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UM-3002

Operating, Maintenance & Installation Instructions

FOR

Model **V-3002 MK-I**

10.4-inch Color TFT LCD 50/200 kHz Dual Frequency Commercial Echo Sounder



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1. Introduction

This manual describes the operating, user-level maintenance and installation instructions for the Model V-3002 color echo sounder. Designed primarily for applications in commercial fishing, the V-3002 is a dual frequency fish finding system built around a 10.4-inch high resolution (VGA) color TFT LCD screen housed in an electrostatically shielded ABS plastic cabinet. The V-3002 offers the following features indispensable for professional fishing:

- Two screen splitting modes in dual frequency operation: horizontal or vertical split
- Two basic range setting modes in split screen operation
 - Normal mode: Same range setting for both frequencies
 - Trawl mode: Separate range setting for each frequency
- Two expansion (zooming) modes:
 - Bottom expansion (bottom-locked expansion)
 - Mid water expansion (pelagic expansion)
- Two bottom tracking modes:
 - Auto range: Tracks the bottom by automatically selecting basic ranges.
 - Auto shift: Tracks the bottom by automatically phasing current basic range.
- A-scope display
Displays echoes in both colors and amplitude instantly without having to wait for the whole echo structure to show up.
- White line function
Separates bottom-feeding fish from bottom contour without affecting sensitivity needed for detection of fish echoes.
- Selectable echo dynamic range
Allows the user to select whether to display echoes in stronger colors or weaker colors without changing receiver gain setting.
- Selectable echo color assignments
Enables the user to select 7 desired echo colors from a total of ten analog and digital colors, and assign each selected color to a desired strength level.
- Selectable echo threshold level
Allows the user to erase disturbing weak echoes without reducing receiver gain.
- Adjustable velocity standard
Compensates for a change in sound propagation velocity where high degree of depth measurement accuracy is required.
- Adjustable transducer draft
Compensates for the transducer draft to read depth from the water surface.
- Variable range marker (VRM)
Measures depth to selected targets or sets alarm depth.
- Five picture feed rates without decreasing sounding rate.
- Temperature readout
Displays surface water temperature when the standard dual-frequency transducer is plugged in.
- Digital I/O interface (NMEA-0183) for displaying GPS-derived navigational data or for outputting depth and water temperature data to onboard applications.

2. Specifications

The specifications listed below are based on the latest versions of hardware and software, and are subject to change without notice or obligation.

- **Display Screen:** 10.4 inch (diagonal) analog RGB backlit TFT LCD screen with 640 × 480 pixel resolution

- **Basic Ranges:** The following ranges in meters (**MT**), fathoms (**FM**), braccia (**BR**) or feet (**FT**) are selectable:

	MT	FM	BR	FT
A:	2.5	2.5	2.5	5
B:	5	5	5	10
C:	10	10	10	20
D:	15	15	15	30
E:	20	20	20	40
F:	30	30	30	60
G:	40	40	40	80
H:	50	50	50	100
I:	80	80	80	150
J:	100	100	100	200
K:	150	150	150	300
L:	200	200	200	500
M:	300	300	300	1,000
N:	500	500	500	2,000
O:	1,000	1,000	1,000	3,000

The readout calibration units (**MT**, **FM**, **BR**, and **FT**) are selectable via the menu system.

- **Manual Phasing:** Each basic range can be phased (shifted) up or down in one-unit steps.

- **Expansion Ranges:** The following expansion ranges are selectable for bottom-locked or pelagic (mid-water) expansion:

	MT	FM	BR	FT
A:	1.5	1.5	1.5	5
B:	2.5	2.5	2.5	10
D:	5	5	5	20
E:	10	10	10	50
F:	20	20	20	100
G:	50	50	50	250
H:	100	100	100	500
I:	200	200	200	1000

(continued on next page)

