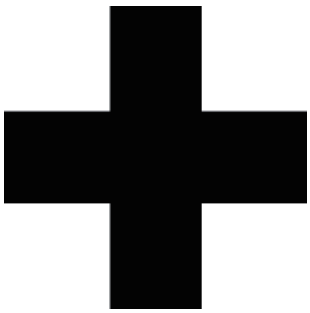
JLN-650/652

DOPPLER CURRENT METER

INSTRUCTION MANUAL

JRC Japan Radio Co., Ltd.



Cautions for High Voltage

High voltages, ranging from several hundreds to tens of thousands of volts, are used in electronic apparatus, such as radio and radar instruments. These voltages are totally harmless in most operations. However, touching a component inside the unit is very dangerous. (Any person other than authorized service engineers should not service, inspect, or adjust the unit.)

High voltages on the order of tens of thousand volts are most likely to cause instant deaths from electrical shocks. At times, even voltages on the order of several hundred volts could lead to electrocution. To defend against electrical shock hazards, don't put your hand into the inside of apparatus. When you put in a hand unavoidably in case of urgent, it is strongly suggested to turn off the power switch and allow the capacitors, etc. to discharge with a wire having its one end positively grounded to remove residual charges. Before you put your hand into the inside of apparatus, make sure that internal parts are no longer charged. Extra protection is ensured by wearing dry cotton gloves at this time. Another important precaution to observe is to keep one hand in your pocket at a time, instead of using both hands at the same time.

It is also important to select a secure footing to work on, as the secondary effects of electrical shock hazards can be more serious. In the event of electrical shocks, disinfect the burnt site completely and obtain medical care immediately.

Precautions for Rescue of Victim of Electric Shock

When a victim of electric shock is found, turn off the power source and ground the circuit immediately. If this is impossible, move the victim away from the unit as quick as possible without touching him or her with bare hands. He or she can safely be moved if an insulating material such as dry wood plate or cloth is used.

Breathing may stop if current flows through the respiration center of brain due to electric shock. If the electric shock is not large, breathing can be restored by artificial respiration. A victim of electric shock looks pale and his or her pulse may become very weak or stop, resulting in unconsciousness and rigidity at worst. It is necessary to perform first aid immediately.

Method of First-Aid Treatment

☆Precautions for First-Aid Treatments

Whenever a person is struck by an electrical shock, give the patient artificial respiration immediately on the spot, unless it is absolutely necessary to move the patient for safety's sake. Once started, artificial respiration should be continued rhythmically.

(1) Refrain from touching the patient carelessly as a result of the accident; the first-aider could suffer from electrical shocks by himself or herself.

(2) Turn off the power calmly and certainly, and move the patient apart from the cable gently.

(3) Call or send for a physician or ambulance immediately, or ask someone to call doctor.

(4) Lay the patient on the back, loosening the necktie, clothes, belts and so on.

(5) (a) Feel the patient's pulse.
(b) Check the heartbeat by bringing your ear close to the patient's heart.
(c) Check for respiration by bringing your face or the back of your hand to the patient's face.
(d) Check the size of patient's pupils.

(6) Opening the patient's mouth, remove artificial teeth, cigarettes, chewing gum, etc. if any. With the patient's mouth open, stretch the tongue and insert a towel or the like into the mouth to prevent the tongue from being withdrawn into the throat. (If the patient clenches the teeth so tight that the mouth won't open, use a screwdriver or the like to force the mouth open and then insert a towel or the like into the mouth.)

(7) Wipe off the mouth to prevent foaming mucus and saliva from accumulating.

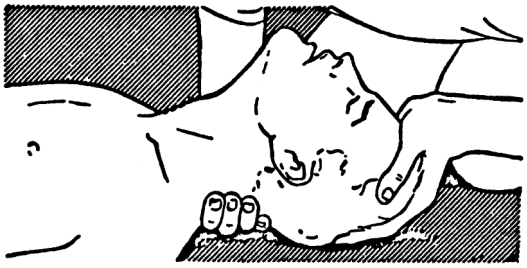
☆Treatment to Give When the Patient Has a Pulse Beating but Has Ceased to Breathe

＊Performing mouth-to-mouth artificial respiration - Fig. 1

(1) Bend the patient's face backward until it is directed to look back. (A pillow may be placed under the neck.)
(2) Pull up the lower jaw to open up the airway. (to spread the airway)
(3) Pinching the patient's nose, breathe deeply and blow your breath into the patient's mouth strongly, with care to close it completely. Then, move your mouth away and take a deep breath, and blow into his or her mouth. Repeat blowing at 10 to 15 times a minute (always with the patient's nostrils closed).
(4) Continue artificial respiration until natural respiration is restored.
(5) If the patient's mouth won't open easily, insert a pipe, such as one made of rubber or vinyl, into either nostril. Then, take a deep breath and blow into the nostril through the pipe, with the other nostril and the mouth completely closed.
(6) The patient may stand up abruptly upon recovering consciousness. Keep the patient lying calmly, giving him or her coffee, tea or any other hot drink (but not alcoholic drink) to keep him or her warm.

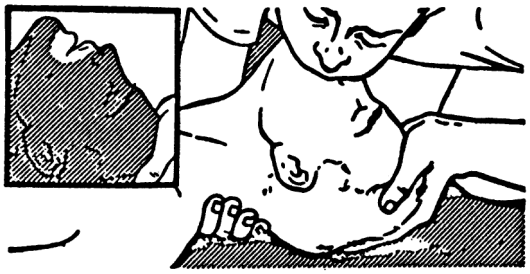
Mouth-to-mouth artificial respiration with the patient's head lifted

①



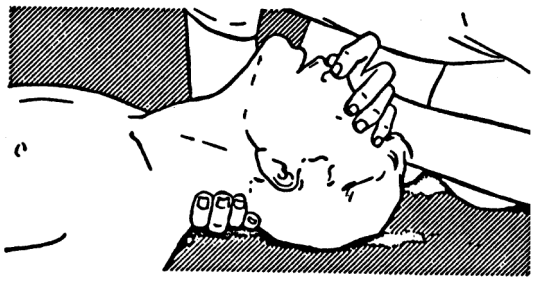
(1) Lift the back part of the patient's head. Support the forehead with one of your hand and the neck with the other hand.→①.
Many patients will have their airways opened by lifting their head in this way to ease mouth-to-mouth artificial respiration.

②



(2) Closing the patient's mouth with your mouth, press your cheek against the patient's nose→②
Alternatively, hold the patient's nose with your finger to prevent air leak → ③.

③



(3) Blowing air into the patient's lungs. Blow air into the patient's lungs until chest is seen to rise. The first 10 breaths must be blown as fast as possible.

Fig.1 Mouth-to-mouth artificial respiration

☆Treatment to Give When the Patient Has No Pulse Beating and Has Ceased to Breathe

＊Performing cardiac massage - Fig. 2

If the patient has no pulse beating, with the pupils open and no heartbeat being heard, the patient has a cardiac arrest and requires immediate artificial respiration. Continue this until a medical specialist arrives, and follow his or her directions after that.

(1) Putting one hand on about the lower one third of the patient's ribs and the other hand over the back of the first, with your elbow fully stretched (with bended elbow, you can't press to the extent the patient's ribs are depressed), apply your body weight to the hands to press the patient's body until it is depressed about 2 cm (Repeat this about 50 times a minute). (Cardiac massage.)

(2) If only one first-aide is available, perform a cardiac massage about 15 times and then give mouth-to-mouth artificial respiration 2 times. Repeat this sequence. If two first-aides are available, while one person performs a cardiac massage 15 times, and the other should give mouth-to-mouth artificial respiration 2 times. Repeat this sequence (combined cardiac massage and mouth-to-mouth artificial respiration method).

(3) Check the patient's pupils and feel the pulse from time to time. When the pupils are restored to normal and the pulse begins to beat regularly, stop treating and keep the patient calm while giving him or her coffee, tea or any other hot drink to keep him or her warm while watching him or her carefully.

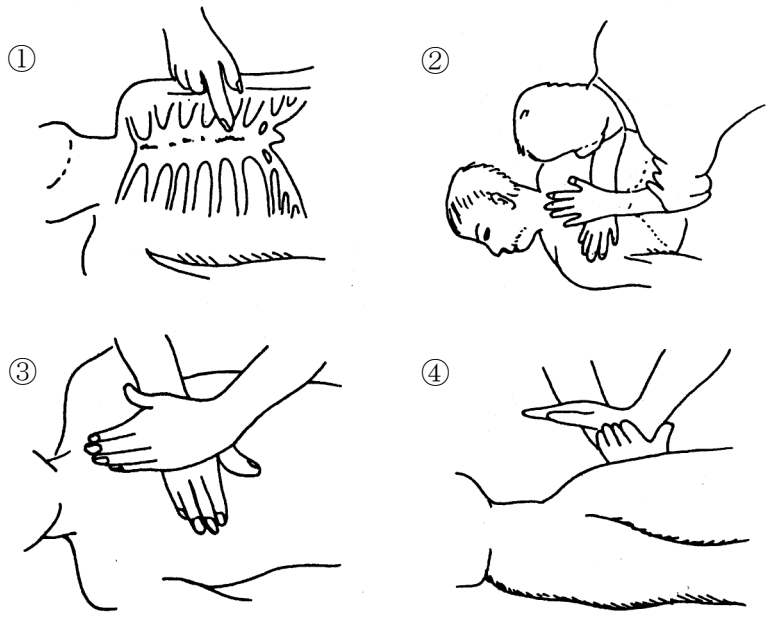


Fig.2 Cardiac massage

Preface

Thank you for purchasing the JRC JLN-652 Doppler Current Meter.

This unit has the following features;

- Maximum 50 layers sequential current measurement
- Wide measurement depth range (up to 100m from 2m under the hull)
- Advanced bottom tracking performance (max 250m)
- Multiple display modes available
- Flexible black box configuration for easy installation
- Enhanced interface built-in

- For the best operation and performance results, read this manual thoroughly before use.
- Keep this manual in a convenient place for future reference.
  Make use of this manual when experiencing operation difficulties.
- The information in this manual is subject to change without notice at any time.

●Before Operation●

Pictorial Indication

Various pictorial indications are included in this manual and are shown on this equipment so that you can operate them safely and correctly and prevent any danger to you and / or to other persons and any damage to your property during operation. Such indications and their meanings are as follows.
Please understand them before you read this manual:

⚠ DANGER	This indication is shown where any person is supposed to be imminent of danger to which the person owes the death or the serious injury if this indication is neglected and this equipment is not operated correctly.
⚠ WARNING	This indication is shown where any person is supposed to be in danger of being killed or seriously injured if this indication is neglected and this equipment is not operated correctly.
⚠ CAUTION	This indication is shown where any person is supposed to be injured or any property damage is supposed to occur if this indication is neglected and this equipment is not operated correctly.

Examples of pictorial indication

The △ mark represents CAUTION (including DANGER and WARNING). Detailed content of CAUTION (“Electric Shock” in the example on the Electric left.) is shown in the mark.

The ⃠ mark represents prohibition.
Detailed content of the prohibited action (“Disassembling Prohibited” in Disassembling the example on the left) is shown in the mark.

The ● mark represents instruction.
Detailed content of the instruction (“Disconnect the power plug” in the example on the left) is shown in the mark.

Warning label

There is a warning label on the top cover of the equipment.
Do not try to remove, break or modify the label.

●Precaution upon Equipment Operation●

⚠DANGER

Never attempt to check or repair the inside of the equipment.
Checking or repair by an unqualified person may cause a fire or an electric shock.
Contact our head office, or a nearby branch or local office to request servicing.

Electric shock prevention by high voltage unit

① There is a part where a high voltage is used, and maintain and check after turning off the power switch without fail when you check the inside.

② Wash the salinity of the hand and drop it when you check. Moreover, change it for the dry one when the work clothes and shoes, etc. have been wet.

③ It loudly informs everyone of it without panicking, and there must be danger that I also get an electric shock when touching directly, and the power switch must be cut or it begins must to help by cutting the board, and it must revive afterwards when you discover the person who got an electric shock by any chance by artificial respiration and a general technique.

⚠WARNING

Do not place a glass or cup containing water, etc., or a small metal object on this equipment.
If water or such object gets inside, a fire, an electric shock, or a malfunction may occur.

Do not operate pulling out the power plug or do not switch by a wet hand.
It may cause the electric shock.

Do not damage, and process the power cable. A heavy thing is put, heated, pulled or is bended strongly, and moreover, the power cable may be damaged, and it may cause a fire and the electric shock.

Neither installation of the transducer nor maintain it on the water.
It may cause the underwater fall and the flood.

In case water or a metal object gets inside the equipment, turn off the power immediately, unplug the power supply cable from an electric outlet, and contact our head office, or a nearby branch or local office to request servicing.
Keeping the equipment in operation under such condition may cause a fire, an electric shock or a malfunction.

⚠WARNING

In case you find smoke, strange smell or unusual heat coming from the equipment, turn off the power immediately, unplug the power supply cable from an electric outlet, and contact our head office, or a nearby branch or local office to request servicing.
Keeping the equipment in operation under such condition may cause a fire or an electric shock.

⚠CAUTION

Caution of installation location

① Avoid the use of this device in the place where direct sunshine strikes into the equipment for a long time and the temperature become 50℃ or more.

② Do not put this device on an unstable place like on the shaking stand and the inclining place, etc. The device might fall, topple, and it may cause the injury and the breakdown.

③ Avoid use in a place where the spindrift is hit directly and a humid place.

④ Do not put this coolant condition device into the high temperature room suddenly. The high voltage might cause the leak doing and the breakdown by the dewfall. Use it after leaving about 30 minutes for this case.

Caution of a ship bottom and equipment check

① Connect the ground lead with the ground terminal surely at the installation. When breaking down and leaking electricity, it might cause the electric shock.

② Remove the power cable correctly. The code might be damaged when power cable is forcibly pulled, and it may cause a fire and the electric shock.

③ Do not turn on the power supply of this device when the ship goes up to the land (like dry dock). It might cause the transducer etc. to break.

④ Turn OFF the power switch of this device without fail for safety, and remove the power cable when you do not use it for a long time. It might cause a fire.

⑤ Do not strongly wipe with a dry cloth when you clean the screen. Moreover, do not use gasoline nor thinner, etc. It may cause to hurt the surface of the screen.

Work by two people or more when you exchange LCD. It might be dropped when exchanging alone and it may cause the injury.

Externals of Equipment

NWZ-164 LCD Monitor and NCH-603E Key Board

NJC-28/30 Signal Processor

CFT-068B/067B Transducer

Glossary

Tidal current direction:	Direction of the current flow. "It flows and leave" direction is indicated usually.
North up bearing:	Bearing displayed with true north at the top of the display.
Head up bearing:	Bearing displayed with bow at the top of the display.
A, B, C, D and E layers:	Five depths at which speeds and other information are measured. Transducer beams are transmitted in four directions; port ahead, starboard ahead, port astern and starboard astern.

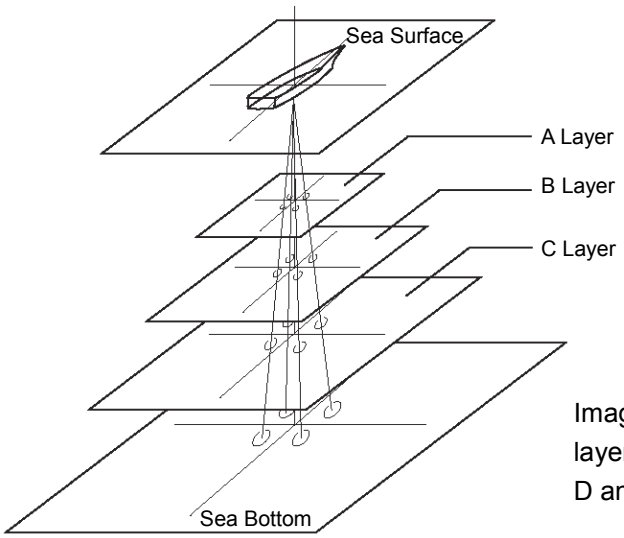


Image figures when three layers (A, B, and C layer) are measured.
D and E layer join further for five layers.

Absolute tidal current:	Direction and a speed of the tidal current to the sea bottom (ground).
Relative tidal current:	Direction and a speed of the current in A layer and B layer when based on the tidal current in E layer. Further is made a standard layer of drum either in not E layer but the A-D layer according to the setting.
Bottom tracking mode:	The direction and the speed at the sea bottom against are measured in bottom tracking mode. When measuring it in the bottom tracking mode, it is displayed on the current measurement screen, "B・T". It automatically changes into the water tracking mode when it becomes impossible to pursue because the sea bottom became deep.
Water tracking mode:	The direction and the speed to the set E layer (It is possible to set it also in the A-D layer) are measured in the water tracking mode. When measuring it in the water tracking mode, it is displayed on the current measurement screen, "W・T".
Trip:	It is a distance sailed from a certain point to the present place. When zero resets are executed pushing "Reset" key in this device, the starting point of trip is set.
Timer:	It is a distance that passes from a certain point to the present place. The timer starts when zero resets are executed pushing "Reset" key in this device.

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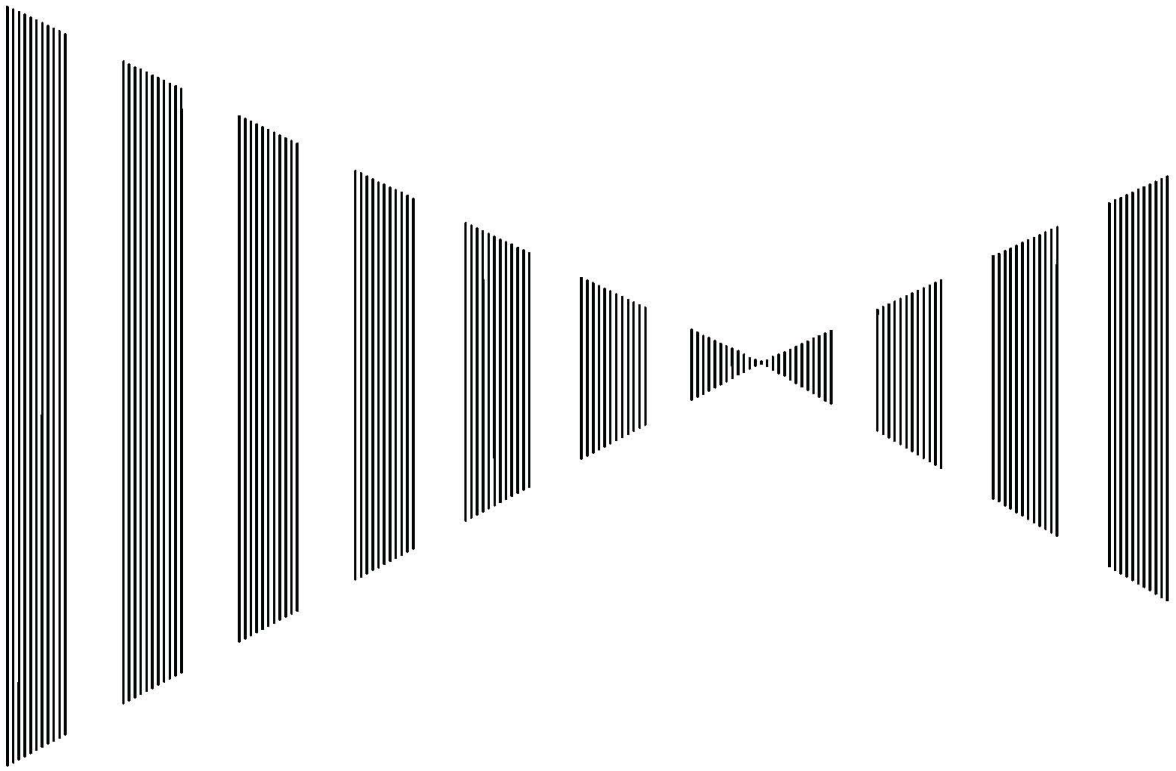
1. Overview



1.1 Function

The JRC JLN-650/652 is a Doppler Current Meter that transmits the supersonic wave from the transducer equipped with the ship bottom to the sea bottom, measures information necessary for operation such as a absolute tidal current, a relative tidal current, bottom tracking ship speed, and water tracking ship speed from the signal reflected by the sea bottom or the plankton in the sea etc. , and displays it in high resolution color LCD.

1.1.1 Function of This System

The JLN-650/652 displays a fish finder image in four direction: port ahead, starboard ahead, port astern and starboard astern at the same time, besides information necessary for fishing operation like a absolute tidal current, a relative tidal current, bottom tracking ship speed, and water tracking ship speed is displayed at the same time. In addition, the water temperature graph and the wind direction speed of the wind graph can be displayed from the input of the water temperature data and the wind direction speed of the wind data from the outside.

The current screen displays at the same time for the ship course and the direction/speed of the current in five layers that sets depth beforehand.
The depth setting of the each level can be set within the range of 2-500m(*1). As for the current display, the speed display is switched to a numeric display and the echo graph display.

The ship speed screen displays the trip distance and the ship course except the numerical value display and the graphical display, and it has the function as ship speed meter.

The shoal of fish screen displays the shoal of fish image in four directions on division into four, division into two, and one screen. The JLN-650/652 displays the same image as a usual fish finder can be displayed in sensitivity and the bubble cancellation with the knob.

The graph screen displays the change for the current direction and speed of the current in five layers, and depth, ship speed, water temperature and wind speed in the graph.

The track plot screen displays the current speed of the current in five layers on the own track in the vector.

The profile screen in real time displays the current in 100(JLN-650)/50(JLN-652) layers or less in the graph. There are a line graph and an ellipse graph display in the profile screen, and in the ellipse graph display, the flow speed of the current in 100(JLN-650)/50(JLN-652) layers is confirmed and can the twist and swinging of the current can visually be confirmed by displaying the vector on the ellipse.

*1: The depth that can be measured is different according to the oceanographic condition, and maximum depth is about 160(JLN-650)/100(JLN-652)m for this device.

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1.2 Features

Clear Image by a High Resolution

・An exact and vivid image is displayed by adopting the LCD indicator of the ultra-high-density 15 inches.
Important data was displayed by a big character, and made a screen to see easily more.

Easy Operation

・The key to the minimum requirement is arranged in the operation panel, and a usual operation can be used only by pushing the change key to the screen.
・A usual setting can be done by comprehensible "Selection frame menu screen". Moreover, it is possible to return to former set screen for one key operation after the setting ends with the menu panel.

Function of Shoal of Fish Image in Four Directions

・This device can display the shoal of fish image in four directions of port ahead/astern and starboard ahead/astern in the direction of the prow at the same time. Because a wide-ranging search can be done compared with the fish finder that searches only for the right under of the ship, the movement of the shoal of fish and the judgment of the inclination of bottom of the sea etc. can be facilitated.

Function of Graph Display of Current, Depth, Ship Speed, Water Temperature, and Wind Speed

・The history situation can be displayed in the graph for 24 hours or less. The change in the current, depth, ship speed, the water temperature, and the wind speed by the passage of time can be easily confirmed. The data input from the water temperature meter and the wind direction/anemometer separately is needed for the display of the water temperature and the wind speed.
・A detailed value on the graph can display the search with the cursor.

Function of Current and Track Plot Display

・The direction and the current speed of the current in five layers can be displayed on the own track. To display the own track in latitude/longitude, the input of the positional data such as GPS is separately needed.
・Either of the display colors of the own track of five layers can be displayed by the color corresponding to reflection strength of one layer.

Function of Profile Display

・The current in 100(JLN-650)/50(JLN-652) layers or less is in real time displayed in the graph. In the ellipse graph display, the current speed of the current in 100(JLN-650)/50(JLN-652) layers is confirmed and can the twist and swinging of the current can visually be confirmed by displaying the vector on the ellipse.

1.3 Composition

The composition unit and option unit are shown in the following tables;

Composition unit

JLN-650

Description	Model Name	Q'ty	Remarks
LCD Monitor	NWZ-164	1	15-inch LCD Signal Cable 5m include Power Cable 5m include
Signal Processor	NJC-28	1	
Keyboard	NCH-603E	1	Cable 5m
Transducer JLN-650	NKF-774	1	Cable 25m Stuffing Tube MPJD30076 Transducer CFT-068B
Spare Parts	7ZXNA3002	1	Fuse：4 Piece
Instruction Manual	7ZPNA3204C	1	English version

Option unit

Description	Model Name	Q'ty	Remarks
Transducer JLN-650	NKF-775	1	Tank for Iron Bottom Cable 25m Stuffing Tube MPJD30076 Transducer CFT-068B
Stuffing Tube	MPJD30078	1	for Wooden or FRP ship
Stand	MPBX42944	1	For 15-inch LCD Monitor
Sunvisor	MPOL30369	1	For 15-inch LCD Monitor
Junction Box	NQD-2438	1	For extension Transducer cable
Keyboard extension cable	CFQ-6999	1	NCH-603 Keyboard extention cable 10m
10.4-inchi LCD Monitor	NWZ-211	1	Signal Cable 5m include Power Cable 5m include

JLN-652

Description	Model Name	Q'ty	Remarks
LCD Monitor	NWZ-164	1	15-inch LCD Signal Cable 5m include Power Cable 5m include
Signal Processor	NJC-30	1	
Keyboard	NCH-603E	1	Cable 5m
Transducer JLN-652	NKF-779	1	Cable 25m Stuffing Tube MPJD30076 Transducer CFT-067B
Spare Parts	7ZXNA3002	1	Fuse：4 Piece
Instruction Manual	7ZPNA3204C	1	English version

Option unit

Description	Model Name	Q'ty	Remarks
Transducer JLN-652	NKF-780	1	Tank for Iron Bottom Cable 25m Stuffing Tube MPJD30076 Transducer CFT-067B
Stuffing Tube	MPJD30078	1	for Wooden or FRP ship
Stand	MPBX42944	1	For 15-inch LCD Monitor
Sunvisor	MPOL30369	1	For 15-inch LCD Monitor
Matching Box	NQD-2422	1	For CFT-067
Junction Box	NQD-2438	1	For extension Transducer cable
Rectifier	NBA-5111	1	AC Power Supply
Keyboard extension cable	CFQ-6999	1	NCH-603 Keyboard extention cable 10m
10.4-inchi LCD Monitor	NWZ-211	1	Signal Cable 5m include Power Cable 5m include

1.4 Construction

The outline drawing of the unit is shown in below;

Model Name	Description			Remarks
NWZ-164	LCD Monitor	Outline ·····	Fig. 1.4-1	
NCH-603E	Keyboard	Outline ·····	Fig. 1.4-2	
NJC-28/30	Signal Processor	Outline ·····	Fig. 1.4-3	
NKF-774	Transducer	Outline ·····	Fig. 1.4-4-1	Transducer / Stuffing Tube
NKF-779		·····	Fig. 1.4-4-2	
NKF-775	Transducer	Outline ·····	Fig. 1.4-5-1	Tank for Iron Bottom : 1 Piece
NKF-780		·····	Fig. 1.4-5-2	

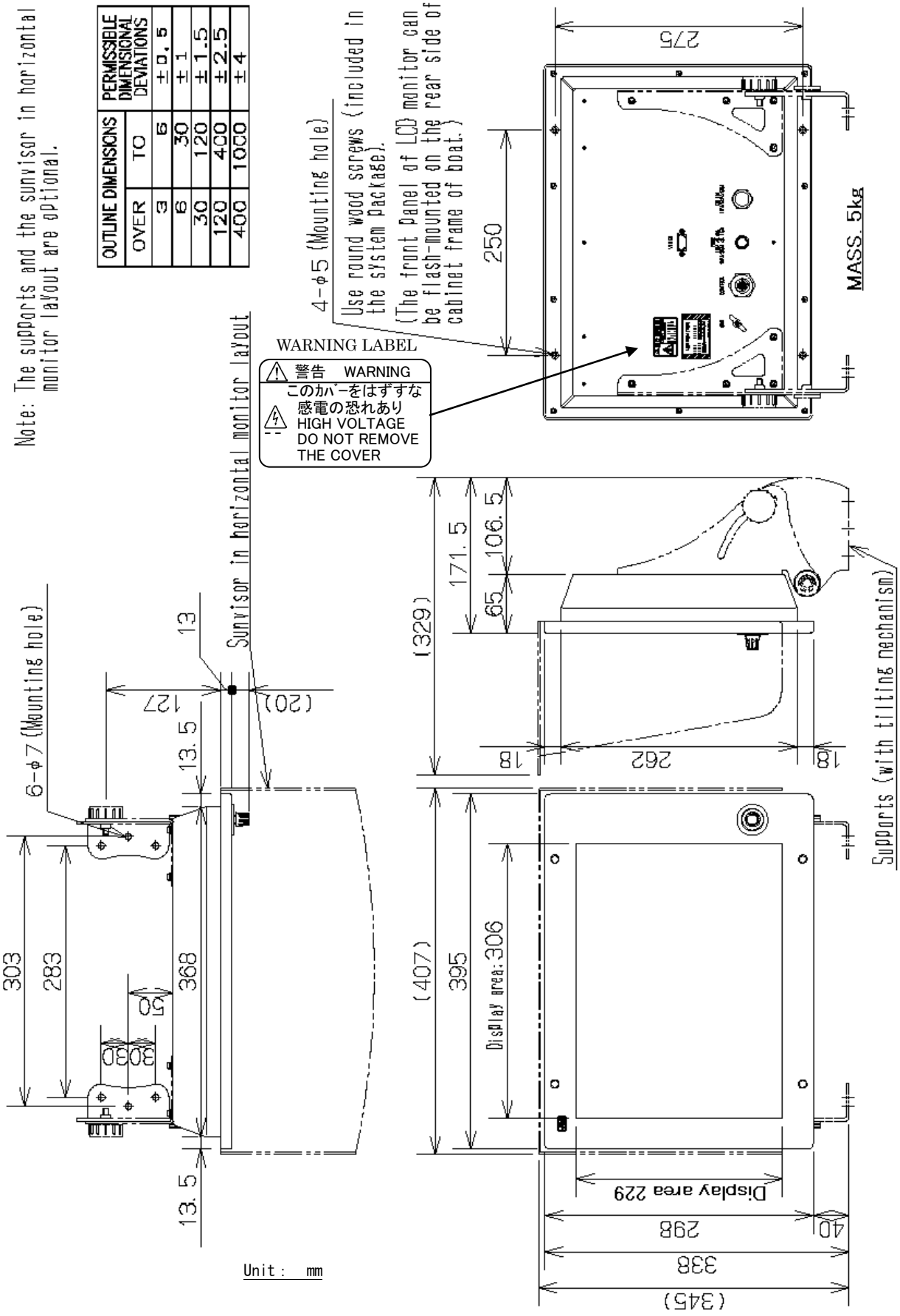


Fig.1.4-1 NWZ-164 LCD Monitor Outline

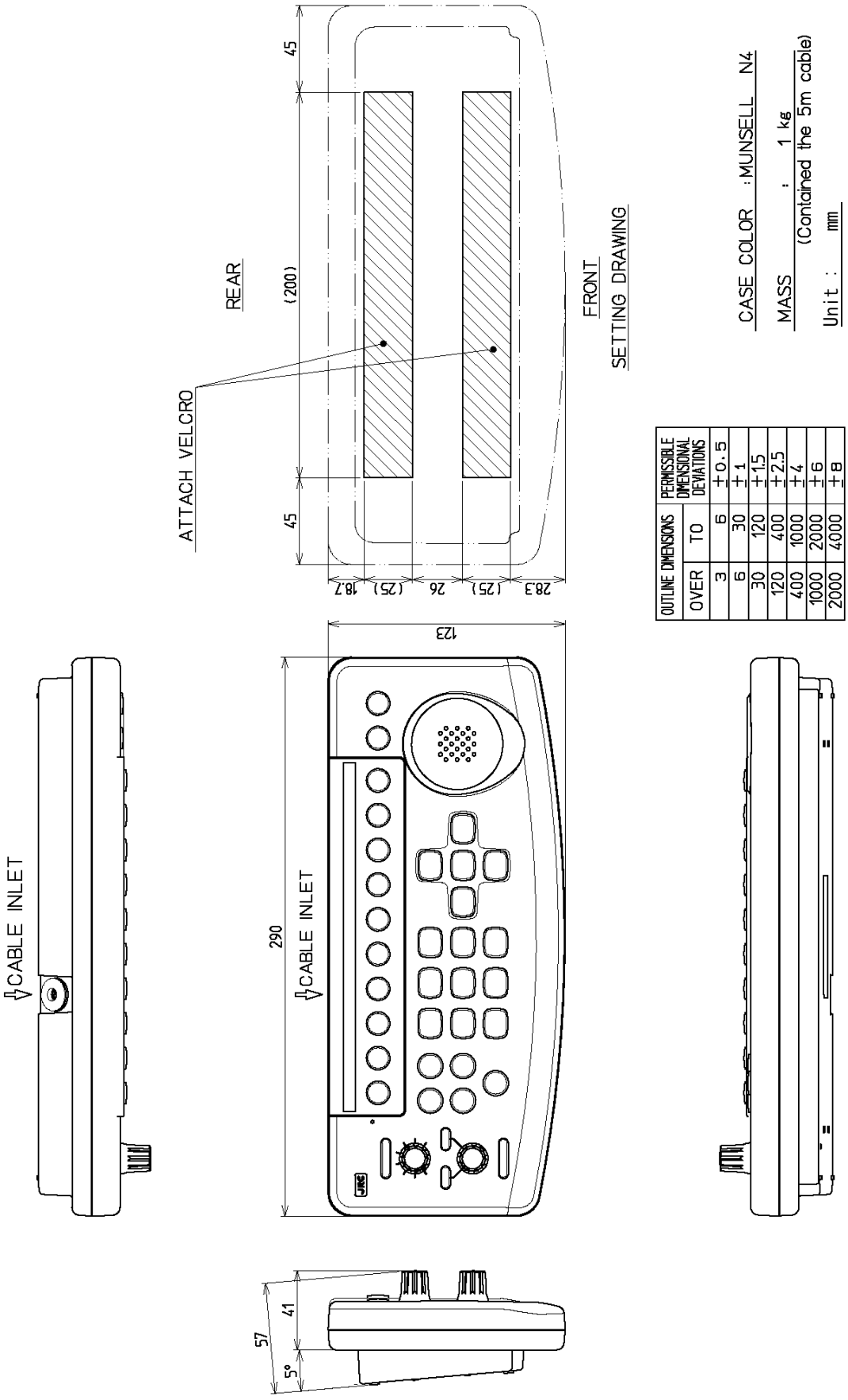
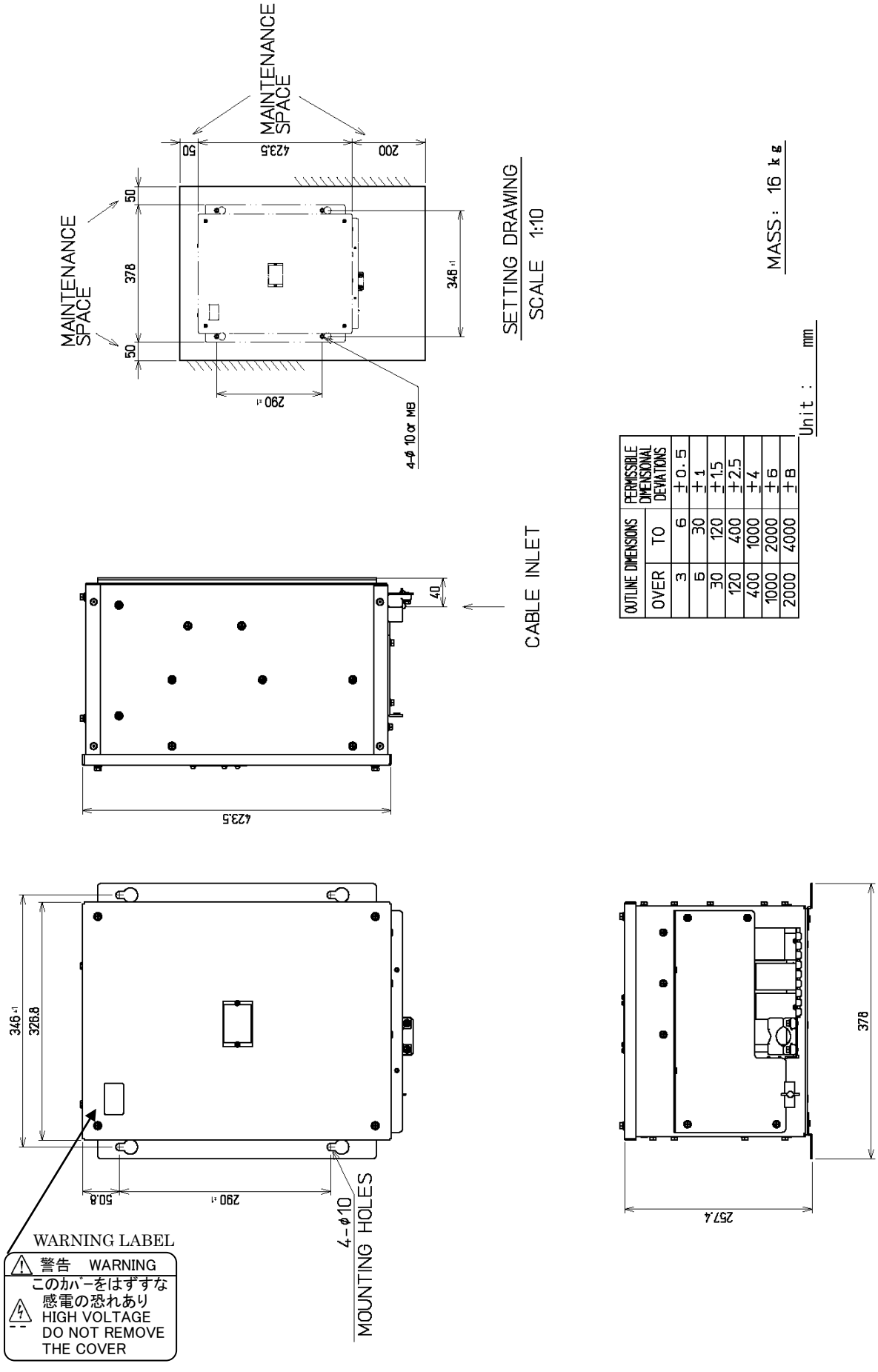
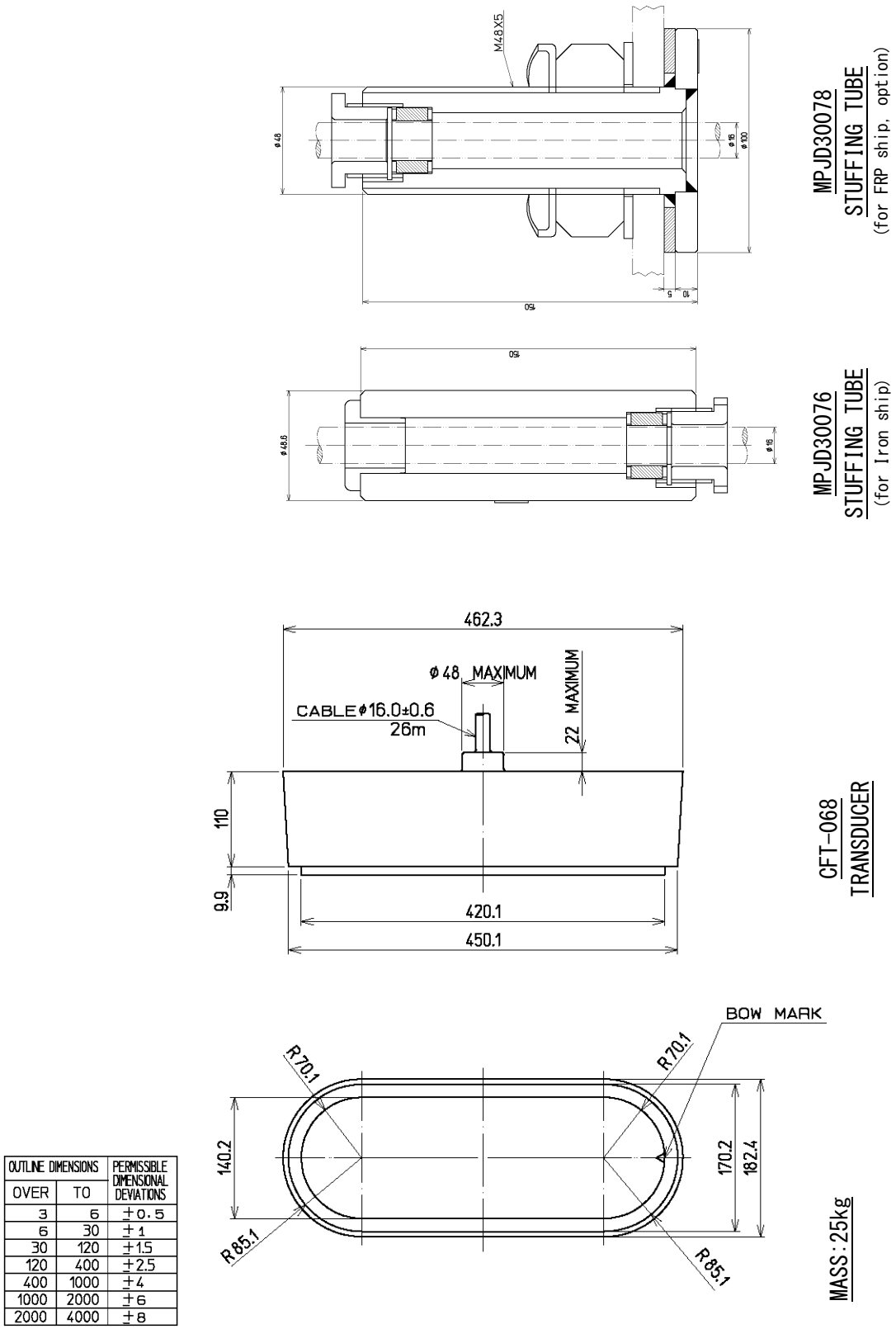


Fig. 1.4-2 NCH-603E Keyboard Outline



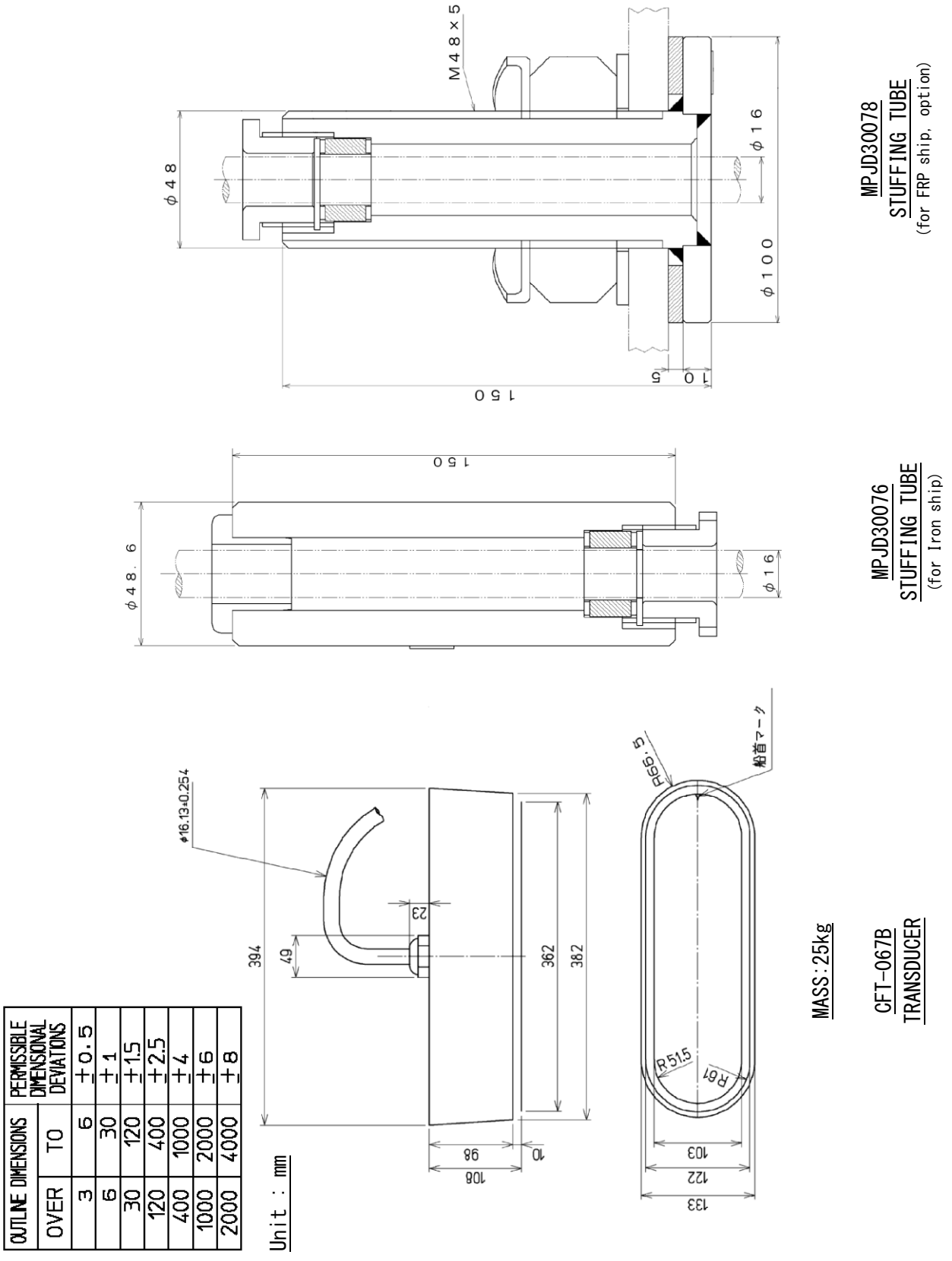
OUTLINE DIMENSIONS		PERMISSIBLE DIMENSIONAL DEVIATIONS
OVER	TO	
3	6	±0.5
6	30	±1
30	120	±1.5
120	400	±2.5
400	1000	±4
1000	2000	±6
2000	4000	±8

Fig. 1.4-3 NJC-28/30 Signal Processor Outline



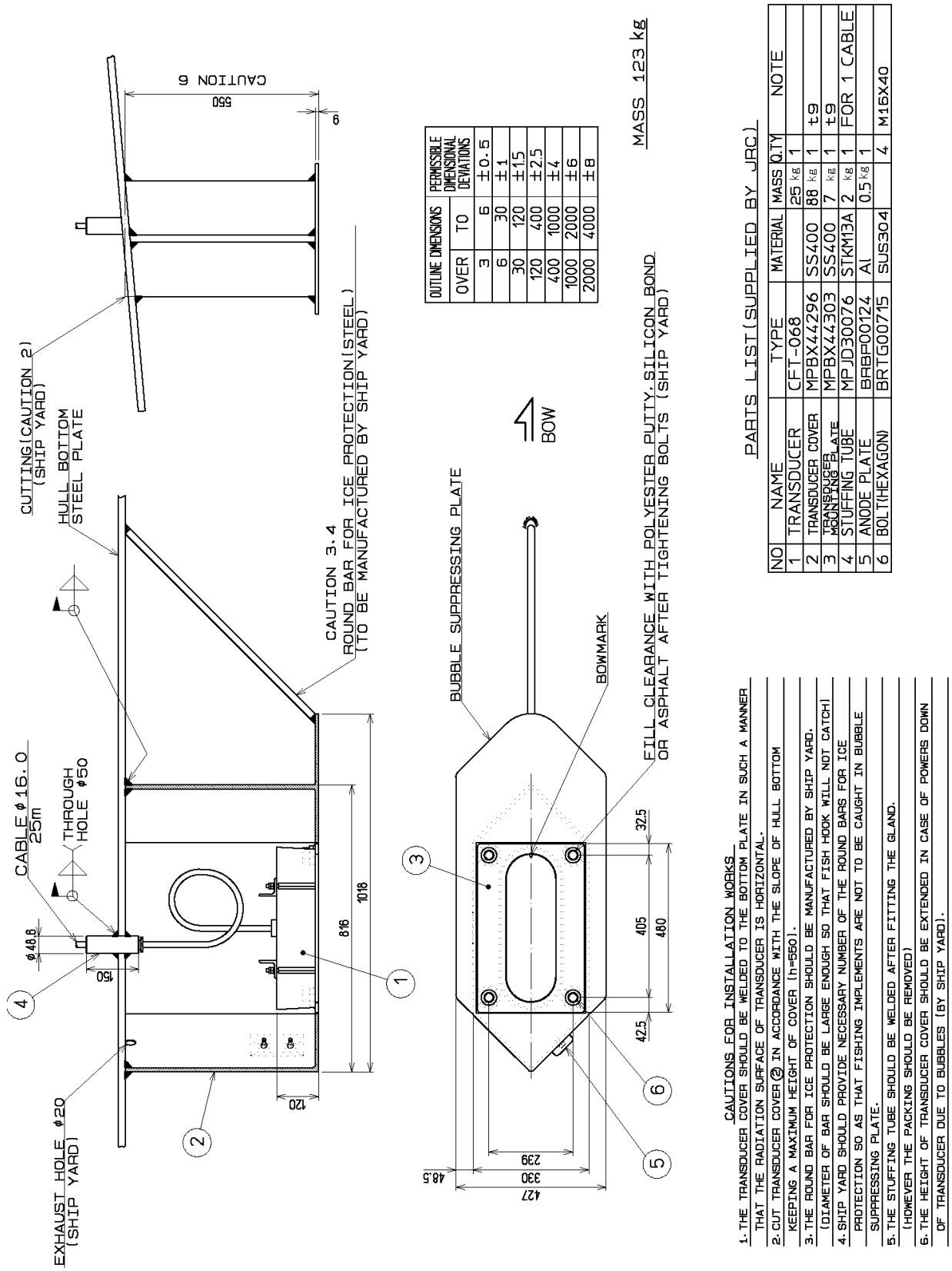
OUTLINE DIMENSIONS		PERMISSIBLE DIMENSIONAL DEVIATIONS
OVER	TO	
3	6	±0.5
6	30	±1
30	120	±1.5
120	400	±2.5
400	1000	±4
1000	2000	±6
2000	4000	±8

Fig. 1.4-4-1 NKF-774 Transducer with Stuffing Tube



OUTLINE DIMENSIONS		PERMISSIBLE DIMENSIONAL DEVIATIONS
OVER	TO	
3	6	±0.5
6	30	±1
30	120	±1.5
120	400	±2.5
400	1000	±4
1000	2000	±6
2000	4000	±8

Fig. 1.4-4-2 NKF-779 Transducer with Stuffing Tube



OUTLINE DIMENSIONS OVER	TO	PERMISSIBLE DIMENSIONAL DEVIATIONS
3	6	±0.5
6	30	±1
30	120	±1.5
120	400	±2.5
400	1000	±4
1000	2000	±6
2000	4000	±8

PARTS LIST(SUPPLIED BY JRC)

NO	NAME	TYPE	MATERIAL	MASS	Q'TY	NOTE
1	TRANSDUCER	CFT-068		25 kg	1	
2	TRANSDUCER COVER	MPBX44296	SS400	88 kg	1	t9
3	TRANSDUCER MOUNTING PLATE	MPBX44303	SS400	7 kg	1	t9
4	STUFFING TUBE	MPJD30076	STKM13A	2 kg	1	FOR 1 CABLE
5	ANODE PLATE	BRBP00124	Al	0.5 kg	1	
6	BOLT(HEXAGON)	BRTG00715	SUS304		4	M16X40

CAUTIONS FOR INSTALLATION WORKS

1. THE TRANSDUCER COVER SHOULD BE WELDED TO THE BOTTOM PLATE IN SUCH A MANNER THAT THE RADIATION SURFACE OF TRANSDUCER IS HORIZONTAL.
2. CUT TRANSDUCER COVER (2) IN ACCORDANCE WITH THE SLOPE OF HULL BOTTOM KEEPING A MAXIMUM HEIGHT OF COVER (h=550).
3. THE ROUND BAR FOR ICE PROTECTION SHOULD BE MANUFACTURED BY SHIP YARD. (DIAMETER OF BAR SHOULD BE LARGE ENOUGH SO THAT FISH HOOK WILL NOT CATCH)
4. SHIP YARD SHOULD PROVIDE NECESSARY NUMBER OF THE ROUND BARS FOR ICE PROTECTION SO AS THAT FISHING IMPLEMENTS ARE NOT TO BE CAUGHT IN BUBBLE SUPPRESSING PLATE.
5. THE STUFFING TUBE SHOULD BE WELDED AFTER FITTING THE GLAND. (HOWEVER THE PACKING SHOULD BE REMOVED)
6. THE HEIGHT OF TRANSDUCER COVER SHOULD BE EXTENDED IN CASE OF POWERS DOWN OF TRANSDUCER DUE TO BUBBLES (BY SHIP YARD).

