MULTI DIRECTIONAL SEARCHLIGHT, COLOUR SONAR

S-1600

OPERATION MANUAL

10 INCH DISPLAY UNIT S-1600 M10
15 INCH DISPLAY UNIT S-1600 M15
180 KHz HULL UNIT S-1600 H180

SUZUKI FISH FINDER CO., LTD.

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<table>
<thead>
<tr>
<th>CONTENTS</th>
<th>PG</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONTENTS</td>
<td>1</td>
</tr>
<tr>
<td>INSTALLATION PRECAUTIONS</td>
<td>2</td>
</tr>
<tr>
<td>COMPOSITION</td>
<td>3</td>
</tr>
<tr>
<td>DIMENSION DIAGRAMS</td>
<td>5</td>
</tr>
<tr>
<td>INSTALLATION INSTRUCTIONS</td>
<td></td>
</tr>
<tr>
<td>[1] INSTALLATION POSITION</td>
<td>6</td>
</tr>
<tr>
<td>[2] TRUNK PIPE INSTALLATION</td>
<td>7</td>
</tr>
<tr>
<td>[3] HULL UNIT ASSEMBLY</td>
<td>11</td>
</tr>
<tr>
<td>[4] DISPLAY UNIT INSTALLATION</td>
<td>18</td>
</tr>
<tr>
<td>[5] CONNECTION INSTRUCTIONS</td>
<td>19</td>
</tr>
<tr>
<td>REFERENCE TERMS AND FUNCTIONS</td>
<td></td>
</tr>
<tr>
<td>[1] CONTROL PANEL KEYS</td>
<td>20</td>
</tr>
<tr>
<td>[2] REMOTE CONTROL KEYS</td>
<td>21</td>
</tr>
<tr>
<td>[5] HULL UNIT CONNECTION PANEL FUNCTIONS</td>
<td>23</td>
</tr>
<tr>
<td>INITIAL SETTING INSTRUCTIONS</td>
<td></td>
</tr>
<tr>
<td>[1] FACTORY SETTING</td>
<td>24</td>
</tr>
<tr>
<td>[2] RETURN TO FACTORY SETTING</td>
<td>24</td>
</tr>
<tr>
<td>[3] USER SETTING</td>
<td>25</td>
</tr>
<tr>
<td>BASIC OPERATION</td>
<td></td>
</tr>
<tr>
<td>[1] SEARCHLIGHT SONAR OPERATION</td>
<td>26</td>
</tr>
<tr>
<td>[2] SCREEN DISPLAY</td>
<td>28</td>
</tr>
<tr>
<td>[3] DISPLAY INFORMATION</td>
<td>30</td>
</tr>
<tr>
<td>OPERATION KEY FUNCTION INFORMATION</td>
<td></td>
</tr>
<tr>
<td>[1] MENU KEY</td>
<td>31</td>
</tr>
<tr>
<td>[2] HOIST RAISE/LOWER KEYS</td>
<td>41</td>
</tr>
<tr>
<td>[3] DISPLAY MODE KEYS</td>
<td>42</td>
</tr>
<tr>
<td>[4] TARGET LOCK KEY</td>
<td>42</td>
</tr>
<tr>
<td>[5] THRESHOLD KEY</td>
<td>43</td>
</tr>
<tr>
<td>[6] RANGE KEY</td>
<td>43</td>
</tr>
<tr>
<td>[7] SECTOR KEY</td>
<td>44</td>
</tr>
<tr>
<td>[8] MARKER KEYS</td>
<td>45</td>
</tr>
<tr>
<td>[9] BEARING KEY</td>
<td>46</td>
</tr>
<tr>
<td>[10] TILT KEY</td>
<td>46</td>
</tr>
<tr>
<td>[12] GAIN DIAL</td>
<td>47</td>
</tr>
<tr>
<td>[13] OFF/ON-BRIGHTNESS DIAL</td>
<td>47</td>
</tr>
<tr>
<td>SPECIFICATIONS</td>
<td>48</td>
</tr>
</tbody>
</table>
INSTALLATION PRECAUTIONS

[1] INSTALLATION POSITION

(1) MAGNETIC INTERFERENCE WARNING
   - To avoid magnetic interference to the display, please keep the unit separated from magnetic equipment such as loud speakers.
   - Also equipment effected by magnetism, compasses and tapes etc. should be kept separate from the Display Cabinet.

(2) HIGH TEMPERATURE WARNING
   Please avoid subjecting the Display Cabinet to high temperatures eg. prolonged exposure to direct sunlight, heat from engine exhaust pipes.

(3) MOISTURE WARNING
   The unit should be installed away from exposure to spray and rain. Failure to do so will eventually result in serious mechanical/electrical problems.

(4) VIBRATION WARNING
   Please avoid installing the S-1600 in areas subject to heavy vibration or violent shocks.

[2] LUBRICATION

   The Hoist Gears and Flange Unit require regular lubrication with grease.

[3] HIGH VOLTAGE WARNING

   High voltage electricity is stored inside the Display Cabinet even when the unit is turned off. The Display and Hull Unit’s covers should not be removed other than by a service man.

[4] ELECTRIC CURRENT WARNING

   - After installation please confirm the voltage between the Flange and the Battery’s negative terminal is not above 0.65 volts.
   - If the voltage exceeds 0.65 connect a thick electrical wire from the negative terminal to the Flange to reduce the voltage.
   - If the voltage is allowed to remain over 0.65 corrosion to the Soundome may result.
© COMPOSITION IS AS FOLLOWS

<table>
<thead>
<tr>
<th>MODEL</th>
<th>COMPOSITION No. 1</th>
<th>COMPOSITION No. 2</th>
<th>COMPOSITION No. 3</th>
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<tbody>
<tr>
<td>15INCH DISPLAY</td>
<td>P-1</td>
<td>P-2</td>
<td>P-3</td>
</tr>
<tr>
<td>10INCH DISPLAY</td>
<td>P-1</td>
<td>P-2</td>
<td>P-4</td>
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</table>

