SUZUKI

MULTI DIRECTIONAL SEARCHLIGHT, COLOUR SONAR

S-1600

OPERATION MANUAL

10 INCH DISPLAY UNIT S-1600 M10 15 INCH DISPLAY UNIT S-1600 M15 18 OKHZ HULL UNIT S-1600 H180

SUZUKI FISH FINDER CO.,LTD.

HEAD OFFICE 95, HANADA-SANBAN-CHO, TOYOHASHI-CITY, AICHI-PREF 441 JAPAN PHONE(81)532-32-7511 FAX(81)532-32-7500

CONTENTS

	PG
CONTENTS	_ 1
INSTALLATION PRECAUTIONS	
COMPOSITION	3
DIMENSION DIAGRAMS	_ 5
INSTALLATION INSTRUCTIONS [1] INSTALLATION POSITION [2] TRUNK PIPE INSTALLATION [3] HULL UNIT ASSEMBLY [4] DISPLAY UNIT INSTALLATION [5] CONNECTION INSTRUCTIONS	_ 6 _ 7
REFERENCE TERMS AND FUNCTIONS [1] CONTROL PANEL KEYS [2] REMOTE CONTROL KEYS [3] M15 (15INCH DISPLAY) CABINET REAR PANEL [4] M10 (10INCH DISPLAY) CABINET REAR PANEL [5] HULL UNIT CONNECTION PANEL FUNCTIONS	21
INITIAL SETTING INSTRUCTIONS [1] FACTORY SETTING [2] RETURN TO FACTORY SETTING [3] USER SETTING	_ 24 _ 24 _ 25
BASIC OPERATION [1] SEARCHLIGHT SONAR OPERATION [2] SCREEN DISPLAY [3] DISPLAY INFORMATION	_ 26 _ 28
OPERATION KEY FUNCTION INFORMATION [1] MENU KEY [2] HOIST RAISE/LOWER KEYS [3] DISPLAY MODE KEYS [4] TARGET LOCK KEY [5] THRESHOLD KEY [6] RANGE KEY [7] SECTOR KEY [8] MARKER KEYS [9] BEARING KEY [10] TILT KEY [11] FAR GAIN DIAL [12] GAIN DIAL [13] OFF/ON-BRIGHTNESS DIAL	- 42 - 42 - 43 - 43 - 44 - 45 - 46 - 46
SPECIFICATIONS	48

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

○ COMPOSITION IS AS FOLLOWS

MODEL	COMPOSITION No. 1	COMPOSITION No. 2	COMPOSITION No. 3
15INCH DISPLAY	P-1	P-2	P-3
10INCH DISPLAY	P-1	P-2	P-4

P-1 HULL UNIT (S-1600 H180)

PART	CODE	PART No.	AMOUNT	DETAILS
Hull Unit	2 1	04E00E	1	A THE THEORY AND A
Spare Parts	**S0010	** S0001, **S	0002, Gre	ease, Crank Handle
FUSE PACK Fuse 0.5A,6A,10A Fuse 5A,8A 3 Pin Connector	**S0001	FGC 32V * FM14-3P	3 Each 3 Each 1	
ANP SET ANP Clip ANP Band	**S002	ANP 1 T-18R	2 2	THEFALL BRACKET
Grease		0.000	1	100g
Crank Handle		QB-50	1	line ton Vintary
INSTALLATION SET Hexagonal Bolt Nut Spring Washer Flat Washer	**S0110	M16x55 M16 Ø16 16×32×2	8 8 8 8	SUS SUS SUS SUS
Flange Gum Packing	**S0120	30926D	1	
Trunk Pipe Flange	**S0140	30925C	1	PVC
JOINT PIPE SET Fixing Collar (a) Fixing Collar (b) Pipe Cap Hexagonal Bolts Joint Pipe Guide	**S0140	32681D 32681D 32682D-Assy M4×10 32035C	1 1 2 Sets 2 3	With Hex Bolts (M4×10) ×2 With Round Bolts (M4×10) ×2
Soundome	£ 1	32600C-Assy	1	With 4 Mtr Cable
Sealant (White)			1	50g

P-2 TRUNK PIPE/JOINT PIPE (S-1600 H180)

PART	CODE	PART No.	AMOUNT	DETAILS
Trunk Pipe		30942C(2)	1	Optional
Joint Pipe		32679C(2)	1	UJSAN.

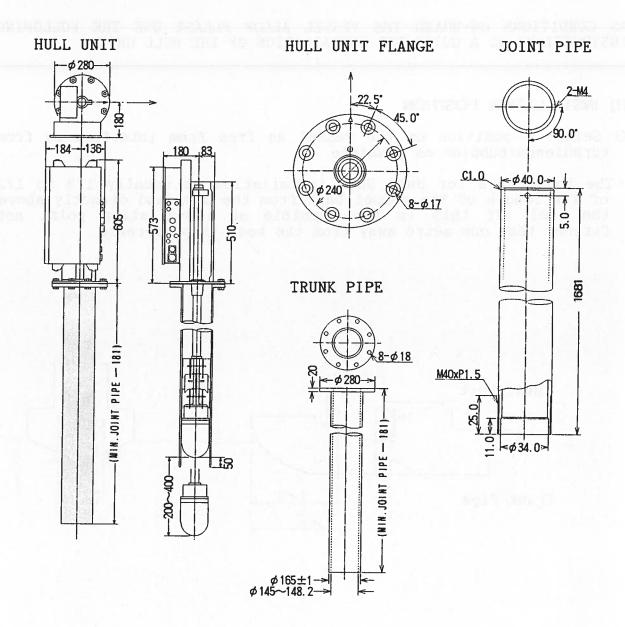
P-3 15 INCH CABINET (S-1600 M15

PART	CODE	PART No.	QUANTITY	DETAILS
DISPLAY CABINET		200		ENHY ERWING
OPERATION MANUAL	** SR121	r statute i i eur m	my l he was	
ELECTRIC CABLE SET	**SR010 I	PACK CONTENTS **	SR001 **SR00	02
ELECTRIC CABLE		31524D	1	2mtr
CONNECTION PACK FUSE 8A, 10A 5 PIN METAL CON 6 PIN METAL CON AUDIO PLUG HEXAGONAL BOLT SPRING WASHER FLAT WASHER	**SR001	FM14-5P FM14-6P AP-314 30054D Ø8 Ø8×18×1.6	1 1 1 1 2 2 2 2	Div. And I
INSTAL.BOLT SET INSTAL.BOLTS NUTS WASHER	**SR002	8×80 M8 30588D	4 10 8	DOMESTIC
INSTAL. BRACKET	**SR110	32762B	1	With Gum- Washer×4
SIGNAL CABLE	**SR141	32190D	1	25mtr
HOIST CABLE	**SR142	32191D	1	25mtr
REMOTE CONTROL	**SR143	32107C-Assy	1	4mtr

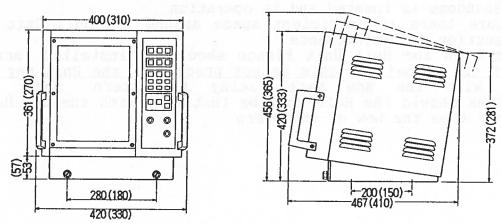
P-4 10 INCH CABINET (S-1600 M10)

PART	CODE	NUMBER	QUANTITY	DETAILS
DISPLAY CABINET			1	
OPERATION MANUAL	**TE121		1	
ELECTRIC CABLE SET	**TE010 PA	CK CONTENTS CA	BLES **TE001.	**TE002
ELECTRIC CABLE		31524D	1	2mtr
CONNECTION SET FUSE 4A, 8A AUDIO PLUG HEXAGONAL BOLT SPRING WASHER FLAT WASHER INSTAL BOLT SET INSTALLATION	**TE001 **TE002	AP314 30054D Ø8 Ø8×18×1.6	3 1 2 2 2 2	Pipe Cap Hernqonal D Joset Flgs molose
NUT WASHER		M8 30588D	8	
INSTAL BRACKET	**TE110	32806B	1	With Gum- Washer×4
SIGNAL CABLE	**TE141	33026D	1	15mtr
HOIST CABLE	**TE142	33027D	1	15mtr

DIMENSION DIAGRAMS



DISPLAY UNIT



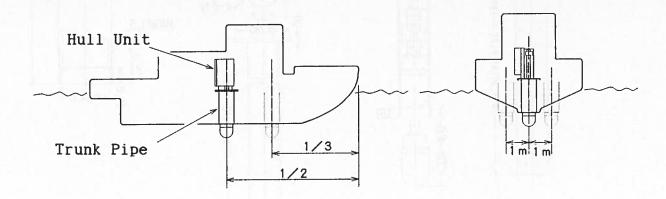
*The dimensions in the brackets () refer to S-1600M10

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 Soundome is lowered and in operation.