2. Specifications (*continued – 2/5*)

- Display Modes:
 - (1) Single Frequency Operation
 - Full screen mode: Normal echoes across full screen
 - Expansion mode: Compressed normal echoes across upper half screen and expanded echoes across lower half screen
 - (2) Dual Frequency Operation
 - Normal split mode: High/low frequency displays across upper/lower halves of screen (horizontal split) or right/left halves of screen (vertical split) with identical range settings
 - Trawl mode: High/low frequency displays across upper/lower halves of screen (horizontal split) or right/left halves of screen (vertical split) with separately selectable range settings
 - (3) A–Scope Mode: The A–scope display can be turned on/off separately over all above displays.
- Transmit Frequencies: 50 kHz and 200 kHz (nominal)
- Matched Transducers: Radarsonics 706–50/200T* and 570–50/200T* dual frequency ceramic
* *Temperature sensor T–200 is embedded in the housing.*

< CAUTION >

Use of a 706–50/200 or 570–50/200 obtained directly from Radarsonics Inc. or its dealers will result in an incorrect temperature readout.

- Transmit Beam Widths: 14° × 20° at 50 kHz, 7° at 200 kHz at –3 dB points
- Power to Transducer: Approx. 1 kW RMS at both 50 kHz and 200 kHz
- Sounding Rates: The following rates are automatically selected for the basic range in use with the upper range limit set to 0:

Basic Range (in meters)	Sounding Rate (per minute)
A	1767
B	1178
C, D, E	883
F, G	706
H	589
I, J	294
K	196
L	141
M	107
N	67
O	34

(continued on next page)

2. Specifications *(continued – 3/5)*

- **Transmit Pulse Widths:** The following pulse widths are automatically selected for the depth range (lower scale limit) in use:

Basic Range (in meters)	Approx. Pulse Width (in milliseconds)
A, B	0.1
C, D, E,	0.2
F	0.3
G, H	0.6
I, J, K, L	1.2
M, N, O	2.2

- **Bottom Tracking Modes:**
 - **Auto Range Mode:** Displays the bottom echo in lower half screen at all times by automatically selecting appropriate basic ranges.
 - **Auto Shift Mode:** Displays the bottom echo in lower half screen at all times by automatically phasing up/down the basic range in use.
NOTE: The bottom echo must show in red or orange to track the bottom.
- **Presentation Colors:**
 - **Echoes:** 7 colors selectable from 10 analog and digital RGB colors
Initial setting: analog RGB colors (red, orange, yellow, green, yellowish green, light blue and blue in order of echo strength)
 - **Dynamic Range:** Change to an adjacent color represents the following change in echo strength: 3 dB (initial), 4 dB, 5 dB or 6 dB
 - **Background:** Blue, black or white
 - **Digits & Scale Lines:** White (on blue or black background or black (on white background)
- **Echo Threshold:** Up to four weak echo colors can be turned off without changing receiver gain.
- **White Line:** The bottom echo can be suppressed in up to 5 levels, starting with red without changing receiver gain for targets off the bottom contour.
- **Echogram Feed Rates:** The following rates are selectable without changing the sounding rate in use:
 - **1/1:** Feeds one pixel for every sounding.
 - **1/2:** Feeds one pixel for every 2 soundings.
 - **1/4:** Feeds one pixel for every 4 soundings.
 - **1/8:** Feeds one pixel for every 8 soundings.
 - **1/16:** Feeds one pixel for every 16 soundings.
 - **STOP:** Freezes picture.

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2. Specifications (*continued – 4/5*)

- **Noise Reduction Levels:** The following levels are selectable without changing the sounding rate or receiver gain:
 - **LOW:** Signals showing at the same depth over last and present transmissions will be accepted as valid echoes.
 - **MID:** Signals showing at the same depth over last 2 and present transmissions will be accepted as valid echoes.
 - **HIGH:** Signals showing at the same depth over last 3 and present transmissions will be accepted as valid echoes.
 - **OFF:** Turns off the noise reduction function.

- **Depth Alarm Modes:** The following modes are selectable:
 - **SHALLOW Mode:** Alarms audibly and visually against decreasing depth.
 - **DEEP Mode:** Alarms audibly and visually against increasing depth.
The alarm depth is presettable in 0.1–unit steps over a depth range less than the depth value of 100, and in 1–unit steps over a depth range exceeding 100.

