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### SONAR OPERATION

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</table>
CHAPTER 1

INTRODUCTION

Thank you for purchasing the S-1900 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 S-1900.

Please carefully read and follow the safety information so that the S-1900 will perform to the utmost of its ability.

Before Use
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Notice -------------------------------------------------- 3
Turning the Power On/Off ----------------------------- 4
Key Operation ---------------------------------------- 4
TFT LCD ----------------------------------------------- 4
Preventive Measure for Interference in the area of ship congestion ------------------- 4

For Your Safety
Use Environment -------------------------------------- 5
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Components
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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>
</tbody>
</table>

NOTE !

- Indicates the contents for the user’s reference.

CF

- Pages for the user’s reference.

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.
BEFORE USE

TURNING the POWER ON/OFF

POWER ON
Press the POWER ON key on the monitor or the keyboard.
“Please wait!” appears on the screen. The soundome is automatically lowered if “HOIST AUTO DOWN – ON” previously set.
In case “HOIST AUTO DOWN – OFF” is previously set, it is lowered only after pressing the Hoist key ( ).

POWER OFF
Press and hold the OFF key when turning the power off.
The power is turned off after “Please wait!” appears on the screen.
The soundome is automatically raised.
Note that slight touch of the OFF key will not turn the power off.

KEY OPERATION
A beep sounds when operating key correctly.
Three short beeps sound when operating wrongly or not accepting the operation.

TFT LCD
The high quality TFT (Thin Film Transistor) LCD displays 99.99% of its picture elements.
The remaining 0.01% may drop out or light, however this is an inherent property of the LCD; it is not a sign of malfunction.

PREVENTIVE MEASURE for INTERFERENCE in the AREA of SHIP CONGESTION
When the fishing ground is crowded with many fishing boats, the sonar is subject to interference from ultrasonic equipment (echo sounder or sonar) on other boards as well as those on own ship. As preventive measure for interference the change of the used frequency or the reduction of the transmitting sound pressure level should be taken from the broadband sonar, the dual frequency sonar and the single frequency sonar accordingly.
FOR YOUR SAFETY

USE ENVIRONMENT

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

Follow the below proposed conditions for the installation. Otherwise it causes 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

Do not install the S-1900 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 causes 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.

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

Use the proper voltage. Otherwise it will result in fire or electrical shock.

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 ship engine. Otherwise it may damage the unit.

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.

Confirm the voltage between the Flang and the minus terminal of the ship’s battery does not exceed 0.65 volts after the installation completed.

Use the larger diameter cable if the voltage exceeds 0.65 volts. Otherwise the damage to the Soundome due to the electrolytic corrosion may results.
### COMPONENTS

#### SUPPLIED COMPONENTS

**M12 DISPLAY UNIT (S-1900 M12)**

<table>
<thead>
<tr>
<th>CODE</th>
<th>DESCRIPTION</th>
<th>MAIN UNIT</th>
<th>M. BRACKET</th>
<th>M. BASE</th>
<th>HEX. BOLT</th>
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</thead>
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<td><img src="image" alt="M. Bracket" /></td>
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<td><img src="image" alt="Hex. Bolt" /></td>
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**CODE**  **HK010**  **HK001**

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**CODE**  **HK121**

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**NOTE**: The code Number is shown on the package. **HK** indicates the lot management No.

**TRUNK PIPE (option) /JOINT PIPE**

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## COMPONENTS

### M15 DISPLAY UNIT (S-1900 M15)

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<th><strong>HJ110</strong></th>
<th>FUSE</th>
<th>AUDIO PLUG</th>
<th>COVER</th>
<th>OPERATION MANUAL</th>
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NOTE: The code Number is shown on the package. ** indicates the lot management No.

---

TRUNK PIPE (option) / JOINT PIPE

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## COMPONENTS

### MBB CONTROL UNIT · KEYBOARD (S-1900MBB)

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**NOTE**: The code Number is shown on the package. **HN** indicates the lot management No

### TRUNK PIPE (option) /JOINT PIPE

[CF] PAGE 7
## COMPONENTS

### HULL UNIT (S-1900H)

<table>
<thead>
<tr>
<th>CODE</th>
<th>DESCRIPTION</th>
<th>HULL UNIT</th>
<th>JUNCTION BOX</th>
<th>PIPE GUIDES</th>
<th>M. BOLT</th>
<th>GUM PACKING for FLANGE</th>
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<td><strong>HH140</strong></td>
<td><strong>HH150</strong></td>
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| P. No | 33481C | SUS-M16x65-Assy | 30926D |
| Q'TY  | 1      | 3              | 1      |

### CODE | **H H 0 1 0** | **H H 0 0 1** | **H H 0 0 2**
|--------|---------------|---------------|---------------|

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>CRANK HANDLE</th>
<th>GREASE</th>
<th>TAPPING SCREW</th>
<th>FUSE</th>
<th>ANP BASE</th>
<th>CABLE TIE</th>
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<th>HEX. ROD</th>
<th>WRENCH</th>
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### CODE | **H H 1 7 0**
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<table>
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<th>HEX. ROD WRENCH</th>
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<td>1 each</td>
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</table>

**NOTE:** The code Number is shown on the package. **** indicates the lot management No.
This Chapter explains the installation of S-1900.

### Installation

- Installation Position of Hull Unit 12
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- Wiring Junction Box 41
INSTALLATION

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

INSTALLATION POSITION of HULL UNIT

Select an area where noise, interference and bubbles are minimal. The point at 1/3 to 1/2 of the ship’s length from the bow or near the keel is the best. If the hull unit cannot be installed on the keel, the center of the retraction trunk pipe should be within 1 meter of the keel.

Be sure there are no obstacles to interfere the ultrasonic beam when the Soundome is lowered.

Provide sufficient clearance around the Trunk Pipe for maintenance and inspection work.

The Bow mark (△) on the Flange should be installed facing the bow. However, if this hinders maintenance or inspection, and there is no solution, direct the mark to the opposite (180°) direction, toward the stern.
DIMENSIONS (S-1900H)

STANDARD: JUNCTION BOX SEPARATELY

Arrow View A

Stroke: 180 – 380mm

FLANGE

JUNCTION BOX
DIMENSIONS (S-1900H)

OPTION: JUNCTIONBOX MOUNTED ON THE HOIST

OPTION: OP-700 S-1900 JUNCTION BOX MOUNTING KIT

S-1900 H800 DIMENSIONS: Refer to the page 113.
DIMENSIONS (M12)

M12

Mounting Hole 6-Ø6.2
(Ø11.4 Countersink)

M. BASE
DIMENSIONS (M15)

M15

4- φ 11.4 Countersink
(M5 Flat Tapping Screw)

M. BASE

KEYBOARD

M. BRACKET
DIMENSIONS (MBB)

MBB

KEYBOARD

M. BRACKET
1. MAINTENANCE SPACE

When installing the Trunk Pipe, pay full attention to the safety (strength, water-tightness, etc.). At the same time, secure a space for maintenance and inspections.

- Since the Hoist unit is not a waterproof structure, keep it away from water drops and splashes.

- S-1900 is shipped from the factory with standard, 1,681mm Joist Pipe and without Trunk Pipe.

When mounting the Joint Pipe to the Soundome, be sure not to damage the Joint Pipe thread or twist the Soundome cable.

**TRUNK PIPE LENGTH (Lt) +181mm**

The drawing shows the optional mounting method, the Junction Box is mounted on the Hoist.

Flange should be positioned over the draft at full load.

Draft at the full load

Trunk Pipe length (min: 670)

Keel

Do not protrude Trunk Pipe from beneath the keel.

If the working space (LT+535) is not available, provide a hole of a size of at least 300x300mm in the ceiling.

In case the Junction Box is mounted on the Hoist, it might be required to be separated from the Hoist or provide a hole of a size of at least 300x300mm in the ceiling if there is no sufficient work space.
2. TRUNK PIPE INSTALLATION CONDITIONS

Satisfy the following installation conditions.

- Installation point should be 1/3 to 1/2 of the ship's overall length back from the bow.
- If it cannot be installed on the keel, the center of the trunk pipe should be within 1 meter of the keel.

- There should be no obstacles right below the flange to avoid hindering bolt clamping.

- Do not protrude the Trunk Pipe from beneath the keel.

- Flange should be positioned in parallel with the ship's draft and over the draft at full load.

- Apply FRP sufficiently to all the necessary sections to prevent water leakage.

- Make the surrounding of Trunk Pipe in a streamline shape and provide a fairing plate to suppress water resistance and generation of air bubbles to the minimum.

- Attach a fin if necessary.

Make sure the fin does not hinder bolt clamping for Flange.

**DANGER**

Fully discuss about the strength and water tightness with the ship owner, the engineer in the shipyard, and the installer before determining on the position, the method of installation, and necessary materials. Otherwise it causes maritime accidents.
3. TRUNK PIPE INSTALLATION EXAMPLES

- Select a location of Trunk pipe. 
  [CF] page 12

- Make a hole of Trunk Pipe diameter in the bottom of ship.

- Install the Trunk Pipe. Flange should be positioned in parallel with the ship’s draft in sailing.

< To be continued >
- Make the surrounding of the Trunk Pipe projecting out from the bottom in a stream line shape and provide a fairing plate to suppress water resistance and generation of air bubbles to the minimum.

- Apply FRP sufficiently to all the necessary parts to prevent leakage of water.
ASSEMBLING and MOUNTING of HOIST

1. JOINT PIPE

Calculate necessary length of Joint Pipe (Standard length of 1681mm) from the length of Trunk Pipe \( L_t \) and cut off the unnecessary portion.

\[
\text{JOINT PIPE LENGTH} = \text{TRUNK PIPE LENGTH (L_t)} + 181\text{mm}
\]

2. JOINT PIPE ADJUSTMENT

1) Cut the Joint Pipe to the required length, Trunk Pipe length \( (L_t) + 181\text{mm} \).

2) Deburr the cut piece and taper the edge (1mm).

3) Bore 4 holes in the Joint Pipe as follows,
   - every 90 degrees
   - 5mm from the cut end of the pipe
   - hole size of \( \phi 3.4 \)
   - set a tapping screw (M4) on the hole each

In case of sufficient space above the Joint Pipe it can be used without cutting.

Mark to the point of \( L_t + 160 \). The upper end of Joint Arm should be united with the Mark and tighten them.

When the space above the Joint Pipe is equal to this, the Joint Pipe may be used without being cut.
3. ASSEMBLING of HOIST

1) Screw Joint Pipe into the Soundome.

Make sure not to damage the Joint Pipe or twist the Soundome Cable.

Totally wipe dirt and grease from the threaded parts of the Soundome and Joint Pipe.

Apply adhesive, Cemedine Bathcork (supplied) to the threaded parts of the Joint Pipe.

Coat the attached cap bolts with adhesive to prevent an electric corrosion after clamping the Joint pie securely with cap bolts.

Put a Bow Mark with a felt pen at the top end of the Joint Pipe as shown in the drawing.

---

**CAUTION**

Pay attention to the following when mounting the Joint Pipe into the Soundome or demounting the Joint Pipe from the Soundome.

Make sure of the metal parts of Soundome fixed and turn the Joint Pipe side when demounting it from the soundome. Otherwise the Soundome or the Soundome Cable gets damaged.

Do not apply any sealants inside the Joint Pipe. Otherwise the Soundome Cable is adhered and gets damaged when demounting it.

Apply some adhesive to coat 4 cap bolts.

< To be continued >
2) Mount Pipe Guides

Insert Pipe Guides (3 pcs) as shown in the drawing. Insert Fixing Collar and fix it with the Cap Bolts (2 pcs).
3) Mount Soundome on the Hoist

- Apply Grease inside the nuts and the Flange.

- Unscrew the nuts. Pass the Joint Pie through the Flange assembly. Pass the Damper through and align the bow mark on the Soundome with the mark on the Flange assembly. Fix the Joint Arm to the Joint Pipe.

- Take care the position of the Soundome bottom is 48mm up from the Trunk Pipe bottom.

- Pass the Fixing Collar into the Joint Pipe and fasten it with the cap bolts (2 pcs).

Refer to the next page to know how to tighten the nuts.
4) Mount Pipe Head at the end of Joint Pipe

Insert the Pipe Head into the Joint Pipe. Screw it with the cap bolts, M4x25 (4 pcs). Screw the cap bolts, M4x10 (4 pcs) to prevent slip-out of the Pipe Head.