· Please ensure there is sufficient space around the Hull Unit to allow inspection and maintenance

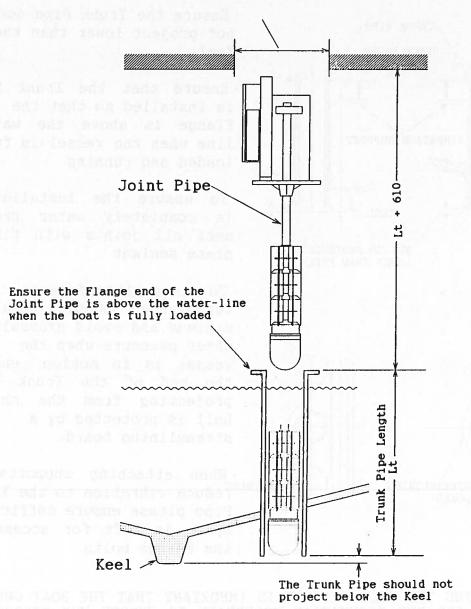
·The Bow Mark on the Hull Unit Flange should be installed facing the bow of the vessel. If this is not practical, the Unit may be installed with the Bow Mark facing the stern. Under no circumstances should the Hull Unit be installed with the Bow Mark facing other than the bow or the stern.

[2] TRUNK PIPE INSTALLATION

(1) MAINTENANCE SPACE

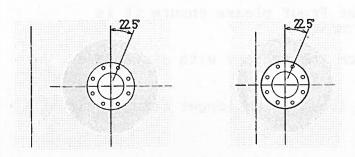
- When installing the Trunk Pipe ensure the installation is strong and water-tight and there is sufficient space for maintenance and repair work.
- As the Hull Unit is not Water Proof please ensure it is installed in an area free from water.
- © S-1600 180KHz is shipped from the factory with a standard 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

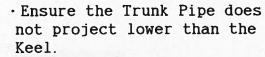


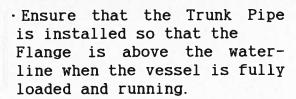
(2) INSTALLATION CONDITIONS

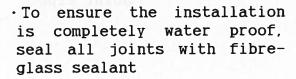
○ Please install the Trunk Pipe in accordance with the following Conditions.

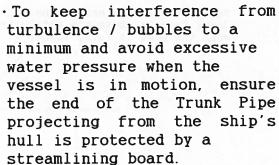


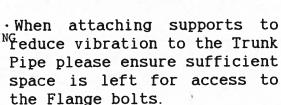
- •To be installed 1/3 to 1/2 of the boat length back from the bow.
- To be installed on the Keel or up to one metre from it.
- Ensure there is enough space left under the Flange to allow tightening of the Flange bolts.

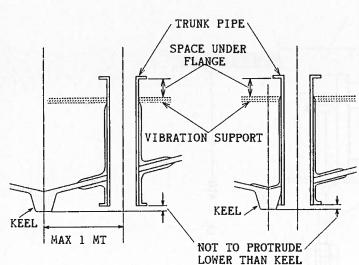


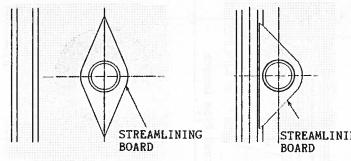








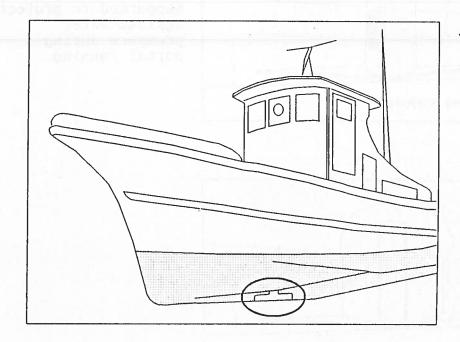




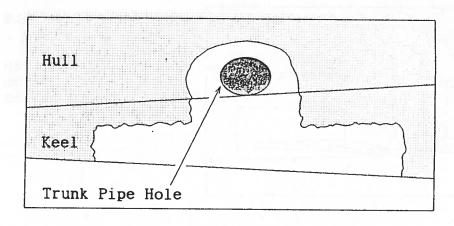
CAUTION:

· 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.

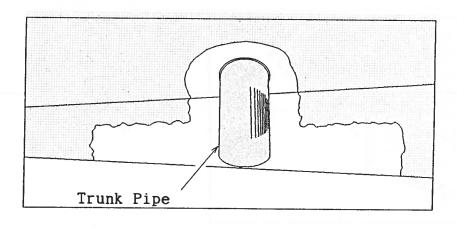
(3) TRUNK PIPE INSTALLATION EXAMPLE



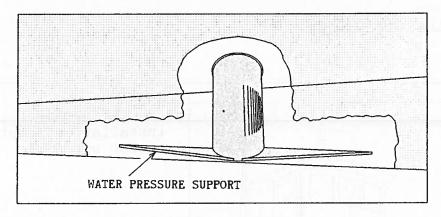
 Decide on the installation point (Refer pgs 6~8).



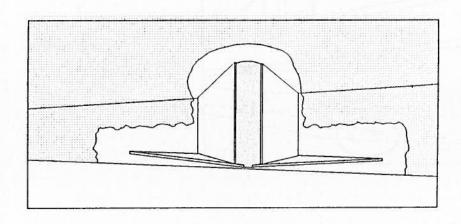
· Make a hole for the Trunk Pipe in the hull of the vessel.

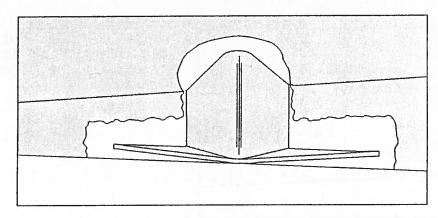


·Install the Trunk Pipe ensuring the Flange end will remain above the water line during normal running.

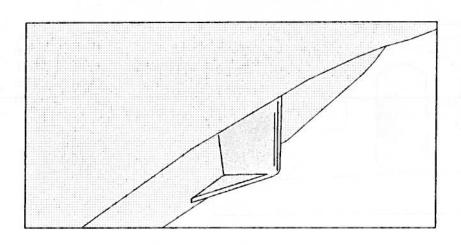


The Trunk Pipe protruding below the hull of the vessel must be sufficiently supported to protect against water pressure during normal running.





• 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

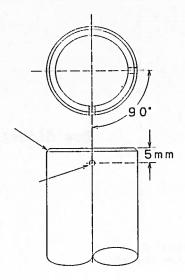
◎ To allow clearance for the Soundome when the Hoist is lowered while providing protection for the Soundome inside the Trunk-Pipe when the Hoist is raised, the following formula for Joint-Pipe length should be observed.

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.

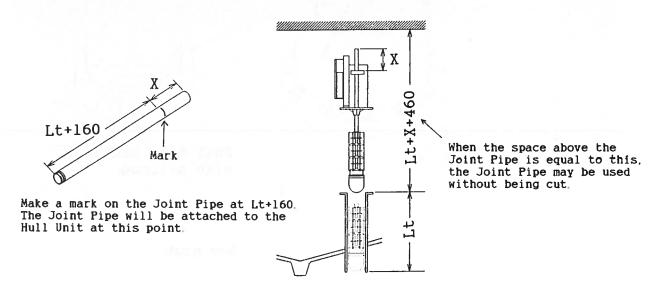
(2) JOINT PIPE ADJUSTMENT

 If the Joint Pipe length is standard ie. Trunk Pipe + 181mm, adjustment is unnecessary.



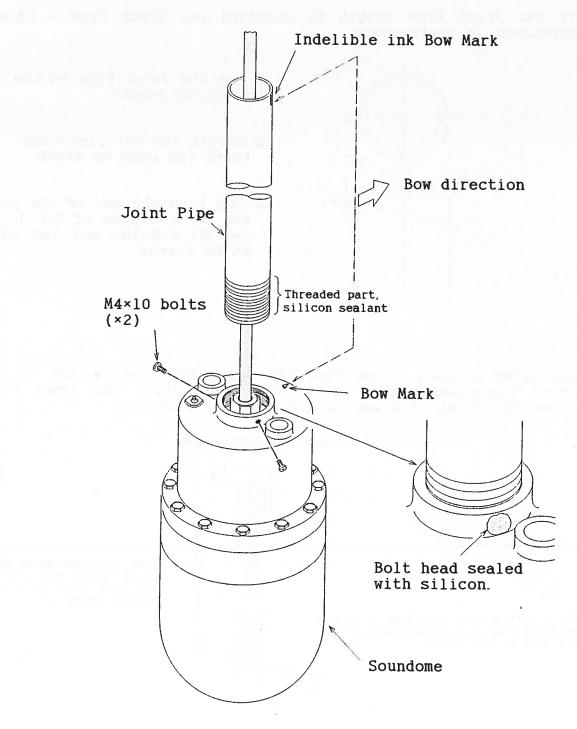
- ① Cut the Joint Pipe to the required length.
- ② Smooth the cut piece and taper the edge as shown.
- ③ 5mm from the end of the pipe and at an angle of 90° drill two Ø3.4 holes and tap with an M4 thread.