NOTE: The bottom must show in red or orange to trigger the alarm.

- **Fish Alarm:** The following relative echo strength levels and sizes are selectable to trigger the alarm:
 - **Echo Strength:** Up to 7 different colors
 - **Echo Size:** Small, medium and large

- **Digital Depth Readout:** Depths will be indicated in 0.1–unit steps for reading less than the value of 100, and in 1–unit steps for reading exceeding 100.

NOTE: The bottom must show in red or orange to display the depth digitally.

- **Velocity Standard:** 1500 meters/second (default)
Adjustable over 1400 to 1600 m/sec. range in 10m steps.

- **Draft Compensation:** Adjustable in 0.1–unit steps

- **Digital I/O Interface:** NMEA–0183 Version 2.1
 - **Inputs:** Position (\$GPGGA), speed & heading (\$GPVTG)
 - **Outputs:** Depth (\$SDDPT, \$SDDBS & \$SDDBT) and water temperature (\$SDMTW) at approx. 2–second intervals

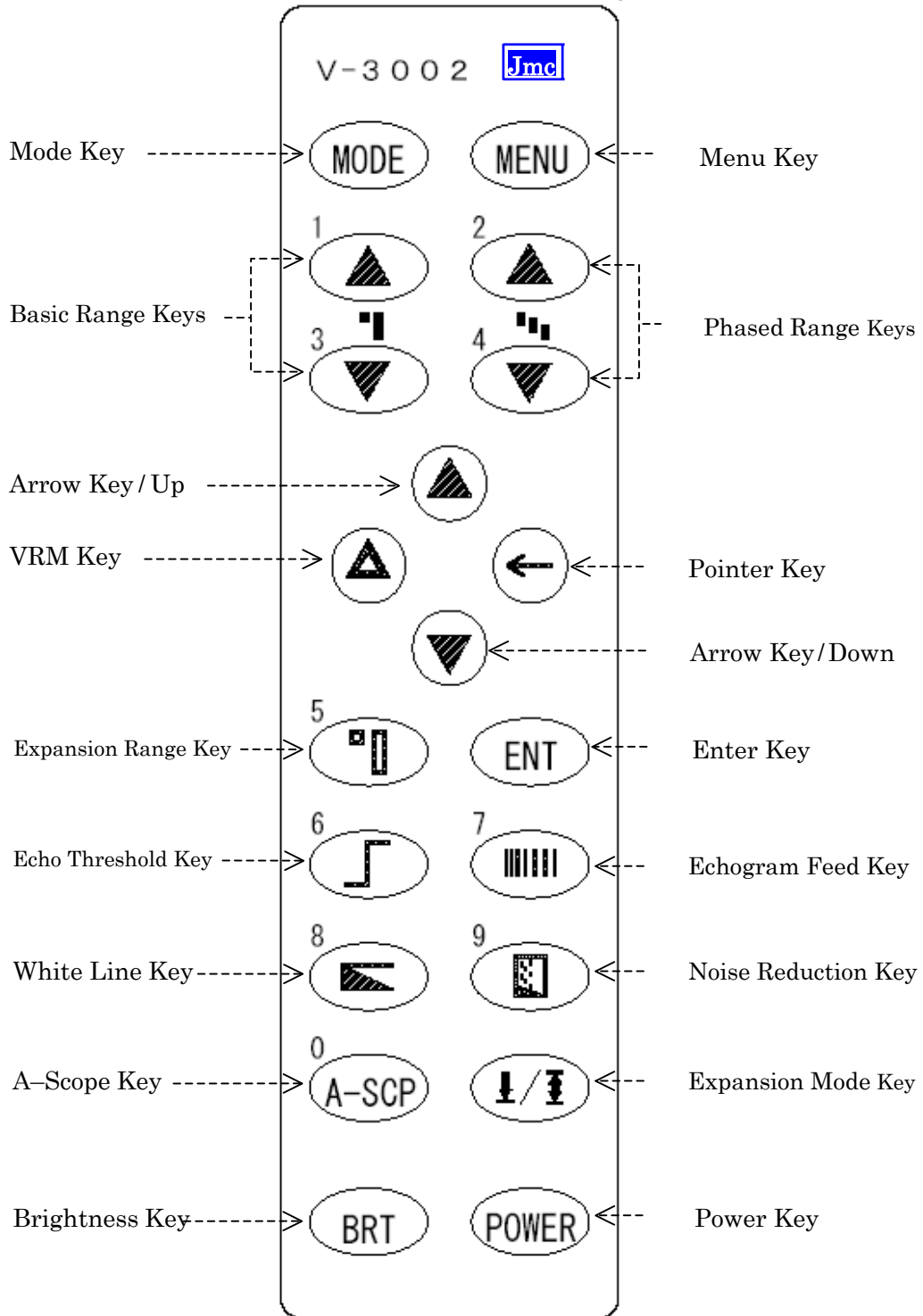
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2. Specifications (*continued – 5/5*)