**P-1 HULL UNIT (S-1600 H180)**

<table>
<thead>
<tr>
<th>PART</th>
<th>CODE</th>
<th>PART No.</th>
<th>AMOUNT</th>
<th>DETAILS</th>
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<tbody>
<tr>
<td>Hull Unit</td>
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<td></td>
</tr>
<tr>
<td>Spare Parts</td>
<td><strong>S0010</strong></td>
<td>** S0001, **S0002, Grease, Crank Handle</td>
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</tr>
<tr>
<td>FUSE PACK</td>
<td><strong>S0001</strong></td>
<td>FGC 32V *</td>
<td>3 Each</td>
<td></td>
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<tr>
<td>Fuse 0.5A, 6A, 10A</td>
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<td>FM14-3P</td>
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<td></td>
</tr>
<tr>
<td>Fuse 5A, 8A</td>
<td></td>
<td></td>
<td>3 Each</td>
<td></td>
</tr>
<tr>
<td>3 Pin Connector</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ANP SET</td>
<td><strong>S002</strong></td>
<td>ANP 1</td>
<td>2</td>
<td></td>
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<tr>
<td>ANP Clip</td>
<td></td>
<td>T-18R</td>
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<tr>
<td>ANP Band</td>
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<tr>
<td>Nut</td>
<td></td>
<td>Ø16</td>
<td>8</td>
<td>SUS</td>
</tr>
<tr>
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<td>SUS</td>
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<tr>
<td>Flat Washer</td>
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<td>Flange Gum Packing</td>
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<tr>
<td>Trunk Pipe Flange</td>
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<td>30925C</td>
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<td>PVC</td>
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<tr>
<td>JOINT PIPE SET</td>
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<tr>
<td>Fixing Collar (a)</td>
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<td>32682D-Assy</td>
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**P-2 TRUNK PIPE/JOINT PIPE (S-1600 H180)**

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<tr>
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### P-3 15 INCH CABINET (S-1600 M15)

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<td></td>
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<td>31524D</td>
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<tr>
<td>CONNECTION PACK</td>
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<td></td>
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<td>FUSE 8A, 10A</td>
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<td></td>
<td>1</td>
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<tr>
<td>5 PIN METAL CON</td>
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</tr>
<tr>
<td>6 PIN METAL CON</td>
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<tr>
<td>HEXAGONAL BOLT</td>
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<td>INSTALL. BOLTS</td>
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<td>M8</td>
<td>10</td>
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<td>NUTS</td>
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<tr>
<td>WASHER</td>
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<tr>
<td>INSTAL. BRACKET</td>
<td>**SR110</td>
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<td>SIGNAL CABLE</td>
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<td>REMOTE CONTROL</td>
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### P-4 10 INCH CABINET (S-1600 M10)

<table>
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<td>**TE001, **TE002</td>
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<tr>
<td>ELECTRIC CABLE</td>
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<td>31524D</td>
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<tr>
<td>CONNECTION SET</td>
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<tr>
<td>FUSE 4A, 8A</td>
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<td>AUDIO PLUG</td>
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<td>SPRING WASHER</td>
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<td>Ø8</td>
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<td>FLAT WASHER</td>
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<td>INSTAL. BOLT SET</td>
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<td>INSTAL. BRACKET</td>
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<td>With Gum-Washer×4</td>
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<tr>
<td>HOIST CABLE</td>
<td>**TE142</td>
<td>33027D</td>
<td>1</td>
<td>15mtr</td>
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</table>
*The dimensions in the brackets ( ) refer to S-1600M10
INSTALLATION INSTRUCTIONS

AS CONDITIONS ON-BOARD THE VESSEL ALLOW PLEASE USE THE FOLLOWING INSTRUCTIONS AS A GUIDE FOR INSTALLATION OF THE HULL UNIT.

[1] INSTALLATION POSITION

© Select a position on the vessel as free from interference from turbulence/bubbles as possible.

- The best place for Hull Unit installation is usually 1/3 to 1/2 of the length of the vessel back from the bow, and directly above the keel. If this is not possible an installation point not further than one metre away from the keel is preferable.

CAUTION:
- Be sure the Sonar Beam will not strike any part of the vessel once the Soun dome is lowered and in operation.
- Please ensure there is sufficient space around the Hull Unit to allow inspection and maintenance.
- The Bow Mark on the Hull Unit Flange should be installed facing the bow of the vessel. If this is not practical, the Unit may be installed with the Bow Mark facing the stern. Under no circumstances should the Hull Unit be installed with the Bow Mark facing other than the bow or the stern.
[2] TRUNK PIPE INSTALLATION

(1) MAINTENANCE SPACE

© When installing the Trunk Pipe ensure the installation is strong and water-tight and there is sufficient space for maintenance and repair work.

© As the Hull Unit is not Water Proof please ensure it is installed in an area free from water.

© S-1600 180KHZ is shipped from the factory with a standard 1.681mm Joint Pipe.

© The Joint Pipe should be at least 181mm longer than the Trunk Pipe.

If sufficient space for the Hull Unit is not available (Lt+610) a hole should be made to accommodate the Hull Unit.

Ensure the Flange end of the Joint Pipe is above the water-line when the boat is fully loaded.

The Trunk Pipe should not project below the Keel.
(2) INSTALLATION CONDITIONS

© Please install the Trunk Pipe in accordance with the following Conditions.

- To be installed 1/3 to 1/2 of the boat length back from the bow.

- To be installed on the Keel or up to one metre from it.

- Ensure there is enough space left under the Flange to allow tightening of the Flange bolts.

- Ensure the Trunk Pipe does not project lower than the Keel.

- Ensure that the Trunk Pipe is installed so that the Flange is above the water-line when the vessel is fully loaded and running.

- To ensure the installation is completely water proof, seal all joints with fibreglass sealant.

- To keep interference from turbulence / bubbles to a minimum and avoid excessive water pressure when the vessel is in motion, ensure the end of the Trunk Pipe projecting from the ship's hull is protected by a streamlining board.

- When attaching supports to reduce vibration to the Trunk Pipe please ensure sufficient space is left for access to the Flange bolts.

CAUTION:

- WHEN INSTALLING THE HULL UNIT IT IS IMPORTANT THAT THE BOAT OWNER, THE CAPTAIN, AND THE TECHNICIAN COOPERATE TO ENSURE THE STRONGEST AND MOST WATER PROOF INSTALLATION METHOD AND POSITION.
3. TRUNK PIPE INSTALLATION EXAMPLE

- Decide on the installation point (Refer pgs 6-8).

- Make a hole for the Trunk Pipe in the hull of the vessel.

- Install the Trunk Pipe ensuring the Flange end will remain above the water line during normal running.
The Trunk Pipe protruding below the hull of the vessel must be sufficiently supported to protect against water pressure during normal running.

The Trunk Pipe and support structure should be streamlined to keep interference from turbulence / bubbles to a minimum.
[3] HULL UNIT ASSEMBLY

(1) JOINT PIPE LENGTH

© To allow clearance for the Soundome when the Hoist is lowered while providing protection for the Soundome inside the Trunk-Pipe when the Hoist is raised, the following formula for Joint-Pipe length should be observed.

STANDARD JOINT PIPE LENGTH = TRUNK PIPE LENGTH + 181mm

If the Joint Pipe is more than 181mm longer than the Trunk Pipe the point the Joint Pipe is secured on the Hull Unit may be adjusted or the Joint Pipe length may be adjusted.

(2) JOINT PIPE ADJUSTMENT

© If the Joint Pipe length is standard i.e. Trunk Pipe + 181mm, adjustment is unnecessary.