•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.



(3) SOUNDOME, JOINT PIPE, HULL UNIT ATTACHMENT

- ① Soundome Joint Pipe attachment
 When attaching the Joint Pipe to the Soundome be sure not to
 damage the Joint Pipe thread or twist the Soundome 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 Soundome Bow Mark.

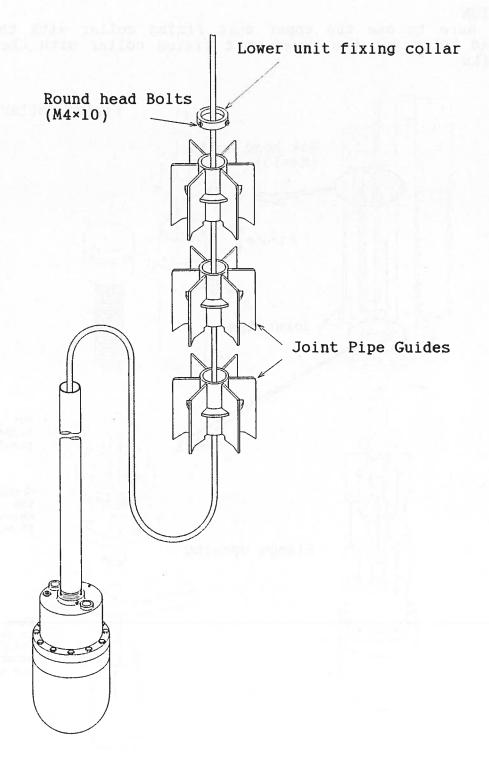


② Attaching the Joint Pipe Guides.

- ·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.



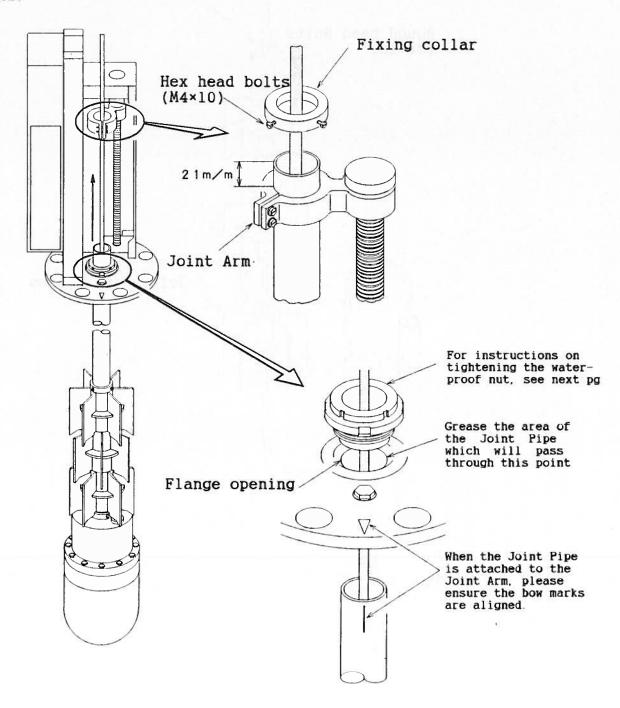
3 Attaching the Soundome to the Hoist

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.

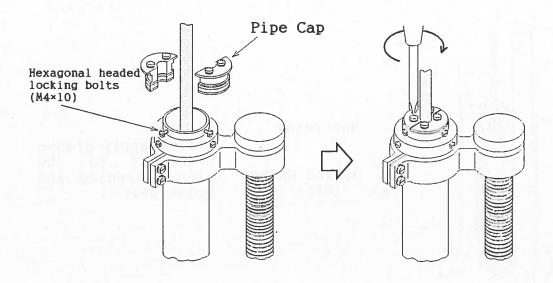
CAUTION

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.



Attaching the Pipe Cap to the end of the Joint Pipe.

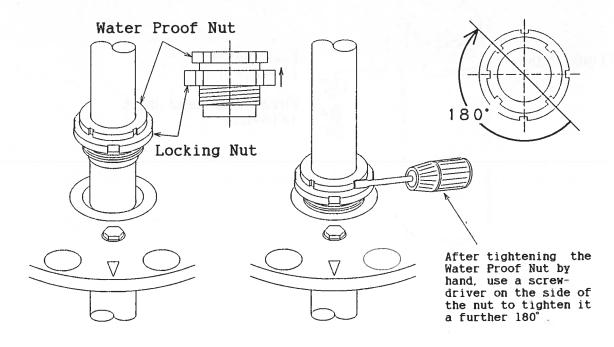
- ·Insert the Pipe Cap into the end of the Joint Pipe as per the diagram below and tighten the round headed Pipe Cap bolts.
- · To prevent loosening of the Pipe Cap, insert and tighten the two hexagonal headed locking bolts as shown.



5 Water Proof Nut and Locking Nut tightening.

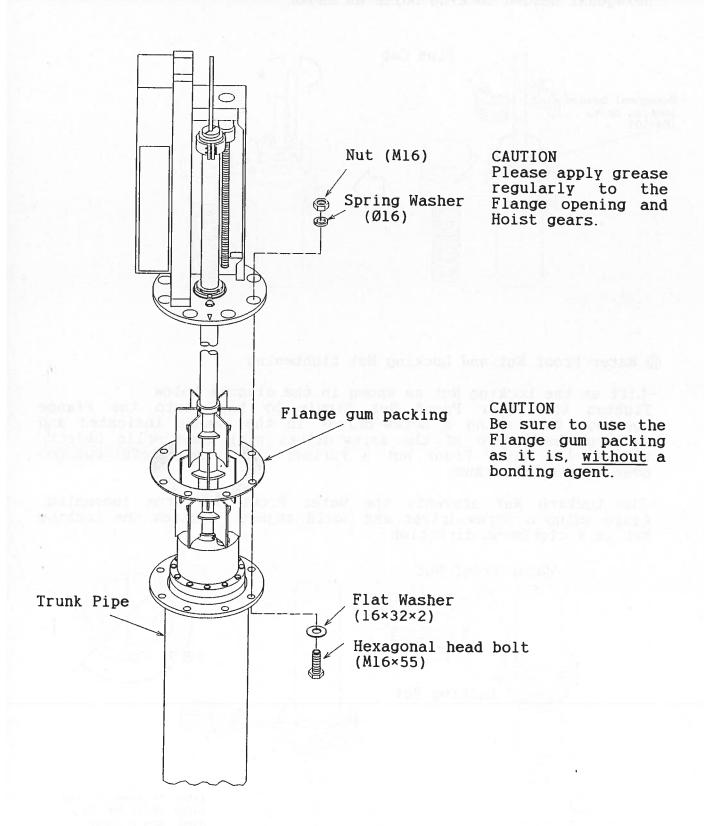
- ·Lift up the Locking Nut as shown in the diagram below.

 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.



6 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.

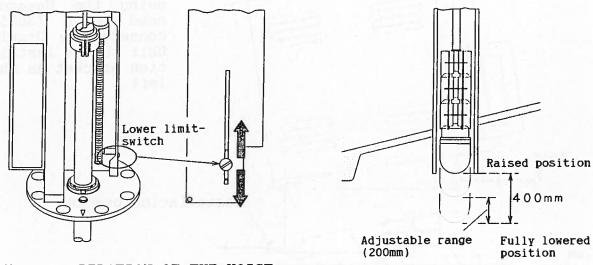


(4) ADJUSTING THE HOIST STROKE

 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.