Fig. 1.4-5-1 NKF-775 Transducer Outline

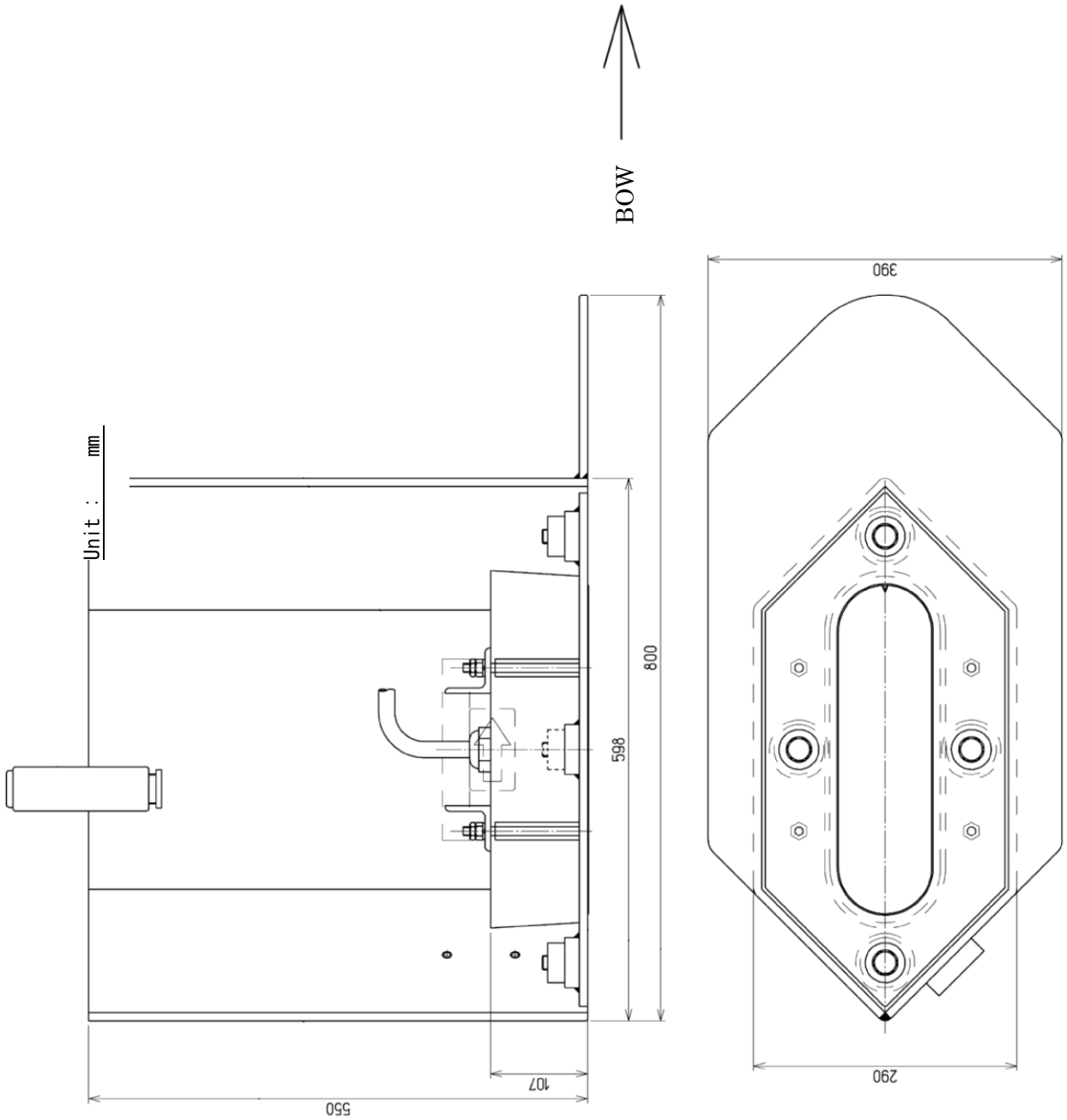


Fig. 1.4-5-2 NKF-780 Transducer Outline

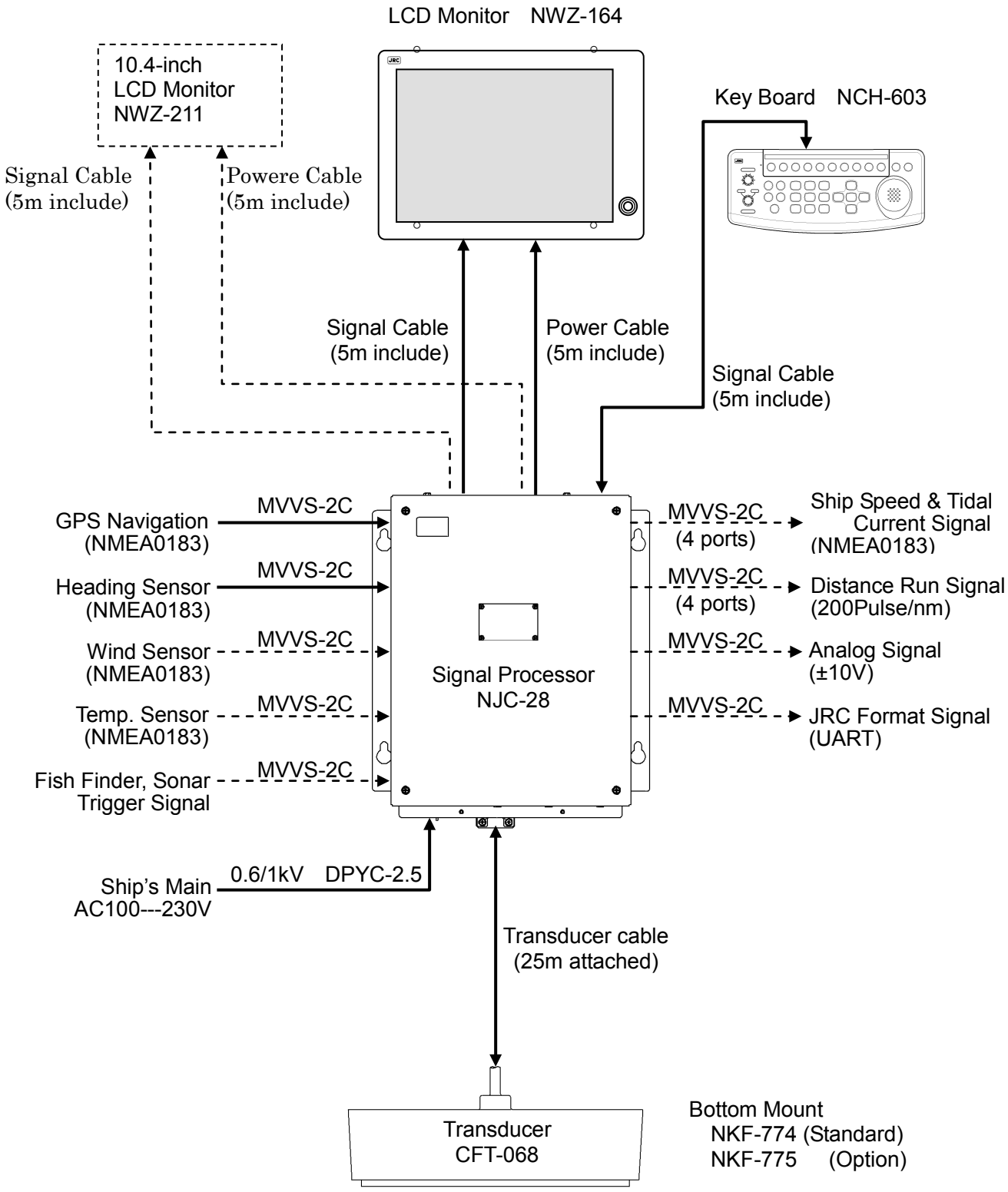


Fig. 1.5-1 JLN-650Doppler Current Meter System Configuration

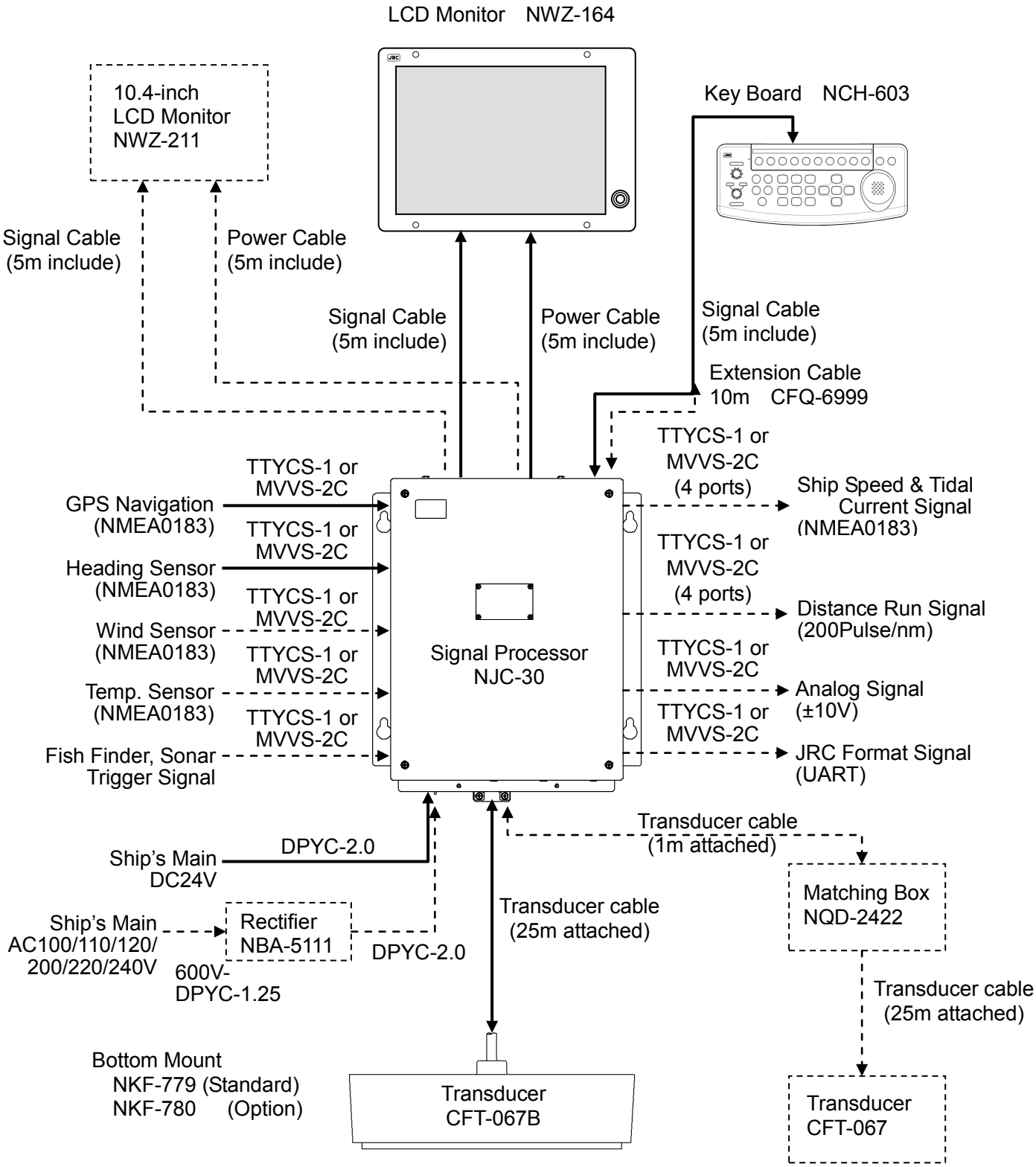
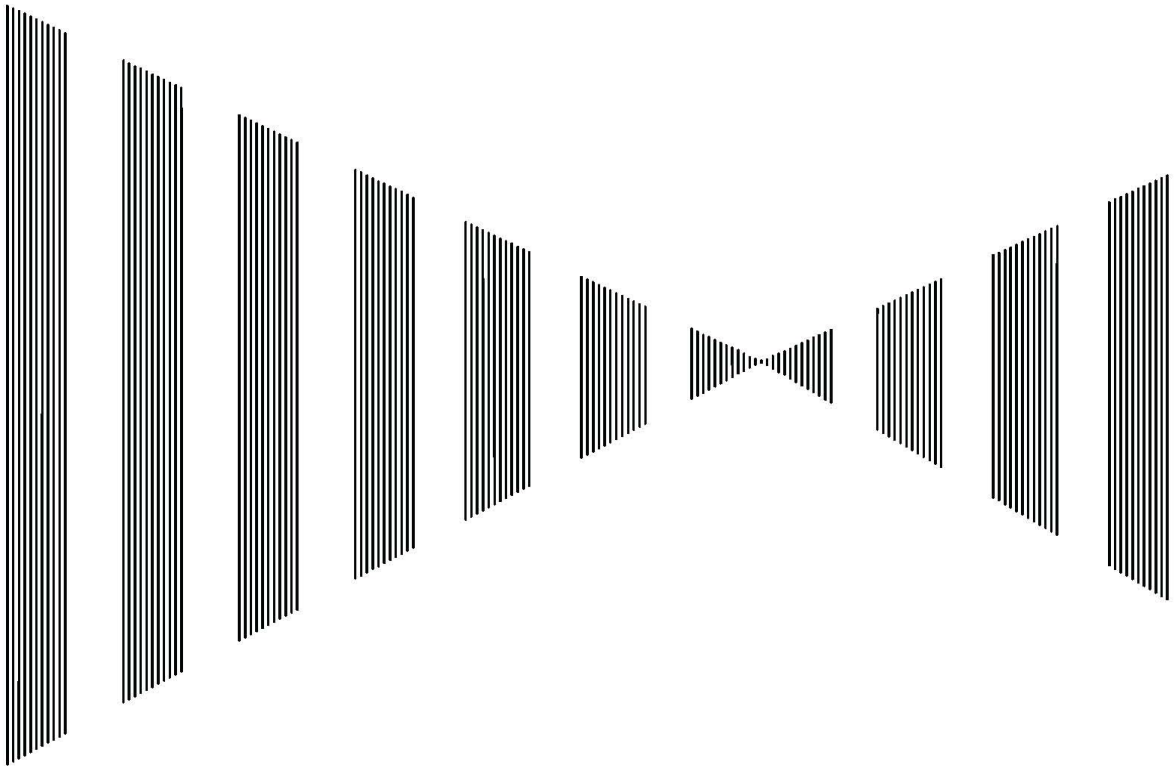


Fig. 1.5-2 JLN-652 Doppler Current Meter System Configuration

2. Name and Functions



2.1 Name and Functions of Keyboard

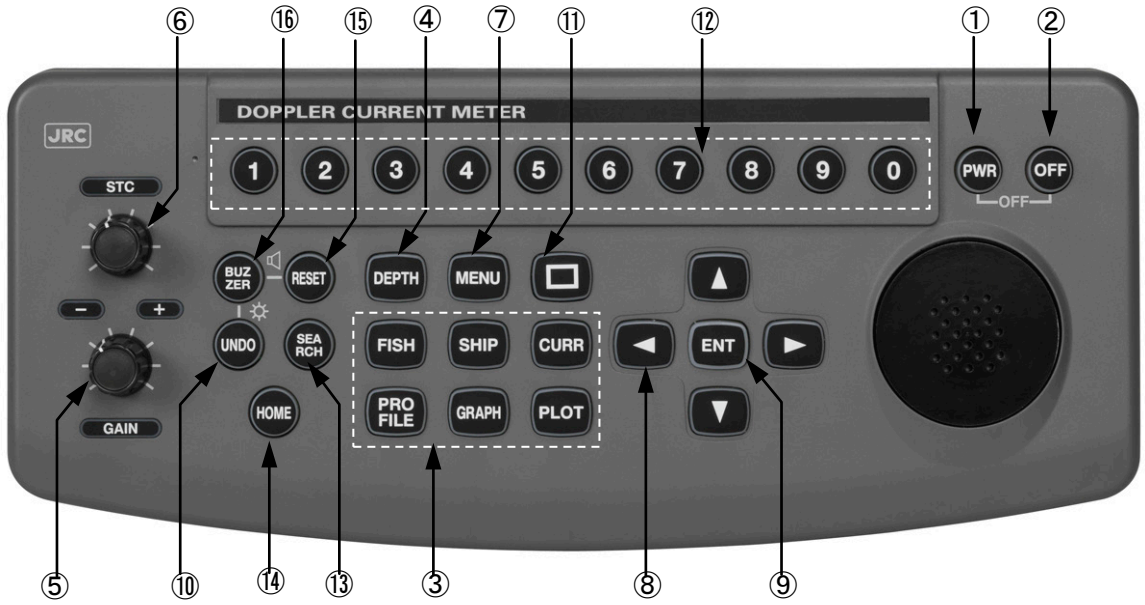


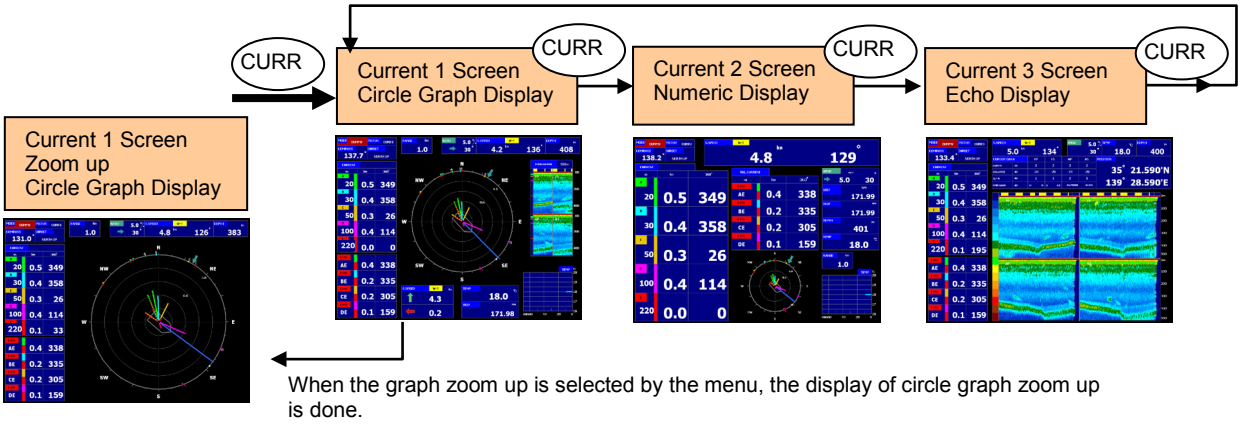
Fig. 2. 1－1 Keyboard / STC and GAIN Knob for Fish Finder

No.	Name	Function
①	PWR	The power supply of this device is turned on.
②	OFF	The power supply of this device is turned off simultaneously with the [PWR] key pushing.
③	FISH, SHIP, CURR PROFILE, GRAPH, PLOT	It switches to each screen of [FISH], [SHIP], [CURR], [PROFILE], [GRAPH], [PLOT].
④	DEPTH	The depth of the current to be measured is set.
⑤	GAIN	The receiving sensitivity is adjusted on the [FISH] display.
⑥	STC	The noise elimination under surface of the water level is adjusted on the [FISH] display. Adjusting the average time on the 「current] display.
⑦	MENU	The menu necessary for the screen setting is displayed.
⑧	CURSOR	An item and a set value are selected with the menu display.
⑨	ENT	An item and a set value that are selected with the [MENU] display were fixed and executed.
⑩	UNDO	The set value that is fixed and executed with the [MENU] display is returned to former setting.
⑪	□（Selection frame key）	The square frame of the displayed data and graph on each screen is displayed. The menu that corresponds with the menu key is displayed.
⑫	NUMERICAL VALUE	A numeric is input, and the depth range on the [FISH] screen is switched.
⑬	SEARCH	In the bottom tracking measurement mode, it compulsorily searches for the sea bottom.
⑭	HOME	The ship is moved to the center part on the latitude longitude display on the [PLOT] display.
⑮	RESET	The starting point of section sailing distance (trip) timer is set.
⑯	BUZZER	The buzzer when alarm is generated is stopped.
⑮ ⑯	RESET･BUZZER	The buzzer volume: It sets with 0-3 of a numeric key while pushing both keys at the same time.
⑩ ⑯	UNDO･BUZZER	The key lighting: It sets with 0-3 of the numeric keys while pushing both keys at the same time.

2.2 Display and Name of Screen

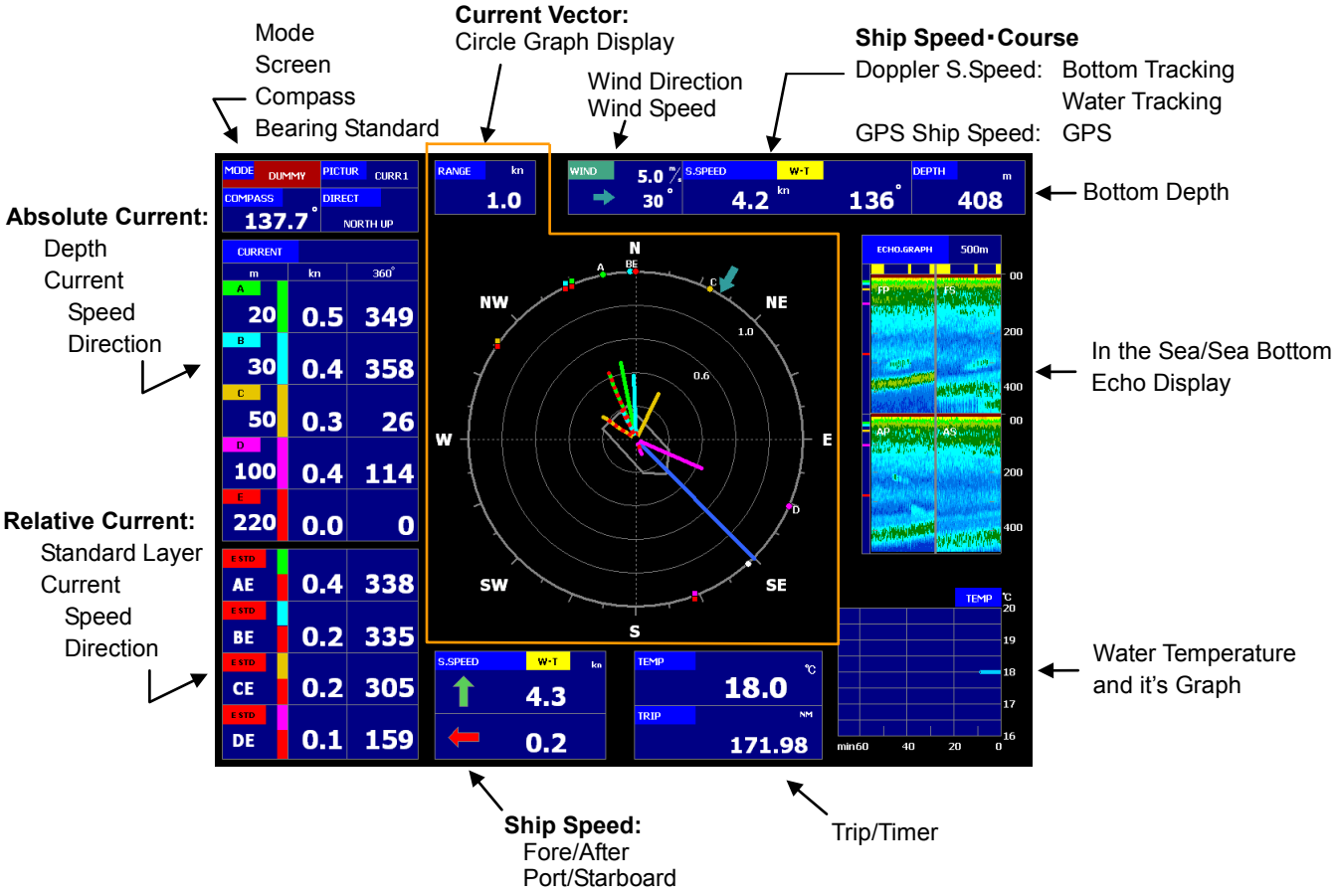
2.2.1 Tidal Current Display

The current screen mainly displays current direction and speed for the subculture of the current in five layers under the surface of the water, the ship speed and the course.
The current screen is displayed with the [CURR] key. There are three screens [current 1(circle graph display), current 2(numeric display), and current 3(echo display)], and the screen changes into the current screen whenever the [CURR] key is pushed.

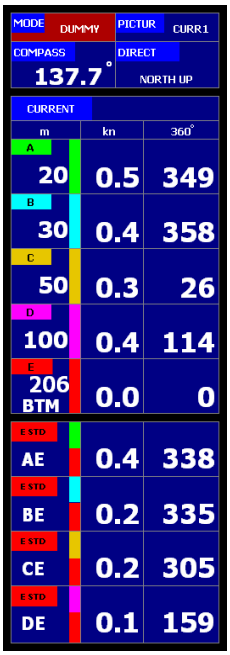


When the graph zoom up is selected by the menu, the display of circle graph zoom up is done.

1) Current 1 screen (circle graph display): Example of display



Left part of the screen



Mode : Usually, set measurement (for current measurement) *101
Screen : Select from current 1/current 2/current 3.
Compass : Displaying head up bearing *102
Bearing Standard:
The bearing standard of the current and the ship speed vector is set and displayed. *103
Direction standard: Select from North up bearing/Head up bearing
・Selecting frame menu display: 12.1.2-(1)

Abusolute Current:
Current Direction/Speed and Depth:
The abusolute current speed and direction in five layers (A-E) display. *104
When E layer is set to BTM, present pursuit depth is displayed.
:4.2.3, 6.2.1
・Selecting frame menu display: 12.1.2-(2)

Relative Current:
Current Direction/Speed and Standard Layer:
It is Excluded the standard layer of drum of A-E layers, the relative current speed and direction in four remainder layers display. *105
・Selecting frame menu display: 12.1.2-(2)

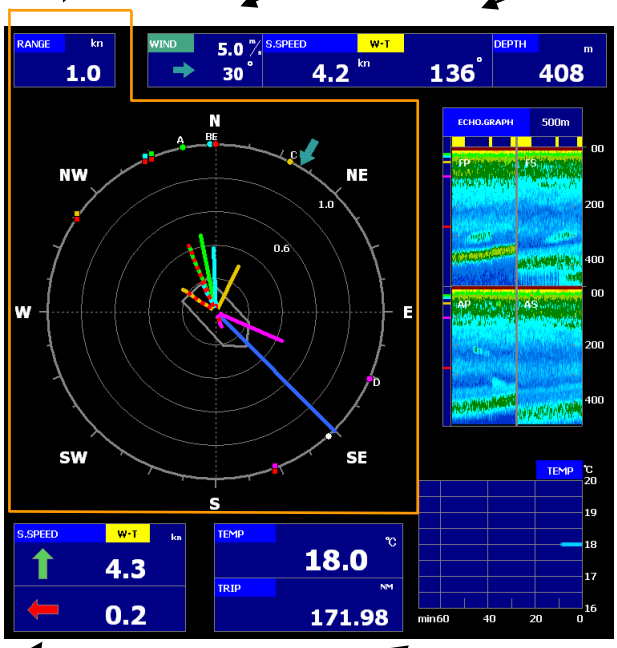
2

Right part of the screen

Current vector display:
The current circle graph displays direction/speed of the A-E layer by the direction and the length of the vector. *106
・Selecting frame menu display: 12.1.2-(3)

Wind Direction
Wind Speed:
It displays wind direction and wind speed. *111
・Selecting frame menu display: 12.1.2-(16)

Ship Speed・Course:
The ship speed and course are displayed.
Doppler:
The bottom tracking or water tracking ship speed measured with the current meter is displayed.
GPS:
The ship speed from the navigation equipment such as GPS is displayed. *110
・Selecting frame menu display: 12.1.2-(10)



Depth:
The sea bottom depth is displayed. *109
・Selecting frame menu display: 12.1.2-(9)

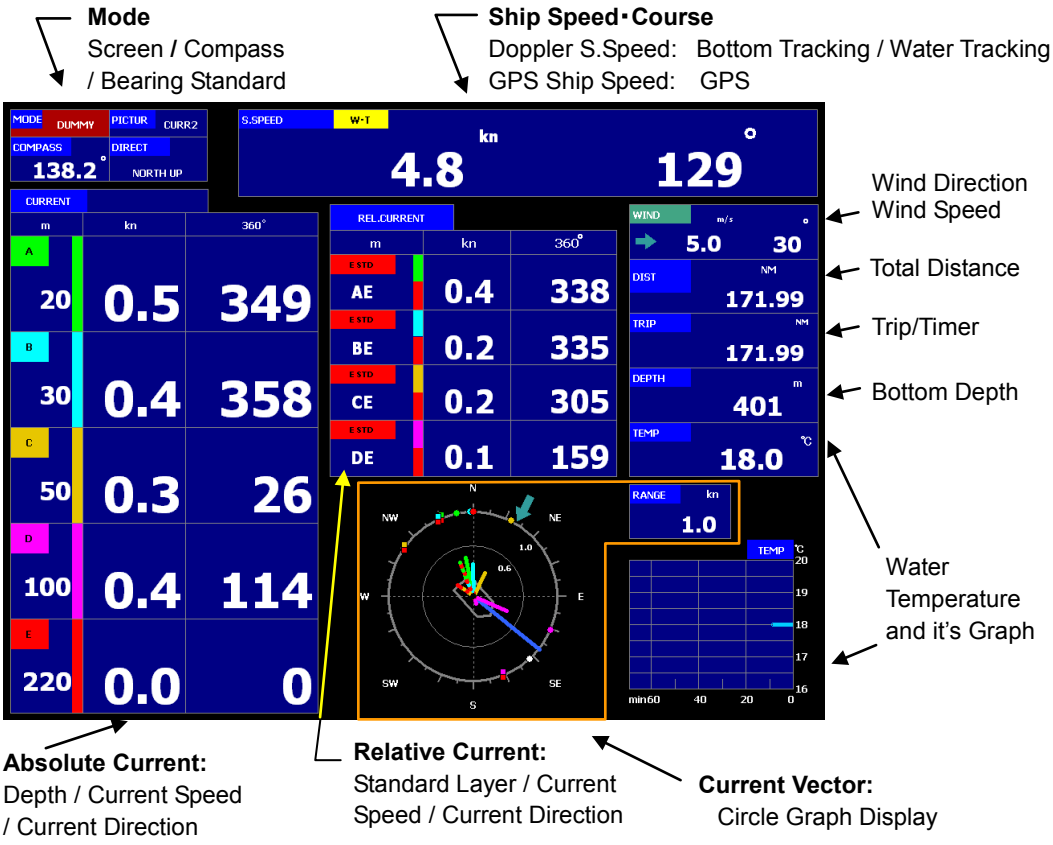
Echo Display:
Echoes each four directions received in the current measurement mode are displayed. *112
・Selecting frame menu display: 12.1.2-(8)

Water Temperature and it's Graph:
A present water temperature is displayed, and the history of water temperature is displayed in the graph. *108
・Selecting frame menu display: 12.1.2-(7)

Fore/After・Port/Starboad Ship Speed:
The speed of the ship is displayed based on the prow dividing into two (fore/after and port/starboard).
・Selecting frame menu display: 12.1.2-(5)

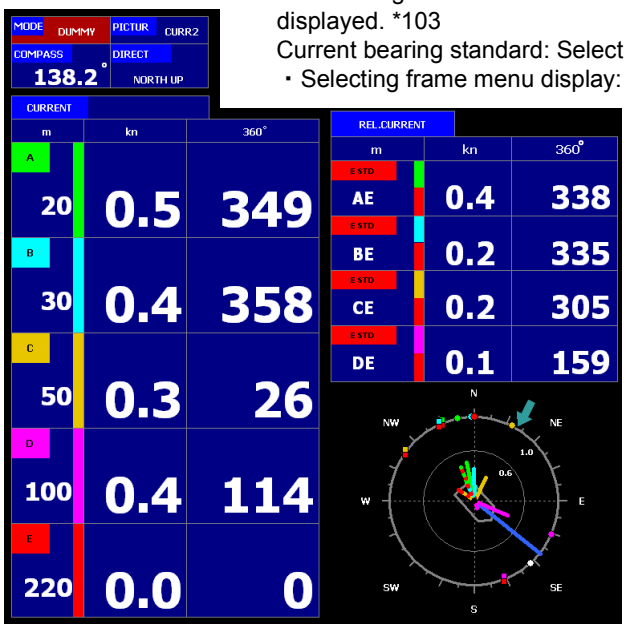
Trip/Timer:
Trip: Section sailing distance
Timer: Passing time *107
・Selecting frame menu display: 12.1.2-(6)

2) Current 2 screen (numeric display): Example of display



Left part of the screen

Mode : Usually, set measurement (for current measurement) *101
Screen : Select from current 1/current 2/current 3.
Compass : Displaying head up bearing *102
Bearing Standard:
The bearing standard of the current and the ship speed vector is set and displayed. *103
Current bearing standard: Select from North up bearing/Head up bearing
・Selecting frame menu display: 12.1.2-(1)



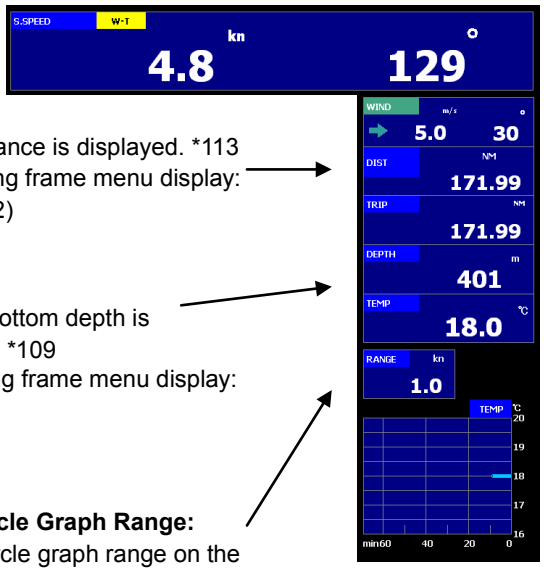
Relative Current: Current Direction/Speed and Standard Layer:
It is Excluded the standard layer of drum of A-E layers, the relative current speed and direction in four remainder layers display. *105
・Selecting frame menu display: 12.1.2-(2)

Current vector display:
The current circle graph displays direction/speed of the A-E layer by the direction and the length of the vector. *106
・Selecting frame menu display: 12.1.2-(3)

Absolute Current:
Current Direction/Speed and Depth:
It displays for a current speed and direction in five layers (A-E). The absolute current shows the direction and the speed of the current at the sea bottom against. *104
・Selecting frame menu display: 12.1.2-(2)

Right part of the screen

Ship Speed･Course: The ship speed and course are displayed.
Doppler: The bottom tracking or water tracking ship speed measured with the current meter is displayed.
GPS: The ship speed from the navigation equipment such as **GPS** is displayed. *110
・Selecting frame menu display: 12.1.2-(10)



Distance:
Total Distance is displayed. *113
・Selecting frame menu display: 12.1.2-(12)

Depth:
The sea bottom depth is displayed. *109
・Selecting frame menu display: 12.1.2-(9)

Current Circle Graph Range:
Current circle graph range on the above is displayed.

Wind Direction/Wind Speed:
It displays wind direction and wind speed. *111
・Selecting frame menu display: 12.1.2-(16)

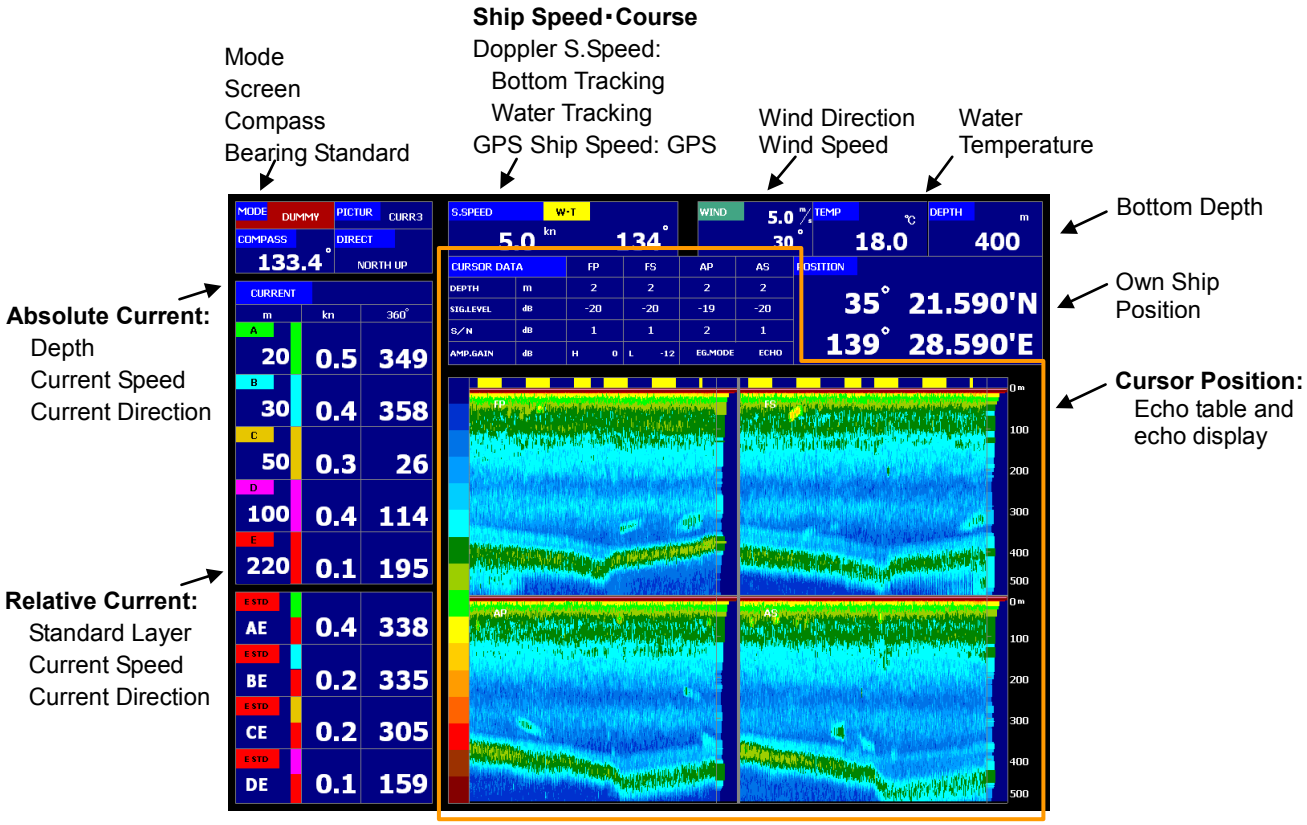
Trip/Timer:
Trip: Section sailing distance
Timer: Passing time *107
・Selecting frame menu display: 12.1.2-(6)

Water Temperature and it's Graph:
A present water temperature is displayed, and the history of water temperature is displayed in the graph. *108
・Selecting frame menu display: 12.1.2-(7)

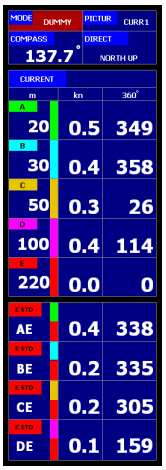
2

*101 "Measurement/Dummy" is selected by the menu. To confirm the device operation, the dummy displays the ship speed and the current data of fictitious.
*102 It is necessary to connect the head up bearing sensor such as gyrocompass for the display.
*103 It is necessary to connect the head up bearing sensor such as gyrocompass for the display of the north up bearing standard.
*104The depth of the measurement layer is set with the depth key.
It sets or it is not likely to be able to measure it according to the environmental condition though the depth that can be set is 500m or less.
*105 For example, E layer is assumed to be a standard layer of drum, and the current (relative current) in A layer seen from E layer is shown as the AE layer.
The standard layer of drum in a relative current is selected from "Relative current standard: A layer-E layer" by the menu.
*106 The absolute current (A-E layer) is displayed each current direction and speed by the solid line using the direction and length of the vector.
Display color [A: Green, B: Blue, C: Orange, D: Pink, E: Red]
A relative current (AE layer etc.) displays by the short dashed line using the direction and speed in the vector.
For example, E layer standard, the AE layer is a short dashed line of "Green/red" for the display color , and the BE layer is displayed in the short dashed line of "Blue/Red".
It is necessary to connect the bearing sensor to display the ship speed/course in the vector. When the bearing sensor is non-connection, it is fixed in the head up bearing.
*107 Trip/timer is selected by the menu. The numerical value is reset with [RESET] key.
*108 It is necessary to connect the water temperature sensor for the display of the water temperature and the water temperature graph. The water temperature graph is set by the menu. Refer to 4.1.8.
*109 The depth value is a mean value of depth measured by four each beam.
*110 Ship speed: True ship speed is displayed. Refer to 4.3.1.
Ship speed display: Component /Deflection angle
Course: Due north is assumed to be N and north, south, east, and west (or, 360°) is displayed at the north up bearing setting. The direction of the prow is assumed to be 0°, and the direction of the course is displayed in the deflection angle at the head up bearing setting.
*111 It is necessary to connect the wind direction/speed sensor for the display. It synchronizes with wind direction arrow (⇒) in the current circle graph. Refer to 4.2.1
*112 The depth range is selected from the menu. Gain and STC cannot be adjusted. Refer to 4.2.2
*113 Even if the Reset key of Trip/Timer is operated, the Total Distance cannot be reset. Refer to 7.1.10

3) Current 3 screen (echo display): Example of display



Left part of the screen



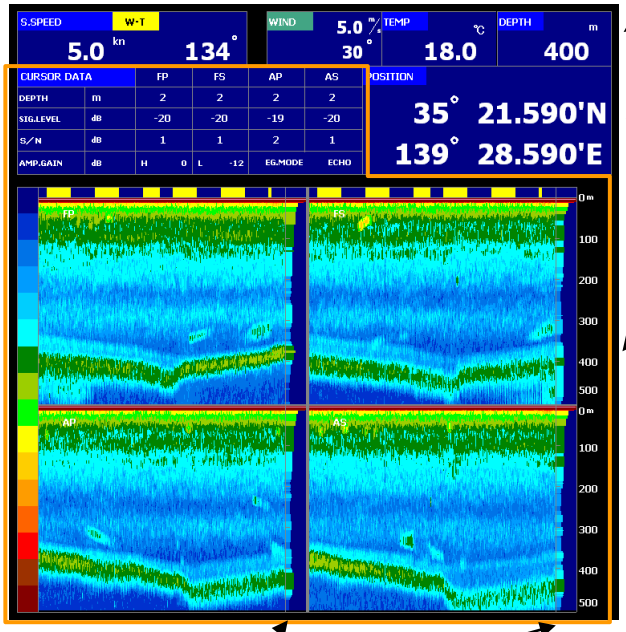
Refer to 2.2.1"Current 1 screen (circle graph display)"

Right part of the screen

Ship Speed･Course: The ship speed and course are displayed.
Doppler: The bottom tracking or water tracking ship speed measured with the current meter is displayed.
GPS: The ship speed from the navigation equipment such as **GPS** is displayed. *110
・Selecting frame menu display: 12.1.2-(10)

Wind Direction/Wind Speed:
It displays wind direction and wind speed. *111
・Selecting frame menu display: 12.1.2-(16)

Water Temperature:
The water temperature is displayed. *108
・Selecting frame menu display: 12.1.2-(7)



Depth:
The sea bottom depth is displayed. *109
・Selecting frame menu display: 12.1.2-(9)

Own Ship Position:
The latitude longitude at the own ship position is displayed. *114
・Selecting frame menu display: 12.1.2-(13)

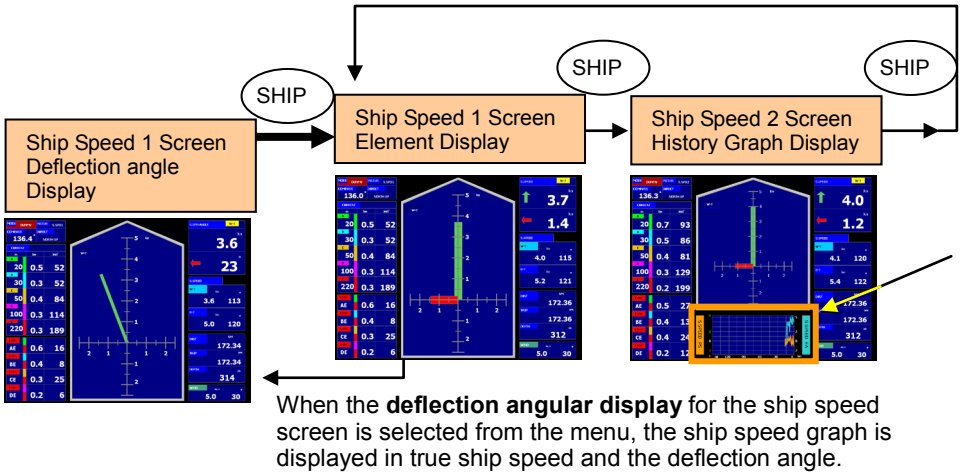
Echo Display and Cursor Position Echo Table:
Echo Table:
Echoes each four directions received in the current measurement mode are displayed in the color bar. *115
Cursor Position Echo Table:
The data of the latest echo in the echo table is displayed in numerical value.
Depth:
Depth at the horizontal cursor position is displayed. *116
Signal Level:
Echo strength at the horizontal cursor position is displayed.
Fore Port/Fore Starboard/After Port /After Starboard (FP/FS/AP/AS)
S/N :
The S/N ratio of the echo of the horizontal cursor position is displayed.SN Setting: When SN is selected, it sets. *117
Display Mode:
Echo/SN is selected from the menu. Usually, the echo is selected. *118
・Selecting frame menu display: 12.1.2-(8)

A scope:
Strength of the echo is expressed in the side length (only the right half) and the color bar.

*109--*111 Refer to page 2-6.
*114 It is necessary to connect the location sensor such as GPS to display the own ship position.
*115 Gain and STC cannot be adjusted. Refer to 4.2.2
*116 The depth range is selected from the menu. Refer to 4.2.2
*117 High: When the S/N value is higher than the level set by "High", the signal is displayed without penetrating.
Low: When the S/N value is lower than the level set by "Low", the signal is displayed by the background color of 100% penetration.
High > Middle (S/N value) > Low: It approaches the background color whose permeability is 100% by the S/N value low. Refer to 4.2.2.
*118 Echo: It converts based on the receiving echo level and the color is displayed. The display color can be selected from A-D by the menu. Refer to 4.2.2.
SN: An echo of the S/N value low (a lot of the noise element) is penetrated, and displayed by a color near the background color. Reference 4.2.2

2.2.2 Ship Speed Display

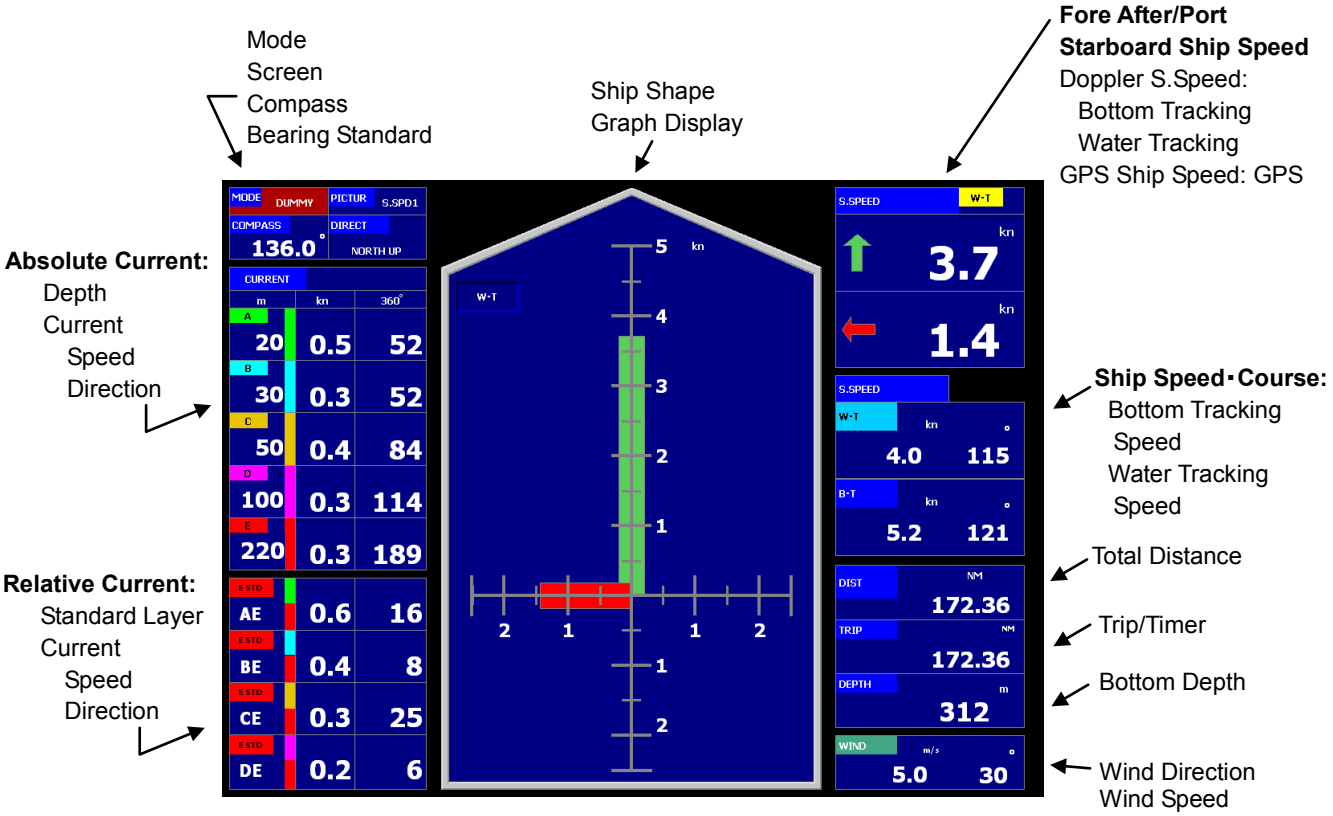
The ship speed screen mainly displays the course and the speed of the ship.
The ship speed screen is displayed with the [SHIP] key. There are two screens (ship speed 1 and ship speed 2(graphical display), and the screen changes into the ship speed screen whenever the [SHIP] key is pushed.



History Graph :
The history of fore, after, port and starboard ship speed is displayed in the graph. *201
・Selecting frame menu display: 12.1.2-(14)

When the **deflection angular display** for the ship speed screen is selected from the menu, the ship speed graph is displayed in true ship speed and the deflection angle.

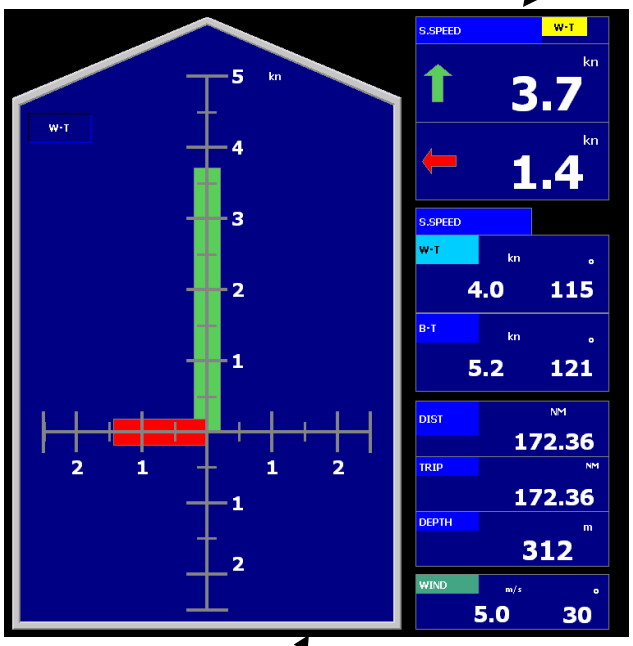
Ship speed 1 screen: Example of display



*201 Refer to 4.3.1. Ship Speed Graph Setting (Ship speed elapsed graph)

Right part of the screen

Fore/After・Port/Starboard Ship Speed:
The speed of the ship is displayed based on the prow dividing into two (fore/after and port/starboard). *202
・Selecting frame menu display: 12.1.2-(5)



Ship Speed・Course:
The ship speed and course are displayed.

Doppler:
The bottom tracking or water tracking ship speed measured with the current meter is displayed. *110
・Selecting frame menu display: 12.1.2-(10)

Distance:
Total Distance is displayed. *113
・Selecting frame menu display: 12.1.2-(12)

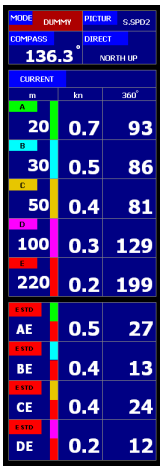
Trip/Timer:
Trip: Trip distance
Timer: Passing time *107
・Selecting frame menu display: 12.1.2-(6)

Depth:
The sea bottom depth is displayed. *109
・Selecting frame menu display: 12.1.2-(9)

Wind Direction/Wind Speed:
It displays wind direction and wind speed. *111
・Selecting frame menu display: 12.1.2-(11)

Ship Speed Display:
Element Display:
Ship speed is displayed separately for the element of fore/after and port/starboard.
Deflection Angle Display:
Ship speed is displayed in true ship speed and the deflection angle. *202
・Selecting frame menu display: 12.1.2-(14)

Left part of the screen



Mode/Screen
Compass/Bearing
Standard

Absolute Current:
Depth
Current Speed
Current Direction

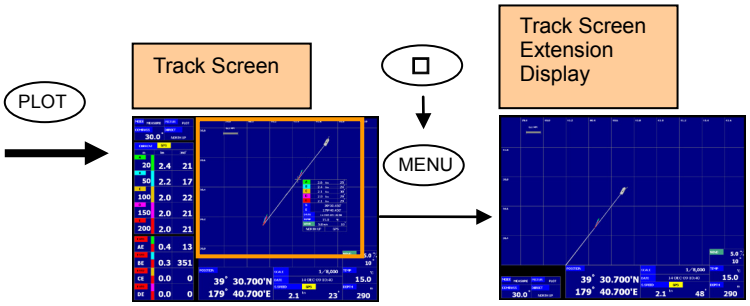
Relative Current:
Standard Layer
Current Speed
Current Direction

Refer to 2.2.1"Current 1 screen (circle graph display)"

*109--*113 Refer to page 2-6.
*202 Refer to 4.3.1. Ship Speed Graph Setting (Element display)

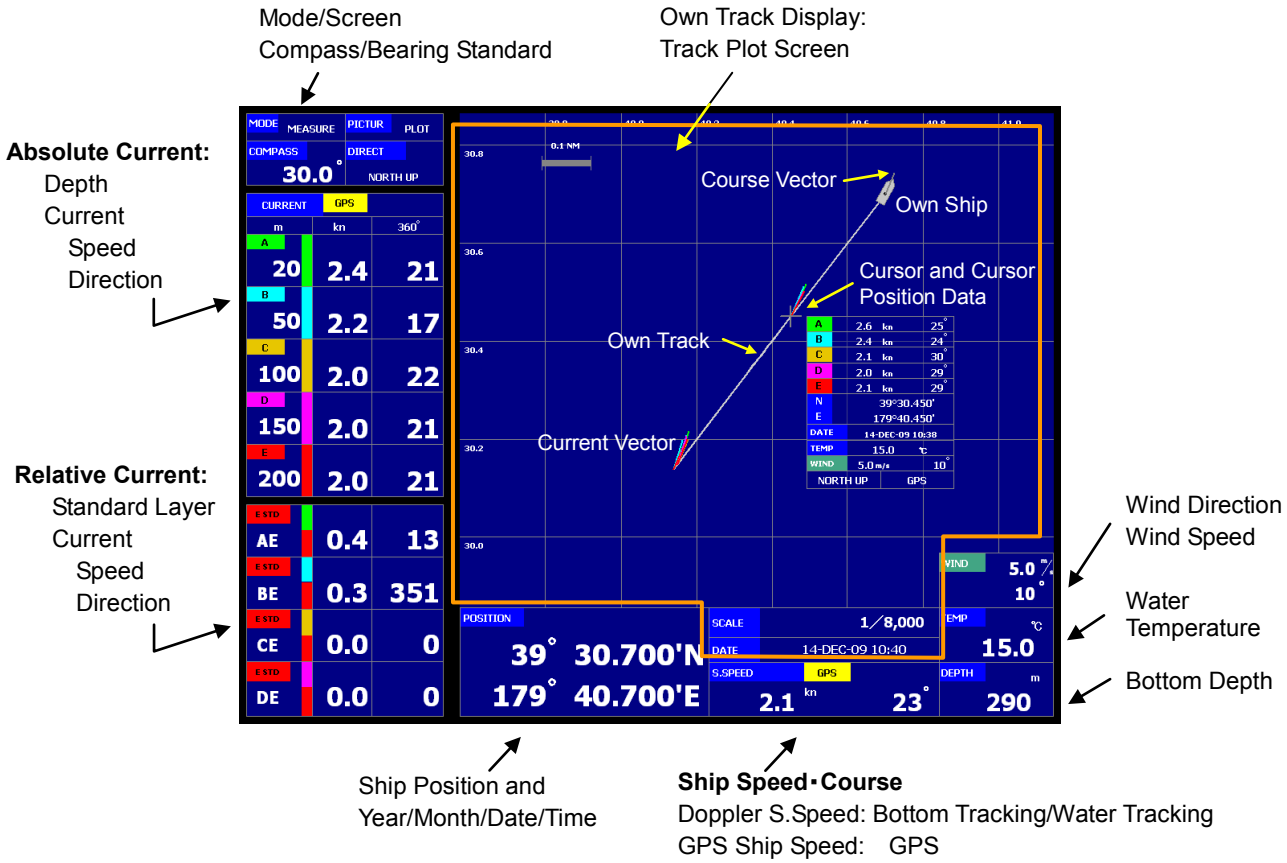
2.2.3 Track Plot Display

The own tracks are displayed on the screen, and the current direction/speed vector of five layers are displayed on the track.
The track screen is displayed with the [PLOT] key. It is possible to display it by extending the range of the track display in the menu.



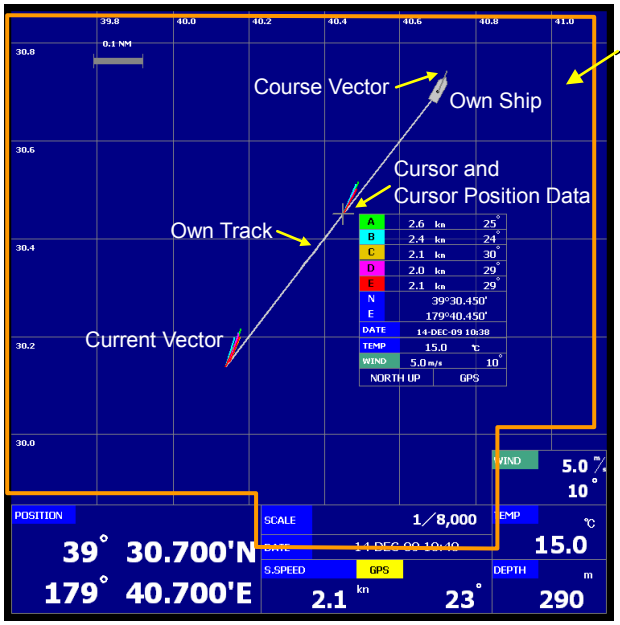
Track Screen:
The range of the track display is enlarged when the current numerical value display / non-display is selected by the menu and it displays. *301
・Selecting frame menu display: 12.1.2-(15)

Track plot screen: Example of display



*301 Refer to 4.4.1. Current Numerical Display: Display / Non-display
*311 **Own Track Display:**
1) **Own Ship:** Own ship is displayed by ship shape mark.
2) **Course Vector:** A present direction of the course is displayed from a present ship position by a white solid line.
3) **Own Track:** The track is plotted on the screen based on information of the GPS location or the ship speed by Doppler data. The track color can be displayed by one optional color (It is possible to select it from six colors). Or, classification (four stages) display is possible according to the scattered intensity of an optional measurement layer (A, B, C, D, and E layer). Refer to 4.4.3
4) **Current Vector (5 layers):** The current vector is displayed at constant intervals. The display form of the vector is equal to the current screen. The absolute current displays a solid line and a relative current in the short dashed line. Moreover, it can be on/off of the display in each vector. It doesn't display when the measurement is not possible. Refer to 4.4.2 “Five Layer Display of Current Vector”

Right part of the screen



Own Track Display (Track Plot):
The track is plotted on the screen based on information of the GPS location or the ship speed by Doppler data. ＊**311**
・Selecting frame menu display: 12.1.2-(15)

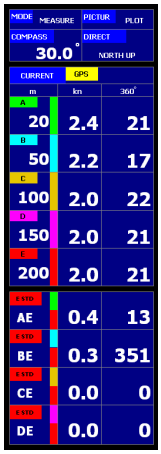
Wind Direction/Wind Speed:
It displays wind direction and wind speed. *111
・Selecting frame menu display: 12.1.2-(11)

Water Temperature:
The water temperature is displayed. *108
・Selecting frame menu display: 12.1.2-(7)

Depth:
The sea bottom depth is displayed. *109
・Selecting frame menu display: 12.1.2-(9)

Ship Position・Date/Time:
Latitude and the longitude at the ship position are displayed.
Local time by countries is set by the menu. ＊312
・Selecting frame menu display: 12.1.2-(13)

Left part of the screen



Mode/Screen
Compass/Bearing
Standard

Absolute Current:
Depth
Current Speed
Current Direction

Relative Current:
Standard Layer
Current Speed
Current Direction

Refer to 2.2.1"Current 1 screen (circle graph display)"

*108, *109, *111 Refer to page 2-6.

*311 **Own Track Display:**

5) Cursor: It displays by a cross mark. The cursor moves with the ◀/▶ key.; When the ◀ key is pushed, to a past position; When the ▶ key is pushed, it moves in the direction of the present place.
Note: When the cursor is moved to the ship, neither a cursor nor a cursor positional data table are displayed. It returns with the ◀ key.
Note: The track standard operates only when GPS is set. Refer to 4.4.4 "Track Standard".

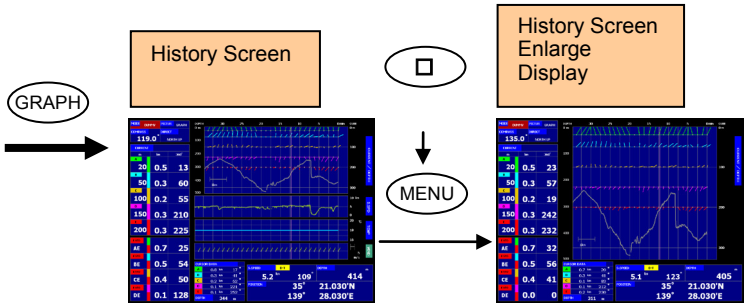
6) Cursor Position Data: The data of latitude longitude, the current, and dates etc. at the cursor position are displayed. Refer to 4.4.4-6.
Note: When the cursor is moved to the ship, neither a cursor nor a cursor positional data table are displayed so as not to display the data table.