1. Cut the Joint Pipe to the required length.

2. Smooth the cut piece and taper the edge as shown.

3. 5mm from the end of the pipe and at an angle of 90° drill two Ø3.4 holes and tap with an M4 thread.

When using a short Trunk Pipe the Joint Pipe may be cut in the method explained above, or if the space above the Trunk Pipe allows the Joint Pipe may be used without being cut.

Make a mark on the Joint Pipe at Lt+160. The Joint Pipe will be attached to the Hull Unit at this point.
(3) SOUNDOME, JOINT PIPE, HULL UNIT ATTACHMENT

1. Soun dome Joint Pipe attachment
   When attaching the Joint Pipe to the Soun dome be sure not to damage the Joint Pipe thread or twist the Soun dome cable.
   - When attaching the Joint Pipe please ensure the connection is free from dirt and oil, and silicon sealant is applied.
   - Please ensure the connection is as strong as possible and that the two M4×10 bolts supplied are inserted to prevent loosening of the connection. Ensure silicon sealant is applied to the bolt-heads.
   - After the Joint Pipe has been attached mark the extreme end of the Joint Pipe with a Bow Mark corresponding to the direction of the Soun dome Bow Mark.

![Diagram of Joint Pipe and Soun dome attachment](image-url)
2 Attaching the Joint Pipe Guides.

- Thread the three Joint Pipe Guides onto the Joint Pipe in the direction shown below.

- Use the two M4×10 fixing bolts to attach the lower unit fixing collar so that the guides cannot move.

CAUTION

Be sure to use the lower unit fixing collar with the round head bolts not the upper unit fixing collar with the hexagonal headed bolts.

![Diagram of Joint Pipe Guides and fixing collar with bolts]
Attaching the Soundome to the Hoist

- Apply grease to the Flange opening.
- Making sure the water proof nut is loosened insert the Joint Pipe into the Flange opening then, ensuring the Bow Mark on the Joint Pipe is aligned with the Bow Mark on the Flange, attach the Joint Pipe to the Joint Arm. Ensure the Joint Pipe projects at least 30mm from the Joint arm. Ensure the lowest part of the Soundome is at least 50mm above the lowest part of the Trunk Pipe.
- Attach the upper unit fixing collar with the hexagonal head bolts so that the Joint Pipe will not slide out.

CAUTION

Be sure to use the upper unit fixing collar with the hexagonal head bolts not the lower unit fixing collar with the round head bolts.
4 Attaching the Pipe Cap to the end of the Joint Pipe.

- Insert the Pipe Cap into the end of the Joint Pipe as per the diagram below and tighten the round headed Pipe Cap bolts.

- To prevent loosening of the Pipe Cap, insert and tighten the two hexagonal headed locking bolts as shown.

5 Water Proof Nut and Locking Nut tightening.

- Lift up the Locking Nut as shown in the diagram below. Tighten the Water Proof Nut firmly by hand into the Flange opening, then using a screw-driver in the manner indicated and tapping the handle of the screw-driver with some solid object, tighten the Water Proof nut a further 180°. Be careful not to over tighten this nut.

- The Locking Nut prevents the Water Proof Nut from loosening. Again using a screw-driver and solid object. Tighten the Locking Nut in a clockwise direction.
Hull Unit and Trunk Pipe attachment.

Use the enclosed hexagonal head bolts (M16×55) to attach the Hull Unit to the Trunk Pipe as shown below. Before the bolts are completely tightened raise and lower the Soundome several times to ensure complete freedom of movement.

CAUTION
Please apply grease regularly to the Flange opening and Hoist gears.

CAUTION
Be sure to use the Flange gum packing as it is, without a bonding agent.
(4) ADJUSTING THE HOIST STROKE

© By adjusting the lower limit switch as shown in the diagram below the Hoist stroke may be adjusted from a minimum of 200mm to a maximum of 400mm. To ensure the Soundome stops at the correct position please adjust the limit switch as illustrated.

CAUTION
If the limit switch is raised please use the ANP base and plastic bands provided to ensure the limit switch wiring does not touch the Hoist gears.

(5) MANUAL OPERATION OF THE HOIST

© In the case of some mechanical trouble or accident where the Hoist is unable to raise the Soundome. The protective cap may be removed and the Hoist operated manually in the manner shown below

CAUTION
After the Hull Unit has been assembled please confirm the voltage between the Flange and battery minus terminal is not above 0.65 volts. If the voltage is above 0.65 connect a thick electrical wire from the terminal to the Flange in order to reduce the voltage. If the voltage is allowed to remain over 0.65 corrosion to the Soundome may result.
When selecting an installation point for the Display Unit please select an area free from direct sunlight, spray and heavy vibration.

- Firstly attach the installation bracket as illustrated then using the Hexagonal head bolts (30054D) connect the Display Unit to the installation bracket as shown left.

- When connecting the Display Unit to the installation bracket select one of three viewing angles.

- Please select the angle most suitable and insert the bolts as shown.
REFERENCE TERMS AND FUNCTIONS

[1] CONTROL PANEL KEYS

HOIST KEYS
- Soundome raise/lower

HOIST LAMP
- Lights when Hoist is down

THRESHOLD KEY
- Erases weak echoes, plankton, noise etc

DISPLAY CHANGE KEYS

TARGET LOCK KEY
- Use this key to lock the sonar beam onto the target echo

MENU KEY
- Displays on screen menu and enters the selection

RANGE KEY
- Adjusts the Range

V.R.M. KEY
- Adjusts the Variable Range Mark

BEARING KEY
- Moves the centre of the sector to the left or right

SECTOR KEY
- Adjusts sector angle

BEARING DIAL
- Erases weak echoes at short range

TILT KEY
- Adjusts tilt

FAR GAIN DIAL
- Erases weak echoes at short range

GAIN DIAL
- Adjusts the strength of the received echo signal

OFF/ON, BRIGHTNESS DIAL
- Turns the machine on and off. Increases/decreases brightness
[2] REMOTE CONTROL KEYS

BEARING KEY
- Moves the centre of the sector to the left or right

RANGE KEY
- Adjusts the Range

SECTOR KEY
- Adjusts the sector angle

TARGET LOCK KEY
- Use this key to lock the sonar beam onto the target echo

DISPLAY CHANGE KEY

Note, the Remote Control unit is an option with M10


SPEAKER TERMINAL     REMOTE CONTROL INPUT (7P)

FUSE SOCKET (10A FUSE)
Please ensure the correct fuse is installed

POWER SUPPLY (2P)
20~40 Volts acceptable

EARTH TERMINAL

HOIST TERMINAL (4P)

SIGNAL TERMINAL (10P)
Connects to Hull Unit signal cable

EXTERNAL NAVIGATOR (6P)
Connects to optional external navigation equipment

NMEA OUTPUT (6P)
Output in NMEA-0183 signal format
DEGAUSSING SWITCH
- When colour on part of the screen is abnormal press this key. If the condition persists press it again at 30 second intervals