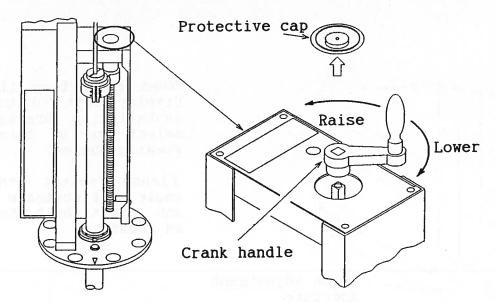
CAUTION

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

O 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

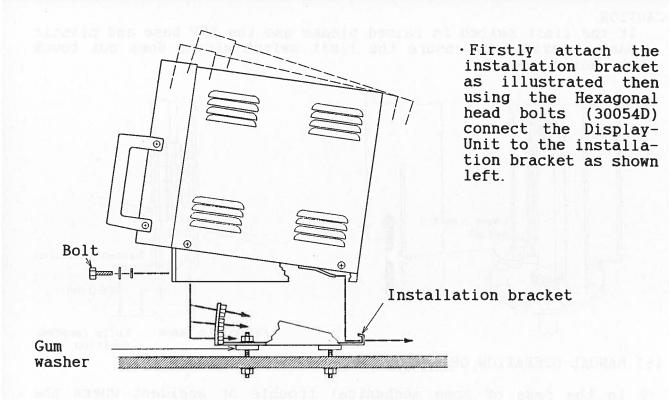


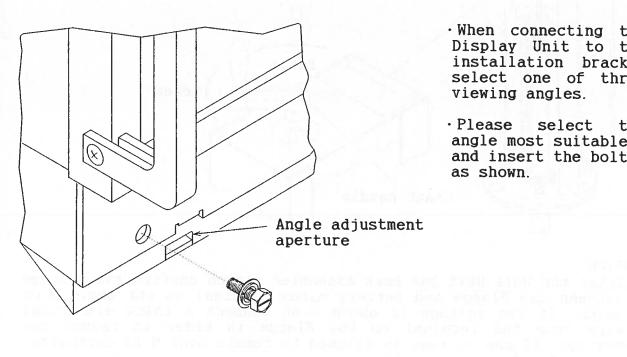
CAUTION

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.

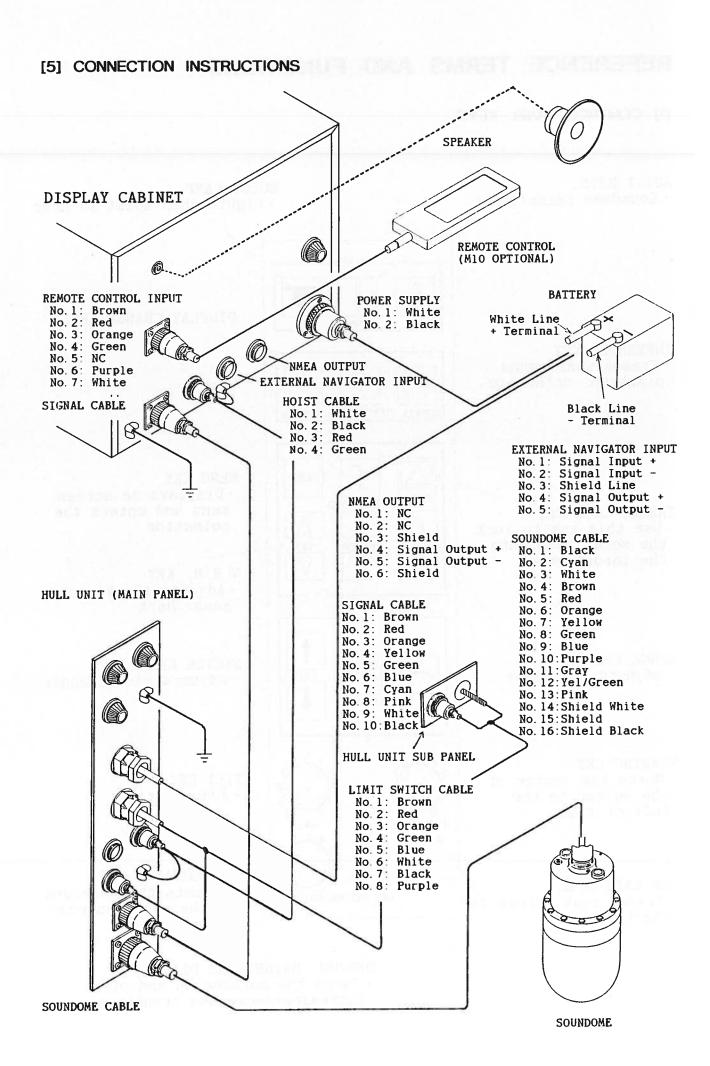
[4] DISPLAY UNIT INSTALLATION

◎ When selecting an installation point for the Display Unit please select an area free from direct sunlight, spray and heavy vibration.



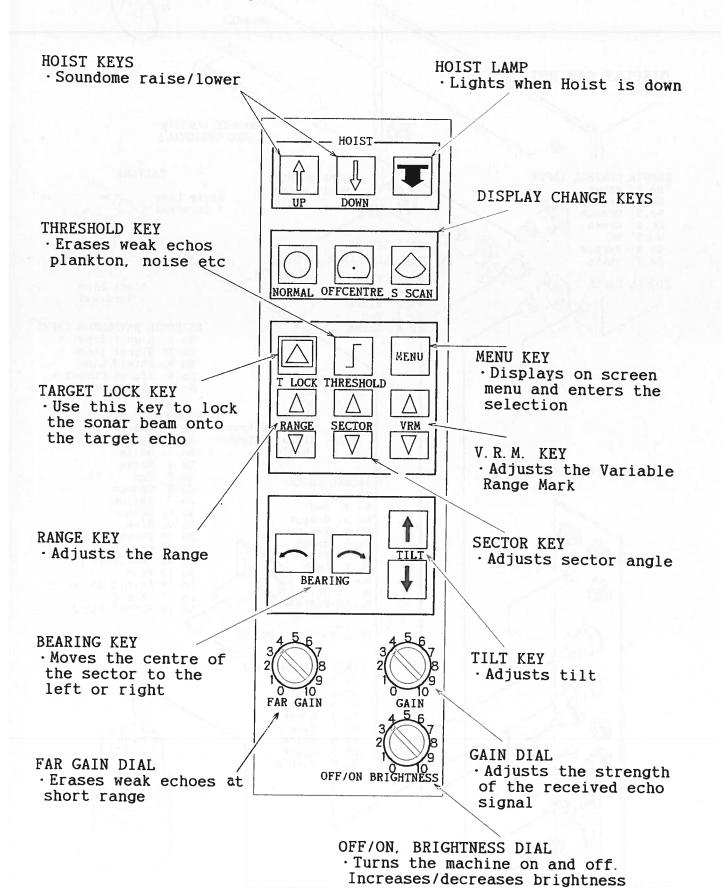


- · When connecting the Display Unit to the installation bracket select one of three viewing angles.
- · Please select the angle most suitable and insert the bolts as shown.

