the tracking, manual sea Bottom layer and transmission synchronization can be set and changed in addition to the depth setting, transmitted pulse width, display mode and track mode described in Chapter 5.

DISPLAY SETTING(1)		
LAYER DEPTH	Default settings	
1st LAYER	20	m
2nd LAYER	40	m
3rd LAYER	60	m
4th LAYER	80	m
5th LAYER	120	m
REF LAYER	120	m
DEV. REF LAYER	1	
5thLAYER TRACK		
5th TRACK	MANUAL	
MAX DEPTH	200	m
TRCK DEPTH	80	%
MANUAL DEPTH	150	m
TX PULSE WIDTH	4	
TX SYNC	INT	
DISPLAY MODE	VECTOR	
TRACK MODE	BOTTOM	

Figure 26

Item	Range	Description
LAYER DEPTH		Set the depth of the layers to measure the current.
1st LAYER	3 to 400 m	
2nd LAYER	3 to 400 m	
3rd LAYER	3 to 400 m	
4th LAYER	3 to 400 m	
5th LAYER	3 to 400 m	
REF. LAYER	3 to 400 m	The vessel speed and current value in the ship to water mode are shown based on the current value of this base layer.
DEV.REF.LAYER	1 to 5	Choose the base layer for the calculation of the deviation current.
5thLAYER TRACK		Shown below are the settings when the 5th layer is chosen as the sea bottom tracking layer.
5th TRACK	MANUAL	Choose either the manual or automatic mode for performing the sea bottom tracking. (Choose the automatic mode so that the 5th layer will be the sea bottom-tracking layer.)
	AUT	
MAX DEPTH	50 to 400 m	Specify the maximum depth when sea bottom tracking is in an automatic mode.
TRACK DEPTH	50 to 95%	The sea bottom layer should be within this percentages range of the depth.
MANUAL DEPTH	3 to 600 m	Choose the sea depth in the manual ship to ground mode.
TX PULSE WIDTH	1 to 4 (TEST)	Choose the transmitted pulse width.
TX SYNC.	INT.	Decide the transmission timing by the internal timer.
	EXT.	Transmission starts when a trigger signal is received from the external device.
Display Mode	VECTOR	Choose the screen display mode.
	DCG-200	
	CHARACTER	
	ECHOGRAM	
	VELO.DISP.	
TRACK MODE	3D VECTOR	
	BOTTOM	Measurement is performed in the ship to ground mode.
	WATER	Measurement is performed in the ship to water mode.
	GPS	Measurement is performed in the GPS mode.
	MANUAL	The ship to ground mode will be set manually.

Note \*1) Vessel speed is calculated with assuming that there is a bottom of the sea certainly, when choosing “MANUAL DETPTH” in the menu at designated sea depth. This mode is effective in case that strong echo (such as fish-school) affects a bottom inspection, even when sea depth is stable.

## 7.2 Display Setting (2)

On this setting screen, both the echogram setting and current graph setting described in Section 6.1 can be set and changed in addition to the gain adjustment described in Section 5.9.

The screenshot shows a menu titled "DISPLAY SETTING(2)" with two main sections: "ECHO GRAM" and "CURRENT DISP". The "ECHO GRAM" section includes settings for GAIN (5.0), COLOR CLUTTER (0), RANGE (200 m), SHIFT (0 m), BEAM SELECT (FAPS), FEED NUM (1), BOTTOM DISP (ON), INTERFER REDUCTION (OFF), and COLOR PATTERN (ON). The "CURRENT DISP" section includes settings for RANGE (2kt), HEAD UP/NORTH UP (NORTH UP), BEARING (32), DISP LAYER (5), and CURR. DISP (CURR. +DEV). A red label "Default settings" is positioned to the right of the menu items.