5) How to tighten the nuts

Lift up the Lock Nut as shown in the drawing. Place the Waterproof Nut on the Flange opening and tighten it firmly by hand and then make a 180-degree turn with a screwdriver. Take care not to over a 180-degree. This Lock Nut is to protect loosening the Waterproof Nut. Screw the Lock Nut tightly with a screwdriver and a hammer.

< To be continued >
6) Assemble Hoist with Trunk Pipe

Insert Gum Packing between Hoist Unit and Trunk Pipe. Use 8 Hex.Bolts (M16x65) to fix Hoist Unit in Trunk Pipe. Check the performance of rising/lowering of the Soundome several times while tentatively clamping with Hex.Bolts and fasten them after the performance is confirmed.

- **CAUTION**
  - Do not apply Adhesive, etc. on the Gum Packing for Flange.

- **CAUTION**
  - The sufficient space should be kept not to disturb the raise/lower of the Soundome.

- **CAUTION**
  - Apply Grease regularly to the parts of Hoist Gear and Flange Opening.

- **CAUTION**
  - Fix the Soundome cable with a Nylon Clip.

- **CAUTION**
  - Do not apply Adhesive, etc. on the Gum Packing for Flange.
4. HOW TO ADJUST HOIST STROKE

The stroke of raising/lowering of the Soundome can be adjusted from the minimum, 180mm to the maximum, 380mm by adjusting the switch shown in the drawing.

Find the proper lowering position of the Soundome with this Switch.

5. MANUAL RAISE/LOWER OF SOUNDOME

In case the Hoist cannot raise the soundome, it is possible to raise the Soundome with the Crank Handle manually after removing the Cap.

- Confirm the voltage between the Flang and the minus terminal of the ship's battery does not exceed 0.65 volts after the installation completed.

- Use the larger diameter cable if the voltage exceeds 0.65 volts. Otherwise the damage to the Soundome due to the electrolytic corrosion may results.
MOUNTING of JUNCTION BOX

The mounting location should be well ventilated and dry. Avoid locations subject to watersplash or rain. Allow enough service clearance. The Cable Junction side should be at the bottom side or the left side.

Components

- Hull Control Unit --- 1
- Truss Tapping Screw --- 4
  (M5x20)

Use the S-1900 Junction Box Mounting Kit to joint the Junction Box to the Hoist if desired.

Option

OP-700 S-1900 Junction Box Mounting Kit

CF page 105
INSTALLATION

MOUNTING M12 DISPLAY UNIT

1) Fasten the M. Base with 6 Flat Tapping Screws on the mounting place.
2) Fit the M12 to the M. Bracket with the Hex. Bolts or the Knob Bolts adjusting the comfortable viewing angle of the monitor.
3) Hook the back of M12 on the M.Base from the upward position diagonally and match the front notch of the M. Bracket with 2 Hex.Bolts. Set the M. Bracket into the left side and screw them.

Components
- M12 Display Unit: 1
- M. Bracket: 1
- M. Base: 1
- Hex. Bolt (M6 x 20): 2
- Flat Tapping Screw: 6
- Hex. Bolt (M8 x 16): 2
- Knob Bolt: 2

The unit should be installed and fixed on a flat surface. Otherwise it may cause the trouble.

Vibration or shock in the mounting area should be minimal. Locate the unit away from areas subject to water splash or rain. Otherwise it may causes corrosive trouble. Locate the unit away from areas subject to heat sources and direct sunlight.
The following optional terminals are available.

**OPTION**

<table>
<thead>
<tr>
<th>OPTION No.</th>
<th>Description</th>
<th>Connects this terminal when</th>
</tr>
</thead>
<tbody>
<tr>
<td>OP-287</td>
<td>Connecting Cable for Remote Controller</td>
<td>Remote Controller used.</td>
</tr>
<tr>
<td>OP-360</td>
<td>VGA Connecting Cable</td>
<td>External Monitor used.</td>
</tr>
</tbody>
</table>

**OPTION**

<table>
<thead>
<tr>
<th>OPTION No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OP-287</td>
<td>Connecting Cable for Remote Controller</td>
</tr>
<tr>
<td>OP-360</td>
<td>VGA Connecting Cable</td>
</tr>
</tbody>
</table>
INSTALLATION

MOUNTING of M15 DISPLAY UNIT/KEYBOARD

DISPLAY UNIT
1) Fasten the M. Base to the mounting location with 4 Flat Tapping Screws.
2) Fit the Display Unit to the M. Base with the Knob Bolts adjusting the comfortable viewing angle of the monitor. Fasten the both knob bolts.
3) Hook the back of M15 on the M.Base from the upward position diagonally and match the front notch of the M. Base with 2 Hex. Bolts.
Set the M. Base into the left side and screw them.

Components
M15 Display Unit 1
M. Bracket 1
M. BASE
Hex. Bolt (M6 x 20) 2
Flat Tapping Screw 4
Knob Bolt 4

KEYBOARD
Refer to MBB Keyboard page 34

Components
Keyboard
M. Bracket
Truss Tapping Screw
Knob Bolt

WARNING
The unit should be installed and fixed on a flat surface. Otherwise it may cause the trouble.

CAUTION
Vibration or shock in the mounting area should be minimal. Locate the unit away from areas subject to water splash or rain. Otherwise it may causes corrosive trouble. Locate the unit away from areas subject to heat sources and direct sunlight.
M15 DISPLAY UNIT (REAR SIDE)

The following optional terminals are available.

<table>
<thead>
<tr>
<th>OPTION No.</th>
<th>Description</th>
<th>Connection Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>OP-287</td>
<td>Connecting Cable for Remote Controller</td>
<td>Connects this terminal when Remote Controller used.</td>
</tr>
<tr>
<td>OP-360</td>
<td>VGA Connecting Cable</td>
<td>Connects this terminal when External Monitor used.</td>
</tr>
</tbody>
</table>
INSTALLATION

MOUNTING of MBB CONTROL UNIT/ KEYBOARD

CONTROL UNIT
1) Fasten the Control Unit to the mounting location with 4 Truss Tapping Screws.

Components
MBB Control Unit  1
Truss Tapping Screw  4

KEYBOARD
1) Fasten the M. Bracket to the mounting location with 4 Truss Tapping Screws.
2) Fit the Keyboard to the M. Bracket with the Knob Bolts adjusting the comfortable viewing angle of the monitor. Fasten the both knob bolts.

Components
Keyboard  1
M. Bracket  1
Truss Tapping Screw  4
Knob Bolt  2

WARNING

The unit should be installed and fixed on a flat surface. Otherwise it may cause the trouble.

CAUTION

Vibration or shock in the mounting area should be minimal. Locate the unit away from areas subject to water splash or rain. Otherwise it may causes corrosive trouble. Locate the unit away from areas subject to heat sources and direct sunlight.
The following optional terminals are available.

<table>
<thead>
<tr>
<th>OPTION No.</th>
<th>Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OP-287</td>
<td>Connecting Cable for Remote Controller</td>
<td>Connects this terminal when Remote Controller used.</td>
</tr>
<tr>
<td>OP-360</td>
<td>VGA Connecting Cable</td>
<td>Connects this terminal when External Monitor used.</td>
</tr>
</tbody>
</table>
WIRING BETWEEN S-1900H AND JUNCTION BOX

Main Fuse
For Main Power Supply of Junction Box
Use the specified fuse as follows,
12V ▶ 6A/24V ▶ 4A.

Motor Fuse
For Hoist Motor
Use the specified fuse as follows,
2V ▶ 4A/24V ▶ 8A.

Power Supply Cable
connects the DC power supply
for activating the Hoist.
Use the voltage in the range
10.5-30Volts.

Motor Fuse
For Hoist Motor
Use the specified fuse as follows,
2V ▶ 4A/24V ▶ 8A.

Hoist Motor Cable
connects the Hoist Motor Cable from the
Hoist.

I/F cable
connects I/F cable to the Hoist.

Limit Switch Cable
connects the Limit Switch Cable from the Hoist.

Soundome Cable
connects the Soundome Cable from the Soundome.

Earth Terminal

S-1900 H- HOIST

Hoist Motor Cable
connects the Hoist Motor Cable to the Junction Box.

Limit Switch Cable
connects the Limit Switch Cable to the Junction Box.
WIRING WARNINGS

Connect the cables to the Hoist, the Junction Box, the Display Units or the Keyboard referring to the following instructions.

- The DC Power Supply connected to the main unit each is as follows,

<table>
<thead>
<tr>
<th></th>
<th>Display Unit</th>
<th>Control Unit</th>
<th>Junction Box</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-1900 M12</td>
<td>10.5 – 30 volts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S-1900 M15</td>
<td>20 – 30 volts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S-1900 MBB</td>
<td>10 – 30 volts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S-1900 H</td>
<td></td>
<td></td>
<td>10.5 – 30 volts</td>
</tr>
</tbody>
</table>

Connection of an incorrect power supply may cause fire, electrical shock or damage to the units.

- Use the specified power supply cable. Otherwise fire or generation of heat may result.

- Confirm the voltage between the Flang and the minus terminal of the ship’s battery does not exceed 0.65 volts after the installation completed.

Use the larger diameter cable if the voltage exceeds 0.65 volts. Otherwise the damage to the Soundome due to the electrolytic corrosion may results.

- Turn off the power and hold the plug when connecting or disconnecting the cable. Otherwise the cable gets damaged and causes electrical shock or fire.

- Do not bent or twist the cables and not to put the heavy obstacles on the cable. Wiring positions should not disturb the sailing operation or interfere with walking.

It may cause fire, generation of heat or injury.
WIRING between S-1900M12 and S-1900H

The length of each cable includes a part (up to 60 cm) for drawing inside the main unit.
The length of each cable includes a part (up to 60 cm) for drawing inside the main unit.
WIRING between S-1900MBB and S-1900H

The length of each cable includes a part (up to 60 cm) for drawing inside the main unit.
**WIRING JUNCTION BOX**

**HOIST MOTOR CABLE**
connects J2 on the board.

**LIMIT SWITCH CABLE**
connects 6P plug to J7 on the board.
connects 5P plug to J6 on the board.
connects 10P plug to J5 on the board.

**SOUNDOME CABLE**
connects 3P plug to J9 on the board.
connects 5P plug to J6 on the board.
connects 10P plug to J5 on the board.

**J 2**
connects the white line to 12V or 24V according to the voltage of the battery.

**BATTERY**

**4 BINDING SCREWS**
(M4X8) 4pcs

---

4 BINDING SCREWS (M4X8) 4pcs
CHAPTER 3

BASIC OPERATION

This Chapter explains the basic operation of S-1900.

Basic Operation

- Operation Panel: 43
- Display Description: 44
- Sample Display of Sonar Mode: 45
- Sonar Mode: 46
- Sample Display of Bottom-Scan Mode: 48
- Bottom-Scan Mode: 49
- Sample Display of Sounder Mode: 50
- Sounder Mode: 51
Note that the drawing shows the Panel for S-1900 M12.
DISPLAY DESCRIPTION

The drawing below shows the typical sonar mode display. Various combination displays are available by selecting the Sub-Display menu and the change of the Mode Dials.

SCREEN LEFT
- SONAR MODE
- OFF-CENTER MODE
- BOTTOM-SCAN MODE
- SOUNDER MODE

Use the MODE DIAL to select the display mode.

MENU 1
Select the desired 8 ranges.

MENU 2
Select the desired user settings.

SUB-DISPLAYS
Select the desired sub-display with MENU 2
In case “SUB-DISPLAY – NO SUB DISPLAY” selected the display mode in the left side can be displayed on the whole screen. Cf page 66
SAMPLE DISPLAY of SONAR MODE

Select **MODE DIAL 1** to display SONAR MODE or **MODE DIAL 2** to display OFF-CENTER MODE.

When the Sub menus other than INFORMATION selected,

They are displayed in the upper left of the Sonar Display (#1). Tilt angle is displayed in the lower left.

“IR-ON” is not displayed when INTERFERENCE REJECTION OFF selected. They are displayed in the upper right of Sonar Display (#2).

They are displayed in the lower right of Sonar Display (#3).

They are displayed in the lower right corner of Sub-Display.

An External Navigator is required to display the ship’s position and the speed.
SONAR MODE

Rotating the transducer in the soundome protruded from the ship’s bottom, the ultra sound beams are sent out and detects the targets in accordance with the selected speed and the range (distance). The reflected sound appears on the PPI depending on the transducer’s sweep. Adjusting the Tilt and Bearing the sonar beam can be trained from the surface to the bottom. The transducer emits the ultra sound beams rotating the Soundome.

