This product is specifically designed to be installed on boats and other means of maritime transport. If your country forms part to the EU, please contact your dealer for advice before attempting to install elsewhere.
Declaration of Conformity

Declares under his sole responsibility that the produced Sonar manufactured by

Koden Electronics Co., Ltd.
5278 Uenohara
Uenohara-Shi,
Yamanashi-Ken
409-0112, Japan

Telephone +81 554 20 5860    Telefax +81 554 20 58705

Identified by the type number **ESR-S1BB** to which this declaration refers conforms to the relevant essential requirements of Directive 2004/108/EC and is in conformity with the EMC requirements of EU harmonised standard

**EN60945: 2002**

Authorised representative in Europe

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Signed

Heinz Hoghoff,

Dated 08 Nov, 2013

Document No. 73-2731U-X003
## Document Revision History

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### Document No. Revised Version Norm

When part of the document needs to be revised, the document has advanced revision number. The document No. is indicated at the lower right side on the cover and at the left or right side of the footer region of each page.

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Thank you for purchasing the ESR-S1BB Searchlight Sonar. We are confident you will enjoy using your unit for many years to come.

This manual provides complete information on safely operating the ESR- S1BB. Please carefully read and follow the safety information so that the ESR- S1BB will perform to the utmost of its ability.
SAFETY INSTRUCTION

SYMBOLS

- The following symbols are used in this manual.
- Please read this manual carefully and take note of these symbols.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="DANGER" /></td>
<td>indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.</td>
</tr>
<tr>
<td><img src="image" alt="WARNING" /></td>
<td>indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.</td>
</tr>
<tr>
<td><img src="image" alt="CAUTION" /></td>
<td>indicates a potentially hazardous situation which, if not avoided, may result in minor injury.</td>
</tr>
<tr>
<td><strong>NOTE !</strong></td>
<td>Indicates the contents for the user’s reference.</td>
</tr>
<tr>
<td><img src="image" alt="CF" /></td>
<td>Pages for the user’s reference.</td>
</tr>
</tbody>
</table>

NOTICE

- This manual should be kept on hand to provide your quick reference whenever you need it.
- Any use other than that mentioned in this manual is not guaranteed.
- The contents of this manual and equipment specifications are subject to change without notice.
- No part of this manual may be copied or reproduced without written permission.
INSTALLATION SITE REQUIREMENTS

**WARNING**
Keep the unit away from the flammable gas. Otherwise it causes a fire.

**CAUTION**
Follow the below proposed conditions for the installation. Otherwise it cases a fire or an electrical shock.

Away as much as possible from areas where the unit is likely to be exposed to direct water spray and free as much as possible from shocks and engine vibration.

Away as much as possible from areas of high temperatures or areas where the unit is likely to be exposed to direct sunlight.

MOUNTING CONDITIONS

**WARNING**
Do not install the ESR-S1BB on unstable or uneven surfaces. Installing the unit tentatively may result in dropping, toppling over or injury.

Follow the below conditions for wirings. Otherwise it cases heat, a fire or injury.
Run the cables not to touch the rotary obstacles or disturb the operation.
Do not use the cables bent, twisted or stretched by force.
Do not put heavy objects on the cables.

**CAUTION**
Always turn off the power before connecting or disconnecting the unit.
Pulling the cables may damage the cables themselves and result in fire or electrical shock.

POWER SUPPLY

**WARNING**
Operating voltage: 12 to 30 volts DC.
Use the proper voltage. Otherwise it will result in fire or electrical shock.

**CAUTION**
Turn on/off the power by ON/OFF keys on the control panel. Turning on/off the power by the switchboard may damage the unit.

Turn off the power when starting the vessel engine. Otherwise it may damage the unit.
FOR YOUR SAFETY

HANDLING

Do not operate the unit while steering. Otherwise it will cause wrecks.

Do not open the case cover. There is a risk of electrical shock if you touch the high voltage conductors. Only qualified personnel should work inside the unit.

Care for sufficient reinforcement and being watertight should be taken when installing the hoist. Otherwise it will cause wrecks.

Use the proper fuse when changed. Otherwise it could result in serious trouble or fire.

Use the specified power supply cables. Otherwise it could result in serious trouble or fire.

The Hoist Gears and Flange Unit need a regular lubrication with grease.
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## COMPONENTS

<table>
<thead>
<tr>
<th>Name of item</th>
<th>OPERATION UNIT</th>
<th>POWER SUPPLY CABLE</th>
<th>REMOTE CONTROLLER</th>
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</thead>
<tbody>
<tr>
<td>Type</td>
<td>ESR-S1BB</td>
<td>CW-206-2M</td>
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<td>Qty</td>
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<table>
<thead>
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<th>OPERATION MANUAL</th>
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<tr>
<td>Type</td>
<td>F-7161 (8A)</td>
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<td>Qty</td>
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## COMPONENTS

<table>
<thead>
<tr>
<th>Name of item</th>
<th>Transducer Unit</th>
<th>Soundome</th>
<th>Silicone Adhesive</th>
<th>Hex. Rod Wrench</th>
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<tbody>
<tr>
<td>Type</td>
<td>-</td>
<td>-</td>
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<td>2.5mm 6mm</td>
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<td>Qty</td>
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<td>50gx1</td>
<td>1 EACH</td>
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<thead>
<tr>
<th>Name of item</th>
<th>Joint Pipe</th>
<th>Lock Nut</th>
<th>Ring</th>
<th>TD Case</th>
<th>Cover</th>
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<tr>
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<td>-</td>
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<td>-</td>
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<td>Qty</td>
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<td>1</td>
<td>1</td>
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</table>

<table>
<thead>
<tr>
<th>Name of item</th>
<th>Low Head Cap Bolt</th>
<th>Cap Bolt</th>
<th>Washer</th>
<th>Nut</th>
<th>Bolt</th>
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<tbody>
<tr>
<td>Type</td>
<td>M4x8</td>
<td>M8x16U</td>
<td>SW8U</td>
<td>N8U</td>
<td>B8x25U</td>
</tr>
<tr>
<td>Qty</td>
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<td>2</td>
<td>2</td>
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### SL-2 [SET] OPTION

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<th>Name of item</th>
<th>Pipe Fixing</th>
<th>Hook Plate</th>
<th>Pipe Cap</th>
<th>Fastening Band</th>
<th>Ring Stopper</th>
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<tr>
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<td>Qty</td>
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<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
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SONAR SYSTEM SUMMARY

This chapter provides some basic information of the PPI (Plan Position Indicator) searchlight sonar.

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Sample Display of Echo Sounder Mode.......... 1 - 9
SONAR SYSTEM SUMMARY

SONAR MODE

A sonar system uses the transmitter-receiver as well as an echo sounder. An echo sounder is only able to search in one direction, down. However, a sonar has a movable transducer and therefore can freely search the entire around a ship, not just the area directly beneath the ship.

When the sonar is not operated, the transducer is retracted. While operating, the transducer is protruded from the hull bottom.

An ultrasonic pulse is emitted from the transducer protruded from the hull bottom. The sonar principle detected by the transducer is the same with the echo sounder. However, like a searchlight, the sonar transducer sends and detects ultra-sound beams one after another while giving relative bearing at some speed in proper ranges. The transducer scans or trains with the step angle set at MENU.

The seabed and fish school will send a reflected echo of sound back to the ship. In a PPI sonar, this reflection with relative bearing and range information is presented like a radar screen.
An echo sounder is only able to search in one direction within some beam angle, beneath the ship. A sonar, however, can freely search the broad range, since the transducer’s angle can be varied not only the horizontal direction but also the vertical direction.

By changing the horizontal angle (Sector), the various ranges from the narrow to the full circle are available.

By changing the transducer’s directional angle (Tilt), the ultra-sound beam angle can be varied from right beneath the ship to the horizontal direction.
SONAR SYSTEM SUMMARY

TILT ANGLE

The tilt angle shows the direction to which the sound wave is emitted. The tilt angle can be set in step of 1° from 0° to +5° (upward) to 0° to 90° (downward).

Find out the suitable tilt angle for a given depth and detection range.