- Temperature Sensor: T-200 thermistor, 5 k at 25°C embedded in transducer housing
- Receiver Gain Level: Continuously adjustable for each operating frequency
- TVG (STC) Level: Continuously adjustable for each operating frequency
- Keypad Panel Dimmer: Adjustable in 8 steps via menu system
- Screen Brightness: Adjustable in 5 steps directly from keypad
- Power Requirements: 11 to 40 VDC, floating ground, approx. 30W
Typical current drain: 1.2A at 24 VDC
- Battery Alarm: Built-in
 - Alarm Voltage: Presetable in 0.1-volt steps over 10.1 to 40 VDC range
 - Alarm Indications: Audible (beep at approx. 1-second intervals) and visual (**ALM=BAT!!**) blinking highlighted and in red
- Display Unit Weight: Approx. 5.8 kg with mounting bracket attached
- Ambient Temperature: -15 to 55°C / operating, 95% RH without condensation

3. Keypad Functions

Figure 3-1 V-3002 Keypad



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3. Keypad Functions (*continued – 2/8*)

3.1. Functions of Keys

Figure 3–1 on the preceding page shows the keypad of the V–3002 echo sounder system. The following is a summary description of the functions the keys provide.

Mode Key 

When no menu is turned on:

Repeated keypress selects the following display modes in sequence:

- Low frequency full screen display
- High frequency full screen display
- Dual frequency normal mode *¹split screen display
- Dual frequency trawl mode *¹split screen display

*¹ *Horizontal or vertical split can be selected via menu system. See para. 5.3.7–5.39.*

When a number of menus are opened:

Pressing this key once closes all menus at a time, returning you to the previous echogram screen.



Menu Key 

When no menu is turned on:

- A first keypress opens the main menu (**MENU**), activating the menu system. You can make various parameter settings, such as depth readout unit, echo color assignments, background colors, etc. to customize operation to your own applications. See paragraphs in section 5 for details.
- A second keypress turns the main menu off.
- Turning the equipment on while holding down this key displays the keypad test screen and displays the software version information.

When a number of menus are opened:


Pressing this key closes the currently active menu alone, returning you to the previous menu or to the previous echogram screen.

Basic Range Keys 


When no menu is turned on:

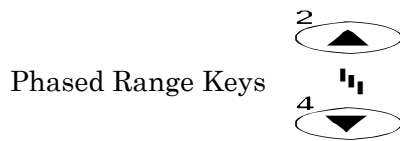
- Pressing this pair of keys selects basic ranges.
- Holding down this pair for a few seconds activates auto range (**AR**) function, displaying the bottom echo in the lower half screen by automatically selecting the most suitable range based on the present depth.

When a number of menus are opened:

These keys act as numeric keys “1” and “3,” selecting menu options 1 and 3 on the currently active menu. To complete selection, press  .