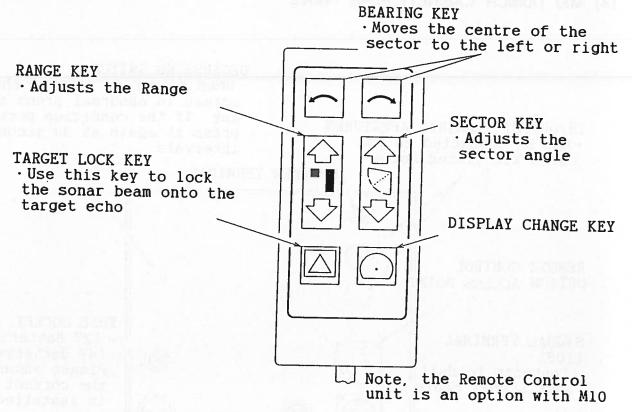


REFERENCE TERMS AND FUNCTIONS

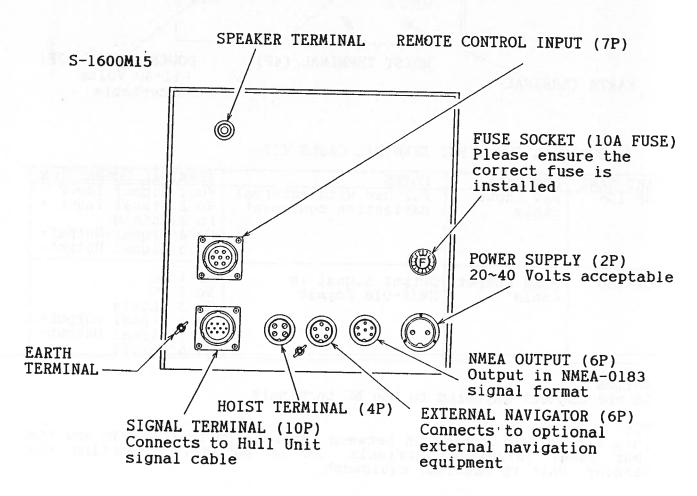
[1] CONTROL PANEL KEYS

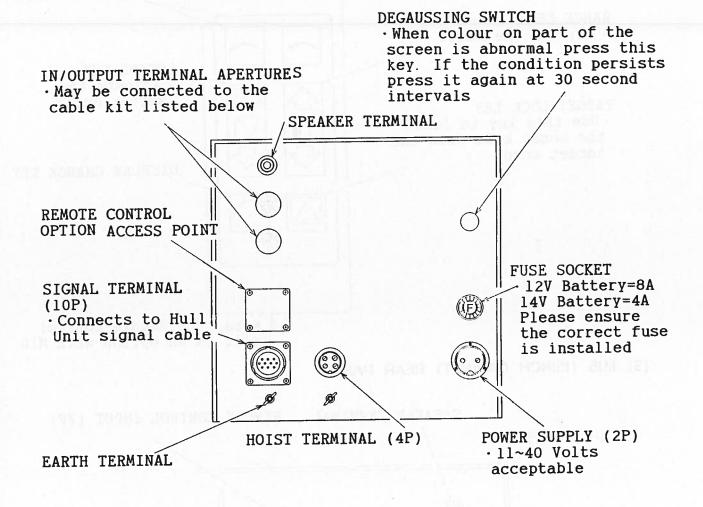


[2] REMOTE CONTROL KEYS



[3] M15 (15INCH CABINET) REAR PANEL





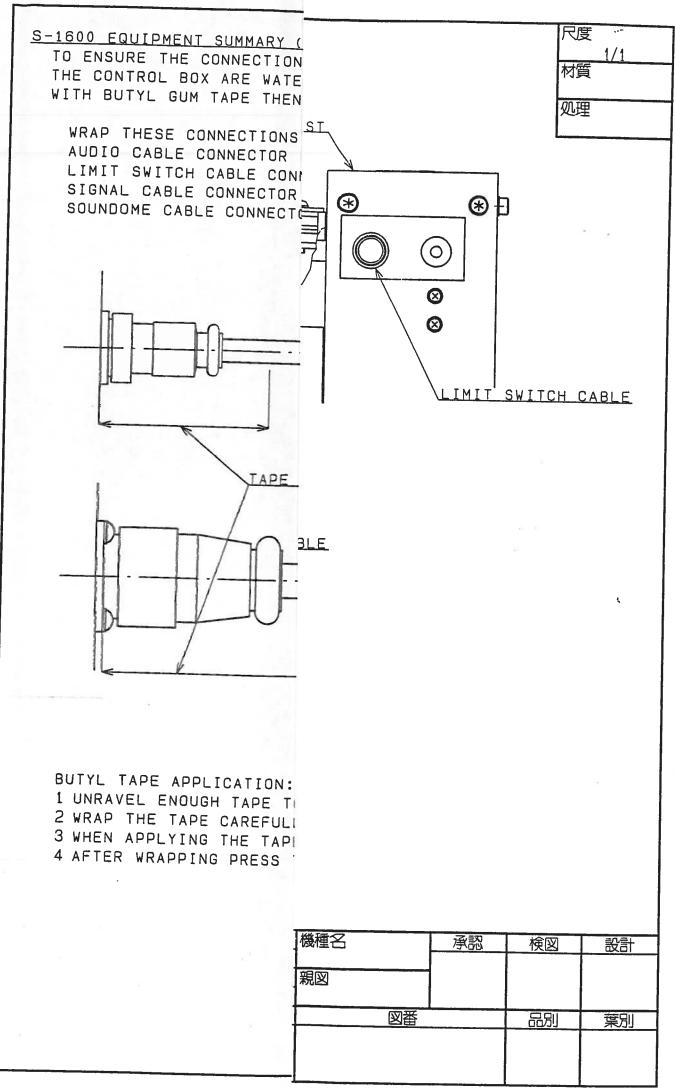
O OPTIONAL IN/OUTPUT TERMINAL CABLE KIT

PART NAME OP-165	FUNCTION Nav Input cable	NOTES For use with external navigation equipment	TERMINAL CONNECTION 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 cuircut boards and the rear panel IN/OUTPUT terminals. It is not for connecting the Display Unit to external equipment.

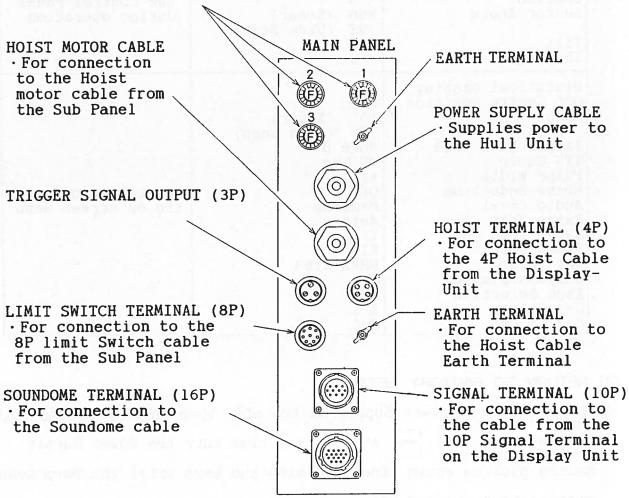


[5] HULL UNIT CONNECTION PANEL FUNCTIONS

© FUSE 1.2.3
Please use fuses in accordance with the chart below.

	24 VOLT BATTERY	12 VOLT BATTERY	
FUSE 1	6A	10A	
FUSE 2	8A 5A		
FUSE 3	0. 5A		

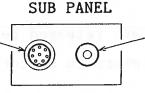
When changing the fuses please ensure the correct fuses are used.



LIMIT SWITCH TERMINAL (8P)

• For connection to the cable from the 8P Limit

Switch Terminal on the Main 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.

FUNCTION	FACTORY SETTING	RESETTING METHOD
Display Range Bearing Sector Angle Tilt Threshold	Full Sweep Normal 100 (Sonar) 150 (Side Scan) 0° 360° (Sonar) 93° (Side Scan) 0° 0	May be changed from the Control Panel during operation
Historical Display Off Centre Position Step Target Lock Mode TVG Curve Pulse Width Noise Reduction Audio Level Range Unit Water Temp Unit Speed Unit Nav Input Compass Display Tone Selection C-1 Colour C-2 Colour	Off Fore 10° (Sonar) 5° (Side Scan) Mode 0 30 Log ×1 Off Minimum Meters °C KT NMEA-0183 Off A-1 A-1 B-1	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.

[3] 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.

BASIC OPERATION

[1] SEARCHLIGHT SONAR OPERATION

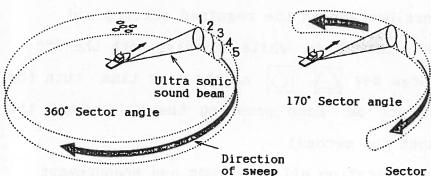
(1) SONAR MODE

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

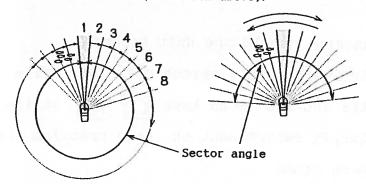
in any direction.



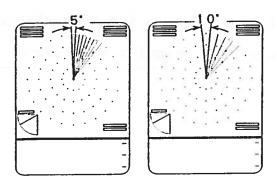
· As the ultra sonic sound pulses out the beam's sweep angle (Sector) may be adjusted.

Sector angle range
5° step: 5° ~360° may be selected
10° step: 10° ~360° "

Ultra sonic beam (view from above).

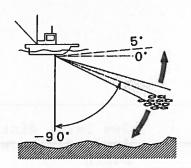


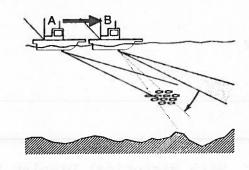
- The echoes received from the sound beam $(1-2-3\rightarrow)$ are displayed on the screen in that order
- The transmitted ultrasonic beam angle is 7° (at 3dB).



- 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.





·Tilt angle range 5° ~ 0° ~ -90° in a 1° step.

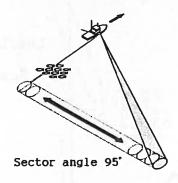
·With this range all directions from extremely shallow waters to deep areas may be searched.

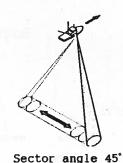
- · When adjusting the tilt angle please take into consideration conditions such as boat speed and water depth.
- · If the vessel should proceed with the Sonar beam at the same angle at point A. the fish school echo will be displayed but when the vessel reaches point B. the beam will pass above the fish school and no echo will be displayed.
- \cdot 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

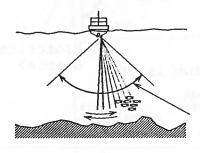
The Sonar beam sweeps from side to side underneath the vessel.
 The screen will clearly display echos from the middle depth and the sea-bottom contour.

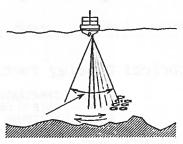
Sector angle range 3° step: 3° ~ 93° may be selected 5° step: 3° ~ 95° "



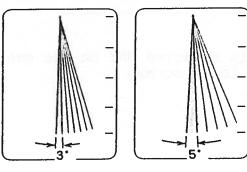


• The ultra sonic sound pulses out as the beam sweeps from side to side.