The tilt angle is of importance when working with sonar. Refer to the illustration below. Find out the suitable tilt angle and beam coverage. When the ship approaches B with the same tilt angle, the reflection is getting smaller and weaker gradually and nothing appears at B position. Without changing the tilt angle, the fish school is out of beam coverage at B position so that no reflection appears on the screen. Set an appropriate tilt angle so that the reflection of fish school always appears on the screen.

The narrow tilt angle is selected for surface detection, however, if 0° is selected, sometimes the reflection of the sea surface appears on the screen as the noise and interferes with observation of wanted echoes. Adjust an appropriate tilt angle to lessen the affect of sea surface reflection.

The Tilt angle is also set in the Bottom Scan mode and the Echo Sounder mode.
**TILT ANGLE AND DISPLAY**

In the shallow water the bottom reflection is prominent, so it is important to be able to distinguish fish echoes from the bottom echo. Therefore the setting of the tilt angle is important to find out the suitable tilt angle.

The below shows how fish schools are displayed on the screen when each different tilt angle set. The below drawings are shown under Off-Center position.

- **TILT ANGLE 40°**: Fish school is just above the bottom echo so that it is hard to discriminate fish echo from the bottom, since the distances from fish school and from bottom are the same.

- **TILT ANGLE 25°**: Fish school is clearly seen. Fish school is displayed behind the bottom echo, since fish school is in the area of weak reflection of bottom echo.

- **TILT ANGLE 10°**: Bottom echo is weak so that fish school is easily seen. Due to the density of fish school the strong reflection of fish school is easily displayed on the screen. Fish school③ is actually in the middle layer, however it is displayed likely to be near the bottom echo on the screen.

**NOTE!**

The explanation mentioned above is extremely general explanation, and it is not a thing satisfying all conditions, which is different depending on the situation of the sea and a state of the bottom of the sea, setting of sensitivity and so on.
BOTTOM SCAN MODE

When this mode is selected, the transmitter/receiver does not rotate like a sonar, but sweeps from side to side like a pendulum when the sound wave is emitted. The reflected echo from the sea bottom is displayed on the screen sequentially.

When the bottom scan mode is selected, it sweeps from side to side in the step set with STEP on MENU - DISP ITEM SEL. Changing the sector angle makes it possible to detect the wider or narrower range as desired.

The center direction of the sounding beam can be changed with the tilt angle. Choose the setting of the tilt angle which places the sector center in the middle of the detection range.

In the bottom scan mode the detectable direction is provided not only rightward or leftward, but also in the direction of 360° by setting the direction of the transducer.
**ECHO SOUNDER MODE**

The transmitter/receiver faces the sea bottom, and emits the ultra-sound beam. The reflected echo from the sea bottom is displayed on the screen. The image is displayed like a usual echo sounder.

The tilt angle and the direction can be changed.

The detecting direction can be set by the Bearing keys.
SONAR SYSTEM SUMMARY

SAMPLE DISPLAY OF SONAR MODE

SAMPLE DISPLAY OF BOTTOM SCAN MODE

※ “IR” will not be displayed when INTERFERENCE RED. function “OFF” is selected.
※ “M-” will not be displayed if OPERATION MODE is not used.
※ To present WATER TEMP./SPEED/LAT/LON/COMPASS DISP. info will require ESR-S1BB is connected to an external equipment.
SAMPLE DISPLAY OF ECHO SOUNDER MODE

※ The depth is displayed when the tilt angle is -90°.
※ "IR" will not be displayed when INTERFERENCE RED. function "OFF" is selected.
※ "M-" will not be displayed if OPERATION MODE is not used.
※ To present WATER TEMP./SPEED/LAT/LON/COMPASS DISP. info will require ESR-S1BB is connected to an external equipment.
This chapter provides you the description of operation dials and keys for the ESR-S1BB Sonar.

Operation Panel

Key Operation

Operation Keys
- Power On/Off Key
- Sonar Mode key
- Off Center Mode Key
- Bottom Scan / Echo Sounder Mode Key
- Bearing Keys
- Tilt Keys
- Sector Keys
- Range Keys
- Operation Mode Keys
- Cursor Keys
- Target Lock Key
- Threshold Key
- Menu Key
- Enter Key

Operation Dials
- Gain Dial
- Far Gain Dial
SONAR OPERATION

OPERATION PANEL

<table>
<thead>
<tr>
<th>No.</th>
<th>NAME</th>
<th>ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SENSOR LAMP</td>
<td>Non use</td>
</tr>
<tr>
<td>2</td>
<td>POWER ON KEY</td>
<td>Turns on the power.</td>
</tr>
<tr>
<td>3</td>
<td>POWER OFF KEY</td>
<td>To turn off the power, press this key for a while. This key doesn’t work by one-push.</td>
</tr>
<tr>
<td>4</td>
<td>GAIN DIAL</td>
<td>Adjusts the receiver sensitivity.</td>
</tr>
<tr>
<td>5</td>
<td>FAR GAIN DIAL</td>
<td>Adjusts the receiver sensitivity for the long ranges and STC function.</td>
</tr>
<tr>
<td>6</td>
<td>OPERATION MODE KEYS</td>
<td>Calls up the user-defined setting or changes the settings.</td>
</tr>
<tr>
<td>7</td>
<td>SONAR MODE KEY</td>
<td>Sonar Mode.</td>
</tr>
<tr>
<td>8</td>
<td>OFF CENTER MODE KEY</td>
<td>Off-Center Mode.</td>
</tr>
<tr>
<td>9</td>
<td>BOTTOM SCAN MODE KEY</td>
<td>Bottom Scan Mode.</td>
</tr>
<tr>
<td>10</td>
<td>THRESHOLD KEY</td>
<td>Reduces the unnecessary weak echoes accordingly.</td>
</tr>
<tr>
<td>11</td>
<td>CURSOR SHIFT KEYS</td>
<td>Moves the cursor or selects to display Marker or Cursor. Use these keys to change the settings.</td>
</tr>
<tr>
<td>12</td>
<td>ENTER KEY</td>
<td>Press this key to set the function setting.</td>
</tr>
<tr>
<td>13</td>
<td>HOIST KEYS</td>
<td>This key is no operation.</td>
</tr>
<tr>
<td>14</td>
<td>SECTOR KEYS</td>
<td>Adjusts the sector angle.</td>
</tr>
<tr>
<td>15</td>
<td>RANGE KEYS</td>
<td>Selects a desired range scale.</td>
</tr>
<tr>
<td>16</td>
<td>BEARING KEYS</td>
<td>Moves the cursor center right or left.</td>
</tr>
<tr>
<td>17</td>
<td>TILT KEYS</td>
<td>Adjusts tilt angle.</td>
</tr>
<tr>
<td>18</td>
<td>TARGET LOCK KEY</td>
<td>Turns on or off the target lock mode.</td>
</tr>
<tr>
<td>19</td>
<td>CURSOR SELECTION KEY</td>
<td>Selects Ring Marker or Cross Marker.</td>
</tr>
<tr>
<td>20</td>
<td>MENU KEY</td>
<td>Displays the function set menu.</td>
</tr>
</tbody>
</table>

KEY OPERATION

After pressing a key, a beep sounds when a correct key operation is done.
Three short beeps sound when a wrong key is pressed.
OPERATION KEYS

POWER ON/OFF KEY

To turn on the power, press [ON] key.

To turn off the power, press [OFF] key for a while. This key does not work by one-push.
SONAR OPERATION

SONAR MODE KEY
Displays the Sonar Mode.

- Tilt angle is adjusted by the Tilt keys.  
- Sector angle is adjusted by the Sector keys.  
- The scanning direction is adjusted by the Bearing keys.

OFF CENTER MODE KEY
Displays the Off-Center Mode.

- It allows showing more information ahead (rightward) by moving the ship’s position downward (leftward) on the screen.

BOTTOM SCAN / ECHO SOUNDER MODE KEY
Displays the Bottom Scan Mode or the Echo Sounder Mode.