Changing the sector angle makes it possible to detect in various ranges. \( \text{CF} \) page 94

The reflected echoes are displayed accordingly after emitting the ultra sound beam from 1 to 8 shown in the drawing left.

The transducer rotates with the selected step angle. The reflected echoes are displayed as the image every step accordingly. The step angle can be selected in \text{MENU 2} – \text{“STEP (SONAR)“}. \( \text{CF} \) page 72

A narrow step gives a more detailed image on the screen, however more sweep time is requested than a wide step

<to be continued>
The Tilt angle can be set in increments of 1° from 0° to 5° to 0° to –90°.

All directions from extremely shallow waters to deep areas can be searched. Adjust the tilt angle considering the conditions such as ship’s speed and water depth.

The below drawing illustrates the fish school is displayed on the screen when the ship reaches the point A, but it is not displayed at the point B even if the same tilt angles are set. Select an appropriate tilt angle in order to display the fish school at the point B.

The setting of the tilt angle is available in the Sonar Mode, Bottom-Scan Mode or Sounder Mode. CF page 98
SAMPLE DISPLAY of BOTTOM-SCAN MODE

Select **MODE DIAL 3** to display the BOTTOM-SCAN MODE.

The above values of #1, #2, #3 and #4 are not displayed when the Sub-Display menu, INFORMATION is active.

When the Sub menus other than INFORMATION selected,
They are displayed in the Bottom Scan Mode Display (#1, #2 and #3).
“IR-ON” is not displayed when INTERFERENCE REJECTION OFF selected.
They are displayed as the data of the range marker in the Bottom-Scan Mode.
They are displayed in the Bottom-Scan Mode (#4).
They are displayed in the lower right corner of Sub-Display when an external navigator connected.
BOTTOM-SCAN MODE

Shaking the transducer in the soundome protruded from the ship’s bottom right and left alternately, it sends out the ultra sound beams and displays the images of the middle layer and the sea-bottom contour.

The transducer emits the ultra sound beams sweeping the transducer right and left.

The reflected echoes are displayed accordingly after emitting the ultra sound beam.

Changing the sector angle makes it possible to detect both the narrow and the wide ranges. **CF page 94**

Changing the tilt angle makes it possible to detect the area of the selected sector angle centering the tilt angle. **CF page 98**

The transducer moves with the selected step angle.

The reflected echoes are displayed as the image every step accordingly.

The step angle can be selected in **MENU 2 – “STEP (BOTTOM-SCAN)”**. **CF page 72**
SAMPLE DISPLAY of SOUNDER MODE

Select MODE DIAL 4 to display the SOUNDER MODE.

The above values of #1, #2, #3, #4, #5 and #6 are not displayed when the Sub-Display, INFORMATION display is active. The depth display is available only when the tilt angle –90 ° set.

When the Sub menus other than INFORMATION selected,

They are displayed in the Sounder Mode Display (#1, #2 and #3).

“IR-ON” is not displayed when INTERFERENCE REJECTION OFF selected.

They are displayed as the data of the range marker in the Sounder Mode Display (#4).

They are not displayed in the Sounder Mode Display.

They are displayed in the lower right corner of Sub-Display (#5). The latitude/longitude and the speed of the ship are displayed only when an external navigator connected.
**SOUNDER MODE**

The transducer in the sound dome protruded from the ship’s bottom sends out the ultra sound beams and displays the images of the middle layer and the sea-bottom contour, which are just beneath the ship.

The transducer emits the ultra sound beams toward the bottom just beneath the ship and the images are displayed like the Echo Sounder. The beam width is different depending on the frequency.

Detects beneath the ship.

Detects fore by changing the tilt angle

The images other than beneath the ship can be displayed by changing the tilt angle and the bearing.

Detects starboard by changing the tilt angle and the bearing.
CHAPTER 4

FUNCTION SETTINGS

This Chapter explains the function settings of S-1900. Select the appropriate setting for performing to the utmost of its ability before use.

Factory Settings

Menu

Function Settings

Function Set

Rejection

Display Item Selection

Gains Up

TVG Curve

Dynamic Range

Pulse Width

TX Power

RX Gain Reduction

RX Bandwidth

Full-Screen Gain Set

Sub-Display

Step (Sonar)

Step (Bottom-Scan)

Off-Center Position

Scale Dots

Compass Display

Heading Display

Track Display

Track Sub Range

Track Mem.Interval (Track Memory Interval)

Press Rate (Compressed Rate)

Filter

Sub Bottom-Scan

Cursor Direction

Cursor Position

<To be continued>
<table>
<thead>
<tr>
<th>Section</th>
<th>Function</th>
<th>Page</th>
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</thead>
<tbody>
<tr>
<td><strong>Others</strong></td>
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<td></td>
<td>Trigger Signal</td>
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<td>Depth Unit</td>
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<td>Temp. Unit (Temperature Unit)</td>
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<td>Temp. Adjust (Temperature Adjustment)</td>
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<td></td>
<td>Speed Unit</td>
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<td>Auto Retract</td>
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<td>Train Correct</td>
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<td></td>
<td>Panel Brightness</td>
<td>82</td>
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<td></td>
<td>Power Supply Frequency</td>
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<td>Ope. Mode Memory</td>
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<td><strong>Color Palette</strong></td>
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<td>Display Colors</td>
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<tr>
<td><strong>Remote Control Set</strong></td>
<td>TX Frequency</td>
<td>88</td>
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<tr>
<td></td>
<td>RX Frequency</td>
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<td><strong>Self Check</strong></td>
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<td><strong>Maintenance</strong></td>
<td>Update</td>
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<td>Backup</td>
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<td></td>
<td>Recovery</td>
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<tr>
<td></td>
<td>Version</td>
<td>91</td>
</tr>
</tbody>
</table>
FACTORY SETTINGS

FACTORY SETTINGS

The factory settings are shown in the below box. Select the desired settings before use.

<table>
<thead>
<tr>
<th>FUNCTION SETTINGS</th>
<th>FACTORY SETTINGS (shown in □)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GAIN UP</td>
<td>OFF · +10dB · +20dB · +30dB · +40dB · +50dB</td>
</tr>
<tr>
<td>TVG CURVE</td>
<td>OFF · 10LOG · 20LOG · 30LOG · 40LOG</td>
</tr>
<tr>
<td>DYNAMIC RANGE</td>
<td>1 dB · 2 dB · 3dB</td>
</tr>
<tr>
<td>PULSE WIDTH</td>
<td>X1 · X1.5 · x2</td>
</tr>
<tr>
<td>TX POWER</td>
<td>A · B · C · D</td>
</tr>
<tr>
<td>RX GAIN RED.</td>
<td>OFF · ON</td>
</tr>
<tr>
<td>RX BANDWIDTH</td>
<td>S. WIDE · WIDE · STANDARD</td>
</tr>
<tr>
<td></td>
<td>NARROW · S. NARROW</td>
</tr>
<tr>
<td>FULL-SCREEN GAIN SET</td>
<td>OFF · ON</td>
</tr>
</tbody>
</table>

REJECTION

INTERFERENCE REJ

OFF · ON

DISP ITEM SEL

SUB-DISPLAY

NO SUB-DISP. · INFO · HISTORICAL · +PRESS

+A-SCOPE · BOTTOM · TRACK · EXTSOUNDER

STEP (SONAR)

5° · 10° · 15°

STEP (BOTTOM-SCAN)

3° · 5°

OFF-CENTER POS.

FORE · BACK · LEFT · RIGHT

SCALE DOTS

OFF · ON

COMPASS DISP.

OFF · ON

HEADING DISP.

OFF · ON

TRACK DISP.

OFF · ON

TRACK SUB RANGE

50m (10-500 depth unit)

TRACK MEM. INTERVAL

5 SEC · 10 SEC · 30 SEC · 60 SEC

PRESS RATE

1/2 · 1/4 · 1/8 · 1/16

FILTER

OFF · 1 · 2

SUB BOTTOM-SCAN

AUTO · MANUAL

CURSOR DIRECTION

R-DIRECTION · T-DIRECTION

CURSOR POSITION

DISTANCE · LAT/LONG

OTHERS

AUDIO LEVEL

0 · 0 (0-31)

TARGET LOCK

MODE0 · MODE1 · MODE2 · MODE3

TRIGGER SIGNAL

INTERNAL · EXTERNAL

DEPTH UNIT

m · ft · fm · br

TEMP. UNIT

°C · °F

TEMP. ADJUST

+0.0 · °C (-9.9 · +9.9°)

SPEED UNIT

kt · km/h

AUTO RETRACT

OFF · 1kt (1-27km/h or 1kt ~15kt)

TRAIN CORRECT

0 · 0 (0 · 355°)

PANEL BRIGHTNESS

15 (0 - 15)

POWER S. FREQUENCY

120k · 125k · 130k

HOIST AUTO DOWN

OFF · ON

OPE.MODE MEMORY

OFF · ON

- 54 -
<table>
<thead>
<tr>
<th>COLOR PALETTE</th>
<th>A-1</th>
<th>A-2</th>
<th>B-1</th>
<th>B-2</th>
<th>C-1</th>
<th>C-2</th>
<th>MENU 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>COLOR SELECT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>PAGE 85-86</td>
</tr>
<tr>
<td>DISPLAY COLORS</td>
<td>8</td>
<td>16</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>PAGE 88</td>
</tr>
<tr>
<td>FREQUENCY SETTING</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TX FREQUENCY</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RX FREQUENCY</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BASIC FREQUENCY (±10kHz / 0.1kHz UNIT)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note 1) The Basic Frequency indicates the frequency the customer purchases.
MENU

MENU 1 (RANGE SETTING MENU)

Select the display range in 8 settings according to the depth desired.

The following menu appears after selecting “MENU 1” with the MODE DIAL.

Use the Cursor Shift key ↓ or ↑ to highlight the item to change.
Press the Cursor Selection key ○/+ to display the following range setting menu.

The range can be set freely as desired every 10 units of depth measurement until 2000 units in case of the units, meters, braccia, and fathoms and every 20 feet until 6000 feet in case of the unit, feet.

These numbers correspond to the Range Dial numbers.

The initial range setting values of both ranges are different each.
Displayed unit of depth measurement can be set via MENU 2 - “OTHERS”. CF page 80

The way of the range setting is the same for both ranges, but the values of range setting are not corresponded each other. The settings for both ranges are required.

In the range settings for SONAR/OFF-CENTER MODE, the range is changed in accordance with the value of SONAR MODE when the Cursor Shift key (← or →) pressed. However, 1.5 times of range of SONAR MODE is displayed when OFF-CENTER MODE selected.


**MENU 2 (FUNCTION SETTING MENU)**

Customize the functions to suit individual needs before using the S-1900. The basic settings are as follows.

<table>
<thead>
<tr>
<th>FUNCTION SET</th>
<th>GAIN UP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TVG CURVE</td>
</tr>
<tr>
<td></td>
<td>DYNAMIC RANGE</td>
</tr>
<tr>
<td></td>
<td>PULSE WIDTH</td>
</tr>
<tr>
<td></td>
<td>TX POWER</td>
</tr>
<tr>
<td></td>
<td>RX GAIN RED.</td>
</tr>
<tr>
<td></td>
<td>RX BANDWIDTH</td>
</tr>
<tr>
<td></td>
<td>FULL-SCREEN GAIN SET</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REJECTION</th>
<th>INTERFERENCE REJECTION</th>
</tr>
</thead>
</table>

| DISP ITEM SEL         | SUB-DISPLAY             |
| (DISPLAY ITEM SELECTION) | STEP (SONAR)          |
|                       | STEP (BOTTOM-SCAN)     |
|                       | OFF-CENTER POSITION    |
|                       | SCALE DOTS             |
|                       | COMPASS DISPLAY        |
|                       | HEADING DISPLAY        |
|                       | TRACK DISPLAY          |
|                       | TRACK SUB RANGE        |
|                       | TRACK MEMORY INTERVAL  |
|                       | PRESS RATE             |
|                       | FILTER                 |
|                       | SUB BOTTOM-SCAN        |
|                       | CURSOR DIRECTION       |
|                       | CURSOR POSITION        |

<p>| OTHERS                | AUDIO LEVEL            |
|                       | TARGET LOCK            |
|                       | TRIGGER SIGNAL         |
|                       | DEPTH UNIT             |
|                       | TEMPERATURE UNIT       |
|                       | TEMPERATURE ADJUST     |
|                       | SPEED UNIT             |
|                       | AUTO RETRACT           |
|                       | TRAIN CORRECT          |
|                       | PANEL BRIGHTNESS       |
|                       | POWER SUPPLY FREQUENCY |
|                       | HOIST AUTO DOWN        |
|                       | OPERATION MODE MEMORY  |</p>
<table>
<thead>
<tr>
<th>MENU</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>COLOR PALETTE</td>
<td>COLOR SELECT</td>
<td>DISPLAY COLORS</td>
</tr>
<tr>
<td>REMOTE CONTROL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FREQUENCY SETTINGS</td>
<td>TX FREQUENCY</td>
<td>RX FREQUENCY</td>
</tr>
<tr>
<td>SELF CHECK</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MAINTENANCE</td>
<td>UPDATE</td>
<td>BACK UP</td>
</tr>
<tr>
<td></td>
<td>RECOVERY</td>
<td>VERSION</td>
</tr>
</tbody>
</table>

For further details see next pages.
FUNCTION SETTINGS

Turn the MODE DIAL to “MENU 2” to display the below menu.