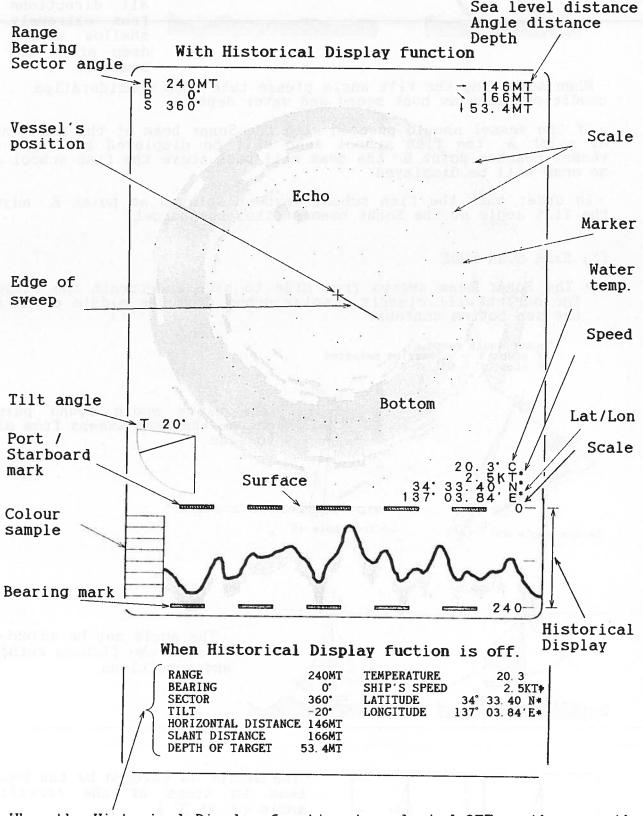
• The angle may be adjusted to suit the fishing method and conditions.



- 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°).

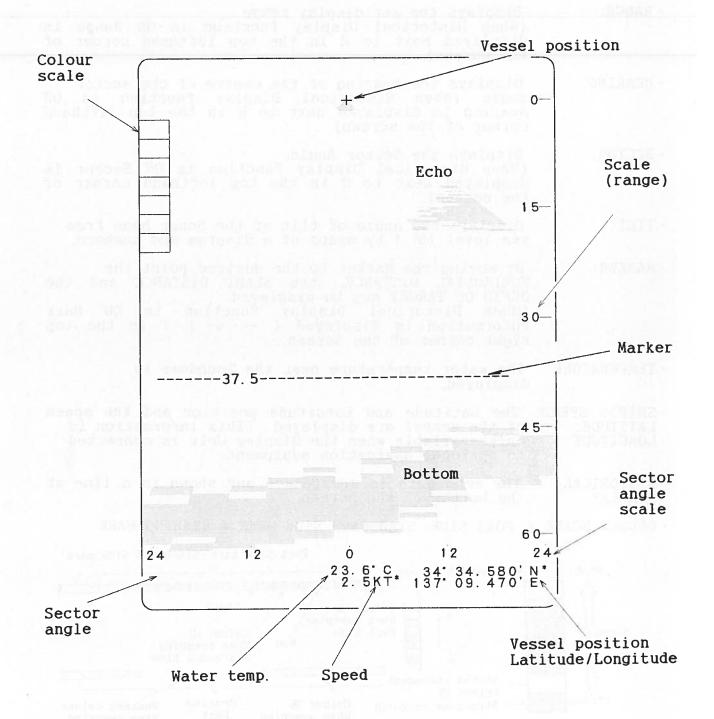
[2] SCREEN DISPLAY

(1) SONAR DISPLAY



When the Historical Display function is selected OFF on the menu the above information is displayed on the Lower screen.

^{*}Available with optional equipment



*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 ($\rightarrow \cdot \ \)$) in the top right corner of the screen.

TEMPERATURE:

The water temperature near the Soundome is

displayed.

LONGITUDE:

·SHIP'S SPEED: The Latitude and Longitude position and the speed LATITUDE: of the vessel are displayed. (This information is

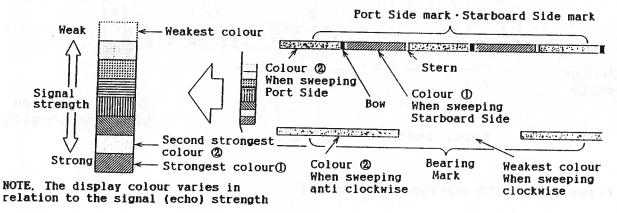
only available when the Display Unit is connected

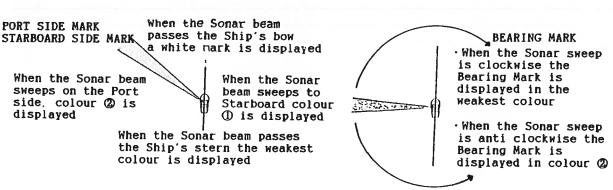
to optional navigation equipment.

· 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



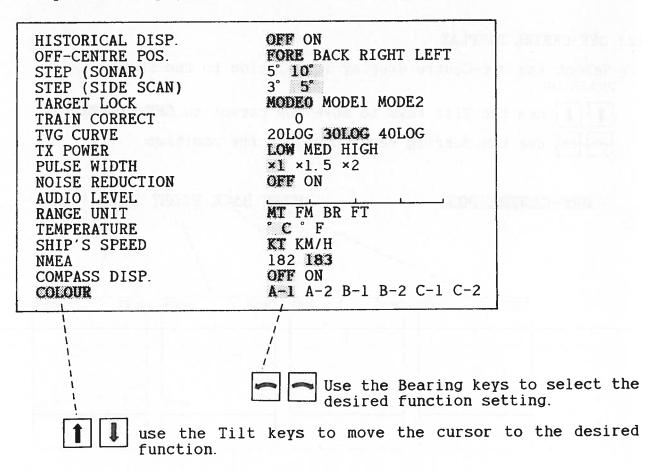


OPERATION KEY FUNCTION INFORMATION

· 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

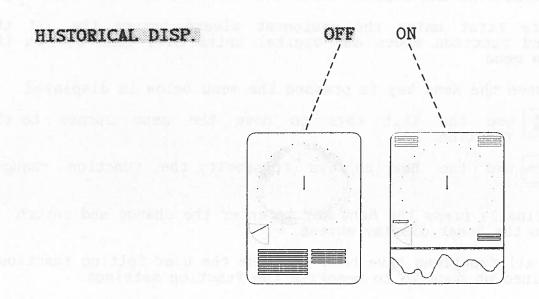
[1] MENU MENU KEY

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



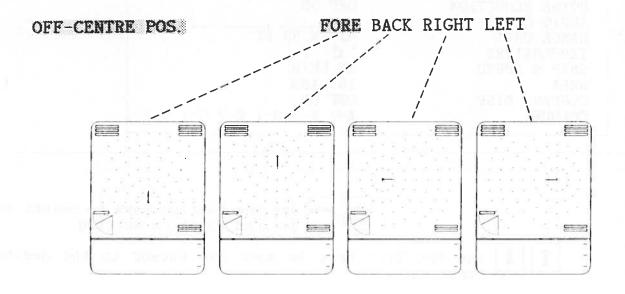
(1) HISTORICAL DISPLAY

- ◎ 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.
- using the Tilt keys to move the menu cursor to HISTORICAL DISP.
- · use the Bearing keys to specify OFF or ON.



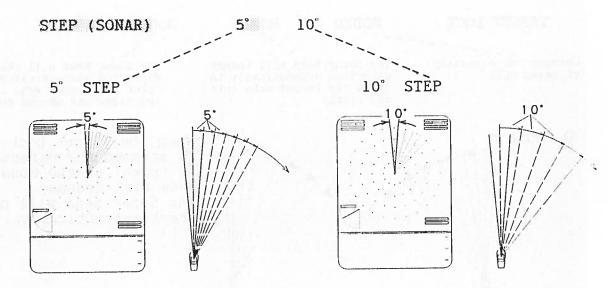
(2) OFF-CENTRE DISPLAY

- \circledcirc Select the Off-Centre display in relation to the Ship's position.
- · 1 use the Tilt keys to move the cursor to OFF-CENTRE POS.
- . use the Bearing keys to select the position.



(3) STEP (SONAR)

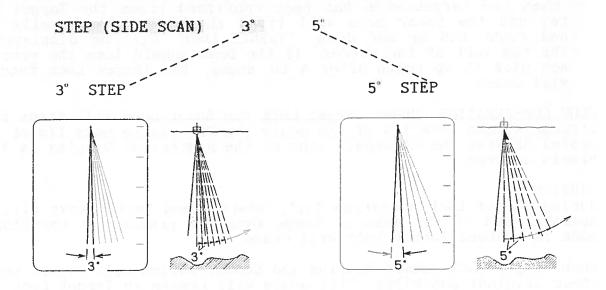
- O The step (the degree of movement of the Sonar beam) under Sonar mode may be selected as follows.
- · 1 using the Tilt keys move the cursor to STEP (SONAR)
 - using the Bearing keys specify the angle.