IN/OUTPUT TERMINAL APERTURES
- May be connected to the cable kit listed below

REMOTE CONTROL OPTION ACCESS POINT

SIGNAL TERMINAL (10P)
- Connects to Hull Unit signal cable

SPEAKER TERMINAL

EARTH TERMINAL

HOIST TERMINAL (4P)

FUSE SOCKET
12V Battery=8A
14V Battery=4A
Please ensure the correct fuse is installed

POWER SUPPLY (2P)
- 11~40 Volts acceptable

© OPTIONAL IN/OUTPUT TERMINAL CABLE KIT

<table>
<thead>
<tr>
<th>PART NAME</th>
<th>FUNCTION</th>
<th>NOTES</th>
<th>TERMINAL CONNECTION</th>
</tr>
</thead>
</table>
| OP-165    | Nav Input cable | For use with external navigation equipment | No. 1: Signal Input -  
No. 2: Signal Input +  
No. 3: Shield  
No. 4: Signal Output+  
No. 5: Signal Output- |
| OP-166    | NMEA Output cable | Output signal in NMEA-018 format | No. 1: NC  
No. 2: NC  
No. 3: Shield  
No. 4: Signal Output+  
No. 5: Signal Output-  
No. 6: Shield |

CAUTION
Do not connect anything to the NC terminals.

NOTE
This kit is for connection between internal circuit boards and the rear panel IN/OUTPUT terminals. It is not for connecting the Display Unit to external equipment.
To ensure the connection of the control box are water with butyl gum tape then wrap these connections.

Audio cable connector
Limit switch cable connector
Signal cable connector
Soundome cable connector

Butyl tape application:
1. Unravel enough tape to wrap.
2. Wrap the tape carefully.
3. When applying the tape.
4. After wrapping press.
[5] HULL UNIT CONNECTION PANEL FUNCTIONS

© FUSE 1 · 2 · 3
Please use fuses in accordance with the chart below.

<table>
<thead>
<tr>
<th>FUSE</th>
<th>24 VOLT BATTERY</th>
<th>12 VOLT BATTERY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6A</td>
<td>10A</td>
</tr>
<tr>
<td>2</td>
<td>8A</td>
<td>5A</td>
</tr>
<tr>
<td>3</td>
<td>0.5A</td>
<td></td>
</tr>
</tbody>
</table>

When changing the fuses please ensure the correct fuses are used.

HOIST MOTOR CABLE
· For connection to the Hoist motor cable from the Sub Panel

TRIGGER SIGNAL OUTPUT (3P)

LIMIT SWITCH TERMINAL (8P)
· For connection to the 8P limit Switch cable from the Sub Panel

SOUNDOME TERMINAL (16P)
· For connection to the Soundome cable

MAIN PANEL

EARTH TERMINAL

POWER SUPPLY CABLE
· Supplies power to the Hull Unit

HOIST TERMINAL (4P)
· For connection to the 4P Hoist Cable from the Display-Unit

EARTH TERMINAL
· For connection to the Hoist Cable Earth Terminal

SIGNAL TERMINAL (10P)
· For connection to the cable from the 10P Signal Terminal on the Display Unit

LIMIT SWITCH TERMINAL (8P)
· For connection to the cable from the 8P Limit Switch Terminal on the Main Panel

SUB PANEL

HOIST MOTOR CABLE
· For connection to the Hoist Motor cable from the Main Panel
INITIAL SETTING INSTRUCTIONS

[1] FACTORY SETTING

When the unit is shipped from the factory the functions are set in the settings outlined below. Before using the machine please re-set the functions to the desired settings.

<table>
<thead>
<tr>
<th>FUNCTION</th>
<th>FACTORY SETTING</th>
<th>RESETTING METHOD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display Range</td>
<td>Full Sweep Normal</td>
<td></td>
</tr>
<tr>
<td></td>
<td>100 (Sonar)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>150 (Side Scan)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0° (Sonar)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>360° (Sonar)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0° (Side Scan)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>93° (Side Scan)</td>
<td></td>
</tr>
<tr>
<td>Bearing Sector Angle</td>
<td>Off</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fore</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10° (Sonar)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5° (Side Scan)</td>
<td></td>
</tr>
<tr>
<td>Tilt Threshold</td>
<td>Mode 0</td>
<td></td>
</tr>
<tr>
<td>Historical Display Off Centre Position Step</td>
<td>30 Log</td>
<td></td>
</tr>
<tr>
<td></td>
<td>×1</td>
<td></td>
</tr>
<tr>
<td>Target Lock Mode</td>
<td>Off</td>
<td></td>
</tr>
<tr>
<td>TVG Curve</td>
<td>Audio Level</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Range Unit</td>
<td>Minimum</td>
</tr>
<tr>
<td></td>
<td>Water Temp Unit</td>
<td>Meters</td>
</tr>
<tr>
<td></td>
<td>Speed Unit</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td>Nav Input</td>
<td>KT</td>
</tr>
<tr>
<td></td>
<td>Compass Display</td>
<td>NMEA-0183</td>
</tr>
<tr>
<td></td>
<td>Tone Selection</td>
<td>A-1</td>
</tr>
<tr>
<td></td>
<td>C-1 Colour</td>
<td>A-1</td>
</tr>
<tr>
<td></td>
<td>C-2 Colour</td>
<td>B-1</td>
</tr>
</tbody>
</table>

May be changed from the Control Panel during operation

May be changed from the on screen Menu

[2] RETURN TO FACTORY SETTING

First turn the Power Supply switch off, then while pressing both bearing keys  →  → at the same time turn the Power Supply switch back on again. Keep pressing the keys until the beep sound stops (about one second).

On completion of this operation all functions will return to the Factory Setting.

CAUTION
If the Bearing keys are released before the beep sound stops, the functions will not return to Factory Setting.
USER SETTING

© Separate to the Factory Setting function. Settings may be entered by the user and memorized. This function is called User-Setting.

· By the simple operation outlined below the functions and measurement units may be set to the user’s specification.

· User Setting function enables the return to the user’s specified setting should the unit become inoperable due to messy or erroneous use of the keyboard. Please ensure user settings are memorized as soon as possible after first operation.

(1) MEMORIZE USER SETTING

· First ensure the functions are at the required setting and switch the Power Supply off. Then, while pressing both the Off-Centre and the Side Scan key ○ △ at the same time, turn the Power Supply switch back on. Keep pressing the keys until the beep sound stops (about one second).

· After completing this operation all functions and measurement units will be memorized as set by the user.

(2) RETURN TO USER SETTING

· During operation of the machine should the unit become inoperable first switch the Power Supply switch off. Then while pressing both the Off Centre and Side Scan keys ○ △ at the same time turn the Power Supply switch back on. Keep pressing the keys until the the beep sound stops.