(continued on next page)

3. Keypad Functions (*continued – 3/8*)



When no menu is turned on:

- Pressing this pair of keys shifts the current basic range upward/downward. (See paragraph 4.6 for details)
- Holding down this pair for a few seconds activates auto shift (**AS**) function, displaying the bottom echo in the lower half screen by automatically shifting the current basic range upward/downward on the basis of the present depth.

When a number of menus are opened:

These keys act as numeric keys “2” and “4,” selecting menu options 2 and 4 on the currently active menu. To complete selection, press **ENT** .



When no menu is turned on:

- Pressing this key moves the variable range marker ^{*2}(VRM) upward.
^{*2} *To turn VRM on, press .*
- Pressing this key selects smaller ^{*3} expansion ranges.
^{*3} *Press to enable the range selecting function after activating the desired expansion mode (bottom-locked expansion mode or pelagic expansion mode) by pressing .*
- Pressing this key selects smaller ranges across the ^{*4} trawl-mode screen.
^{*4} *Press to enable the range selecting function after activating the trawl-mode screen by pressing **MODE** .*
- Pressing this key raises the ^{*5} white line gain (bottom suppression level).
^{*5} *Press to activate the white line function.*
- *Pressing this key raises the ^{*6} echo threshold level (weak echo suppression level).*
^{*6} *Press to activate the echo threshold function.*




When a number of menus are opened:

Pressing this key selects options on the currently active menu upwardly or enters a greater numeric value when setting the transducer draft, velocity standard or keypad dimmer level. To complete selection or entry, press **ENT** .






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3. Keypad Functions (*continued – 4/8*)

Pointer Key








- Pressing this key turns on the arrow pointer to set the upper range limit during ^{*7} pelagic expansion mode (mid water expansion mode) operation. The pointer can be moved up/down by pressing  /  . See paragraph 4.7 for details.
^{*7} *The pelagic expansion mode can be activated by repeatedly pressing  .*
- A second keypress turns the pointer off.

VRM Key


- A first keypress turns the VRM (variable range marker) on. To move the VRM, up/down, press  /  . See paragraph 4.8 for details.
- A second keypress turns the VRM off.
- Pressing  with the VRM turned on activates the depth alarm at the VRM position. To disable the alarm, press  again so that the on-screen depth alarm indication ( X.X) is turned off. See paragraph 5.4 for details.
- Turning the equipment on while holding down this key resets the system, returning all user-made settings to the factory's defaults. See paragraph 6.5 for details.

Arrow Key/Down

When no menu is turned on:

- Pressing this key moves the variable range marker ^{*8}(VRM) downward.
^{*8} *To turn VRM on, press  .*
- Pressing this key selects greater ^{*9}expansion ranges.
^{*9} *Press  to enable the range selecting function after activating the desired expansion mode (bottom-locked expansion mode or pelagic expansion mode) by pressing  .*
- Pressing this key selects greater ranges across the ^{*10}trawl-mode screen.
^{*10} *Press  to enable the range selecting function after activating the trawl-mode screen by pressing  .*
- Pressing this key lowers the ^{*11}white line gain (bottom suppression level).
^{*11} *Press  to activate the white line function.*
- *Pressing this key lowers the ^{*12}echo threshold level (weak echo suppression level).*
^{*12} *Press  to activate the echo threshold function.*

When a number of menus are opened:





Pressing this key selects options on the currently active menu downwardly or enters a smaller numeric value when setting the transducer draft, velocity standard or keypad dimmer level. To complete selection or entry, press  .

(continued on next page)

3. Keypad Functions (*continued – 5/8*)


Expansion Range Key 

When no menu is turned on:

- Pressing this key allows expansion ranges to be selected by pressing  /  during bottom-locked expansion mode or pelagic expansion mode of operation. See paragraph 4.7 for details.
- Pressing this key allows basic ranges across the *¹³ trawl mode screen to be selected by pressing  /  .

*¹³ *The trawl mode screen can be activated by repeatedly pressing  .*

When a number of menus are opened:





Pressing this key selects menu option #5 on the currently active menu. To complete selection, press  .