DISPLAY SETTING(2)	
ECHO GRAM	
GAIN	5.0
COLOR CLUTTER	0
RANGE	200 m
SHIFT	0 m
BEAM SELECT	FAPS
FEED NUM	1
BOTTOM DISP	ON
INTERFER REDUCTION	OFF
COLOR PATTERN	ON
CURRENT DISP	
RANGE	2kt
HEAD UP/NORTH UP	NORTH UP
BEARING	32
DISP LAYER	5
CURR. DISP	CURR. +DEV

Figure 27

KDG-300 Doppler Current Graph Instruction Manual

Item	Range	Description
ECHOGRAM		Set the items related to the echogram display.
GAIN	0.0 to 10.0	Use 5.0 normally. However, increase this value to enhance the sensitivity if it is difficult to obtain the current value.
COLOR CLUTTER	0 to 7	This is for disabling the color display.
RANGE	50 m	Choose the display range of the echogram.
	100 m	
	150 m	
	200 m	
	300 m	
	400 m	
	500 m	
	600 m	
SHIFT	0 to 300 m	Choose the shift of the echogram.
BEAM SELECT	FAPS	Choose the echogram display from; the display divided into four to show FAPS in all directions, the display divided into two, and the display only in 1 direction.
	FA	
	PS	
	FP	
	FS	
	F	
	A	
	P	
S		
FEED NUM.	1 to 4	Set the echogram screen change speed of the displayed at the upper left side of the vector display screen.
BOTTOM DISP	ON/OFF	Choose either to display or hide the white line showing the sea bottom on the echogram screen.
INTERFER REDUCT	ON/OFF	Choose either to enable or disable the interference removal processing of The echogram data.
COLOR PATTERN	ON/OFF	Choose either to display or hide the color pattern shown on the left end of the echogram screen.
CURRENT DISP.		Set the items related to the current graph.
RANGE	1 kt	Choose the range of the circle graph of the current vector display.
	2 kt	
	4 kt	
	10 kt	
HEAD UP/ NORTH UP	HEAD UP NORTH UP	Choose either Head Up or North Up for the circle graph of the current vector display.
BEARING	32-point	For the current direction display shown on the right side of the screen, choose either 0-to-359-degree or 32-point display such as NE/N and SW.
	0 to 360	
DISP.LAYER	3	Choose either 3 layers or 5 layers to be displayed on the screen.
	5	
CURR.DISP	CURRENT	For the current to be displayed on the screen, choose from; the current, the deviation current, or both the current and the deviation current.
	DEVIATION	
	CURR.+DEV.	

### 7.3 Display Setting (3)

On this setting screen, the items related to the trend graph described in Section 6.1, and the items related to 3-D Vector display described in Section 6.2.5 can be set and changed.