(3) CHANGING USER SETTING

· To change the functions in User Setting first perform the Return to Factory Setting function to clear User Setting and then change the functions as desired on the menu screen. Finally memorize as in (1) Memorize User Setting.
(1) SONAR MODE

- The Soundome transducer sends out a beam of ultra sonic sound which sweeps in the specified sector and bearing.
- The echoes of reflected soundwaves are picked up by the transducer and displayed in their respective range and direction on the Display Unit screen.
- By adjusting the Tilt and Bearing the Sonar beam may be trained in any direction.

- As the ultra sonic sound pulses out the beam's sweep angle (Sector) may be adjusted.

- The echoes received from the sound beam (1-2-3-4) are displayed on the screen in that order

- The transmitted ultra-sonic beam angle is 7° (at 3dB).

- The sector is covered by the Sonar beam in steps of the selected step angle.

- The echoes of the reflected sound waves are displayed on the screen in the specified step angle

- The beam angle may be selected from the Menu screen (5° or 10°).

The 5° step gives a more detailed display on the screen, however sweep time is almost double that of the 10° step.
When adjusting the tilt angle please take into consideration conditions such as boat speed and water depth.

If the vessel should proceed with the Sonar beam at the same angle at point A, the fish school echo will be displayed but when the vessel reaches point B, the beam will pass above the fish school and no echo will be displayed.

In order that the fish school maybe displayed at point B, adjust the Tilt angle so the Sonar beam strikes the target.

(2) SIDE SCAN MODE

The Sonar beam sweeps from side to side underneath the vessel. The screen will clearly display echos from the middle depth and the sea-bottom contour.

- The ultra sonic sound pulses out as the beam sweeps from side to side.

- The angle may be adjusted to suit the fishing method and conditions.

- The sector is covered by the Sonar beam in steps of the specified angle (3' or 5').

- The reflected echo is displayed in order in the angle specified.

- The step angle may be selected from the screen menu (3' or 5')
When Historical Display function is selected OFF on the menu the above information is displayed on the Lower screen.

*Available with optional equipment
(2) SIDE SCAN DISPLAY

- Colour scale
- Vessel position
- Scale (range)
- Marker
- Sector angle scale
- Bottom
- Water temp.
- Speed
- Vessel position Latitude/Longitude

*Available with optional equipment
[3] DISPLAY INFORMATION

· RANGE: Displays the set display range.
   (When Historical Display function is ON Range is
    displayed next to R in the top lefthand corner of
    the screen).

· BEARING: Displays the Bearing of the centre of the sector
   angle (When Historical Display function is ON
   Bearing is displayed next to B in the top lefthand
   corner of the screen).

· SECTOR: Displays the Sector Angle.
   (When Historical Display Function is ON Sector is
   displayed next to S in the top lefthand corner of
   the screen).

· TILT: Displays the angle of tilt of the Sonar beam from
   sea level (0°) by means of a diagram and numbers.

· MARKER: By moving the Marker to the desired point the
   HORIZONTAL DISTANCE, the SLANT DISTANCE and the
   DEPTH OF TARGET may be displayed.
   (When Historical Display function is ON Mark
   information is displayed ( → · · · ↓ ) in the top
   right corner of the screen).

· TEMPERATURE: The water temperature near the Soundome is
   displayed.

· SHIP'S SPEED: The Latitude and Longitude position and the speed
   LATITUDE: of the vessel are displayed. (This information is
   LONGITUDE: only available when the Display Unit is connected
   to optional navigation equipment.

· HISTORICAL DISPLAY The echo data is compressed and shown in a line at
   the bottom of the screen.

· COLOUR SCALE / PORT SIDE · STARBOARD SIDE MARK / BEARING MARK

   PORT SIDE MARK
   STARBOARD SIDE MARK

   When the Sonar beam passes the Ship’s bow
   a white mark is displayed

   When the Sonar beam sweeps on the Port
   side, colour © is displayed

   When the Sonar beam sweeps to
   Starboard colour © is displayed

   When the Sonar beam passes the Ship’s stern the weakest
   colour is displayed

   BEARING MARK

   · When the Sonar sweep is clockwise the
   Bearing Mark is displayed in the
   weakest colour

   · When the Sonar sweep is anti clockwise the
   Bearing Mark is displayed in colour ©
When the operation keys are used correctly a single beep sound will be heard. In the case of incorrect operation, or if the function change has not been entered, a multiple beep will sound.

[1] **MENU**

MENU KEY

All functions and digital units are selected with the Menu key.

Before first using the equipment please ensure the all the desired function modes and digital units have been set on the screen menu.

When the Menu key is pressed the menu below is displayed.

Use the Tilt keys to move the menu cursor to the function.

Use the Bearing keys to specify the function change.

Finally press the Menu key to enter the change and return to the Sonar display screen.

Once all functions have been set, use the User Setting function explained on page 25 to memorize the function settings.

<table>
<thead>
<tr>
<th>HISTORICAL DISP.</th>
<th>OFF ON</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF-CENTRE POS.</td>
<td>FORE BACK RIGHT LEFT</td>
</tr>
<tr>
<td>STEP (SONAR)</td>
<td>5° 10'</td>
</tr>
<tr>
<td>STEP (SIDE SCAN)</td>
<td>3° 5'</td>
</tr>
<tr>
<td>TARGET LOCK</td>
<td>MODE0 MODE1 MODE2</td>
</tr>
<tr>
<td>TRAIN CORRECT</td>
<td>0</td>
</tr>
<tr>
<td>TVG CURVE</td>
<td>20LOG 30LOG 40LOG</td>
</tr>
<tr>
<td>TX POWER</td>
<td>LOW MED HIGH</td>
</tr>
<tr>
<td>PULSE WIDTH</td>
<td>×1 ×1.5 ×2</td>
</tr>
<tr>
<td>NOISE REDUCTION</td>
<td>OFF ON</td>
</tr>
<tr>
<td>AUDIO LEVEL</td>
<td></td>
</tr>
<tr>
<td>RANGE UNIT</td>
<td>MT FM BR FT</td>
</tr>
<tr>
<td>TEMPERATURE</td>
<td>°C °F</td>
</tr>
<tr>
<td>SHIP'S SPEED</td>
<td>KT KM/H</td>
</tr>
<tr>
<td>NMEA</td>
<td>182 183</td>
</tr>
<tr>
<td>COMPASS DISP.</td>
<td>OFF ON</td>
</tr>
<tr>
<td>COLOUR</td>
<td>A-1 A-2 B-1 B-2 C-1 C-2</td>
</tr>
</tbody>
</table>

Use the Bearing keys to select the desired function setting.

Use the Tilt keys to move the cursor to the desired function.
(1) HISTORICAL DISPLAY

Historical Display may be specified ON or OFF at the screen menu.