Enter Key 

When no menu is turned on:


Pressing this key turns on/off the *¹⁴ depth alarm function when the alarm is set.

*¹⁴ *The depth alarm can be set via the following steps:*



- (1) Turn the VRM on by pressing  .
- (2) Move the VRM to the desired depth by pressing  /  .
- (3) Press  . See paragraph 5.4 for details.

When a number of menus are opened:


Pressing this key completes the selection of a menu option or the entry of a numeric value.

Echo Threshold Key 

When no menu is turned on:


Pressing this key activates the echo threshold function. Further keypress sets the threshold level, suppressing up to four weak echo colors or recovering those suppressed. The same effect can be achieved by pressing  /  after pressing this key. See paragraph 4.10 for details.

When a number of menus are opened:

Pressing this key selects menu option #6 on the currently active menu. To complete selection, press  .

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3. Keypad Functions (*continued – 6/8*)

Echogram Feed Key 


When no menu is turned on:

Pressing this key selects the echogram feed rates (**PF**):

- **PF =1/1**(fastest rate)
- **PF =1/16** (slowest rate)
- **PF =STOP** (freezes feed)



See paragraph 4.11 for details.

When a number of menus are opened:


Pressing this key selects menu option #7 on the currently active menu. To complete selection, press  .

White Line Key 

When no menu is turned on:

- Pressing this key once activates the white line function and suppresses the strongest part of the bottom echo. Successive keypress suppresses up to five bottom echo colors one at a time in order of strength, allowing bottom-feeding fish to stand out from the bottom contour. See paragraph 4.9 for details.
- The same effect can be achieved by pressing  /  after pressing this key.

When a number of menus are opened:

Pressing this key selects menu option #8 on the currently active menu. To complete selection, press  .


Noise Reduction Key 

When no menu is turned on:

Pressing this key activates the noise reduction (**NR**) function and selects the levels of interference reduction. See paragraph 4.12 for details.

- **NR =LOW** : low reduction level
- **NR =MID** : mid reduction level
- **NR =HIGH** : high reduction level
- **NR =OFF** : function turned off

When a number of menus are opened:

Pressing this key selects menu option #9 on the currently active menu. To complete selection, press  .

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3. Keypad Functions (*continued – 7/8*)

A–Scope Key 




When no menu is turned on:

Pressing this key turns on/off the A–scope display. See paragraph 4.13 for details.

When a number of menus are opened:

Pressing this key selects menu option #0 (representing 10) on the currently active menu. To complete selection, press .

Expansion Mode Key 


- A first keypress activates the pelagic expansion mode.
- A second keypress activates the bottom–locked expansion mode.
- A third keypress returns you to the normal echogram screen.
- The depth ranges across the expansion display can be selected by pressing , followed by  / .



See paragraph 4.4 for details.

Brightness Key 

Repeated keypress adjusts the screen brightness level in 5 steps without affecting the *15 keypad backlighting level.

*15 *The keypad backlighting can be controlled via* **MENU 7:DIMMER**  / .