- The scanning direction is adjusted by the Bearing keys.  
- Tilt angle is adjusted by the Tilt keys.  
- Sector angle is adjusted by the Sector keys in Bottom Scan Mode.
BEARING KEYS

Use these keys to define the center of current scanning sector in the Sonar Mode. The bearing angle of the display is shifted with every 5° steps.

Rotates the center of the sector counterclockwise. 
Rotates the center of the sector clockwise.

Displays the center of the sector angle.

This arrow marks the center of the sector.

Changes the center direction.

Use these keys to define the center of current scanning sector in the Bottom Scan Mode. The bearing angle of the display is shifted with every 5° steps.

Counterclockwise rotation 
Clockwise rotation

Clockwise rotation 

Display of the scanning direction

Displays the scanning direction of the bow.

Displays your own ship direction at every 90° off the record.

Use these keys to define the scanning direction in the Echo Sounder Mode. The bearing angle of the display is shifted with every 5° steps.
SONAR OPERATION

TILT KEYS

Use these keys to control the tilt angle in the Sonar Mode.

- The tilt angle can be set in increments of 1° from 0° to 5° (upward) to 0° to 90° (downward).

![Diagram showing tilt angle increments](image)

Each press of this key moves the tilt angle upwards.

Each press of this key moves the tilt angle downwards.

Displays the values of the tilt angle.

Displays the tilt angle in a diagram.

Use these keys to control the scanning center direction of the detection range in the Bottom Scan Mode.

- Variable range in increments of 3° step: -3° ~ -90° and -3° on another side
- Variable range in increments of 5° step: -5° ~ -90° and -5° on another side

(Refer to the page 3-11 for steps)

Changes the tilt angle and the center direction.

Depth, just under your own ship

Displays the angle in a diagram.

Just under your own ship (-90°)

The angle center is just under your own ship.

The center is set in the range shown by an arrow.

The center is set in the range shown by an arrow.

Each press of this key moves the tilt angle clockwise.

Each press of this key moves the tilt angle counterclockwise.

Your own ship position (center)

Your own ship position (right)

Your own ship position (left)
Use these keys to control the tilt angle in the Echo Sounder Mode.

- The tilt angle can be set in increments of 1° from 0° to 5° (upward) to 0° to 90° (downward).

Use VRM to read the depth if the tilt angle is not -90°. (Refer to the page 2-11 for VRM).
SONAR OPERATION

SECTOR KEYS

Changes the sector angle (horizontal angle) in the Sonar Mode.

- Each press of the Sector key widens the sector angle.
- Each press of the Sector key narrows the sector angle.

8 selectable sector angles in the Sonar Mode

<table>
<thead>
<tr>
<th>5° STEP</th>
<th>5°</th>
<th>25°</th>
<th>45°</th>
<th>85°</th>
<th>125°</th>
<th>165°</th>
<th>205°</th>
<th>360°</th>
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<tbody>
<tr>
<td>10° STEP</td>
<td>10°</td>
<td>30°</td>
<td>50°</td>
<td>90°</td>
<td>130°</td>
<td>170°</td>
<td>210°</td>
<td>360°</td>
</tr>
</tbody>
</table>

(Refer to the page 3-10 for steps)

Changes the sector angle (vertical angle) in the Bottom Scan Mode.

- Each press of the Sector key widens the sector angle.
- Each press of the Sector key narrows the sector angle.

8 selectable sector angles in the Bottom Scan Mode

<table>
<thead>
<tr>
<th>3° STEP</th>
<th>3°</th>
<th>27°</th>
<th>45°</th>
<th>63°</th>
<th>93°</th>
<th>117°</th>
<th>147°</th>
<th>177°</th>
</tr>
</thead>
<tbody>
<tr>
<td>5° STEP</td>
<td>5°</td>
<td>25°</td>
<td>45°</td>
<td>65°</td>
<td>95°</td>
<td>115°</td>
<td>145°</td>
<td>175°</td>
</tr>
</tbody>
</table>

(Refer to the page 3-11 for steps)
RANGE KEYS

Changes the basic range (the basic depth)

- 20 selectable ranges are available.
- Each press of the Range key makes the range value smaller.
- Each press of the Range key makes the range value larger.
- The setting for the depth unit is accessed by using “FUNCTION SETTINGS.”
- Scale marker can be turned on or off by using “FUNCTION SETTINGS.”

BASIC RANGE

<table>
<thead>
<tr>
<th>RANGE</th>
<th>m</th>
<th>br/fm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SONAR</td>
<td>OFF CENTER</td>
</tr>
<tr>
<td>0</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>1</td>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td>2</td>
<td>30</td>
<td>45</td>
</tr>
<tr>
<td>3</td>
<td>40</td>
<td>60</td>
</tr>
<tr>
<td>4</td>
<td>50</td>
<td>75</td>
</tr>
<tr>
<td>5</td>
<td>60</td>
<td>90</td>
</tr>
<tr>
<td>6</td>
<td>70</td>
<td>105</td>
</tr>
<tr>
<td>7</td>
<td>80</td>
<td>120</td>
</tr>
<tr>
<td>8</td>
<td>90</td>
<td>135</td>
</tr>
<tr>
<td>9</td>
<td>100</td>
<td>150</td>
</tr>
<tr>
<td>10</td>
<td>120</td>
<td>180</td>
</tr>
<tr>
<td>11</td>
<td>140</td>
<td>210</td>
</tr>
<tr>
<td>12</td>
<td>160</td>
<td>240</td>
</tr>
<tr>
<td>13</td>
<td>180</td>
<td>270</td>
</tr>
<tr>
<td>14</td>
<td>200</td>
<td>300</td>
</tr>
<tr>
<td>15</td>
<td>220</td>
<td>330</td>
</tr>
<tr>
<td>16</td>
<td>240</td>
<td>360</td>
</tr>
<tr>
<td>17</td>
<td>260</td>
<td>390</td>
</tr>
<tr>
<td>18</td>
<td>280</td>
<td>420</td>
</tr>
<tr>
<td>19</td>
<td>300</td>
<td>450</td>
</tr>
</tbody>
</table>
SONAR OPERATION

OPERATION MODE KEYS

Use these keys to select one of 2 kinds of operation mode you have created. (You may be able to create 4 kinds of operation mode by FUNCTION SETTINGS. [CF] page 3-15)

By pressing one of these keys, the desired operation mode can be set immediately.

To memorize the setting in the Operation Mode key, the following procedure is required.
- Create your own setting of operation mode.
- Exit Menu.
- Hold the Operation Mode [1] or [2] key for 3 seconds until you hear a beep. The operation mode that you have created is now memorized in the Operation Mode key. Note that it may not be memorized when the key is released before you hear a beep.


- You may adjust the setting while one of the operation modes works, however pressing one of the Operation Mode keys again returns to the previous operation mode.
- It is possible to memorize the present setting in the Operation Mode keys by holding the key for 3 seconds.
- The Operation Mode key number appears on the screen.

indicates the function setting number you selected.
indicates the Operation Mode key number you selected.
CURSOR KEYS

By using these keys, the horizontal range, depth and bearing to the target can be measured.

- Use [Cursor Selection] key to select a cursor and [↑] [↓] [←] [→] keys move the cursor in any direction on the screen.

- activates either Ring Marker or Cross Cursor in the Sonar Mode.
- activates either VRM or Cross Cursor in the Bottom Scan Mode.
- activates either VRM in the Echo Sounder Mode.

- expands the Ring Marker, shifts the Cross Cursor upward, or shifts VRM to the shallow.
- moves the highlighted item upward in the Menu.

- contracts the Ring Marker, shifts the Cross Cursor downward, or shifts VRM to the deeper area.
- moves the highlighted item downward in the Menu.

- shifts the Cross Cursor left.
- selects the content of the item in the Menu.

- shifts the Cross Cursor right.
- selects the content of the item in the Menu.

The Ring Marker or the Cross Cursor neither appears nor operates on the screen when turning on the power at the very first time.

- The Marker appears by pressing either [↑] or [↓] key, and then select the Ring Marker or the Cross Cursor by [Cursor Selection] key.
- The inactive function is displayed in red and stored even if the power is turned off.