- Historical Display is the Sonar echo data compressed and displayed in a line.
- \[\uparrow \downarrow\] using the Tilt keys to move the menu cursor to HISTORICAL DISP.
- \[-\equiv\] use the Bearing keys to specify OFF or ON.

(2) OFF-CENTRE DISPLAY

Select the Off-Centre display in relation to the Ship's position.

- \[\uparrow \downarrow\] use the Tilt keys to move the cursor to OFF-CENTRE POS.
- \[-\equiv\] use the Bearing keys to select the position.
(3) STEP (SONAR)

◎ The step (the degree of movement of the Sonar beam) under Sonar mode may be selected as follows.

- using the Tilt keys move the cursor to STEP (SONAR)
- using the Bearing keys specify the angle.

CAUTION: The sweep time with the 5° step is approximately twice that with the 10° step.

(4) STEP (SIDE SCAN)

◎ The Step (the degree of movement of the Sonar beam) under Side Scan mode may be selected as follows.

- use the Tilt keys to move the cursor to STEP (SIDE SCAN)
- using the Bearing keys specify the angle.
(5) TARGET LOCK

- Target Lock Function automatically changes the sweep direction and tracks the target.
  - To start Target Lock function press the Target Lock key during Sonar mode.
  - To specify Target Lock mode use the Tilt keys to move the cursor to TARGET LOCK.
  - Then using the Bearing keys specify the Target Lock mode.

![Diagram]

1. **MODE 0**
   - When the Target Lock key is pressed the direction of travel of the Sonar beam will change.
   - The Sonar beam will not track automatically.

2. **MODE 1**
   - When the target echo has been confirmed press the Target Lock key and the Sonar beam will track the echo automatically left and right and "TARGET LOCK" will be displayed at the top left of the screen. If the beam should lose the echo and not pick it up again after a 60" sweep, the Target Lock function will cease.

3. **MODE 2**
   - When the target echo has been confirmed press the Target Lock key and the Sonar beam will track the echo automatically left and right and up and down. "TARGET LOCK" will be displayed at the top left of the screen. If the beam should lose the echo and not pick it up again after a 60" sweep, the Target Lock function will cease.

**ECHO CONFIRMATION:** Under Target Lock the Sonar beam will track the strongest echo from 1/4 of the scale (in Off Centre mode 1/6 of the scale) or when the strongest echo of the Historical Display is 3 pixels or over.

**CAUTION:**

During Target Lock operation Tilt, Bearing and Sector keys will not operate, and if the Menu or Range keys are pressed or the Display mode is changed Target Lock will cease.

When Target Lock ceases Bearing and Sector angles will return to their original positions, Tilt angle will remain in Target Lock position.
(6) 0° TRAIN CORRECT

To display the Bearing in the Bow direction:

- Using the Bearing keys set the Bearing to the direction to be displayed in the Bow direction.
- Press the Menu key and use the Tilt keys to move the cursor to TRAIN CORRECT. Press either Bearing key and the degree of Train Correct will be displayed. Also the Screen Display will change to show current Bearing at Bow direction 0°.

![Diagram of TRAIN CORRECT](image)

The Display turns 90° anticlockwise.

(7) TVG CURVE

Select the TVG curve according to the size of the target school.

- This function adjusts the decline in sensitivity of the Sonar beam over distance to eliminate error caused by varying detection ranges.
- Without TVG Curve adjustment fish schools at short range will seem larger than the same size fish schools at long range.
- Use the Tilt keys to move the cursor to TVG CURVE.
- Use the Bearing keys to select the desired curve.

![Diagram of TVG CURVE](image)

TVG CURVE

- 20LOG For use when searching for large schools. (The gain is restored slowly).
- 30LOG For use when searching for single fish (The gain is restored abruptly).
- 40LOG For use when searching for small schools. (The gain is restored at a medium level).
(8) TRANSMIT POWER

The output power of the ultrasonic soundwave may be selected.

- In crowded fishing areas, this function may be used to reduce power and so avoid interference to other fishing boat's Sonars and Echo Sounders.

- Use the Tilt keys to move the cursor to TX POWER.
- Use the Bearing keys to select the Transmit Power level.

<table>
<thead>
<tr>
<th>TX POWER</th>
<th>LOW</th>
<th>MED</th>
<th>HIGH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Minimum power</td>
<td>Maximum power</td>
<td></td>
</tr>
</tbody>
</table>

CAUTION
The unit is shipped from the factory with the Transmit Power setting on Low.

(9) PULSE WIDTH

The interval of the ultrasonic soundwave may be selected (msec).

- When the searching range is short and high definition is required, the Pulse Width should be set Low (×1).
- When searching at long ranges, a larger Pulse Width should be selected to increase searching ability. However, definition will decrease.

- Use the Tilt keys to move the cursor to PULSE WIDTH.
- Use the Bearing keys to select the desired width.

<table>
<thead>
<tr>
<th>PULSE WIDTH</th>
<th>×1</th>
<th>×2</th>
<th>×3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulse Width lengthens</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(10) NOISE REDUCTION

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

- Use the Tilt keys to move the cursor to NOISE REDUCTION.
- Use the Bearing keys to select Noise Reduction Off or On.

<table>
<thead>
<tr>
<th>NOISE REDUCTION</th>
<th>OFF</th>
<th>ON</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without Noise Reduction function</td>
<td>With Noise Reduction function</td>
<td></td>
</tr>
</tbody>
</table>
(11) AUDIO LEVEL

© To adjust the sound level of an external speaker.

- use the Tilt keys to move the cursor to AUDIO LEVEL.
- use the Bearing keys to adjust the level

![Audio Level Scale]

**NOTE**
The speaker is optional equipment. Please refer to PG 19 for connection instructions.

(12) RANGE UNIT

© The unit for Range, Horizontal distance, Slant distance and Depth maybe selected with this function.

- use the Tilt keys to move the cursor to RANGE UNIT.
- use the Bearing keys to select the unit.

![Range Unit Options]

(13) TEMPERATURE UNIT

© Select the unit to display water temperature.

- use the Tilt keys to move the cursor to TEMPERATURE.
- use the Bearing keys to select the unit.

![Temperature Unit Options]
(14) SHIP’S SPEED

© The unit for measuring Ship’s Speed may be selected.

- use the Tilt keys to move the cursor to SHIP’S SPEED.
- use the Bearing keys to select the speed unit.

<table>
<thead>
<tr>
<th>SHIP’S SPEED</th>
<th>KT</th>
<th>KM/H</th>
</tr>
</thead>
</table>
| Ship’s speed will be displayed in Knots. | Ship’s speed will be displayed in Kilometers per hour.

NOTE: Ship's speed information will only be displayed when the unit is connected to optional navigation equipment.

(15) NAVIGATION EQUIPMENT OUTPUT FORMAT

© Navigation information may be accepted in NMEA-0182 and NMEA-0183 formats.