7) **Reduced scale:** The reduced scale level can be set within the range of 1/1,000-1/1,000,000. It sets by the menu of track screen/reduced scale. Refer to 4.4.4-2.

*312 Ship Position・Date/Time: "Date/Time" displays the year, Month, Date, and time from GPS. Time is converted by the menu to the local time.
The ship position displays "***" and "Blank" is displayed at the date when GPS is not connected, Refer to 4.4.4-4.

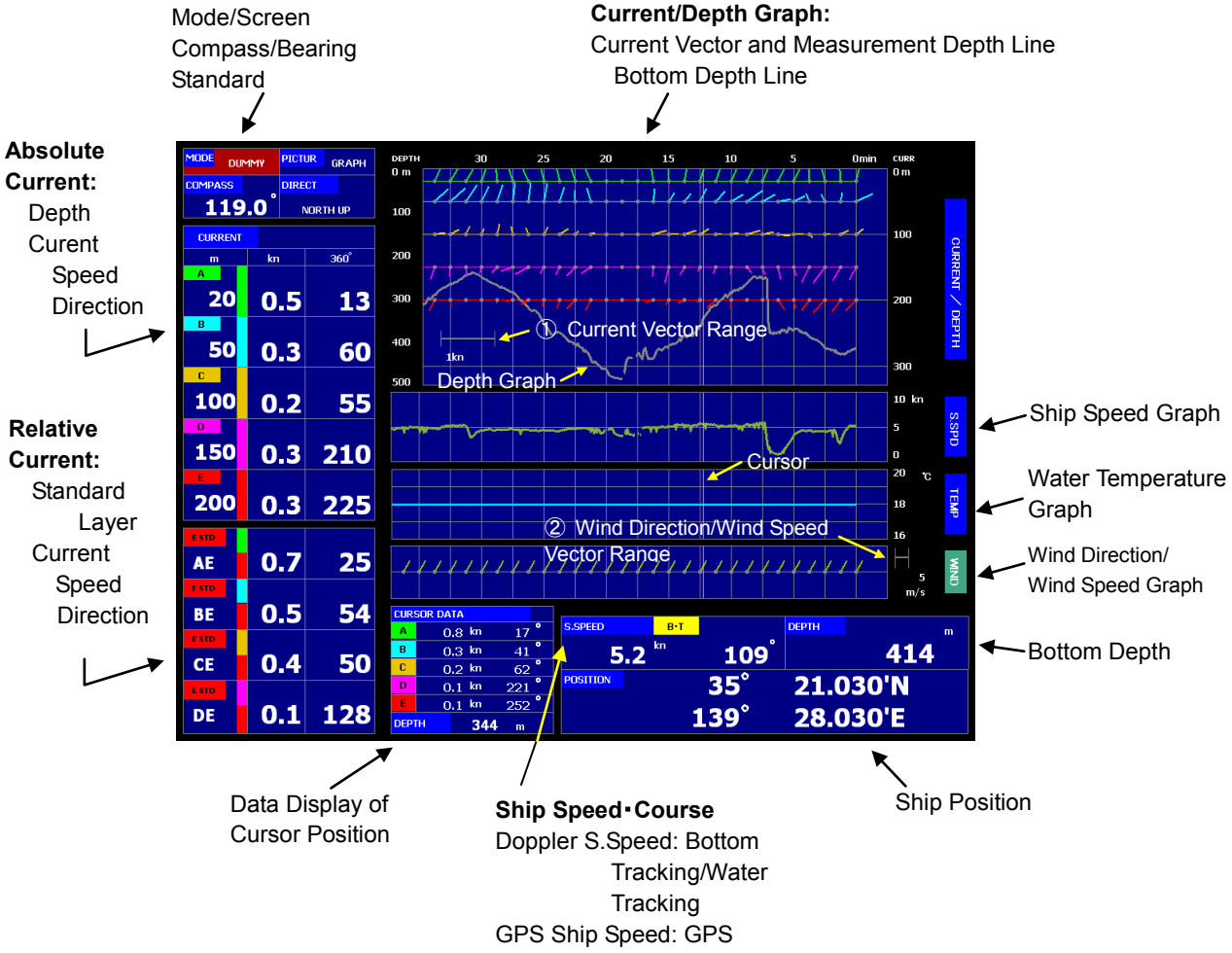
2.2.4 Graph Display

Current direction/speed, depth, ship speed, water temperature (*401), and wind direction/speed (*402) from the past to present of the current in five layers are displayed.
The passage screen is displayed with the [GRAPH] key. It is possible to display it by enlarging the display range in the passage graph by the menu.



On the Menu,
History Screen:
Ship speed display/non-display
Water temperature display/non-display
Wind direction speed display/non-display
When setting it to the above-mentioned Current/depth graph is enlarged and displayed.
・Selecting frame menu display: 12.1.2- (18)

Graph screen: Example of display



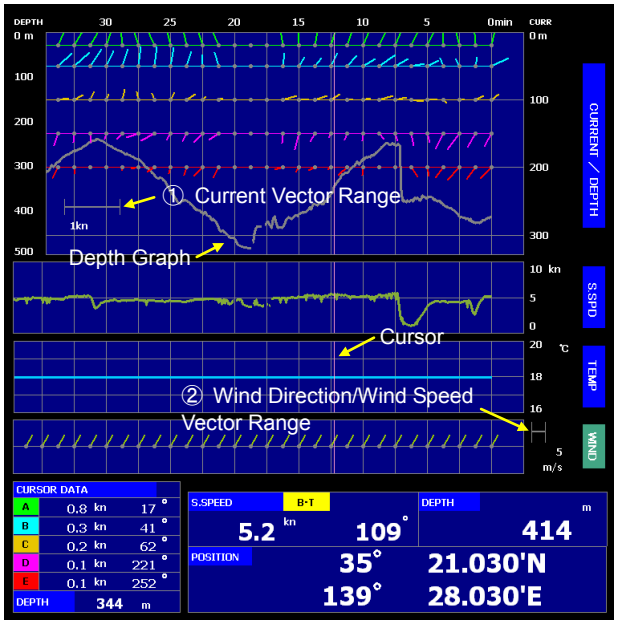
*401 Water Temperature: It is necessary to connect the water temperature sensor for the display of the water temperature graph.
*402 Wind Direction/Wind Speed: It is necessary to connect the wind direction/wind speed sensor for the display of the wind direction/wind speed graph.

Right part of the screen

Current/Depth Graph: The current is displayed right within the range of depth of the vertical axis, and depth is displayed left.

Current Graph: The history of the time of the current vector on each intersection of the horizontal axis and the depth value of the graph is displayed.
① is a range of the current vector.

Depth Graph: The history of the time of depth is displayed. The range of the display depth is set besides the current graph though it displays on the current graph repeatedly. *410
・Selecting frame menu display: 12.1.2- (18)



Ship Speed Graph:
The history of the time of ship speed is displayed in the graph. *411
・Selecting frame menu display: 12.1.2- (17)

Water Temperature Graph:
The history of the time of the water temperature is displayed. *412
・Selecting frame menu display: 12.1.2- (7)

Wind Direction/Wind Speed Graph:
The history of the time of the wind direction/wind speed is displayed in the vector. ② is a range of the vector of the wind direction/wind speed. *413
・Selecting frame menu display: 12.1.2- (16)

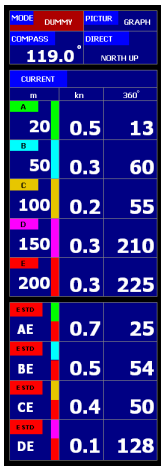
Ship Position:
Latitude and the longitude at the ship position are displayed. *114
・Selecting frame menu display: 12.1.2-(13)

Cursor Position Data:
The current and depth in the cursor position are displayed.
・Selecting frame menu display: 12.1.2- (18)

Ship Speed・Course:
The ship speed and course are displayed.

Doppler:
The bottom tracking or water tracking ship speed measured with the current meter is displayed. *110
・Selecting frame menu display: 12.1.2-(10)

Left part of the screen



Mode/Screen
Compass/Bearing
Standard

Absolute Current:
Depth
Current Speed
Current Direction

Relative Current:
Standard Layer
Current Speed
Current Direction

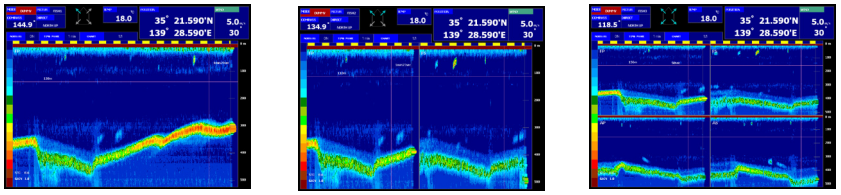
Refer to 2.2.1"Current 1 screen (circle graph display)"

*110 Refer to page 2-6. *114 Refer to page 2-8.
*410 Depth Graph: Refer to 4.5.1 "Current/Depth Graph Setting".
*411 Ship Speed Graph: Refer to 4.5.2 "Ship Speed Graph Setting".
*412 Water Temperature Graph: Refer to 4.5.3 "Water Temperature Graph Setting".
*413 Wind Direction/Wind Speed Graph: Refer to 4.5.4 "Wind Direction/Speed Setting".

2.2.5 Fish Finder Display

The fish finder screen converts the reflection signal of the supersonic wave launched in four directions into 16 colors according to strength, and displays the water inside.
Because the supersonic wave is turned in four directions (Fore Starboard, Fore Port, After Starboard, After Port), each detection result can be displayed by division (four screens) into four, and, in addition, two screens and one screen displays can be selected.
The fish finder screen is displayed with the [FISH] key. The fish finder screen includes three screens; fish finder 1(one direction display), fish finder 2(two direction display), and fish finder 3(four direction display). The selection of the screen is set by the menu. (*501)

FISH → Fish Finder 1 Screen 1 Direction Display or Fish Finder 2 Screen 2 Direction Display or Fish Finder 3 Screen 4 Direction Display

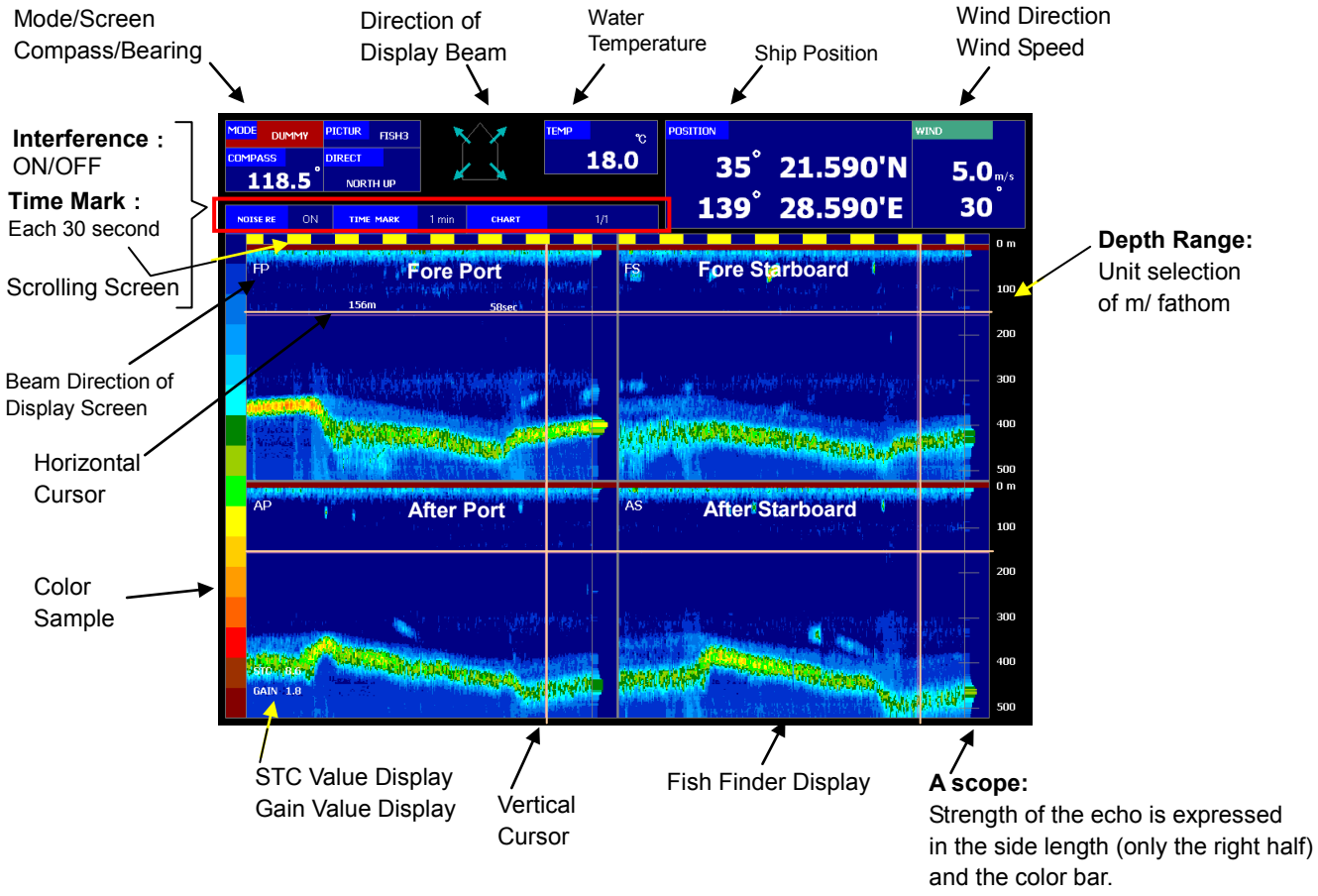


□ → MENU

At fish finder screen on the menu, it is selected from 4Screen/Fore/Starboard/Port / Fore Starboard/Fore Port/ After Starboard / After Port. *502
・Selecting frame menu display: 12.1.2- (19)

Gain Adjustment:
Gain is set with the gain knob of the keyboard.
STC Adjustment :
STC is set with the STA knob of the keyboard.
Depth Range/Scrolling Screen/ Color arrangement:
It sets by the fish finder screen menu.
・Selecting frame menu display: 12.1.2- (19)

Fish Finder screen: Example of display



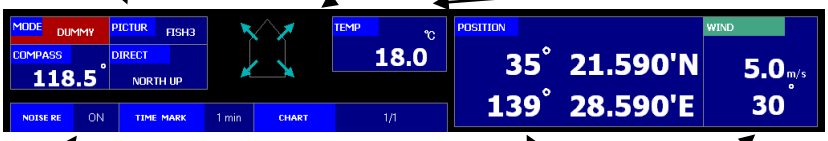
*501 Ship speed and the current cannot be displayed for the fish finder screen.
*502 Refer to 4.6.1 “Split-screen Selecting”.

Upper part of the screen

Mode: It sets to the measurement usually. *101
Screen : Selecting from FISH 1/FISH 2/FISH 3
・Selecting frame menu display: 12.1.2- (1)

Direction of Display Beam:
The selecting display beam is displayed by a red arrow now. *511
・Selecting frame menu display: 12.1.2- (19)

Water temperature:
Water temperature is displayed. *108
・Selecting frame menu display: 12.1.2- (7)



Interference: Interference from other supersonic wave equipment is decreased when turning it on. *512

Time Mark: Periodic Time Display

Scrolling Screen: The speed of the scrolling is displayed. *513

Wind Direction/Wind Speed:
Wind Direction/Wind Speed is displayed. *111
・Selecting frame menu display: 12.1.2- (11)

Ship Position:
Latitude and the longitude at the ship position are displayed. *114
・Selecting frame menu display: 12.1.2-(13)

Lower part of the screen

Fish Finder Echo Display :
The fish finder screen converts the reflection signal of the supersonic wave launched in four directions into 16 colors according to strength, and displays the water inside.
Gain and STC are adjusted with the knob of the keyboard. Moreover, depth range, selection of display beam, color arrangement and scrolling screen, etc. is set by the menu. *514
・Selecting frame menu display: 12.1.2- (19)

Depth Range:
The depth range on the fish finder screen is changed with ten numeric keys "1-9,0" to the keyboard.
The range of each numeric key can be set. *516

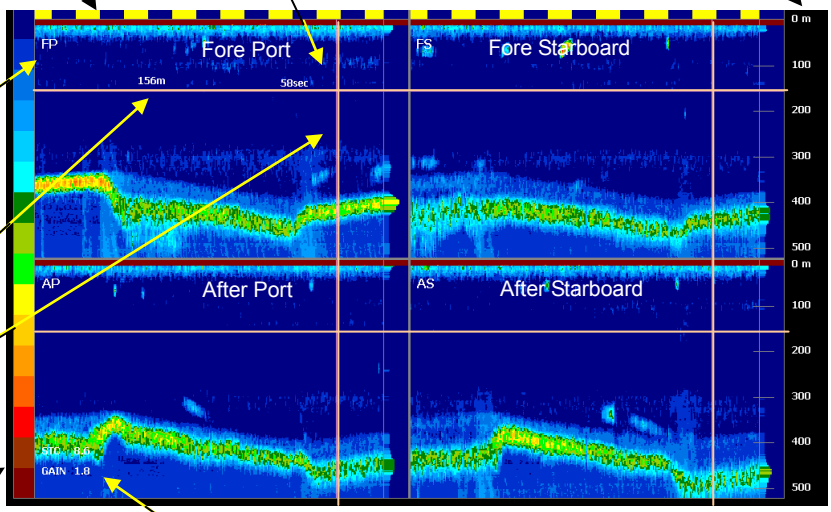
Depth Unit Change:
The unit of depth selects m or fathom. *517
・Selecting frame menu display: 12.1.2- (19)

Time Mark:
It displays at one cycle of the minute. It changes a color every 30 seconds.

Display Direction:
The direction of the beam that has been selected now is displayed. *511

Horizontal Cursor:
Depth of the cursor is displayed. *513

Vertical Cursor:
Time of the cursor is displayed. *513



Color Sample
In the color sample, the color in the the lower is a signal at the strongest level. The display color signal level lowers while going to the upper of the screen. *513

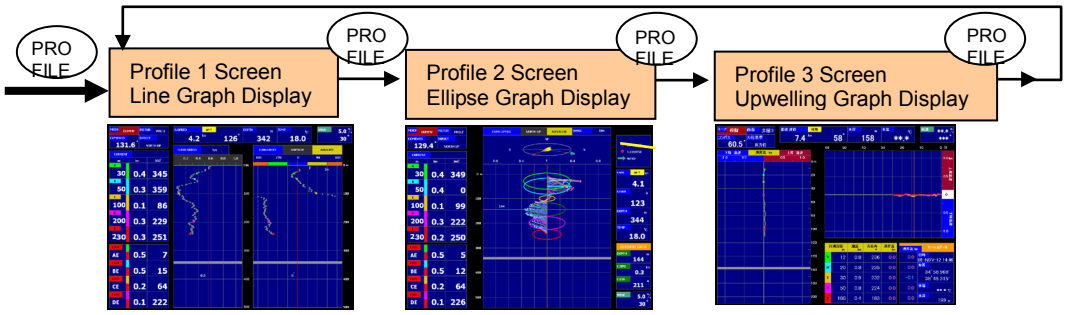
Gain: The receiving gain setting value is displayed by the fish finder display.

STC: The value of the noise eliminate level set under the surface of the water is displayed. * 515
The adjustment knob of Gain and STC is on the

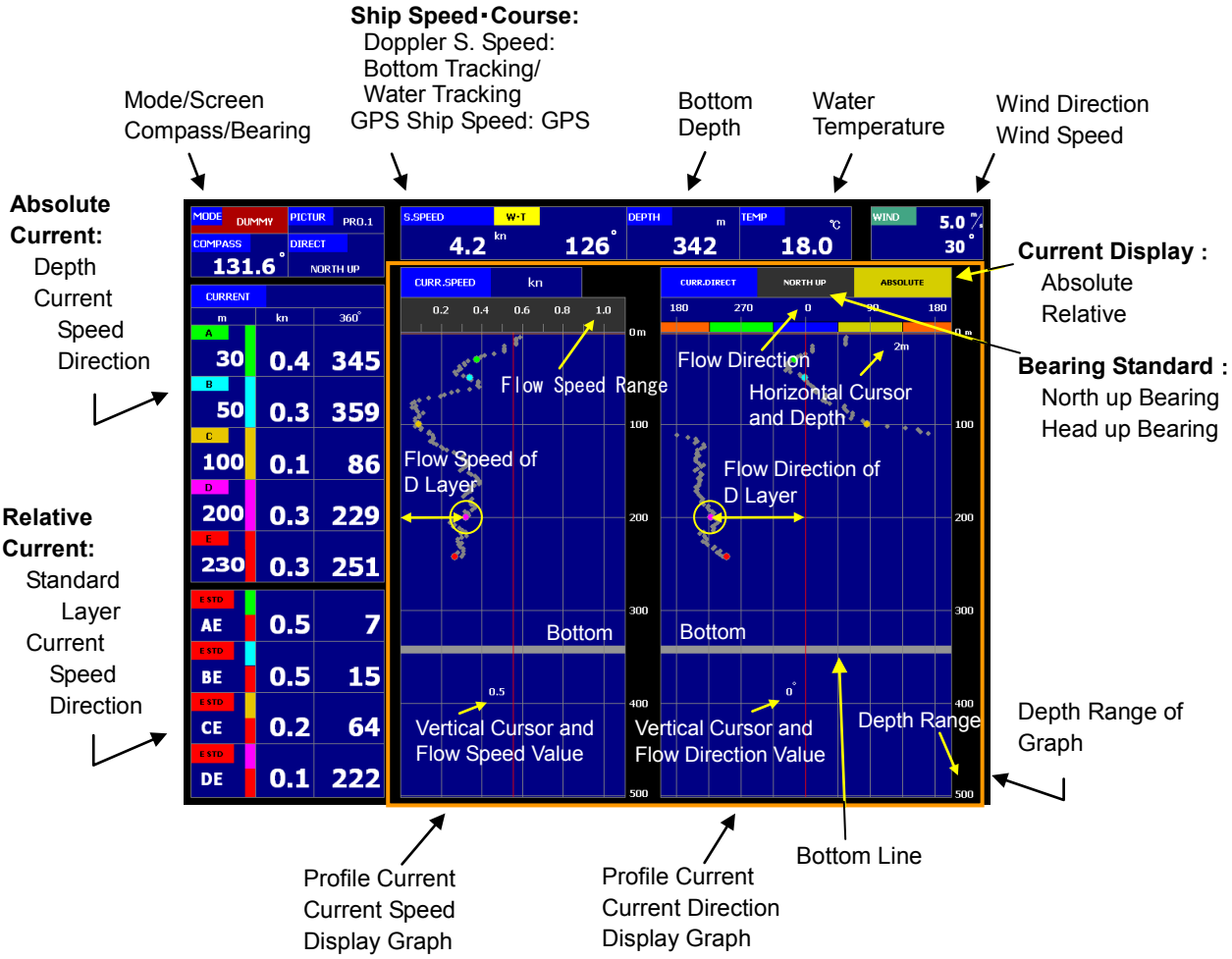
*111, *108, *111 Refer to page 2-6. *114 Refer to page 2-8.
*511 Refer to 4.6.1 “Split-screen Selecting”. *512 Refer to 4.6.3 “Eliminating Interference”. *513 Refer to 4.6.2 “Screen Display Setting”. *514 Refer to 4.6.2 “Screen Display Setting”./4.6.4 “Adjusting Gain and STC” *515 Refer to 4.6.4 “Adjusting Gain and STC” *516 Refer to “Depth Range Setting (Fish Finder Screen)” *517 Refer to 7.1.3 “Unit Setting”.

2.2.6 Tidal Profile Display

The current (direction/speed) to depth layer (*601) from the surface to bottom of the sea is displayed in the graph by the depth of each 2m.
Five current layers of a numeric display are seen, and the current in about 50 layers is seen in depth from 12m in depth to 112m in case of addition, for instance, 150m in depth it and because the graph is displayed at the same time, can the twist of the current from the surface to bottom of the sea and the change in swinging can be seen.
Profile screen is displayed with the [PROFILE] key.
There are two screens; profile 1(line graph) and profile 2(ellipse graph), and the screen changes into the profile screen whenever the [PROFILE] key is pushed.



1) Profile 1 screen (line graph display): Example of display



*601 Depth in which the current can be measured is up to a depth value of about 80% of the bottom of the sea depth. Moreover, it changes by the oceanographic condition though the maximum measurement depth of layer is about 200m.
*602 Refer to 4.7.2 “Two Display of Profile Setting (Ellipse Display)”.

Right Part of the screen

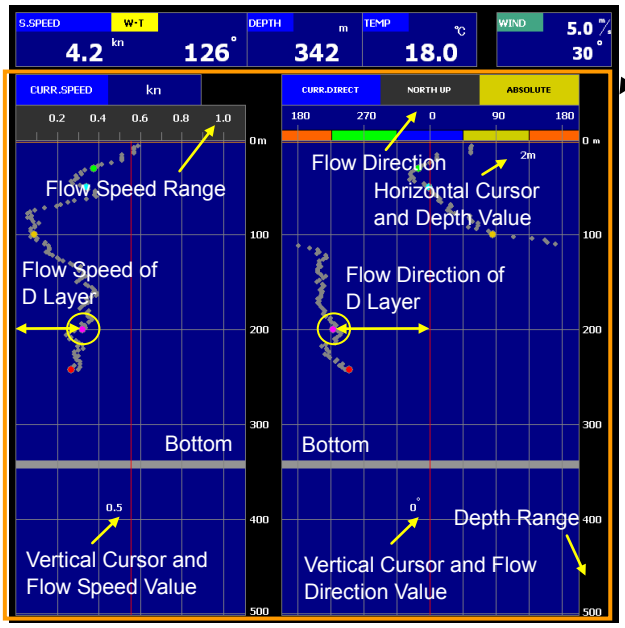
Depth:
The sea bottom depth is displayed. *109
・Selecting frame menu display: 12.1.2-(9)

Ship Speed・Course:
The ship speed and course are displayed.

Doppler:
The bottom tracking or water tracking ship speed measured with the current meter is displayed. *110
・Selecting frame menu display: 12.1.2-(10)

Water Temperature:
The water temperature is displayed. *108
・Selecting frame menu display: 12.1.2-(7)

Wind Direction/Wind Speed:
It displays wind direction and wind speed. *111
・Selecting frame menu display: 12.1.2-(16)



Profile Current; Current Direction Display Graph:
In case of north up bearing
0° :N (North)、
90° :E (East)
Incase of head up bearing
0° :Fore direction
90° :Starboard direction *611

North up Bearing :
It selects from north up bearing /head up bearing by the menu. *611

Absolute Current :
It selects from absolute current/ relative current by the menu. *612

Depth Range : The depth range in the graph is set by the menu. *612

Current Direction of D Layer : Depth 200m Current Direction 229°
・Selecting frame menu display: 12.1.2- (21)

Profile Current; Current Speed Display Graph

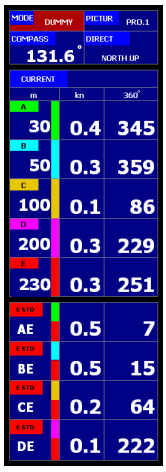
Current Speed: The Current speed(unit kn) is displayed.

Current Speed Range : The Current speed rqnge in the graph is set by the menu. *612

Current Speed of D Layer : Depth 200m/Current Speed 0.3 kn

Cursor: Profile Current speed/Current direction graph shared
Horizontal: Move by◄ ► key.
Vertical: Move by ▲ ▼ key.
・Selecting frame menu display: 12.1.2- (21)

Left part of the screen



Mode/Screen
Compass/Bearing
Standard

Absolute Current:
Depth
Current Speed
Current Direction

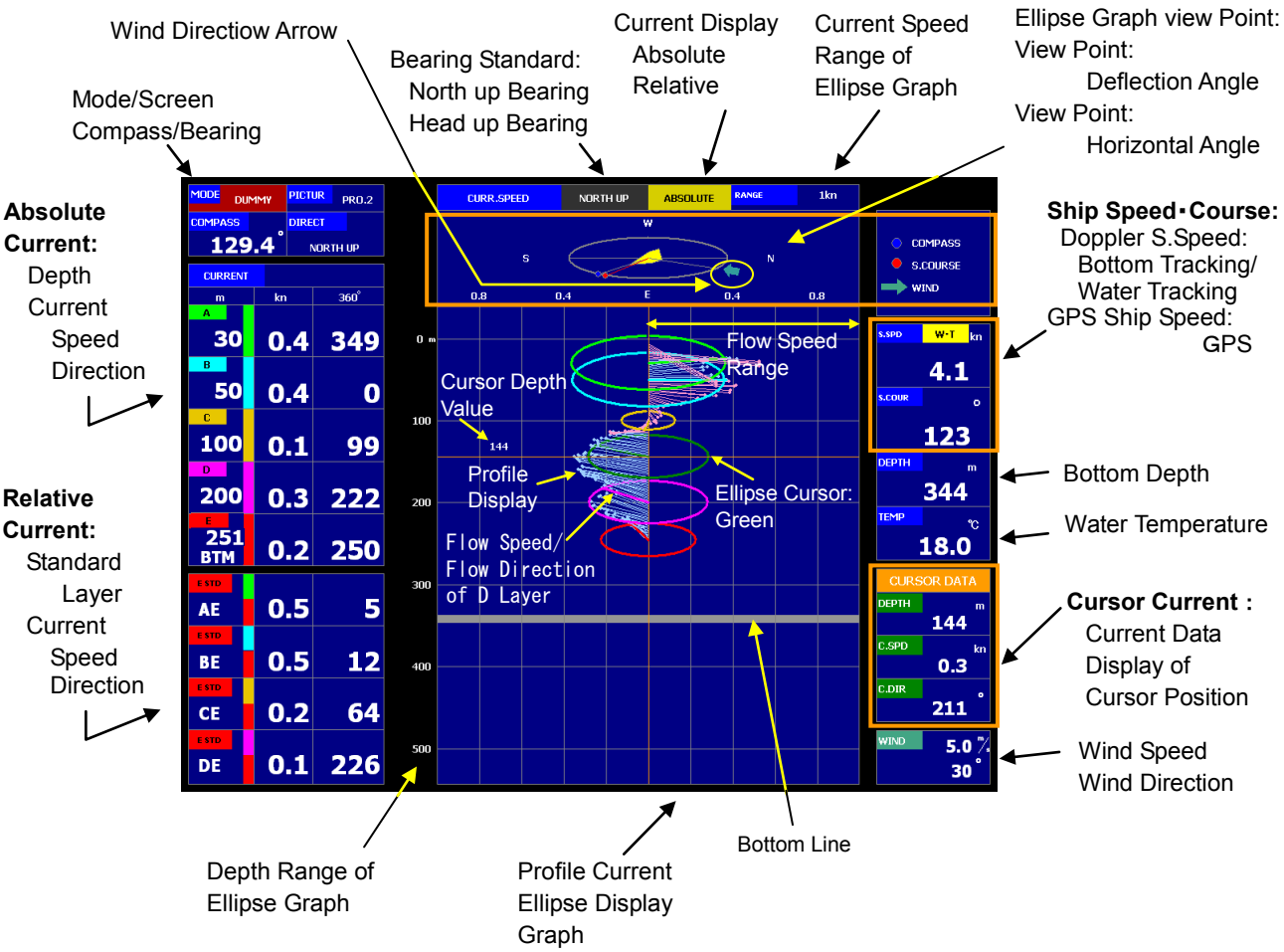
Relative Current:
Standard Layer
Current Speed
Current Direction

Refer to 2.2.1"Current 1 screen (circle graph display)"

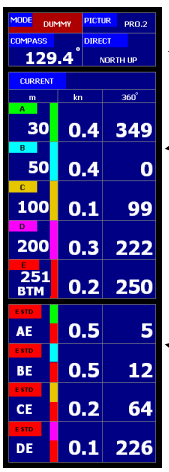
*108--*111 Refer to page 2-6.
*611 Refer to 4.1.2 "Current Bearing Standard : North up Bearing /Head up Bearing".
*612 Refer to 4.7.1 "" Profile 1 Graph Setting (Commonness Setting).

2) Profile 2 screen (ellipse graph display): Example of display

The current direction and current speed in 50 layers or less are displayed on an ellipse graph by the vector. Moreover, because the deflection angle and the horizontal angle of the view point that looks down at an ellipse graph can be changed, the twist of the current and the change in swinging can be seen so that it may peep in the sea.



Left part of the screen



Refer to 2.2.1"Current 1 screen (circle graph display)"

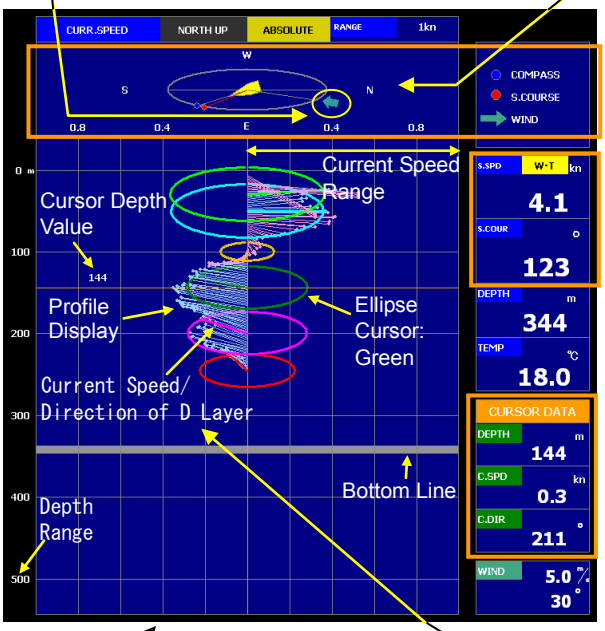
Right part of the screen

Profile Current; Current Direction/Current Speed:
The current is displayed in the vector in an ellipse graph. The length of the vector shows the speed of the Current, and the direction of the vector shows the direction of the Current.
N(north) is displayed for the north up bearing and E(east) is displayed right.
The direction of the prow is fixed to 0°(upper part) for the head up bearing and it displays.
・Selecting frame menu display: 12.1.2- (22)

Ellipse Graph Flow Speed Range:
The flow speed range of the graph is set by the menu. *620
・Selecting frame menu display: 12.1.2- (22)

Ellipse Graph View Point:
The graph view point is set by the menu.
View Point of Deflection Angle :
Setting of deflection angle.
View Point of Horizontal Angle :
Setting of bearing. *621
・Selecting frame menu display: 12.1.2- (22)

Wind Direction Arrow :
The direction of the arrow shows the wind direction.*111



Ship Speed・Course:
The ship speed and course are displayed.
Doppler:
The bottom tracking or water tracking ship speed measured with the current meter is displayed.
GPS: Ship speed from the navigation equipment such as GPS is displayed. *110
・Selecting frame menu display: 12.1.2-(10)

Water Temperature:
The water temperature is displayed. *108
・Selecting frame menu display: 12.1.2-(7)

Cursor Current:
The cursor is displayed in a green ellipse. It moves up and down in the direction of depth with a ▲▼ key. The value of current direction/current speed of the current in depth at the ellipse cursor position is displayed. *622

Wind Direction/Wind Speed:
It displays wind direction and wind speed. *111
・Selecting frame menu display: 12.1.2-(16)

Current Direction/Flow Speed of D Layer:
Depth 200m
Current direction 222°
Current speed 0.3 kn
*621

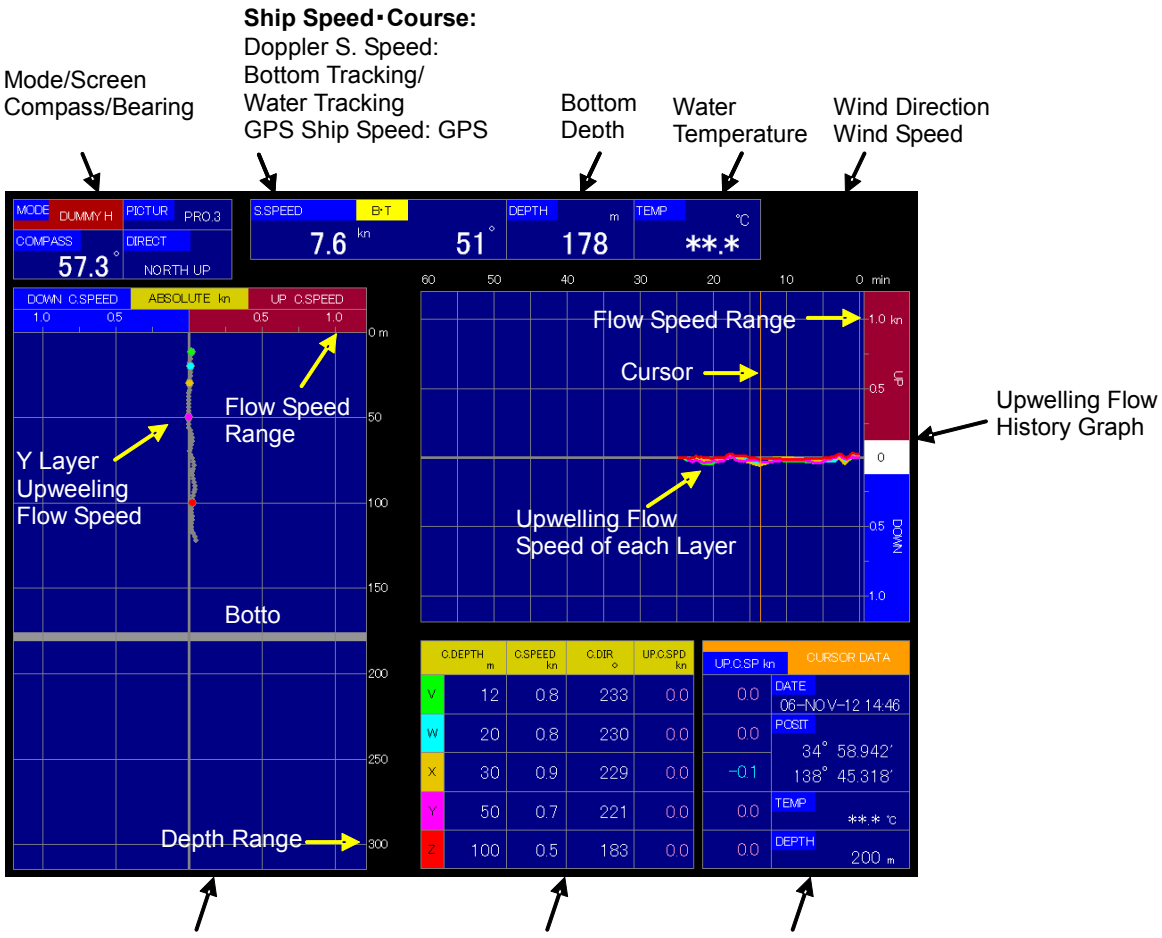
Profile Display:
The display of the profile vector is set by the menu.

Depth Range:
The depth range in the graph is set by the menu. *620
・Selecting frame menu display: 12.1.2- (22)

*108, *110, *111 Refer to page 2-6.
*620 It synchronizes with profile 1 screen setup.
*621 Refer to 4.7.2 “Profile 2 Setting (Ellipse Display)”.
622 The layer without data displays “”.

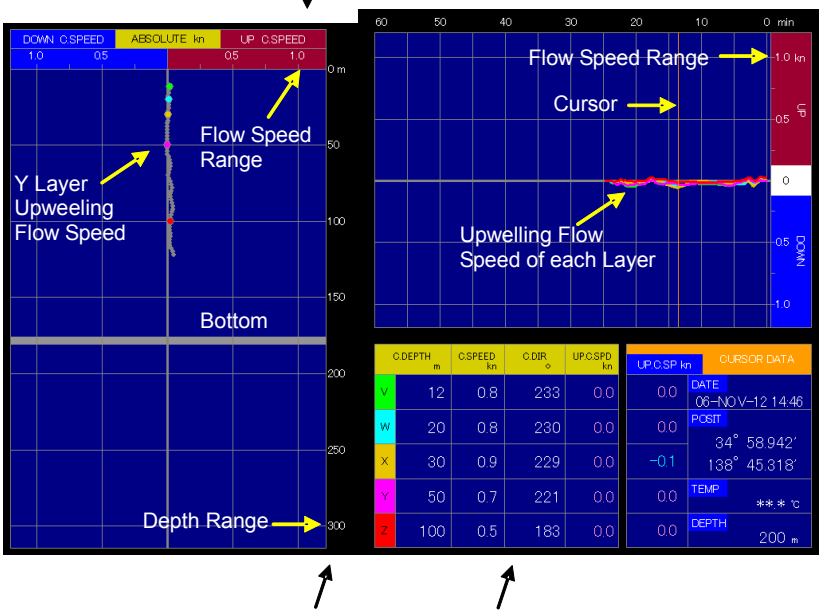
3) Profile 3 screen (Upwelling flow): Example of display

The Upwelling flow in 50 layers or less are displayed in the graph.



Profile Current　Upwelling Flow
Display of Current in the vertical direction

Flow Speed Range:
The flow speed range of the graph is set by the menu.
・Selecting frame menu display: 12.1.2- (23)



The history time Range
of Upwelling Flow is
set by the menu.
・Selecting frame menu display
12.1.2-(23)

The history graph of Upwelling Flow:
Upwelling Flow Speed from
the past to present
of the current in five layers
(V～Z) are displayed.

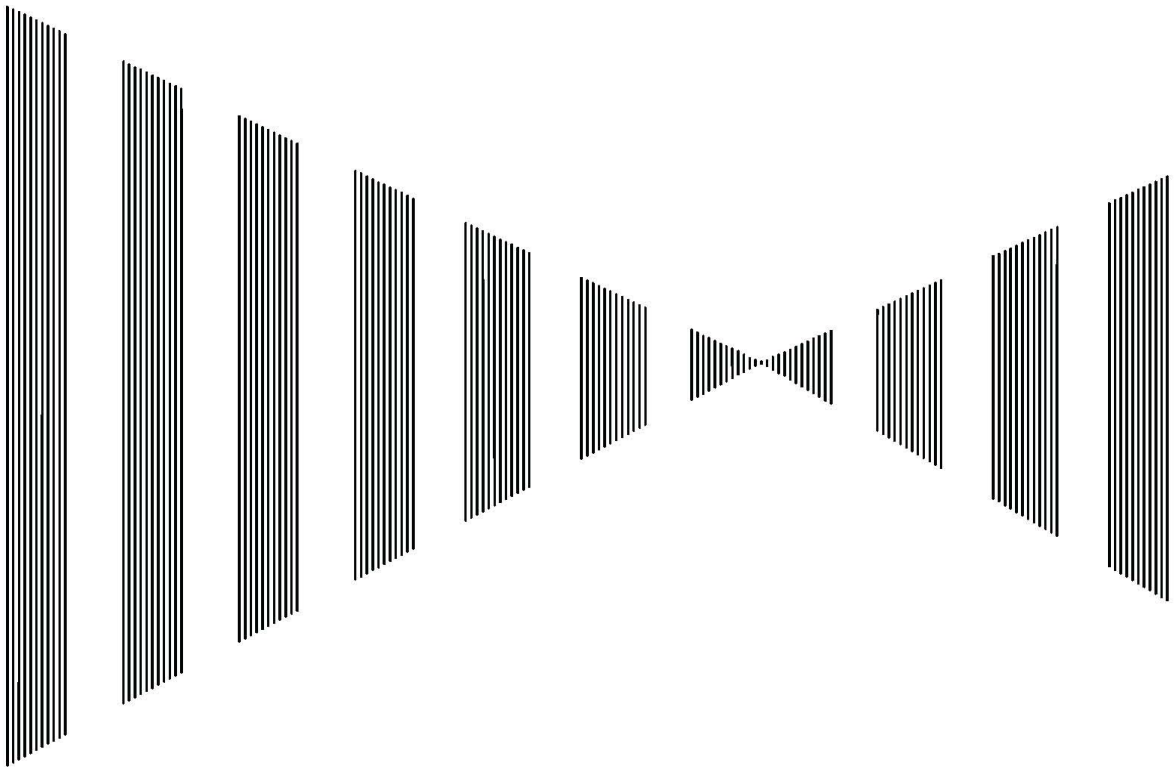
Cursor Current:
Data Displey of Cursor Position
Date
Position
Water Temperature
Bottom Depth
Upwelling Flow Speed

Bottom Depth Range:
The Bottom Depth Range of the graph
is set by the menu.
・Selecting framge menu display: 12.1.2-(23)

Absolute Current:
The Absolute Current of each layer is Displayed. ***623**
The Depth of the layer is set by the menu.
・Selecting framge menu display: 12.1.2-(23)

623 The layer without data displays "".

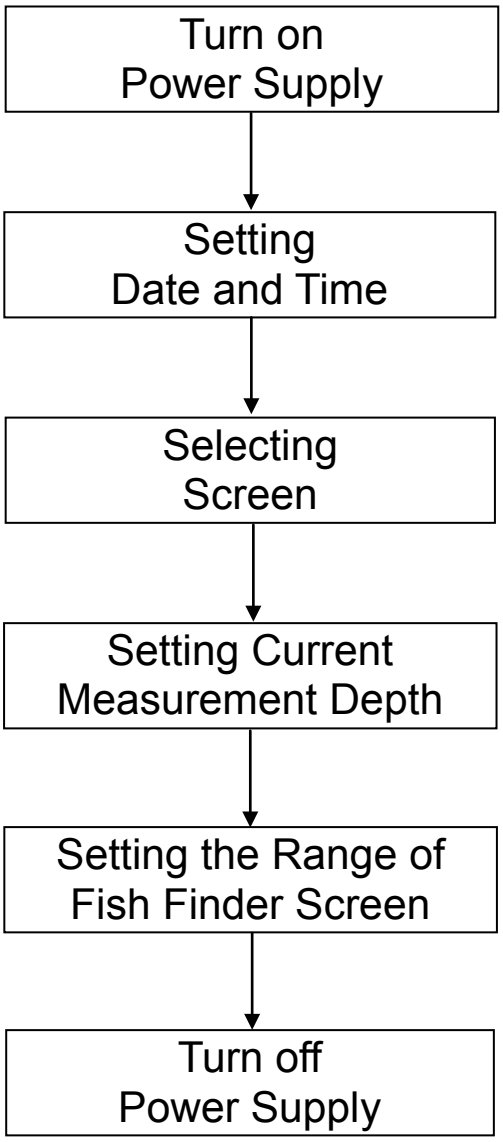
3. Operation Method



3.1 General Flow Chart

CAUTION

- Do not put the thing on the keyboard.
  Especially, when a hot thing is put on the keyboard, it might cause the transubstantiation.
- Please do not give the strong impact to the knob of the keyboard.
  It might cause the breakdown.



Each operation is described as follows.

3.1.1 Power ON and Date/Time Setting

CAUTION

- Execute to turn on the power supply again after thirty seconds or more have passed since the power supply was intercepted.
- The current meter might power off or malfunction when the ship power supply failure while the current meter is working. At that time, please turn on the power supply again.

Operation Procedure

1 Confirm the ship power supply ON.

2 Push [PWR] key.

The power supply of the device enters, and normal screen (*1) is displayed.
It transmits automatically at the same time as displaying the screen, and the measurement begins.

3 Set the date and time. (*2)

*** When GPS is connected, this operation is unnecessary because it is set by the automatic operation.**

1) Push [MENU] key, the menu is displayed.
2) Select ► Time Setting ≫ by ▼▲ key. Then, open the sub-menu “Time Setting” by pushing [ENT] key.
3) According to menu items, enter the present Year/Month/Date/Hour/Minute/Second by numeric key.
   Ex.) Setting of ► Month: In case of October, "10" is input by numeric key, [ENT] key is pushed, and it fixes.
4) After inputting Year/Month/Date/Hour/Minute/Second, finally select the item of “► Setting Execute” by ▼▲ key and ◄ ► key. Then, push [ENT] key, and it fixes.
5) The menu is ended pushing the [MENU] key again.
   *Set "Date and Time" at that time when you turn on the power supply.

3.1.2 Display Selecting

Operation Procedure

The display is selected with the screen selection key to the keyboard.

1) [CURR] key: Current screen (*3) is displayed.
2) [SHIP] key: Ship speed screen (*4) is displayed.
3) [PLOT] key: Track screen (*5) (current vector on the ship track) is displayed.
4) [GRAPH] key Graph screen (*6) (passage graphs of the current, ship speed, and depth, etc.) is displayed.
5) [FISH] key Fish finder screen (*7) (reflection in the sea echo such as shoals of fish) is displayed.
   *Ship speed and the current cannot display the measurement on the fish finder screen.
6) [PROFILE] key Profile screen (*8) (measurement graph of the multilayer current) is displayed.

---

*1 Normal Screen: When the factory is shipped, "current 1 screen" is displayed. Next time, the screen displayed at the end (power supply determination) is displayed.
*2 Setting Date /Time: In case of not setting he Date/Time, the misdate time is saved when the measured current data is memorizing saved.
*3 Current Screen: Refer to 2.2.1 “Tidal Current Display”.
*4 Ship Screen: Refer to 2.2.2 “Ship Speed Display”.
*5 Plot Screen: Refer to 2.2.3 “Track Plot Display”.
*6 Graph Screen: Refer to 2.2.4 “Graph Display”.
*7 Fish Screen: Refer to 2.2.5 “Fish Finder Display”.
*8 Profile Screen Refer to 2.2.6 “Tidal Profile Display”

3.1.3 Current Measuring Depth Setting

Operation Procedure

The depth of the measured current is set. It set on all screens except fish finder screen.

1) "Setting of the depth of the current measurement layer" menu (*1) is displayed by the [DEPTH] key.
2) Each depth of five layers of A-E that displays the current by the menu is set.
Ex.) Setting of ► A Layer: "30" is input with numeric key after ► A layer is selected by ▼▲ key when the measurement depth of A layer is set to 30m, [ENT] key is pushed, and it fixes.
3) Similarly, B-E layer is set.
4) The depth menu is ended pushing [depth] key again.

3.1.4 Fish Finder Display Range Setting

Operation Procedure

The range of depth, sensitivity [GAIN], and the bubble cancellation [STC] etc. of the fish finder screen are set. * It is not possible to set it on screens other than the fish finder screen.

1 Selecting display beam

Which screen is displayed among one screen display, two screen display, and four screen displays is selected.

In one screen display, the direction of the displayed beam is selected from the following four directions by menu (*2).

Beam Direction: Fore Starboard/Fore Port/After Starboard/After Port

The direction of the displayed beam is selected from the following three directions by menu (*2) on two screen display.

Beam Direction: Fore/Starboard/Port

2 Setting Depth Range

1) After numeric key (1-9,0) on the keyboard is pushed, it changes within the depth range set to each key.

2) A set value of ten numeric keys and a set value within the depth range can be confirmed by "Fish finder screen depth range setting" menu. A set menu is displayed by the [DEPTH] key. (*3)

3 Adjustment of Sensitivity [GAIN]: Adjustable at the range of 0.0-10.0

The receiving sensitivity of the fish finder screen is adjusted with the [GAIN] knob of the keyboard. Sensitivity rises by the display under the left of the screen, and the numerical value large as for the sensitivity value.

4 Adjustment of Sensitivity in the shallow water [STC]: Adjustable at the range of 0.0-10.0

The noise removal under surface of the water level is adjusted with the [STC] knob of the keyboard. The level by which the bubble is erased is displayed lower the left of the screen. The range of depth to remove the noise broadens when the numerical value is large.

3.1.5 Power OFF

End

The [PWR] key and the [OFF] key are pushed at the same time for about one second.

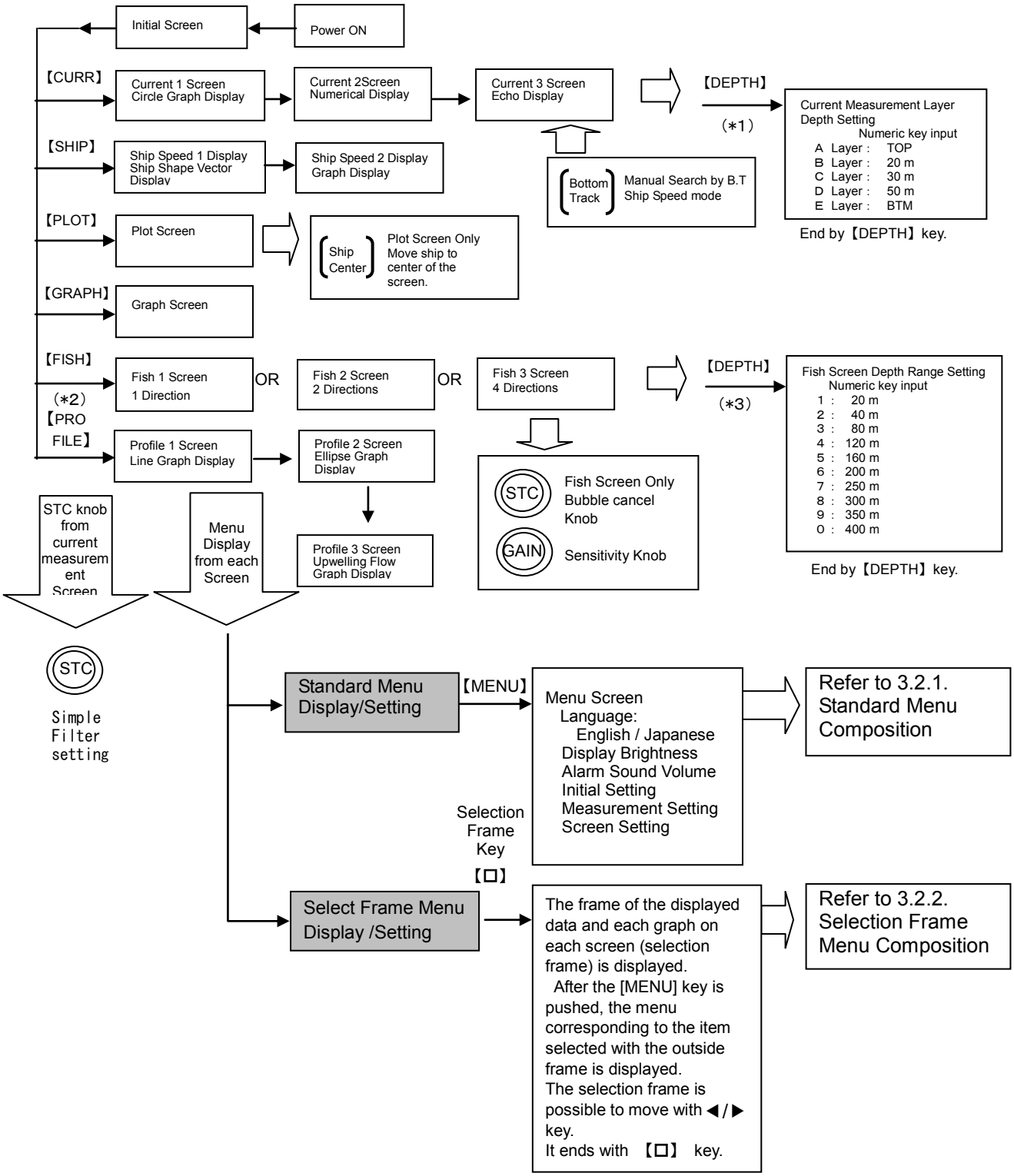
It sounds with [pi--pi], and the power supply enters the state of determination.

*It takes about ten seconds until the power supply cuts completely. (*4) * Push the [PWR] key and the [OFF] key at the same time for about ten seconds or more when you do not determine the power supply by any chance. It compulsorily becomes power supply determination.

*1 Depth setting in current measurement layer: Refer to 4.2.3 “Current Measurement Layer Depth Setting”.
*2 Selection of Beam Direction: Menu/Picture Setting/Fish Finder It sets in the ► screen.
*3 Fish Finder Screen Setting Menu of Depth Range: It is displayed that the [DEPTH] key is pushed by the fish finder screen displayed.
*4 When the [PWR] key is pushed at once after the power supply cuts, it is likely not to start normally.