- Press [↑] and [↓] keys at the same time to turn the Marker off.
- Pressing [↑] or [↓] key again returns the Marker to the previous position.
SONAR OPERATION

When the Ring Marker is selected (the Cross Cursor is in red or not displayed,)

- **SONAR MODE**

  ![Diagram of Sonar Mode](image1)

  - **BOTTOM SCAN MODE**
  - **ECHO SOUNDER MODE**

  In Bottom Scan Mode Marker data is not presented and VRM appears on the screen.
  In Echo Sounder Mode Marker data is presented and Slant distance appears on the screen.

When the Cross Cursor is selected (the Ring Marker is in red or not displayed,)

- Set the Cross Cursor on a target by using the Cursor Shift [↑][↓][←][→] keys, and the depth and horizontal/slant distance to the target are displayed in the Cursor box.

![Diagram of Cross Cursor Mode](image2)
TARGET LOCK KEY

When pressing the Target Lock key in the Sonar Mode, the direction of sweep of the sonar beam is reversed.  (When MENU / TARGET LOCK / MODE 0 is selected.)

When pressing the Target Lock key in the Sonar Mode, the sonar beam tracks the echo automatically.  (When MENU / TARGET LOCK / MODE 1 or MODE 2 is selected.)
The red-letter “TARGET LOCK” is displayed at the position of both “BEARING” and “SECTOR” on the screen right.

- Please refer to page 3-13 for more details of the Target Lock operation.

THRESHOLD KEY

The weak echoes disappear by pressing this key accordingly.

- Only strong wanted targets appear on the screen by pressing this key to erase unwanted returns such as plankton or noise.

- Each press of Threshold key clears the weakest color sample.
SONAR OPERATION

MENU KEY

Use this key to set the basic functions.

- Pressing this key displays MAIN MENU on the right of the screen.
- Refer to Chapter 3 “FUNCTION SETTINGS” for more details.
- By pressing this key again, MAIN MENU disappears.
- Pressing this key returns to MAIN MENU when the setup menu is displayed.
- Use the Enter key to set the function item you changed.

ENTER KEY

After you change the settings in the setup menu, press this key.

- Note that the content of the settings is not changed when you exit MAIN MENU by pressing the Menu key even if you set the function items.
OPERATION DIALS

GAIN DIAL

Adjusts the sensitivity of the received signal and turn this dial Clockwise to increase the gain.

- Gain controls can be adjusted by “GAIN UP” function in FUNCTION SETTINGS.  
  CF page 3-6

FAR GAIN DIAL

TVG CURVE in FUNCTION SETTINGS
10LOG ~ 40LOG

As the echoes returning from the bottom and from fish targets get weaker as the depth increases, it is advantageous to have a Time-varied-gain function that automatically compensates for propagation loss of sound.  
CF page 3-7

STC function in TVG CURVE in FUNCTION SETTINGS

This STC function enables you to reduce noise interference resulting from bubbles, dirt, etc. near the surface of the water. As the dial is turned toward “0”, then the STC effect will become progressively from the surface to the distance stronger.

- Selecting STC function releases the gain adjustment automatically so that the sensitivity of the receiver becomes weaker in the distance.
- Gain controls can be adjusted by the Gain Dials and “GAIN UP” function in FUNCTION SETTINGS. 
  CF page 3-6
This chapter provides you the main functions of the ESR-S1BB Sonar and describes the primary controls. It also suggests settings to use for initial start up.

Initial Settings
- Factory Settings
- Return to Factory Settings
- User Settings

Menu
- Function Set Menu

Function Settings
- Setting Functions
- Gain Up
- TVG Curve
- Dynamic Range
- Pulse Width
- TX Power
- Interference Reduction
- Noise Reduction

Display Item Selection
- Step (Sonar)
- Step (Bottom Scan)
- Off-Center Position
- Scale Display
- Compass Display

Others
- Target Lock
- Operation Mode
- Depth Unit
- Temperature Unit
- Speed Unit
- Train Correct
- Color
- Filter
FUNCTION SETTINGS

INITIAL SETTINGS

FACTORY SETTINGS

The ESR-S1BB is shipped from the factory with the functions under the settings listed below.

- Before using it, please enter the functions to the desired setup.

<table>
<thead>
<tr>
<th>FUNCTIONS</th>
<th>FACTORY SETTINGS (in the item □ )</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FUNCTION SET</strong></td>
<td></td>
</tr>
<tr>
<td>GAIN UP</td>
<td>OFF • +10dB • +20dB • +30dB • +40dB</td>
</tr>
<tr>
<td>TVG CURVE</td>
<td>OFF • 10LOG • 20LOG • 30LOG • 40LOG</td>
</tr>
<tr>
<td>DYNAMIC RANGE</td>
<td>1dB • 2dB • 3dB</td>
</tr>
<tr>
<td>PULSE WIDTH</td>
<td>NARROW • NORMAL • WIDE • 0.3ms</td>
</tr>
<tr>
<td>TX POWER</td>
<td>LOW • HIGH</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>REDUCTION</strong></td>
<td></td>
</tr>
<tr>
<td>INTERFERENCE RED.</td>
<td>OFF • 1 • 2 • 3</td>
</tr>
<tr>
<td>NOISE REDUCTION</td>
<td>OFF • ON</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>DISP ITEM SEL.</strong></td>
<td></td>
</tr>
<tr>
<td>STEP (SONAR)</td>
<td>5° • 10°</td>
</tr>
<tr>
<td>STEP (BOTTOM SCAN)</td>
<td>3° • 5°</td>
</tr>
<tr>
<td>OFF-CENTER POS.</td>
<td>FORE • BACK • RIGHT • LEFT</td>
</tr>
<tr>
<td>SCALE DOTS</td>
<td>OFF • ON</td>
</tr>
<tr>
<td>COMPASS DISP.</td>
<td>OFF • ON</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>OTHERS</strong></td>
<td></td>
</tr>
<tr>
<td>TARGET LOCK</td>
<td>MODE 0 • MODE 1 • MODE 2</td>
</tr>
<tr>
<td>OPERATION MODE</td>
<td>0 • 1</td>
</tr>
<tr>
<td>DEPTH UNIT</td>
<td>m • br • fm • ft</td>
</tr>
<tr>
<td>TEMP. UNIT</td>
<td>°C • °F</td>
</tr>
<tr>
<td>SPEED UNIT</td>
<td>kt • km/h</td>
</tr>
<tr>
<td>TRAIN CORRECT</td>
<td>0°~ 355°</td>
</tr>
<tr>
<td>COLOR</td>
<td>A-1 • A-2 • B-1 • B-2 • C-1 • C-2</td>
</tr>
<tr>
<td>FILTER</td>
<td>OFF • 1 • 2</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>OPERATION MODE 1 • 2</strong></td>
<td></td>
</tr>
<tr>
<td>USER SETTINGS</td>
<td>NO SETTINGS</td>
</tr>
<tr>
<td></td>
<td>NO SETTINGS</td>
</tr>
</tbody>
</table>
RETURN TO FACTORY SETTINGS

First press the Power [OFF] key, then press [ON] key while pressing both the Bearing keys [←][→] at the same time. Keep pressing the Bearing keys [←][→] until the beep sound stops.

- Activating this operation will erase all settings excluding "Train Correct" at FUNCTION SETTINGS, and restore the basic settings from the factory.

USER SETTINGS

Being separated from the Factory Setting function, Settings may be entered by the user and memorized. This function is called "User Settings". By entering "User Settings" the ESR-S1BB to suit individual needs can be done. This not only simplifies operation of the ESR-S1BB, but also adds considerably to its reliability.

- All user-implemented data in the ESR-S1BB can be erased by making a reset of the unit and thus return to "User settings". Please ensure the "User settings" are memorized on the first operation.

1. MEMORIZE USER SETTINGS
- First ensure the functions are at the desired settings.
- After disconnecting the power supply once by pressing the Power [OFF] key, then turn the power supply back on, while pressing both the Operation Mode [1] and the Power [ON] keys at the same time. Keep pressing [1] and [ON] keys until the beep sound stops.
- After completing this operation all functions and their units will be memorized as set by the user.