The item currently selected is highlighted.

Use the Cursor Shift key (↓ or ↑) to select the desired item.

Press the Cursor Selection key ○/+ to open the menu for change.

FUNCTION SET MENU

Press the Cursor Selection key ○/+ to return to MENU 2.

Use the Cursor Shift key (↓ or ↑) to select the desired item to change.

Use the Cursor Shift key (← or →) to change the settings.

TVG (Time-Varying-Gain) Curve reflects various changes such as TVG Curve, Gain Adjustment, Gain/Far Gain dials.
1. GAIN UP

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

Use the Cursor Shift key ( or ) to select “GAIN UP”.

Use the Cursor Shift key ( or ) to change the setting.

[OFF, +10dB, +20dB, +30dB, +40dB, +50dB]

The “sensitivity” or possibly “volume” is increased 3.3 times when the gain setting is changed to “+10dB” from “OFF”.

The reflected image at level “3.3” in the gain setting “OFF” is the one at level “0” in the Gain setting “+10dB”.

TVG Curve changes in accordance with the change of the values of GAIN UP.

The setting values shown in the above drawing are as follows,
Gain Dial: 0
Far Gain Dial: 0
TVG Curve: 30LOG
2. TVG CURVE

TVG (Time Variable Gain) offsets the effects of propagation loss of sound as it passes through the water. To counter this loss, the TVG curve is adjusted by correctly set.

Use the Cursor Shift key (↓ or ↑) to select “TVG CURVE”.

Use the Cursor Shift key (← or →) to change the setting.

TVG CURVE 30LOG ———— Use the Cursor Shift key (↓ or ↑) to change.

[OFF, 10LOG, 20LOG, 30LOG, 40LOG]

TVG CURVE

OFF: No TVG curve
10LOG: □ in the below drawing
20LOG: □ in the below drawing
30LOG: □ in the below drawing
40LOG: □ in the below drawing

NOTE!

Caution should be taken to select the TVG curve of which TVG setting is related to the Gain Dial functions.
3. DYNAMIC RANGE

This is the way to display the reactions with emphasis or with density discrimination.

Use the Cursor Shift key (↓ or ↑) to select “DYNAMIC RANGE”.

Use the Cursor Shift key (← or →) to change the setting.

```
DYNAMIC RANGE 3dB Use the Cursor Shift key (↓ or ↑) to change.
[1dB, 2dB, 3dB]
```

COLOR SCALE

The selected level is reflected to the Color Scale as shown in the left. The weaker reflections are eliminated and the stronger reflections are displayed when selecting rather 2dB than 3dB or 1dB than 2dB.

4. PULSE WIDTH

This is the way to select the transmitted pulse width.

Use the Cursor Shift key (↓ or ↑) to select “PULSE WIDTH”.

Use the Cursor Shift key (← or →) to change the setting.

```
PULSE WIDTH x1 Use the Cursor Shift key (↓ or ↑) to change.
[x1, x1.5, x2]
```

- x1 : standard (shown in the below box)
- x 1.5 : 1.5 times of standard
- x 2 : 2 times of standard for longer range detection

<table>
<thead>
<tr>
<th>RANGE (m)</th>
<th>PULSE WIDTHE (ms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 59</td>
<td>0.25</td>
</tr>
<tr>
<td>60 - 79</td>
<td>0.40</td>
</tr>
<tr>
<td>80 - 99</td>
<td>0.75</td>
</tr>
<tr>
<td>100 - 119</td>
<td>0.90</td>
</tr>
<tr>
<td>120 - 159</td>
<td>1.00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>RANGE (m)</th>
<th>PULSE WIDTHE (ms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>160 - 199</td>
<td>1.25</td>
</tr>
<tr>
<td>200 - 239</td>
<td>2.00</td>
</tr>
<tr>
<td>240 - 399</td>
<td>2.50</td>
</tr>
<tr>
<td>400 - up</td>
<td>3.75</td>
</tr>
</tbody>
</table>
5. TX POWER
The output power of the ultra sound wave from the transmitter can be set.
Use the Cursor Shift key (↓ or ↑) to select “TX POWER”.
Use the Cursor Shift key (← or →) to change the setting.

<table>
<thead>
<tr>
<th>TX POWER</th>
<th>D</th>
</tr>
</thead>
</table>

[A, B, C, D]
D is the maximum level and A is the minimum level.

6. RX GAIN REDUCTION
Reduction of RX gain to weaken too strong reaction in the shallow water can be set.
Use the Cursor Shift key (↓ or ↑) to select “RX GAIN REDUCTION”.
Use the Cursor Shift key (← or →) to change the setting.

<table>
<thead>
<tr>
<th>RX GAIN RD.</th>
<th>OFF</th>
</tr>
</thead>
</table>

[ON, OFF]

ON: reduces the RX gain.
OFF: no change.
FUNCTION SETTINGS

7. RX BANDWIDTH
RX bandwidth can be set.
Use the Cursor Shift key (↓ or ↑) to select “RX BANDWIDTH”.
Use the Cursor Shift key (← or →) to change the setting.

RX BANDWIDTH  STANDARD

[S. WIDE, WIDE, STANDARD, NARROW, S. NARROW]

NOTE!
Selecting wider bandwidth makes the resolution higher, but more noise.
Selecting narrower bandwidth makes the resolution lower, but less noise.

8. FULL-SCREEN GAIN SET
Select full gain function ON or OFF when changing the gain dial.
Use the Cursor Shift key (↓ or ↑) to select “FULL-SCREEN GAIN SET”.
Use the Cursor Shift key (← or →) to change the setting.

FULL-SCREEN GAIN SET  ON

[ON, OFF]

ON: the gain is changed on the full screen at the same time when changing the gain dial.
OFF: the gain is changed from the point of changing the gain dial.
REJECTION

[MODE DIAL – MENU 2 – REJECTION]

Use the Cursor Shift key (↓ or ↑) to select “INTERFERENCE REJ.”.

Use the Cursor Shift key (← or →) to change the setting.

[ON, OFF]

ON: activates this function.

OFF: inactivates this function.
DISPLAY ITEM SELECTION

<table>
<thead>
<tr>
<th>DISP ITEM SEL</th>
<th>RETURN MARK</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUB-DISPLAY</td>
<td></td>
</tr>
<tr>
<td>STEP (SONAR)</td>
<td></td>
</tr>
<tr>
<td>STEP (BOTTOM-SCAN)</td>
<td></td>
</tr>
<tr>
<td>OFF-CENTER POS.</td>
<td></td>
</tr>
<tr>
<td>SCALE DOTS</td>
<td></td>
</tr>
<tr>
<td>COMPASS DISP.</td>
<td></td>
</tr>
<tr>
<td>HEADING DISP.</td>
<td></td>
</tr>
<tr>
<td>TRACK DISP.</td>
<td></td>
</tr>
<tr>
<td>TRACK SUB RANGE</td>
<td></td>
</tr>
<tr>
<td>TRACK MEM. INTERVAL</td>
<td></td>
</tr>
<tr>
<td>PRESS RATE</td>
<td></td>
</tr>
<tr>
<td>FILTER</td>
<td></td>
</tr>
<tr>
<td>SUB BOTTOM-SCAN</td>
<td></td>
</tr>
<tr>
<td>CURSOR DIRECTION</td>
<td></td>
</tr>
<tr>
<td>CURSOR POSITION</td>
<td></td>
</tr>
</tbody>
</table>

Press the Cursor Selection key \(\downarrow/\uparrow\) to return to MENU 2.

Use the Cursor Shift key (\(\leftarrow\) or \(\rightarrow\)) to select the desired item to change.

Use the Cursor Shift key (\(\leftarrow\) or \(\rightarrow\)) to change the settings.

1. SUB-DISPLAY

Sub menu displayed on the right half of the screen can be selected.

Use the Cursor Shift key (\(\leftarrow\) or \(\rightarrow\)) to select “SUB-DISPLAY”.

Use the Cursor Shift key (\(\leftarrow\) or \(\rightarrow\)) to change the setting.

[NO SUB-DISP., INFO, HISTORICAL, +PRESS, +A-SCOPE, BOTTOM, TRACK, EXTSOUNDER]

- NO SUB-DISP. (NO SUB-DISPLAY)

The SUB-DISPLAY is not displayed. SONAR MODE, OFF-CENTER MODE, BOTTOM-SCAN MODE or SOUNDER MODE is displayed on the whole screen.
INFO (INFORMATION)
This sub menu “INFO” can be displayed when one of the Mode dials, No.1-4 selected.

- Displays the selected range by using the Range Dial desired.
- Displays the selected bearing angle by using the Bearing Key.
- Displays the selected sector angle by using the Sector Dial.
- Displays the selected tilt angle by using the Tilt Key.
- It appears only when Interference Rejection-ON selected.
- Displays the horizontal distance, slant distance and depth to the marker. No data appears when Bottom-Scan mode set.
- Displays the horizontal distance, slant distance and depth to the cursor. No data appears when Sounder mode set.
- Displays the power supply voltage and the temperature.
- Displays the ship's speed and own ship's position in latitude/longitude. Note that an External Navigator is required to display these values.
HISTORICAL DISPLAY

The vertical images can be displayed as sub menu when SONAR MODE or BOTTOM-SCAN MODE set. Note that the normal echo sounder images are displayed on the whole screen when SOUNDER MODE is selected.

The color shows the position/direction currently the beam passes.
FUNCTION SETTINGS

+PRESS (COMPRESSED IMAGE AND HISTORICAL DISPLAY)

The vertical images and their compressed image can be displayed when SONAR MODE or BOTTOM-SCAN MODE set. The normal echo sounder images and compressed image are displayed on the screen when SOUNDER MODE is selected.

Compressed images are displayed at the selected rate [MENU-DISP ITEMSEL-PRESS RATE].

+A-SCOPE (HISTORICAL DISPLAY+A-SCOPE)

A-Scope is displayed on the right side of the historical display.

The illustration below shows when SONAR MODE/BOTTOM SCAN MODE selected. It is also displayed on the right side of the screen when SOUNDER MODE selected.
FUNCTION SETTINGS

- **BOTTOM-SCAN**
  The images of BOTTOM-SCAN MODE can be displayed in the sub-display. Note that this function is not available in Sounder Mode. [CF page 76]

  - The setting values such as Range, Bearing, Sector, Tilt for the Bottom-Scan mode can be set while the Bottom-Scan mode is active. The setting values will not be changed even if it backs to the Sonar Mode.

  - The Sonar Mode display changes into the Bottom-Scan when it passes the center while clockwise rotating when “SUB BOTTOM-SCAN / AUTO” selected. After it updated, it will back to the Sonar Mode.

  - The Sonar Mode display alternates with the Bottom-Scan display each time the Hoist key pressed when “SUB BOTTOM-SCAN / MANUAL” selected. The scanning direction is determined by the position when the Sonar Mode changes into the Bottom Scan.

- **TRACK**
  Own ship’s position can be displayed when an external navigator connected.

  - **SCREEN WIDTH**
    Displays the screen width selected via “TRACK SUB RANGE” selected.

  - **OWN SHIP**
    Displays Own Ship’s position in latitude/longitude and the speed at the bottom of the screen.

  - **MARK**
    Displays the mark placed by a Cross Cursor in the Sonar Mode.

  - **TRACK**
    Displays the track line. The past line is memorized every interval set via “TRACK MEM.INTERVAL”.