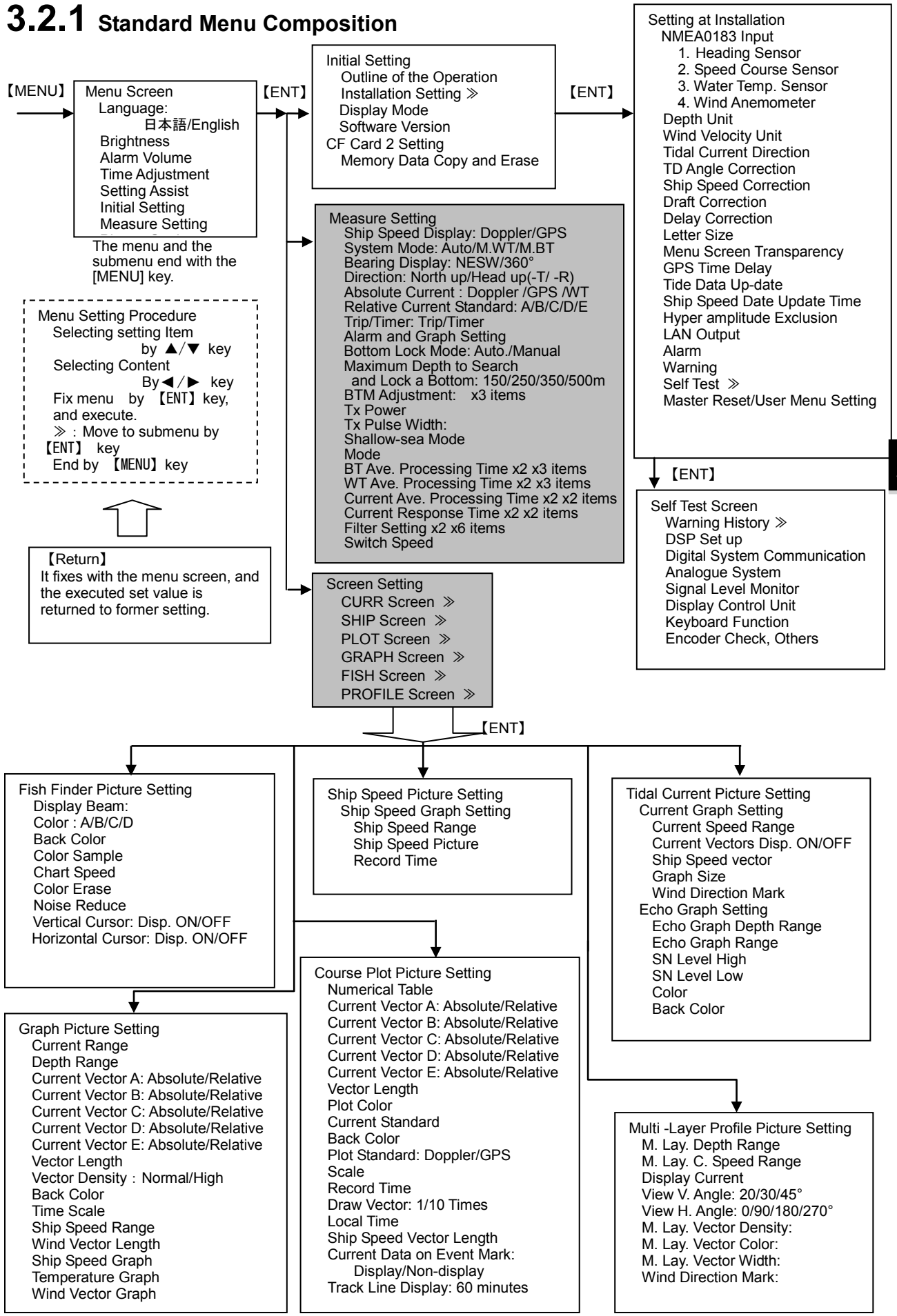
3.2 Menu Composition

In this device (current meter), the function to operate by the panel key and the knob of the keyboard is provided, and, besides, the function to operate on the menu is provided.. The current meter can be used more functionally by doing the setting to be suitable for the purpose.
There are two kinds of display methods of the menu about "Standard menu" and "Selection frame menu". It is possible to set it from either, and the set value is common and saved. In the figure below, (**) is an operation that pushes the key to which the keyboard corresponds.



*1 Depth setting in current measurement layer: Refer to 4.2.3 “Current Measurement Depth Setting”
*2 Selection of Beam Direction: Menu/Picture Setting/Fish It is set by ・Display Screen.
*3 Fish Screen Depth Range Setting Menu: It is displayed that the [DEPTH] key is pushed with the fish finder screen displayed.

3.2.1 Standard Menu Composition



3.2.2 Selection Frame Menu Composition

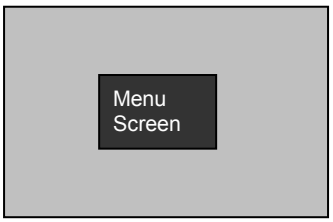
Display Screen	Selection Frame Menu Title Selection frame is displayed by【□】 key and move by ◀/▶ key. End by 【□】key.	Ref. of Menu Item Selection frame menu is displayed with the 【MENU】 key.	Display Screen No.
[CURR]Screen	Disp. Mode / Picture / Direction. Mode	12.1.2－ (1)	Common [CURR] Display
	Current S. &. Direction / Relative Current Layer	12.1.2－ (2)	Common [CURR] Display
	Current Circle Graph	12.1.2－ (3)	Current 1, 2
	Ship Speed Display	12.1.2－ (5)	Current 1
	Trip/Timer and Alarm	12.1.2－ (6)	Current 1, 2
	Water Temperature Alarm and graph	12.1.2－ (7)	Common [CURR] Display
	Echo Graph Setting	12.1.2－ (8)	Current 1, 3
	Bottom Depth Alarm	12.1.2－ (9)	Common [CURR] Display
	Ship Speed and Course	12.1.2－ (10)	Common [CURR] Display
	Wind Speed and Direction	12.1.2－ (16)	Common [CURR] Display
	Distance	12.1.2－ (12)	Current 2
	Own Ship Position	12.1.2－ (13)	Current 3
[SHIP] Screen	Disp. Mode / Picture / Direction. Mode	12.1.2－ (1)	Common [SHIP] Screen
	Current S. &. Direction / Relative Current Layer	12.1.2－ (2)	Common [SHIP] Screen
	Ship Speed Graph	12.1.2－ (14)	Common [SHIP] Screen
	Ship Speed Display	12.1.2－ (5)	Common [SHIP] Screen
	Ship Speed and Course	12.1.2－ (10)	Common [SHIP] Screen
	Distance	12.1.2－ (12)	Common [SHIP] Screen
	Trip/Timer and Alarm	12.1.2－ (6)	Common [SHIP] Screen
	Bottom Depth Alarm	12.1.2－ (9)	Common [SHIP] Screen
	Wind Speed and Direction	12.1.2－ (11)	Common [SHIP] Screen
[PLOT] Screen	Disp. Mode / Picture / Direction. Mode	12.1.2－ (1)	
	Current S. &. Direction / Relative Current Layer	12.1.2－ (2)	
	Plot Display	12.1.2－ (15)	
	Own Ship Position	12.1.2－ (13)	
	Ship Speed and Course	12.1.2－ (14)	
	Bottom Depth Alarm	12.1.2－ (9)	
	Water Temperature Alarm and graph	12.1.2－ (7)	
	Wind Speed and Direction	12.1.2－ (11)	
[Graph] Screen	Disp. Mode / Picture / Direction. Mode	12.1.2－ (1)	
	Current S. &. Direction / Relative Current Layer	12.1.2－ (2)	
	Own Ship Position	12.1.2－ (13)	
	Ship Speed and Course	12.1.2－ (10)	
	Bottom Depth Alarm	12.1.2－ (9)	
	Wind Vector Graph	12.1.2－ (16)	
	Water Temperature Alarm and Graph	12.1.2－ (7)	
	Ship Speed Graph	12.1.2－ (17)	
	Current and Depth Graph	12.1.2－ (18)	
[FISH] Screen	Disp. Mode / Picture / Direction. Mode	12.1.2－ (1)	Common [FISH]Screen
	Fish Finder Display	12.1.2－ (19)	Common [FISH]Screen
	Wind Speed and Direction	12.1.2－ (11)	Common [FISH]Screen
	Own Ship Position	12.1.2－ (13)	Common [FISH]Screen
	Water Temperature Alarm and graph	12.1.2－ (7)	Common [FISH]Screen
[PROFILE] Screen	Disp. Mode / Picture / Direction. Mode	12.1.2－ (1)	Common [PROFILE] Screen
	Current S. &. Direction / Relative Current Layer	12.1.2－ (2)	Common [PROFILE] Screen
	Profile 1 Graph	12.1.2－ (21)	Profile 1
	Wind Speed and Direction	12.1.2－ (16)	Common [PROFILE] Screen
	Water Temperature Alarm and graph	12.1.2－ (7)	Common [PROFILE] Screen
	Bottom Depth Alarm	12.1.2－ (9)	Common [PROFILE] Screen
	Ship Speed and Course	12.1.2－ (10)	Common [PROFILE] Screen
	Profile 2 Graph	12.1.2－ (22)	Profile 2
	Profile 3 Graph	12.1.2－ (23)	Profile 3

3.2.3 Basic Operation of Menu

1) Standard menu

How to open menu

The menu display opens pushing the [MENU] key.



*The menu screen is displayed at the center of screen.
*The menu Screen is displayed by the half penetration, and can select the permeability. (*1)

How to close menu

When the menu is closed, it closes pushing the [MENU] key again. Or, even if the lower menu [display/end] is selected with cursor key (*2), and the [ENT] key is pushed, it closes.

How to move to the lower hierarchy (submenu) of the menu

The submenu mark "《" has adhered to the menu with the lower hierarchy.

After the submenu "《" is selected with the cursor key to move to the submenu, push the [ENT] key.

How to move to the higher hierarchy (submenu) of the menu

After selecting the lower "Display/Return] in menu with the cursor key, push the [ENT] key in the return from the submenu to the higher hierarchy.

How to decide the item

A set value is selected with the cursor key when the item is decided or the numerical value is input. And, the thing that the set item reverses the character is confirmed. After that, it decides it pushing the [ENT] key.

Selecting by [・/・] key

When this display is in the menu, the setting is selected with the right and left cursor key.

Inputting by numeric volume key

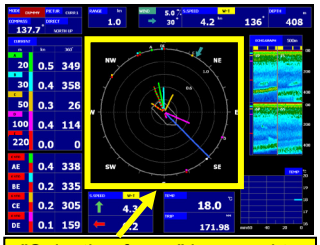
When this display is in the menu, a set value is input with numeric key (1,2・・・9,0) of the keyboard.

Standard menu list

Refer to the list "3.2.1 Standard Menu Composition" or "12.1.1 Standard Menu"

*1 Display of permeability setting menu: Menu/Initial setting/Installation setting/Menu permeability
*2 After moving to up/down by [▲/▼] key, select the setting value with [◀/▶] key.

2) Selection frame menu



"Selection frame" (outside frame with square yellow bold line) is displayed on the screen being displayed now. It moves to the table and the graph where it wants to set this "Selection frame".
Under such a condition, when the [MENU] key is pushed, a set menu corresponding to the part selected by "Selection frame" is displayed.

Fig. 3.2.1

How to display the selection frame

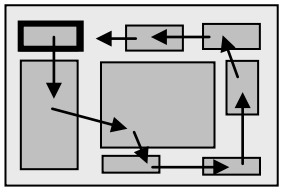
When the [□] key is pushed, the selection frame is displayed on the screen.
Refer to “Fig. 3.2.1”

How to close the selection frame

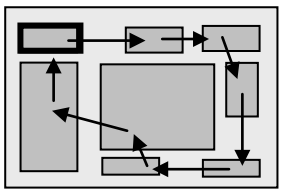
When the [□] key is pushed again with the selection frame displayed, the selection frame disappears from the screen.

How to move the selection frame

Move by [◄/► (Right/left)] cursor key.



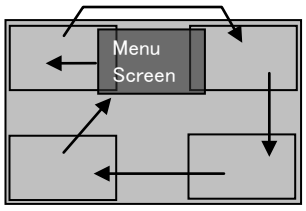
The selection frame moves to "Counterclockwise" with the [◄] or [▼] key.



The selection frame moves to "Clockwise" with the [►] or [▲] key.

For instance, the selection frame moves from "Circle Graph" to "Fore/After and Port/Starboard ship speed" in the lower when the [◄] key is pushed once from Fig. 3.2.1.
The movement order is a little different according to the screen.

How to display selection frame menu



It moves to the table and the graph where it wants to set "Selection frame" with the right and left cursor key. Under such a condition, when the [MENU] key is pushed, a set menu corresponding to the part selected by "Selection frame" is displayed.
Whenever the [PLOT] key is pushed, the selection frame menu can sequentially be moved as shown in a left figure.

How to close selection frame menu

When the menu is closed, it closes pushing the [MENU] key again. Or, even if the lower menu [display/end] is selected with cursor key, and the [ENT] key is pushed, it closes.

How to move to the lower hierarchy of the menu

This procedure is the same as the above-mentioned "Standard menu".

How to move to the higher hierarchy of the menu

This procedure is the same as the above-mentioned "Standard menu".

How to decide the item

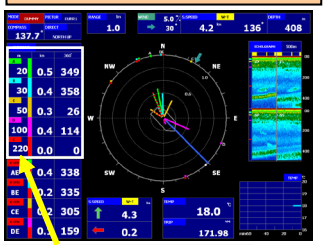
This procedure is the same as the above-mentioned "Standard menu".

Selection frame menu list

Refer to the list “3.2.2 Selection Frame Menu Composition” or “12.1.2 Selection Frame Menu”

3) Depth setting menu

Ex.: [CURR] 1 Screen
Circle Graph Display

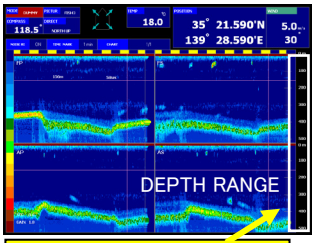


The current measurement depth of the A-E layer is set.

Fig. 3.2.2 [CURR] Screen

When the current measurement data (All screens except the [FISH] screen correspond) is displayed, the depth setting menu of the current measurement layer in the A-E layer is displayed.

Ex.: [FISH] 3 Screen



The depth range setting menu of the [FISH] screen is displayed.

Fig. 3.2.3 [FISH] Screen

When the [FISH] screen is displayed, the depth range setting menu of the [FISH] screen is displayed.

How to open the depth menu

It opens by pushing the [DEPTH] key.
Refer to “Fig. 3.2.2, Fig. 3.2.3”.

How to close the depth menu

When the menu is closed, it closes pushing the [DEPTH]key again. Or, even if the lower menu [display/end] is selected with cursor key, and the [ENT] key is pushed, it closes.

How to move to the lower hierarchy (submenu) of the depth menu

This procedure is the same as the above-mentioned "Standard menu".

How to move to the higher hierarchy (submenu) of the depth menu

This procedure is the same as the above-mentioned "Standard menu".

How to decide the item

This procedure is the same as the above-mentioned "Standard menu".

Depth menu list

Refer to “3.2 Menu Composition” or “12.1-(15)”, “12.1.1-(20)”.

4) Return of menu

The set value that is input with the menu screen and fixed is returned to former set value ([UNDO] key of keyboard).

[Common: Standard menu, Selection frame menu, Depth menu]

Even after the setting of the menu is fixed with the [ENT] key, it is possible to return it to a set value before the menu is changed with the [UNDO] key before the menu is closed.

Ex.) Before change

Current measurement layer and depth setting: Numeric key input			
▶ A layer	12	m	TOP
▶ B layer	20	m	
▶ C layer	30	m	
▶ D layer	50	m	
▶ E layer	100	m	Bottom Lock
Menu Display Help	Display End Return ≫ Push [ENT] key		

Change Setting Value

After change

Current measurement layer and depth setting: Numeric key input			
▶ A layer	12	m	TOP
▶ B layer	**50**	m	
▶ C layer	**80**	m	
▶ D layer	**100**	m	
▶ E layer	**150**	m	Bottom Lock
Menu Display Help	Display End Return ≫ Push [ENT] key		

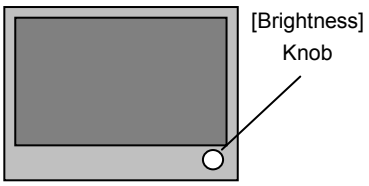
1) Push [UNDO] key.
2) Undo menu is displayed.
3) Execution is selected from Undo (discontinuance/execution), and push the [ENT] key.
4) It returns to the setting before it changes.

3.3 Preparation for Operation

3.3.1 Adjusting Screen Brightness

Operation Procedure

Confirm that there is a power supply.
The brightness knob under the right of the display is rotated, and it adjusts in the state to see the screen easily.



The whole of the screen lightens if the [brightness] knob is turned clockwise.
The whole of the screen darkens when the [brightness] knob is turned counterclockwise.

3.3.2 Lighting Operation Panel and Adjusting Operation Sound

1) Adjusting the panel lighting

Operation Procedure

It adjusts pushing either of numeric keys (0-3) while pushing both [BUZZER] and [UNDO] keys at the same time.
Brightness changes by selecting a numeric key at three stages.

Numeric Key	0	1	**2**	3
Brightness	Lighting OFF	Dark	**Medium**	Bright

*When the power supply is turned on, it is set to [2].

2) Adjusting the operation sound

Operation Procedure

It adjusts pushing either of numeric keys (0-3) while pushing both [BUZZER] and [RESET] keys at the same time.
Sound volume changes by selecting a numeric key at three stages.

Numeric Key	0	1	**2**	3
Sound Volume	Sound OFF	Low	**Medium**	High

*When the power supply is turned on, it is set to [2].

3.3.3 Changing the Display color of Screen at Daytime and Night

Operation Procedure

The screen of the light color system is switched in daytime. And, it is possible to switch to a screen the dark color system at night.

1 **Push the [MENU] key.** The main menu is displayed.
2 **The screen ► brightness is selected from the main menu.**
3 **Brightness or darkness is selected from the [screen brightness], and it fixes with the [ENT] key.**
The screen of brightness and darkness can separately set the selection by a set submenu [Setting ≫].

Setting submenu

Screen Brightness	
Bright・Background Color	Black, Navy Blue, Gray, and White
Dark・Background Color	Black, Navy Blue, Gray, and White

3.3.4 Alarm Display, Stopping of Alarm Sound and Adjusting volume

1) The alarm display and the alarm sound are stopped when alarm is generated, and it is canceled an alarm.

Operation Procedure

Push the BUZZER key. The alarm display and the alarm sound stop.

2) The alarm sound volume is adjusted.

Operation Procedure

1 **Push the [MENU] key.** The main menu is displayed.
2 **The screen ► Alarm sound volume is selected from the main menu.**
3 **OFF or 1-3 is selected from the [Alarm sound volume], and it fixes with the [ENT] key.**

Setting Value	OFF	1	**2**	3
Sound Volume	Sound OFF	Low	**Medium**	High

3.3.5 Setting of Display Color in Shoal of Fish Image and Echo Graph

The shoal of fish image and the echo graph can selecting set the display color respectively.

3

1) The display color of the shoal of fish image on the [FISH] screen is set.

Operation Procedure

1 **Push the [MENU] key.** The main menu is displayed.
2 **The screen ► Picture setting is selected from the main menu.**
3 **[FISH≫] is selected from "Picture setting", and "Fish Finder Picture setting" is displayed with the [ENT] key.**
4 **A, B, C or D is selected from the ► Color, and it fixes with the [ENT] key.**

Setting Value	**A**	B	C	D
Color Arrangement	**16 Color Blue system color**	16 Color Green system color	16 Color Light color	8 Color Blue system color

2) The display color of echo graph on the [CURR] screen is set.

1 **Push the [MENU] key.** The main menu is displayed.
2 **The screen ► Picture setting is selected from the main menu.**
3 **[CURR≫] is selected from "Picture setting", and "Tidal Current Picture Setting" is displayed with the [ENT] key.**
4 **A, B, C or D is selected from the ► Color, and it fixes with the [ENT] key.**

Setting Value	**A**	B	C	D
Color Arrangement	**16 Color Blue system color**	16 Color Green system color	16 Color Light color	8 Color Blue system color

3.3.6 Eliminating Interference

It is possible to set it only to the [FISH] screen. The interference elimination is used to remove the acoustic noise that enters from another ship and the noise appearing at random. Use it by 'Off' usually., and make it to 'On' When you want to reduce the effects of noise.

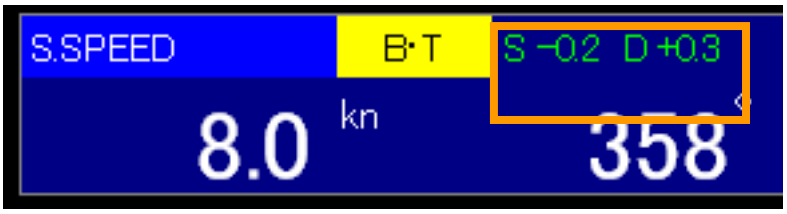
Operation Procedure

1 **Push the [MENU] key.** The main menu is displayed.
2 **The screen ► Picture setting is selected from the main menu.**
3 **[FISH≫] is selected from "Picture setting", and "Fish Finder Picture Setting" is displayed with the [ENT] key.**
4 **ON or OFF is selected from the ► Noise Reduce, and it fixes with the [ENT] key.**

3.3.7 Assistance of Setting

Since it is a menu for servicemen, please use it in OFF usually.

Assistance of a setting computes and displays the reference value of each setting value of compensation of the attachment angle of required transducer, and ship speed compensation, when measuring a current on a GPS standard.



In the case of the above-mentioned example
Input value “-0.2” of S clause as ship speed correction value after opening a menu.
Input value"+0.3" of D clause as angle correction value after opening a menu.
When using assistance of a setting, it needs to be cautious of the following matter.
(1) To measure ship speed by bottom tracking stably
(2) To navigate linearly without carrying out acceleration and a slowdown, and a turning round
(3) To be flat a sea bottom
(4) To be a little roll-pitch of a vessel.
(5) The state of (1) - (4) should be continuing 30 minutes or more.

Operation procedure

1 **Press [MENU] key.** A main menu is displayed.
2 **Select ▶Setting assistance from a main menu.**
3 **After selecting either of OFF/ON from ▶setting assistance, fix it ([ENT] key).**

3.3.8 Simple Setting and Reference Value of Measurement Setting

The reference value of a measurement setting according to situation is introduced.
Note: By setting a reference value, it does not guarantee that a situation improves.

In the tidal current measurement mode (all screens except fish finder mode)
Filter setting using STC knob is possible.
Filter setting by the STC knob,
One-dimensional setting (-15 to 0 to +6) with the STC knob is enabled.
In the past, adjustment of 7 kinds of parameters is necessary.

-15 : Shortest verage time (Respons is fast, not stable)
0 : Initial value (Respons is relatively slow, stabilized well)
+6 : Longest average time (Respons is slow, stabilized)

It is recommended to use between -10 and +1

In the following cases,
It may be improved by decreasing the setting value (shortening the average time).

- Tidal current value does not easily approach the true value.
- Tidal current display value is small continues.
- The respons is slow and can't detect the tide (current-rip).

If it is set to less than -10, In most situations the display value of the tidal current does not stabilize (large variation) and it is hard to use.

If it is not stable even if it is set to a value greater than +1, there are bad factors that affect measurement.

By operating the STC knob, change the measurement setting value of 7 items.

TIDE PROCESS
TIDE AVE. PROCESSING TIME 1
TIDE AVE. PROCESSING TIME 2
TIDE RESPONSE TIME 1
TIDE RESPONSE TIME 2
FILTER SETTING 1
FILTER SETTING 6

After adjusting with the STC knob it is also possible to change every item by menu.

Introduce reference values for setting when not using simple setting

The following configuration changes is
the setting that priority to the response compared to the standard setting.

This setting is the setting that assumes as much follow-up and JLN628(std.. or short.).
Adjustment of response (stability) is, please go tide ava. processing time 1,2.

BTM ADJUSTMENT = +2 → 0 (Adjusted in accordance with change of tide process.)
TIDE PROCESS = J3 → J3 or J4+ (Adjusted in accordance with change of response-oriented)
TIDE AVG. PROCESSING TIME 1 = 6 → 8 (Time constant filter 8: about 240s)
TIDE AVG. PROCESSING TIME 2 = 7 → 5 (Same kind of filter operation as the 628.)
TIDE RESPONSE TIME 1 = 6 → 3 (Same kind of filter operation as the 628.)
TIDE RESPONSE TIME 2 = 0 (Standard setting)
FILTER SETTING 1 = B1 (Standard setting)
FILTER SETTING 2 = K3 (Standard setting)
FILTER SETTING 6 = M5 → M3 (Same kind of filter operation as the 628.)

Below, change depending on the preferences and circumstances.
TIDE DATA UPDATE TIME = MOMENT → FAST (It reduces the variation of the display value.)

The following configuration changes is
the setting that priority to extreme importance to response-oriented.

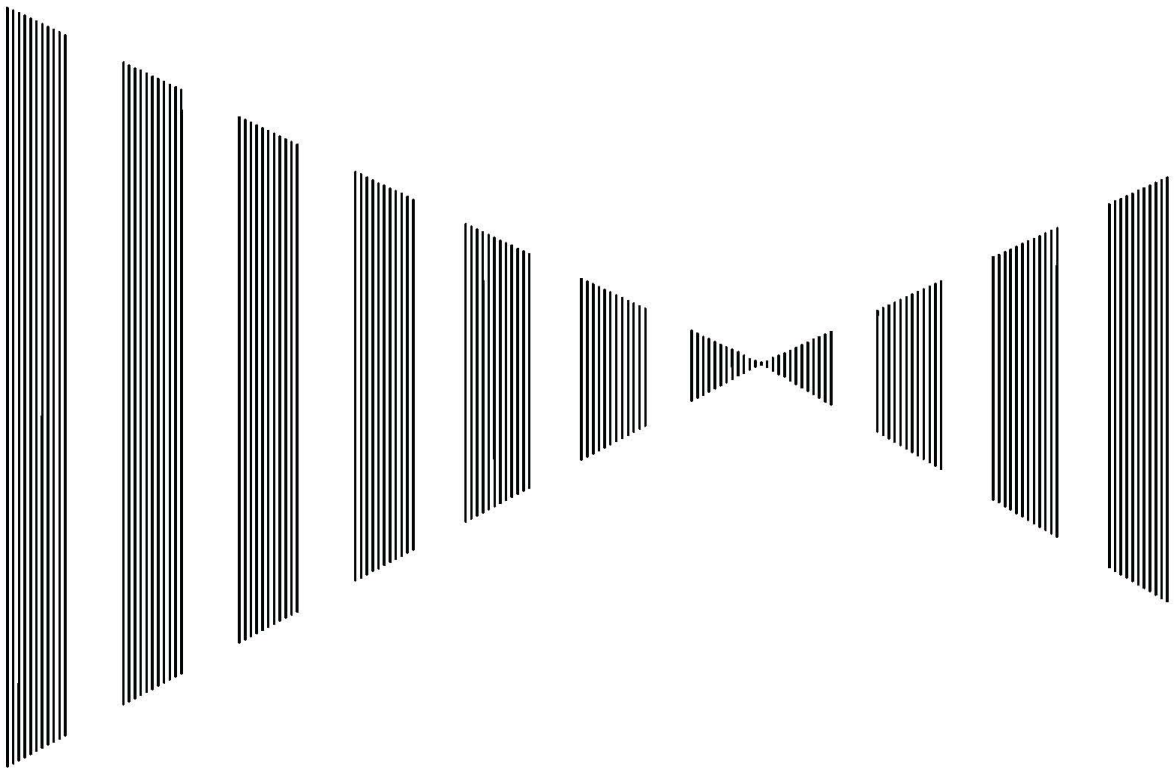
Response is faster than the standard set of JLN628.
However, in order to easily influenced by the disturbance, the variation will increase.
Adjustment of response (stability) is, please go tide ava. processing time 1,2.
(The following is related to Ver.3.1.1.21.
Depending on the version of the software, the standard value and the setting item, there is a different thing.)

BTM ADJUSTMENT = +2 → 0 (Adjusted in accordance with change of tide process.)
TIDE PROCESS = J3 → J3 or J4+ (Adjusted in accordance with change of response-oriented)
TIDE AVG. PROCESSING TIME 1 = 6 → 6～9 (Time constant filter about 20s ～ 120s)
TIDE AVG. PROCESSING TIME 2 = 7 → Short (Same kind of filter operation as the 628.)
TIDE RESPONSE TIME 1 = 6 → Short (Same kind of filter operation as the 628.)
TIDE RESPONSE TIME 2 = 0 → -3 (Same kind of filter operation as the 628.)
FILTER SETTING 1 = B1 (Standard setting)
FILTER SETTING 2 = K3 → K1 (Adjusted in accordance with change of response-oriented)
FILTER SETTING 6 = M5 → M1 (Adjusted in accordance with change of response-oriented.)

Below, change depending on the preferences and circumstances.
TIDE DATA UPDATE TIME = MOMENT → FAST (It reduces the variation of the display value.)

Filter settings will mutually influence each item each other.
Therefore, in the above-mentioned two settings, different response time for the setting of the TIDE AVG. PROCESSING TIME 1.

4. Operation



4.1 Measurement Setting and Current Display

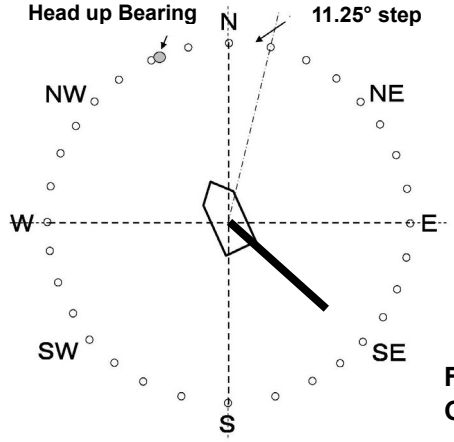
4.1.1 Bearing Display: 32 Point or 360°

Function When the direction standard is set to the north up bearing, the mode of expression of the current direction and the course of the [CURR] screen is selected.

Operation **Standard Menu:** [MENU] key/Menu screen/Measure setting≫ /[ENT] key/Bearings : N･E･S･W/360°

Selection Frame Menu: [□] key/Enclose “Current” with the frame/[MENU] key/ Current Speed and Direction/Relative Current Layer/ Bearings: N･E･S･W /360°

Bearing Display



The graphical figure displays all surroundings with the bearing mark of division (11.25° step) into 32. (Figure 4.1.1)
The same graph as "32 point bearing" is displayed for "360°", and only a numeric display in the current direction changes. Moreover, 32 point bearing figure converted into 360° bearing and it displays in Table 4.1.1.

Fig. 4.1.1 N･E･S･W /360° bearing Graph Display (common)

Current direction/Current speed Numerical Display

N･E･S･W (32 Point Display)

Depth	Current Speed	Current Direction
m	kn	N･E･S･W
A 40	1. 4	SE

360° Bearing Display

Depth	Current Speed	Current Direction
m	kn	360°
A 40	1. 4	135

Table 4.1.1 N･E･S･W /360° bearing conversion table

N･E･S･W	360°Bearing	N･E･S･W	360°Bearing	N･E･S･W	360°Bearing
N	0.00(360)	SE	135.00	W	270.00
N／E	11.25	SE／S	146.25	W／N	281.25
NNE	22.50	SSE	157.50	WNW	292.50
NE／N	33.75	S／E	168.75	NW／W	303.75
NE	45.00	S	180.00	NW	315.00
NE／E	56.25	S／W	191.25	NW／N	326.25
ENE	67.50	SSW	202.50	NNW	337.50
E／N	78.75	SW／S	213.75	N／W	348.75
E	90.00	SW	225.00	N	0.00(360)
E／S	101.25	SW／W	236.25		
ESE	112.50	WSW	247.50		
SE／E	123.75	W／S	258.75		

4.1.2 Direction Standard: North up Bearing/Head up Bearing (-T / -R)

·Function· The bearing standard of the current and the ship speed vector displayed on the [CURR] screen and others is selected.

Operation **Standard Menu:** [MENU] key/Menu screen/Measure setting ≫ /[ENT] key/Direction standard: North up bearing /Head up bearing −T /Head up bearing -R

Selection Frame Menu: [□] key/Enclose “Mode/Screen” with the frame/[MENU] key/ “Mode/Screen” (*1) menu/ Direction standard: North up bearing/Head up bearing

Bearing Display

North up bearing: True north (N) is fixed on the top of screen. The direction of hull, current speed and ship speed vector are displayed on the bearing board in 32 point bearing (*2). The hull is turning to NNW (337.5°/compass bearing) in the example of Figure 4.1.2.

Moreover, the prow bearing mark and the hull rotate according to the change in the compass bearing

Head up bearing: The ship head is fixed on the top of screen. North, south, east, and west, current speed, and the ship speed vector are displayed on the bearing board of 360°. As 0°, the direction of starboard 22.5° is true north (N) in the example of Figure 4.1.2 as for the ship head.

Moreover, the bearing character of NSEW rotates according to the change in the compass bearing.

Head up bearing -T, current direction value is displayed in true direction.

Head up bearing –R, current direction value is displayed in the relative direction.

North up Bearing **Head up Bearing**

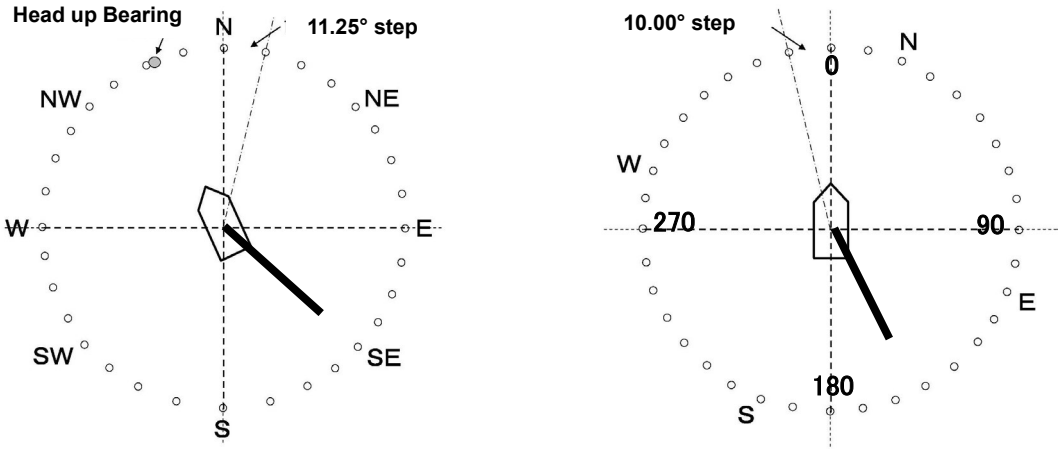


Fig. 4.1.2 North up Bearing and Head up Bearing Graph Display

Current Direction/Current Speed Numerical Display

North up Bearing Display

Depth	Current Speed	Current Direction
m	kn	N·E·S·W (*2)
A 40	1. 4	SE

Head up Bearing Display

Depth	Current Speed	Current Direction
m	kn	360°(*3)
A 40	1. 4	158 (*4)

*1 Mode/Screen: Abbreviation display for Selection frame menu screen “Mode/Screen/Compass/Bearing standard”

*2 The bearing display can display "360° bearing" by the menu selection.

*3 The current direction doesn't depend on the selection of the bearing display, and become only 360° display for the head up bearing.

*4 When it is made the head up bearing standard, the current of SE(135.0°) (the head up bearing 337.5°) becomes 157.5≒ 158° by Figure 4.1.2 North up Bearing Standard.

4.1.3 Absolute Current Standard: Doppler / GPS / Auto-GPS WT / Auto-WT

·Function· When absolute current (*1) (current speed to ground) is measured, the ship speed data is set as a standard.
Set the Doppler /Auto-WT /WT when the navigation equipment such as GPS is not connected.

Operation **Standard Menu:** [MENU] key/Menu screen/Measure setting≫ /[ENT] key/Absolute current standard: Doppler/GPS/GPS at water tracking
Selection Frame Menu: [□] key/ Enclose “Current” with the frame /[MENU] key/ “Current Speed and Direction / Relative Current Layer” menu/Absolute current standard: Doppler/GPS/GPS at water tracking

Display

The absolute current standard is displayed.
GPS/WT: It is displayed that the absolute current standard is set to GPS/WT.
In the GPS standard, the absolute current is measured based on the ship speed data of GPS and displayed. It is necessary to connect the navigation equipment such as GPS with this device to use the GPS standard.
Under the WT standard, Measure the tidal current based on ship speed to water.

Non-display (Doppler): When the absolute current standard is set to Doppler, it is not displayed.
In the Doppler standard, the absolute current is measured based on ship speed by bottom tracking of the Doppler data and displayed.
Auto-GPS / Auto-WT: When the absolute current standard is set to Auto-GPS / Auto-WT, it switches based on Doppler standard when the Doppler data is bottom tracking, and it switches automatically based on GPS / WT standard at water tracking.

4.1.4 Relative Current Standard: Selection of Standard Layer.

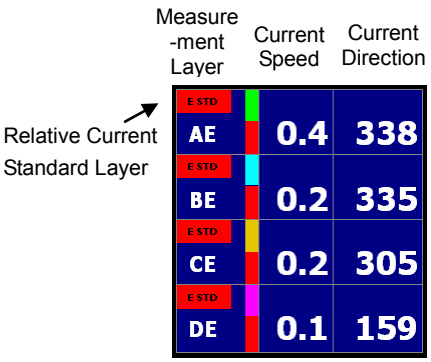
·Function· When relative current (*2) is measured, the based current layer is selected from the A-E layer.

Operation **Standard Menu:** [MENU] key/Menu screen/Measure setting≫ /[ENT] key/Relative current standard: A-E layer
Selection Frame Menu: [□] key/ Enclose “Current” with the frame /[MENU] key/ “Current Speed and Direction / Relative Current Layer” menu/ Relative current standard: A-E layer

About relative current standard

For instance, when the relative current standard is set to "E layer", A layer, B layer, C layer, and D layer are displayed respectively based on E layer as "AE" "BE" "CE" "DE".

Relative Current Display



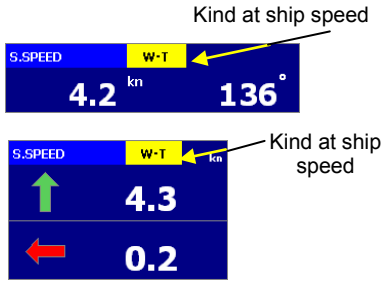
*1 Absolute current: Refer to 6.1.1 “Absolute current”.
*2 Relative current and standard current layer: Refer to 6.1.2 “Relative Current and Standard Current Layer”.

4.1.5 Ship Speed Display: Doppler/GPS

Function The ship speed data is selected.
Set it to Doppler (ship speed measurement by bottom tracking･water tracking) when the navigation equipment such as GPS is not connected.

Operation **Standard Menu:** [MENU] key/Menu screen/Measure setting≫ /[ENT] key/Ship speed display: Doppler･GPS
Selection Frame Menu: [□] key/ Enclose “Ship speed・Course” with the frame /[MENU] key/ Ship speed・Course menu/ Ship speed display: Doppler･GPS

Display



Display of the ship speed
GPS: It is displayed when the ship speed display is set to GPS.
In GPS, the ship speed data of GPS is displayed.
It is necessary to connect the navigation equipment such as GPS with this device to display ship speed by GPS.

Doppler: When the ship speed display is set to Doppler, it is displayed as BT or WT.
Doppler measures and displays the ship speed by bottom tracking or water tracking(*1) of the Doppler data.

4.1.6 System Mode: Auto / Manual water tracking/Manual Bottom tracking

Function The measurement mode when ship speed is measured by Doppler and displayed is selected.
The standard is set to [Auto].

Operation **Standard Menu:** [MENU] key/Menu screen/Measure setting≫ /[ENT] key/System mode: Auto/Manual W.T. /Manual B.T.
Selection Frame Menu: [□] key/ Enclose “Ship speed/Course” with the frame /[MENU] key/ Ship speed/Course menu/System mode: Auto･Manual W.T.･Manual B.T.

About system mode

Automatic: Though ground A is usually displayed, when it becomes impossible to measure the ship speed by bottom tracking as the bottom of the sea or more depth becomes deep (about 400(JLN-650)/250(JLN-652)m(*2)), it switches to water tracking display automatically (*3).
Manual water tracking: The ship speed by water tracking is always displayed. (*4),(*6)
Manual bottom tracking: The ship speed by bottom tracking is always displayed. (*5),(*6)

*1 Whether the sip speed by bottom tracking or water tracking is displayed follows the setting of "4.1.6 ship speed measurement mode".
*2 The maximum bottom of the sea depth to which the ship speed by bottom tracking can be measured is different according to the bottom sediment and the oceanographic condition.
*3 Select GPS by menu/measurement setting/ship speed display when you display the ship speed (to ground) by GPS.
*4 In the automatic mode of operation, correct the ship speed by water tracking is measured and displayed after it makes to manual water tracking when the large fish group is recognized bottom of the sea by mistake.
*5 When the ship speed by bottom tracking cannot be measured, "***" is displayed.
*6 This setting doesn't influence the current measurement.

4.1.7 Trip/Timer

Function Whether the section track distance (trip) is displayed or the elapsed time (timer) is displayed is selected.
This trip or the timer is displayed on the [CURR] screen and the [SHIP] screen.

Operation **Standard Menu:** [MENU] key/Menu screen/Measure setting≫ /[ENT] key/Trip・Timer: Trip・Timer
Selection Frame Menu: [□] key/ Enclose “Trip (Timer)” with the frame /[MENU] key/”Trip・Timer and Alarm” menu/ Trip・Timer: Trip・Timer

About ship speed measurement mode

Trip or Timer

Trip Distance: It is a distance that sailed in the point “0” resets as a starting point till present.
It is displayed by the unit of NM, and the maximum value is 99999.99NM.
“0” resets that the maximum value is exceeded.

Timer (Elapsed time): It is time for the point “0” resets to be going to pass as a starting point till present.
It is displayed at the hour, the minute and the second, and the maximum value is 99:59:59 .
“0” resets that the maximum value is exceeded.

Zero Reset: [RESET] key/ “Trip Timer and Alarm” menu/ Trip Timer Reset: Cancel/Operate /[ENT]
If the distance is set, the alarm can be given according to the distance. (*1)
It ends pushing [RESET] key.

Total Distance: Even if reset of trip/timer is operated by the total distance, the distance displayed by "Sailing" on the screen cannot be done in "0". (*2)

4.1.8 Measurement Alarm and Graph Setting

Function **Measurement Alarm (*3):** The warning value respectively of current speed, ship speed, depth, trip, timer, water temperature (*4), and the wind speed (*4) is set. When a set value is exceeded, it generates an alarm.

Operation **Standard Menu:** [MENU] key/Menu screen/Measure setting≫ /[ENT] key/Alarm and Graph setting≫/[ENT] key/”Alarm and Graph setting” menu/ Various alarm settings(Current speed, Ship speed, Depth, Trip, Timer, Water temperature, Wind speed)
Selection Frame Menu:
Current speed alarm: [□] key/ Enclose “Current” with the frame /[MENU] key/ “Current Speed and Direction / Relative Current Layer” menu/ Current speed alarm・Low: OFF kn
Ship speed alarm: [□] key/ Enclose “Ship speed and Course” (*5) with the frame /[MENU] key/ “Ship speed and Course” menu/ Ship speed alarm・Low: OFF kn
Depth alarm: [□] key/ Enclose “Depth” with the frame /[MENU] key/”Bottom Depth alarm” menu/ Bottom Depth alarm・Shallow: OFF m
Trip (Timer) alarm: [□] key/ Enclose “Trip (Timer)” with the frame /[MENU] key/”Trip/Timer and alarm” menu/ Trip alarm: OFF NM (Timer alarm: OFF h)
Water temperature alarm: [□] key/ Enclose “Water temperature” with the frame /[MENU] key/”Water temperature alarm and graph” menu/ Temperature alarm・High: OFF ℃
Wind speed alarm: [□] key/ Enclose “Wind speed” with the frame /[MENU] key/”Wind speed and Direction” menu/ Wind speed alarm・Low: OFF m/s

*1 Refer to 4.1.8 “Alarm and Graph Setting”
*2 To adjust the total distance to “0”, execute the master reset. Refer to 7.1.10 “Master reset”.
*3 Alarm includes a measurement alarm and a warning alarm. Refer to 9.1 “Warning”.
*4 It is necessary to connect each sensor to display, and to alarm the water temperature and the wind speed.
*5 It is displayed as the S. Speed when the Direction Standard is the North Up.
It is displayed at the Head Up as the S. SPD Angle.

Measurement alarm

Current speed alarm・Low: When Current speed falls below a set value (warning value), it generates an alarm.

▶ Setting alarm value [OFF, 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5]kn

Ship speed alarm・Low: When ship speed falls below a set value (warning value), it generates an alarm.

▶ Setting alarm value [OFF, 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0]kn

Bottom Depth alarm・Shallow: When becoming shallower than the set depth (warning value), it generates an alarm.

▶ Setting alarm value [OFF, 60]m 60m: Input by numeric key. (It is possible to set within range (*1) of 5-500m.)

Timer alarm・Long: When the set time (warning value) is exceeded and it sails, it generates an alarm.

▶ Setting alarm value [OFF, 1:00 1:30 2:00 2:30]h
The timer is time that passes between the point “0” resets (*2) with [RESET] key and present.

Trip alarm・Long: When the set distance (warning value) is exceeded and it sails, it generates an alarm.

▶ Setting alarm value [OFF, 1.00 2.00 3.00 4.00]NM
Trip is a section sailing distance that sailed from the point “0” resets (*2) with 【 reset 】 key to present.

Temp. alarm・High (*3): When the set water temperature (warning value) is exceeded, it generates an alarm.

▶ Setting alarm value [OFF, 10 11 12 13 14 15 16 17] ℃

Wind speed alarm・Low (*3): When falling below the set the wind speed (warning value), it generates an alarm.

▶ Setting alarm value [OFF, 4.0 5.0 6.0 8.0 10.0 12.0 14.0]m/s

Stop of alarm buzzer

The corresponding measurement alarm is displayed when it reaches the set warning value, and the alarm buzzer rings.
Stop the buzzer pushing the [BUZZER] key when the alarm buzzer rings.

CURRENT SPEED ALARM

Date : ＊＊＊Year＊＊Month＊＊Date 14:06
ALARM POINT : ＊＊. ＊ kn
SITUATION : CURRENT SPEED BECAME SLOWER THAN SETTING POINT.
INDICATION : OFF THE ALARM INDICATION WITH “BUZZER” KEY.

Fig. 4.1.3 Ex.: Current speed alarm

Note: When the alarm buzzer rings, the operations of the key other than [BUZZER] become invalid. Cancel an alarm first pushing the [BUZZER] key when the operations other than an OFF buzzer are done. Afterwards, the measurement alarm buzzer will be released in about five seconds automatically.

Function

Water temperature setting (*3): The water temperature graph is on current 1 screen, current 2 screen, and the elapsed screen.
The setting of the graph sets width and the center (median) in the water temperature graph together.

Operation

Standard Menu: [MENU] key/Menu screen/Measure setting≫ /[ENT] key/Alarm and Graph setting ≫/[ENT] key/ “Alarm and Graph setting” menu/Temperature graph center and Temperature graph width (*4)

Selection Frame Menu: [□] key/ Enclose “Water temperature” with the frame /[MENU] key/”Water temperature alarm and graph” menu/ Temperature graph center and Temperature graph width (*4)

▶ **Temp. graph center:** The water temperature value of the graph center is set.

▶ **Temp. graph width:** The water temperature range value is set.

▶ **Temp. graph display time:** The display time of each screen is set.
Curr1 Picture: 60min. Fixed
Graph Picture: It depends on the setting of Time Scale.

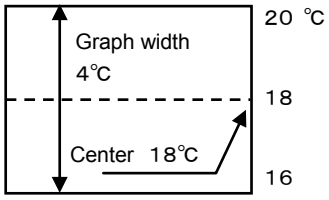


Fig. 4.1.4 Water Temp. Graph

*1 Around 5m and 500m of depth might not be able to be measured according to the condition of sea.
The display depth value is a mean value of depth measured from the ultrasonic beam in four directions, and no depth value of the right under. The depth value is a value from oscillator (supersonic wave transducer) roller end face of this device, and the water line is not corrected.
*2 How to “0” reset trip/timer value: Refer to 4.1.7 “Trip/Timer”.
*3 When the water temperature and the wind speed alarm are displayed, it is necessary to connect each sensor.
*4 The graph can be erased by selecting OFF. To restart the water temperature graph on the graph screen, set excluding OFF from standard menu or the selection frame menu of current 1 and 2 screens.

4.1.9 Setting of Bottom Tracking Maximum Depth to Seach

Function It explores the seabed within the range of depth that is shallower than that of the depth value selected by the menu. And, the bottom of the sea depth is measured and tracked. The standard is set to 500m the maximum.

Operation **Standard Menu:** [MENU] key/Menu screen/Measure setting≫ /[ENT] key/ maximum depth to saech: 0/50/100/150/200/250/300/350/400/500m

About the maximum depth to seach

This device explores the seabed and provides the function to track automatically. The bottom of the sea distinction and the tracking precision go up when the range to explore the seabed is shallowly limited.

Therefore, please set the bottom of the sea tracking maximum depth to deeper than the bottom of the sea depth value of the sea area and nearest depth by the menu as much as possible when the bottom of the sea depth uses it in an already-known sea area.

For instance, the bottom of the sea tracking maximum depth is set to 250m when operating in the sea area where the maximum bottom of the sea depth is 170m. In this case, to explore the seabed by depth that is shallower than 250m and to distinguish from bottom of the sea, it comes might not mistake tracking bottom of the sea by the multiple reflection etc. that are 251m or deeper.

4.1.10 Bottom Lock Mode: Automatic / Manual

Function The mode of the investigation and the tracking of the sea bottom is selected. The standard is set automatic.

Operation **Standard Menu:** [MENU] key/Menu screen/Measure setting≫ /[ENT] key/Bottom lock mode: Auto / /Manual

About the bottom lock mode

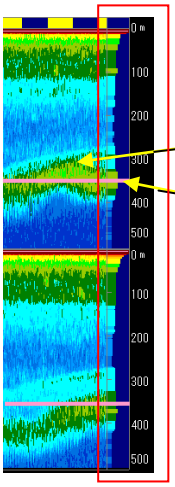
Auto: In the depth range shallower than the depth-sounding value selected with the bottom tracking maximum depth of the menu, it automatic-explores and tracks the bottom of the sea.

Manual: The sea bottom depth is input, it limits within the near range of depth by manually, and the sea bottom is investigated into again.

After the sea bottom is distinguished, it tracks by the automatic operation.

Manual input of bottom investigation depth: While seeing the echo display of current 3 screen, the horizontal cursor is moved to the upper side of the echoes of a screen right edge by the ▼ ▲ key.

Next, the [Seach] key on the operation panel is pushed.



Manual input of bottom investigation depth:

1) The current 3 screens are displayed.
2) It is confirmed that the depth range (500m or less) is changed, and the sea bottom echo is displayed on the screen.
3) The horizontal cursor is moved with the ▼▲ key, and the cursor is set to the upper side of the sea bottom echoes,
4) When the Seach key to the operation panel is pushed, the sea bottom in the vicinity of depth of the horizontal cursor is investigated into.

4.1.11 BTM Adjustment: -3/-2/-1/0/+1/+2/+3/+4/+5/+6

Function The measurement depth of layer pursued according to ups and downs in bottom of the sea automatically can be adjusted. Use the +2 position usually.

Operation **Standard Menu:** [MENU] key/Menu screen/Measure setting≫/[ENT] key/BTM Adjustment: -3/-2/-1/0/ +1/+2/+3/+4/+5/+6

About the BTM Adjustment

Set the "-" value when you want to tracking the upper part from sea bottom. Set the "+" value when you want to tracking the near bottom. Set it to the value immediately before that because the current abnormally displays it when you set the large "+" value.

* BTM Adjustment1 is a menu for servicemen.
* BTM Adjustment2 is a menu for servicemen.

4.1.12 Transmitting Power: Standard/High/Auto

Function The transmission output is selected. Use the Standard position usually.

Operation **Standard Menu:** [MENU] key/Menu screen/Measure setting≫/[ENT] key/Tx power: Standard/High/Auto

About the Tx Power

Standard: It is a transmission of the standard output.

High: The transmission output is twice the standard. It is effective when giving priority to the maximum depth. However, the response and the stability of the current worsen compared with the "Standard" because the transmission repetition decreases to the half.

Auto: An output is automatically adjusted with various states.

4.1.13 Transmitting Pulse Width: S-short/Shot/Normal/Long

Function The length of the transmitted pulse of the supersonic wave is selected. Use the Normal position usually.

Operation **Standard Menu:** [MENU] key/Menu screen/ Measure setting≫/[ENT] key/Tx pulse width: S-short/Shot/Normal/Long

About the Tx pulse width

S-short: The pulse width is standard 1/4. Use this setting when depth is less than 50m.

Short: The pulse width is standard 1/2. Use this setting when depth is less than 100m.

Normal: The pulse width is standard.

Long: The pulse width is 1.5 times the standard. The response and the stability of the current worsen more than the standard.
It may be effective to the case where a current is measured in the ocean area where echo intensity is low, and the purpose of reducing interference of other audio equipment.

4.1.14 Tide Process: J1/J1+/J2/J2+/J3/J3+/J4/J4+/J5/J5+

Function It is a menu for servicemen.
Used the J3 position usually.

Operation **Standard Menu:** [MENU] key/Menu screen/Measure setting≫/[ENT] key/ Tide Process: J1/J1+/J2/J2+/J3/J3+/J4/J4+/J5/J5+

About current operation

It is a setting item which functions on the operation of a current value.
The variation in a current value becomes small so that a numerical value is large, but the influence of the following comes out.
- The probability that the function to eliminate an unexpected value stops working correctly becomes high.
- Since the tracking to change of a current becomes quick, it may not be stabilized depending on a situation.

4.1.15 Shallow Water Mode: Standard/Shallow water /Auto 1/Auto 2

Function A standard/shallow sea is selected according to the depth region which measures a current.
Use as standard usually.
The Auto 2 is a setting for servicemen.

Operation **Standard Menu:** [MENU] key/Menu screen/Measure setting≫/[ENT] key/Shallow water mode: Standard/Shallow water /Auto 1/Auto 2

About shallow water mode

It is a setting item which functions on the measurement limit in a shallow sea region.
If shallow water mode is selected, measurement of a current will be attained at the place of bottom depth shallower than usual, but the influence of the following comes out.
- A possibility that a current value will become unstable at a place about deeper than 50 m in the bottom of the sea depth becomes high.
- A possibility that a bottom tracking ship speed will become unstable at a place about deeper than 50 m in the bottom of the sea depth becomes high.
- At the bottom of the sea depth about deeper than 50 m, a possibility of losing the bottom of the sea becomes high.
- Compared with the case of a standard, the accuracy of a current value may become low.
- Compared with the case of a standard, the tracking performance of a current value may become slow.

The Auto 1 changes standard and shallow sea mode automatically according to bottom of the sea depth.
The Auto 2 is an item for servicemen. Please do not use it.

4.1.16 Mode: 628 mode/650 mode

Function It is a menu for servicemen.
Use in the 650 mode Usually.

Operation **Standard Menu:** [MENU] key/Menu screen/Measure setting≫/[ENT] key/Mode:628 mode/650 mode

About the mode

In the 628 mode, it operates by a function similar to JLN-628.
- The standard of a current measurement layer is made equivalent to JLN-628, and maximum shallow layer of 2m becomes able to always display.
- In shallow water mode, the selection of those other than a standard becomes impossible.
- Selection of a multilayer screen becomes impossible.

4.1.17 BT WT Tide Average time 1: Short/2/3/4/5/6/7/8/9/Long

Function The measurement data average time to measure the ship speed is switched by ten stages.
Use the 5 (current is 6) position usually.
Set BT, WT and Tide separately.

Operation **Standard Menu:** [MENU] key/Menu screen/ Measure setting≫/[ENT] key
/BT Ave. Processing time1: Short/2/3/4/5/6/7/8/9/Long
/WT Ave. Processing time1: Short/2/3/4/5/6/7/8/9/Long
/Tide Ave. Processing time1: Short/2/3/4/5/6/7/8/9/Long

About BT･WT･Tide Average time 1

Short : Tracking performance is the quickest setting. A display is not stabilized in many cases.

1: ↑
2:
3:
4:
5: **-- (it is a standard setting of the ship speed for BT and WT.)**
6: **-- (it is a standard setting of the tide flow velocity.)**
7:
8:
9: ↓

Long: Tracking performance is the slowest setting. Although a display is stabilized, in the ocean area of a changeful current, an actual current and display do not suit in many cases.

4.1.18 BT WT Tide Average time2: Short/2/3/4/5/6/7/8/9/Long

Function The measurement data average time to measure the ship speed is switched by ten stages.
Use the 7 position usually.

Operation **Standard Menu:** [MENU] key/Menu screen/ Measure setting≫/[ENT] key
/BT Ave. Processing time2: Short/2/3/4/5/6/7/8/9/Long
/WT Ave. Processing time2: Short/2/3/4/5/6/7/8/9/Long
/Tide Ave. Processing time2: Short/2/3/4/5/6/7/8/9/Long

About BT･WT･Tide Average time 2

It is a setting similar to "BT･WT･Tide Average time1".
Although tracking performance is as quick as the numerical value of a setting being small (or short) and stability becomes high in the numerical value of a setting being large (or long). However, since other calculation items and a result have correlation, the expected setting result is not necessarily obtained.

4.1.19 BT WT Average time 3: Short/2/3/4/5/6/7/8/9/Long

Function It is a menu for servicemen.
Use the 3 position usually.

Operation **Standard Menu:** [MENU] key/Menu screen/ Measure setting≫/[ENT] key
/BT Ave. Processing time3: Short/2/3/4/5/6/7/8/9/Long
/WT Ave. Processing time3: Short/2/3/4/5/6/7/8/9/Long

About BT･WT Average time 3

It is a setting similar to "BT･WT･Tide Average time1".
Although tracking performance is as quick as the numerical value of a setting being small (or short) and stability becomes high in the numerical value of a setting being large (or long). However, since other calculation items and a result have correlation, the expected setting result is not necessarily obtained.

4.1.20 Tide Response Time 1: Short/2/3/4/5/6/7/8/9/Long

Function It is a menu for servicemen.
Use the 6 position usually.

Operation **Standard Menu:** [MENU] key/Menu screen/ Measure setting≫/[ENT] key
/Tide Response time 1: Short/2/3/4/5/6/7/8/9/Long

About Tide Response time 1

It is a setting similar to "BT･WT･Tide Average time1".
Although tracking performance is as quick as the numerical value of a setting being small (or short) and stability becomes high in the numerical value of a setting being large (or long). However, since other calculation items and a result have correlation, the expected setting result is not necessarily obtained.

4.1.21 Tide Response Time 2: -3/-2/-1/0/+1/+2/+3/+4

Function It is a menu for servicemen.
Use the 0 position usually.