2. RETURN TO USER SETTINGS
- In case, for some reason, the ESR-S1BB becomes inoperable, the unit can be reset by disconnecting the power supply and then turn the power supply back on, while pressing the Operation Mode [2] and the Power [ON] keys at the same time. Keep pressing [2] key until the beep sound stops.
- This operation can return to "User Settings."

3. CHANGING USER SETTINGS
- To change the functions in User Settings first activate "Return to Factory Settings" and then memorize "User Settings" again as described in the previous item 1.

NOTE !
Releasing the keys before the beep sounds stops may not complete the above-mentioned settings. Performing "Return to Factory Settings" will return all settings to Factory Settings and erase all User Settings.
FUNCTION SETTINGS

MENU

FUNCTION SET MENU

Basic functions may be briefly described in the following.

- Before first using the ESR-S1BB, customizing the functions to suit individual needs.
- The following function items can be customized in the function set menu.

MAIN MENU

FUNCTION SET
  - GAIN UP
  - TVG CURVE
  - DYNAMIC RANGE
  - PULSE WIDTH
  - TX POWER

REDUCTION
  - INTERF RED (INTERFERENCE REDUCTION)
  - NOISE REDUCTION

DISP ITEM SEL (DISPLAY ITEM SELECTION)
  - STEP (SONAR)
  - STEP (BOTTOM SCAN)
  - OFF-CENTER POS. (OFF-CENTER POSITION)
  - SCALE DOTS
  - COMPASS DISP. (COMPASS DISPLAY)

OTHERS
  - TARGET LOCK
  - OPERATION MODE
  - DEPTH UNIT
  - TEMP. UNIT
  - SPEED UNIT
  - TRAIN CORRECT
  - COLOR
  - FILTER

REMOTE CONTROLLER
**FUNCTION SETTINGS**

Press the Menu key to display the menu below.

- Use the Cursor Shift key [↑] or [↓] to highlight the item you wish to change.
- By pressing the Cursor Shift key [←] or [→] the following is displayed.

**MAIN MENU**

- **FUNCTION SET**
- **REDUCTION**
- **DISP ITEM SEL.**
- **OTHERS**
- **REMOTE CONTROLLER**

**ESR-S1BB**

****/**/**

Ver *.*.*

**SELF CHECK**

TRAIN OK

**SELF CHECK FUNCTION**

The test result NG in red is displayed in case of some troubles.

**SETTING FUNCTIONS**

**FUNCTION SET**

- **GAIN UP** OFF
- **TVG CURVE** 30 LOG
- **DYNAMIC RANGE** 3 dB
- **PULSE WIDTH** NORMAL
- **TX POWER** HIGH

**Graph for Gain Characteristics**

Displays the changed gains such as TVG curve, Gain Up, Gain dial and Far Gain dial, etc.
FUNCTION SETTINGS

1. GAIN UP

This function makes it possible to display a clearer picture of the full range and control the sensitivity at various depths.

- Each press of [←] or [→] key changes the setting, "OFF, +10dB, +20dB, +30dB, +40dB."

- Select the desired value, and then press the Enter key.

- When the menu gain adjust setting is changed from “OFF” to “+10dB,” the gain dial volume increases 3 points on the scale.
- When the menu gain adjust setting is “OFF” and the front panel dial is on “3,” it has the same result as when the menu gain adjust setting is on “+10dB” and the gain dial is on “0.”

- Selected GAIN UP, Gain Characteristics Diagram shifted accordingly shows left under the following conditions.
  - Gain dial : 0
  - Far Gain dial : 0
  - TVG Curve : 30LOG
2. TVG CURVE

TVG offsets the effects of propagation loss of sound as it passes through the water. Propagation loss of sound is the sum of spreading and attenuation losses. The TVG curve is adjusted to counter the loss.

- Each press of [←] or [→] key changes the setting, "OFF, 10LOG, 20LOG, 30LOG, 40LOG."
- Select the desired value, and then press the Enter key.
  
  **OFF** : STC function  
  **10LOG** : Curve 1 in the below drawing.  
  **20LOG** : Curve 2 in the below drawing.  
  **30LOG** : Curve 3 in the below drawing.  
  **40LOG** : Curve 4 in the below drawing.

- In accordance with the distance the gain increases automatically even if the gain volume is unchanged as seen in the above drawing.

3. DYNAMIC RANGE

By shifting the dynamic range, the display to reflect the received echo more precisely or the display to discriminate their density is selected.

- Each press of [←] or [→] key changes the setting, "1dB, 2dB, 3dB."
- Select the desired value, and then press the Enter key.
- The diagram shows the comparative signal threshold levels for the dynamic ranges.
FUNCTION SETTINGS

4. PULSE WIDTH

The transmitted pulse width can be set.

- The transmitted pulse can be set to these three (narrow, normal, wide), where the optimum setting will be applied according to the range automatically.
- Or it can be set manually, if a specific pulse width (0.1 to 3.6 msec) is required.
- Each press of [←] or [→] key changes the setting, "NARROW, NORMAL, WIDE, 0.3ms."
- Select the desired value, and then press the Enter key.

<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NORMAL</td>
<td>Setting NORMAL changes automatically according to the range.</td>
</tr>
<tr>
<td>NARROW</td>
<td>When the searching range is short and higher resolution is required, the pulse width should be set NARROW.</td>
</tr>
<tr>
<td>WIDE</td>
<td>The longer range gives less resolution.</td>
</tr>
<tr>
<td>CONSTANT</td>
<td>The initial value of the pulse width is 0.3 ms. The pulse width is to be set every 0.1 ms unit from 0.1 to 3.6 ms.</td>
</tr>
</tbody>
</table>

- Use [↑] key to select the larger value.
- Use [↓] key to select the smaller value.

NOTE !----------------------------------------------------------------------------------
In actual practice, the shorter pulse (narrower) gives better resolution, and Less noise in shallow water or surface scanning. The longer pulse (wider) will reach deeper but give less resolutions.
----------------------------------------------------------------------------------

5. TX POWER

The output power of the ultrasonic sound wave may be selected.

- In crowded fishing areas, this function may be used to reduce power and avoid interference to other Fishing boat's Sonars and Echo Sounders.
- Each press of [←] or [→] key change the setting, "LOW or HIGH."
- Select the desired level of the transmitting power, and then press the Enter key.
1. INTERFERENCE REDUCTION

This function may be used to eliminate noise from other boats.

- Each press of [←] or [→] key changes the setting, "OFF, 1, 2, 3."
- Select the desired level of the reduction, and then press the Enter key.
- "OFF" indicates this function is inactive.
- As the level of the setting close to HIGH, higher level of reduction is set and the level of reducing interference appears at the right of the screen.

2. NOISE REDUCTION

This function may be used to eliminate small noise.

- Each press of [←] or [→] key changes the setting, "OFF or ON."
- Select ON or OFF, and then press the Enter key.

- OFF : Noise reduction is not functioning.
- ON : Noise reduction is functioning.
FUNCTION SETTINGS

DISPLAY ITEM SELECTION

DSP ITEM SEL.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>STEP (SONAR)</td>
<td>10°</td>
</tr>
<tr>
<td>STEP (BOTTOM SCAN)</td>
<td>5°</td>
</tr>
<tr>
<td>OFF-CENTER POS.</td>
<td>FORE</td>
</tr>
<tr>
<td>SCALE DOTS</td>
<td>ON</td>
</tr>
<tr>
<td>COMPASS DISP.</td>
<td>OFF</td>
</tr>
</tbody>
</table>

- Use the Cursor Shift key [↑] or [↓] to highlight the item you wish to change.
- Press [←] or [→] key to select the desired setting.

1. STEP (SONAR)

The step angle (scanning angle) in the Sonar Mode may be selected.

- Each press of [←] or [→] key changes the setting, "5° or 10°."

- Select the desired step angle, and then press the Enter key.

NOTE !

Narrower step: The image density is increased but the rotational speed is reduced.
Wider step: The image density is reduced but the rotational speed is increased.
2. STEP (BOTTOM SCAN)

The step angle (scanning angle) in the Bottom Scan Mode may be selected.