- 70 -
EXT.SOUNDER (EXTERNAL SOUNDER)

This function is only available when some Suzuki units connected.
2. STEP (SONAR)
The Step angle for SONAR MODE can be selected.
Use the Cursor Shift key (↓ or ↑) to select “STEP (SONAR)”.
Use the Cursor Shift key (← or →) to change the setting.

<table>
<thead>
<tr>
<th>STEP (SONAR)</th>
<th>10°</th>
<th>Use the Cursor Shift key (→ or ←) to change.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5°, 10°, 15°</td>
<td></td>
</tr>
</tbody>
</table>

3. STEP (BOTTOM-SCAN)
The Step angle for SONAR MODE can be selected.
Use the Cursor Shift key (↓ or ↑) to select “STEP (BOTTOM-SCAN)”.
Use the Cursor Shift key (← or →) to change the setting.

<table>
<thead>
<tr>
<th>STEP (BOTTOM-SCAN)</th>
<th>5°</th>
<th>Use the Cursor Shift key (→ or ←) to change.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3°, 5°</td>
<td></td>
</tr>
</tbody>
</table>

NOTE!
The superior detection images can be obtained when the narrower step angle selected, but the longer detection time is required.
4. OFF-CENTER POS. (OFF-CENTER POSITION)

The displayed position of own ship on the screen can be selected when OFF-CENTER MODE is active.

Use the Cursor Shift key (↓ or ↑) to select “OFF-CENTER POS.”.

Use the Cursor Shift key (← or →) to change the setting.

OFF-CENTER POS. FORE Use the Cursor Shift key ( or ) to change.

[FORE, BACK, RIGHT, LEFT]

5. SCALE DOTS

The display of scale dots on the screen can be selected ON/OFF.

Use the Cursor Shift key (↓ or ↑) to select “SCALE DOTS”.

Use the Cursor Shift key (← or →) to change the setting.

SCALE DOTS ON Use the Cursor Shift key ( or ) to select.

[ON, OFF]

ON: activates Scale
OFF: inactivates Scale

When “OFF” set, Scale does not appear on SONAR MODE/OFF-CENTER MODE screens. However, it appears on BOTTOM-SCAN MODE/SOUNDER MODE screens even if “OFF” set.
FUNCTION SETTINGS

6. COMPASS DISPLAY
Compass can be displayed in the SONAR MODE when an External Navigator connected.
Use the Cursor Shift key (↓ or ↑) to select “COMPASS DISP.”.
Use the Cursor Shift key (← or →) to change the setting.

COMPASS DISP. OFF

[ON, OFF]
- ON: activates Compass display
- OFF: inactivates Compass display

7. HEADING DISPLAY
Heading line can be displayed in the SONAR MODE.
Use the Cursor Shift key (↓ or ↑) to select “HEADING DISP.”.
Use the Cursor Shift key (← or →) to change the setting.

HEADING DISP. OFF

[ON, OFF]
- ON: activates Heading line display
- OFF: inactivates Heading line display

8. TRACK DISPLAY
Track line can be displayed in the SONAR MODE when an external navigator connected.
Use the Cursor Shift key (↓ or ↑) to select “TRACK DISP.”.
Use the Cursor Shift key (← or →) to change the setting.

TRACK DISP. OFF

[ON, OFF]
- ON: activates Track line display
- OFF: inactivates Track line display
9. TACK SUB RANGE
The screen width for Track display in sub menu can be selected. CF page 70
Use the Cursor Shift key (↓ or ↑) to select “TRACK SUB RANGE”.
Use the Cursor Shift key (← or →) to change the setting.

TRACK SUB RANGE 50m ---- Use the Cursor Shift key (↓ or ↑) to change.
[10 – 500 depth unit]

Cursor Shift keys

← : sets the value smaller.
→ : sets the value larger.

10. TRACK MEM. INTERVAL (TRACK MEMORY INTERVAL)
The tracking interval can be selected.
Use the Cursor Shift key (↓ or ↑) to select “TRACK MEM. INTERVAL”.
Use the Cursor Shift key (← or →) to change the setting.

TACK MEM. INTERVAL 5SEC Use the Cursor Shift key (↓ or ↑) to change.
[5 SEC, 10 SEC, 30 SEC, 60 SEC]
The short interval can provide for the display of smooth wake line, but it is the record of short term. In case of the long interval it displays the record of long term, but the zigzag line appears on the screen.

<table>
<thead>
<tr>
<th>Interval</th>
<th>Memorized Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 seconds</td>
<td>8 minutes 20 seconds</td>
</tr>
<tr>
<td>10 seconds</td>
<td>16 minutes 40 seconds</td>
</tr>
<tr>
<td>30 seconds</td>
<td>50 minutes</td>
</tr>
<tr>
<td>60 seconds</td>
<td>100 minutes</td>
</tr>
</tbody>
</table>

11. PRESS RATE (COMPRESSED RATE)
The compressed rate for images on the screen can be selected. CF page 69
Use the Cursor Shift key (↓ or ↑) to select “PRESS RATE”.
Use the Cursor Shift key (← or →) to change the setting.

PRESS RATE 1/4 Use the Cursor Shift key (↓ or ↑) to change.
[1/2, 1/4, 1/8, 1/16]
Compress rate 1/2 shows one line for 2 sound beams and 1/4 for 4 sound beams. The information for the long time can be displayed when the higher rate selected, but the compressed image is tighter.
12. FILTER

The image on the sonar can be enhanced by this function. Use the Cursor Shift key (↓ or ↑) to select “FILTER”. Use the Cursor Shift key (← or →) to change the setting.

<table>
<thead>
<tr>
<th>FILTER</th>
<th>1</th>
</tr>
</thead>
</table>

[OFF, 1, 2]

- OFF: inactivates filter function.
- 1: enhances the image on the sonar.
- 2: enhances further the image on the sonar.

13. SUB BOTTOM-SCAN

Select the SUB BOTTOM-SCAN MODE. Cf page 70 Use the Cursor Shift key (↓ or ↑) to select “SUB BOTTOM-SCAN”. Use the Cursor Shift key (← or →) to change the setting.

<table>
<thead>
<tr>
<th>SUB BOTTOM SCAN</th>
<th>AUTO</th>
</tr>
</thead>
</table>

[AUTO, MANUAL]

- AUTO: Sonar Mode changes into BOTTOM-SCAN MODE automatically.
- MANUAL: Sonar Mode changes into BOTTOM-SCAN MODE display manually.

14. CURSOR DIRECTION

Select the display way of the CURSOR DIRECTION when an External Navigator connected. Use the Cursor Shift key (↓ or ↑) to select “CURSOR DIRECTION”. Use the Cursor Shift key (← or →) to change the setting.

<table>
<thead>
<tr>
<th>CURSOR DIRECTION</th>
<th>R-DIRECTION</th>
</tr>
</thead>
</table>

[R-DIRECTION, A-DIRECTION]

- R-DIRECTION (RELATIVE DIRECTION): corresponds to the ship’s heading direction
- T-DIRECTION (TRUE DIRECTION): corresponds to the compass direction

15. CURSOR POSITION

Select the display way of CURSOR POSITION when an External Navigator connected. Use the Cursor Shift key (↓ or ↑) to select “CURSOR POSITION”. Use the Cursor Shift key (← or →) to change the setting.

<table>
<thead>
<tr>
<th>CURSOR POSITION</th>
<th>DISTANCE</th>
</tr>
</thead>
</table>

[DISTANCE, LAT/LONG]

- DISTANCE: displays the distance of the cursor position
- LAT/LONG: displays the cursor position in latitude/longitude.
OTHERS

[MODE DIAL – MENU 2 – OTHERS]

<table>
<thead>
<tr>
<th>OTHERSARC</th>
<th>RETURN MARK</th>
<th>Press the Cursor Selection key ▲/▼ to return to MENU 2.</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUDIO LEVEL</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>TARGET LOCK</td>
<td>MODE0</td>
<td></td>
</tr>
<tr>
<td>TRIGGER SIGNAL</td>
<td>INTERNAL</td>
<td></td>
</tr>
<tr>
<td>DEPTH UNIT</td>
<td>m</td>
<td></td>
</tr>
<tr>
<td>TEMP. UNIT</td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td>TEMP. ADJUST</td>
<td>+0.0 °C</td>
<td></td>
</tr>
<tr>
<td>SPEED UNIT</td>
<td>kt</td>
<td></td>
</tr>
<tr>
<td>AUTO RETRACT</td>
<td>OFF</td>
<td></td>
</tr>
<tr>
<td>TRAIN CORRECT</td>
<td>0 °</td>
<td></td>
</tr>
<tr>
<td>PANEL BRIGHTNESS</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>POWER S.FREQUENCY</td>
<td>120k</td>
<td></td>
</tr>
<tr>
<td>HOIST AUTO DOWN</td>
<td>OFF</td>
<td></td>
</tr>
<tr>
<td>OPE. MODE MEMORY</td>
<td>OFF</td>
<td></td>
</tr>
</tbody>
</table>

Note that the value of Train Correct cannot be set here. CF page 82

1. AUDIO LEVEL

The audio volume can be selected when connecting an external speaker.

Use the Cursor Shift key (↓ or ↑) to select “AUDIO LEVEL”.

Use the Cursor Shift key (← or →) to change the setting.

<table>
<thead>
<tr>
<th>AUDIO LEVEL</th>
<th>0</th>
<th>Use the Cursor Shift key (↑ or ↓) to change.</th>
</tr>
</thead>
<tbody>
<tr>
<td>[0 – 31]</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Cursor Shift keys

[ ] : sets the value smaller.

[ ] : sets the value larger.

NOTE!

A speaker device (4 Ω) is required. CF page 31, 33, and 35.
2. TARGET LOCK

The desired target lock function can be selected, which is activated by pressing the Target Lock key (▲) while SONAR MODE or BOTTOM-SCAN MODE (only in case of MODE0) operated. It can change the rotary direction, track the target or the position specified with a cursor automatically.

Use the Cursor Shift key (↓ or ↑) to select “TARGET LOCK”.

Use the Cursor Shift key (← or →) to change the setting.

TARGET LOCK MODE0

[MODE0, MODE1, MODE2, MODE3]

MODE 0 (REVERSE)
Each press of the Target Lock key reverses the sector rotary direction. Note that the automatic tracking is not available in this MODE 0.

MODE 1 (RIGHT - LEFT)
Press the Target Lock key to track the reaction automatically. “TARGET LOCK” sign appears on the upper left corner of the screen or on the display position of BEARING and SECTOR in the INFORMATION display. MODE 1 reverses the soundome train direction only right and left and track the target automatically.

If it should have lost the target after a 60° reverse sweep, this function is released.

MODE 2 (UP-DOWN, RIGHT-LEFT)
One time of up and down detection is added after 3 times of MODE 1 detection. Other actions are the same with MODE 1.
MODE 3
Target mark appears on the screen and tracks the target automatically after placing the Cross cursor on the target and press the Target Lock key.

Target mark moves along with the own ship on the screen.

Target mark also appears on the sub menu if TRACK is selected.

NOTE!
- Tilt and Bearing keys are inoperative while Target lock function is active.
- Target lock function is released when Range, Sector and Display mode changed.
- Bearing and Sector angles will back to the original values when Target Lock function is released. The value of Tilt angle of activating Target lock remains.
- Target lock function is inoperative while SOUNDER MODE is active.
- It is only operative in case of [Bottom-Scan mode - MODE0] selected.
- It is inoperative other than MODE0.

3. TRIGGER SIGNAL
Select which Trigger signal to use.

Use the Cursor Shift key (↓ or ↑) to select “TRIGGER SIGNAL”.

Use the Cursor Shift key (← or →) to change the setting.

[INTERNAL, EXTERNAL]

INTERNAL: activates the internal trigger signal of S-1900.

EXTERNAL: activates the signal from an external unit.
(when another echo sounder synchronized)

NOTE!
The sweeping speed might be slower depending on the depth when the S-1900 is synchronizing with an external echo sounder.
Using the internal trigger signal of S-1900 is recommended for synchronizing with an external echo sounder.
The output terminal for trigger signal has prepared in the unit. CF page 106
4. DEPTH UNIT
The unit of depth measurement can be selected. Use the Cursor Shift key (↓ or ↑) to select “DEPTH UNIT”. Use the Cursor Shift key (← or →) to change the setting.


5. TEMPERATURE UNIT
The unit of temperature measurement can be selected. Use the Cursor Shift key (↓ or ↑) to select “TEMP. UNIT”. Use the Cursor Shift key (← or →) to change the setting.