Operation **Standard Menu: [MENU] key/Menu scr**een/ Measurement setting≫/[ENT] key
/Tide Response time2: -3/-2/-1/0/+1/+2/+3/+4

About Tide Response time 2

Tracking performance immediately after the start of current calculation is mainly setting.
Tracking performance may be made quick when the bottom of the sea depth measures a current at the place which becomes deep suddenly.
Tracking performance becomes quick, so that a numerical value is small, and tracking performance becomes slow, so that a numerical value is large.
If tracking performance is too quick, in the state where beginning displays in a current value, an actual current and display do not suit in many cases.
When the current at the time of a display start is not stabilized, it sets to a large value.

4.1.22 Filter setting 1:A0/A1/A2/B0/B1/B2/C0/C1/C2/C3

Function The balance of the stability of a current display, accuracy, and tracking performance is adjusted.

Use the B1 position usually.

When it gives top priority to the tracking performance in the low current flow velocity, use the A1 position.

Operation **Standard Menu:** [MENU] key/Menu screen/ Measure setting≫/[ENT] key / Filter Setting 1: A0/A1/A2/B0/B1/B2/C0/C1/C2/C3

About Filter Setting 1

It is a setting item which functions on the operation of a current.

It is used when removing the influence of direct and indirect acoustical disturbance especially.

If it is set as B from A and set as C from B, it is in the tendency in which a current value is stabilized.

If it is set as 1 from 0, is set as 2 from 1 and is set as 3 from 2, it is in the tendency in which a current is stabilized.

By judging the current value in the middle of calculation to be unusual, and making low the threshold value to delete, a current is calculated with a value with little variation, and this stability is stabilized directly. And, as for this, it acts that average time gets longer equivalently because the number of the data to use for operation decreases.

4.1.23 Filter Setting 2: D0/D1/D2/E0/E1/E2/F0/F1/F2

Function It is a menu for servicemen.

Use the D1 position usually.

Operation **Standard Menu:** [MENU] key/Menu screen/ Measure setting≫/[ENT] key / Filter Setting 2: D0/D1/D2/E0/E1/E2/F0/F1/F2

About Filter Setting 2

It is a setting item which functions on the operation of a current.

It is used when removing the influence by fishing gears or a shoal of fish especially.

A setting of the filter setting 2 becomes effective when a setting of the filter setting 1 is C position.

If it is set as E from D and set as F from E, it is in the tendency in which a current value is stabilized.

If it is set as 1 from 0, is set as 2 from 1 and is set as 3 from 2, it is in the tendency in which a current is stabilized.

By judging the current value in the middle of calculation to be unusual, and making low the threshold value to delete, a current is calculated with a value with little variation, and this stability is stabilized directly. And, as for this, it acts that average time gets longer equivalently because the number of the data to use for operation decreases.

4.1.24 Filter Setting 3:G0/G1/G2/G3/G4/H0/H1/H2/H3/H4

Function It is a menu for servicemen.
Use the G1 position usually.

Operation **Standard Menu:** [MENU] key/Menu screen/ Measure setting≫/[ENT] key
/ Filter Setting 3: G0/G1/G2/G3/G4/H0/H1/H2/H3/H4

About Filter Setting 3

It is a setting item which functions on the operation of a current.
The action which converges a current value to 0 becomes large, so that a numerical value is large.
Except for the special case, it is used by 1 position.
The variation in the BT ship speed used as a standard is very large, and when a current value does not approach a true value, it is set as H position.
The function which removes the variation in BT ship speed works, and it can be expected that tracking (convergence) will become quick. However, since the fluctuation of the truth of BT ship speed may also be removed, in turning constantly especially, an actual current value and indicated value are not in match in many cases.

* Filter Setting 4 is a menu for servicemen.

4.1.25 Filter Setting 4:K0/K1/K2/K3/K4

Function It is a menu for servicemen.
To adjust the threshold to stop the calculation by detecting the change of ship speed and heading.
Use the K3 position usually.

Operation
MENU → MEASURE SETTING → FILTER SETTING 4 = K0 / K1 / K2 / K3 / K4

About Filter Setting 4
0～4:
To adjust the threshold to stop the calculation by detecting the change of ship speed and heading.
The larger the number, to abort the calculation with a little change. ,
You can expect an effect to reduce the error of the power flow calculation.
But There is a negative effect.
Responsibility is slow, Time to discontinue calculation becomes longer

Use the K3 position usually.

If you want to set the response-oriented (listed separately), will be used in 1.

* Standard setting is current measurement operation of the stability-oriented.
When the configuration changes to the stability-oriented → response emphasis on,
Please refer to the reference set value 7-3) section.

4.1.26 Filter Setting 5:L0/L1/L2/L3/L4/L5/L6/L7/L8/L9

Function It is a menu for servicemen.
Adjust the settings. When Set of filter setting1 is A or B
Use the L8 position usually.

Operation
MENU → MEASURE SETTING → FILTER SETTING 5 = L0 / L1 / L2 / L3 / L4 / L5 / L6 / L7 / L8 / L9

About Filter Setting 5
0～9 :
Setting of Filter setting1 only when A or B, Adjustment is enabled.
Adjust the threshold of signal detection level.
The smaller the value, to detect the low levels signal.
The smaller the number, it can be expected to display a trend of more deep.
But, The influence of noise and interference,
There is a risk measurement error is large.

Use the L8 position usually.

(reference)
By the set to 7, it can be expected to measure the few m deep.
If the seven smaller configuration, Measurements of the deeper is unreliable.

4.1.27 Filter Setting 6:M0/M1/M2/M3/M4/M5/M6/M7/M8/M9

Function It is a menu for servicemen.
Adjust the settings. When Set of filter setting1 is B or C
Use the M5 position usually.

Operation
MENU → MEASURE SETTING → FILTER SETTING 6 = M0 / M1 / M2 / M3 / M4 / M5 / M6 / M7 / M8 / M9

About Filter Setting 5
0～9 :
Setting of Filter Setting1 will be effective to adjust only when the B or C.

When the amount of information is less shallow sea and/or when the low current speed,
Adjustment the response and stability of the current calculation.

Lower the setting, you can expect that the response is improved.
But, There is a possibility that measurement error increases.

Use the M5 position usually.

* Standard setting is current measurement operation of the stability-oriented.
  When the configuration changes to the stability-oriented → response emphasis on,
  Please refer to the reference set value 7-3) section.

4.1.28 Switch Speed: -10/-5/-2/-1/0/1/2/5/10/20

Function It is a menu for servicemen.
Use the 0 position usually.

Operation **Standard Menu:** [MENU] key/Menu screen/ Measure setting≫/[ENT] key
/ Switch speed: -10/-5/-2/-1/0/1/2/5/10/20

About stabilization of current

It is a setting item which functions on the operation of a current.
In the following case, a setup of a current operation filter is changed to a preliminary setting group.

- In the case of the setting value (ship speed value) is a minus value, when ship speed is slower than the value
- In the case of the setting value (ship speed value) is a plus value, when ship speed is quicker than the value.

Preliminary setting group: The head of a setting subject name has a notation of "+."
Example: + BT average time 1

As for this function, a good result may be obtained in the following situations.

- Usually navigate at 5 knots or more, and when carrying out a fishery, it becomes less than 5 knots.
- While carrying out the fishery, the echo by fishing gears can check with an echo screen.
- Or while carrying out the fishery, the muddiness generated with fishing gears etc. can check with an echo screen.
- Although it is usually satisfactory, when a fishery is begun, a current value differs from a true value.
- The current value which became once unusual does not show a true value easily in the usual movement state.

In the situation of fulfilling these conditions, switch speed is set as "-5", and the usual filter setting is set as tracking performance serious consideration, and a preliminary setting group is set as stability serious consideration.

4.2 Current Display Setting

4.2.1 Current Circle Graph Setting

Function The current circle graph is set.
Setting items: Current speed range, Current vector display, Ship speed vector, Enlarge of graph, Wind direction arrow

Operation **Standard Menu:** [MENU] key/Menu screen/Picture Setting ≫ / Curr≫/[ENT] key/Tidal Current Picture Setting menu
Selection Frame Menu: [□] key/ Enclose “Current circle graph” with the frame /[MENU] key/Current Circle Graph menu

▶ **Current Speed Range**

Function The circle range is set. Refer to Ex.① in the Fig.4.2.1
Range: Select from 1-10 kn
Automatic: The reduced scale within the range changes automatically responding at the measured Current speed when setting it to automatic.

Operation **Standard Menu:** Tidal Current Picture setting /Current speed range: Automatic/1-10 kn
Selection Frame Menu: Current Circle Graph menu/ Current speed range: Automatic/1-10 kn

▶ **Current Vector Display/Non-display**

Function Whether it displays each vector of Absolute current A-E layer and relative current.
Display: The corresponding vector is displayed on the pie chart.
Non-display: The corresponding vector is not displayed.
Ex. ② in figure: Absolute current vector of A layer, B layer, and C layer are displayed. The absolute current vector is displayed by the solid line.
Ex. ③ in figure: A relative current displays the AC layer and the BC layer based on C layer and the vector is displayed. The relative current vector is displayed in the short dashed line. (*1)

Operation **Standard Menu:** Tidal Current Picture setting /Current Vectors display ON･OFF /Absolute current: Display ON / Relative current: OFF
Selection Frame Menu: Current circle graph/ Current Vectors display ON･OFF /Absolute current: ON / Relative current: OFF

▶ **Ship Speed Vector Display/Non-display**

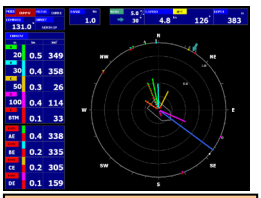
Function It is set whether to display the ship speed vector on the circle graph.
Display: The ship speed vector is displayed on the circle graph. Ex. ④ in the figure
It doesn't display it any more on the outer line in the circle graph when ship speed (vector length) exceeds the range in the graph.
Non-display: The corresponding ship speed vector is not displayed.
Ex. ② in figure: Absolute current vector of A, B, C, D, Elayer are displayed. The absolute current vector is displayed by the solid line.
Ex. ③ in figure: A relative current displays the AE,BE,CE layer and the DE layer based on E layer and the vector is displayed. The relative current vector is displayed in the short dashed line. (*1)

Operation **Standard Menu:** Current screen setting menu/Ship speed vector: Display/Non-display
Selection Frame Menu: Current circle graph menu/ Ship speed vector: Display /Non-display

▶ **Enlarge of Graph: Standard/Enlarge**

Function When the enlarge is selected, the circle graph display is increased by a factor of about 1.3. (*2)

Operation **Standard Menu:** Current screen setting menu/Graph enlarge: Standard/Enlarge
Selection Frame Menu: Current circle graph menu/ Graph enlarge: Standard/Enlarge



Circle Graph:
Ex. Enlarge Display

*1 The layer of the standard cannot be displayed on the relative current. For instance, when it is E layer standard, "Relative current vector EE" is non-display.
*2 Refer to 2.2.1 “Tidal Current Display”.

▶ **Wind Direction Arrow (*1): Display/Non-display**

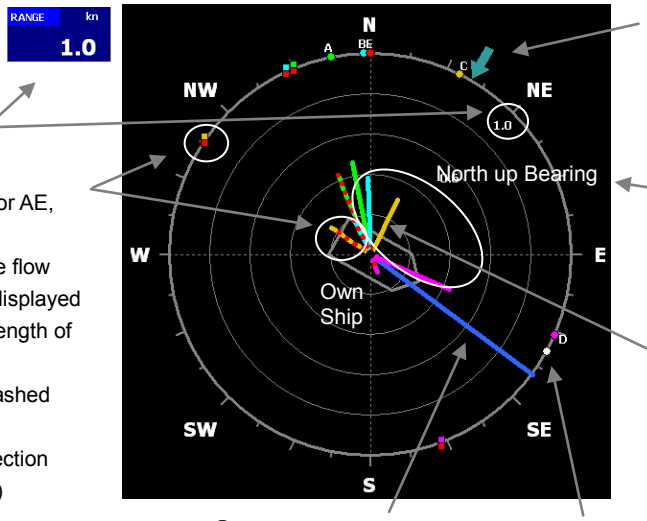
Function It is set whether to display the wind direction arrow on the circle graph.

Display: The arrow of the example ⑤ is displayed in figure. The wind blows from the direction of the arrow.

Non-display: The wind direction arrow is not displayed.

Operation **Standard Menu:** Current screen setting menu/Wind direction arrow: Display/Non-display

Selection Frame Menu: Current circle graph menu/ Wind direction arrow: Display /Non-display



① Circle Graph Range

③ Relative Current Vector AE, BE, CE, DE Layer
The flow direction and the flow speed of each layer are displayed by the direction and the length of the vector.
It displays by the short dashed line.
The flow direction is "Direction that flows and is left. "(*2)

⑤ Wind Direction Arrow

Current Bearing Standard (*3):
The bearing standard of graph is set.
North up bearing:
True north is fixed on top.
Head up bearing:
The ship head is fixed on top.

② Absolute Current Vector
Absolute current vector A, B, C, D, E Layer
The Current direction and the Current speed of each layer are displayed by the direction and the length of the vector.
It displays by the solid line.
The Current direction is "Direction that flows and is left. "(*2)

④ Ship Speed Vector (Course・Ship speed)

○ Is head up bearing.

Fig. 4.2.1 Current Circle Graph

4.2.2 Current Echo Graph Setting

Function The display of the echo graph of current 3 screens is set.

Setting item: Echo Graph depth range, mode selection, and SN value high・low, display color, background color

Operation **Standard Menu:** [MENU] key/Menu screen/Display setting ≫/[ENT] key/Current screen ≫/[ENT] key/Current screen setting menu

Selection Frame Menu: [□] key/ Enclose “Echo graph” with the frame /[MENU] key/Echo graph setting menu

About echo graph

The reflection of the supersonic wave transmitted in four directions is caught in current measurement mode (*4), and the water inside is displayed.

Because the supersonic wave is turned in four directions (fore of the starboard, fore of the portside, the after side of the starboard, and the after side of the portside), each in the sea and the sea bottom reflection reception echo is displayed on the screen of division into 4 (four). (*5)

The latest echo data on the horizontal cursor position is displayed in "Cursor position echo" table (*6).

Signal level and S/N (*7) (Signal to noise ratio) of the received echo can be confirmed from example ① table by the numerical value in figure.

*1 It is necessary to connect the sensor separately to display the wind direction and the wind speed. Moreover, set it to the “connection” by menu "Installation Setting/Aerovane".
*2 Set the Current direction by menu "Installation setting/Display of the Current direction".
*3 Refer to 4.1.2 “Direction Standard”.
*4 There is a shoal of fish display mode (The transmission pulse width is short, and use it exclusively the shoal of fish screen display) in addition to the current measurement mode.
*5 The screen is only four display. This is different from the fish finder screen, and neither sensitivity nor the bubble cancellation is adjusted.
*6 Refer to Fig. 4.2.2 ⑪–⑭.
*7 Refer to Fig. 4.2.2 ⑬ S/N

► **Echo Graph Depth Range**

Function The depth range in the graph is set within the range of 100-500m. Refer to the example ② in Fig.4.2.2

Range setting value: [100 200 300 500] m

Operation **Standard Menu:** Current screen setting menu/Echo Graph depth range: 100-500m

Selection Frame Menu: Echo graph setting menu/ Echo Graph depth range: 100-500m

► **Mode Selection**

Function Display mode (*1) in the graph is selected. The standard is an echo mode.

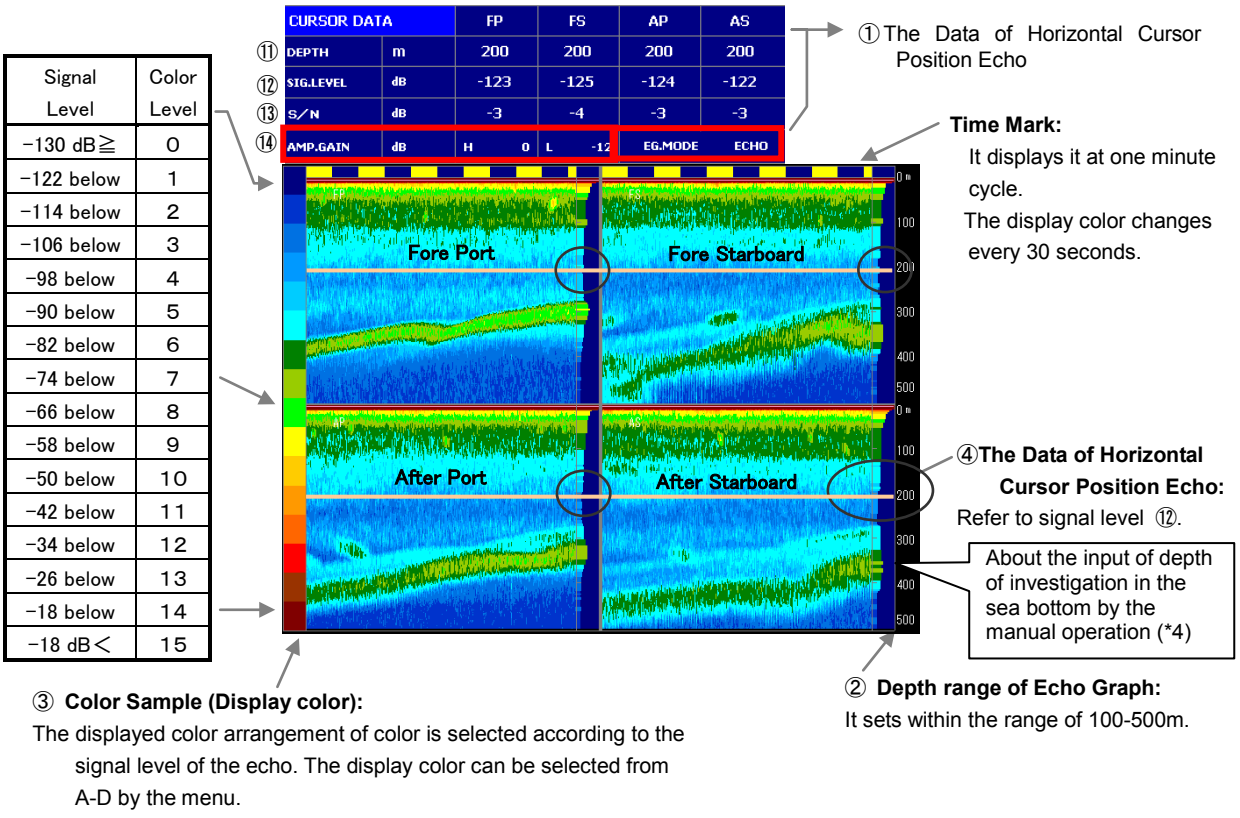
Echo: It converts into the display color based on signal level (*2) of the received echo and it displays. The display color can be selected from A-D by the menu (*2).

S N: An echo of the S/N value low (It is a lot of noise element) is penetrated, and displayed by a color near the background color.

The S/N value is displayed in "Cursor position echo" table (*3).

Operation **Standard Menu:** Current screen setting menu/Mode selection: Echo/SN

Selection Frame Menu: Echo graph setting menu/Mode selection: Echo/SN



Signal Level	Color Level
−130 dB≧	0
−122 below	1
−114 below	2
−106 below	3
−98 below	4
−90 below	5
−82 below	6
−74 below	7
−66 below	8
−58 below	9
−50 below	10
−42 below	11
−34 below	12
−26 below	13
−18 below	14
−18 dB＜	15

Fig. 4.2.2 Current 3 Screen Echo Graph

*1 Display mode: Refer to Fig. 4.2.2-⑮
*2 Color sample and signal level: Refer to Fig. 4.2.2 ③
*3 Cursor position echo table: Refer to Fig. 4.2.2 ⑪～⑭
*4 The input of depth of investigation in the sea bottom by the manual operation: Refer to 4.1.10 “Bottom Tracking Mode”.

► **SN Value: High**

Function When SN is selected by the mode selection of the echo graph setting, it sets.
When the S/N value of the echo is higher than that of the set level, it displays by the permeability 0%(no penetration). Refer to Fig. 4.2.3.

Operation **Standard Menu:** Current screen setting menu/SN value: High 0 dB
Selection Frame Menu: Echo graph setting menu/ SN value: High 0 dB

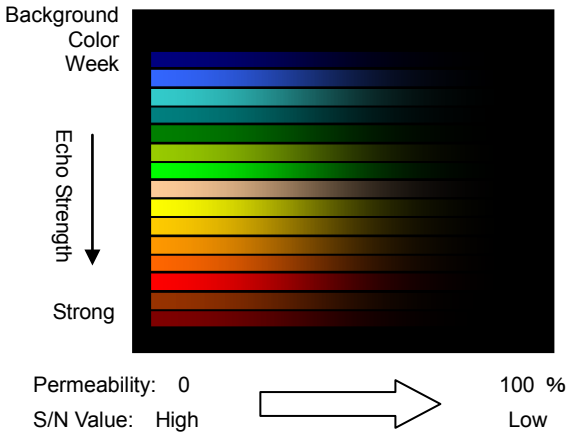


Fig. 4.2.3 Echo Table by SN Mode

► **SN Value: Low**

Function When the S/N value of the echo is lower than that of the set level, it displays by the permeability 100%(all penetration). Refer to Fig. 4.2.3.

Operation **Standard Menu:** Current screen setting menu/SN value: Low -12 dB
Selection Frame Menu: Echo graph setting menu/ SN value: Low -12 dB

Setting condition of SN value **SN High>Medium S>N Value>SN Low**

It approaches the background color of the permeability 100% by the S/N value low. Refer to Fig. 4.2.3.
Setting value: It is possible to set freely in every 1dB step within the range from 0 to -120 dB.
Setting condition: SN Value High > SN Value Low (Standard setting: High -0dB/Low -12dB)

► **Display Color**

Function It is possible to select it from A-D by the menu. Refer to Table 4.2.1.
[FISH] screen and commonness: A) 16 color standard B) 16 color dark color system C) 16 light color system D) Eight colors

Operation **Standard Menu:** Current screen setting menu/Display color: A B C D
Selection Frame Menu: Echo graph setting menu/Display color: A B C D

Table 4.2.1 Color Sample and Color Arrangement

		Weak → Signal Strength → Strong														
No		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Color Sample	A	Dark Blue	Blue	Light Blue	Dark Sky Blue	Sky Blue	Grn	Light Grn	Pea Grn	Yellow	Light Org	Org	Dark Org	Red	Brwn	Dark Brwn
	B	Dark Blue	Blue	Dark Grn	Grn	Light Grn	Pea Grn	Yellow	Light Org	Org	Dark Org	Red	Dark Red	Light Brwn	Brwn	Dark Brwn
	C	Light Sky Blue	Sky Blue	Light Blue	Blue	Dark Blue	Pea Grn	Yellow	Light Org	Org	Dark Org	Red	Light Brwn	Brwn	Dark Brwn	Pink
	D	Back −ground	Sky Blue		Blue		Pea Grn		Yellow		Org		Red		Brwn	

► **Background Color**

Function The background color in the echo graph is selected. It selects from four colors.
The standard is set to the same background color as other background colors.

Operation **Standard Menu:** Current screen setting menu/Background color: Black Navy Blue Gray White
Selection Frame Menu: Echo graph setting menu/ Background color: Black Navy Blue Gray White

Cursor position echo table: Refer to Fig. 4.2.2-①

"Cursor position echo" displays information on horizontal cursor ④ in the echo graph. The horizontal cursor moves up and down with the ▲▼ key on the keyboard.

⑪ **Depth**	(Ex.:200 m): Depth at the horizontal cursor position is displayed. When a shoal of fish and a multiple reflection, etc. are recognized bottom of the sea by any chance, and the bottom of the sea depth is displayed by mistake, move the horizontal cursor, and push the [Bottom Tracking] key according to the position of sea bottom depth while seeing the echo graph. When it searches for bottom of the sea again centering on the value of the depth of the horizontal cursor, and true bottom of the sea is recognized, the following are tracked automatically. Refer to 4.1.10 Bottom Lock Mode: Automatic/Manual
⑫ **Signal Level**	(Ex. :FS -125 dB): The value at the latest receiving signal level in the horizontal cursor position ④ is displayed. The situation and bottom of the sea reflection strength of the dirt in the sea can be confirmed according to this value.
⑬ **S/N**	(Ex.:FS -4 dB): The noise ratio included in the signal of ⑫ is displayed. Therefore, the noise is few signals by large the numerical value (It is near 0dB). As for S/N, when it differs in natural environment and installation requirements, and the S/N value is low, the measurement becomes unstable.
⑭ **SN Setting**	(Standard:High -0dB／Low -12dB): When "SN" is selected by the display mode, it sets. Setting reference: ▶ SN High ／ ▶ SN Low

4.2.3 Current Measurement Layer Depth Setting

・Function・ The depth of five layers (A-E layer) in which the current is measured is set respectively. The following operation can be done in E layer besides the depth setting of fixation. It is possible to set it to the function (bottom lock) to pursue by the automatic operation according to ups and downs in bottom of the sea. Refer to 6.2.1

Operation When [DEPTH] key on the keyboard is pushed at either of the [CURR] screen, the [SHIP] screen, the [PLOT] screen, the [GRAPH] screen or the [PROFILE] screen, "The depth setting of the current measurement layer" menu is displayed. It is not possible to set it at the [FISH] screen. (*1)

Standard Menu: [DEPTH] key/Depth setting of the current measurement layer menu/From A Layer: 20m to E Layer: 150m

Selection Frame Menu: [□] key/ Enclose “Wind direction and Wind speed” with the frame /[MENU] key/ Wind direction and Wind speed menu/ From A Layer: 20m to E Layer: 150m

Numerical key input of the depth

The depth value of the each level inputs a set value with numeric key (1,2・・・9,0) on the keyboard. A set unit: 1m (*2)

Ex.) 20m in A layer is adjusted to 34m in A layer.

(1) 20m in A layer is selected with the cursor key.
(2) It is input with a numeric key to the keyboard as 34.
(3) It fixes with the [ENT] key.
(4) It is confirmed to have become 34m in A layer.
(5) The end: It ends pushing the [DEPTH] key for a standard menu.
It ends pushing the [MENU] key for the selection frame menu.

*1 The depth range setting menu of the [FISH] screen is displayed in the [DEPTH] key at the [FISH] screen. Refer to 4.6.5 “Depth Range Setting”.
*2 A set unit when the unit is fathom: It becomes one fathom.

4.3 Ship Speed Display Setting

4.3.1 Ship Speed Graph Setting

Function The ship speed graph is set.
Setting item: Ship speed range, Ship speed display (Element/Deflection), Recording time

Operation **Standard Menu:** [MENU] key/Menu screen/Display setting ≫/[ENT] key/Ship speed display ≫/[ENT] key/Ship speed display setting menu
Selection Frame Menu: [□] key/ Enclose “Ship speed・Course graph” with the frame /[MENU] key/ Ship speed・Course graph menu

▶ Ship Speed Range

Function The range of ship speed graph is set.
Range: It selected from[5 10 15 20 25 30 40] kn.

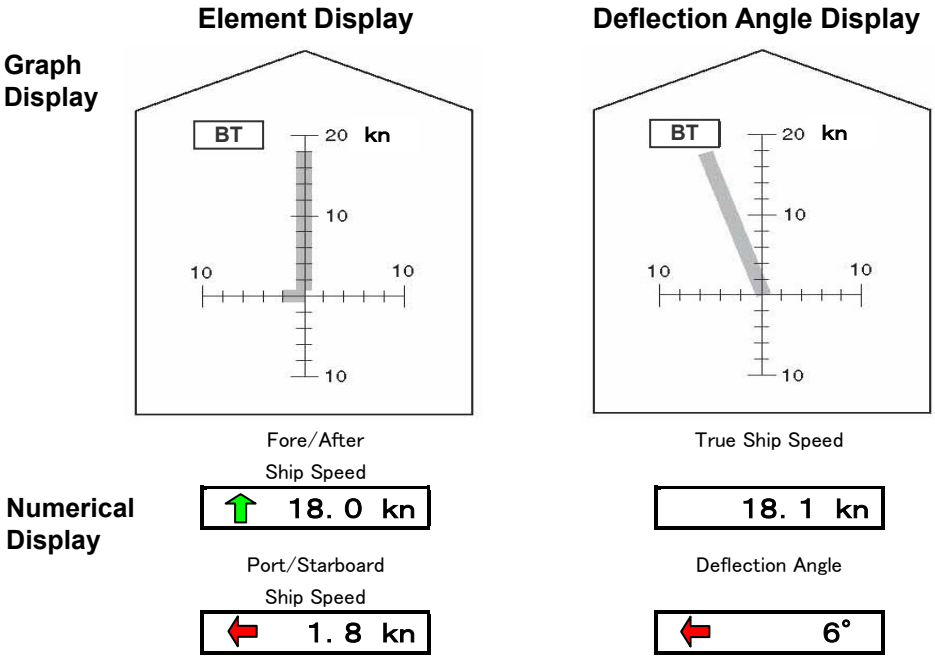
Operation **Standard Menu:** Ship speed display setting menu/Ship speed range: 10 kn
Selection Frame Menu: Ship speed・Course graph menu/ Ship speed range: 10 kn

▶ Ship Speed Display: Element/Deflection

Function The display method of the Ship speed graph and others of the [SHIP] screen and the Ship speed data is selected.
Element: The ship speed in the Fore/After, Port/Starboard is separately displayed for the element display.
Deflection angle: It displays it in true ship speed and the deflection angle at the display of the deflection angle.

Operation **Standard Menu:** Ship speed display setting menu/Ship speed display: Element/Deflection angle
Selection Frame Menu: Ship speed・Course graph menu/Ship speed display: Element/Deflection angle

Element display and deflection angle (When the setting is 20kn)



▶ **Recording Time**

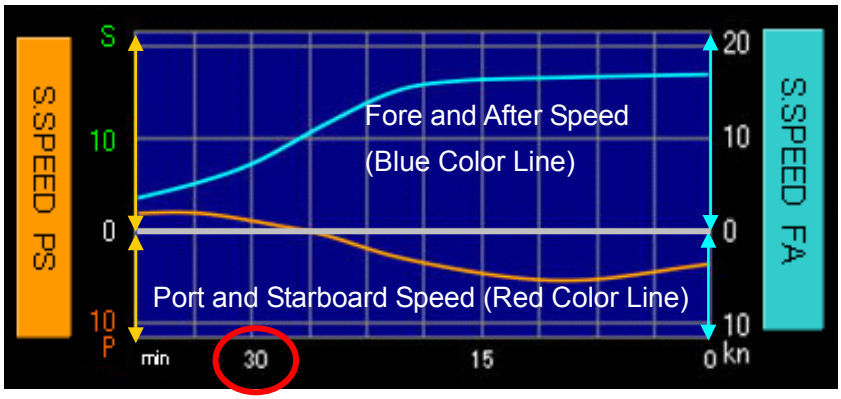
Function The record time of the elapsed (ship speed) graph of [SHIP] 2 screens is set.
Recording time: It is selected from [30 60 120 240] mimute

Operation **Standard Menu:** Ship speed display setting menu/Recording time: 30 mimutes
Selection Frame Menu: Ship speed・Course graph menu/ Recording time: 30 mimutes

Ship speed elapsed graph

Upper Side: Starboard Speed

Upper Side: Fore Speed



Lower Side: Port Speed

Lower Side: After Speed

Elapsed Time Ex.: Ship speed 30 minutes ago
The record time of the graph can be set from the menu.

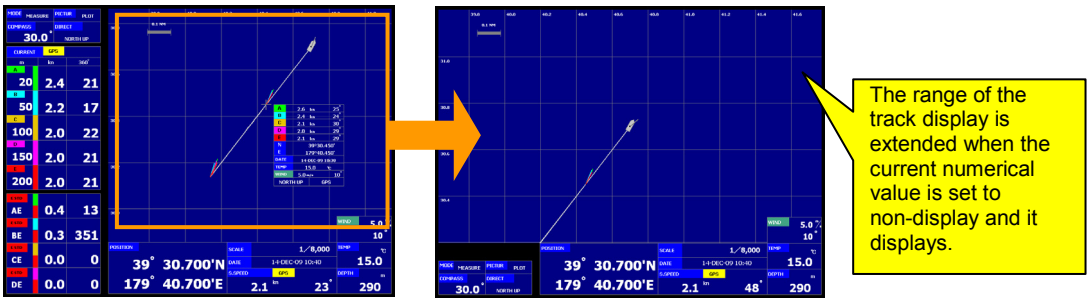
4.4 Track Plot Display Setting

4.4.1 Current Numerical Value Display: Display / Non-display

Function ON or OFF of A numeric display of "Current direction and Current speed" displayed at the left of the screen can be selected.

Operation **Standard Menu:** [MENU] key/Menu screen/Display setting ≫/[ENT] key/Plot screen ≫ /[ENT] key/Plot screen setting menu/Current numeric value display: Display/Non-display
Selection Frame Menu: [□] key/ Enclose “Plot screen” with the frame /[MENU] key/Plot drawing menu/Current numeric value display: Display/Non-display

Display screen



Current value: Display **Current value: Non-display**

4.4.2 Five Layer Display of Current Vector

Function The current vector is displayed at constant intervals. The display form of the vector is equal to the current screen.
It displays by the solid line at the absolute current display, and it displays it in the short dashed line at the relative current display.
Moreover, on/off of the display of each vector can be displayed. When it is not possible to measure it, it doesn't display it.

Operation **Standard Menu:** [MENU] key/Menu screen/Display setting ≫/[ENT] key/Plot screen ≫ /[ENT] key/Plot screen setting menu
Selection Frame Menu: [□] key/ Enclose “Plot screen” with the frame /[MENU] key/Plot drawing menu

▶ **Current Vector A-E: Absolute/Relative/Absolute + Relative/OFF**

Function The display of the current vector of each level of A-E can be set by the menu.
Absolute: The absolute current is displayed on the track by the solid line.
Relativity: A relative current is displayed on the track in the short dashed line.
Absolutely + relativity: Both absolute current and a relative current are displayed.
OFF: The vector of the current is made non-display.

Operation **Standard Menu:** Plot screen setting menu/Current vector A: Absolute/Relative/Absolute + Relative/OFF･･･Same as current vector B-E
Selection Frame Menu: Plot drawing menu/Current vector A: Absolute/Relative/Absolute + Relative/OFF･･･Same as current vector B-E

▶ **Vector Length**

Function The length of the current vector displayed on the track is set.
Setting value: [0.5 1 2 4] cm/kn

Operation **Standard Menu:** Plot screen setting menu/Vector length: 4 cm/kn
Selection Frame Menu: Plot drawing menu/Vector length: 4 cm/kn

4.4.3 Own Track Display (Track Plotting)

Function The track of the ship is plotted on the screen based on the location information of GPS or speed information on the ship of the Doppler data.
The ship position is displayed on the plot screen by the ship shape mark. Moreover, the speed and the course vector of the ship are displayed by a white solid line.

Operation **Standard Menu:** [MENU] key/Menu screen/Display setting ≫/[ENT] key/Plot screen ≫ /[ENT] key/Plot screen setting menu
Selection Frame Menu: [□] key/ Enclose “Plot screen” with the frame /[MENU] key/Plot drawing menu

▶ Track Color

Function The track color is displayed by one arbitrary color (It is possible to select it from among six colors). Moreover, when "Strength" is selected, the classification display is done by four stages by the scattered intensity of an arbitrary measurement layer (A, B, C, D, and E layer).
Setting color: [Red Pink Yellow Green Blue White Strength]

	Weak	Scattered Intensity		Strong
Scattered Intensity	1	2	3	4
Display Color	Sky Blue	Pea Green	Orange	Brawn

Operation **Standard Menu:** Plot screen setting menu/Track color: White
Selection Frame Menu: Plot drawing menu/Track color: White

▶ Track Color Standard

Function When "Strength" is selected by the track color, the targeted measurement layer is selected from the A-E layer.
Setting layer: [A Layer B Layer C Layer D Layer E Layer]

Operation **Standard Menu:** Plot screen setting menu/Track color standard: A Layer
Selection Frame Menu: Plot drawing menu/ Track color standard: A Layer

4.4.4 Plot Display Setting

Function The latitude line and the longitude line are always displayed with the north up bearing based on the reduced scale.
The latitude longitude at the ship position is displayed at the center under the screen. (*1)

Operation **Standard Menu:** [MENU] key/Menu screen/Display setting ≫/[ENT] key/Plot screen ≫ /[ENT] key/Plot screen setting menu
Selection Frame Menu: [□] key/ Enclose “Plot screen” with the frame /[MENU] key/Plot drawing menu

▶ Background Color

Function The background color of the [PLOT] screen is selected from the following set value.
Setting color: [Standard Black Navy Blue Gray White]
The background color of the track screen pairs with the background color of the plot screen in the standard, and the background color of the plot screen is decided by the background color of the track screen, too. The background color of the (track) screen is set by screen brightness (*2) of the main menu.

Operation **Standard Menu:** Plot screen setting menu/Background color: Black
Selection Frame Menu: Plot drawing menu/Background color: Black

*1 Latitude longitude: When GPS is not connected, "****" is displayed.
*2 Refer to 3.3.1 “Adjusting Screen Brightness”.

► **Track Standard: Doppler/GPS**

Function The track standard is data that becomes a standard to display the ship track on the [PLOT] screen. This selects GPS or Doppler from the menu.
When the track standard is Doppler, a numeric scale is not displayed in the latitude line and longitude lines on the [PLOT] screen.
Doppler: The movement zone is guessing calculated from the Doppler data (course and ship speed), and the track is displayed.
GPS: The track is displayed from the latitude longitude data from GPS.

Operation **Standard Menu:** Plot screen setting menu/Track standard: Doppler/GPS
Selection Frame Menu: Plot drawing menu/Track standard: Doppler/GPS

Display of track standard and plot screen

Whether the track standard is GPS or Doppler, the display of the [PLOT] screen is different. Connect the GPS sensor, and make the setting of the track standard GPS when the latitude line and longitude lines are displayed, and the ship position and the track are displayed clearly.

Table 4.4.1 Track Standard and Plot Screen

Track Standard (Menu Setting)	GPS Connection	Display of Plot Screen					
		latitude line ・ longitude line	Scale mark of NM unit	Latitude longitude data	Display at date	Track	Current Vector
GPS	with	Display	Display	Display	Automatic Input	Display	Display
	without	Display	Display	＊＊＊	① When the power supply is turned on, it inputs from the menu by manually.	Non-display	Non-display
Doppler (*1)	with	Display	Display	Display	Automatic Input	Display	Display
	without	Display	Display	＊＊＊	Same as ①	Display	Display

► **Reduced Scale**

Function The reduced scale of track [PLOT] screen is set. The standard can be set within the range of 1/1,000 - 1/1,000,000.
The value of the reduced scale is displayed at the center of the [PLOT] screen lower position.
Setting value: [1/10000] The numerical value in the hatching part is selected with the ◄/► key, and it fixes with the [ENT] key.

Operation **Standard Menu:** Plot screen setting menu/Reduced scale: 1/10000
Selection Frame Menu: Plot drawing menu/ Reduced scale: 1/10000

► **Storage Interval**

Function The track can be reproduced by saving data at the same time as the track's being plotted on the screen every second. The storage interval of GPS and the Doppler data in case of saving data of time can be set.
Setting value: [6 15 30 60 120 240] sec

Operation **Standard Menu:** Plot screen setting menu/Storage interval: 6 sec
Selection Frame Menu: Plot drawing menu/Storage interval: 6 sec

Relation between storage interval and storage time

The storage interval synchronizes with "Storage time of the [GRAPH] screen" (*2). Set the storage time of the [GRAPH] screen to the value for a short time according to the table below when you want to shorten the storage interval of the [PLOT] screen.

[PLOT] Screen: Storage Interval	6 sec	15 sec	30 sec	60 sec	120 sec	240 sec
[GRAPH] Screen: Storage Time	0. 5 hour	1 hour	3 hour	6 hour	12 hour	24 hour

*1 The prow bearing sensor such as GPS compasses is necessary to display the prow bearing.
*2 The storage time of [GRAPH] screen setting is given to priority. When the storage time will be set in a long time, the storage interval of the [PLOT] screen becomes long.

► **Vector Display**

Function The interval of the current vector in which it displays it on the track is set.
Whether the current vector is displayed at the rate once every times of "Storage interval" in the previous clause how many is specified.
Setting value: [1/1 2 4 10 20 50] times
Ex.: When the setting is 1/2, the current vector is displayed on the track at the rate once every 12 seconds for six seconds the setting of "Storage interval".

Operation **Standard Menu:** Plot screen setting menu/Vector display: 1/2 times
Selection Frame Menu: Plot drawing menu/Vector display: 1/2 times

► **Local Time**

Function The time difference to convert from the world standard time to the local time is set.
Setting value: [+9.0] h
The numerical value in the hatching part increases and decreases by the◄/► key operation in 0.5 hour step. The time difference is selected, and it fixes with the [ENT] key.

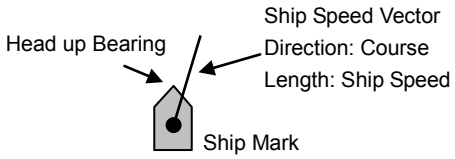
Operation **Standard Menu:** Plot screen setting menu/Local time: +9.0 h
Selection Frame Menu: Plot drawing menu/Local time: +9.0 h

Display at date

The date and time from GPS are displayed at the center under the screen. Time is converted to local time.
Ex.) Standard time: 00:30 January 1, 2010 / In case of Menu setting Local time: +9.0 h
Date 10-01-01 09:30 is displayed at the date.
Input the present date from the menu when turning on power without GPS. The date of data is not understood when the saved data is play backed later if there is no input at the date. It becomes blank when GPS is not connected and there is not an input of time by manually either.

► **Ship Speed Vector Length**

Function The length of the ship speed vector is set to the ship mark on the [PLOT] screen.
Setting value: [0.5 1 2 4] cm/10kn
Ex.: When the setting is 4, the vector length is displayed to ship speed 10kn by 4cm.



Operation **Standard Menu:** Plot screen setting menu/Ship speed vector length: 4 cm/10kn
Selection Frame Menu: Plot drawing menu/Ship speed vector length: 4 cm/10kn

► **Track Line Display**

Function The track where the set time passes disappears on the screen. When you do not see the [PLOT] screen easily by displaying the track line, do it non-display or set the display time short.
Setting value: [60] minutes
It selects with the ◄/►key from among the numerical value [Non-display 1 - 60 - 1440 minutes) in the hatching part, and it fixes with the [ENT] key.

Operation **Standard Menu:** Plot screen setting menu/Track line display: 60 minutes
Selection Frame Menu: Plot drawing menu/Track line display: 60 minutes

*1 Time setting menu Refer to 3.1.1 “Power ON and Date/Time Setting”.

► **Current Event Mark: Display/Non-display**

Function When the display is selected, memorized past track and current vector are displayed. (*1) It sets to non-display usually.

Operation **Standard Menu:** Plot screen setting menu/Current event mark: Display/Non-display
Selection Frame Menu: Plot drawing menu/Current event mark: Display/Non-display

Display and movement of cursor positional data sheet

The cursor is displayed by marking the cross.
Movement: The cursor moves on the track with the ◄/► key.
It moves to a past position when ◄ key is pushed, and it moves to the value (ship position) now when ► key is pushed. Latitude longitude (*2) at the cursor position and the measured current data are displayed in "Cursor positional data" table next to a **cross mark**.
Display/Non-display: It disappears to erase "Cursor positional data" when a cross mark is laid to ship shape by pushing ►key. Push ◄ key when you want to display it again.

A	2.6 kn	25°
B	2.4 kn	24°
C	2.1 kn	30°
D	2.0 kn	29°
E	2.1 kn	29°
N	39°30.450'	
E	179°40.450'	
DATE	14-DEC-09 10:38	
TEMP	15.0 ℃	
WIND	5.0 m/s	10°
NORTH UP	GPS	

Cursor Position Data Table

Current on Cursor Position: Display A-E Layer。
The measurement depth is all layers, and depth at that time at the time of measured it.

Latitude longitude: Only when connecting it with GPS, the track standard is displayed. Blank in case of non-connection.

Date: When GPS is connected, it inputs it automatically. When the power supply is turned on, it inputs it from the menu by hand power at non-connection.

Water temperature and the wind speed: It is necessary to connect each sensor. It is a blank for non-connection setup.

Bearing Standard (North up bearing/Head up bearing): A set standard at that time at the time of measured it is displayed.

Absolute current standard(B.T/GPS): A set standard at that time at the time of measured it is displayed.

4

*1 The storage point is 10,000 points. When the number of points exceeds it, it is deleted from the oldest point.
*2 It is necessary to connect GPS for the display of the latitude longitude.

4.5 Graph Display Setting

4.5.1 Current/Depth Graph Setting

Function **Current Graph:** The elapsed time of the current vector of each intersection of a horizontal axis of the depth value and a vertical axis of the graph is displayed.
The vector can be set ON/OFF according to the layer.
Depth Graph: (current graph and overlay display)The elapsed time of depth is displayed.
The range of the display depth is set besides the current graph though it displays on the current graph repeatedly.
When depth becomes outside the display depth range, the short dashed line is pulled on a horizontal axis of the frame outside the graph.

Operation **Standard Menu:** [MENU] key/Menu screen/Picture setting≫ / [GRAPH] screen ≫/[ENT] key/"Graph Picture setting" menu
Selection Frame Menu: [□] key/ Enclose "Current and Depth graph" with the frame /[MENU] key/"Current and Depth graph" menu

▶ **Current Range**

Function The maximum value within the range of the current depth in current/depth graph is set. It synchronizes within the range in the current range depth graph when the Depth Range is selected by the menu.
Setting value: [100 200 300 500 Depth Range] m

Operation **Standard Menu:** "Graph Picture setting" menu/Current Range: Depth Range m
Selection Frame Menu: "Current and Depth graph" menu/Current Range: Depth Range m

▶ **Depth Range**

Function The maximum value within the range of the bottom depth in current/depth graph is set.
Setting value: [100 200 300 500] m

Operation **Standard Menu:** "Graph Picture setting" menu/Depth Range: 200 m
Selection Frame Menu: "Current and Depth graph" menu/Depth Range: 200 m

▶ **Current Vector A-E**

Function The current vector of the A-E each layer displayed in current/depth graph is selected.
Absolute: The Absolute current in a specified layer is displayed by the solid line.
Relative: A relative current in a specified layer is displayed in the short dashed line.
Absolute + relative: Both absolute current and a relative current in a specified layer are displayed.
OFF: The vector of a specified layer is not displayed.

Operation **Standard Menu:** "Graph Picture setting" menu/ Current vector A:
Absolute/Relative/Absolute + Relative/OFF・・・Same as current vector B-E
Selection Frame Menu: "Current and Depth graph" menu / Current vector A:
Absolute/Relative/Absolute + Relative/OFF・・・Same as current vector B-E

▶ **Vector Length**

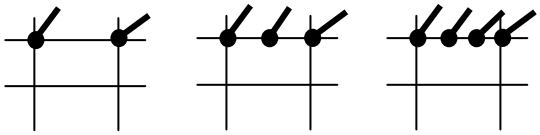
Function The length of the current vector in current/depth graph is set.
Setting value: [0.5 1 2 4] cm/kn

Vector Length（cm/kn ）	0.5	1	2	4
Max. Current Speed (kn)	4	2	1	0.5

Operation **Standard Menu:** "Graph Picture setting" menu / Vector length: 4 cm/kn
Selection Frame Menu: "Current and Depth graph" menu/Vector length: 4 cm/kn

▶ **Vector Density**

Function The vector display interval in the current graph is selected.
Setting value: [Normal High S-High]
Normal: The vector is displayed on the intersection in the grid.
High, S-High: The vector is displayed between grids.


[Normal] [High] [S-High]

Operation **Standard Menu:** "Graph Picture setting" Menu /Vector Density: S-High
Selection Frame Menu: "Current and Depth graph" menu/Vector Density: S-High

▶ **Back Color**

Function The background color in the graph is selected from either of the following, set values.
Setting color: [Standard Black Dark-Blue Gray White]
The graph background color of the GRAPH screen is common to the graph of the current speed/depth, ship speed, water temperature, the graph of wind direction/speed and set. The screen background color pairs with the background color in the graph in the standard, and the background color in the graph is decided by the background color of the screen, too. The background color of the screen is set by screen brightness (*1) of the main menu.

Operation **Standard Menu:** "Graph Picture setting" menu/Back color: Black
Selection Frame Menu: "Current and Depth graph" menu/ Back color: Black

▶ **Time Scale**

Function The time of a graph horizontal axis is set.
The axis of the time of the GRAPH screen is common to all graphs of the current speed/depth, ship speed, water temperature, the graph of wind direction/speed and set.
Setting value: [0.5 1 3 6 12 24] h
The storage time synchronizes with "Record Time of the track screen". Set the Record Time of the track screen according to the table below at length intervals when you want to lengthen the Time Scale of the [GRAPH] screen.

[PLOT] Screen: Record Time	6 sec	15 sec	30 sec	60 sec	120 sec	240 sec
[GRAPH] Screen: Time Scale	0.5 hour	1 hour	3 hour	6 hour	12 hour	24 hour

Operation **Standard Menu:** "Graph Picture setting" menu/Time Scale: 1 h
Selection Frame Menu: "Current and Depth graph" menu/Time Scale: 1 h

4.5.2 Ship Speed Graph Setting

Function The elapsed time of ship speed is displayed in the graph. The range of the display depth can be changed by a set menu.
When ship speed becomes outside the display ship speed range, the short dashed line is pulled on a horizontal axis of the frame outside the graph.

Operation **Standard Menu:** [MENU] key/Menu screen/Picture setting≫ / [GRAPH] screen≫/[ENT] key/"Graph Picture setting" menu
Selection Frame Menu: [□] key/ Enclose "Ship speed graph" with the frame /[MENU] key/"Ship speed graph" menu

*1 The screen brightness: As for the background color of the screen, the selection change can be done by menu/screen brightness/light and dark. The color corresponding to brightness and darkness is selected from four colors (Black, Navy Blue, Gray, and White) by the submenu setting.
*2 The storage time of [GRAPH] screen setting is given to priority. When the storage time will be set in a long time, the storage interval of the track screen becomes long.

▶ **Ship Speed Range**

Function The maximum display value of the graph is set.
Setting value: [5 10 15 20 25 30 40] kn
The setting of the time axis is common with current/depth graph.

Operation **Standard Menu:** "Graph Picture setting" menu/Ship speed range: 10 kn
Selection Frame Menu: "Ship Speed graph" menu/Ship speed range: 10 kn

▶ **Ship Speed Graph**

Function When OFF is selected, the ship speed graph display can be erased.
Setting value: [Display ON OFF]
The amount where the ship speed graph disappeared expands current/depth graph and is displayed.

Operation **Standard Menu:** "Graph Picture setting" menu/Ship Speed Graph: Display ON

4.5.3 Water Temperature Graph Setting

Function The elapsed time of the water temperature is displayed in the graph. (*1)
The displayed range of the water temperature can be changed by a set menu.
The water temperature graph is set by measure setting/alarm and graph setting (*2) of the menu.
In the setting of alarm and the graph, a center temperature in the water temperature graph and width (range) in the water temperature graph are set.
The setting of the time axis is common with current/depth graph.

Operation **Standard Menu:** [MENU] key/Menu screen/Measure setting ≫ /[ENT] key/"Measure setting" menu/Alarm and Graph setting≫/"Alarm and Graph setting" menu/ Temperature Graph Center and Temperature Graph Width
Selection Frame Menu: [□] key/ Enclose "Water temperature graph" with the frame /[MENU] key/"Water temperature alarm and graph" menu/Temperature Graph Center and Temperature Graph Width

▶ **Water Temperature Display**

Function The water temperature graph display can be erased by selecting OFF.
Setting value: [Display Non-display]
The amount where the water temperature graph disappeared expands current/depth graph and is displayed.

Operation **Standard Menu:** [MENU] key/Menu screen/Picture Setting≫/ [GRAPH] screen ≫/[ENT] key/"Graph Picture setting" menu/Temperature display: Display ON

*1 It is necessary to connect the water temperature sensor for the display of the water temperature graph.
*2 The water temperature graph is on current 1, current 2, and the [GRAPH] screen, and the graph setting is common.
Measure setting/Alarm and Graph setting: Refer to 4.1.8 "Setting of Measurement Alarm and Water Temperature Graph"
Water Temperature Center and Water Temperature Graph Width.

4.5.4 Wind direction/Speed Graph Setting

Function The elapsed time of the wind direction/wind speed vector in each vertical line of the graph time axis are displayed. (*1)
The setting of the time axis is common with current/depth graph.
The vector display interval in the graph is common with current/depth graph.
Refer to "Vector Density" of current/depth graph setting.

Operation **Standard Menu:** [MENU] key/Menu screen/Picture setting≫/ [GRAPH] screen ≫/[ENT] key/"Graph Picture setting" menu
Selection Frame Menu: [□] key/ Enclose “Wind direction and Wind speed graph” with the frame /[MENU] key/ "Wind Vector Graph" menu

▶ Wind Vector Length

Function The vector length of the wind direction and the wind speed are set in the graph.
Setting value: [0.5 1 2] mm/(m/s)

Vector Length [mm/(m/s)]	0. 5	1	2
Max. Wind Speed (m/s)	40	20	10

It is displayed that the maximum Wind speed display in the above table is exceeded in red though the vector color is green.

Operation **Standard Menu:** "Graph Picture setting" menu/Wind vector length:1 mm/(m/s)
Selection Frame Menu: "Wind Vector graph" menu/Wind vector length:1 mm/(m/s)

▶ Wind Vector Graph

Function The Wind Vector graph display can be erased by selecting non-display.
Setting value: [Display ON OFF]
The amount where the Wind Vector graph disappeared expands current/depth graph and is displayed.

Operation **Standard Menu:** "Graph Picture setting" menu / Wind Vector Graph: Display ON/OFF

*1 It is necessary to connect the wind direction and wind speed sensor for the display of the wind direction and wind speed graph.

4.6 Fish Finder Display Setting

The [FISH] screen converts the reflection signal of the supersonic wave launched in four directions into 16 colors according to strength, and displays the water inside. (*1)
Because the supersonic wave is turned in four directions (fore of the starboard, fore of the port, the after of the starboard, and the after of the port), another, two screens, and one screen displays that display each detection result by division (four screens) into four can be selected, too.

4.6.1 Split-screen Selecting

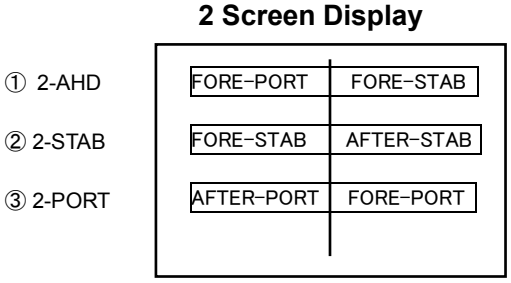
Function In the [FISH] screen, there are three kinds of split-screens of [FISH 1] screen (one direction display), [FISH 2] screens (two direction display), and [FISH 3] screens (four direction display). The screen is selected from the menu including the selection of the direction of the display beam in two screen display and one screen display.

Operation **Standard Menu:** [MENU] key / Menu screen/Picture setting≫ / [FISH]≫ / [ENT] key / "Fish Finder Picture setting" menu
Selection Frame Menu: [□] key / Enclose "Fish display screen" with the frame /[MENU] key / "Fish Finder display" menu

► [FISH 2] Screen Display

Function When you select the beam direction displayed on two shoal of fish screens (two direction display).
Setting value: [2-AHD]
The beam direction in the hatching part is selected with ◄/► key from among [① 2-AHD ② 2-STAB ③ 2-PORT], and it fixes with the [ENT] key.

2 Screen Display

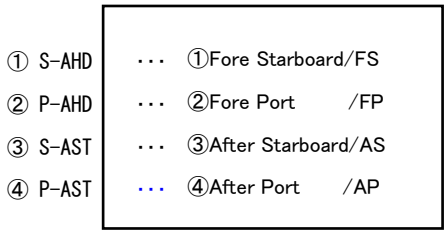


The display at two screen display is like a left chart.
For instance, when it selects 2-AHD of ①, division into two
"Beam echo fore of the port" is displayed at the left of the screen.
"Beam echo fore of the starboard" is displayed at the right of the screen.

Operation **Standard Menu:** "Fish Finder Picture setting" menu / Display Beam: 2-AHD
Selection Frame Menu: "Fish Finder display" menu / Display Beam: 2-AHD

► [FISH 1] Screen Display

Function When you select the beam direction displayed on one shoal of fish screens (one direction display).
Setting value: [S-AHD]
The beam direction in the hatching part is selected with◄/►key from among [①S-AHD ② P-AHD ③S-AST ④P-AST], and it fixes with the [ENT] key.



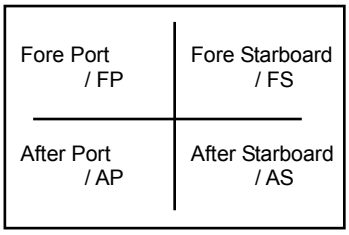
1 Screen Display
The display at one screen display is like a left chart.
For instance, when ① S-AHD is selected, "Beam echo fore of the starboard" is displayed on the screen.

Operation **Standard Menu:** "Fish Finder Picture setting" menu / Display Beam: S-AHD
Selection Frame Menu: "Fish Finder display" menu / Display Beam: S-AHD

*1 The ship speed and the current cannot be displayed while the [FISH] screen is displayed.

► **[FISH 3] Screen Display**

Function When you select the beam direction displayed on three shoal of fish screens (four direction display).
Setting value: [4]
The beam direction in the hatching part is selected with ◄/► key as [4] and it fixes with the [ENT] key.