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

(4) STEP (SIDE SCAN)

- . 1 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

track the target echo left

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

TARGET LOCK MODEO MODE1

Changes the direction of sweep only.

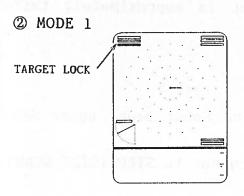
The Sonar beam will change direction automatically to

and right.

The Sonar beam will change direction automatically to track the target echo left and right and up and down.

① MODE O

When the Target Lock key is pressed the direction of travel of the Sonar beam will change. The Sonar beam will not track automatically.



· 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.

MODE2

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.

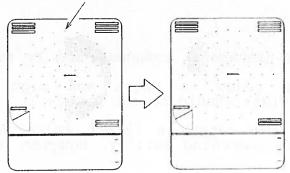
(6) O° TRAIN CORRECT

- ◎ 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 WENU and use the Tilt keys 1 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°

TRAIN CORRECT

90"

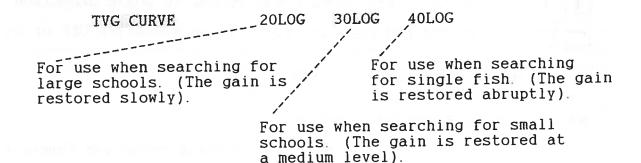
Bow Direction 0°

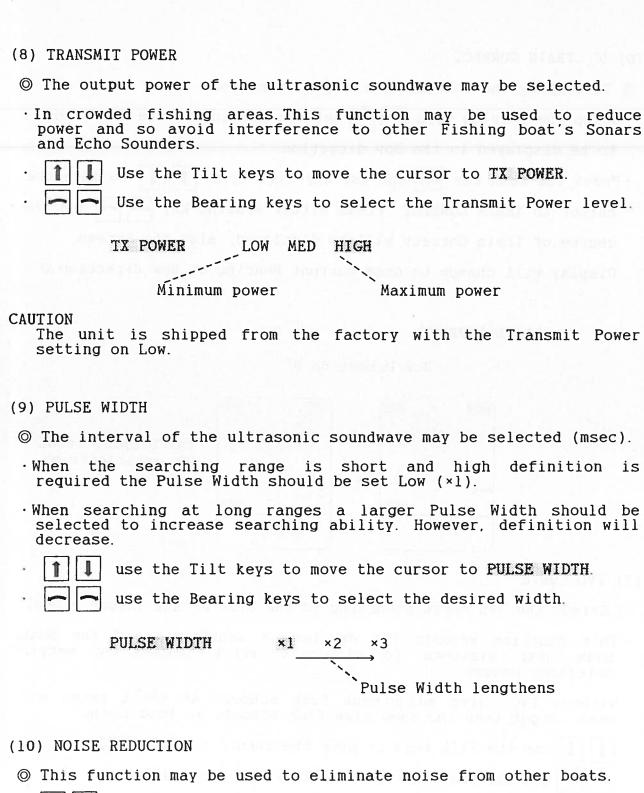


The Display turns 90° anticlockwise.

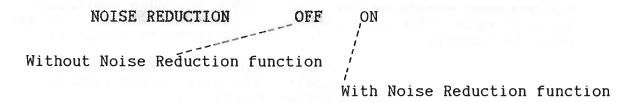
(7) TVG CURVE

- 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.





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



(11) AUDIO LEVEL

- To adjust the sound level of an external speaker.
- · 1 use the Tilt keys to move the cursor to AUDIO LEVEL.
- · use the Bearing keys to adjust the level

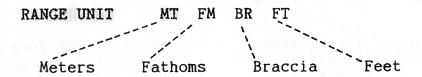
AUDIO LEVEL

NOTE

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

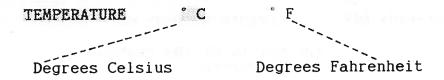
(12) RANGE UNIT

- O The unit for Range, Horizontal distance, Slant distance and Depth maybe selected with this function.
- · 1 use the Tilt keys to move the cursor to RANGE UNIT.
- use the Bearing keys to select the unit.



(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.



(14) SHIP'S SPEED

- The unit for measuring Ship's Speed may be selected.
- · I use the Tilt keys to move the cursor to SHIP'S SPEED.
- use the Bearing keys to select the speed unit.

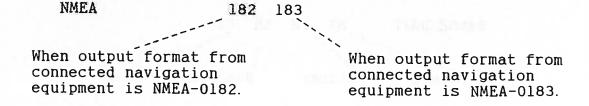
Ship's speed will be displayed in Knots.

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.

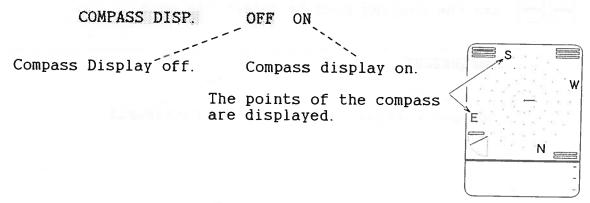
(15) NAVIGATION EQUIPMENT OUTPUT FORMAT

- 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.



(16) COMPASS DISPLAY

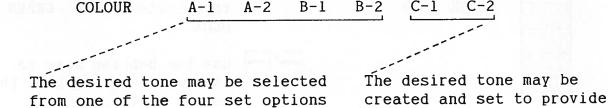
- The points of the compass may be displayed under Sonar mode.
- use the Tilt keys to move the cursor to COMPASS DISP.
- use the Bearing keys to specify ON or OFF.



NOTE: This function is only available when optional navigation equipment is connected.

(17) COLOUR SELECTION

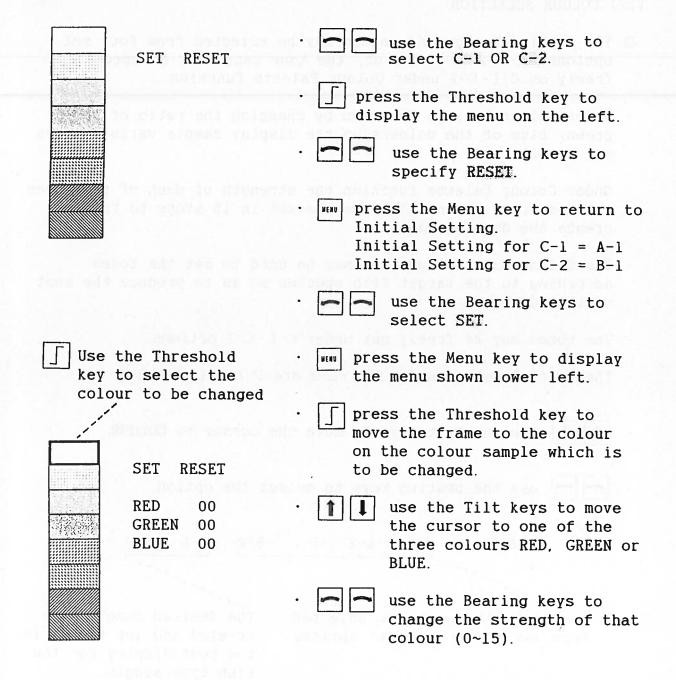
- \odot The display background colour may be selected from four set options Al·A-2·B-1·B-2 or, the tone range may be specified freely on C-1·C-2 under Colour Palette function.
- Under Colour Pallete Function by changing the ratio of red, green, blue of the colours on the display sample various tones 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.



the best display for the

fish type sought.

PLEASE SEE FOLLOWING PAGE FOR TONE CREATION DETAILS.



- · 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.

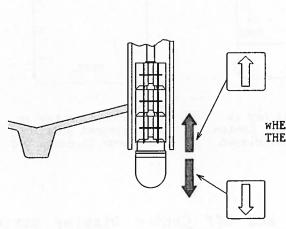
[2]





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.

WHEN THIS KEY IS PRESSED THE SOUNDOME IS RAISED

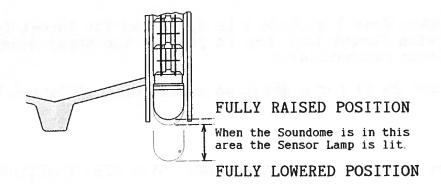
WHEN THIS KEY IS PRESSED THE SOUNDOME IS LOWERED

SENSOR LAMP



SENSOR LAMP

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



CAUTION

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

[3]







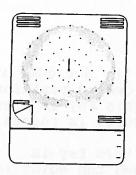
DISPLAY MODE KEYS

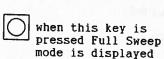
O Use these keys to select the required display mode.