- Each press of [←] or [→] key changes the setting, "3° or 5°."
- Select the desired step angle, and then press the Enter key.

3. OFF-CENTER POSITION

The ship’s position on the screen may be selected in the OFF-CENTER Mode.

- Each press of [←] or [→] key changes the setting, "FORE, BACK, RIGHT, LEFT."
- Select the desired center position, and then press the Enter key.
4. SCALE DISPLAY
The scale dots display under the Sonar Mode can be turned on / off.

- Each press of [←] or [→] key changes the setting, "ON or OFF."
- Select ON or OFF, and then press the Enter key.

```
ON                      OFF
```

- When the scale dots display OFF is selected, no scale appears on the screen in the SONAR / OFF-CENTER Modes.
- When the scale dots display OFF is selected, scale appears on the screen in the Bottom Scan Mode.

5. COMPASS DISPLAY
The points of the compass can be shown on the screen in the Sonar Mode by connecting “NAV IN” terminal to an external navigator.

- Each press of [←] or [→] key changes the setting, "ON or OFF."
- Select ON or OFF, and then press the Enter key.
1. TARGET LOCK

This function changes the rotary direction or tracks the target automatically.

- To select the desired Target Lock function when the Target Lock key is pressed in the Sonar mode.
- Each press of [←] or [→] key changes the setting, "MODE 0, MODE 1, MODE 2."
- Select the desired MODE, and then press the Enter key.

MODE 0

- Each press of the Target Lock key reverses the sector rotary direction.
- Not tracking the echo automatically.
MODE 1

- By pressing the Target Lock key, the Sonar beam will track the echo automatically left and right.
- "TARGET LOCK" will be displayed at the right of the screen.
- If the beam should have lost the echo and not picked it up again after a 60° sweep, the Target Lock function will be released.

MODE 2

- The Sonar beam will track the echo automatically up and down (one time of up and down track after three times of left and right track) in addition to the MODE 1 functions.

The sonar beam tracks the echo up and down

It tracks the echo 5° up

Does it pick the echo up?  

NO  

It backs to the previous angle.

YES  

It tracks the echo 10° down

Does it pick the echo up?  

NO  

It backs to the previous angle.

YES  

The Target Lock function continues.

Does it pick the echo up?  

NO  

The Target Lock function will be released.

YES  

The Target Lock function continues.

Does it pick the echo up?  

NO  

The Target Lock function will be released.

YES  

The Target Lock function continues.


NOTE !

During the Target Lock operation, Tilt, Bearing, and Sector keys will not be operated.
And if the Range, Sector, Display Mode or Menu key is pressed, the Target Lock function will be released.

When the Target Lock function ceases, Bearing and Sector angles will return to their original positions, but Tilt angle will remain in Target Lock position.

The Target Lock function is not available in the Bottom Scan and Echo Sounder Modes.
FUNCTION SETTINGS

2. OPERATION MODE

4 kinds of operation mode can be memorized by switching the function setting number “0” or “1” with the operation mode [1] and [2] keys.

- Each press of [←] or [→] key changes the setting, “0 or 1.”
- Select the desired function setting number, and then press the Enter key.

3. DEPTH UNIT

The user may select the displayed depth unit to be one of the following: meters (m), braccia (br), fathoms (fm) or feet (ft).

- Each press of [←] or [→] key changes the setting, “m, br, fm, ft.”
- Select the desired depth unit, and then press the Enter key.

4. TEMPERATURE UNIT

Temperature unit can be set to °C or °F.

- To display water temperature, the water temperature data should be read in NMEA-0183 sentences.
- Each press of [←] or [→] key changes the setting, “°C or °F.”
- Select the desired temperature unit, and then press the Enter key.

5. SPEED UNIT

It can be shown in knots (kt) or kilometers/hour (km/h).

- Each press of [←] or [→] key changes the setting, “kt or km/h.”
- Select the desired speed unit, and then press the Enter key.
6. TRAIN CORRECT

To adjust the deviation of the bow direction (0°), the following procedure is required.

- In the Sonar mode, use [←] or [→] key to set the Bearing toward Bow direction.
- Press the Menu key, and select OTHERS.
- Highlight “TRAIN CORRECT.”
- Press [←] or [→] key to display the degree that you have set in the Sonar mode.
- Press the Enter key.

[EXAMPLE]
Set the bearing at 90°, the display turned 90° counterclockwise.

- Releasing this function, set the current bearing at 0° and follow the above procedure.
7. COLOR

The display tone (COLOR BAR) and the background color may be selected as desired from 4 optional patterns, “A-1, A-2, B-1, B-2.” And the tone range may be specified freely on C-1 and C-2 in Color Palette function. (The initial setting of the color tone for C-1 is the same as A-1 and C-2 is the same as B-1.)

- Each press of [←] or [→] key changes the setting, “A-1, A-2, B-1, B-2, C-1, C-2.”
- Select the desired tone, and then press the Enter key.

GUIDES TO THE COLOR PALETTE

C-1 and C-2 can be customized to suit individual needs and wishes.

- Use [←] or [→] key to select C-1 or C-2, and then press the Threshold key to display COLOR PALLET SET Menu.

<table>
<thead>
<tr>
<th>COLOR PALETTE SET</th>
</tr>
</thead>
<tbody>
<tr>
<td>R 00 ...............</td>
</tr>
<tr>
<td>G 15 00000000000000000</td>
</tr>
<tr>
<td>B 00 ...............</td>
</tr>
</tbody>
</table>

Select the desired value by using [←] or [→] key.

Highlight R, G, or B that you wish to change by pressing the Threshold key.

- Use [↑] or [↓] key to select the color (number from 1 to 8) that you wish to change. The levels of the three primary colors “red (R), green (G), blue (B)”, scale from 0 to 15, are displayed above the color bar.
- Highlight R, G, or B that you wish to change by pressing the Threshold key, and select the level of the color (scale 0 to 15) by using [←] and [→] keys.
- The number 15 is the strongest color and its tone decreases in accordance with the smaller number.
- Press the Enter key to memorize the desired color selection into C-1 or C-2.
FUNCTION SETTINGS

8. FILTER

This function provides some smoother display of picture image.

FILTER: OFF, 1, 2

- OFF: picture image without filter function
- 1: filter activates
- 2: a father filter than [1]
Chapter 4

INSTALLATION

This chapter explains the installation for sonar monitor and hull unit.

- Installation Position .......................................................... 4 - 2
- Dimensions ........................................................................ 4 - 3
- Transducer Unit Installation .............................................. 4 - 4
  - Mounting Joint Pipe into Soundome ............................... 4 - 4
  - Mounting Soundome into TD Case ................................. 4 - 5
- Mounting Method of Display Unit ........................................ 4 - 6
- Connections ....................................................................... 4 - 7
- Wiring Among Units ............................................................ 4 - 7
- Electrical Connections - Terminals ..................................... 4 - 8
INSTALLATION

Fully discussion and agreement are required with the ship owner and dockyard in deciding the location for the hull unit. Give careful considerations on mounting.

INSTALLATION POSITION

Select an area where noise, bubbles and interference from turbulences are minimal.

The point at 1/3 to 1/2 of the ship's length from the bow is the best.
DIMENSIONS

TRANSDUCER UNIT

OPERATION UNIT

Unit: mm
INSTALLATION

TRANSDUCER UNIT INSTALLATION

MOUNTING JOINT PIPE INTO SOUNDOME

- When assembling the Joint Pipe into the Soundome, the Soundome must be fixed, and screw the Joint Pipe into the Soundome.
- Be sure not to damage the Joint Pipe thread or twist the Soundome cable.

1. Totally wipe off dirt and grease from the threads of the Soundome and the Joint Pipe.
   - Screw the Lock Nut into the thread end of the Joint Pipe. (see figure (1) below)

2. Pass the Soundome cable through the Joint Pipe.
   - Apply some silicone adhesive (supplied) to the thread of the Joint Pipe. (see figure (2) below)

3. Fully screw the Joint Pipe into the Soundome.
   - Clamp the Lock Nut to the Soundome.
   - Coat the Lock Nut and the Joint Pipe with silicone adhesive (supplied).