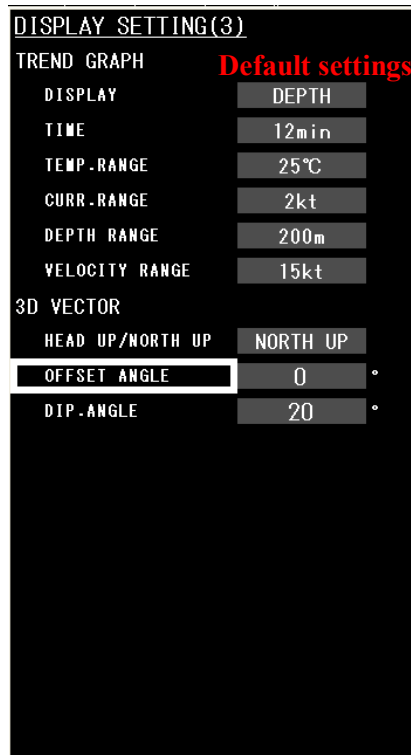


Figure 28

Item	Range	Description
TREND GRAPH		Set the items related to the trend graph to be displayed at the lower left side of the current screen.
DISPLAY	TEMP.	Choose the items to be displayed in the trend graph.
	CURRENT	
	DAVIATION	
	DEPTH	
	VELOCITY	
TIME	12 min	This is the time range of the horizontal axis of the trend graph. Choose the time range for the past data to be displayed in the graph.
	24 min	
	60 min	
	120 min	
	240 min	
	480 min	
TEM.RANGE	15 to 35 °C (in 5 °C steps )	Choose the temperature range of the vertical axis when the water temperature is chosen.
CURR.RANGE	1 kt	Choose the range of the vertical axis when the current and deviation current are chosen.
	2 kt	
	4 kt	
DEPTH RANGE	100 m to 600 m (in steps of 100 m)	Choose the range of the vertical axis when the sea depth is chosen.
VELOCITY RANGE	5 kt to 30 kt (in steps of 5 kt)	Choose the range of the vertical axis when the ship velocity is chosen.
3-D VECTOR		Set the items related to the current 3-D display.
HEAD UP / NORTH UP	HEAD UP	Choose either Head Up or North Up for the current 3-D display.
	NORTH UP	
OFFSET ANGLE	0 to 359 degrees	Choose the offset angle of the direction.
DIP. ANGLE	0 to 90 degrees	Set the tilt for the current 3-D display when it is viewed from the oblique direction. The tilt at 0 degrees shows the view looking from the side, and the tilt at 90 degrees shows the view looking from the top.

## 7.4 Display Setting (4)

On this setting screen, the items related to the distance can be set and changed.

The item to move to the service menu can also be set on this screen.

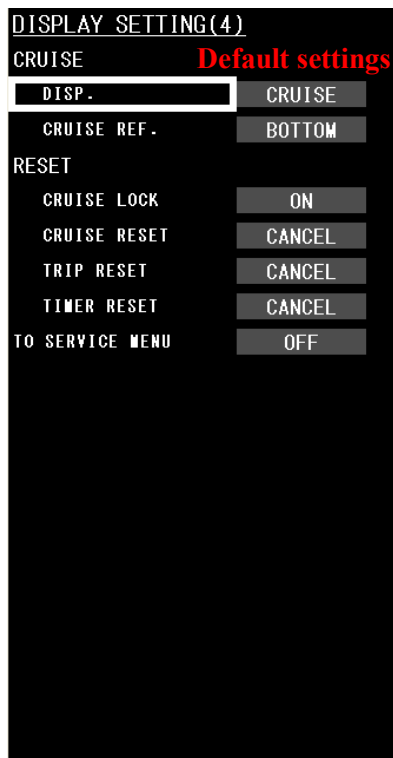


Figure 29

Item	Range	Description
CRUISE		
DISP.	CRUISE	Choose the display for the mileage.
	TRIP	
	TIMER	
CRUISE REF.	BOTTOM	Choose how to count the mileage and trip; counting either based on the “ship to ground” or the “ ship to water.”
	WATER	
RESET		Set the items related to the current display.
CRUISE LOCK	OFF/ON	This is for protecting the mileage value.
CRUISE RESET	CANCEL/RESET	The mileage will be reset to 0 if “Execute” is chosen.
TRIP RESET	CANCEL/RESET	The trip will be reset to 0 if “Execute” is chosen.
TIMER RESET	CANCEL/RESET	The timer will be reset to 0 if “Execute” is chosen.
TO SERVICE MENU	OFF/ON	The “Service Menu” starts if it is set to ON.

## 7.5 Memory

On this setting screen, the items related to reproduction and storage functions described in Section 5.11 can be set and changed.

The reproduction function is to reproduce the stored settings.

The storage function is to save all settings except the key settings.

The item “Standard” refers to the default setting.