- use the Tilt keys to move the cursor to NMEA.
- use the Bearing keys to specify the format.

<table>
<thead>
<tr>
<th>NMEA</th>
<th>182</th>
<th>183</th>
</tr>
</thead>
</table>
| When output format from connected navigation equipment is NMEA-0182. | When output format from connected navigation equipment is NMEA-0183.

(16) COMPASS DISPLAY

© The points of the compass may be displayed under Sonar mode.

- use the Tilt keys to move the cursor to COMPASS DISP.
- use the Bearing keys to specify ON or OFF.

<table>
<thead>
<tr>
<th>COMPASS DISP.</th>
<th>OFF</th>
<th>ON</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compass Display off.</td>
<td>Compass display on.</td>
<td></td>
</tr>
</tbody>
</table>

The points of the compass are displayed.

NOTE: This function is only available when optional navigation equipment is connected.
(17) COLOUR SELECTION

© The display background colour may be selected from four set options A1 · A-2 · B-1 · B-2 or, the tone range may be specified freely on C-1 · C-2 under Colour Palette function.

- Under Colour Palette Function by changing the ratio of red, green, blue of the colours on the display sample various tones may be selected.

- Under Colour Palette function the strength of each of the three colours (red, green, blue) may be set in 15 steps to freely create the desired range.

- The Colour Palette function may be used to set the tones according to the target fish species so as to produce the most visible display.

- The tones may be freely set under C-1 · C-2 options.

- The initial settings for C-1 · C-2 are C-1 = A-1 · C-2 = B-1.

- ⬆️ ⬇️ use the Tilt keys to move the cursor to COLOUR.

- ← → use the bearing keys to select the option.

| COLOUR | A-1 | A-2 | B-1 | B-2 | C-1 | C-2 |

The desired tone may be selected from one of the four set options

The desired tone may be created and set to provide the best display for the fish type sought.

PLEASE SEE FOLLOWING PAGE FOR TONE CREATION DETAILS.
· Press the Threshold key to display the menu on the left.
· Press the Menu key to return to Initial Setting. Initial Setting for C-1 = A-1 Initial Setting for C-2 = B-1
· Press the Menu key to display the menu shown lower left.
· Press the Threshold key to move the frame to the colour on the colour sample which is to be changed.
· Press the Tilt keys to move the cursor to one of the three colours RED, GREEN or BLUE.
· Press the Bearing keys to change the strength of that colour (0-15).

As the ratio is changed the change of colour will be indicated in the frame.

15 is the strongest colour level, as the numerals become smaller the colour level becomes weaker.

Once the desired tone range has been created press the Menu key to memorize the range of tones under C-1 or C-2.
HOIST RAISE / LOWER KEYS

When the unit is in operation the Soundome may be raised or lowered with the Hoist keys.

- When the power supply is switched On the Hoist lowers automatically. When the power supply is switched Off the Hoist raises automatically.

  - when the Soundome is in the lowered position and this key is pressed the Hoist is raised.

  - when this key is pressed the Hoist is lowered.

SENSOR LAMP

When the Soundome is in the lowered position the Sensor Lamp lights automatically.

FULLY RAISED POSITION

When the Soundome is in this area the Sensor Lamp is lit.

FULLY LOWERED POSITION

CAUTION

When the power supply is turned Off the Hoist keys will not function.
DISPLAY MODE KEYS

© Use these keys to select the required display mode.

Full Sweep Display    Off Centre Display    Side Scan Display

© when this key is pressed Full Sweep mode is displayed
© when this key is pressed Off Centre mode is displayed.
© when this key is pressed Side Scan mode is displayed.

NOTE
Historical Display Mode Off/On and Off Centre Display position (Fore, Back, Right, Left) are selected from the screen menu.

TARGET LOCK KEY

© When Mode 0 is specified for Target Lock on the screen menu if Target Lock key is pressed the direction of sweep of the Sonar beam will be reversed.

© When Mode 1 or Mode 2 is specified for Target Lock on the menu when Target Lock key is pressed the Sonar Beam will track the echo automatically.

See PG 34 for a detailed explanation of Target Lock function.

NOTE
Target Lock may not be used under Side Scan function.
**[5]**  ☛ THRESHOLD KEY

- Unwanted echoes eg bubbles, plankton, interference, may be eliminated for a clear display.
- Each time the Threshold key is pressed display colours are eliminated one at a time starting from the weakest colour on the scale.

\[ 	ext{Threshold key is pressed colours are eliminated one at a time.} \]

**[6]**  ☛ RANGE KEY

- Adjust the searching range with this key.
- Displays the selected Range

- Available Ranges

<table>
<thead>
<tr>
<th>Standard Sonar and Side Scan modes.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MT</td>
</tr>
<tr>
<td>FM•BR</td>
</tr>
<tr>
<td>FT</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Off Centre Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>MT</td>
</tr>
<tr>
<td>FM•BR</td>
</tr>
<tr>
<td>FT</td>
</tr>
</tbody>
</table>

**NOTE**  
For Range Unit selection details please see PG 37
SECTOR KEY

Changes the angle of sweep of the Sonar beam.

The specified Sector Angle is displayed.

Each time this key is pressed the Sector angle is enlarged.

Each time this key is pressed the Sector angle is made more narrow.

Available angles

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

Side Scan mode

<table>
<thead>
<tr>
<th>3° STEP</th>
<th>3°</th>
<th>27°</th>
<th>45°</th>
<th>63°</th>
<th>93°</th>
</tr>
</thead>
<tbody>
<tr>
<td>5° STEP</td>
<td>5°</td>
<td>25°</td>
<td>45°</td>
<td>65°</td>
<td>95°</td>
</tr>
</tbody>
</table>

NOTE

The Step angle may be changed on the screen menu. See PG 33.

SECTOR ANGLE AND SWEEP TIME

Because the sweep time of the Sonar beam becomes longer as the Sector angle is made larger please be sure to adjust the angle to suit the method of use.

NOTE

When the Step angle is 5° the sweep time will be approximately twice that of when the Step angle is 10°.

90° Sector Angle
A one way sweep takes 3.2 seconds.
(200 MT range, 10° Step angle)

360° Sector Angle (Full Sweep)
One revolution takes 12.8 seconds
(200 MT range, 10° Step angle)

NOTE

When the Noise Reduction function is in use the sweep time becomes longer. Please use Noise Reduction only when necessary. See PG 36
MARKER KEYS

© Under Sonar mode the VRM (Variable Range Marker) may be shifted to the target echo to display the distance at sea level, the slant distance and the depth to the target.

- Under Side Scan mode the VRM may be used to display the depth to the target.
- When either Marker key is pressed the VRM will be displayed.