6. TEMPERATURE ADJUSTMENT
The water temperature displayed on the screen can be adjusted. Use the Cursor Shift key (↓ or ↑) to select “TEMP. ADJUST”. Use the Cursor Shift key (← or →) to change the setting.


\[ -9.9 \degree C \text{ to } +9.9 \degree C \text{, every 0.1 unit} \]
7. SPEED UNIT
The unit of the ship’s speed displayed on the screen can be selected when an external navigator connected.

Use the Cursor Shift key (↓ or ↑) to select “SPEED UNIT”.

Use the Cursor Shift key (← or →) to change the setting.

<table>
<thead>
<tr>
<th>SPEED UNIT</th>
<th>kt</th>
</tr>
</thead>
</table>

[ kt, km/h ]

kt: displays the speed in knots.

km/h: displays the speed in km/h.

8. AUTO RETRACT
The soundome can be raised automatically when the ship’s speed exceeds the speed previously set. The preset speed can be set.

Use the Cursor Shift key (↓ or ↑) to select “AUTO RETRACT”.

Use the Cursor Shift key (← or →) to change the setting.

<table>
<thead>
<tr>
<th>AUTO RETRACT</th>
<th>OFF</th>
</tr>
</thead>
</table>

[ OFF, 10kt (18km/h) ] Available setting ranges: 1-15kt (1km/h-27km/h)

Use the Cursor Shift key (↑ or ↓) to set the speed after selecting the initial value.

↑: increases the value.

↓: decreases the value.

With the speed input the soundome can be raised automatically when the ship’s speed exceeds a preset speed. The down arrow appears at the down left corner of the screen when the soundome is being lowered. When this function is activated, the arrow changes into the up arrow. When the soundome is retracted completely, the sensor lamp on the control panel is turned off.

Soundome status indicator

: Sensor lamp on the control panel

CAUTION
The ship’s speed should not exceed 15 knots (27km/h) while retracting the soundome. The recommended setting speed is less 12kt (22km/h) considering the case that it speeds up without retracting the soundome.
9. TRAIN CORRECT

This changes the center direction of the detection range into the bow direction (0°).

Select the SONAR MODE and set the desired position by using the Bearing keys (→ or ←).

Open “MENU 2” and use the Cursor Shift key (↓ or ↑) to select “OTHERS-TRAIN CORRECT”. Press the Cursor Selection (←/→) so that the confirmation sign appears on the screen. Selecting “OK” displays the value for adjustment and the display of the current center direction is changed into the bow direction (0°). Selecting “CANCEL” cancel the current operation.

TRAIN CORRECT 90° ---- After pressing the Cursor Shift key (← or →), the angle of the center direction set at the menu of SONAR MODE appears.

BOW DIRECTION (0°)

To release this function, setting the current bearing at 0° and the procedure “TRAIN CORRECT” above again are required.

10. PANEL BRIGHTNESS

The backlight brightness of operation panel can be changed.

Use the Cursor Shift key (↓ or ↑) to select “PANEL BRIGHTNESS”.

Use the Cursor Shift key (← or →) to change the setting.

PANEL BRIGHTNESS 15 ---- Use the Cursor Shift key (← or →) to change.

[0 - 15]

- : increases the value and sets brighter.
- : decreases the value and sets darker.
11. POWER SUPPLY FREQUENCY

The switching frequency of the power supply is changed. The switching currents can cause electrical noise problems. The noise produced by the SMPS itself can be suppressed changing the frequency. It is usually not required to change the frequency other than noise problem.

Use the Cursor Shift key (↓ or ↑) to select “POWER FREQUENCY”.

Use the Cursor Shift key (← or →) to change the setting.

**POWER S. FREQUENCY 120k**

[ 120k, 125k, 130k ]

Select “120K” for normal use.

12. HOIST AUTO DOWN

With the function “HOIST AUTO DOWN ON” selected, the soundome is automatically lowered when the power turned on.

Use the Cursor Shift key (↓ or ↑) to select “HOIST AUTO DOWN”.

Use the Cursor Shift key (← or →) to change the setting.

**HOIST AUTO DOWN OFF**

[ OFF, ON ]

OFF: This function is inactive. The soundome is not automatically lowered.

ON: This function is active. The soundome is automatically lowered.

**NOTE !**

It takes time (some seconds) to lower the soundome even if the POWER ON key on the monitor or the key board pressed.
If “HOIST AUTO DOWN ON” selected, the Hoist starts to lower the soundome just before the unit starts working.
13. OPERATION MODE MEMORY

The memory of Operation Mode is restricted. CF page 103

It can avoid memorizing the operation accidentally by selecting OFF.

Use the Cursor Shift key (↓ or ↑) to select “OPE. MODE MEMORY”.

Use the Cursor Shift key (← or →) to change the setting.

OFF: The new settings for Operation Mode are not overwritten.

ON: The new settings for Operation Mode are overwritten.
COLOR PALETTE

[MODE DIAL – MENU 2 – COLOR PALETTE]

Press the Cursor Selection key \( \uparrow/\downarrow \) to return to MENU 2.

Use the Cursor Shift key \( \leftarrow/\rightarrow \) to select the desired item to change.

Use the Cursor Shift key \( \leftarrow/\rightarrow \) to change the settings.

1. COLOR SELECTION

The color of echoes and background (A-1, A-2, B-1 or B-2) can be set as desired. C-1 / C-2 can set the colors freely with Color palette function.

Use the Cursor Shift key \( \downarrow/\uparrow \) to select “COLOR SELECT”.

Use the Cursor Shift key \( \leftarrow/\rightarrow \) to change the setting.

COLOR SELECT A-1

[ A-1, A-2, B-1, B-2, C-1, C-2 ]

2. DISPLAY COLORS

The display colors, can be select. C-1 / C-2 can set the colors freely with Color palette function.

Use the Cursor Shift key \( \downarrow/\uparrow \) to select “DISPLAY COLORS”.

Use the Cursor Shift key \( \leftarrow/\rightarrow \) to change the setting.

DISPLAY COLORS 8

[ 8, 16 ]
HOW TO SET COLOR PALLETTE

Color palette can provide 2 color patterns (C-1 & C-2) freely.

The initial color pattern of C-1 is the same with A-1 and C-2 are is the same with A-2.

Use the Cursor Shift key (← or →) to select “C-1” or “C-2”, which activates the “INITIAL SETTINGS” and “EDIT” functions.

Use the Cursor Shift key (↓ or ↑) to select “INITIAL SETTINGS” and press the Cursor Selection key □/+ to back to the “INITIAL SETTINGS”.

Use the Cursor Shift key (← or →) to select “EDIT” and press the Cursor Selection key □/+ . Color palette appears on the screen.

Use the Cursor Shift key (H or H) to select the color to set, which activates the RGB ratio function.

Press the Cursor Selection key □/+ to close this menu.

Use the Cursor Shift key (L or L) to select R, G or B for the ratio change □

Use the Cursor Shift key (L or L) to change the ratio value (0 to 15).

15 is the strongest in RGB and its tone decreases in accordance with the smaller number.

Move the Frame to the top after the RGB setting □ Press the Cursor Selection key □/+ to close this menu and the desired settings are memorized in C-1 or C-2 □

COLOR PALETTE!

Various desired colors can be created from changing RGB ratio.

Color palette function provides the creation of desired colors.

Utilize this Color palette function to set the most visible display for the reaction of fish schools.
REMOTE CONTROL SET (OPTION)

Previously set the key each on the remote controller before use.

[MODE DIAL – MENU 2 – REMOTE CONTROL SET]

See CF page 110 for the settings in details.
FUNCTION SETTINGS

FREQUENCY SETTING

Press the Cursor Selection key ▼/▼ to return to MENU 2.

Use the Cursor Shift key (or ▼) to select the desired item to change.

Use the Cursor Shift key (or ▼) to change the settings.

1. TX FREQUENCY

Adjust the transmitting frequency of the S-1900 and the receiving frequency changes in conjunction with the transmitting frequency.

It can be changed from the basic frequency to ▼ 10kHz every 0.1kHz unit.

Use the Cursor Shift key ( or ▼) to select “TX FREQUENCY”.

Use the Cursor Shift key ( or ▼) to change the setting.

TX FREQUENCY 180.0kHz

[ BASIC FREQUENCY to ▼ 10kHz ]

: decreases every 0.1kHz of the values of the frequencies for TX FREQUENCY and RX FREQUENCY.

: increases every 0.1kHz of the values of the frequencies for TX FREQUENCY and RX FREQUENCY.

2. RX FREQUENCY

Adjust the receiving frequency of the S-1900, but the transmitting frequency does not change in conjunction with the receiving frequency.

It can be changed from the basic frequency to ▼ 10kHz every 0.1kHz unit.

Use the Cursor Shift key ( or ▼) to select “RX FREQUENCY”.

Use the Cursor Shift key ( or ▼) to change the setting.

RX FREQUENCY 180.0kHz

[ BASIC FREQUENCY to ▼ 10kHz ]

: decreases every 0.1kHz of the values of the frequencies for RX FREQUENCY.

: increases every 0.1kHz of the values of the frequencies for RX FREQUENCY.

NOTE!

The basic frequencies of TX FREQUENCY and RX FREQUENCY is specified by the unit the customer purchases.
SELF CHECK
The following messages appear on the display.
This function checks the battery voltage, the internal voltage, the hoist up and down or the conditions of the stepping motor in the soundome.

Use the Cursor Shift key \[←\] or \[→\] to select “RETURN MARK” and press the Cursor Selection key \[0 \dors 1\] to close this menu.

Select “SAVE REPORT” to store the report of Self Check in the USB memory.

NO PROBLEM:
appears when the system has no problem.

MB (Main Board): ABNORMAL POWER SUPPLY VOLTAGE:
appears when the abnormal voltage detection of the battery is suspected.

HB (Hull Board): NO RESPONSE:
appears when the disconnection of the wiring between Hull Unit and the communication line is suspected.

HOIST: BLOWN FUSE:
appears when the blown fuse in the hoist is suspected.

HOIST: UP (DOWN) LIMIT NOT DETECTED:
appears when the abnormal upper (down) limit switch is suspected.

TRAIN MOTOR: DISCONNECTION
appears when the abnormal train motor is suspected.

TILT MOTOR: DISCONNECTION
appears when the abnormal tilt motor is suspected.

TRAIN MOTOR: ABNORMAL DETECTION OF ORIGIN
appears when the abnormal train motor or the abnormal detection of training position inside the soundome is suspected.

TRAIN MOTOR: STEP OUT
appears when the abnormal train motor or the abnormal detection of training position inside the soundome is suspected.

NOTE!
Both TRAIN MOTOR: ABNORMAL DETECTION OF ORIGIN and TRAIN MOTOR: STEP OUT appear when the Hall IC board in the soundome is abnormal.

TRAIN MOTOR: DISCONNECTION, TRAIN MOTOR: ABNORMAL DETECTION OF ORIGIN and TRAIN MOTOR: STEP OUT appear all when the soundome is total breakdown.
FUNCTION SETTINGS

MAINTENANCE

[MODE DIAL – MENU 2 – MAINTENANCE]

Press the Cursor Selection key (或+) to return to MENU 2.

Use the Cursor Shift key (或)to select the desired item to change. Each menu appears after the Cursor Selection key (或+) pressed.

LANGUAGE

Use the Cursor Shift key (或) to select “LANGUAGE”.
Use the Cursor Shift key (或) to select the desired language.
It is required to turn the power off once to determine the language. Hold the OFF key for a while and then turn the ON key.

ELAPSED TIME

It indicates the total time that elapses while the S-1900 operating and can be reset.
Use the Cursor Shift key (或) to select “ELAPSED TIME”.
The following menu appears on the bottom of the screen after pressing the Cursor Selection key (或+).

ELAPSED TIME RESET

Do you reset elapsed time?
OK CANCEL

CANCEL: Use the Cursor Shift key (或) to select “CANCEL” and press the Cursor Selection key (或+) to finish this menu.
OK: Use the Cursor Shift key (或) to select “OK” and press the Cursor Selection key (或+) to reset the elapsed time. 0H appears on the screen.

1. UPDATE

This is the way to update the version of the program.
Use the Cursor Shift key (或) to select “UPDATE”.
The following menu appears on the bottom of the screen after pressing the Cursor Selection key (或+) Use the Cursor Shift key (或) to select.

UPDATE

![Insert the USB stick contains updated files](NEXT CANCEL)

Use the Cursor Shift key (或) to select “CANCEL” and press the Cursor Selection key (或+) to close this menu.