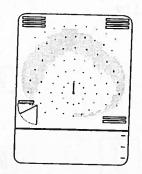
Full Sweep Display

Off Centre Display

Side Scan Display







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.

[4]



TARGET LOCK KEY

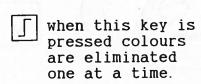
- When Mode O is specified for Target Lock on the screen menu if Target Lock key is pressed the direction of sweep of the Sonar beam will be reversed.
- When Mode 1 or Mode 2 is specified for Target Lock on the menu when Target Lock key is pressed the Sonar Beam will track the echo automatically.
- See PG 34 for a detailed explanation of Target Lock function.

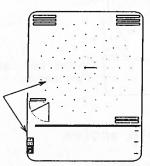
NOTE

Target Lock may not be used under Side Scan function.

[5] THRESHOLD KEY

- O 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.





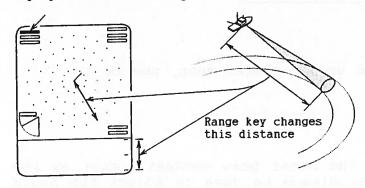
[6]





RANGE KEY

Displays the selected Range



Δ

RANGE

each time this key is pressed the range becomes shorter.

 ∇

each time this key is pressed the range becomes longer.

· Available Ranges

Standard Sonar and Side Scan modes.

	Standard Sonar and Side Sean medes.	
MT	20 40 60 80 100 120 160 200 240 280 320 400 600 800 1000 1200 1600 2000	
FM·BR	12 20 40 60 80 100 120 160 200 240 280 320 400 600 800 1000 1200 1600	
FT	80 120 160 200 240 280 320 400 600 800 1000 1200 1600 2400 3200 4000 5000 6000	

Off Centre Mode

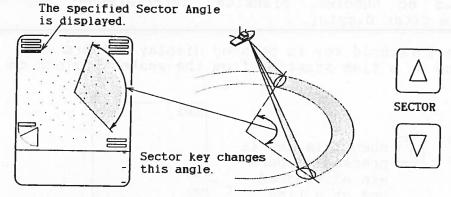
MT	30	60	90	120	150	180	240	300	360	420	480	600	900	120	00 15	500 1	800	2400 3	000	
FM·BR	18	30	60	90	120	150	180	240	300	360	420	480 (600	900	1200	150	0 18	00 240	0	
FT	120) 18	80	240	300	360	420	480	600	900	1200	1500	0 18	00 2	2400	3600	480	0 6000	7500	9000

NOTE

For Range Unit selection details please see PG 37

[7] \triangle SECTOR KEY

O Changes the angle of sweep of the Sonar beam.



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

Sonar								
5° STEP	5°	25°	45°	85°	125"	165°	205°	360"
10" STEP	10°	30°	50°	90"	130°	170°	210°	360°
Side So								

	DIG 2	can mod	16			
3 °	STEP	3°	27"	45°	6 3°	93°
5°	STEP	5°	25°	45°	65°	95°

NOTE

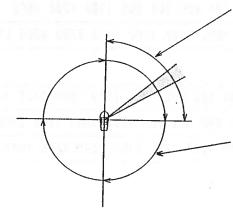
The Step angle may be changed on the screen menu, see PG 33.

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

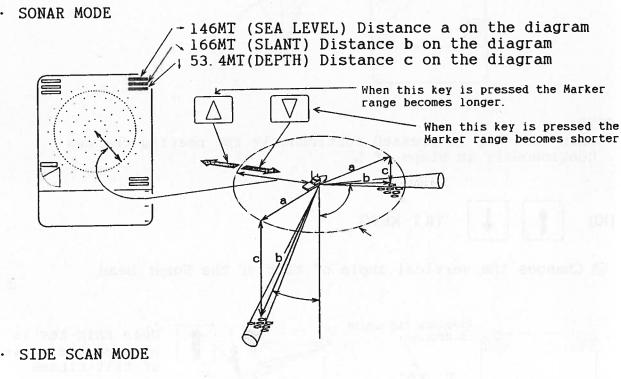
When the Noise Reduction function is in use the sweep time becomes longer. Please use Noise Reduction only when necessary. See PG 36

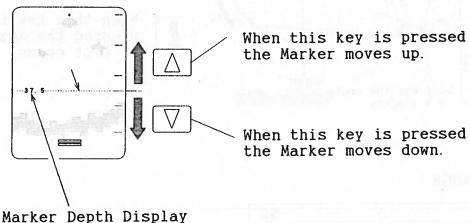




MARKER KEYS

- 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.





- · 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.

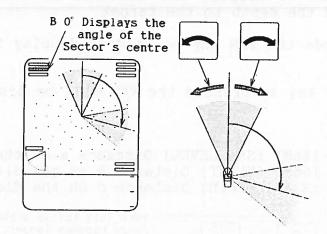
[9]





BEARING KEYS

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



when this key is pressed the centre of the Sector angle moves in a clockwise direction

NOTE

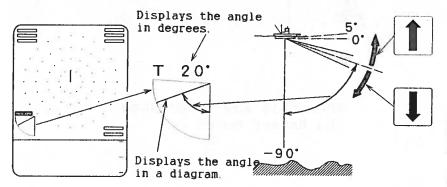
When this key is pressed continuously the bearing changes continuously in steps of 5° .

[10]



TILT KEYS

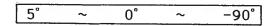
O Changes the vertical angle of tilt of the Sonar beam.



When this key is pressed the angle of tilt closes.

When this key is pressed the angle of tilt opens.

TILT ANGLE RANGE



NOTE

When the Tilt key is pressed continuously the angle of tilt changes continuously.

[11] 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.

[12] GAIN DIAL



[14] 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

FEATURE	S-1600H180
TYPE FREQUENCY HOIST STROKE HOIST TIME OUTPUT DATA POWER SUPPLY WEIGHT	MULTI DIRECTIONAL SEARCHLIGHT 180KHz 200 ~ 400mm 10sec (400mm stroke, 24V power supply) SIGNAL TRIGGER 10.5 ~ 30V DC 40KG

DISPLAY CABINET

FEATURE	S-1600M10	S-1600M15					
DISPLAY TYPE	COLOUR CRT PPI DISPLAY						
RANGE (SONAR MODE) RANGE (OFF CENTRE)	0~20, 40, 60, 80, 100, 120, 160, 200, 240, 280, 320, 400 600, 800, 1000, 1200, 1600, 2000 MT 0~12, 20, 40, 60, 80, 100, 120, 160, 200, 240, 280, 320 400, 600, 800, 1000, 1200, 1600 FM · BR 0~80, 120, 160, 200, 240, 320, 400, 600, 800, 1000, 1200, 1600, 2400, 3200, 4000, 5000, 6000 FT 0~30, 60, 90, 120, 150, 180, 240, 300, 360, 420, 480, 600, 900, 1200, 1500, 1800, 2400, 3000 MT 0~18, 30, 60, 90, 120, 150, 180, 240, 300, 360, 420, 480 600, 900, 1200, 1500, 1800, 2400 FM · BR 0~120, 180, 240, 300, 360, 420, 480, 600, 900, 1200, 1500, 1800, 2400, 6000, 7500, 9000 FT						
SECTOR ANGLE (SONAR) SECTOR ANGLE (S SCAN)	(10° Step) 10, 30, 50, 90, 130, 170, 210, 360° (5° Step) 5, 25, 45, 85, 125, 165, 205, 360° (5° Step) 5, 35, 45, 65, 95° (3° Step) 3, 27, 45, 63, 93°						
TILT ANGLE RANGE	5° ~ 0° ~ 90° (1° Step)						
DISPLAY MODES	SONAR · SONAR/HISTORICAL DISPLAY · SIDE SCAN						
DATA DISPLAY	RANGE, MARKER RANGE, TILT ANGLE, TILT DIAGRAM, SECTOR, BEARING, RING MARKER (DISTANCE, SLANT DISTANCE, DEPTH), COLOUR SCALE, WATER TEMP., SHIP'S SPEED*, LAT/LONG*.						
MAIN FUNCTIONS	OFF CENTRE (4 POSITIONS), TARGET LOCK, THRESHOLD CONTROL, PULSE ADJUST, GAIN CONTROL, DEGAUSSING, TRANSDUCER STABILIZER, COMPASS DISPLAY*, COLOUR PALETTE, AUDIO OUTPUT.						
INPUT DATA	(EXTERNAL NAVIGATOR) NMEA-0182,0183						
REMOTE CONTROL	OPTION	STANDARD					
DISPLAY SCREEN	10INCH COLOUR CRT	15INCH COLOUR CRT					
POWER SUPPLY	10.5 ~ 40V 40W	20 ~ 40V 60W					
WEIGHT	15KG	28KG					

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