- SONAR MODE

- 146MT (SEA LEVEL) Distance a on the diagram
- 166MT (SLANT) Distance b on the diagram
- 53.4MT(DEPTH) Distance c on the diagram

When this key is pressed the Marker range becomes longer.

When this key is pressed the Marker range becomes shorter

- SIDE SCAN MODE

When this key is pressed the Marker moves up.

When this key is pressed the Marker moves down.

Marker Depth Display

- If both Marker keys are pressed at once the VRM will be erased.
- Then if a single Marker key is pressed the Marker will re-appear in the position it was last displayed.

NOTE
If the Marker key is pressed continuously the VRM will move continuously.
[9] BEARING KEYS

Use these keys to move the centre of the Sector angle.

B 0° Displays the angle of the Sector's centre when this key is pressed the centre of the Sector angle moves in a clockwise direction.

NOTE
When this key is pressed continuously the bearing changes continuously in steps of 5°.

[10] TILT KEYS

Changes the vertical angle of tilt of the Sonar beam.

Displays the angle in degrees. When this key is pressed the angle of tilt closes.

Displays the angle in a diagram. When this key is pressed the angle of tilt opens.

TILT ANGLE RANGE

5° ~ 0° ~ -90°

NOTE
When the Tilt key is pressed continuously the angle of tilt changes continuously.
FAR GAIN DIAL

Eliminates unwanted echoes at short range, bubbles, noise etc.

CAUTION
When the dial is turned to the 10 position there is no elimination of echoes. As the dial is turned toward 0 position the elimination effect increases. However, take care the effect is not increased too much and target echoes are eliminated.

GAIN DIAL
Adjusts the sensitivity of the received signal.

OFF/ON - BRIGHTNESS DIAL
When this dial is turned clockwise from the OFF position a click will be heard and the unit will be switched on. At this time the Soundome will be automatically lowered. Further clockwise turning of the dial will brighten the screen display. When the power is turned off, by turning the dial anti-clockwise, the Soundome will be raised automatically.
## SPECIFICATIONS

### HULL UNIT

<table>
<thead>
<tr>
<th>FEATURE</th>
<th>S-1600H180</th>
</tr>
</thead>
<tbody>
<tr>
<td>TYPE</td>
<td>MULTI DIRECTIONAL SEARCHLIGHT</td>
</tr>
<tr>
<td>FREQUENCY</td>
<td>180KHz</td>
</tr>
<tr>
<td>HOIST STROKE</td>
<td>200 ~ 400mm</td>
</tr>
<tr>
<td>HOIST TIME</td>
<td>10sec (400mm stroke, 24V power supply)</td>
</tr>
<tr>
<td>OUTPUT DATA</td>
<td>SIGNAL TRIGGER</td>
</tr>
<tr>
<td>POWER SUPPLY</td>
<td>10.5 ~ 30V DC</td>
</tr>
<tr>
<td>WEIGHT</td>
<td>40KG</td>
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### DISPLAY CABINET

<table>
<thead>
<tr>
<th>FEATURE</th>
<th>S-1600M10</th>
<th>S-1600M15</th>
</tr>
</thead>
<tbody>
<tr>
<td>DISPLAY TYPE</td>
<td>COLOUR CRT PPI DISPLAY</td>
<td></td>
</tr>
<tr>
<td>RANGE (SONAR MODE)</td>
<td>0<del>20, 40, 60, 80, 100, 120, 160, 200, 240, 280, 320, 400 600, 800, 1000, 1200, 1600, 2000 MT 0</del>12, 20, 40, 60, 80, 100, 120, 160, 200, 240, 280, 320 400, 500, 600, 800, 1000, 1200, 1600 1200, 1600, 2400, 3200, 4000, 5000, 6000 FT 0<del>30, 60, 90, 120, 150, 180, 240, 300, 360, 420, 480, 600, 900, 1200, 1500, 1800, 2400, 3000 MT 0</del>18, 30, 60, 90, 120, 150, 180, 240, 300, 360, 420, 480, 600, 900, 1200, 1500, 1800, 2400 2400 FT 0~120, 180, 240, 300, 360, 420, 480, 600, 900, 1200, 1500, 1800, 2400, 3600, 4800, 6000, 7500, 9000 FT</td>
<td></td>
</tr>
<tr>
<td>RANGE (OFF CENTRE)</td>
<td>(10° Step) 10, 30, 50, 90, 130, 170, 210, 360° 5° Step 5.25, 45.85, 125, 165, 205, 360° 3° Step 5.35, 45.65, 95°</td>
<td></td>
</tr>
<tr>
<td>SECTOR ANGLE (SONAR)</td>
<td>(10° Step) 10, 30, 50, 90, 130, 170, 210, 360° 5° Step 5.25, 45.85, 125, 165, 205, 360° 3° Step 5.35, 45.65, 95°</td>
<td></td>
</tr>
<tr>
<td>SECTOR ANGLE (S SCAN)</td>
<td>(10° Step) 10, 30, 50, 90, 130, 170, 210, 360° 5° Step 5.25, 45.85, 125, 165, 205, 360° 3° Step 5.35, 45.65, 95°</td>
<td></td>
</tr>
<tr>
<td>TILT ANGLE RANGE</td>
<td>5° ~ 0° ~ 90° (1° Step)</td>
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<tr>
<td>DISPLAY MODES</td>
<td>SONAR·SONAR/HISTORICAL DISPLAY·SIDE SCAN</td>
<td></td>
</tr>
<tr>
<td>DATA DISPLAY</td>
<td>RANGE, MARKER RANGE, TILT ANGLE, TILT DIAGRAM, SECTOR, BEARING, RING MARKER (DISTANCE, SLANT DISTANCE, DEPTH), COLOUR SCALE, WATER TEMP. SHIP'S SPEED*, LAT/LONG*.</td>
<td></td>
</tr>
<tr>
<td>MAIN FUNCTIONS</td>
<td>OFF CENTRE (4 POSITIONS), TARGET LOCK, THRESHOLD CONTROL, PULSE ADJUST, GAIN CONTROL, DEGAUSSING, TRANSDUCER STABILIZER, COMPASS DISPLAY*, COLOUR PALETTE, AUDIO OUTPUT.</td>
<td></td>
</tr>
<tr>
<td>INPUT DATA</td>
<td>(EXTERNAL NAVIGATOR) NMEA-0182, 0183</td>
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<tr>
<td>REMOTE CONTROL</td>
<td>OPTION</td>
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<tr>
<td>DISPLAY SCREEN</td>
<td>10INCH COLOUR CRT</td>
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</tr>
<tr>
<td>POWER SUPPLY</td>
<td>10.5 ~ 40V 40W</td>
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<td>15INCH COLOUR CRT</td>
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</tr>
<tr>
<td></td>
<td>20 ~ 40V 60W</td>
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<tr>
<td></td>
<td>28KG</td>
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</table>

*Available only when the unit is connected to optional navigation equipment.*