Power Key 

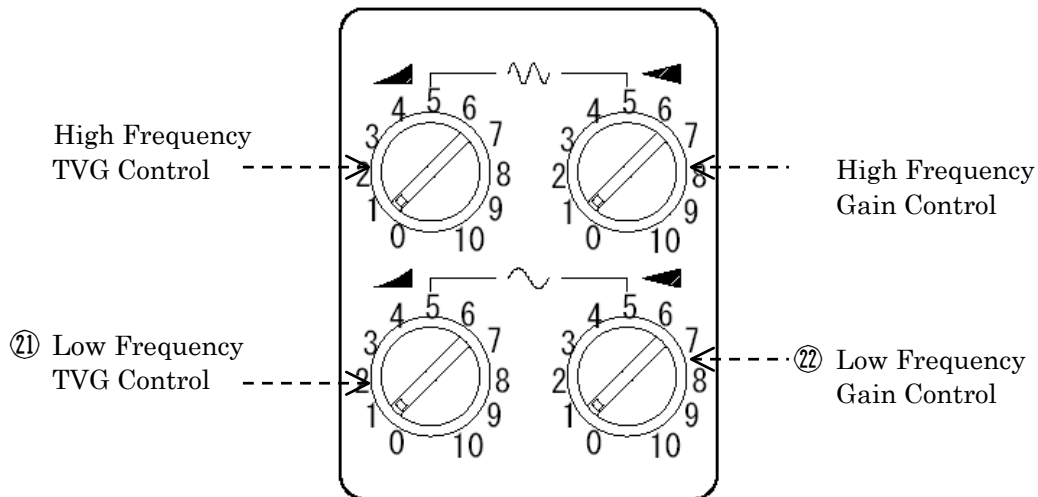
- Pressing this key turns the equipment on.
- Holding this key down for a few seconds turns the equipment off.
- Turning the equipment on while holding down  resets the system software, displays the **LANGUAGE MENU**, and initializes the user–made parameter settings.
- Turning the equipment on while holding down  turns on the keypad test screen, and displays the software version information.

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3. Keypad Functions (*continued – 8/8*)

3.2. Functions of Front Panel Controls

Figure 3-2 V-3002 Gain and TVG Controls



High Frequency TVG Control

- Clockwise rotation raises the TVG level, decreasing the level of receiver gain suppression at shallow depth in high frequency (200 kHz) operation.
- Fully clockwise (CW) position produces no TVG effect (no gain suppression).
- At the fully counter-clockwise (CCW) position, both suppression and range of effectiveness are maximum.

High Frequency Gain Control

This control adjusts the receiver gain level in high frequency (200 kHz) operation.

②① Low Frequency TVG Control

- Clockwise rotation raises the TVG level, decreasing the level of receiver gain suppression at shallow depth in low frequency (50 kHz) operation.
- Fully clockwise (CW) position produces no TVG effect (no gain suppression).
- At the fully counter-clockwise (CCW) position, both suppression and range of effectiveness are maximum.

②② Low Frequency Gain Control

This control adjusts the receiver gain level in low frequency (50 kHz) operation.

4. Basic Operating Procedure

4.1. Introduction

The following instructions will enable you to select often-used operating parameters, such as basic range, phased range, brightness level, image feed rate and noise reduction level, via the front panel keypad. Parameters that are used to customize the equipment to your particular operating needs, such as depth readout unit (fathoms, braccia, feet), screen split mode, and background color, are accessible via the menu system described in section 5.

4.2. Powering On/Off

To turn the equipment on, lightly press **POWER**, and release it immediately.

< CAUTION >

Holding down the key until a beep is heard may turn the equipment off.

To turn the equipment off, hold down **POWER** for a few seconds until two slow beeps, followed by two quick beeps, are heard. This delayed key actuation is intentional, preventing accidental turning-off of the equipment.

If the **MENU LANGUAGE** shown in Figure 4-1 is displayed when the equipment is switched on, proceed to paragraph 4.3, selecting the desired language for the menu and on-screen message indications.

4.3. Selecting Menu Languages

4.3.1. Introduction


The menu system, which is turned on by pressing **MENU**, and other on-screen alphanumeric messages are initially indicated in English. Several other local languages are supported and selectable via the following procedure.

NOTE: If your unit already shows the desired language selected when it is delivered from your dealer, skip the procedure.

4.3.2. Displaying Language Menu

To display the language menu, proceed as follows:

Turn the equipment off.

Turn it on again while holding down  (VRM key). Release the key after hearing two quick beeps. This will cause the following menu to show up.

NOTE: If the menu is displayed on initial power-up, skip this particular step.

(continued on next page)




4.3.2. Displaying Menu Language (*continued* – 2/2)

Figure 4-1 Language Menu – Example

LANGUAGE MENU
1:ENGLISH
2:CHINESE (中文)
3:VIETNAMESE
4:SPANISH

The currently selected language (**ENGLISH** as default) is shown in red.

NOTE: The above menu is an example. The number of languages supported is subject to change with software version.