4 Direction Display
The display and the beam direction at 4 direction display are like a left chart.

4.6.2 Screen Display Setting

Function I It sets concerning the display of the [FISH] screen.
Setting item: Color arrangement, background color, color sample display, color erasing, and screen scrolling

Operation **Standard Menu:** [MENU] key/Menu screen/Picture setting≫ / [FISH] screen ≫/[ENT] key/"Fish Finder Picture setting" menu
Selection Frame Menu: [□] key/ Enclose "[FISH] display screen" with the frame /[MENU] key/"Fish Finder display" menu

► **Color**

Function The color expressed on the screen according to the signal strength arrangement of color (color sample) is switched.
Setting value: [A B C D]
The color sample can be selected according to four kinds (A-D). Refer to Table 4.6.1.
The color sample is displayed in the left end of the FISH screen. It makes to non-display by the setting. (*1)

Table 4.6.1 Color Sample and Color arrangement

		Weak → Signal Strength → Strong														
No		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Color Sample	A	Dark Blue	Blue	Light Blue	Dark Sky Blue	Sky Blue	Grn	Light Grn	Pea Grn	Yellow	Light Org	Org	Dark Org	Red	Brwn	Dark Brwn
	B	Dark Blue	Blue	Dark Grn	Grn	Light Grn	Pea Grn	Yellow	Light Org	Org	Dark Org	Red	Dark Red	Light Brwn	Brwn	Dark Brwn
	C	Light Sky Blue	Sky Blue	Light Blue	Blue	Dark Blue	Pea Grn	Yellow	Light Org	Org	Dark Org	Red	Light Brwn	Brwn	Dark Brwn	Pink
	D	Back -ground	Sky Blue		Blue		Pea Grn		Yellow		Org		Red		Brwn	

Operation **Standard Menu:** "Fish Finder Picture setting" menu/Color: C
Selection Frame Menu: "Fish Finder display" menu/Color: C

► **Back Color**

Function The background color when a no signal and no drawing is chosen.
Setting item: [Standard Black Dark- Blue Gray White]
The screen background color pairs with the background color in the graph in the standard, and the background color in the graph is decided by the background color of the screen, too. The background color of the screen is set by Brightness (*2) of the menu.

Operation **Standard Menu:** "Fish Finder Picture setting" menu/Back color: Black
Selection Frame Menu: "Fish Finder display" menu/Back color: Black

*1 Refer to "Color sample" in this menu for the setting of Display/Non-display of the color sample.
*2 As for the background color of the screen, the selection change can be done by menu/Brightness/High and Low. Moreover, the color corresponding to High and Low is selected from four colors (Black, Dark- Blue, Gray, and White) by the submenu setting.

▶ Color Sample

Function The color sample is displayed on the left end of the screen.
Setting item: [Display ON OFF]
The color sample is not displayed when setting to OFF.
Refer to the above-mentioned "Color" for the color arrangement of color sample.

Operation **Standard Menu:** "Fish Finder Picture setting" menu/Color sample: Display ON/OFF
Selection Frame Menu: "Fish Finder display" menu/Color sample: Display ON/OFF

▶ Chart Speed

Function The scrolling speed of the screen can be slowed down.
Setting item: [1/1 1/2 1/3]
It uses by 1/1 usually. In 1/2 and 1/3, the scrolling speed of the screen slows to 1/2 and 1/3 respectively.

Operation **Standard Menu:** "Fish Finder Picture setting" menu/Chart Speed: 1/1
Selection Frame Menu: "Fish Finder display" menu/ Chart Speed: 1/1

▶ Color Erase

Function So as not to display a weak reaction like the plankton and the fingerling group, etc. , it sets.
Setting item: [OFF]
It selects with ◄/► key from among the setting of the net multiplication part [OFF 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15], and it fixes with the [ENT] key.
It usually uses OFF though there is a set value of the color erasing up to 1-15 corresponding to signal strength No of the color sample. Table below 4.6.2 shows the setting example.
For instance, background color (*1) is displayed without displaying the signal whose signal strength is smaller than No4 (No4 is included) when the color erasing is set to 4.
When the background color is a black, the display by "Color sample A-D" becomes an arrangement of color in the next table.

Table 4.6.2 Color Sample and Color Erasing Display

		Weak → Signal Strength → Strong														
No		1	2	3	④	5	6	7	8	9	10	11	12	13	14	15
Color Sample	A	Black	Black	Black	Black	Sky Blue	Grn	Light Grn	Pea Grn	Yellow	Light Org	Org	Dark Org	Red	Brwn	Dark Brwn
	B	Black	Black	Black	Black	Light Grn	Pea Grn	Yellow	Light Org	Org	Dark Org	Red	Dark Red	Light Brwn	Brwn	Dark Brwn
	C	Black	Black	Black	Black	Dark Blue	Pea Grn	Yellow	Light Org	Org	Dark Org	Red	Light Brwn	Brwn	Dark Brwn	Pink
	D	Black	Black		Black		Pea Grn		Yellow		Org		Red		Brwn	

Operation **Standard Menu:** "Fish Finder Picture setting" menu/Color erase: OFF
Selection Frame Menu: "Fish Finder display" menu/Color erase: OFF

▶ Vertical Cursor

Function The cursor is not displayed when OFF is set.
Setting item: [Display ON OFF]
A vertical cursor moves with ◄/► key. The display numerical value is an elapsed time from the cursor position to present.

Operation **Standard Menu:** "Fish Finder Picture setting" menu/Vertical cursor: Display ON/OFF
Selection Frame Menu: "Fish Finder display" menu/Vertical cursor: Display ON/OFF

*1 The background color depends on the setting of "Back color" in this menu. The color sample doesn't change even if the color erasing is set.

▶ **Horizontal Cursor**

Function The cursor is not displayed when OFF is set.
Setting item: [Display ON OFF]
A horizontal cursor moves with ▲/▼ key. The display numerical value is a depth at the cursor position.

Operation **Standard Menu:** "Fish Finder Picture setting" menu/Horizontal cursor: Display ON/OFF
Selection Frame Menu: "Fish Finder display" menu/Horizontal cursor: Display ON/OFF

4.6.3 Eliminating Interference

Function It is possible to set only to the [FISH] screen. The interference elimination is used to remove the acoustic noise that enters from another ship and the noise that appears at random. To display a weak reaction, it turns it OFF.

Operation **Standard Menu:** [MENU] key/Menu screen/Picture setting≫ / [FISH] screen≫/[ENT] key/ "Fish Finder Picture setting" menu
Selection Frame Menu: [□] key/ Enclose “[FISH] display screen” with the frame /[MENU] key/"Fish Finder display" menu

▶ **Noise Reduce**

Function The interference removal function is operated when there is interference from other supersonic wave equipment, and it makes to the image that sees easily.
Setting item: [ON OFF]
If the interference removal is used on, a very thin reaction might not be displayed easily.

Operation **Standard Menu:** "Fish Finder Picture setting" menu/Noise Reduce: OFF
Selection Frame Menu: "Fish Finder display" menu/Noise Reduce: OFF

4.6.4 Adjusting Gain and STC

▶ **GAIN (Sensitivity Setting)**

Function [GAIN] knob (*1) of the keyboard is turned, and the echo display sensitivity of the [FISH] screen is adjusted.
The [GAIN] knob operates only on the [FISH] screen. It doesn't correspond on other screens.

Operation Sensitivity rises when the [GAIN] knob is turned to the right (direction of a large numerical value).
Setting value: [0.0 (Min.) ・・・5.0・・・10.0(Max.)] Standard: 5.0 (in 0.1 step)
When sensitivity is too low: The image weakens, and the shoal of fish doesn't recognize it easily.
When sensitivity is too high: Dirt the plankton and in water etc. are displayed, and the shoal of fish doesn't recognize it easily.

▶ **STC (Bubble Cancellation Adjustment)**

Function Garbage in the vicinity of the surface of the sea and the noise by the bubble etc. can be decreased by turning [STC] knob (*1) of the keyboard on the [FISH] screen. The [STC] knob operates only on the [FISH] screen. It doesn't correspond on other screens.

Operation The [STC] knob can be strongly erased by turning to the right (direction of a large numerical value).
Setting value: [0.0 (Min.) ・・・5.0・・・10.0(Max.)] Standard: 5.0 (in 0.1 step)
When the bubble cancellation is too weak: A lot of noises in the vicinity of the surface of the sea are displayed, and the shoal of fish doesn't recognize it easily.
When the bubble cancellation is too strong: The image in the vicinity of the surface of the sea weakens, and the shoal of fish doesn't recognize it easily.

*1 Refer to 2.1 “Name and Functions of Keyboard”.

4.6.5 Depth Range Setting

This section is described 1)Depth range setting of FISH screen and 2)The range of depth is allocated to a numeric key.

▶ [FISH] screen: Depth Range Setting

Function It changes within the range of depth corresponding to each key on the [FISH] screen when [numerical value] key on the keyboard is pushed. (*1)

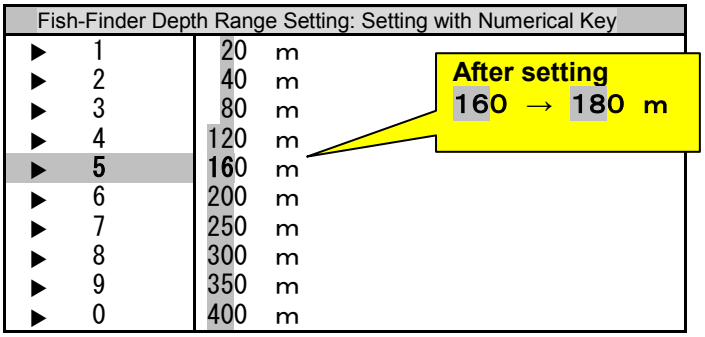
Operation For instance, if [5] of [numerical value] key is pushed by setting table below 4.6.3, the range of depth becomes 160m.
Refer to table below 4.6.3 for the default of the [numerical value] key and the range of depth.

▶ **Allocating Numeric Key to the Depth Range**

Function Ten [numerical value] keys (1-9,0) are made to correspond within the range of depth on the [FISH] screen and it allocates.

Operation "[FISH] screen depth setting menu" is displayed pushing [DEPTH] key at the [FISH] screen. (*2)
The range of depth of each number of ten [numerical value] keys "1,2,‥‥9,0" on the keyboard is set on the depth setting menu screen.
For instance, when you allocate the range of 180m to [5] of [numerical value] key.
1) The [FISH] screen depth setting menu is opened pushing [DEPTH] key (*3).
2) Five [5] is selected with ▲/▼ cursor.
3) It is input with [numerical value] key on the keyboard as " 180 " (10m unit)(selection (*4) of the unit).
4) It fixes it pushing [ENT] key.
5) It ends pushing [DEPTH] key.

Table 4.6.3 [FISH] Screen: Depth Range Setting Menu



*1 The range in the graph doesn't change excluding the [FISH] screen even if [numerical value] key on the keyboard is pushed. Set it by the range menu of each screen.
*2 The depth range on the [FISH] screen can be set from the selection frame menu.
Selection Frame Menu: [☐] key/ Enclose "[FISH] display screen" with the frame /[MENU] key/"Fish Finder display" menu/Range setting≫ /"Fish Finder Depth Range setting" menu
*3 When the [DEPTH] key is pushed excluding the [FISH] screen, "Current Depth setting" menu is displayed.
*4 The unit within the range of depth can be selected from "m/fathom". Refer to 7.1.3 "Depth Unit".

4.7 Tidal Profile Display Setting

The current (direction and speed) of each 2m is measured from the surface of the sea to bottom of the sea (*1), and it displays in the graph in real time on the [PROFILE] screen.
For instance, 150m in depth, the graphical display of the current in about 50 layers can be done at the same time in depth from 12m in depth to 112m in case of a standard measurement in five current layers. As a result, can the twist of the current from the surface of the sea to bottom of the sea and the change in swinging can be seen.
The profile screen is displayed with the [PROFILE] key on the keyboard. There are three screens (profile 1(graphical display) , profile 2(ellipse display)) and profile 3(Upwelling flow display), and the screen of profile 1 , profile 2 and profile 3 changes into the profile screen whenever the [PROFILE] key is pushed.

4.7.1 Profile 1 Graph Setting (Graph Display / Ellipse Display Commonness setting)

Function Profile 1 screen displays the multilayer current data separately for 1) Current speed graph and 2) Current direction graph.
Set item: Range of multilayer depth, range of multilayer Current speed, and display current
The setting of profile graph 1 and profile graph 2 is common.

Operation **Standard Menu:** [MENU] key/Menu screen/Picture setting≫ / [PROFILE] screen ≫/[ENT] key/"Multi-Layer Profile Picture setting" menu
Selection Frame Menu: [□] key/ Enclose “Profile 1 graph” with the frame /[MENU] key/ "Profile 1 graph" menu

► Multilayer Depth Range

Function The range of depth in the profile current graph is set. Select the maximum display value to be measured. (*2)
Set value: [100 200 300 500] m
The Multilayer Depth Range is common to profile 1 screen and profile 2 screens and set. ･･･ Unit setting (*3)

Operation **Standard Menu:** "Multi-Layer Profile Picture setting" menu/Multilayer depth range: 200 m
Selection Frame Menu: "Profile 1 graph" menu/Multilayer depth range: 200 m

► Multilayer Current Speed Range

Function The range of Current speed in the multilayer current graph is set. Select the maximum display value to be measured.
Set value: [1 2 5 10] kn
The Multilayer Current speed Range is common to profile 1 screen and profile 2 screens and set. ･･･ Unit (kn)

Operation **Standard Menu:** "Multi-Layer Profile Picture setting" menu/Multilayer Current speed range: 1 kn
Selection Frame Menu: "Profile 1 graph" menu/ Multilayer Current speed range: 1 kn

► Display Current

Function The current displayed in the graph is selected from [absolute/relative].
Absolute: The Absolute current is displayed.
Relative: The relative current is displayed.
The display current is common to profile 1 screen and profile 2 screens and set.

Operation **Standard Menu:** "Multi-Layer Profile Picture setting" menu/Display Current: Absolute
Selection Frame Menu: "Profile 1 graph" menu/Display Current: Absolute

*1 The maximum depth in which the current can be measured is about 160(JLN-650)/100(JLN-652)m of depth or about 75% value of bottom of the sea depth. It changes by the oceanographic condition.
*2 The bottom of the sea depth that can be measured is about the maximum 400(JLN-650)/250(JLN-652)m. It changes by the oceanographic condition.
*3 The unit within the range of depth can be selected from m/fathom. Refer to 7.1.3 “Depth Unit”.

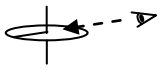
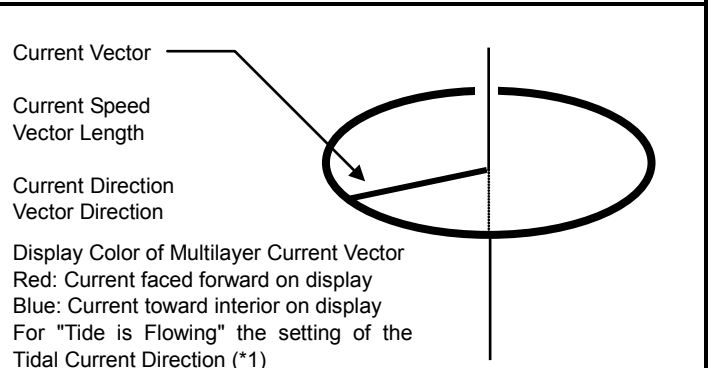
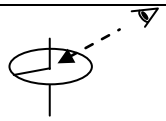
4.7.2 Profile 2 Graph Setting (Ellipse Display)

Function The multilayer current data is made an ellipse graph on profile 2 screens and it displays. An ellipse size shows the speed of the current, and the direction of the vector shows the direction of the current.
Setting item: View point [Deflection angle], View point [Horizontal angle], Multilayer display, Vector color, Width of vector, and Wind direction arrow :(hereafter, profile graph 1 and common setting) Multilayer depth range, Multilayer Current speed range, and Display current

Operation **Standard Menu:** [MENU] key/Menu screen/Picture setting≫ / [PROFILE] screen ≫/[ENT] key/"Multi-Layer Profile Picture setting" menu
Selection Frame Menu: [□] key/ Enclose "Profile 2 graph" with the frame /[MENU] key/ "Profile 2 graph" menu

▶ View Point: Vertical Angle

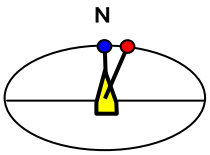
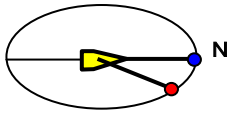
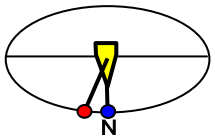
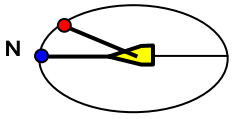
Function The vertical angle of the view point that looks down at the ellipse is selected on profile 2 screens (ellipse display).
Setting value: [30 2045] °
The ellipse approaches to true circle by angle large about the vertical angle of view point.

View Point: Vertical Angle		Profile 2 Screen (Ellipse Display)
20°		
30°		
45°		

Operation **Standard Menu:** "Multi-Layer Profile Picture setting" menu / View V. Angle: 20°
Selection Frame Menu: "Profile 2 graph" menu / View V. Angle: 20°

▶ View Point: Horizontal Angle

Function The horizontal angle of the view point that looks down at the ellipse is selected on profile 2 screens (ellipse display).
Setting value: [0 90 180 270] °
It sets to 0°, and NORTH (north) is displayed up usually. It becomes easy to see by rotating the view point of either right and left and the horizontal angle by 90° because it becomes difficult to see an ellipse display when the direction of the current is for the south - north.

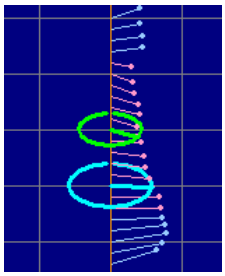
View Point: Horizontal Angle / Profile 2 Screen (Ellipse Display)			
0°	90°	180°	270°
			

Operation **Standard Menu:** "Multi-Layer Profile Picture setting" menu / View V. Angle: 0°
Selection Frame Menu: "Profile 2 graph" menu / View H. Angle: 0°

*1 When the setting of the Tidal Current Direction is "Tide is coming", the direction of the current becomes "Tide is Flowing" and opposite direction. Refer to 7.1.4 "Display Setting"

▶ Multilayer Vector Density

Function The number of the displayed multilayer vector is thinned out on the profile screen. It is set to 1 (1/1=100% display) usually.
Setting value: [1/1 2 4 8 16 Display OFF]
For instance, when the multilayer current up to 200m in depth is displayed, about maximum 100 current vectors are displayed. At this time, the profile display becomes 1/1 when 1 is selected, and 100 all is displayed. When it is 4, similarly it is thinned out, and 25 current vectors in all for 4 are displayed in 1/4.
Only the vector of A-E of five layers is displayed without displaying the multilayer current vector when Display OFF it.
The setting of the M. Lay. Vector Density is common in both of the profile 1 screen and profile 2 screens.



Vector Density

Operation **Standard Menu:** ”Multi-Layer Profile Picture setting” menu/Vector Density: 1/1 Times
Selection Frame Menu: ”Profile 2 graph” menu/ Vector Density: 1/1 Times

▶ Multilayer Vector Color

Function The vector color of the multilayer current is selected from [Light / Dark].
The display color of the multilayer current vector is displayed by two colors (Red and Blue) on profile 2 screens (ellipse display).
This red and blue are selected from a Light / Dark. We can use it properly at daytime and nighttime.
Refer to the above-mentioned “View Point: Vertical Angle” for the display color of the multilayer current vector.

Operation **Standard Menu:** ”Multi-Layer Profile Picture setting” menu/Vector color: Light
Selection Frame Menu: ”Profile 2 graph” menu/Vector color: Light

▶ Multilayer Vector Width

Function The thickness of the vector of the multilayer current is selected from [Narrow/Wide].
The thickness of the multilayer current vector can be selected from Narrow/Wide on profile 2 screens as well as the “Vector Color”.
When the number of the displayed multilayer current vector is thinned out and displayed, it becomes easy to expect being make it to Wide.

Operation **Standard Menu:** ”Multi-Layer Profile Picture setting” menu/Vector width: Narrow
Selection Frame Menu: ”Profile 2 graph” menu/Vector width: Narrow

▶ Wind Direction Mark

Function The wind direction mark is selected from [Display ON/OFF]. (*1)
It can be selected whether to display ON the wind direction arrow in the bearing display chart (Right Fig. 4.7.1) on profile 2 screens.
When the velocity of the wind is 0 m/sec (calm), the wind direction arrow is not displayed.

Operation **Standard Menu:** ”Multi-Layer Profile Picture setting” menu/Wind direction Mark: Display ON
Selection Frame Menu: ”Profile 2 graph” menu/Wind direction Mark: Display ON

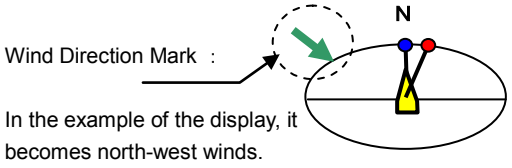


Fig. 4.7.1 Bearing Display

*1 It is necessary to connect the sensor for the display of data of wind direction/wind speed.
Set to "The anemometer is connected" when you connect the wind direction/wind speed sensor. Refer to 7.1.2 “NMEA0183 Input setting”

4.7.3 Multilayer 3 Screens Setting (Upwelling Display)

Function The up-and-down direction component of multilayer current data is displayed with multilayer 3 screens to 1) upwelling graph and 2) progress graph.
Setting item: upwelling depth range, upwelling speed range, record time measurement depth (V, W, X, Y, Z layer) and graph partitioning

Operation **Standard Menu:** None
Selection Frame Menu: [□] key/Multilayer 3 graph is enclosed by a frame/[MENU] key/Multilayer 1 graph menu

▶ **Upwelling depth range**

Function The depth range of an upwelling graph is set.
Select the maximum indicated value to measure. (*1)
Setting value [100 200 300 500] ... Unit setting (*2)

Operation **Selection Frame Menu:** Multilayer 3 graph menu/ upwelling depth range: 200 m

▶ **Upwelling speed range**

Function The speed range of an upwelling graph is set.
Select the maximum indicated value to measure.
Setting value [1 2 5 10] kn ... Unit (kn)

Operation **Selection Frame Menu:** Multilayer 3 graph menu/ Multilayer speed range: 1 kn

▶ **Measurement depth**

Function The layer depth of the upwelling layer of a numeric display is set.
Non-display: The numerical value of an applicable layer is not displayed.
2-500m: The numerical value of upwelling speed of the setting depth is displayed.

Operation **Selection Frame Menu:** Multilayer 3 graph menu/Measurement depth: Non-display, 2-500m

▶ **Graph partitioning**

Function The display range of an upwelling graph is shifted to +/-.
1/2: It indicates by shift at + (up) side.
1/1: 0kn is indicated in the center.
2/1: It indicates by shift at - (down) side.

Operation **Selection Frame Menu:** Multilayer 3 graph menu/Graph partitioning: 1/2, 1/1, 2/1

*1 Measurable the bottom of the sea depth is a maximum of approx. 250 m. It changes according to an oceanic condition.

*2 The unit of a depth range can be selected from m/fathom. Reference: 7.1.3 Unit setting

4.8 User Menu Setting

Function Two kinds of (user 1 and user 2) arbitrary menu settings can be registered.
It is possible to use it by registering what set according to the fishing method, the fishery, and the season such as ranges on the current measurement depth of layer and the [FISH] screen, and reading it if necessary.

Operation **Standard Menu:** [MENU] key/Menu screen/Initial setting≫/[ENT] key/"Installation setting" menu/Master reset User menu setting≫/[ENT] key/"Master reset User menu setting" menu

▶ 1. Read out the setting Value

Function The registered menu set value is read. (*1)
Read out the setting value: [Cancel/Factory/User 1/User 2/External]
User 1 or user 2 is selected from among the menu, and it executes it with the [ENT] key. After it executes it, it ends with the [MENU] key.
Execute "**2. Write in the setting Value**" when the menu setting is changed after it reads and it registers again.
Factory: A set value when the factory is shipped is read. (*2)
User 1: The set value being registered by user 1 is read. An initial value is the same as the shipment value.
User 2: The set value being registered by user 2 is read. An initial value is the same as the shipment value.
External: It is the menu for the service man. An error is displayed.

Operation **Standard Menu:** "Installation setting" menu/"Master reset User menu setting"/Read out the setting value: Cancel

▶ 2. Write in the setting Value

Function A present menu setting value is registered to user 1 or user 2. (*1)
Write in the setting value: [Cancel/Operate≫].
When Operate≫ is selected and the [ENT] key is pushed, following "Write in the setting value" menu is displayed.

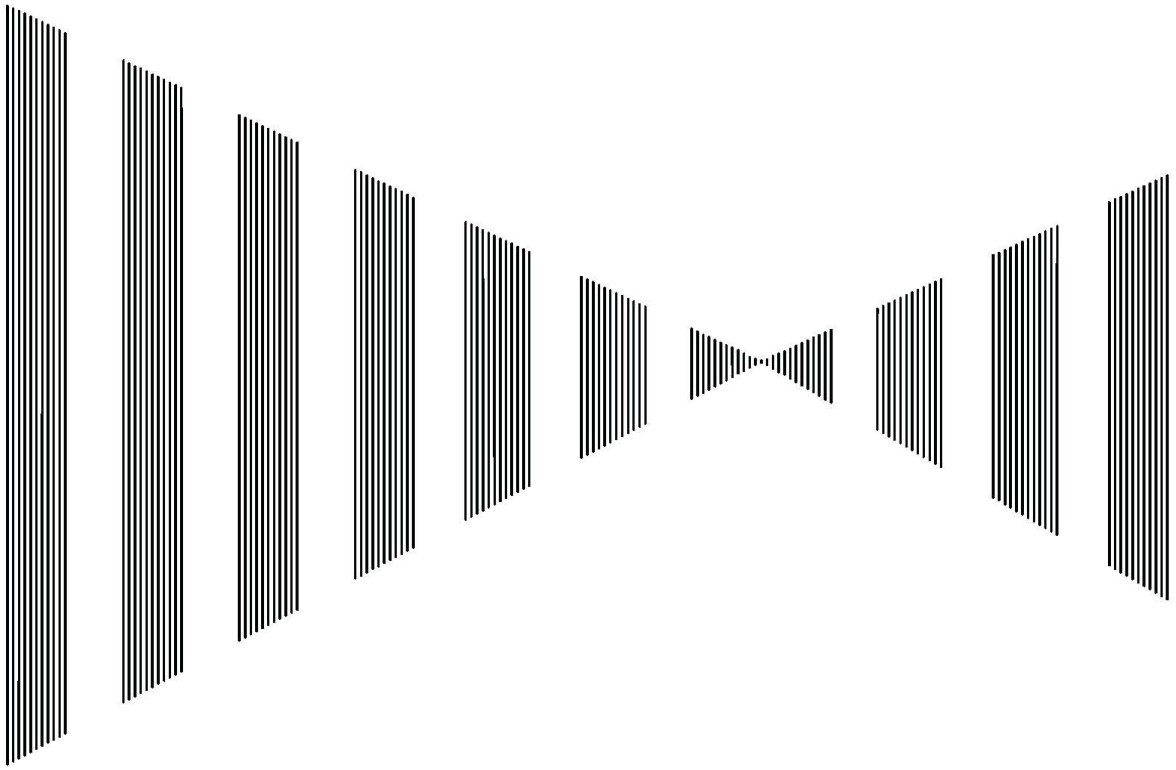
Write in the setting value			
▶ Write in the Value of menu Displayed	Cancel	User 1	User 2

User 1 or user 2 is selected from among the menu, and it executes with the [ENT] key. (*3)
After it executes, it ends with the [MENU] key.
Execute "1. Read out the setting Value" when you call the written menu.

Operation **Standard Menu:** "Installation setting" menu/"Master reset User menu setting"/2.Write in the setting value: Cancel/Operate≫/ "Write in the setting value" menu / Write in the value of menu display: Cancel

*1 Other operations (The panel operation is included) cannot be done while being reading the registration value or writing it. The menu value set to read the registered menu value now is overwrote and deleted.
Register the menu to user 1 or user 2 beforehand when the saving is necessary. It is possible to return to the last menu setting value with [UNDO] key before "Submenu" is ended it.
*2 A set value when the factory is shipped becomes an initial value of the menu setting. Refer to 12.1 “Menu Table”
*3 It returns to the previous setting value with [UNDO] key before "Execution menu" is ended it.

5. Measurement Alarm



5.1 Measurement Alarm Display

There are two kinds of alarm; a measurement alarm and a warning alarm.
When abnormality is found by the unit and the system of the equipment, a warning alarm displays "Warning message".
Refer to 9.1 “Warning" for an abnormal alarm.

Function When alarm is generated, "Measurement alarm message" is displayed with the alarm sound.

Operation Alarm sound/message disappears when the [BUZZER] key on the keyboard is pushed. Moreover, it is possible to set it to non-display by the menu. (*1)
There are five kinds of measurement alarm about the following:

1) The measurement alarm: When the measurement data exceeds the alarm setting value as the current speed and the decrease and depth of ship speed become shallow.
2) The depth alarm that cannot be measured: When the current measurement depth of layer becomes depth that is deeper than the bottom of the sea depth or the measurement condition is impossible.
3) The echo level decrease alarm: When the current echo level of the measured depth decreases, and the measurement becomes unstable.
4) The over range alarm: When the measurement value exceeds it to the range in the graph for the graphical representation.
5) The operation invalidity alarm: When the [UNDO] key cannot be operated (invalidity).

Table 5.1.1 The List of Measurement Alarm Items

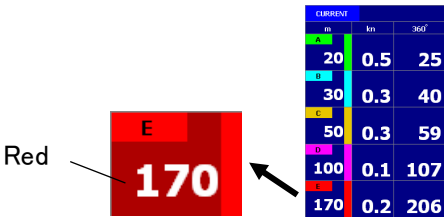
No	Measurement Alarm	Alarm Message
1	Current Speed Alarm Low	Current speed has slowed more than a setting value. Date, Setting value, Display: Push the [BUZZER] key to end alarm display.
2	Ship Speed Alarm Low	Ship speed has slowed more than a setting value. Date, Setting value, Display: Push the [BUZZER] key to end alarm display.
3	Bottom Depth Alarm Shallow	Depth became shallower than a setting value. Date, Setting value, Display: Push the [BUZZER] key to end alarm display.
4	Timer Alarm	The sailing timer exceeded the setting time. Date, Setting value, Display: Push the [BUZZER] key to end alarm display.
5	Trip Alarm	The sailing trip exceeded a setting distance. Date, Setting value, Display: Push the [BUZZER] key to end alarm display.
6	Temp. Alarm High	Water temperatures rose more than setting values. Date, Setting value, Display: Push the [BUZZER] key to end alarm display.
7	Wind Speed Alarm Low	Wind speed has slowed more than set values. Date, Setting value, Display: Push the [BUZZER] key to end alarm display.

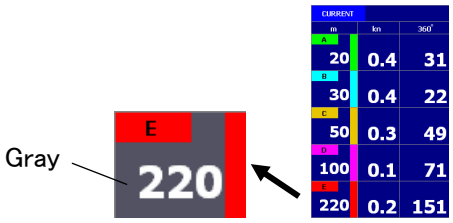
Measurement alarm message is;

1. displaying for approx. 10 seconds.
2. sounding alarm for approx. 10 seconds at the same time.
3. disappearing alarm message and alarm sound by pushing the [BUZZER] key.
4. able to non-display the measurement alarm message by menu setting.
   Menu/Initial Setting/Installation Setting /Alarm
5. Example of display: Refer to right table

Current Speed Alarm	
Date	: Year Month Day 14:06
Alarm Point	: * * . * kn
Situation	:Current speed became slower than setting point.
Indication	: OFF the alarm indication with “BUZZER” key.

*1 Non-display: Refer to 7.1.8 ”Alarm Display Setting”, or refer to 3.3.4 “Alarm Display, Stopping Alarm Sound and Adjusting Volume”.

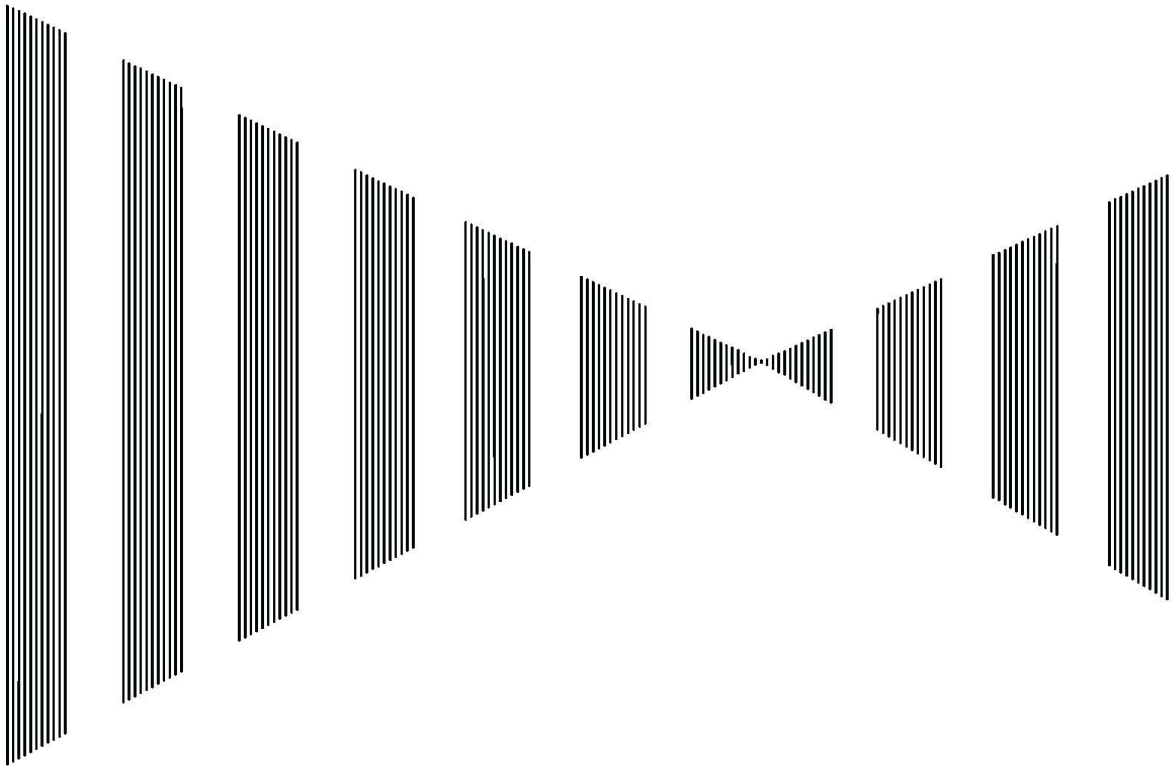
No	Measurement Alarm	Alarm Message
8	Depth alarm in which current cannot be measured.	1. When the depth of the A-E layer (absolute current measurement depth of layer) is deeper than about 80% of bottom of the sea depth. Alarm Ex.) When the depth is 200m, current measurement depth of layer is 170m 2. Less than 5m in depth cannot be measured regardless of depth. 3. A relative current is alarmed the layer in Alarm.
	Alarm Example: Depth has changed from 300m into 200m because it moved to a shallow place while adjusting set depth of E layer to 170m and measuring it. In this case, E layer is displayed as shown in a right picture by a red background color.	

No	Measurement Alarm	Alarm Message
9	Current measurement echo level lower alarm	The sea when current measurement depth of layer is deeper than 200m becomes and when the echo level of the supersonic wave lowers on the condition such as clear, both current measurements might become unstable. In this case, "Current measurement echo level lower alarm" is displayed. The displayed data maintains the last data excellently measured.
	Alarm Example: When going out offshore in addition while setting depth of E layer to 220m and measuring it, and entering the sea area where the sea was clear, E layer was displayed by a gray background color. (*1)	

No	Measurement Alarm	Alarm Message
10	Over range alarm	It is an over range. Switch the range. (Note 1) Note 1: About the current circle graph, the ship speed graph, the water temperature graph, and the wind direction/the wind speed vector, an over range alarm when data exceeds it to the setting range in each graph is displayed.
11	Operation invalidity alarm	[UNDO] key: Only when the menu screen is displayed, the [UNDO] key is effective.
Alarm message is; 1. displaying for approx. 10 seconds. 2. sounding alarm for approx. 10 seconds at the same time. 3. disappearing alarm message and alarm sound by pushing the [BUZZER] key. 4. Example of display: Refer to right table		[UNDO] key. Can't operate it. Situation: "UNDO" key is effective, when a menu screen is displayed. Indication: OFF with "BUZZER" key.

*1 Echo level lower alarm: The instrument fault is when the echo level lower alarm is generated by shallow depth (The example: It is 100m or more shallower). Check abnormally on the 9.2 "Self Test".

6. How to See Display



6.1 Absolute Current and Relative current

6.1.1 Absolute current

The absolute current shows the direction and the speed of the current to bottom of the sea (to ground). Fig. 6.1.1 is an example when the absolute current of three layers (A, B, and E) is displayed in the circle graph based on bottom of the sea among the currents in A, B, C, D, and E layer.

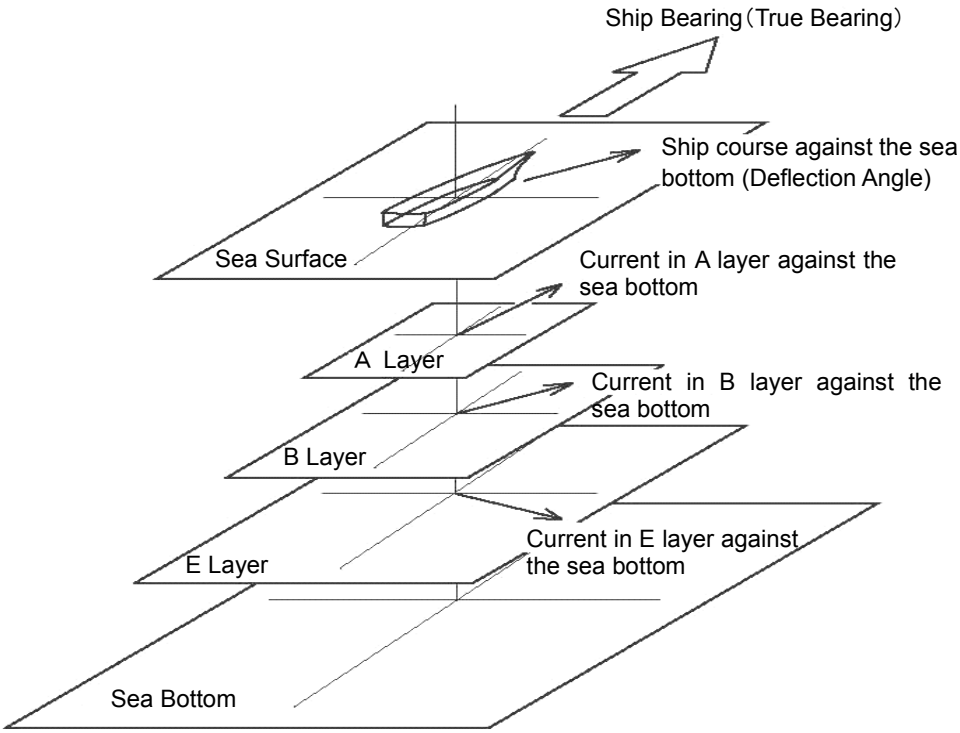
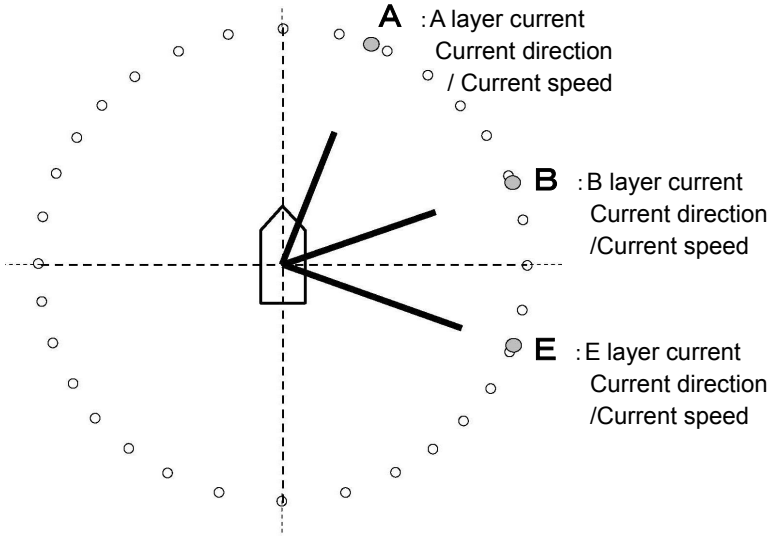


Fig. 6.1.1 Absolute Current



The current speed is displayed by the vector length in the current circle graph, and the current direction is displayed in the vector direction. (*1)

*1 The direction of the current can be selected from 1) "Tide is Flowing" and 2) "Tide is Coming". Refer to 7.1.4 “Display Setting”.

6.1.2 Relative Current and Standard Current Layer

Relative Current: For instance, when E layer is a standard, a relative current shows the direction and speed of the current in A layer to the current in E layer, B layer, C layer, and D layer. Moreover, each relative current is displayed as the AE layer, the BE layer, the CE layer, and the DE layer.

Figure 6.1.2 is an example of displaying the current in A and B layer because of a relative current based on E layer as shown in figure (Circle graph).

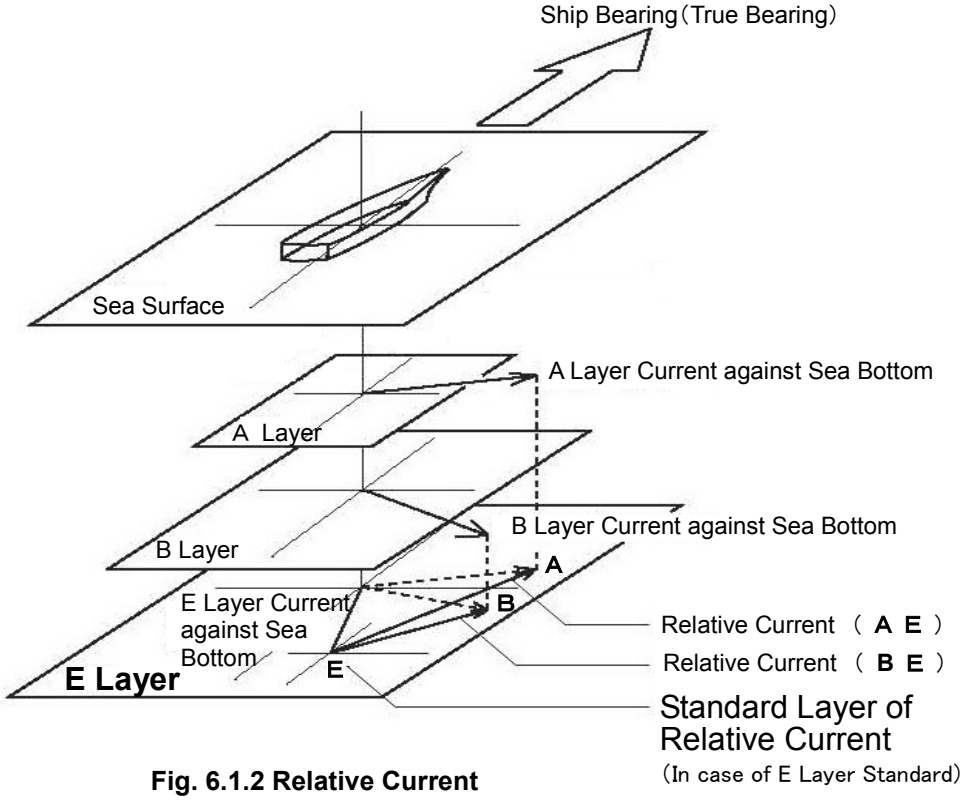
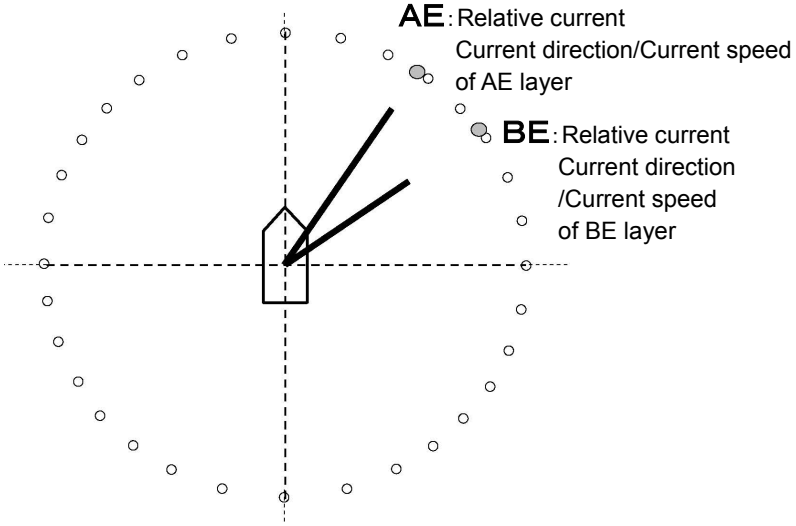


Fig. 6.1.2 Relative Current

The current speed is displayed by the vector length in the current circle graph, and the current direction is displayed in the vector direction. (*1)



*1 The direction of the current can be selected from 1) "Tide is Flowing" and 2) "Tide is Coming". Refer to 7.1.4 “Display Setting”.

・Setting of Relative Current Standard

Function When a relative current is measured, the based current layer is selected.
For instance, when E layer is set to the standard layer of drum, A layer, B layer, C layer, and D layer are displayed respectively based on E layer as "AE", "BE", "CE", and "DE".

Operation **Standard Menu:** [MENU] key/Menu screen/Measure setting≫/[ENT] key/Relative current standard: A-E Layer
Selection Frame Menu: [□] key/ Enclose “Current direction/Current speed” with the frame /[MENU] key/”Current speed and direction/relative current layer” menu / Relative current standard: A-E Layer

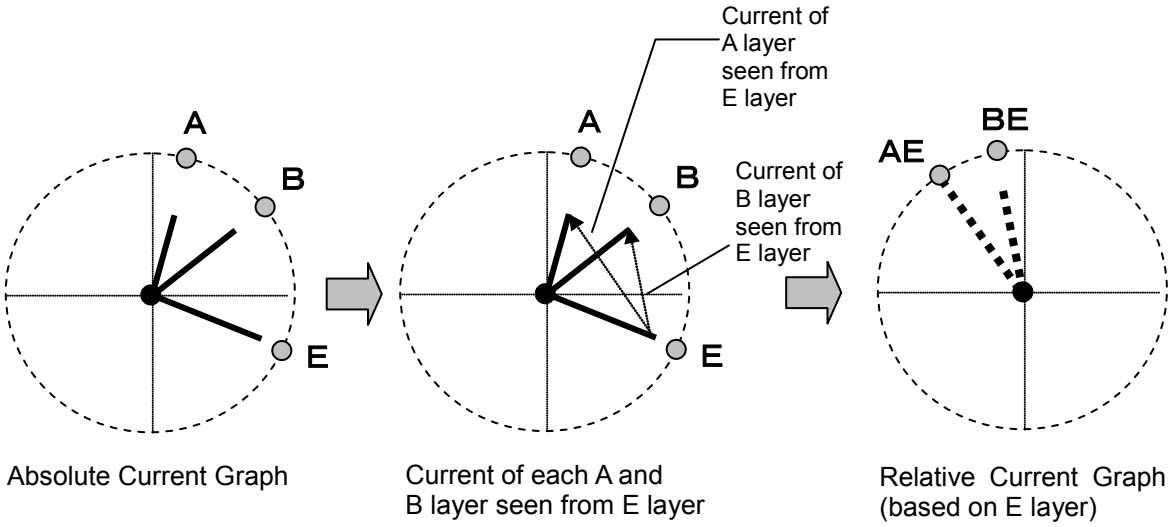


Fig. 6.1.3 Example of Absolute Current and Relative Current Graph Display

6.2 Bottom tracking layer

6.2.1 Bottom Lock (BTM)

Function **Absolute Current of Sea Bottom:** The measurement depth of layer changes automatically according to ups and downs in bottom of the sea if the measurement depth of E layer is set to BTM (bottom lock). (*1)

This is convenient for the measurement of the bottom of the sea layer.

Relative Current based on the bottom of the sea layer: When the standard layer of drum is set to E layer when a relative current is measured, and the measurement depth of layer is set to BTM (bottom lock), a relative current (AE-DE layer) based on the bottom of the sea layer (E layer) can be measured by the bottom of the sea tracking.

Operation **Standard Menu:** [DEPTH] key/"Current Depth setting" menu/E Layer: 150/Bottom Lock (End: [DEPTH] key)

Selection Frame Menu: [□] key/ Enclose "Current direction/Current speed" with the frame /[MENU] key/"Current speed and direction/relative current layer" menu/ E Layer: 150/ Bottom Lock

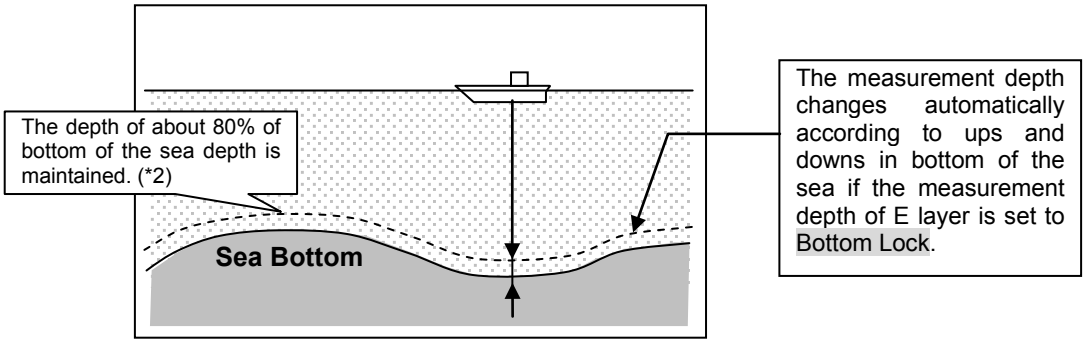
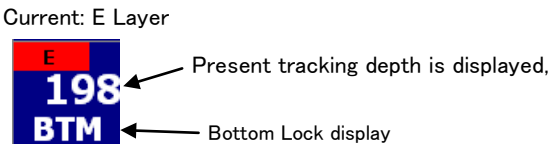


Fig. 6.2.1 Bottom Lock



Note: Because the device cannot recognize ridge when the 4-beam of the transducer steps over ridge in sea bottom, it measures as a measurement layer. In this case, the current measurement layer of the lower layer including the bottom lock layer might become a mis-display.

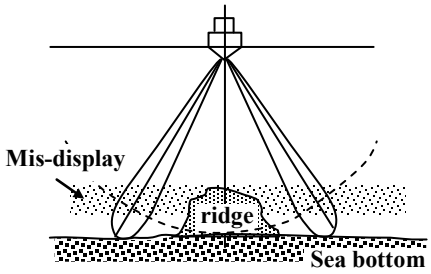


Fig. 6.2.2 Mis-display by ridge

*1 The maximum measurement depth of the current is about 200m. The maximum measurement depth of layer is different depending on the oceanographic condition.
The bottom of the sea depth value is a mean value of the measured four beams. It might be different from the depth value of the right under.

*2 In case of the shallow sea bottom or the slant sea bottom, %-value decreases.

6.3 Surface Automatic Tracking Layer

6.3.1 Top Lock (TOP)

Function **Absolute Current of surface:** If a current measurement layer depth setting of A layer is set to a top lock (TOP), according to a transmitting pulse width setting and a surface measurement condition, the measurement layer depth is changed automatically. (*1)

This is convenient for the measurement of the surface layer.

Operation **Standard Menu:** [DEPTH] key/Current measurement layer Depth setting menu/ A layer: 12 m/Top lock (Finishing: [DEPTH] key)

Selection Frame Menu: [□] key/ Current speed and direction is enclosed by a frame/[MENU] key/ Current speed and direction menu/ A layer: 12 m/Top lock

*1 The minimum measurement layer depth of a current is 8 m.

JLN-652 current meter follows manual operation or sea bottom depth, and changes transmitting pulse width.

The shallowest current layer that can be measured changes with transmitting pulse width.

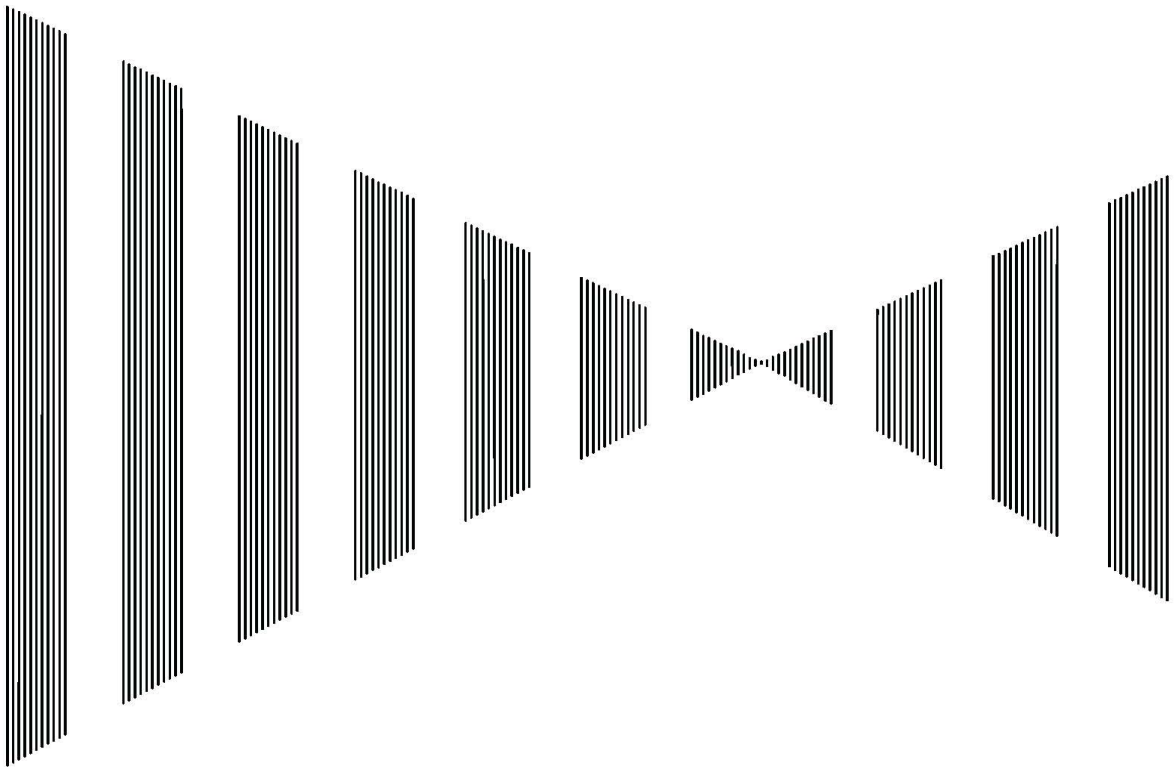
A top lock is an effective function in the following case.

When transmitting pulse width is changed manually frequently,

When a current is measured in an ocean area about shallower than 40 m,

When the current of a shallower layer is always measured.

7. Confirming the Operation of Equipment



7.1 Setting when Installing

This paragraph is described the content done when service person installs the equipment. It is work necessary to measure accurately, and to display it correctly.
After completing the installation, all work checks whether to be done properly as it is an instruction. Especially, confirm whether the mistake of the connection of the cable, the state of the installation of each equipment, and the processing of the cable shield braid are correctly done.
After installing it, set the following equipment item accurately according to the installation condition. (*1)

⚠ CAUTION
Do not adjust it excluding special service person. It might cause operation to become unstable if a wrong setting is done.

7.1.1 How to Open The Setting Menu When Installing

Operation Procedure

1. [illegible]pened pushing the [MENU] key.
2. Initial setting≫ is selected from the menu. And, the initial setting menu is displayed pushing the [ENT] key.
3. Installation setting≫ is selected from the initial setting menu. And, the installation setting menu is displayed pushing the [ENT] key.
4. When ending, the [MENU] key is pushed again. Or, it ends pushing the [ENT] key after [Menu display/Exit] is selected.

7.1.2 Connecting Input Sensor NMEA0183

▶ 1. Heading Sensor

Function It selects it from **Disconnection/GPS compass/Gyro/others**. (*2)
The Direction Standard becomes heading (*3) when Disconnection. The current is important bearing information on north, south, east, and west, and connect the heading sensor as much as possible.

Operation **Standard Menu:** “Installation setting” menu/1.Heading sensor: Disconnection

▶ 2. Ship Speed Course Sensor

Function It selects it from **Disconnection/GPS compass/others.** (*2)
When Disconnecting it, ship speed by GPS and the current cannot be measured according to the absolute current standard. Connect the ship speed course sensor when ship speed by bottom tracking and the absolute current in the sea area about 300m or more in the sea bottom are necessary.

Operation **Standard Menu:** “Installation setting” menu/2.Ship Speed Course sensor: Disconnection

*1 A wrong ship speed and current are displayed when a setting different from the equipment condition is done, and set it accurately.
*2 NMEA input sentence list that can be read. Refer to 11.1 “specifications”.
*3 Direction Standard: Refer to 4.1.2 “Direction Standard: North up /Head up”.

▶ **3. Water Temperature Sensor**

Function It selects it from **Disconnection**/**Connection**. (*1)
When Disconnecting it, the water temperature data and the water temperature graph are not displayed on the display, and the part of it becomes blank.