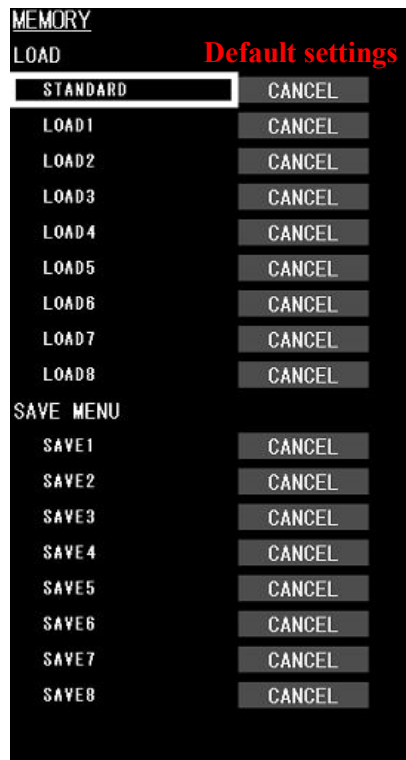


Figure 30

Item	Range	Description
LOAD		The settings in the menu can be load.
STANDARD	CANCEL	
	EXECUTE	If "Execute" is chosen, the setting will be the default setting.
LOAD 1	CANCEL	
	EXECUTE	
LOAD 2	CANCEL	
	EXECUTE	
LOAD 3	CANCEL	
	EXECUTE	
LOAD 4	CANCEL	
	EXECUTE	
LOAD 5	CANCEL	
	EXECUTE	
LOAD 6	CANCEL	
	EXECUTE	
LOAD 7	CANCEL	
	EXECUTE	
LOAD 8	CANCEL	
	EXECUTE	
SAVE		The settings in the menu can be save.
SAVE 1	CANCEL	
	EXECUTE	
SAVE 2	CANCEL	
	EXECUTE	
SAVE 3	CANCEL	
	EXECUTE	
SAVE 4	CANCEL	
	EXECUTE	
SAVE 5	CANCEL	
	EXECUTE	
SAVE 6	CANCEL	
	EXECUTE	
SAVE 7	CANCEL	
	EXECUTE	
SAVE 8	CANCEL	
	EXECUTE	

## 7.6 Alarm

On this setting screen, the items related to the alarm described in Section 5.10 can be set or changed.

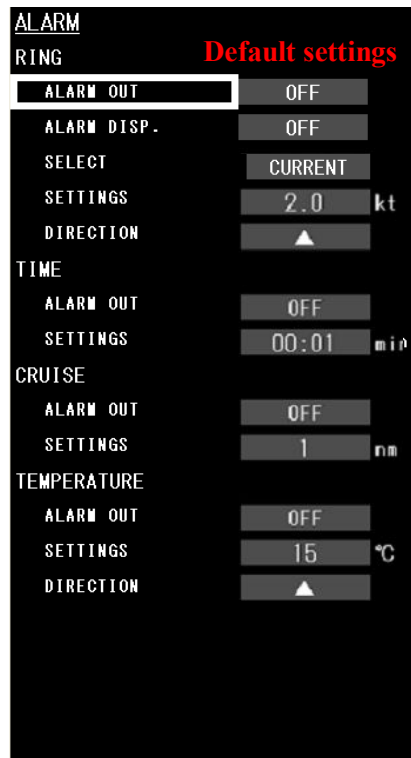


Figure 31

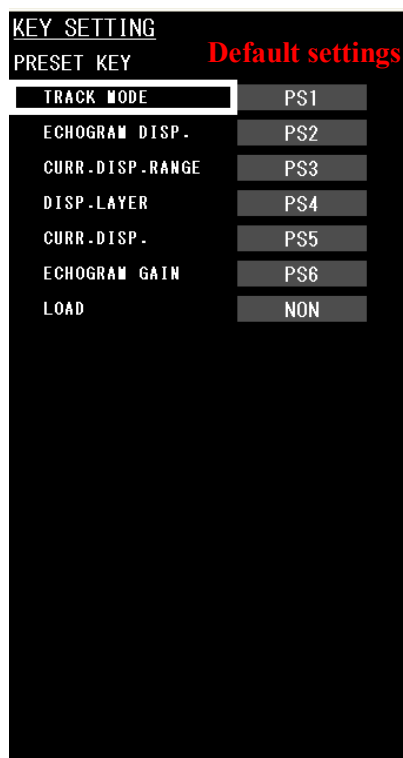
Item		Range
RING		
	ALARM OUT	OFF
		ON
	ALARM DISP.	OFF
		ON
	SELECT	Ship Velocity
		Absolute Current
		Deviation Current
	SETTINGS	0.1 to 30.0 (in steps of 0.1)
	DIRECTION	▲
		▼
TIME		
	ALARM OUT	OFF
		ON
	SETTINGS	00:01 to 23:59
CRUISE		
	ALARM OUT	OFF
		ON
	SETTINGS	00000-99999 (in steps of 1)
TEMPERATURE		
	ALARM OUT	OFF
		ON
	SETTINGS	0 to 30 °C (in steps of 1 degree)
	DIRECTION	▲
		▼

## 7.7 Key Setting

On this setting screen, the items related to the key setting described in Section 5.12 can be set or changed.