<To be continued>
FUNCTION SETTINGS

[ HOW TO UPDATE VERSION ]
Insert the USB stick contains the upgraded files.
Use the Cursor Shift key (← or →) to select “NEXT”.
Pressing the Cursor Selection key (0/+ updates the program.
After rebooting the unit, it is operated with the updated version.

2. BACKUP
This is the way to back up the settings.
Use the Cursor Shift key (↓ or ↑) to select “BACKUP”.
The following menu appears on the bottom of the screen after pressing the Cursor Selection key (↓/+). Use the Cursor Shift key (0 or 1) to select.

[ HOW TO BACK UP THE SETTINGS ]
Use the Cursor Shift key (0 or 1) to select where to back up (INTERNAL or MEMORY USB) and press the Cursor Selection key (↓/+ to backup the settings.

3. RECOVERY
This is the way to recover the settings.
Use the Cursor Shift key (↓ or ↑) to select “RECOVERY”.
The following menu appears on the screen after pressing the Cursor Selection key (↓/+). Use the Cursor Shift key (0 or 1) to select.

[ HOW TO RECOVER THE SETTINGS ]
Use the Cursor Shift key (0 or 1) to select what to recover (INTERNAL, MEMORY USB or FACTORY SETTINGS) and press the Cursor Selection key (↓/+ to recover the settings.
Selecting the factory settings will back to the factory settings.

4. VERSION
Use the Cursor Shift key (↓ or ↑) to select “VERSION” to know the version of the program in this unit.
CHAPTER 5

DESCRIPTIONS of DIALS and KEYS

This Chapter explains how to use the dials and keys.

Dials

- Mode Dial .................................................. 93
- Range Dial ................................................. 93
- Sector Dial .................................................. 94
- Brightness Dial .......................................... 95
- Gin Dial ..................................................... 95
- Far Gain Dial ............................................... 95

Keys

- Power Supply Key ON/OFF ......................... 96
- Hoist Key ................................................... 96
- Sensor Lamp ............................................. 96
- Bearing Key ............................................... 97
- Tilt Key .................................................... 98
- Cursor key ............................................... 99
- Target Lock Key ....................................... 101
- Mark Key .................................................. 102
- Threshold Key ......................................... 102
- Operation Mode Key ................................. 103
MODE DIAL

The display mode is selected.
The Sub-Display menu displayed in the right split screen can be set via "MENU 2". [CF] page 66
The own ship’s position in the Off-Center Mode can be set via "MENU 2". [CF] page 73

OFF-CENTER MODE  BOTTOM-SCAN MODE  SOUNDER MODE

SONAR MODE (360 degree coverage)  RANGE SETTING MENU

RANGE DIAL

The basic ranges can be changed.
8 ranges can be set via "MENU 1". [CF] page 56
The unit of range measurement can be selected via "MENU 2". [CF] page 80
The display (ON/OFF) of Scale dots can be selected via "MENU 2". [CF] page 73

Display of the Range in selected unit

Changes this distance
SECTOR DIAL

The horizontal training angle can be changed when SONAR MODE selected. The vertical training angle can be changed when BOTTOM-SCAN MODE selected.

[SONAR MODE]
Displays the selected sector angle

Changes this angle

Clockwise rotation (●) increases the sector width and counterclockwise rotation (○) decreases it. The desired step can be selected via "MENU 2". CF page 72

SONAR MODE

<table>
<thead>
<tr>
<th>STEP</th>
<th>5°</th>
<th>10°</th>
<th>15°</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>5</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>10</td>
<td>25</td>
<td>30</td>
<td>45</td>
</tr>
<tr>
<td>15</td>
<td>45</td>
<td>50</td>
<td>75</td>
</tr>
</tbody>
</table>

BOTTOM-SCAN MODE

<table>
<thead>
<tr>
<th>STEP</th>
<th>3°</th>
<th>5°</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>27</td>
<td>25</td>
</tr>
</tbody>
</table>

DIALS
**BRIGHTNESS DIAL**

Screen brilliance can be increased by rotating this dial clockwise and decreases by rotating it counterclockwise.

This dial cannot adjust the brightness of control panel and its brightness can be only set via "MENU 2 – PANEL BRIGHTNESS". [CP] page 82

**GAIN DIAL**

Rotating this dial clockwise can adjust or increase the sensitivity of the sonar display.

The gain value can be set via "MENU 2 – GAIN UP". [CP] page 60

**FAR GAIN DIAL**

Rotating this dial clockwise increases sensitivity of the sonar for the last half of the displayed range and adjusts the TVG curve. [CP] page 61
KEYS

POWER ON/OFF KEYS

**ON** key
Press this key to turn on the power. The soundome is automatically lowered. The sensor lamp on the control panel lights while the soundome is being lowered. The sign “Please wait” appears on the bottom of the screen. The sonar operation starts after the sign disappears.

**OFF** key
Press this key to turn off the power. The soundome is automatically raised. The sign “Please wait” appears on the bottom of the screen. The power is turned off after the sign disappears. The sensor lamp ( ) is off after the soundome is retracted into the Trunk Pipe. **Do not turn off the power on the hull unit until the sensor lamp is off.**

HOIST KEYS

↑ : HOIST UP KEY / ↓ : HOIST DOWN KEY
The hoist keys raises and lowers the soundome while operating the S-1900. Pressing the hoist up key raises the soundome and the mark on the lower left screen changes into the up arrow (↑). The sensor lamp is off after the retraction of the soundome is completed.
Pressing the hoist down key lowers the soundome, the mark changes into the down arrow (↓) and the sensor lamp lights. Down the ship's speed and press the hoist down key in case the soundome is retracted by the function “AUTO RETRACT”.

NOTE!
[ X ] in red appears on the left corner of the screen in case of the malfunction of raising/lowering of the Soundome.

SENSOR LAMP

The sensor lamp lights while the soundome is being lowered. **Do not turn off the power on the hull unit until the sensor lamp is off.**
BEARING KEY

[SONAR MODE]
The center direction of the detection range can be shifted as follows.

5° step shift

Displays values of Sector angle

This arrow mark shows the center direction.

5° step shift

This key changes scanning direction counterclockwise

This key changes scanning direction clockwise

Display of scanning direction

Displays the scanning direction of the bow.

Displays the direction of the bow every 90°.

[BOTTOM-SCAN MODE]
The direction of the detection range can be shifted.

5° step shift

This key changes the center direction

5° step shift

This key changes the center direction counterclockwise

This key changes the center direction clockwise

Display of scanning direction

Displays the scanning direction of the bow.

Displays the direction of the bow every 90°.

[SOUNDER MODE]
The direction of the detection range can be shifted together with “TILT KEY”. The shifted angle is the same with BOTTOM-SCAN MODE.

CF page 99
TILT KEY

[SONAR MODE]
The tilt angle can be changed.

Variable Tilt angle: in increments of 1° from -5° (0°) to -90°

[BOTTOM-SCAN MODE]
The scanning center can be shifted.

Variable Tilt angle (Refer to the page 72 for the setting of step.)
3° step: in increments of 3° from –3° to –90°
5° step: in increments of 5° from –5° to –90°

<to be continued>
[SOUNDER MODE]
The direction of emitting the sound wave and the bearing of the detection can be shifted together with “BEARING KEY”.

Variable Tilt angle: in increments of 1 ° from –5 ° ( 0 °) to –90 °

Use the Depth marker to measure the depth other than the tilt angle –90 °.

CURSOR KEY

Use 2 types (one type in case of SOUNDER MODE) of Cursor to display the range from own ship to the cursor location.
Use the Cursor selection key to select the cursor.
Use the Cursor shift keys to move the cursor.

- Use the Cursor shift keys to move the cursor.

<to be continued>
[when the power turned on]
No cursors appear on the screen when the power turned on. Press the Cursor selection key (\(\text{[○/+]}\)) to activate the function.
Press the Cursor shift keys (\(\text{[↓]}\) or \(\text{[↑]}\)) to display the Marker.
Press the Cursor selection key again to activate this function.
(In case of SOUNDER MODE, this function is off.)
Inactive functions are displayed in yellow.
The Marker and the Cursor disappear after pressing the Cursor selection key again.

[when the Marker selected] (Cross cursor displayed in yellow or no display)

**SONAR MODE**

**BOTTOM SCAN MODE**

**SOUNDER MODE**

*Marker data displays in the submenu.*
[when the Cross cursor selected] (Marker displayed in yellow or no display)
In case of SOUNDER MODE this function is inactive.

Use the Cursor shift keys to place the cursor where desired. The data of the “Cross Cursor” is displayed in the submenu.

This Cross cursor is also used for placing the event mark (CF page 102) and target mark (CF page 79).

**TARGET LOCK KEY (arius)**
The following Target lock key actions are available in the SONAR MODE and in the BOTTOM-SCAN MODE – MODE 0 only and it is different action depending on the selected menu via “MENU 2 – TARGET LOCK.

- Setting MODE 0: the train direction is reversed.
- Setting MODE 1 & 2: it tracks the target automatically.
- Setting MODE 3 (an external navigator should be connected):
  Place the Cross cursor on the target and press the Target lock key. A target mark is inscribed at the Cross cursor location and tracks the target automatically. Refer to the page 78 “TARGET LOCK” for details.

**NOTE!**

This Target lock key is not available other than the above Modes.
MARK KEY

The Mark key functions to mark desired locations on the screen, and 5 marks can be inscribed at the Cross cursor locations desired. Move the Cross cursor to the desired locations and press the Mark key.

The Mark \(\bigotimes\) appears at the Cross cursor location and moves with ship’s movement.

\[\begin{array}{c}
\text{This mark also appears on the screen when the sub-display, WAKE display is active.}
\end{array}\]

THRESHOLD KEY

This key can eliminate the appearance of unwanted week colors. It can eliminate small fish and unidentified objects and display the clearer images. Each time this key is pressed, one of the weakest display colors is eliminated.

\[\begin{array}{c}
\text{Color scale}
\end{array}\]
OPERATION MODE KEY

3 different types of customized operation settings can be registered previously. Press one of the Operation mode keys to operate the units with the desired settings soon after pressing it.

Open MENU 2 display and press one of the Operation mode keys. The following “OPERATION MODE” menu appears on the screen. Use the Cursor Shift key (↓ or ↑) to highlight the item to change. Use the Cursor Shift key (← or →) to change the setting values.

<table>
<thead>
<tr>
<th>OPERATION MODE 1 (2, or 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DISPLAY MODE</td>
</tr>
<tr>
<td>RANGE</td>
</tr>
<tr>
<td>STEP</td>
</tr>
<tr>
<td>SECTOR</td>
</tr>
<tr>
<td>BEARING</td>
</tr>
<tr>
<td>TILT</td>
</tr>
<tr>
<td>GAIN UP</td>
</tr>
<tr>
<td>TVG CURVE</td>
</tr>
</tbody>
</table>

Each time the Cursor shift key (↓ or ↑) Pressed, the value changes

Use the Mode dial to back to the desired mode after the settings completed. Press one of the desired keys (1, 2 or 3) to activate the memorized operation menu.

Even if the settings are changed via MENU 2 or Control panel, the settings in the Operation mode (1, 2 or 3) remain.

In case the settings are changed via MENU 2 or Control panel while the Operation mode is used, the action will follow the changed settings, but it back to the Operation mode by pressing one of the operation mode keys again.

NOTE!

This is the way to register the operation mode being used without opening the “OPERATION MODE” menu.

Hold one of the operation mode keys (1, 2 or 3) for 3 seconds after the first buzzer. The desired settings is registered in the selected operation mode key after the buzzer sounds again.

Do not release the key until the second buzzer sounds. Otherwise the new settings cannot be registered.

Selecting [MODE DIAL - MENU2 – OTHERS – OPE.MODE MEMORY OFF] can protect overwriting the new settings of the operation.

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CHAPTER 6

OPTION

This chapter provides you the explanation related to the optional input/output terminals and the remote controller.