Operation **Standard Menu:** “Installation setting” menu/3.Water temperature sensor: Disconnection

▶ **4. Wind Anemometer (Measuring for wind direction and wind speed)**

Function It selects it from **Disconnection**/**Connection**. (*1)
When Disconnecting it, the wind direction and wind speed data and their graph are not displayed on the display, and the part of it becomes blank.

Operation **Standard Menu:** “Installation setting” menu/4.Wind Anemometer: Disconnection

7.1.3 Unit Setting

▶ **Depth Unit**

Function It selects it from **m**/**fathom(FM)**.
The unit of the display depth of the current measurement depth of layer and the Fish Finder screen is selected.
The unit of depth is common to the [CURR] screen and the [FISH] screen and set.

Operation **Standard Menu:** “Installation setting” menu/Depth unit: m

▶ **Wind Velocity Unit**

Function It selects it from **m/sec** / **kn**.
The unit of the display of the wind speed data is selected.
It is necessary to connect anemometer (*1) to display the wind speed.

Operation **Standard Menu:** “Installation setting” menu/Wind Velocity unit: m/sec

7.1.4 Display Setting

▶ **Letter Size**

Function It selects it from **Normal**/**Wide**.
When the Wide type is selected, the numerical data of the screen display, the table, and the character in the graph are made bold character. (*2)

Operation **Standard Menu:** “Installation setting” menu/Letter size: Normal

▶ **Menu Screen Transparency**

Function It selects it from **0**/**1**/**2**/**3**.
The permeability of the menu panel displayed by the half penetration is selected.
0: It is permeability 0. The background of the menu panel is painted out with the black.
3: The permeability is the maximum. It is possible to set it by penetrating the menu panel while seeing the display in the back.

Operation **Standard Menu:** “Installation setting” menu/Menu Screen Transparency: 2

*1 Readable NMEA input sentence list Refer to 11.1 “Specifications”.
*2 The character of the menu is not changed in "Normal" size.

▶ **Movement of Menu Screen**

Function The display position can be moved in "Selection frame menu". (*1)

Operation When "Selection frame menu" is displayed, the menu panel moves whenever the [PLOT] key on the keyboard is pushed.

Movement zone: Fixed position → Upper the left → Upper the right → Under the right → Under the left → Fixed position → ···

▶ **Tidal Current Direction**

Function It selects from the [Tide is Flowing] or the [Tide is Coming].

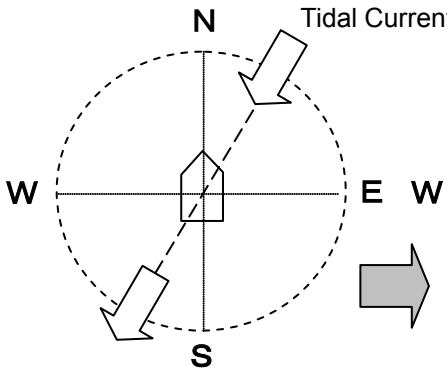
When the current direction is displayed, It selects from the ①[Tide is Flowing] or the ② [Tide is Coming]. The current direction is displayed [Tide is Flowing] usually.

In the example of Figure 7.1.1a, the ship sails to the north, and flows from the direction where the current is 30°, flows in the direction of 210°, and has left. In this case, the vector display of "Tide is Flowing" and "Tide is Coming " is as follows.

Tide is Flowing: The current flows in the current when the vector is displayed and the vector is displayed in the left direction. In the example of Figure 7.1.1b, it is displayed on the circle graph, "Current speed 1.3kn/bearing 210°".

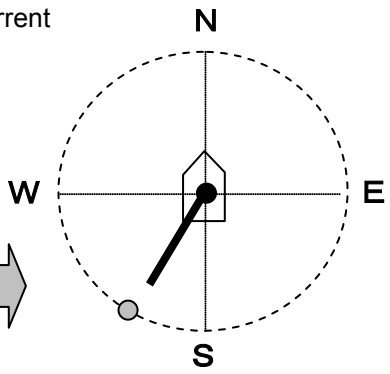
Tide is Coming: The current flows in the current when the vector is displayed and the vector is displayed in the come direction. In the example of Figure 7.1.1c, it is displayed on the circle graph, "Current speed 1.3kn/bearing 30°".

Operation **Standard Menu:** “Installation setting” menu/Tidal Current Direction: Tide is Flowing



When the tide of 1.3kn flows from the direction of 30°

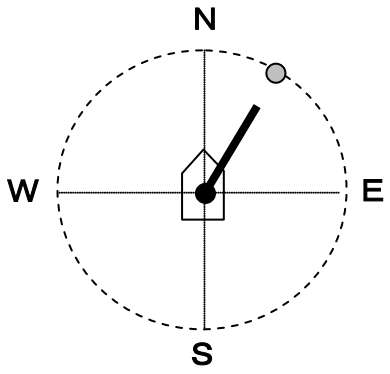
Fig. 7.1.1a



Current：1.3 kn / 210°

Display of direction that flows and is left

Fig. 7.1.1b



Current：1.3 kn / 30°

Display of direction that flows and is come

Fig.7.1.1c

7

*1 The selection frame menu is displayed to push the [MENU] key after "Frame" is displayed pushing the [□] key. A standard menu cannot be moved. A fixed display is done in the center part on the screen.

7.1.5 TD Angle and Ship Speed Correction

▶ Transducer Angle Correction

Function It is possible to set within the range of **[-20.0 - ±00.0 - +20.0] degree. Standard: ±00.0**
The numerical value changes into the direction of the minus with ◄ key in 0.1 degrees step, and changes into the direction of the plus with ► key in 0.1 degrees step.
It is necessary to install the direction of the prow mark of the ship prow with the transducer according to accuracy.
Moreover, the installation angle of the transducer shifts when the direction of ship speed is biased to the left or the right though the straight advancement sailing is done and it is displayed. Correct the direction on the screen.
The correction of the installation angle can be corrected within the range of maximum ±20 degrees.

About Transducer Angle Correction

1) Input the value of (-) when the direction of ship speed is biased right though it sails straight.
   When the transducer turns to the prow on the port side by 3 degrees, input -3.0 degrees of the correction value.
2) Input the value of (+) when the direction of ship speed has been biased left.
   When the transducer turns to the prow on the starboard side by 3 degrees. input +3.0 degrees of the correction value.

Operation **Standard Menu:** "Installation setting" menu/TD Angle correction: ±00.0 degrees

▶ Ship Speed Correction

Function It is possible to set within the range of **[-20.0 - ±00.0 - +20.0] %. Standard: ±00.0**
The numerical value changes into the direction of the minus with ◄ key in 0.1 % step, and changes into the direction of the plus with ► key in 0.1 % step.

About Ship Speed Correction

Correct the speed based on the result of the speed examination. Please input the value of (+) when you correct the speed in the direction of the plus, and input the value of (-) when correcting it in the direction of the minus.

Operation **Standard Menu:** "Installation setting" menu/ Ship speed correction: ±00.0 %

▶ Draft Correction

·Function· It is possible to set within the range of **[±00.0 - +20.0] m. Standard: ±00.0**
The numerical value changes into the direction of the minus with ◄ key in 0.1 m step, and changes into the direction of the plus with ► key in 0.1 m step.

About Draft Correction

The set correction value is reflected in the depth of screen display and the draft value outputting NMEA.

Operation **Standard Menu:** "Installation setting" menu/ Draft correction: ±00.0 m

▶ Delay Correction

·Function· It is possible to set within the range of **[±00.0 - +40.0] sec. Standard: ±00.0**
The numerical value changes into the direction of the minus with◄ key in 0.1s. step, and changes into the direction of the plus with ► key in 0.1 s step.

About Delay Correction

The set correction value corrects the delay due to the difference in processing between the heading value and COG value that NMEA has entered.

Operation **Standard Menu:** "Installation setting" menu/ Delay correction: ±00.0 s

7.1.6 Data Processing Setting

▶ **GPS Time Delay**

Function It sets within the range of **[0 - 7 - 12]**. **Standard: 7**
The numerical value changes into the direction of the minus with ◄ key in 1 step, and changes into the direction of the plus with ► key in 1 step.
It sets to 7 usually. The amount of the correction delay grows by the numerical value large.

Operation **Standard Menu:** "Installation setting" menu/ GPS Time delay: 7

About the GPS Time Delay
When the absolute current by the GPS standard is operated accurately, the measurement delay time between input ship speed and the course data difference is corrected from GPS to the bottom tracking data measured by Doppler using the ①GPS Time Delay.

▶ **Tide Data Update Time**

Function It selects from [**Standard**/**Fast**/**Moment**].
The update interval of the current data displayed on the screen of time is selected. It sets to the standard usually.
Standard: 15 Sec Fast: 5 sec Moment: 1 sec
The follow to the change becomes early if it uses at Fast when the current has changed intensely. Moment is used for at the operation check (*1).

Operation **Standard Menu:** "Installation setting" menu/Tide Data Update Time: Standard

▶ **Ship Speed Data Update Time**

Function It selects from [**Standard**/**Fast**].
The update interval of the ship speed displayed on the screen of time is selected. It sets to the standard usually.
Standard: 3 Sec Fast: 1 sec
Fast is used for at the operation check (*1).

Operation **Standard Menu:** "Installation setting" menu/Ship speed Data Update Time: Standard

▶ **Standard Deviation**

Function It selects from [**5**/**7**/**10**/**15**/**20**].
It sets to 10 usually.
The measurement data is narrowed by standard deviation. The selection numerical value is a measurement frequency.
When the numerical value is small, the follow becomes early. Moreover, when the numerical value is large, the displayed data is stable.

Operation **Standard Menu:** "Installation setting" menu/Standard deviation: 10

▶ **Hyper Amplitude exclusion**

Function It selects from [**Cancel**/**Operate**].
It sets to the cancel usually.
It sets to execution only for the squid fishing boat. When the squid fishing boat operates, exclusion processes the abnormal echo such as the squid fishing needles moved up and down in the sea.

Operation **Standard Menu:** "Installation setting" menu/Hyper Amplitude Exclusion: Cancel

7.1.7 LAN Output Setting

▶ **LAN Output**

Function It selects from [**Cancel**/**Operate**].
It sets to the cancel usually.
LAN output offers maintenance information on this equipment. It is not current data.
Select Operate after connecting external personal computer (*2) by LAN when you Operate LAN output. When LAN output is left set to Operate though an external personal computer is not connected, an abnormal alarm is generated.

Operation **Standard Menu:** "Installation setting" menu/LAN output: Cancel

*1 Only when the data of the moment of the test run of the ship and the confirmation of the measurement data of the current meter, etc. is necessary, it sets.
*2 There is no permission and the data collection is not enforceable. LAN connection's special software is necessary for an external personal computer.

7.1.8 Alarm Display Setting

▶ **Alarm (Measurement Alarm Display)**

Function It selects from [**Display ON**/**OFF**]. It sets to the Display ON usually.
When the measurement alarm (depth, ship speed, current, water temperature (*1), and the wind speed (*1)) is generated, information on "Measurement alarm" is displayed on the screen if it sets to the display. (*2) "Measurement alarm" is released by pushing the [BUZZER] key on the keyboard.

Operation **Standard Menu:** “Installation setting” menu/Alarm: Display ON

▶ **Warning (Abnormal Warning Display)**

Function It selects from [**Display ON**/**OFF**]. It sets to the Display ON usually.
When an abnormal warning (abnormality (*3) of the equipment and the system) is generated, information on "Warning" is displayed on the screen if it sets to the display. "Warning" is released by pushing the [BUZZER] key on the keyboard.

Operation **Standard Menu:** “Installation setting” menu/Warning: Display ON

7.1.9 Self Test Display

▶ **Self Test**

Function ≫ is selected, the [ENT] key is pushed, and it shifts to submenu "Self Test" screen.
Refer to 9.2 “Self Test Screen”.
The watch check result of the equipment unit and the system and the warning histories are displayed on the self test screen. Refer when "Warning" is displayed checking and by any chance after it installs it. (*4)

Operation **Standard Menu:** “Installation setting” menu/Self Test: ≫ (Shift to submenu)

7.1.10 Total Distance/Master Reset/User Menu Registration

Master Reset/User Menu setting

Function ≫ is selected, the [ENT] key is pushed, and it shifts to submenu "Master reset/User menu registration".
▶ Total Distance Run Reset or Master Reset is selected, and executed by the submenu.

▶ **Total Distance Run Reset**

Function It selects from [**Cancel**/**Operate**].
When integrating distance reset is executed, the Total Distance (screen "Distance" and display) is reset in 0.0 NM.
Note: The total distance is an operation history of the device. Do not reset usually. (*5)

Operation **Standard Menu:** “Master reset/User menu setting” menu/Total Distance Run reset: Cancel

▶ **Master Reset**

Function It selects from [**Cancel**/**Operate**].
When master reset is executed, a set value and the total distance value of a set each screen are returned to the factory shipment value. (*6)
Refer to 12.1.1 “Standard Menu” for the state of the factory shipment value. (*7)
Note: It becomes a Japanese screen by this operation. Please set English from the menu.

Operation **Standard Menu:** “Master reset/User menu setting” menu/Master reset: Cancel

▶ **User Menu Setting:** Refer to 4.8 “User Menu Setting”.

*1 It is necessary to connect the water temperature and the wind direction/the wind speed sensor for the display of the measurement alarm.
*2 “Measurement Alarm”: Refer to 5.1 “Measurement Alarm Display”.
*3 “Warning”: Refer to 9.1 “Warning”. In a warning, there is alarming not released by the [BUZZER] key either.
*4 Refer to 9.2.2 “Warning History Screen”.
*5 Reference: Use "Trip/timer" for the management of the section sailing distance. Reference 4.1.7
*6 The storage data is deleted when mastering reset is done, and do not usually reset it, please.
*7 [MENU] key/ﾒﾆｭｰ screen/言語 Language ： 日本語 English

7.2 Initial Setting

Service person must execute this paragraph after confirming the normal performance by the check after equipment is installed.

⚠ CAUTION
Do not adjust it excluding special service person. It might cause operation to become unstable if a wrong setting is done.

The following content can be done by the initialization menu.

- ・Display of equipment operation outline
- ・The display of a set menu when installing: Refer to 7.1 “Setting When Installing”.
- ・Mode selection of Measurement/Dummy
- ・Display of software version information
- ・Copy and Erase of storage data saved on CF card

7.2.1 How to Open the Initial Setting Menu

Operation Procedure

1. The main menu is opened pushing the MENU key.
2. Initial setting≫ is selected from the menu items, the [ENT] key is pushed, and the initial setting menu is displayed.
3. The [MENU] key is pushed again or Menu Display/Exit is selected, the [ENT] key is pushed, and it ends.

7.2.2 Outline of the Operation

▶ **Outline of the Operation**

Function When ≫ is selected, and the [ENT] key is pushed, it is display as for "Manual excerpt version" of the following content.

1. Name and function of keyboard each part ---------- Refer to 2.1.
2. Flow of the operation ---------- Refer to 3.1.
3. Menu composition ①Standard menu composition ---------- Refer to 3.2.1.
   ②Selection frame menu composition - Refer to 3.2.2.
4. Ready for operation ---------- Refer to 3.3.
5. Measurement alarm display ---------- Refer to 5.1.
6. Warning display ---------- Refer to 9.1.

Operation **Standard Menu:** “Initial setting” menu/Outline of the operation≫/[ENT] key/ Display "Manual excerpt version"

7.2.3 Selecting of Measurement/Dummy Mode

▶ **Display Mode**

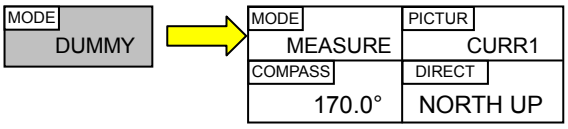
Function It selects it from Measurement/Dummy.

Measurement: It operates as a standard current measurement equipment. Set to the measurement usually.

Dummy: To confirm the operation of the equipment, ship speed and the current data of the dummy are displayed.

All basic displays such as the current, ship speed, and shoals of fish can be displayed.

When the simulated data is displayed, it is displayed that it is dummy in the display of the mode on the left of the screen frame.



Operation **Standard Menu:** “Initial setting” menu/Display Mode: Measurement/Dummy

Selection Frame Menu: [□] key/ Enclose “Mode/Screen” with the frame /[MENU] key/”Display Mode/Picture/Direction Mode” menu/Display Mode: Measurement /Dummy

7.2.4 Software Version Information

▶ **Software Version**

Function When ≫ is selected, and the [ENT] key is pushed, following submenu "Software version" is displayed.

Inform the content of the breakdown to the engineer of our company of version information on software additionally when the breakdown etc. occur by any chance.

Software Version		
Main	R1.0.1.57（*1）	→ The version of the main application is displayed.
Signal Processor	R0100_ R0100_ R0100－R0100_（*1）	→ The version of the signal processort is displayed.
Keyboard	R1.0（*1）	→ The version of the keyboard is displayed.

Operation **Standard Menu:** “Initial setting” menu/Software Version≫/[ENT] key/Display “Software version” information.

Selection Frame Menu: [□] key/ Enclose “Mode/Screen” with the frame /[MENU] key/”Display Mode/Picture/Direction Mode” menu/Initial setting≫/[MENU] key/Software Version≫/ [ENT] key/Display “Software version” information.

*1 The version number of the description is an example of the display. Confirm the version number of the installing software with a real machine.

7.2.5 Memory Data Copy and Erase

▶ Memory Data Copy and Erase

Function When ≫ is selected, and the [ENT] key is pushed, submenu "Memory data copy and erase" is displayed.

About Memory Data: A present menu setting value, and it is a ship track, and the current vector of the track screen in "SSD".

It is done that the displayed data preserves it memory (*1). When Software upgrade etc. of current meter software(*2), we will recommend present memory data to be copied onto new software. Moreover, please erase it according to the following procedure (erase) when you want to erase the memory data that becomes unnecessary because of the transfer of equipment etc.

Operation **Standard Menu:** “Initial setting” menu/Memory data copy and erase ≫/[ENT] key/ “Memory data copy and erase” menu

Copy: It copies onto CF card 2 that exchanges the memory data (*1)

1) Preparation:

① New software Ver. (*3) that wants to copy memory data. Prepare USB external memory (*4) at hand respectively.

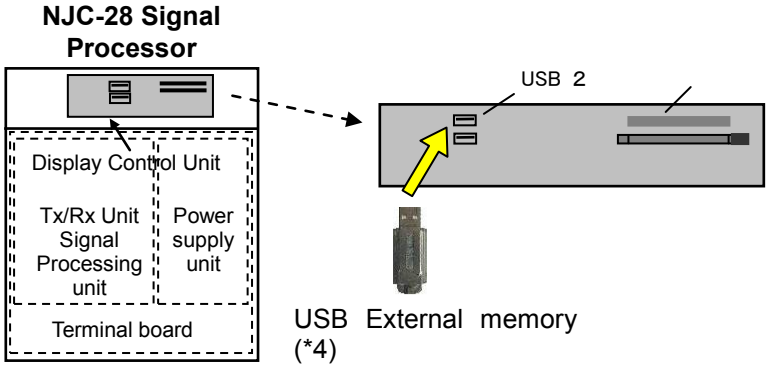


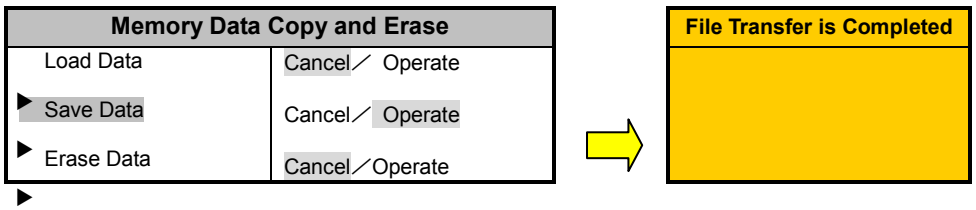
Fig. 7.2.1a

2) The memory data of the track etc. preserved on present SSD is read, and copied onto the USB external memory once.:

①The prepared USB external memory is inserted in USB2 in the display control part in the NJC-28/30 signal processing unit. (*5)

②[**Memory data copy and erase:** ≫] is selected from main menu/”Initial setting” menu, and the following submenu is displayed with the [ENT] key.

③[**Save data: Operate**] is selected from submenu "Memory data copy and erase", and the [ENT] key is executed pushing.



▶ ④ When the memory preservation data of SSD is normally copied onto the USB external memory, the message of "File transfer is completed" is displayed on the display screen. (*6)

*1 The memory data keeps by 1000 points or less with data on the track. When 1000 points are exceeded, it erases from an old point

*2 Request it to serviceman.

*3 The version of the installing software can be confirmed to SSD by "7.2.4 version information".

*4 USB external memory is necessary by the free space 64MB or more. Arrange by user

*5 Please turn off the power supply of the current meter when USB external memory is pulled out and it opens. The driver's installation might be necessary for USB external memory

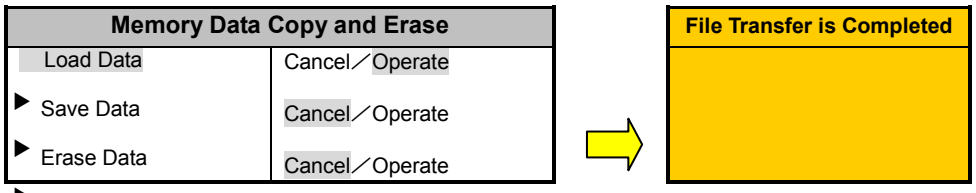
*6 Confirm an abnormal situation on 9.2.1 Self Test screen when it is displayed even if it executes it again, "Failed in File transfer".

3) The memory data of the track etc. copied onto the USB external memory is written to new SSD(Software Ver.).

①The USB external memory to which the memory data is copied by 2) leaves insertion in USB2, and replaces SSD. (*1)". (*2)

②[**Memory data copy and erase: ≫**] is selected from main menu/"Initial setting" menu, and the following submenu is displayed with the [ENT] key.

③[**Load data: Operate**] is selected from submenu "Memory data copy and erase", and the [ENT] key is executed pushing.



④When the memory preservation data of the USB external memory is normally copied onto "New SSD", the message of "File transfer is completed" is displayed on the display screen. (*3)

4) End

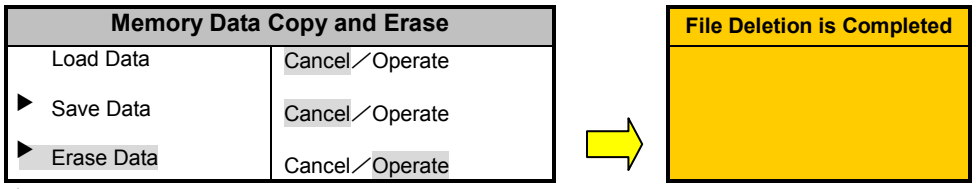
①The power supply of the current meter is turned off, the USB external memory is pulled out from USB2, and it ends.

②After ending, turn on the power supply of the current meter again, display software version information (*4) by the menu, and confirm the version number of exchanged SSD.

Erase: When you erase the memory data that becomes unnecessary by the transfer of equipment etc.

①[**Memory data copy and erase: ≫**] is selected from main menu/"Initial setting" menu, and the following submenu is displayed with the [ENT] key.

②[**Erase data: Operate**] is selected from submenu "Memory data copy and erase", and the [ENT] key is executed pushing.

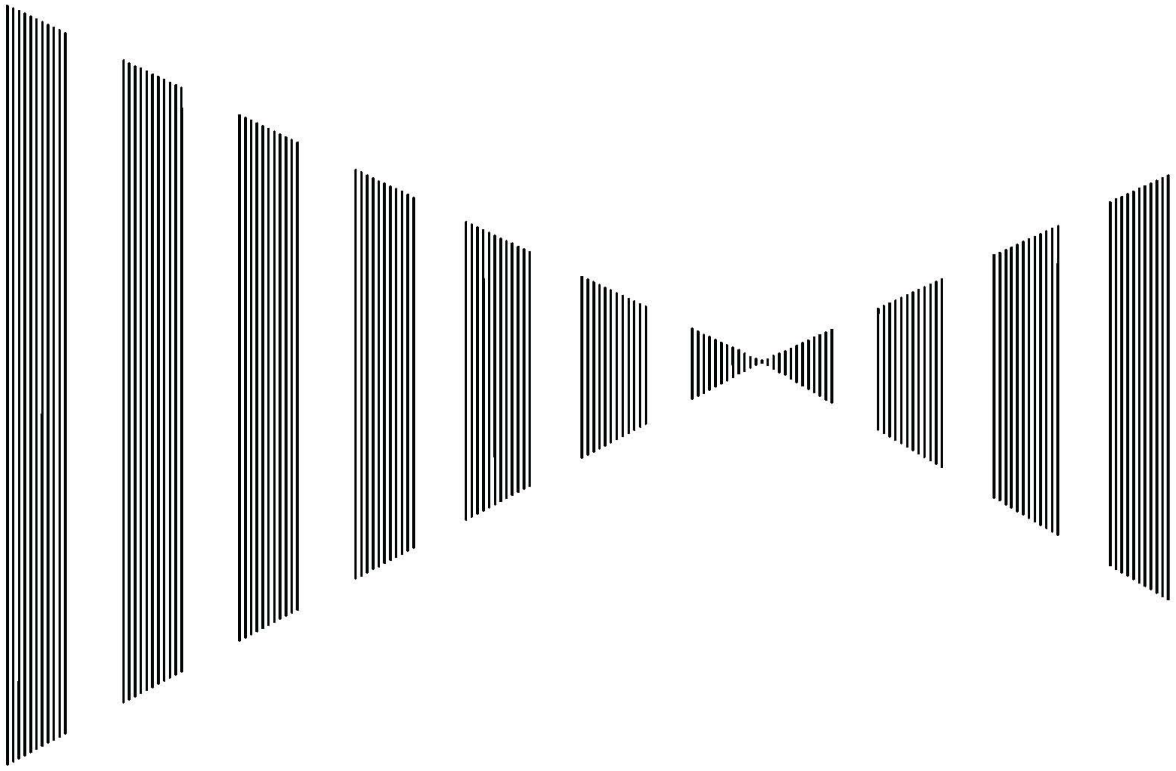


③When the memory preservation data of SSD is normally erased, the message of "File deletion is completed" is displayed on the display screen. (*3)

④The power supply of the current meter is turned off and it ends.

*1 SSD are exchanged as an example of "New SSD" according to the upgrade of current meter software by serviceman.
*2 When the SSD card is pulled out and inserted, turn off the power supply of the current meter.
*3 Confirm an abnormal situation on 9.2.1 Self Test screen when it is displayed even if it executes it again, "Failed in File transfer".
re Version Information".

8. Maintenance and Check



8.1 General Maintenance

⚠ CAUTION
Never attempt to check or repair the inside of the equipment. Checking or repair by an unqualified person may cause a fire or an electric shock. Contact our head office, or a nearby branch or local office to request servicing.
There is a part where a high voltage is used, and maintain and check after turning off the power switch without fail when you check the inside. There is a shock hazard when checking without turning off power.
Do not strongly wipe with a dry cloth and use neither gasoline nor thinner, etc. when you clean the display. It might cause to hurt the surface.

8.1.1 Daily Maintenance

The maintenance described the following is necessary to make the current meter work always excellently. Because the breakdown decreases when maintenance is done well, we will recommend maintaining it as regularly as possible.
The following contents are general maintenance common to each equipment.

Clean the equipment.

It is cleaned only that the dust of the case, dirt, and seawater can adhere. Clean it with a dry cloth. Especially, clean the vent with brush etc. well to improve as shown in air.
The transparency worsens when dust adheres to the display, and the image darkens. The cleaning is wiped with a soft cloth (flannel or cotton). Do not wipe it strongly with a dry cloth. Moreover, do not use the gasoline or thinner, etc.

Confirm loosening of parts.

Loosening of the screw, the nut, the knob, switches and connectors, and the omissions of connectors, etc. are checked, and it tightens correctly.

Confirm the cable connecting wires.

Check the cable connecting wires between equipment and the connection such as connectors, and confirm a certain connection.

Fuse

Exchange it after thoroughly investigating the cause when the power supply fuse cuts.
The fuse uses tubular glass type (It is included in the spare parts).

8.1.2 Countermeasure to abnormality and trouble

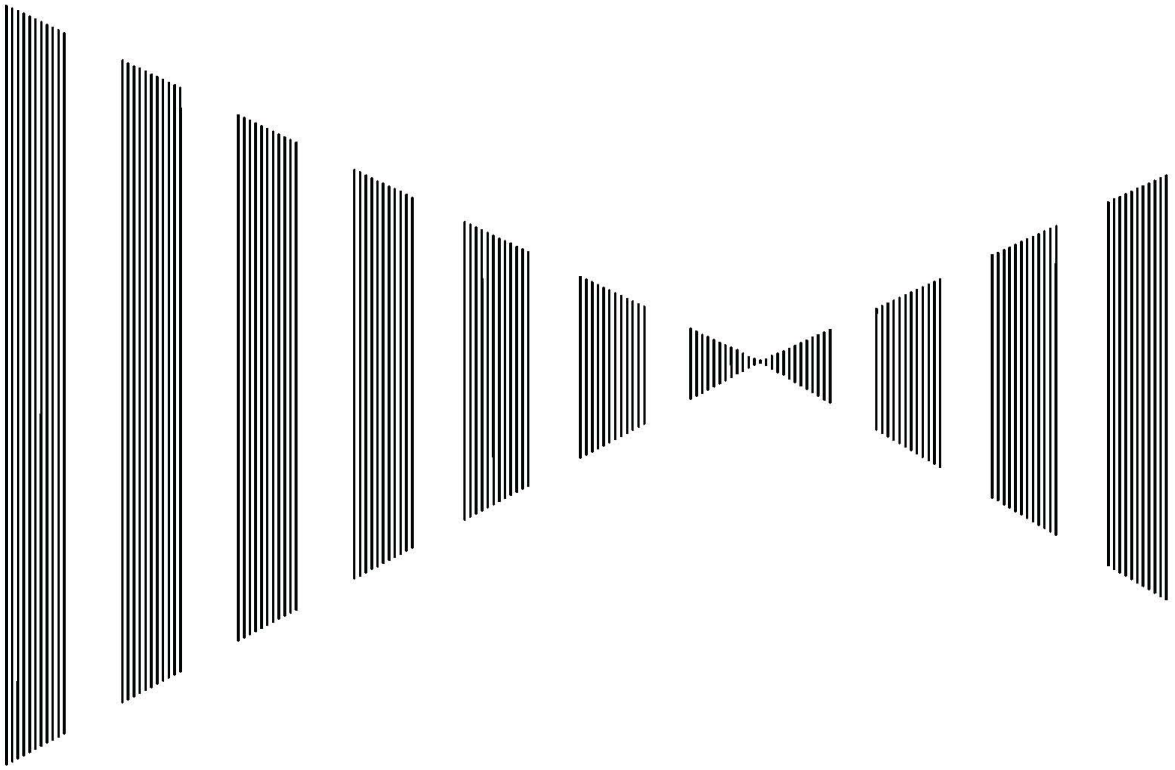
Stop using, and contact shop, agency or our each branch, office, and liaison office that purchases it at the following symptom.

Abnormality and breakdown symptom

1) The screen doesn't reflect. The power supply doesn't enter. Anything doesn't appear of the color etc. to the screen. (*1)
2) Smoke has risen from the main body, and it smells strange, and turn off power at once, and remove the power cable when you notice the symptom such as abnormally hot.
3) The shoal of fish image doesn't appear though the screen scrolling is done.
4) Sensitivity is low. The shoal of fish image is weaker than usually.

*1 1) Check whether the power supply to the signal processor has stopped.
2) Check whether the loose connection etc. of the signal cable that ties the signal processor to the LCD monitor in colors have been generated.

9. Trouble and After-sales Service



9.1 Warning

There are two kinds of warning (**measurement alarm** (*1) and a **warning**). When the abnormal alarm message is displayed, the current data or the shoal of fish image cannot be correctly measured. Stops using and then contact shop, agency or our each branch and office that purchased it when the symptom is not repaired even if it treats it according to the message.

9.1.1 Warning Display

Function When abnormality is found by the equipment unit and the system, "Warning message" is displayed with the alarm sound.

Operation Warning disappears when the [BUZZER] key is pushed. It is possible to set it to non-display by the menu. (*1)
The warning item table is shown below.
Warning No: The warning number is common with self test and warning history. (*2)
Warning Contents: The outline of warning is displayed.
Countermeasure: The countermeasure to warning is displayed. Turn off the power supply and request the repair when not repaired.

Warning No.	Warning Contents	Countermeasure Message
DSP set up		
1-01	Signal processing unit stopped.	Please reboot after having switched it off once. When it still abnormal. Please ask it for repair after power switching off.
1-02		
1-03		
1-04		
1-05		
1-06		
1-07		
1-08		
1-09	"COM communication" with the Signal processing unit is unstable.	Please reboot after having switched it off once.
1-10		
Digital System Communication		
2-01	"COM communication" with the signal processing unit is not possible.	Please reboot after having switched it off once. Check whether a connector of "COM" does not connect off.
2-02	"USB communication" with the signal processing unit is not possible.	Please reboot after having switched it off once. Check whether a connector of "USB" does not connect off.
2-03		
2-04		Please reboot after having switched it off once. Check whether a connector of "USB" does not connect off. When it still abnormal. Please ask it for repair after power switching off.
2-05	Signal processing unit stopped.	Please reboot after having switched it off once. When it still abnormal. Please ask it for repair after power switching off.
2-06		
2-07		
2-08		
2-09		
2-10		
2-11		
2-12		
2-13		
2-14		
2-15		

*1 Refer to 5.1 “Measurement Alarm Display”. /7.1.8 “Alarm Display Setting”
*2 Refer to 9.2.1 “Self Test Screen”. /9.2.2 “Warning History Screen”

Warning: 1-01～2-15	Remarks

Warning message;

1. It displays until erasing it by manually when the warning message is appeared once.
2. The alarm sounds at the same time for about 30 seconds.
3. The message and the alarm sound disappear with the [BUZZER] key.
4. The warning message is made non-display in the menu setting. Please set a warning usually to the display.
   Menu/"Initial setting"/Installation setting /Warning/Display ON
5. Example of Display: Refer to right figure.

Warning	
Date	: Year Month Day 14:06
Warning No.	: 2-04
Situation	: "USB Communication" with the Sig- Processing unit is not possible.
Measure	: Please reboot after having switched it OFF once. Check whether a connector of "USB does not connect off. When it still abnormal. Please ask it for repair after power switching off.
Indication	: OFF the Warning indication with "BUZZER" key.

Note: There is a warning without the warning number either. In that case, the warning number is displayed by "***/ the warning code".
Inform the warning code when inquiring.
Normality and abnormality can be confirmed about other items on the Self Test screen.

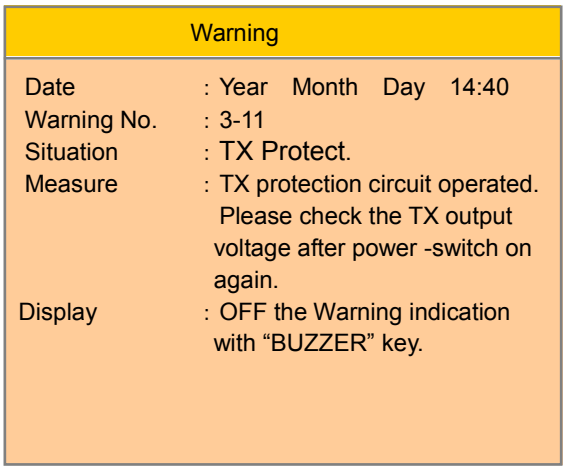
Warning No.	Warning Contents	Countermeasure Message	
Analog System			Remarks: Do not warn range
3-01	Transducer Temperature: NG	*** ℃	0 ～ 100
3-02	Sig-processing Unit Temp: NG	*** ℃	-10 ～ 70
3-03	High Voltage Supply: NG	*** V	30 ～ 160
3-04	Tx Output Voltage 1: NG	*** Vp-p	200 ～ 1300
3-05	Tx Output Voltage 2: NG	*** Vp-p	200 ～ 1300
3-06	* * *	* * *	*** ～ ***
3-07	+5V : NG	+*.* V	+2 ～ +8
3-08	+15V : NG	+**.* V	+10 ～ +20
3-09	-15V : NG	-**.* V	-20 ～ -10
3-10	Cooling FAN operation: NG	Switch it off immediately, and please ask it for repair of FAN.	
3-11	TX protect	TX protection circuit operated. Please check the TX output voltage after power -switch on again.	
Display Control Unit			
4-01 4-02	Can't communicate with a keyboard unit.	Please reboot after having switched it off once. Check whether a connector of "keyboard unit" does not connect off.	
4-03 4-04	"USB communication" with the sig-processing unit is not possible.	Please reboot after having switched it off once. Check whether a connector of "COM" does not connect off.	
4-05 4-06	"USB communication" with the sig-processing unit is not possible.	Please reboot after having switched it off once. Check whether a connector of "USB" does not connect off.	
4-07 4-08	—	(Non-display)	

Warning No.	Warning Contents	Countermeasure Message
Display Control Unit		
4-09	Setting data reading error	Please reboot after having switched it off once. Does not “CF card 2” come off? Please carry out the handling of the CF card after switching it off.
4-10	Course plot data reading error.	
4-11	Total distance run or trip data, reading error.	
4-12	Setting data writing error	
4-13	Course plot data writing error.	
4-14	Total distance run or trip data, writing error.	
4-15	—	(Non-display)
4-16	Non-display (”Dummy data is not found” when making it to a dummy mode.)	Please reboot after having switched it off once. Does not “CF card 2” come off? Please carry out the handling of the CF card after switching it off.
4-17	Non-display (”Dummy data communication error” when making it to dummy mode)	
4-18	An update file is not found.	
4-19	Can't update it, for a communication error.	

Warning No.: 3-01～4-19	Remarks

Warning message;

1. It displays until erasing it by manually when the warning message is appeared once.
2. The alarm sounds at the same time for about 30 seconds.
3. The message and the alarm sound disappear with the [BUZZER] key.
4. The warning message is made non-display in the menu setting. Please set a warning usually to the display.
   Menu/”Initial setting”/Installation setting /Warning/Display ON
5. Example of Display: Refer to right figure.



Note: There is a warning without the warning number either. In that case, the warning number is displayed by "***/ the warning code".
Inform the alarm code when inquiring.
Normality and abnormality can be confirmed about other items on the Self Test screen.

9.2 Self Test

9.2.1 Self Test Screen

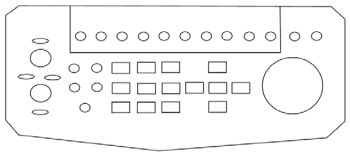
Function The state of the equipment unit and the system is always observed. The result is displayed on the self test screen.
When "Warning" is displayed, whether abnormality is found in addition can be confirmed on the self test screen.

Operation **Standard Menu:** “Initial setting” menu/Installation setting≫/[ENT] key/”Installation setting” menu/Self Test≫/[ENT] key/Self Test screen
Warning history: The warning history screen is displayed by the submenu.
Number: It displays it according to the content of warning. The number is common in "Number of a warning" and "warning number of the warning history".
Item: It is an outline of the warning contents. Especially, it is effective for the check of the analog system, the display control unit (indicator), and the keyboard.
Results: "NG" is displayed in a defective item. Refer to the reference value and the operation explanation for the analog system and the keyboard.
Remarks: The example of displaying a warning is shown.

Self Test				Remarks
No.	Item		Results	
Warning History	≫			Submenu Screen Refer to Warning History.
DSP Set up				
▶ 1-01	ROM	ROM	OK NG	
▶ 1-02	CPU－SRAM	RAM	OK NG	
▶ 1-03	FPGA Configuration	CONFIG	OK NG	
▶ 1-04	DSP5 set up	DSP5_WUP	OK NG	
▶ 1-05	DSP1 set up	DSP1_WUP	OK NG	
▶ 1-06	DSP2 set up	DSP2_WUP	OK NG	
▶ 1-07	DSP3 set up	DSP3_WUP	OK NG	
▶ 1-08	DSP4 set up	DSP4_WUP	OK NG	
▶ 1-09	COM port	COM	OK NG	
▶ 1-10	COM Setting	EX_INIT	OK NG	
Digital System Communication				
▶ 2-01	COM Display → Processing	SCI1_RX	OK NG	
▶ 2-02	USB Display → Processing	USB_RX	OK NG	
▶ 2-03	USB Display → Processing	USB_CTRL	OK NG	
▶ 2-04	USB Processing ⇔USB	USB_DIV	OK NG	
▶ 2-05	UART CPU→DSP5	UART_TX	OK NG	
▶ 2-06	UART DSP5→CPU	UART_RX	OK NG	
▶ 2-07	FIFO DSP5→CPU	FIFO_RX	OK NG	
▶ 2-08	HPI DSP1←DSP5	HPI_1	OK NG	
▶ 2-09	HPI DSP2←DSP5	HPI_2	OK NG	
▶ 2-10	HPI DSP3←DSP5	HPI_3	OK NG	
▶ 2-11	HPI DSP4←DSP5	HPI_4	OK NG	
▶ 2-12	IIS ADC1→DSP1	IIS_1	OK NG	
▶ 2-13	IIS ADC2→DSP2	IIS_2	OK NG	
▶ 2-14	IIS ADC3→DSP3	IIS_3	OK NG	
▶ 2-15	IIS ADC4→DSP4	IIS_4	OK NG	
Analog System				Reference Value (*1)
▶ 3-01	Transducer Temperature ℃	0.0 - 100.0	65	65℃
▶ 3-02	Sig-processing Unit Temp. ℃	-10.0 - 70.0	50	50℃
▶ 3-03	High Voltage Supply V	30.0 - 160.0	140	140V
▶ 3-04	Tx Output Voltage 1 V	20.0 - 1300.0	820	820VP-P
▶ 3-05	Tx Output Voltage 2 V	20.0 - 1300.0	820	820VVP-P
▶ 3-06	―――		―――	
▶ 3-07	＋5 V	2.0 - 8.0	＋5.1	＋ 5.1V
▶ 3-08	＋15 V	10.0 - 20.0	＋15.3	＋15.3V
▶ 3-09	－15 V	-20.0 - -10.0	－14.8	－14.8V
▶ 3-10	Cooling FAN Operation	OK：Work NG：Stop (*2)	OK NG	
▶ 3-11	Tx protect	OK：OFF NG：ON (*3)	OK NG	

*1 Refer to 9.1.1 “Warning Display” *2 When FAN stops, the measurement operation in the signal processing unit stopped.
*3 When the transmission protection circuit operates, the transmission is stopped. Though it resets when trying to turn on power, the protection circuit operates again when breaking down.

Self Test			Remarks
No.	Item	Results.	
Signal Level Monitor			
▶ 3-21	———	———	
▶ 3-22	Noise -FS mV	0. 0060	Less than 0. 03mV
▶ 3-23	Noise -AP mV	0. 0060	
▶ 3-24	Noise -FP mV	0. 0060	
▶ 3-25	Noise -AS mV	0. 0060	
▶ 3-26	BT Level FS Refer to Current 3 Picture		The horizontal cursor is set to the sea bottom in the echo graph of current 3 screen, and it confirms by the signal level at the cursor position.
▶ 3-27	BT Level AP Refer to Current 3 Picture		
▶ 3-28	BT Level FP Refer to Current 3 Picture		
▶ 3-29	BT Level AS Refer to Current 3 Picture		
Display Control Unit			
▶ 4-01	keyboard・I/O Error	OK NG	
▶ 4-02	Keyboard・No Communication	OK NG	
▶ 4-03	Signal Processing Unit・COM I/O Error	OK NG	
▶ 4-04	Signal Processing Unit・COM No Communication	OK NG	
▶ 4-05	Signal Processing Unit・USB I/O Error	OK NG	
▶ 4-06	Signal Processing Unit・USB No Communication	OK NG	
▶ 4-07	CF C (OS) ：Be Damaged (Can't access).	OK NG	
▶ 4-08	CF D (Application)：Be Damaged (Can't access).	OK NG	
▶ 4-09	CF D At start, all setting data reading error	OK NG	
▶ 4-10	CF D At start, Ship's tracking data reading error	OK NG	
▶ 4-11	CF D At start, Distance run and trip data reading error	OK NG	
▶ 4-12	CF D Setting data writing error	OK NG	
▶ 4-13	CF D Ship's tracking data writing error	OK NG	
▶ 4-14	CF D Distance run and trip data writing error	OK NG	
▶ 4-15	LAN	OK NG	
▶ 4-16	Dummy data are not found.	OK NG	
▶ 4-17	Dummy data I/O error	OK NG	
▶ 4-18	Update file in the signal processing unit is not found..	OK NG	
▶ 4-19	Update file in the signal processing unit: I/O error	OK NG	
Keyboard Function Check	Please Operate 5-02／5-03		
▶ 5-01	Keyboard Version No.	R*.*	
▶ 5-02	Illumination of keyboard Setting Value Display by 「[BUZZER]＋[UNDO]」key		
▶ 5-03	Sound –volume of pushed key Setting Value Display by 「[BUZZER]＋[RESET]」key		
▶ Key check of keyboard	Cancel Operate≫ Operate： "Execution" is selected with the [▶]key, and it confirms in the key arrangement figure. Cancel："Cancel" is selected with a double key of [◀] and [□].		Submenu Screen Refer to "Key check of keyboard"
Encoder Check, etc.,			
▶ 6-01	STC Volume 1.0 changes by 10 clicks.		
▶ 6-02	STC Lamp +/- point lights in the direction of the rotation.		
▶ 6-03	GAIN Volume 1.0 changes by 10 clicks.		
▶ 6-04	GAIN Lamp +/- point lights in the direction of the rotation.		
▶ 6-05	Warning Speaker It rings at a maximum and a minimum position of GAIN VOL.		
▶ 6-06	Key Touch Buzzer It sounds by key touch.		
▶ Menu Display	Display Exit Previous		
▶ Help	Push ≫ [ENT] key.		

Key Check	Remarks
Check whether the key to keyboard-unit is normal. Press each key. The key is normal, when a green mark is displayed by the key on figure. Press each key. The key is defective, when nothing is displayed by the key on figure. Press long each key, or press 2times or more. The key is normal, when a orange mark is displayed by the key on figure.	
	
Cancel： Select "cancel" with the double key of [◀] and [□].	

9.2.2 Warning History Screen

Function The warning history screen is displayed from the submenu of the self test screen. 100 histories or less of past "Warning" are displayed on the warning history screen.

Operation **Standard Menu:** “Installation setting” menu/Self Test≫/[ENT] key/Self Test screen /Warning history≫(Upper part)／ [ENT] key/Warning history screen

Number: It is a serial number. Large number is displayed a new warning and the number is displayed up to 100 warnings. When the 100 warnings are exceeded, it deletes from the old one at the date one by one.

Date and Time: The date and time when an Warning generates or was released are recorded. It is necessary to connect GPS to display the date and time. (*1)

Warning Number: It corresponds to "Number" of the Self Test screen. Ex.) 3-03: Analog system/high-voltage power supply.

NG/OK: When an Warning is generated, "NG" is displayed. When normally returning by reactivation and the repair, "OK" is displayed.

Item: It synchronizes with the warning number, and "Item" content of the self test screen is recorded. (*2)

Remarks: It synchronizes with the warning number, and "Result" content of the self test screen (State when warning is recorded. (*2)

Warning History							Remarks
No.	Date	Time	Warning Number	NG／OK	Item	Remarks	
100							
99							
98							
97							
96							
95							
94							
93	2009/08/06	15:30	3-03	NG	High Voltage Supply	20V	Ex.：Break down of High Voltage Power Supply
92	2009/08/06	15:25	2-02	NG	USB	Abnormal	
2							
1	2008/07/06	15:25	3-10	NG	FAN Operation	Stop	Ex.：FAN Break down

*1 When GPS is connected, the date and time are automatically recorded. Set "Time" by the menu when you turn on the power supply when you do not connect the navigation equipment such as GPS. Input Menu/Time Adjustment/Date and time.

*2 Warning information (maker technological information) that is not on the self test screen might be displayed.

9.3 After-sales Service

9.3.1 About The Stock Periods of Repair Parts

After discontinuance of manufacturing, the stock of performance parts (parts necessary to have the function of the product) for the repair of this product are 10 years.

9.3.2 Notes When Repair is requested

Is it "Breakdown"? Examine "Chapter 8 Maintenance and Check, Chapter 9 Trouble and After-sales Service" when it thinks again well after it reads.
Still abnormal, stop using it, and consult the shop that purchases it or our Sales Department, the nearby branch office, and the office.

Repair during warranty term

The shop or our company will repair free of charge when breaking down because of an explanation of the manual and a normal use situation that obeys instructions.
Our company will repair the breakdown caused by the inevitability of the wrong use, the fault or the natural disaster and a fire, etc. in charge.

When you have passed the warranty term

When the function is recoverable, it repairs in charge by the repair by the customer's demand.

Necessary reports

- Product name, Model name, Date of manufacture, and Production number
- Abnormal situation (as much as possible detailed: Refer to 9.1.1 “Warning Display” /9.2 “Self Test Screen”.
- Office name or organization name, address, telephone number and E-mail address(if possible)

9.3.3 Recommendation of Maintenance

The performance might decrease by the secular distortions etc. of parts though it differs according to the use situation. We will recommend maintenance besides usual maintenance.
Consult a branch office, a branch, and an office that the shop that purchases it or is our Sales Department and near about maintenance. In this case, it becomes charged.

9.3.4 About the articles of consumption

The LCD module used for the LCD monitor is an article of consumption. The LCD module is use in a usual environment (room temperature), and brightness will be reduced by half in about 20,000 hours. This time shortens when the temperature used rises.
When the brightness of the LCD module decreases extremely, the exchange repair is received by the customer's demand in charge.
The fan used for the signal processor is an article of consumption. The fan is use in a usual environment (room temperature), and the rotational speed will decrease by 30% in about 60,000 hours. It becomes a factor to shorten the longevities of other parts when the rotational speed decreases, and please request the exchange repair to the standard at the use time.
In this case, it becomes charged.

Please inquire of nearby shop or our business and branch office, branch, and office that purchases it about uncertain point of after-sales service.

JLN-650 / 652 Current Meter Malfunction Confirmation List

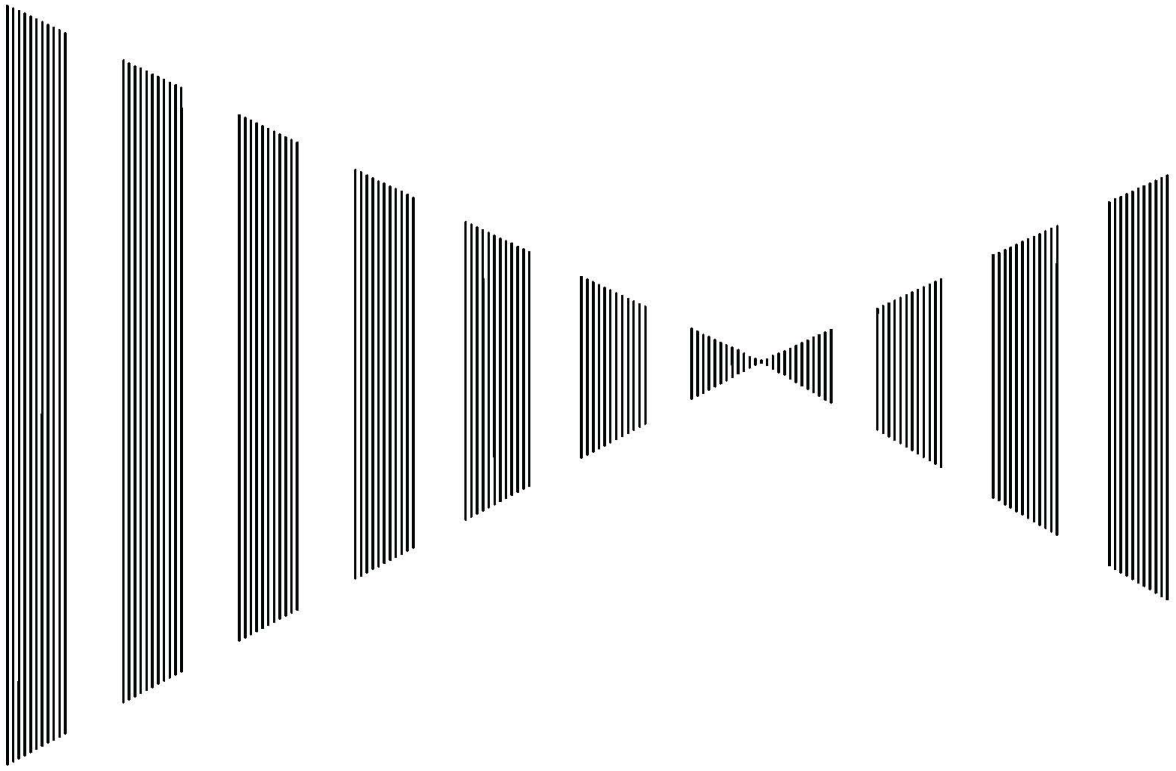
(Asking) Please contact about the repairing or ordering, and after confirming and filling in the following item.
Please inquire to the mother ship, and fill it in as accurately as possible when there is an uncertain item upon filling in.

Ship Name	
TEL.	
Fax.	
Model	**JLN-650 / JLN-652**
Production No.	

Please confirm the following confirmation item in numerical order, and apply the check mark (✓) to the side where either "Yes" or "No" corresponds.
Please fill it in as specific as possible on "Other content" of the end when not corresponding to either.

No.	Confirmation Item	Result	
1	The power supply doesn't turn on. (When the key on the keyboard is pushed, the touch sound is not generated.)	☐Yes	☐No
2	Nothing is displayed in the indicator though the power supply is turned on and the operation sound rings.	☐Yes	☐No
3	The power supply doesn't turn off.	☐Yes	☐No
4	The display doesn't change like the first stage screen.	☐Yes	☐No
5	An warning and the update screen are displayed next to an initial screen.	☐Yes	☐No
6	When using it, a warning is displayed usually.	☐Yes	☐No
7	Nothing is displayed on the [FISH] screen.	☐Yes	☐No
8	The sensitivity of a specific screen is low among four screens of the [FISH] screen.	☐Yes	☐No
9	Among four screens, a lot of noises of the [FISH] screen are displayed on a specific screen.	☐Yes	☐No
10	The color is displayed to 400m of current 3 echo display in the quay excluding the backing color(First color) and Second color.	☐Yes	☐No
11	Depth in bottom of the sea is not displayed shallowly of 250m or less.	☐Yes	☐No
12	The bottom tracking speed is not displayed. Or, the error is large.	☐Yes	☐No
13	A Port/Starboard ship speed at the bottom tracking speed is always biased to one direction and it is displayed.	☐Yes	☐No
14	The water tracking speed is not displayed. Or, the error is large.	☐Yes	☐No
15	The current is not displayed. Or, the error is large.	☐Yes	☐No
16	The current is biased in a specific direction of the ship and it is displayed.	☐Yes	☐No
17	**Other content**		

10. Disposal



10.1 Disposal of This Product

Please process it according to the ordinance of the local government that has jurisdiction over the abandoned place or the rule when you abandon this device.
This device doesn't use the battery.

10.2 About Chinese Version RoHS

有毒有害物质或元素的名称及含量

(Names & Content of toxic and hazardous substances or elements)

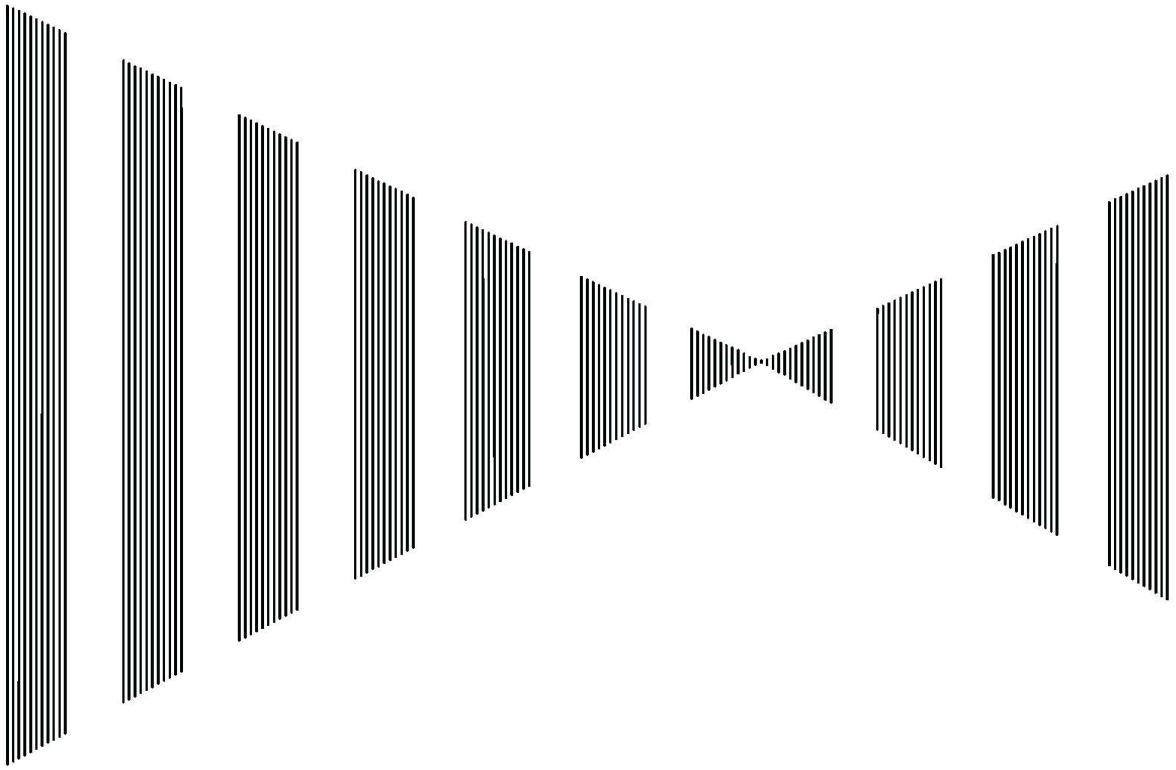
形式名(Type)：JLN－652　　名称(Name)：Doppler Current Meter

部件名称 (Part name)	有毒有害物质或元素 (Toxic and Hazardous Substances and Elements)					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr6+)	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
传感器 (Transducer)	×	×	×	×	×	×
主船内装置 (Inboard Unit) ・显示装置 (Display Unit) ・键盘装置 (Keyboard) ・信号处理装置 (Signal Processor)	×	×	×	×	×	×
外部设备(Peripherals) ・选择(Options) ・电线类(Cables) ・手册(Documents)	×	×	×	×	×	×

○：表示该有毒有害物质在该部件所有均质材料中的含量均在 SJ/T11363-2006 标准规定的限量要求以下.
(Indicates that this toxic, or hazardous substance contained in all of the homogeneous materials for this part is below the requirement in SJ/T11363-2006.)