The items selected here will be RC-20 preset key items.

The preset keys set here allow you to change the item with one push, without opening the menu.



The screenshot shows a menu titled "KEY SETTING" with a sub-header "PRESET KEY" and a red label "Default settings". The menu lists several items, each with a corresponding preset key assignment:

Item	Preset Key
TRACK MODE	PS1
ECHOGRAM DISP.	PS2
CURR.DISP.RANGE	PS3
DISP.LAYER	PS4
CURR.DISP.	PS5
ECHOGRAM GAIN	PS6
LOAD	NON

Figure 32

Item	Range	Description
PRESET KEY		Set the function to be assigned to each PS key.
TRACK MODE	PS1	
ECHOGRAM DISP.	PS2	
CURR.DISP.RANGE	PS3	
DISP.LAYER	PS4	
CURR.DISP	PS5	
ECHOGRAM GAIN	PS6	
LOAD	NON	

## 7.8 Service (1)

On this setting screen, the items related to the date and time of the basic display described in Section 6.1 can be set.

<u>SERVICE (1)</u>		Default settings
DATE ADJUST		
YEAR		2010
MONTH		4
DAY		7
TIME ADJUST		
HOUR		17
MINUTE		47
SECOND		30
CHECK		OFF
SPECTRUM		1

Figure 33

Item	Range	Description
DATE ADJUST		Set the date of the inner clock of this device.
YEAR	-	
MONTH	-	
DAY	-	
TIME ADJUST		Set the time of the inner clock of this device.
HOUR	-	
MINUTE	-	
SECOND	-	
CHECK	OFF/ON	If this item is set to ON, a pseudo current value based on the dummy data will be displayed.
SPECTRUM	1 to 28	This menu is used by service staff when they check the operation.

## 7.9 Service (2)

On this setting screen, the Language, IF Output, On-Screen Display, Screen Ratio, Tiltmeter Correction and Transmitting Mode can be set or changed. An item to move to the Technical Menu can also be set.

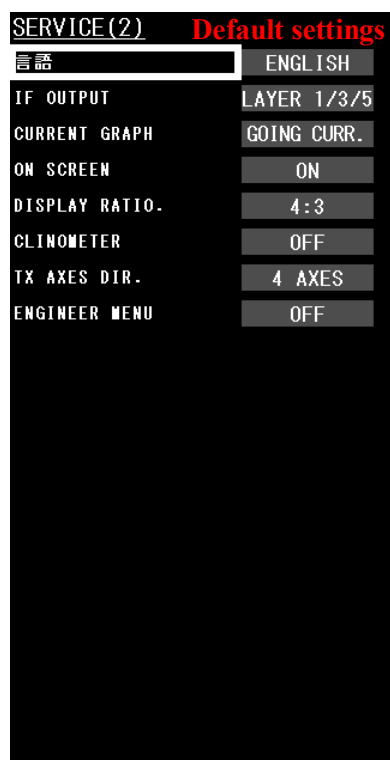


Figure 34

Item	Range	Description
言語	ENGLISH	The language used for the menu display can be chosen.
	日本語	
	NORWEGAN	
	SPANISH	
	韓国語	
IF OUTPUT	LAYER1/3/5	The GPIF format data that are output from IF-42 interface board has 3 layers, so that the layer of the data to be output must be specified.
	LAYER1/2 /3	
CURRENT GRATH	GOING CURR. /COMING CURR.	
ON SCREEN	OFF ON	Choose either to enable or disable the pop-up display for the preset key operation.
DISPLAY RATIO.	4: 3 5: 4	The ratio of the circle graph to the screen must be chosen. Choose “4:3” when using 1024:768 monitor (15 model). Choose “5:4” when using 1280:1024 monitor (17 and 19 models).
CLINOMETER	OFF/ON	Choose either to enable or disable the current calculation correction with a clinometers.
CLINOMETER	4 AXES	Choose the ultrasonic wave transmission mode from; output to all 4 axes, 3 beams or 2 beams.
	3 AXES	
	2 AXESP	
	2 AXES S	
ENGINEER MENU		Choose ON to start “Engineer Menu.”