Option

<table>
<thead>
<tr>
<th>Option</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option List</td>
<td>105</td>
</tr>
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<td>Input/Output Terminals</td>
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<td>Input/Output Terminals (M12)</td>
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<td>Input/Output Terminals (M15)</td>
<td>108</td>
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<td>109</td>
</tr>
<tr>
<td>Remote Controller</td>
<td>110</td>
</tr>
</tbody>
</table>
## OPTION LIST

### For M12/M15/MBB

<table>
<thead>
<tr>
<th>P. No.</th>
<th>Description</th>
<th>Terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>OP-287</td>
<td>Remote Controller Connect Cable Assy</td>
<td></td>
</tr>
<tr>
<td>CRC-201</td>
<td>Remote Controller</td>
<td>with 4m cable</td>
</tr>
<tr>
<td>OP-360</td>
<td>VGA Connect Cable Assy</td>
<td></td>
</tr>
<tr>
<td>OP-190</td>
<td>Trigger Output Cable 36981D</td>
<td></td>
</tr>
<tr>
<td>OP-191</td>
<td>Trigger Output Cable 36982D with FM14-8Pplug</td>
<td></td>
</tr>
<tr>
<td>TS2GJFV33</td>
<td>USB Flash Drive 2GB</td>
<td></td>
</tr>
</tbody>
</table>

### For M12

<table>
<thead>
<tr>
<th>P. No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OP-131</td>
<td>Panel Mount Fittings for 12.1-inch LCD</td>
</tr>
</tbody>
</table>

### For S-1900 H

<table>
<thead>
<tr>
<th>P. No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OP-700</td>
<td>S-1900 Junction Box Mounting Kit</td>
</tr>
</tbody>
</table>

For M12/M15/MBB:
- **OP-287 Remote Controller Connect Cable Assy**
- **CRC-201 Remote Controller**
- **OP-360 VGA Connect Cable Assy**
- **OP-190 Trigger Output Cable 36981D**
- **OP-191 Trigger Output Cable 36982D with FM14-8Pplug**
- **TS2GJFV33 USB Flash Drive (2GB)**

For M12:
- **OP-131 Panel Mount Fittings for 12.1-inch LCD**

For S-1900 H:
- **OP-700 S-1900 Junction Box Mounting Kit**

For the backup of the settings or the storage of the report of Self Check.
OPTION

INPUT/OUTPUT TERMINALS

The following optional terminals are required to connect a remote controller and an External monitor.

This is to indicate the settings for the interface setups. Note that the connection cables between the S-1900 and the external units to be connected are not supplied as standard.

<table>
<thead>
<tr>
<th>P. No.</th>
<th>NAMES of TERMINALS</th>
<th>TERMINAL CONNECTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>OP-287</td>
<td>REMOTE CONTROLLER</td>
<td></td>
</tr>
<tr>
<td>OP-360</td>
<td>VGA OUTPUT</td>
<td>No1: RED OUTPUT</td>
</tr>
<tr>
<td></td>
<td>( TERMINAL for EXTERNAL MONITOR )</td>
<td>No2: GREEN OUTPUT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No3: BLUE OUTPUT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No5: GND</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No6: RED GND</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OTHER Nos: NC</td>
</tr>
<tr>
<td>STANDARD SUPPLY</td>
<td>ALARM ( TERMINAL for EXTERNAL BUZZER)</td>
<td>No1: ALARM</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No2: ALARM</td>
</tr>
<tr>
<td>STANDARD SUPPLY</td>
<td>TRIG - OUT ( TERMINAL for TRIGGER OUTPUT )</td>
<td>No1: TRIGGER OUTPUT +</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No2: SHIELD</td>
</tr>
<tr>
<td>STANDARD SUPPLY</td>
<td>NAV - IN ( TERMINAL for NAVIGATOR )</td>
<td>No1: SIGNAL INPUT +</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No2: SIGNAL INPUT -</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No3: SHIELD</td>
</tr>
<tr>
<td>STANDARD SUPPLY</td>
<td>NMEA - OUT ( TERMINAL for NAVIGATOR or Something else)</td>
<td>No1: SIGNAL INPUT +</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No2: SIGNAL INPUT -</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No3: SHIELD</td>
</tr>
<tr>
<td>STANDARD SUPPLY</td>
<td>SERIAL - IF ( TERMINAL for EXTERNAL SOUNDER )</td>
<td>No1: SIGNAL INPUT +</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No2: SIGNAL INPUT -</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No3: SHIELD</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No4: SIGNAL OUTPUT +</td>
</tr>
<tr>
<td>STANDARD SUPPLY</td>
<td>TRIG - IN ( TERMINAL for TRIGGER INPUT)</td>
<td>No1: TRIGGER INPUT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No2: NC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No3: NC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No4: NC</td>
</tr>
</tbody>
</table>

※ Note that nothing should be connected to the above NC.

A navigator can be connected to NMEA-OUT terminal (No.1 and No.2), but the data of NAV-IN terminal will prior to NMEA-OUT terminal (No.1 and No.2).
INPUT/OUTPUT TERMINALS (M12)

Remove all cables connected to the rear side of the monitor M12 before mounting any terminals.

1) Remove 8 Binding Screws holding the Case Cover and the Rear Panel (Drawing A position).
2) Remove 4 Tapping Screws holding the Case Cover and the Front Case (Drawing B position) and remove the Case Cover backward.

3) Remove the Blind Lid to mount the terminal. Mount it referring to the above drawing.
4) Insert the connector of the terminal into the specified terminal of the Main Board or the External Connecting Board. CF page 109

   - VGA OUTPUT Terminal → J3 or J4 on the Main Board
   - REMOTE CONTROLLER TERMINAL → J3

5) Put the Case Cover back to its original place after finishing the mounting work.
OPTION

INPUT/OUTPUT TERMINALS (M15)

Remove all cables connected to the rear side of the monitor M15 before mounting any terminals.

1) Remove 10 Binding Screws holding the Case Cover and the Rear Panel (Drawing A position).

2) Remove the Blind Lid to mount the terminal. Mount it referring to the above drawing.

3) Insert the connector of the terminal into the specified terminal of the Main Board or the External Connecting Board. CF page 109

   - VGA OUTPUT Terminal □ J3 or J4 on the Main Board
   - REMOTE CONTROLLER TERMINAL □ J3 on the External Connecting board

4) Put the Rear Case back to its original place after finishing the mounting work.

DANGER
Do not open the Case Cover thoughtlessly.
There might be some high voltage potion inside the unit which sometimes causes death or injury.
Only qualified personnel should work on mounting terminals.
INPUT/OUTPUT TERMINALS (MBB)

Remove all cables connected to the unit, the MBB before mounting any terminals.
1) Remove 4 Binding Screws holding the Lid of the MBB and remove the Lid (Drawing A position).
   - Remove the Blind Lid or the Cap to mount the terminal. Mount it referring to the above drawing.
   - Insert the connector of the terminal into the specified terminal of the Main Board or the External Connecting Board.

   - VGA OUTPUT Terminal → J3 or J4 on the Main Board No.792
   - REMOTE CONTROLLER TERMINAL → J3 on the External Connecting board No.796

2) Put the Lid of the MBB back to its original place after finishing the mounting work.

DANGER

Do not open the Case Cover thoughtlessly.
There might be some high voltage potion inside the unit which sometimes causes death or injury.
Only qualified personnel should work on mounting terminals.

Main Board No.792

External Connecting Board No.796
REMOTE CONTROLLER

Connect the terminal of the Remote Controller to the specified port.

1) Select the Mode Dial (MENU 2)
2) Use the Cursor Shift key (↓ or ↑) to select “REMOTE CONTROL” and press the Cursor Selection key (○/+) so that the following menu appears on the screen.

REMOTE CONTROL (Initial Settings)
RETURN MARK
1 BEARING LEFT
2 BEARING RIGHT
3 HOIST UP
4 TILT UP
5 HOIST DOWN
6 TILT DOWN
7 MARK
8 TARGET

Use the Cursor Shift key (↓ or ↑) to select the key number to be changed.

Bearing Key
changes the center direction right or left.

Tilt Key
adjusts the Tilt Angle.

Target Lock Key
reverses the sector rotary direction or the track the reaction automatically.

Mark Key
enters the Mark.

Hoist Key
raises or lowers the Soundome.

Each time the Cursor Shift key (← or →) pressed, the item appears in the following orders.

OPE. MODE 1, OPE. MODE 2, OPE.MODE3, TARGET, MARK, THRESHOLD, CURSOR SEL., CURSOR UP, CURSOR DOWN, CURSOR RIGHT, CURSOR LEFT, RANGE SHALLOW, RANGE DEEP, HOIST UP, HOIST DOWN, TILT UP, TILT DOWN, BEARING RIGHT, BEARING LEFT, OPE.MODE 1........]

All ranges of the range setting menu can be controlled by the remote control keys until the Range Dial operated.
ADDITIONS

DISPOSAL

WARNING

The S-1900 contains the lithium battery of high-density energy. Careless disposal of the lithium battery causes electric shorts, impact, heat, electrical shock, explosion, injury, fire and so on.

DISPOSAL OF S-1900

Dispose of the S-1900 in accordance with local regulations.

DISPOSAL OF LITHIUM BATTERY

Place a piece of adhesive tape across the plus and minus terminals before disposing of the lithium battery. Dispose of the lithium battery in accordance with local regulations.
# SPECIFICATIONS

## DISPLAY UNIT

<table>
<thead>
<tr>
<th>Model Name</th>
<th>S-1900 M12</th>
<th>S-1900 M15</th>
<th>S-1900 MBB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display</td>
<td>12.1-inch TFT color LCD</td>
<td>15-inch TFT color LCD</td>
<td>w/out Display Unit</td>
</tr>
<tr>
<td>Weight</td>
<td>9kg (bracket included)</td>
<td>12kg (keyboard included)</td>
<td>1kg (keyboard)+4.5kg (control unit)</td>
</tr>
<tr>
<td>Power Supply</td>
<td>10.5 - 30 Vdc</td>
<td>20 - 30 Vdc</td>
<td>20 - 30 Vdc</td>
</tr>
<tr>
<td>Sonar Type</td>
<td>Searchlight Sonar</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ranges</td>
<td>8 ranges freely set (Meters, Feet, Fathoms, Braccia can be selected)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sector Angle</td>
<td>(5° STEP) 5° 25° 45° 85° 125° 165° 205° 360°</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Sonar Mode)</td>
<td>(10°STEP) 10° 30° 50° 90° 130° 170° 210° 360°</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(15°STEP) 15° 45° 75° 105° 135° 165° 225° 360°</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sector Angle</td>
<td>(3° STEP) 3° 27° 45° 63° 93° 117° 147° 177°</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Bottom Scan Mode)</td>
<td>(5° STEP) 5° 25° 45° 65° 95° 115° 145° 175°</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sector Center</td>
<td>Sector center can be set every 5° step.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tilt Angle</td>
<td>+5° (0°) to -90° (1° step)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Display Mode</td>
<td>Sonar mode + Data display, Off-center mode + Data display</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Off-center on the whole screen (new !), Bottom scan mode+Data display, Sounder Mode + Data display</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sub-Display</td>
<td>Historical display, +Press display, + A-scope display, Track, EXT, Sounder display</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data Display</td>
<td>Range, Sector angle, Range scale, Power supply voltage, Water temperature, Color scale, Interference rejection, Gain, Far Gain, TVG graph, Latitude/Longitude and speed (option)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Sonar/Off-Center)</td>
<td>Sector center angle, Tilt angle, Tilt angle indicator, Ring marker, Cross Cursor</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Compass (option), Navigation (option)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Bottom Scan)</td>
<td>Own ship position, Scan image (2 types), VRM, Depth</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Additions</td>
<td>Operation mode (3 modes), Off-center (4 changes), Train correct, Power rejection</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Gain adjust, Temperature adjust, Pulse width control, TVG change, Target lock</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Color change (4 types + 2 types of color palette settings), Dynamic range</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Interference rejection, Threshold, Filter (OFF/1/2), Gain control, Far gain control</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Brightness control, External trigger synchronization, Trigger signal output</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hoist sensor lamp, Audio (optional speaker required), Stabilizer (up to 25°controllable)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Soundome automatic retract (Navigator connect required), Full-screen gain control (new!)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>External Input</td>
<td>Trigger input, Navigator input, External sounder input, Remote controller input</td>
<td></td>
<td></td>
</tr>
<tr>
<td>External Output</td>
<td>External buzzer, Trigger output, NMEA output, XGA output, Audio output</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>USB terminal (memory for setting values)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## HULL UNIT

<table>
<thead>
<tr>
<th>Model Name</th>
<th>S-1900 H80</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>80KHz</td>
</tr>
<tr>
<td>Weight</td>
<td>Hoist: 32kg (trunk pipe excluded) / Junction box: 5kg</td>
</tr>
<tr>
<td>Power Supply</td>
<td>10.5 – 30 VDC</td>
</tr>
</tbody>
</table>