4. Fix the RING to prevent movement of the cover.

![Diagram of Joint Pipe Installation](image)

**CAUTION**

Care not to damage the Soundome cable should be taken.
Screw or unscrew the joint pipe when mounting the joint pipe into the Soundome or dismounting it.
Screwing the cable causes the damage of the Soundome or its cable.
MOUNTING SOUNDOME INTO TD CASE

4-CAP BOLT
M8X16(SUS)

WASHER
SW8U

TD CASE

2-HEXAGON NUT
M8(SUS)

2-HEXAGON BOLT
M8X25(SUS)

PIPE

SL-2

SOCKET
G1-1/2

BOW

TRANSUCER UNIT
MOUNTING METHOD OF DISPLAY UNIT

(1) Fasten the Bracket to the place you selected with 4 tapping screws.

![Diagram]

**WARNING**

Do not install the unit on unstable or uneven surface.
Do not use the unit while tentatively mounted. Otherwise it may result in the unit falling or toppling over, resulting in injury.

**CAUTION**

Be free as much as possible from shocks and engine vibrations.
Mount the unit in a location away from salt spray, heat sources, and direct sunlight.
CONNECTIONS

Prior to the connections between the Display Unit and the Operation Unit, read the following warning carefully to ensure its correct operation.

**WARNING**

- Operating voltage: 10.8 to 30 volts DC
- Use the correct voltage, otherwise it will result in fire or electrical shock.
- Use the specified power supply cables.
- If not, it could result in serious trouble or fire.
- Always turn off the power before connecting or disconnecting the unit.
- Pulling the cables may damage the cables themselves and result in fire or electrical shock.
- Bring wiring to the following attention to avoid getting hurt or causing fire or damage.
- Run the cables not to touch the rotary obstacles or disturb the operation.
- Do not use the cables bent, twisted or stretched by force.
- Do not put heavy objects on the cables.

WIRING AMONG UNITS

- Turn off the power by [OFF] key on the control panel.
- Do not turn off the power by the switch-board or the breaker.
- Confirm the retraction of Soundome and the power of the Display Unit is turned off before turning off the switch-board or the breaker.
- Use the proper fuses.
INSTALLATION

ELECTRICAL CONNECTIONS - TERMINALS

Explanation of the Terminals on the rear of the Display Unit

TRIGGER OUTPUT TERMINAL

1: TRIGGER OUTPUT +
2: GND
3: TRIGGER OUTPUT –

NAV-IN TERMINAL

1: SIGNAL INPUT +
2: SIGNAL INPUT –
3: GND
4: NC
5: NC
(Do not connect anything to NC)

POWER SUPPLY INPUT TERMINAL

1: DC INPUT +
2: DC INPUT –

SOUNDOME TERMINAL

1: GND
2: +12V
3: HALL IC OUTPUT
4: TRAIN MOTOR 1
5: TRAIN MOTOR 2
6: TRAIN MOTOR 3
7: TRAIN MOTOR 4
8: TRAIN COM (+12V)
9: TILT MOTOR 1
10: TILT MOTOR 2
11: TILT MOTOR 3
12: TILT MOTOR 4
13: TILT COM (+12V)
14: TRANSDUCER
15: GND
16: TRANSDUCER
INSTALLATION

**AUDIO TERMINAL**

Audio Box
OP-603

**REMOTE CONTROL TERMINAL**

Remote controller
OP-1409

**MONITOR TERMINAL**

1 : RVD
2 : GVD
3 : BVD
4 : NC
5 : NC
6 : R-GND
7 : G-GND
8 : B-GND
9 : NC
10 : GND
11 : NC
12 : NC
13 : H-SYNC
14 : V-SYNC
15 : NC
OPTION

This chapter provides you the explanation related to the optional kits.

Option........................................................................................................ 5 - 2
**OPTION**

<table>
<thead>
<tr>
<th>Parts No.</th>
<th>NAME</th>
<th>MEMO</th>
</tr>
</thead>
<tbody>
<tr>
<td>OP-603</td>
<td>Audio Box</td>
<td>the audio cable included</td>
</tr>
<tr>
<td></td>
<td></td>
<td>the audio plug included</td>
</tr>
</tbody>
</table>

- OP-603 does not include an audio speaker (4 ohm) and a speaker cable.
APPENDIX

This chapter describes you the daily maintenance, disposal, and specifications of the ESR-S1BB Sonar. It also provides a memo of operation mode.

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Disposal................................................................................. 6 - 3
Specifications....................................................................... 6 - 4
Remote Controller................................................................. 6 - 5
Memo of Operation Mode....................................................... 6 - 7
APPENDIX

DAILY MAINTENANCE

CLEANING DISPLAY UNIT

Wipe off dust or salt crystals from the filter lightly with a soft wet cloth.

- Using a dry or firm cloth may scratch the surface of display. Display with many scratches shows the poor visibility of the screen.
- Do not use any chemical cleaners to clean the ESR-S1BB Sonar.
- Make sure to turn off the power before cleaning. Breathe out on the surface, and wipe off dust from LCD display lightly with an absorbent cotton or clean soft cloth after removing the filter.
  If there is dust you can not wipe away, contact your local dealer or KODEN head office.

CLEANING SOUNDOME

Since Soundome is installed in the bottom of the vessel, barnacle and oyster stick to the Soundome. These barnacle and oyster disturb the smooth operation of the unit.

- At the dry dock, remove oyster and barnacle sticking to the Trunk Pipe and the Soundome. Do not scratch the Soundome while removing them.
- Do not paint the Soundome. Otherwise it will result in poor sonar performance.
DISPOSAL

This equipment contains the lithium battery of high-density energy.
Careless disposal of the lithium battery causes electric shorts, impact, generation of heat, electrical shock, explosion, injury, or fire.

DISPOSAL of EQUIPMENT
Dispose of this equipment in accordance with local regulations.

DISPOSAL of LITHIUM BATTERY
Before disposing of the lithium battery, place a piece of adhesive tape across the plus and minus terminals as non-combustible garbage.
Dispose of the lithium battery in accordance with local regulations.
# APPENDIX

## SPECIFICATIONS

<table>
<thead>
<tr>
<th></th>
<th>Power Supply</th>
<th>Weight</th>
<th>Sonar Type</th>
<th>Display Range</th>
<th>Scanning Step Angle</th>
<th>Bearing Center</th>
<th>Display Modes</th>
<th>Data Display</th>
<th>Other Functions</th>
<th>Input Data</th>
<th>Output Data</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>12 to 30 VDC</td>
<td>4.1kg</td>
<td>Searchlight Sonar</td>
<td>0 - 10 - 100 (10 steps)</td>
<td>( 5° step) 5°, 25°, 45°, 85°, 125°, 165°, 205°, 360°</td>
<td>selectable in step of 5°</td>
<td>Sonar Mode + Data Display / Off-Center Mode + Data Display / Bottom Scan Mode + Data Display / Echo Sounder Mode + Data Display</td>
<td>Range, Range Scale, Tilt Angle, Tilt Angle Diagram, Sector Angle Display, Bearing Angle, Ring Marker (Historical Distance, Slant Distance, Depth), Gain Up, TVG Graph, Cross Cursor (Bearing, Historical Distance, Slant Distance, Depth), Interference Reduction, Color Scale, Compass Display*, Ship Speed*, LAT/LON*, Temperature*, Scan Display (2 types), Own Ship Position, VRM, Depth (on detecting just below the ship)</td>
<td>Operation Modes (2 x 2 types), Off-Center (4 types), Target Lock, Train Correct, Gain Control, TVG Control, Dynamic Range, Pulse Width, Color Selection, Output Power Reduction, Interference Reduction, Noise Reduction, Threshold Control, Gain, Far Gain, Brightness Control, Sensor Lamp, Hoist Auto Up, Stabilizer</td>
<td>NMEA-0183 (LAT/LON, Ship Speed, Compass Display, Temperature)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>50W</td>
<td></td>
<td></td>
<td>0 - 10 - 200 (10 steps)</td>
<td>(10° step) 10°, 30°, 50°, 90°, 130°, 170°, 210°, 360°</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Trigger Signal, VGA, Audio</td>
</tr>
<tr>
<td>Display Range</td>
<td>Feet</td>
<td>0 - 50 - 1000 (50 steps)</td>
<td></td>
<td></td>
<td>( 3° step) 3°, 27°, 45°, 63°, 93°, 117°, 147°, 177°</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sonar Type</td>
<td></td>
<td></td>
<td></td>
<td>0 - 50 - 1000 (50 steps)</td>
<td>( 5° step) 5°, 25°, 45°, 65°, 95°, 115°, 145°, 175°</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Requires data from the external equipment.
REMOTE CONTROLLER (Standard configuration)

Remote controller connection is made to the terminal on the rear of the operation unit.