## 7.10 Technical (1)

### Caution

These are internal advanced settings.  
**Do not change them - use the default settings.**

The image shows a screenshot of the 'ENGINEER SETTING(1)' menu. The menu is divided into 'TX' and 'RX' sections. The 'TX' section includes 'TX POWER' (10) and 'SYNC-DELAY' (0). The 'RX' section includes 'GOS' (5.0), 'STC RANGE' (10 m), 'STC LEVEL' (10.0), 'TVG RANGE' (400m), 'TVG CURVE' (20log), 'ABS' (5), 'MAX GAIN' (10.0), 'W-AMP GAIN1' (1), 'W-AMP GAIN2' (1), 'E-AMP GAIN1' (3), 'E-AMP GAIN2' (1), and 'COLOR EXP.' (4). The values are displayed in a list format with a dark background and light text.

ENGINEER SETTING(1)	
TX	
TX POWER	10
SYNC-DELAY	0
RX	
GOS	5.0
STC RANGE	10 m
STC LEVEL	10.0
TVG RANGE	400m
TVG CURVE	20log
ABS	5
MAX GAIN	10.0
W-AMP GAIN1	1
W-AMP GAIN2	1
E-AMP GAIN1	3
E-AMP GAIN2	1
COLOR EXP.	4

Figure 35

7.11 Technical (2)

Caution

These are internal advanced settings.

**Do not change them - use the default settings.**

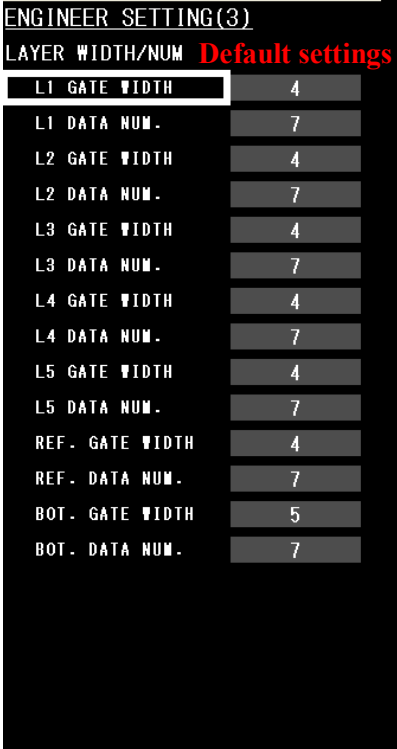
ENGINEER SETTING(2)	
BOTTOM DETECT <b>Default settings</b>	
DETECT METHOD	THRESHOLD
THRESHOLD LEV.	2
BOTTOM WIDTH	2
BOT.RANGE SPEC.	OFF
RANGE MIN	1 m
RANGE MAX	600 m
IF DEPTH INPUT	OFF
LOST DATA METHOD	OFF
CURR-DEPTH MARK	80 %
DEV.CALC.	C1-C2
HOLD TIME	2 min
LOST DATA MARK	OFF
CURR-DEPTH MARK	OFF

Figure 36

## 7.12 Technical (3)

### Caution

These are internal advanced settings.  
**Do not change them - use the default settings.**



ENGINEER SETTING(3)

LAYER WIDTH/NUM	Default settings
L1 GATE WIDTH	4
L1 DATA NUM.	7
L2 GATE WIDTH	4
L2 DATA NUM.	7
L3 GATE WIDTH	4
L3 DATA NUM.	7
L4 GATE WIDTH	4
L4 DATA NUM.	7
L5 GATE WIDTH	4
L5 DATA NUM.	7
REF. GATE WIDTH	4
REF. DATA NUM.	7
BOT. GATE WIDTH	5
BOT. DATA NUM.	7

Figure 37

7.13 Technical (4)

Caution

These are internal advanced settings.  
**Do not change them - use the default settings.**