×：表示该有毒有害物质至少在该部件的某一均质材料中的含量超出 SJ/T11363-2006 标准规定的限量要求.
(Indicates that this toxic, or hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement in SJ/T11363-2006.)

11. Specifications



11.1 Specifications

11.1.1 General Specification

1) Measurement method :2 axis dual beam pulse Doppler

2) Frequency JLN-650 :125kHz
JLN-652 :240kHz

3) Display / Resolution :15"color LCD, 1024X768 pixels (XGA)

4) Power supply JLN-650 100 - 230VAC -10% +10%:
JLN-652 24VDC -10% +30%

5) Power consumption :Less than 270W

6) Environmental condition :Temperature：-15℃～＋55℃／Humidity：Less than 93% at ＋40℃
:Vibration Amplitude：±1mm at 2～13.2Hz、Acceleration：7m/s^2 at 13.2～100Hz

7) Current measurement performance

Current speed range	:0～10.0kn
Current measurement accuracy	:Large one either ±2%rms or 0.2kn Note: When there is a bubble right under transducer or the roll-pitch of the hull is large, the unexpected value exclusion processing to keep the measurement accuracy is done. However, when they are excessive too large, there is a possibility that the direction and speed of the current is mis-displayed.
Current direction display	: All surroundings (360°), numerical values, and 32 point bearing display
Measurement layer	: Max. 50 Layer (A numeric display shows five arbitrary layers.)
Minimum Measurement depth of layer	: 2m (Shallow-water mode) : 12m (Std. mode)
Maximum Measurement depth of layer JLN-650 JLN-652	:160m : 100m Note: The maximum value of measurement depth of layer is 80% or less of depth. %-value decreases as depth becomes shallow. Moreover, the maximum value of the measurement depth might be different depending on reflection strength in the sea.
Minimum measurement sea depth	: 5m
Depth setting	: 2～500m It is possible to set it arbitrarily.
Current Standard	Doppler or GPS

8) Ship speed measurement performance

Fore/After measurement range	: -10.0～40.0kn
Port/Starboard measurement range	: -10.0～＋10.0kn
Measurement accuracy	Large one either ±1%rms or 0.1kn
Measurement depth of bottom	: Ground speed measurement depth: 5～250m : Water speed measurement depth: More than 10m (Ground speed/Water speed simultaneous display) Note: The measurement depth might be different according to the state of the bottom.
Distance Run range	: 0～99999.99nm
Distance Run accuracy	Large one either ±1%rms or 0.1nm
Others	Manual bottom tracking function

11.1.2 Main Performance

1)	Function	: Measuring current, ship speed, depth, Fish finder, Track plotting, Graph display, Profile display, Self test, Alarm function (Current speed, Ship speed, Trip, Timer, Water temperature)
2)	Display mode	: Current, Ship, Plot, Graph, Fish, Profile
3)	Numeric display	: Current speed, Current direction (Absolute 5 layer, relative 4 layer), Measurement depth of layer, Bottom tracking ship speed/Course, Water tracking ship speed/Course, Ship position, Heading, Trip, Date, FA ship speed/PS ship speed, Trip or time value, Water depth, Water temperature
4)	Graphic display	: Absolute current vector, Relative current vector, Ship speed vector, Water temperature graph, Current・depth graph, Ship speed graph, Wind speed・wind direction graph, Trip display, Fish display, Profile display.

11.1.3 Input/Output Signal

1) Input Signal

NMEA Input : ① Bearing data NMEA0183 [Signal name on terminal：Gyro IN]
(Ver 1.5—3.01)

$_ _HDT	; Heading, True
$_ _VHW	; Water Speed and Heading
$_ _HDM	; Heading, Magnetic
$_ _HDG	; Heading, Deviation & Variation
$_ _THS	; True Heading and Status

: ② Latitude longitude data NMEA0183 [Signal name on terminal：GPS IN]

$_ _RMC	; Recommended Minimum Specific GNSS Data
$_ _GGA	; Global Positioning System Fix Data
$_ _GLL	; Geographic Position – Latitude/longitude
$_ _VTG	; Course Over Ground and Ground Speed

: ③ Water temperature Data NMEA0183 [Signal name on terminal：TEMP IN]

$_ _MTW	; Water Temperature

: ④ Wind direction speed data NMEA0183 [Signal name on terminal：WIND IN]

$_ _MWD	; Wind direction and Speed
$_ _MWV	; Wind Speed and Angle

Trigger Input : ⑤ Transmission trigger For interference prevention [Signal name on terminal：TRIG1,TRIG2] Note: Available for option.

2) Output Signal

NMEA Output : ① Ship speed current data NMEA0183 (Ver. 2.3/3.1)
(Ver 2.3—3.01) [Signal name on terminal：NMEA OUT1～4 (4 circuits)]

$VDVBW	; Dual Ground/Water Speed
$VDVLW	; Distance Traveled Through the Water
$VDVHW	; Water Speed/Heading
$VDDBT	; Depth Below Transducer
$VDDPT	; Depth
$VDCUR	; Water Current Layer
$PJRCL	; Proprietary Code

Distance Output: ② Distance Run contact Signal 200 pulse/nm
[Signal name on terminal：NMEA OUT1～4 (4 circuits)]

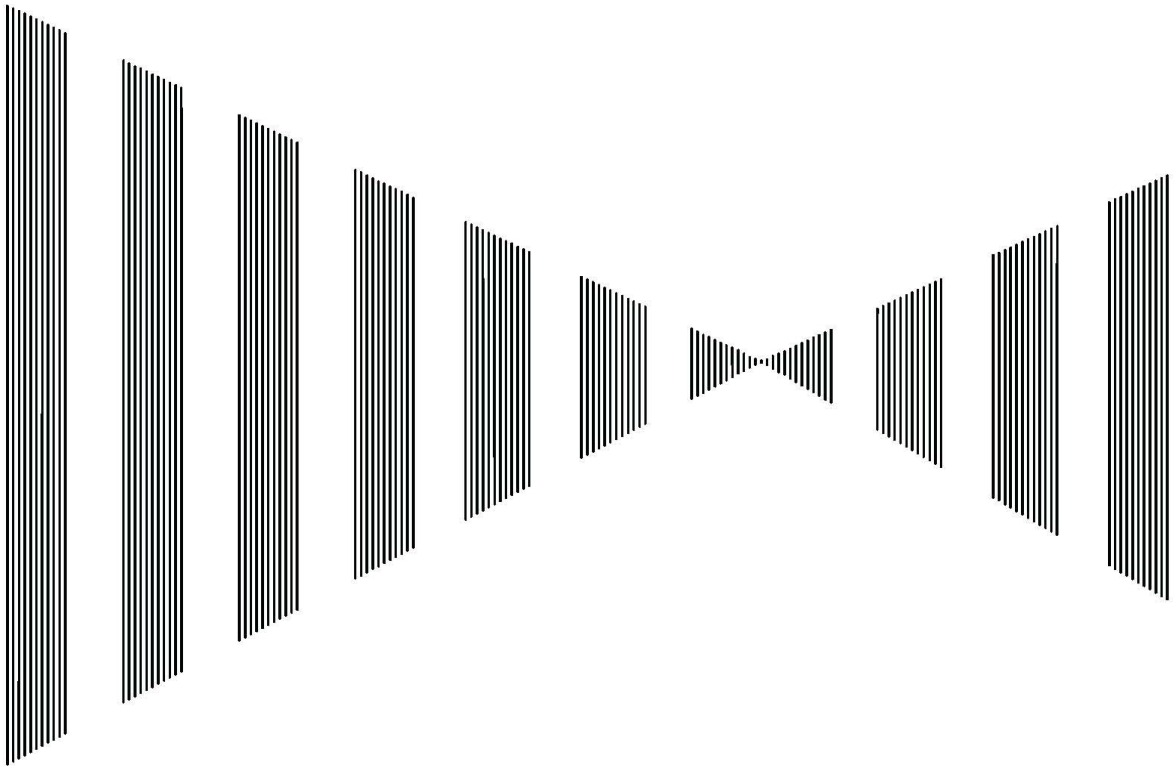
JRC Output : ③ JRC format Signal [Signal name on terminal：JRC OUT]

Trigger Output: ④ Transmission trigger For interference prevention.

11.1.4 Mechanical Specification

1) Construction/Mass / Waterproof grade	LCD Monitor	: Desk-top, Flush-mount/3.7kg/IP45
	Signal processor	: Wall hanging/16kg/IP01
	Keyboard	: Desk-top, Flush-mount /1kg/IP22
	Transducer	: Submerged/25kg (include cable)/IP68
2) Outline Size	LCD Monitor	: 298mm (H) x 395mm (W) x 65mm (D) (Not included brightness knob and optional stand.)
	Signal processor	: 423.5mm (H) x 326.8mm (W) x 257.4mm (D) (Not included Installation part and cable support.)
	Keyboard	: 123mm (H) x 290mm (W) x 57mm (D) (Depth at embedding: 41mm)
	Transducer	
	CFT-068B	: 120mm (H) x 183mm (W) x 450mm (L) (Not included cable sealing off part and with 25m cable)
	CFT-067B	: 108mm (H) x 133mm (W) x 394mm (L) (Not included cable sealing off part and with 25m cable)

12. Others



12.1 Menu table

12.1.1 Standard Menu

(1)

MENU	
･LANGUAGE／言語	日本語　ENGLISH
･BRIGHTNESS	HIGH　LOW　BACK COLOR SETTING≫
･ALARM VOLUME	OFF　1　2　3
･TIME ADJUSTMENT	≫
･SETTING ASSIST	OFF　ON
･INITIAL SETTING	≫
･MEASURE SETTING	≫
･PICTURE SETTING	CURR≫ SHIP≫ PLOT≫　GRP≫　FISH≫ PRO≫
･MENU DISPLAY	DISPLAY　EXIT　PREVIOUS
･HELP／ﾍﾙﾌﾟ	≫　PUSH　ENT KEY／入力ｷｰ押す

Menu
- ☐ Japanese or English display is selected.
- ☐ The color arrangement of the screen of daytime and the night is set.
- ☐ Alarm is stopped with the [BUZZER] key.
- ☐ When GPS is connected, it is not necessary to set.
- ☐ It is the menu for the service man.
- ☐ The setting of installing and the CF card, etc. are set.
- ☐ The direction standard, the ship speed measurement mode, and alarm, etc. are set.
- ☐ Drawing in the table and the graph displayed according to the screen is set.
- ☐ EXIT : The menu is ended.　PREVIOUS : It returns to the previous menu.
- ☐ Supplementary explanation of the menu.

(2)

TIME ADJUSTMENT	
･YEAR	2011
･MONTH	07
･DAY	30
･HOUR	15
･MINUTE	54
･SECOND	00
･ADJUST	CANCEL　OPERATE
MENU DISPLAY	DISPLAY　EXIT　PREVIOUS
･HELP	≫　PUSH　ENT KEY

MENU / TIME ADJUSTMENT≫

Refer to 3.1.1 “Power ON and Date/Time Setting”.

(3)

BRIGHTNESS	
･HIGH LIGHT･BACK COLOR	BLACK　DARK.BLUE　GRAY　WHITE
･LOW　LIGHT･BACK COLOR	BLACK　DARK.BLUE　GRAY　WHITE
･MENU DISPLAY	DISPLAY　EXIT　PREVIOUS
･HELP	≫　PUSH　ENT KEY

MENU / BRIGHTNESS / SETTING ≫

Refer to 3.3.3 “Changing the Display color of Screen at Daytime and Night”.

(4)

INITIAL SETTING	
･OUTLINE OF THE OPERATION	≫
･INSTALLATION SETTING	≫
･DISPLAY MODE	MEASUREMENT　DUMMY
･SOFTWARE VERSION	≫
CF CARD 2 SETTING	
･MEMORY DATA COPY AND ERASE	≫
･MENU DISPLAY	DISPLAY　EXIT　PREVIOUS
･HELP	≫　PUSH　ENT KEY

MENU / INITIAL SETTING ≫

Refer to 7.2 “Initial Setting”.

(5)

SOFTWARE VERSION	
･MAIN	R1.01.46　(sample)
･SIGNAL PROCESSOR	R0100_R0100_R0100_R0100_　(sample)
･KEYBOARD	R 1.5　(sample)
･MENU DISPLAY	DISPLAY　EXIT　PREVIOUS
･HELP	≫　PUSH　ENT KEY

MENU / INITIAL SETTING ≫ SOFTWARE VERSION

Refer to 7.2.4 “Software Version Information”.

Note: The version number described in the menu is an example of the display.
Confirm version information with a real machine.

(6)

MEMORY DATA COPY AND ERASE	
･LOAD DATA	CANCEL　OPERATE
･SAVE DATA	CANCEL　OPERATE
･ERASE DATA	CANCEL　OPERATE
･MENU DISPLAY	DISPLAY　EXIT　PREVIOUS
･HELP	≫　PUSH　ENT KEY

MENU / INITIAL SETTING ≫MEMORY DATA COPY AND ERASE

Refer to 7.2.5 “Memory Data Copy and Erase”.

Standard Menu

(7)

INSTALLATION SETTING	
NMEA0183 INPUT SETTING	
·1. HEDING SENSOR	DISCON. GPS COMPASS GYRO OTHERS
·2. SPEED/COURSE SENSOR	DISCON. GPS GPS COMPASS OTHERS
·3. WATER TEMP. SENSOR	DISCON. CONNECT
·4. WIND ANEMOMETER	DISCON. CONNECT
·DEPTH UNIT	m FM
·WIND VELOCITY UNIT	m/s kn
·TIDAL CURRENT DIRECTION	TIDE IS FLOWING TIDE IS COMING
·TD ANGL CORRECTION	±0.0 ° :SELECT WITH ◀/▶ KEY
·S. SPEED CORRECTION	±0.0 % :SELECT WITH ◀/▶ KEY
·DRAFT CORRECTION	±0.0 m :SELECT WITH ◀/▶ KEY
·DELAYL CORRECTION	±0.0 s :SELECT WITH ◀/▶ KEY
·LETTER SIZE	NORMAL WIDE
·MENU SCREEN TRANSPARENCY	0 1 2 3
·GPS TIME DELAY	7
·TIDE DATA UPDATE TIME	STANDARD FAST MOMENT
·S. SPEED DATA UPDATE TIME	STANDARD FAST
·HYPERAMPLITUDE EXCLUSION	CANCEL OPERATE
·LAN OUTPUT	CANCEL OPERATE
·ALARM	DISP ON OFF
·WARNING	DISP ON OFF
·SELF TEST	≫
·MASTER RESET/ USER MENU SETTING	≫
·MENU DISPLAY	DISPLAY EXIT PREVIOUS
·HELP	≫ PUSH ENT KEY

MENU / INITIAL SETTING ≫ INSTALLATION SETTING

Refer to 7.1 “Setting When Installing”.

(8)

MASTER RESET / USER MENU SETTING	
USER MENU SETTING	
·1. READ OUT THE SETTING VALUE	CANCEL FACTORY USER1 USER2 EXT.
·2. WRITE IN THE SETING VALUE	CANCEL OPERATE ≫
·TOTAL DISTANCE RUN RESET	CANCEL OPERATE ≫
·MASTER RESET	CANCEL OPERATE ≫
·MENU DISPLAY	DISPLAY EXIT PREVIOUS
·HELP	≫ PUSH ENT KEY

MENU / INITIAL SETTING ≫ INSTALLATION SETTING ≫ MASTER RESET / USER MENU SETTING

Refer to 7.1.10 “Integrating Distance/Master Reset/User Menu Registration”.

(9)

WRITE IN THE SETTING VALUE	
·WRITE IN THE VALUE OF MENU DISPLAYED	CANCEL USER1 USER2
·MENU DISPLAY	DISPLAY EXIT PREVIOUS
·HELP	≫ PUSH ENT KEY

MENU / INITIAL SETTING ≫ INSTALLATION SETTING ≫ MASTER RESET / USER MENU SETTING ≫WRITE IN THE SETTING VALUE

Refer to 4.8 “User Menu Registration”.

(10)

MEASURE SETTING	
·S.SPEED DISPLAY	DOPPLER GPS
·SYSYTEM MODE	AUTO MANUAL.W.T MANUAL.B.T
·BEARINGS	N·E·S·W 360°
·DIRECTION STAND.	NORTH UP HEAD UP-T HEAD UP-R
·ABSOLUTE CURRENT STANDARD	DOPPLER GPS Auto-GPS WT Auto-WT
·RELATIVE SURRENT STANDARD	A B C D E
·TRIP/TIMER	TRIP TIMER
·ALARM AND GRAPH SETTING	≫ (CURRENT/SHIPSPEED/DEPTH/ TIMER/TRIP/WATERTEMP./WINDSPEED)
·BOTTOM LOCK MODE	AUTO MANUAL
·MAXIMUM DEPTH TO SEACH	0 50 100 150 200 250 300 350 400 500 m
·BTM ADJUSTMENT	-3 -2 -1 0 +1 +2 +3 +4 +5 +6
·BTM ADJUSTMENT1	-4 -3 -2 -1 0 +1 +2 +3 +4 +5
·BTM ADJUSTMENT2	-4 -3 -2 -1 0 +1 +2 +3 +4 +5
·TX POWER	STANDARD HIGH AUTO
·TX PULSE WIDTH	S-SHORT SHORT NORMAL LONG
·TIDE PROCESS	J1 J1+ J2 J2+ J3 J3+ J4 J4+ J5 J5+
·SW MODE	STANDARD SHALLOW_WATER AUTO1 AUTO2
·MODE	628MODE 650MODE
·BT AVE. PROCESSING TIME1	SHORT 2 3 4 5 6 7 8 9 LONG
·BT AVE. PROCESSING TIME2	SHORT 2 3 4 5 6 7 8 9 LONG
·BT AVE. PROCESSING TIME3	SHORT 2 3 4 5 6 7 8 9 LONG
·WT AVE. PROCESSING TIME1	SHORT 2 3 4 5 6 7 8 9 LONG
·WT AVE. PROCESSING TIME2	SHORT 2 3 4 5 6 7 8 9 LONG
·WT AVE. PROCESSING TIME3	SHORT 2 3 4 5 6 7 8 9 LONG
·TIDE AVE. PROCESSING TIME1	SHORT 2 3 4 5 6 7 8 9 LONG
·TIDE AVE. PROCESSING TIME2	SHORT 2 3 4 5 6 7 8 9 LONG
·TIDE RESPONSE TIME1	SHORT 2 3 4 5 6 7 8 9 LONG
·TIDE RESPONSE TIME2	-3 -2 -1 0 +1 +2 +3 +4
·FILTER SETTING1	A0 A1 A2 B0 B1 B2 C0 C1 C2 C3
·FILTER SETTING2	D0 D1 D2 E0 E1 E2 F0 F1 F2
·FILTER SETTING3	G0 G1 G2 G3 G4 H0 H1 H2 H3 H4
·FILTER SETTING4	K0 K1 K2 K3 K4
·FILTER SETTING5	L0 L1 L2 L3 L4 L5 L6 L7 L8 L9
·FILTER SETTING6	M0 M1 M2 M3 M4 M5 M6 M7 M8 M9
·SWITCH SPD.	-10 -5 -2 -1 0 1 2 5 10 20
·+ BT AVE. PROCESSING TIME1	SHORT 2 3 4 5 6 7 8 9 LONG
·+ BT AVE. PROCESSING TIME2	SHORT 2 3 4 5 6 7 8 9 LONG
·+ BT AVE. PROCESSING TIME3	SHORT 2 3 4 5 6 7 8 9 LONG
·+ WT AVE. PROCESSING TIME1	SHORT 2 3 4 5 6 7 8 9 LONG
·+ WT AVE. PROCESSING TIME2	SHORT 2 3 4 5 6 7 8 9 LONG
·+ WT AVE. PROCESSING TIME3	SHORT 2 3 4 5 6 7 8 9 LONG
·+ TIDE AVE. PROCESSING TIME1	SHORT 2 3 4 5 6 7 8 9 LONG
·+ TIDE AVE. PROCESSING TIME2	SHORT 2 3 4 5 6 7 8 9 LONG
·+ TIDE RESPONSE TIME1	SHORT 2 3 4 5 6 7 8 9 LONG
·+ TIDE RESPONSE TIME2	-3 -2 -1 0 +1 +2 +3 +4
·+ FILTER SETTING1	A0 A1 A2 B0 B1 B2 C0 C1 C2 C3
·+ FILTER SETTING2	D0 D1 D2 E0 E1 E2 F0 F1 F2
·+ FILTER SETTING3	G0 G1 G2 G3 G4 H0 H1 H2 H3 H4
·+ FILTER SETTING4	K0 K1 K2 K3 K4
·MENU DISPLAY	DISPLAY EXIT PREVIOUS
·HELP	≫ PUSH ENT KEY

MENU / MEASURE SETTING ≫

Refer to 4.1 “Measurement Setting and Current Display”.

Standard Menu

(11)

ALARM AND GRAPH SETTING	
·C.SPD ALARM·L	OFF kn :SELECT WITH ◀/▶ KEY
·S.SPD ALARM·L	OFF kn :SELECT WITH ◀/▶ KEY
·BOTTOM DEPTH ALARM·S	OFF 60 m :SET WITH KEY
·TIMER ALARM	OFF 1:00 1:30 2:00 2:30 h
·TRIP ALARM	OFF 1:00 2:00 3:00 4:00 NM
·TRIP/TIMER RESET	CANCEL OPERATE
·TEMP ALARM·H	OFF 10 11 12 13 14 15 16 17 ℃
·TEMP GRAPH CENTER	15 ℃ :SET WITH KEY
·TEMP GRAPH WIDTH	OFF 1 2 4 8 ℃
·WIND SPEED ALARM·L	OFF m/s :SELECT WITH ◀/▶ KEY
·MENU DISPLAY	DISPLAY EXIT PREVIOUS
·HELP	≫ PUSH ENT KEY

MENU / MEASURE SETTING ≫ ALARM AND GRAPH SETTING ≫

Refer to 4.1.8 “Alarm and Graph Setting”.

(12)

“UNDO” SETTING	
·UNDO (RETURN TO FORMER MENU)	CANCEL OPERATE
·MENU DISPLAY	DISPLAY EXIT PREVIOUS
·HELP	≫ PUSH ENT KEY

UNDO

Refer to 3.2.3 “Basic Operation of Menu”.

(13)

TIDAL CURRENT PICTURE SETTING	
CURRENT GRAPH SETTING	
·C.SPEED RANGE	AUTO 1 2 4 6 8 10 kn
·CURRENT VECTORS DISP.ON/OFF	≫
·SHIP SPEED VECTORS	DISP ON OFF
·GRAPH SIZE	NORMAL LARGE
·WIND DIRECTION MARK	DISP ON OFF
ECHO GRAPH SETTING	
·ECHO GRAPH DEPTH RANGE	100 200 300 500 m
·ECHO GRAPH MODE	ECHO SN
·SN. LEVEL HIGH	0 dB :SET WITH KEY
·SN. LEVEL LOW	-12 dB :SET WITH KEY
·COLOR	A B C D
·BACK COLOR	STND BLK D.BLU GRY WHT
·MENU DISPLAY	DISPLAY EXIT PREVIOUS
·HELP	≫ PUSH ENT KEY

MENU / PICTURE SETTING / TIDAL CURRENT ≫

Refer to 4.2 “Current Display Setting”.

(14)

CURRENT VECTORS DISPLAY ON / OFF	
·ABSOLUTE CURRENT VECTOR A	DISP ON OFF
·ABSOLUTE CURRENT VECTOR B	DISP ON OFF
·ABSOLUTE CURRENT VECTOR C	DISP ON OFF
·ABSOLUTE CURRENT VECTOR D	DISP ON OFF
·ABSOLUTE CURRENT VECTOR E	DISP ON OFF
·RELATIVE CURRENT VECTOR A	DISP ON OFF
·RELATIVE CURRENT VECTOR B	DISP ON OFF
·RELATIVE CURRENT VECTOR C	DISP ON OFF
·RELATIVE CURRENT VECTOR D	DISP ON OFF
·RELATIVE CURRENT VECTOR E	DISP ON OFF
·MENU DISPLAY	DISPLAY EXIT PREVIOUS
·HELP	≫ PUSH ENT KEY

MENU / PICTURE SETTING / TIDAL CURRENT ≫ CURRENT VECTORS DISPLAY ON/OFF ≫

Refer to 4.2.1 “Current Circle Graph Setting”.

(15)

CURRENT DEPTH SETTING :SETTING WITH A NUMERICAL KEY	
·A LAYER	12 m TOP LOCK
·B LAYER	20 m
·C LAYER	30 m
·D LAYER	50 m
·E LAYER	100 m BOTTOM LOCK
·MENU DISPLAY	DISPLAY EXIT PREVIOUS
·HELP	≫ PUSH ENT KEY

CURRENT DEPTH SETTING

Refer to 4.2.3 “Current Measurement Layer Depth Setting”.

Standard Menu

(16)

SHIP SPEED PICTURE SETTING	
S.SPEED GRAPH SETTING	
·S.SPEED RANGE	5 10 15 20 25 30 40 kn
·S.SPEED PICTURE	ELEMENT VECTOR
·RECORD TIME	30 60 120 240 min
·MENU DISPLAY	DISPLAY EXIT PREVIOUS
·HELP	≫ PUSH ENT KEY

MENU / PICTURE SETTING / SHIP SPEED ≫

Refer to 4.3 “Ship Speed Display Setting”.

(17)

COURSE PLOT PICTURE SETTING	
·NUMERIC TABLE	DISP ON OFF
·CURRENT VECTOR A	ABS. REL. ABS.+REL. OFF
·CURRENT VECTOR B	ABS. REL. ABS.+REL. OFF
·CURRENT VECTOR C	ABS. REL. ABS.+REL. OFF
·CURRENT VECTOR D	ABS. REL. ABS.+REL. OFF
·CURRENT VECTOR E	ABS. REL. ABS.+REL. OFF
·VECTOR LENGTH	0.5 1 2 4 cm/kn
·PLOT COLOR	RED PNK YEL GRN BLU WHT LEVEL
·CURRENT STANDARD	A B C D E
·BACK COLOR	STND BLK D.BLU GRY WHT
·PLOT STANDARD	DOPPLER GPS
·SCALE	1/10000 :SELECT WITH ◀/▶KEY
·RECORD TIME	6 15 30 60 120 240 SEC
·DRAW VECTORS	1/ 1 2 4 10 20 50 TIME(S)
·LOCAL TIME	+9.0 h : SELECT WITH ◀/▶KEY
·S.SPEED VECTOR LENGTH	0.5 1 2 4 cm/10kn
·CURRENT DATA ON EVENT MARK	DISP ON OFF
·TRACK LINE MARKER	60 min : SELECT WITH ◀/▶KEY
·MENU DISPLAY	DISPLAY EXIT PREVIOUS
·HELP	≫ PUSH ENT KEY

MENU / PICTURE SETTING / COURSE PLOT ≫

Refer to 4.4 “Track Plot Display Setting”.

(18)

GRAPH PICTURE SETTING	
·CURRENT RANGE	100 200 300 500 DEPTH RANGE m
·DEPTH RANGE	100 200 300 500 m
·CURRENT VECTOR A	ABS. REL. ABS.+REL. OFF
·CURRENT VECTOR B	ABS. REL. ABS.+REL. OFF
·CURRENT VECTOR C	ABS. REL. ABS.+REL. OFF
·CURRENT VECTOR D	ABS. REL. ABS.+REL. OFF
·CURRENT VECTOR E	ABS. REL. ABS.+REL. OFF
·VECTOR LENGTH	0.5 1 2 4 cm/kn
·VECTOR DENSITY	NORMAL HIGH S-HIGH
·BACK COLOR	STND BLK D.BLU GRY WHT
·TIME SCALE	0.5 1 3 6 12 24 h
·S.SPEED RANGE	5 10 15 20 25 30 40 kn
·WIND VECTOR LENGTH	0.5 1 2 mm/(m/s)
·SHIP SPEED GRAPH	DISP ON OFF
·TEMPARATURE GRAPH	DISP ON OFF
·WIND VECTOR GRAPH	DISP ON OFF
·MENU DISPLAY	DISPLAY EXIT PREVIOUS
·HELP	≫ PUSH ENT KEY

MENU / PICTURE SETTING / GRAPH ≫

Refer to 4.5 “History Display Setting”.
All of item was not able to be displayed on one screen.
Therefore, it displays separately with two screens.

(19)

FISH FINDER PICTURE SETTING	
·DISPLAY BEAM	4 :SELECT WITH ◀/▶ KEY
·COLOR	A B C D
·BACK COLOR	STND BLK D.BLU GRY WHT
·COLOR SAMPLE	DISP ON OFF
·CHART SPEED	1/1 1/2 1/3
·COLOR ERASE	OFF :SELECT WITH ◀/▶ KEY
·NOISE REDUCE	ON OFF
·VERTICAL CURSOR	DISP ON OFF
·HORIZONTAL CURSOR	DISP ON OFF
·MENU DISPLAY	DISPLAY EXIT PREVIOUS
·HELP	≫ PUSH ENT KEY

MENU / PICTURE SETTING / FISH FINDER ≫

Refer to 4.6 “Fish Finder Display Setting”.

Standard Menu

(20)

FISH FINDER DEPTH RANGE SETTING :SETTING WITH NUMERICAL KEY	
·1	20 m
·2	40 m
·3	80 m
·4	120 m
·5	160 m
·6	200 m
·7	250 m
·8	300 m
·9	350 m
·0	400 m
·MENU DISPLAY	DISPLAY EXIT PREVIOUS
·HELP	≫ PUSH ENT KEY

DEPTH

Refer to 4.6.5 “Depth Range Setting”.

(21)

“MALTI-LAYER PROFILE” PICTURE SETTING	
·M. LAY. DEPTH RANGE	100 200 300 500 m
·M. LAY. C. SPEED RANGE	1 2 5 10 kn
·DISPLAY CURRENT	ABSOLUTE RELATIVE
·VIEW: V. ANGLE	20 30 45 °
·VIEW: H. ANGLE	0 90 180 270 °
·M. LAY. VECTOR DENSITY	1/ 1 2 4 8 16 DISP OFF
·M. LAY. VECTOR COLOR	LIGHT DARK
·M. LAY. VECTOR WIDTH	NARROW WIDE
·WIND DIRECTION MARK	DISP ON OFF
·MENU DISPLAY	DISPLAY EXIT PREVIOUS
·HELP	≫ PUSH ENT KEY

MENU / PICTURE SETING /PROFILE ≫

Refer to 4.7 “Tidal Profile Display Setting”.

12.1.2 Selection Frame Menu

(1)

DISP. MODE / PICTURE / DIRECTION MODE	
·DISPLAY MODE	MEASUREMENT DUMMY
·DIRECTION STAND.	NORTH UP HEAD UP
·PICTURE SETTING	CURR≫ SHIP≫ PLOT≫ GRP≫ FISH≫ PRO≫
·BRIGHTNESS	HIGH LOW BACK COLOR SETTING
·ALARM VOLUME	OFF 1 2 3
·ALARM	DISP ON OFF
·WARNING	DISP ON OFF
·TIME ADJUSTMENT	≫
·INITIAL SETTING	≫
·MEASURE SETTING	≫
·LANGUAGE/日本語	日本語 ENGLISH
·MENU DISPLAY	DISPLAY EXIT PREVIOUS
·HELP/ﾍﾙﾌﾟ	≫ PUSH ENT KEY

□ / [DISP. MODE / PICTUER / DIRECTION. MODE] SELECTING / MENU

Refer to 4.1 “Measurement Setting and Current Display”.

(2)

CURRENT SPEED AND DIRECTION / RELATIVE CURRENT LAYER	
·BEARINGS	N·E·S·W 360°
·ABSOLUTE CURRENT STANDARD	DOPPLER GPS GPS AT W.T
·RELATIVE CURRENT STANDARD	A B C D E
·C. SPEED ALARM·L	OFF kn :SELECT WITH ◀/▶ KEY
DEPTH SETTING: SET WITH KEY	
·A LAYER	12 m TOP LOCK
·B LAYER	20 m
·C LAYER	30 m
·D LAYER	50 m
·E LAYER	100 m BOTTOM LOCK
·MENU DISPLAY	DISPLAY EXIT PREVIOUS
·HELP	≫ PUSH ENT KEY

□ / [CURRENT SPEED AND DIRECTION / RELATIVE CURRENT] SELECTION] / MENU

Refer to 4.1 “Measurement Setting and Current Display”.

(3)

CURRENT CIRCLE GRAPH	
·BEARINGS	N·E·S·W 360°
·C. SPEED RANGE	AUTO 1 2 4 6 8 10 kn
·CURRENT VECTORS DISP. ON/OFF	≫
·SHIP SPEED VECTORS	DISP ON OFF
·GRAPH SIZE	NORMAL LARGE
·WIND DIRCTION MARK	DISP. ON OFF
·C. SPEED ALARM·L	OFF kn :SELECT WITH ◀/▶KEY
·MENU DISPLAY	DISPLAY EXIT PREVIOUS
·HELP	≫ PUSH ENT KEY

□/ [CURRENT CIRCLE GRAPH] SELECTION / MENU

Refer to 4.2.1 “Current Circle Graph Setting”.

(4)

CURRENT VECTORS DISPLAY ON / OFF	
·ABSOLUTE CURRENT VECTOR A	DISP ON OFF
·ABSOLUTE CURRENT VECTOR B	DISP ON OFF
·ABSOLUTE CURRENT VECTOR C	DISP ON OFF
·ABSOLUTE CURRENT VECTOR D	DISP ON OFF
·ABSOLUTE CURRENT VECTOR E	DISP ON OFF
·RELATIVE CURRENT VECTOR A	DISP ON OFF
·RELATIVE CURRENT VECTOR B	DISP ON OFF
·RELATIVE CURRENT VECTOR C	DISP ON OFF
·RELATIVE CURRENT VECTOR D	DISP ON OFF
·RELATIVE CURRENT VECTOR E	DISP ON OFF
·MENU DISPLAY	DISPLAY EXIT PREVIOUS
·HELP	≫ PUSH ENT KEY

□/ [CURRENT CIRCLE GRAPH] SELECTION / MENU / CURRENT VECTORS DISPLAY ON /OFF ≫

Refer to 4.2.1 “Current Circle Graph Setting”.

(5)

SHIP SPEED DISPLAY	
·MENU DISPLAY	DISPLAY EXIT PREVIOUS
·HELP	≫ PUSH ENT KEY

□ / [SHIP SPEED DISPLAY] SELECTION / MENU

Refer to 4.3 “Ship Speed Display Setting”.

Selection Frame Menu

(6)

TRIP / TIMER AND ALARM	
·TRIP / TIMER	TRIP TIMER
·TIMER ALARM	OFF 1:00 1:30 2:00 2:30 h
·TRIP ALARM	OFF 1:00 2:00 3:00 4:00 h
·TRIP/TIMER RESET	CANCEL OPERATE
·MENU DISPLAY	DISPLAY EXIT PREVIOUS
·HELP	≫ PUSH ENT KEY

☐ / [TRIP / TIMER AND ALARM] SELECTION / MENU

Refer to 4.1.8 “Alarm and Graph Setting”.

(7)

WATER TEMPERATUR ALARM AND GRAPH	
·TEMP ALARM·H	OFF 10 11 12 13 14 15 16 17 ℃
·TEMP GRAPH CENTER	15 ℃ :SET WITH KEY
·TEMP GRAPH WIDTH	OFF 1 2 4 8 ℃
·MENU DISPLAY	DISPLAY EXIT PREVIOUS
·HELP	≫ PUSH ENT KEY

☐ / [WATER TEMPERATURE ALARM AND GRAPH] SELECTION / MENU

Refer to 4.1.8 “Alarm and Graph Setting”.

(8)

ECHO GRAPH SETTING	
·ECHO GRAPH DEPTH RANGE	100 200 300 500 m
·ECHO GRAPH MODE	ECHO SN
·SN. LEVEL HIGH	0 dB :SET WITH KEY
·SN. LEVEL LOW	-12 dB :SET WITH KEY
·COLOR	A B C D
·BACK COLOR	STND BLK D.BLU GRY WHT
·MENU DISPLAY	DISPLAY EXIT PREVIOUS
·HELP	≫ PUSH ENT KEY

☐ / [ECHO GRAPH SETTING] SELECTION / MENU

Refer to 4.2.2 “Current Echo Graph Setting”.

(9)

BOTTOM DEPTH ALARM	
·BOTTOM DEPTH ALARM·S	OFF 60 m :SET WITH KEY
·MENU DISPLAY	DISPLAY EXIT PREVIOUS
·HELP	≫ PUSH ENT KEY

☐ / [BOTTOM DEPTH ALARM] SELECTION MENU

Refer to 4.1.8 “Alarm and Graph Setting”.

(10)

SHIP SPEED AND COURSE	
·BEARINGS	N·E·S·W 360°
·S. SPEED DISPLAY	DOPPLER GPS
·SYSTEM MODE	AUTO MANUAL W.T MANUAL B.T
·S. SPEED ALARM·L	OFF kn :SELECT WITH ◀/▶ KEY
·MENU DISPLAY	DISPLAY EXIT PREVIOUS
·HELP	≫ PUSH ENT KEY

☐ / [SHIP. SPEED AND COURSE] SELECTION / MENU

Refer to 4.3 “Ship Speed Display Setting”.

(11)

WIND SPEED AND DIRECTION	
·WIND SPEED ALARM·L	OFF m/s :SELECT WITH ◀/▶ KEY
·MENU DISPLAY	DISPLAY EXIT PREVIOUS
·HELP	≫ PUSH ENT KEY

☐ / [WIND. SPEED AND DIRECTION] SELECTION / MENU

Refer to 4.1.8 “Alarm and Graph Setting”.

(12)

DISTANCE	
·MENU DISPLAY	DISPLAY EXIT PREVIOUS
·HELP	≫ PUSH ENT KEY

☐ / [DISTANCE] SELECTION MENU

Refer to 7.1.10 “Integrating Distance/Master Reset/User Menu Registration”.

(13)

OWN. SHIP POSITION	
·LOCAL TIME	+9.0 h :SELECT WITH ◀/▶ KEY
·MENU DISPLAY	DISPLAY EXIT PREVIOUS
·HELP	≫ PUSH ENT KEY

☐ / [OWN. SHIP POSITION] SELECTION / MENU

Refer to 4.4.3 “Own Track Display”.

Selection Frame Menu

(14)

SHIP SPEED GRAPH	
·S. SPEED RANGE	5 10 15 20 25 30 40 kn
·S. SPEED PICTURE	ELEMENT VECTOR
·RECORD TIME	30 60 120 240 min
·S. SPEED ALARM·L	OFF kn :SELECT WITH ◀/▶ KEY
·MENU DISPLAY	DISPLAY EXIT PREVIOUS
·HELP	≫ PUSH ENT KEY

□ / [SHIP SPEED GRAPH] SELECTION / MENU

Refer to 4.5.2 “Ship Speed Graph Setting”

(15)

PLOT DISPLAY	
·NUMERIC TABLE	DISP ON OFF
·CURRENT VECTOR A	ABS. REL. ABS.+REL. OFF
·CURRENT VECTOR B	ABS. REL. ABS.+REL. OFF
·CURRENT VECTOR C	ABS. REL. ABS.+REL. OFF
·CURRENT VECTOR D	ABS. REL. ABS.+REL. OFF
·CURRENT VECTOR E	ABS. REL. ABS.+REL. OFF
·VECTOR LENGTH	0.5 1 2 4 cm/kn
·PLOT COLOR	RED PNK YEL GRN BLU WHT LEVEL
·CURRENT STANDARD	A B C D E
·BACK COLOR	STND BLK D.BLU GRY WHT
·PLOT STANDARD	DOPPLER GPS
·SCALE	1/10000 :SELECT WITH ◀/▶KEY
·RECORD TIME	6 15 30 60 120 240 sec
·DRAW VECTORS	1/ 1 2 4 10 20 50 TIME(S)
·LOCAL TIME	+9.0 h : SELECT WITH ◀/▶KEY
·S. SPEED VECTOR LENGTH	0.5 1 2 4 cm/10kn
·CURRENT DATA ON EVENT MARK	DISP ON OFF
·TRACK LINE MARKER	60 min :SELECT WITH ◀/▶KEY
·MENU DISPLAY	DISPLAY EXIT PREVIOUS
·HELP	≫ PUSH ENT KEY

(16)

WIND VECTOR GRAPH	
·WIND VECTOR LENGTH	0.5 1 2 mm/(m/s)
·WIND SPEED ALARM·L	OFF m/s :SELECT WITH ◀/▶ KEY
·MENU DISPLAY	DISPLAY EXIT PREVIOUS
·HELP	≫ PUSH ENT KEY

□ / [WIND VECTOR GRAPH] SELECTION / MENU

Refer to 4.5.4 “Wind Direction/Speed Graph Setting”.

(17)

SHIP SPEED GRAPH	
·S. SPEED RANGE	5 10 15 20 25 30 40 kn
·S. SPEED ALARM·L	OFF kn :SELECT WITH ◀/▶ KEY
·MENU DISPLAY	DISPLAY EXIT PREVIOUS
·HELP	≫ PUSH ENT KEY

□ / [SHIP SPEED GRAPH] SELECTION / MENU

Refer to 4.5.2 “Ship Speed Graph Setting”.

(18)

CURRENT AND DEPTH GRAPH	
·CURRENT RANGE	100 200 300 500 DEPTH RANGE m
·DEPTH RANGE	100 200 300 500 m
·CURRENT VECTOR A	ABS. REL. ABS.+REL. OFF
·CURRENT VECTOR B	ABS. REL. ABS.+REL. OFF
·CURRENT VECTOR C	ABS. REL. ABS.+REL. OFF
·CURRENT VECTOR D	ABS. REL. ABS.+REL. OFF
·CURRENT VECTOR E	ABS. REL. ABS.+REL. OFF
·VECTOR LENGTH	0.5 1 2 4 cm/kn
·VECTOR DENSITY	NORMAL HIGH S-HIGH
·BACK COLOR	STND BLK D.BLU GRY WHT
·TIME SCALE	0.5 1 3 6 12 24 h
·SHIP SPEED GRAPH	DISP ON OFF
·TEMPARATURE GRAPH	DISP ON OFF
·WIND VECTOR GRAPH	DISP ON OFF
·C. SPEED ALARM·L	OFF kn :SELECT WITH ◀/▶ KEY
·BOTTOM DEPTH ALARM·S	OFF 60 m :SET WITH KEY
·MENU DISPLAY	DISPLAY EXIT PREVIOUS
·HELP	≫ PUSH ENT KEY

□ / [CURRENT AND DEPTH GRAPH] SELECTION / MENU

Refer to 4.5.1 “Current/Depth History Graph Setting”.

Selection Frame Menu

(19)

FISH FINDER DISPLAY	
·RANGE SETTING	≫
·DISPLAY BEAM	4 :SELECT WITH ◀/▶ KEY
·COLOR	A B C D
·BACK COLOR	STND BLK D.BLU GRY WHT
·COLOR SAMPLE	DISP ON OFF
·CHART SPEED	1/1 1/2 1/3
·COLOR ERASE	OFF :SELECT WITH ◀/▶ KEY
·NOISE REDUCE	ON OFF
·VERTICAL CURSOR	DISP ON OFF
·HORIZONTAL CURSOR	DISP ON OFF
·MENU DISPLAY	DISPLAY EXIT PREVIOUS
·HELP	≫ PUSH ENT KEY

☐ / [FISH FINDER DISPLAY] SELECTION / MENU

Refer to 4.6 “Fish Finder Display Setting”.

(20)

FISH FINDER DEPTH RANGE SETTING :SETTING WITH NUMERICAL KEY	
·1	20 m
·2	40 m
·3	80 m
·4	120 m
·5	160 m
·6	200 m
·7	250 m
·8	300 m
·9	350 m
·0	400 m
·MENU DISPLAY	DISPLAY EXIT PREVIOUS
·HELP	≫ PUSH ENT KEY

☐ / [FISH FINDER] SECTION / MENU/ DEPTH RANGE SETTING ≫

Refer to 4.6.5 “Depth Range Setting”.

(21)

PROFILE 1 GRAPH	
·BEARINGS	N·E·S·W 360°
·M. LAY. DEPTH RANGE	100 200 300 500 m
·M. LAY. C.SPEED RANGE	1 2 5 10 kn
·DISPLAY CURRENT	ABSOLUTE RELATIVE
·MENU DISPLAY	DISPLAY EXIT PREVIOUS
·HELP	≫ PUSH ENT KEY

☐ / [PROFILE 1 GRAPH] SELECTION / MENU

Refer to 4.7.1 “ Profile 1 Graph Setting”.

(22)

PROFILE 2 GRAPH	
·BEARINGS	N·E·S·W 360°
·M. LAY. DEPTH RANGE	100 200 300 500 m
·M. LAY. C. SPEED RANGE	1 2 5 10 kn
·DISPLAY CURRENT	ABSOLUTE RELATIVE
·VIEW: V. ANGLE	20 30 45 °
·VIEW: H. ANGLE	0 90 180 270 °
·M. LAY. VECTOR DENSITY	1/ 1 2 4 8 16 DISP OFF
·M. LAY. VECTOR COLOR	LIGHT DARK
·M. LAY. VECTOR WIDTH	NARROW WIDE
·WIND DIRECTION MARK	DISP ON OFF
·MENU DISPLAY	DISPLAY EXIT PREVIOUS
·HELP	≫ PUSH ENT KEY

☐ / [PROFILE 2 GRAPH] SELECTION / MENU

Refer to 4.7.2 “Profile 2 graph Setting”.

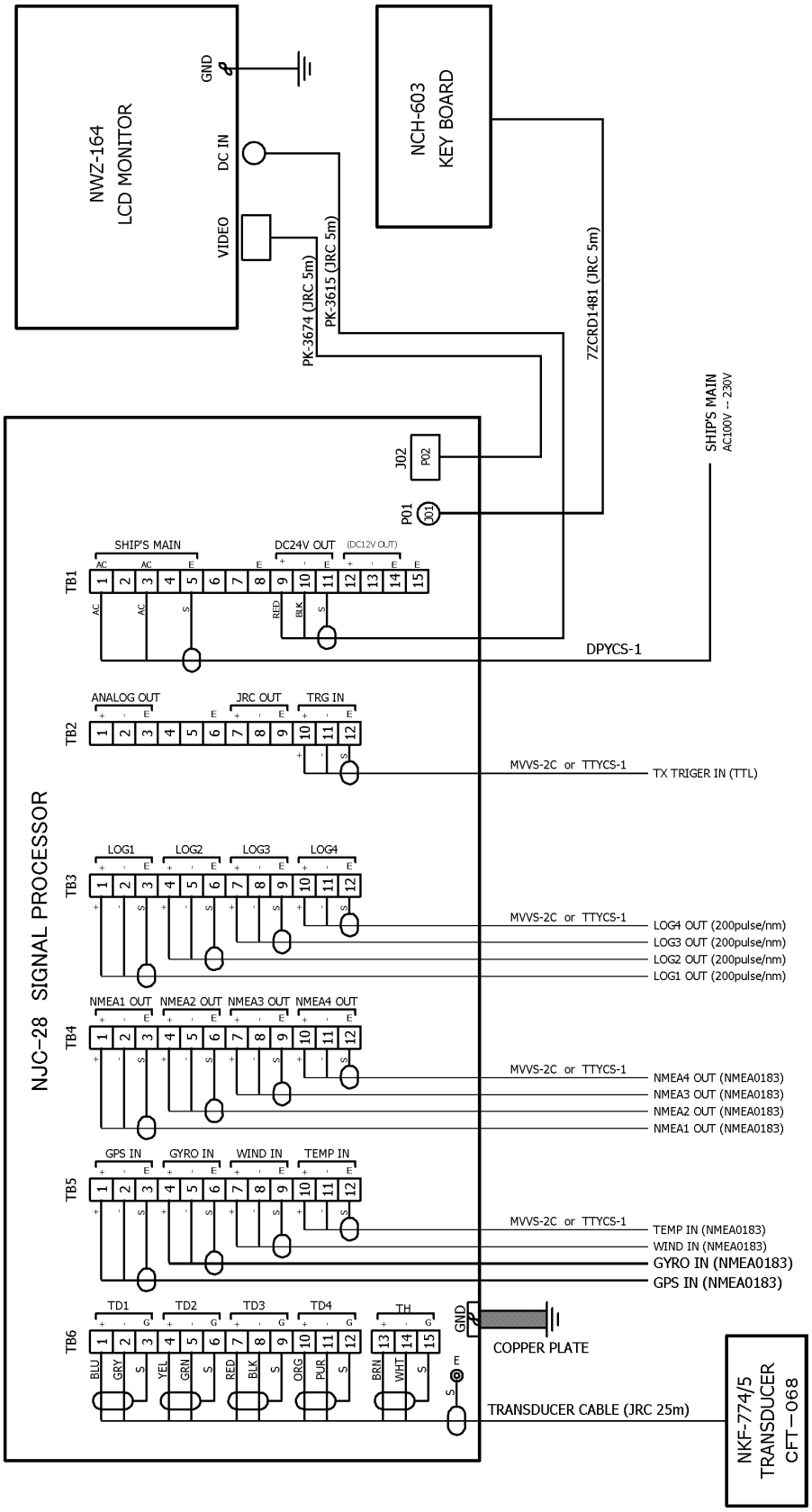
(23)

UPWELLING CURRENT GRAPH	
·UP.CURR.DEPTH RANGE	100 200 300 500 m
·UP.CURR.SPEED RANGE	1 2 4 kn
·GRAPH TIME SCALE	10 30 60 min
DEPTH SETTING	
·V LAYER	DISP OFF 12 m :SET WITH KEY
·W LAYER	DISP OFF 20 m :SET WITH KEY
·X LAYER	DISP OFF 30 m :SET WITH KEY
·Y LAYER	DISP OFF 50 m :SET WITH KEY
·Z LAYER	DISP OFF 100m :SET WITH KEY
·GRAPH AREA DIVISION	1/2 1/1 2/1
·MENU DISPLAY	DISPLAY EXIT PREVIOUS
·HELP	≫ PUSH ENT KEY

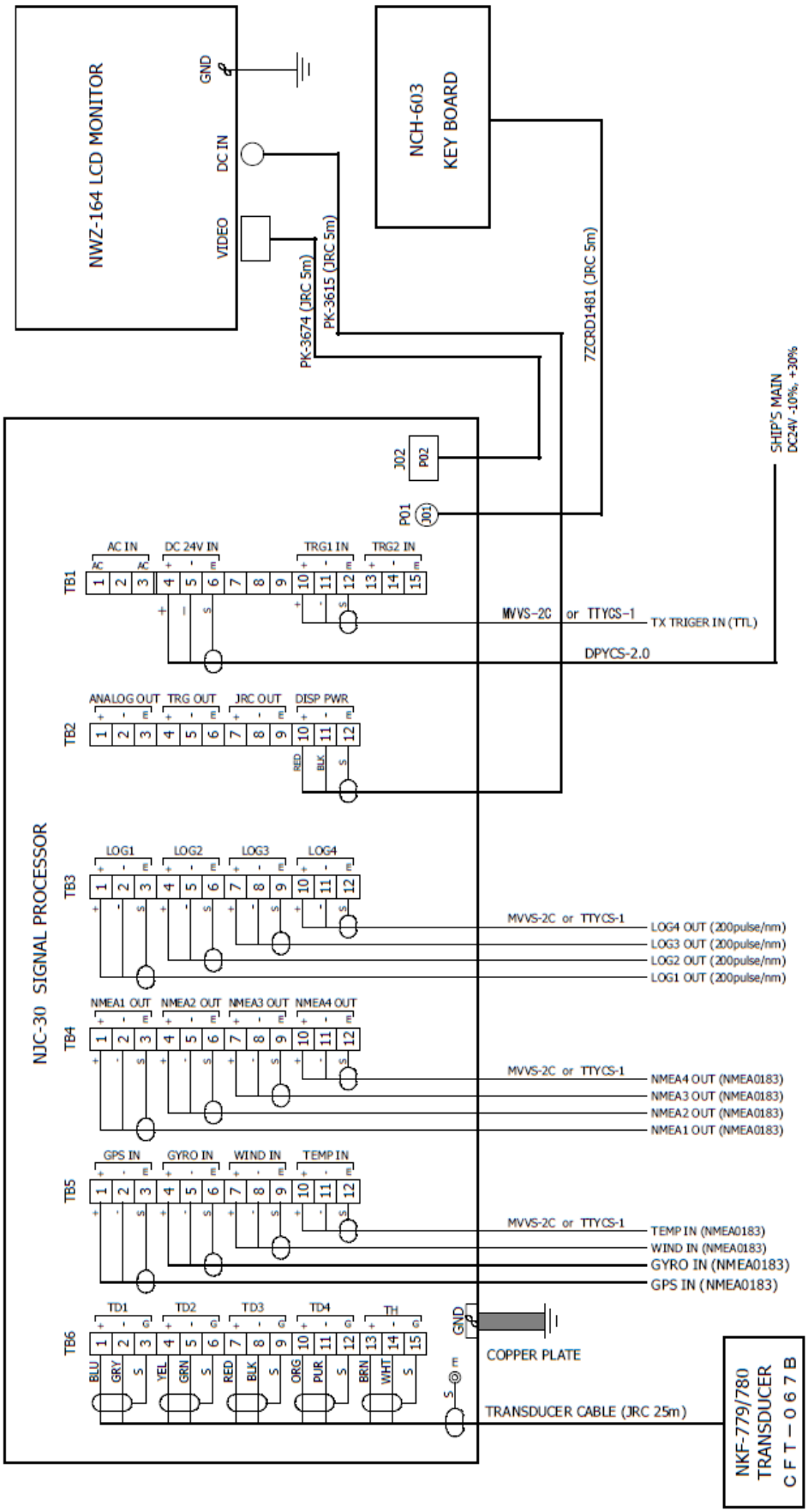
□ / [PROFILE 3 GRAPH] SELECTION / MENU

Refer to 4.7.3 “Profile 3 graph Setting”.

12.2 Connection Diagram



JLN-650 Connection Diagram

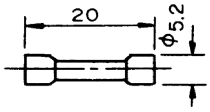
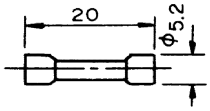


JLN-652 Connection Diagram

12.3 Spare Parts List

BOX No. P

SHIP No.	SPARE PARTS LIST FOR	U S E	SETS PER VESSEL
	MODEL JLN-650 潮 流 計 Doppler Current Meter		

ITEM No.	NAME OF PART	OUTLINE (Dimension in m/m)	QUANTITY WORKING PER SET	QUANTITY WORKING PER VESS	QUANTITY SPARE	REMARKS DESCRIPTION JRC CORD NO.	REMARKS SUB MARK OF BOX NO.
1	ヒューズ Fuse		2		2	ULTSC 6.3AN1 5ZFCA00034	
2	ヒューズ Fuse		2		2	250V A SC10A 5ZFCA00044	

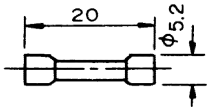
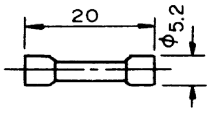
MFR'S NAME	JAPAN RADIO CO.,LTD.	DRW.No.	7ZXNA3001

Note: Spare part (description or JRC code number) may be replaced with compatible part.
予備品(型名・コード)は、予告無く互換品に変更することがございます。

Inquiry regarding the order of a part : Marine Service Department
Telephone:+81-3-3492-1305 Facsimile:+81-3-3779-1420 e-mail:tmsc@jrc.co.jp

BOX No. P

SHIP No.	SPARE PARTS LIST FOR	U S E	SETS PER VESSEL
	MODEL **JLN-652** 潮 流 計 Doppler Current Meter		

ITEM No.	NAME OF PART	OUTLINE (Dimension in m/m)	QUANTITY WORKING PER SET	QUANTITY WORKING PER VESS	QUANTITY SPARE	REMARKS DESCRIPTION JRC CORD NO.	REMARKS SUB MARK OF BOX NO.
1	ヒューズ Fuse		**1**		2	ULTSC 6.3AN1 5ZFCA00034	
2	ヒューズ Fuse		**1**		2	ULTSC10AN1 5ZFCA00035	

MFR'S NAME	JAPAN RADIO CO.,LTD.	DRW.No.	**7ZXNA3002**

Note: Spare part (description or JRC code number) may be replaced with compatible part.
予備品(型名・コード)は、予告無く互換品に変更することがございます。
Inquiry regarding the order of a part : Marine Service Department
Telephone:+81-3-3492-1305 Facsimile:+81-3-3779-1420 e-mail:tmsc@jrc.co.jp

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For further information,contact:

JRC Japan Radio Co., Ltd.
Since 1915

URL Head office : http://www.jrc.co.jp/eng/
Marine Service Department
e-mail : msc@jrc.co.jp
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