- **BEARING KEYS**: Moves cursor-center right or left.
- **RANGE KEYS**: Adjust range.
- **TILT KEYS**: Adjust tilt angle.
- **OPERATION-1 KEY**
- **OPERATION-2 KEY**
APPENDIX

REMOTE CONTROLLER SETTING

1. Press MENU KEY. “MENU” appears on the screen.

2. Use the cursor shift key [↑] or [↓] to highlight “REMOTE CONTROLLER SET” and by pressing the cursor shift key [←] or [→] the following appears on the screen.

   - The above box shows the initial settings of the remote control keys.
   - Highlighting the item to be changed and pressing the cursor shift key [←] or [→] the keyoperation will change as follows.

   RENGE SHALLOW → RANGE DEEP → SECTOR WIDE → SECTOR NARROW → DISPLAY MODE* → OPERATION-1 → OPERATION-2 → TARGET LOCK → THRESHOLD → CURSOR → CURSOR UP → CURSOR DOWN → CURSOR RIGHT → CURSOR LEFT → NO SETTING → HOIST UP → HOIST DOWN → TILT UP → TILT DOWN → BEARING RIGHT → BEARING LEFT

   - DISPLAY MODE* means that each press of the key changes the mode as follows.

   SONAR MODE → OFF CENTER MODE → BOTTOM SCAN MODE → ECHO SOUNDER MODE → SONAR MODE

   - Press ENTER KEY to finish the setting.
   Press MENU KEY to escape the setting.
MEMO OF OPERATION MODE

MENU AND OPERATION PANEL

<table>
<thead>
<tr>
<th>FUNCTIONS</th>
<th>FACTORY SETTINGS (item in the box)</th>
<th>0-1</th>
<th>0-2</th>
<th>1-1</th>
<th>1-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>FUNCTION SET</td>
<td>GAIN UP</td>
<td>OFF • +10dB • +20dB • +30dB • +40dB</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>TVG CURVE</td>
<td>OFF • 10LOG • 20LOG • 30LOG • 40LOG</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>DYNAMIC RANGE</td>
<td>1dB • 2dB • 3dB</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PULSE WIDTH</td>
<td>NARROW • NORMAL • WIDE • 0.3ms</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>TX POWER</td>
<td>LOW • HIGH</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>REDUCTION</td>
<td>INTERFERENCE RED.</td>
<td>OFF • 1 • 2 • 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>NOISE REDUCTION</td>
<td>OFF • ON</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DISP ITEM SEL.</td>
<td>STEP (SONAR)</td>
<td>5° • 10°</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>STEP (BOTTOM SCAN)</td>
<td>3° • 5°</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>OFF-CENTER POS.</td>
<td>FORE • BACK • RIGHT • LEFT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SCALE DOTS</td>
<td>OFF • ON</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>COMPASS DISP.</td>
<td>OFF • ON</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OTHERS</td>
<td>TARGET LOCK</td>
<td>MODE 0 • MODE 1 • MODE 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>OPERATION MODE</td>
<td>0 • 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>DEPTH UNIT</td>
<td>m • br • fm • ft</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>TEMP. UNIT</td>
<td>°C • °F</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SPEED UNIT</td>
<td>Kt • km/h</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>TRAIN CORRECT</td>
<td>0° ~ 355°</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>COLOR</td>
<td>A-1 • A-2 • B-1 • B-2 • C-1 • C-2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FILTER</td>
<td>OFF • 1 • 2</td>
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<table>
<thead>
<tr>
<th>RANGE</th>
<th>0-1</th>
<th>0-2</th>
<th>1-1</th>
<th>1-2</th>
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<tr>
<td></td>
<td>Sonar Mode</td>
<td>Bottom Scan Mode</td>
<td>Echo Sounder Mode</td>
<td></td>
</tr>
<tr>
<td>SECTOR ANGLE</td>
<td>Sonar Mode</td>
<td>Bottom Scan Mode</td>
<td>Echo Sounder Mode</td>
<td></td>
</tr>
<tr>
<td>TILT ANGLE</td>
<td>Sonar Mode</td>
<td>Bottom Scan Mode</td>
<td>Echo Sounder Mode</td>
<td></td>
</tr>
<tr>
<td>BEARING CENTER</td>
<td>Sonar Mode</td>
<td>Bottom Scan Mode</td>
<td>Echo Sounder Mode</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### APPENDIX

#### COLOR PALETTE

<table>
<thead>
<tr>
<th>OPERATION MODE KEY (0-1)</th>
<th></th>
<th>OPERATION MODE KEY (0-2)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>[C-1]</td>
<td>[C-2]</td>
<td>[C-1]</td>
<td>[C-2]</td>
</tr>
<tr>
<td>1: R ( ) · G ( ) · B ( )</td>
<td>1: R ( ) · G ( ) · B ( )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2: R ( ) · G ( ) · B ( )</td>
<td>2: R ( ) · G ( ) · B ( )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3: R ( ) · G ( ) · B ( )</td>
<td>3: R ( ) · G ( ) · B ( )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4: R ( ) · G ( ) · B ( )</td>
<td>4: R ( ) · G ( ) · B ( )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5: R ( ) · G ( ) · B ( )</td>
<td>5: R ( ) · G ( ) · B ( )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6: R ( ) · G ( ) · B ( )</td>
<td>6: R ( ) · G ( ) · B ( )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7: R ( ) · G ( ) · B ( )</td>
<td>7: R ( ) · G ( ) · B ( )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8: R ( ) · G ( ) · B ( )</td>
<td>8: R ( ) · G ( ) · B ( )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9: R ( ) · G ( ) · B ( )</td>
<td>9: R ( ) · G ( ) · B ( )</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OPERATION MODE KEY (1-1)</th>
<th></th>
<th>OPERATION MODE KEY (1-2)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>[C-1]</td>
<td>[C-2]</td>
<td>[C-1]</td>
<td>[C-2]</td>
</tr>
<tr>
<td>1: R ( ) · G ( ) · B ( )</td>
<td>1: R ( ) · G ( ) · B ( )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2: R ( ) · G ( ) · B ( )</td>
<td>2: R ( ) · G ( ) · B ( )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3: R ( ) · G ( ) · B ( )</td>
<td>3: R ( ) · G ( ) · B ( )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4: R ( ) · G ( ) · B ( )</td>
<td>4: R ( ) · G ( ) · B ( )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5: R ( ) · G ( ) · B ( )</td>
<td>5: R ( ) · G ( ) · B ( )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6: R ( ) · G ( ) · B ( )</td>
<td>6: R ( ) · G ( ) · B ( )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7: R ( ) · G ( ) · B ( )</td>
<td>7: R ( ) · G ( ) · B ( )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8: R ( ) · G ( ) · B ( )</td>
<td>8: R ( ) · G ( ) · B ( )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9: R ( ) · G ( ) · B ( )</td>
<td>9: R ( ) · G ( ) · B ( )</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OPERATION MODE KEY (1-2)</th>
<th></th>
<th>OPERATION MODE KEY (1-2)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>[C-1]</td>
<td>[C-2]</td>
<td>[C-1]</td>
<td>[C-2]</td>
</tr>
<tr>
<td>1: R ( ) · G ( ) · B ( )</td>
<td>1: R ( ) · G ( ) · B ( )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2: R ( ) · G ( ) · B ( )</td>
<td>2: R ( ) · G ( ) · B ( )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3: R ( ) · G ( ) · B ( )</td>
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</table>
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