ENGINEER SETTING(4)		
AVERAGE TIME	Default settings	
CURR.AVE.	120	sec
CURR.MOVING AVE.	0	sec
CURR.REDUC.THRS.	0.0	kt
B-V AVE.	15	sec
B-V MOVING AVE.	0	sec
B-V REDUC.THRS.	0.0	kt
W-V AVE.	30	sec
W-V MOVING AVE.	0	sec
W-V REDUC.THRS.	0.0	kt
CORRECTION		
CURRENT	+0.0	%
BOTTOM TRACK	+0.0	%
WATER TRACK	+0.0	%
TRANSDUCER	+0.0	°
CLINO.CORR.		
CLINO.DIRECT.	+0.0	°
CLINO.X	+0.0	°
CLINO.Y	+0.0	°

Figure 38

## 7.14 OK MONITOR

This screen allows you to check whether the calculation results are sent correctly.

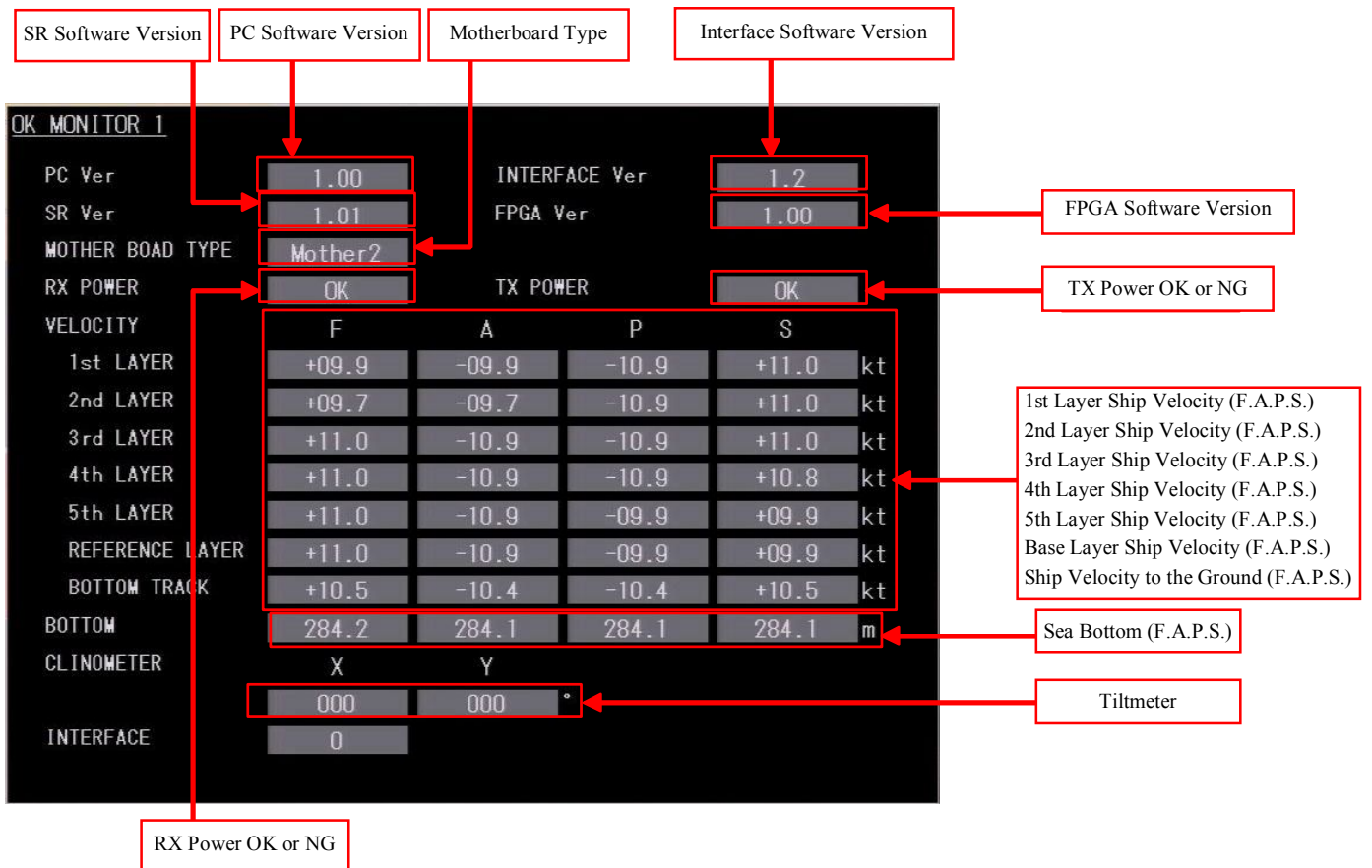


Figure 39

## 8 Specifications

### 8.1 Measuring Method

The 4-beam system using ultrasonic pulses

### 8.2 Frequency in Use

140 [kHz]

### 8.3 Measurement of Current and Deviation Current

(1) Maximum Layers: 5 layers

(2) Distance under

The Bottom: Within 80% of the sea depth, and in the range from 3 m to 220 m (depending on the sea conditions)

(3) Measuring Method: Simultaneous measurement with the current and deviation current.

(4) Measuring Range: 0 to 9.9 kt (the minimum unit of 0.1 kt)

(5) Current Direction: ① 360-Degree Display: 360-degree omni-directional display in 1-degree steps.  
② 32-bearing Display: 32-step directional display.

### 8.4 Ship Velocity Setting

(1) Distance under Ship Bottom:

① Vessel Speed to the Bottom:

3[m] to 450[m]

(depending on bottom sediments)

② Vessel Speed to Water:

Deeper than 15[m]

(2) Heading Direction: 360-degree omni-directional display.

(3) Measurement Range: Fore 30.0 kt to Aft 10.0 kt  
Starboard 9.9 kt to Portside 9.9 kt

### 8.5 Log Display

0 to 9999.99[nm]

## 8.6 External Input

- (1) NMEA Fore Direction Input
- (2) NMEA Latitude and Longitude Input
- (3) NMEA Water Temperature Input
- (4) NMEA Sea Depth Input
- (5) GC-21 Input
- (6) External Synchronization Input

## 8.7 External Output

- (1) NMEA Output
- (2) GPIF(IF17) Output
- (3) Log Pulse Signal 200 Pulse/nm
- (4) External Synchronization Output

## 8.8 Power

**SR-86:** AC100[V], AC110[V] and AC220[V]      Approx. 180[VA]  
(Switched when the internal wiring is changed)

**PRC-56:** AC100[V] to AC220[V]      Approx. 60[VA]

## 8.9 Alarm

The warning sound can be set for any one of the following items; for the vessel speed, for the current (absolute current) or for the deviation current. For the Water Temperature, Distance and Time, the alarm value can be decided on the menu to set the warning sound.

## 9 Configuration

### 9.1 Equipment Configuration

#### 9.1.1 Standard Unit

Equipment Name	Outline Drawing	Weight (approx. kg)	Quant.	Note
SR-86 Transmitter & Receiver	S404794-D	31	1	—
RC-20 Remote Controller	S405340-A	1	1	With a cable approx. 15 m in length
PRC-56 Processor	S404795-D	5	1	—
CB-25 Cable (30 m)	—	6	1	—
T-101 Transducer	S405460	13	2	With a cable Approx. 24 m in length

#### 9.1.2 Optional Equipments

Equipment Name	Outline Drawing	Weight (approx. kg)	Quant.	Remarks
I-133 Display	S404714-A	24	1	19 inch LCD
NWZ-157 xx Display	—	—	1	15 inch LCD
Power Switch Box	S405459	1	1	When the LCD other than I-133 is in use
Power Switch Box Cable (15 m)	—	—	1	Supplied in a set with the power switch box
Power Switch Box Cable (30 m)	—	—	1	Supplied in a set with the power switch box
CB-25 Cable (60 m)	—	12	1	—
CB-25 Cable (90 m)	—	18	1	—
RGB Extension Cable (30 m)	—	—	1	—
RC-20 Remote Controller	—	1	1	With a cable approx. 30 m in length.
J-39 Junction Box	—	2	2	Supplied in a set.
TD-SR Extension Cable (25 m)	—	—	2	

## 9.2 Equipment Chart