Select the desired language using  /  , and press  . This will turn the menu off, allowing normal operation to begin.

This selection will be stored in memory, enabling the menus and messages to show in the selected language from next time.

To re-display the menu, repeat all the above steps.

< CAUTION >

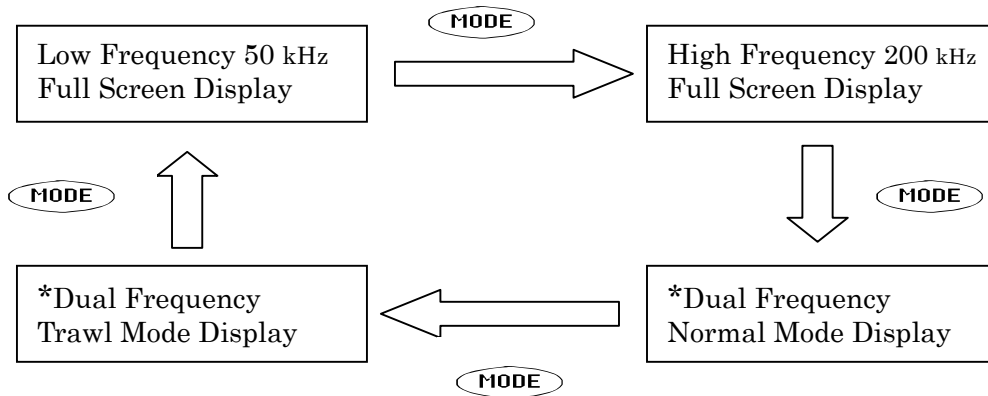
Re-displaying the MENU LANGUAGE will reset the system, returning all user-made settings to the initial factory settings.

4.4. Selecting Display Modes

4.4.1. Introduction

Repeated pressing of **MODE** selects the following display modes in sequence:

Figure 4-2 Selecting Display Modes

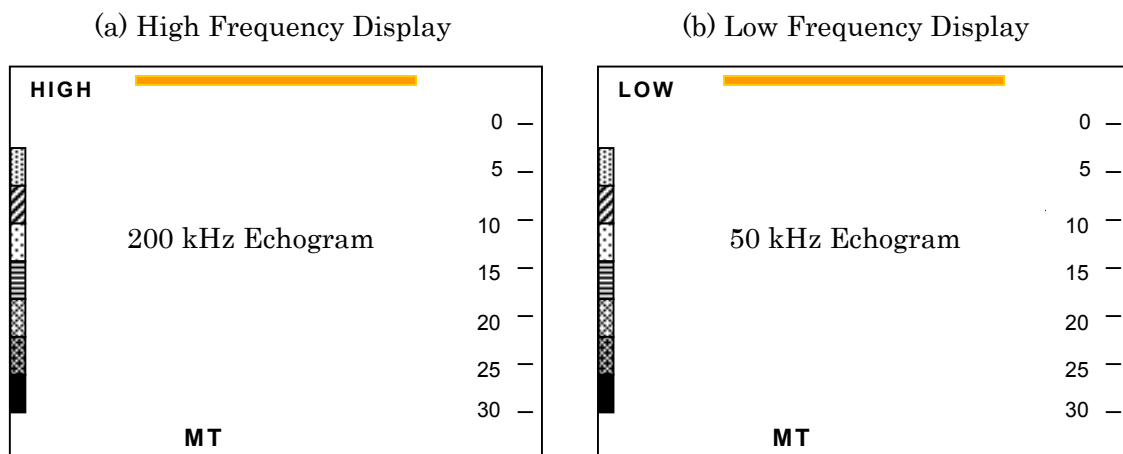


**NOTE: In the case of dual frequency operation, the screen is split horizontally into upper and lower halves (default) or vertically into right and left halves (user-setting).*

4.4.2. Full-Screen Display Mode

The display shows either high frequency (200 kHz) echogram or low frequency (50 kHz) echogram across the full screen area, as in the examples below.

Figure 4-3 Single Frequency Full Screen Displays

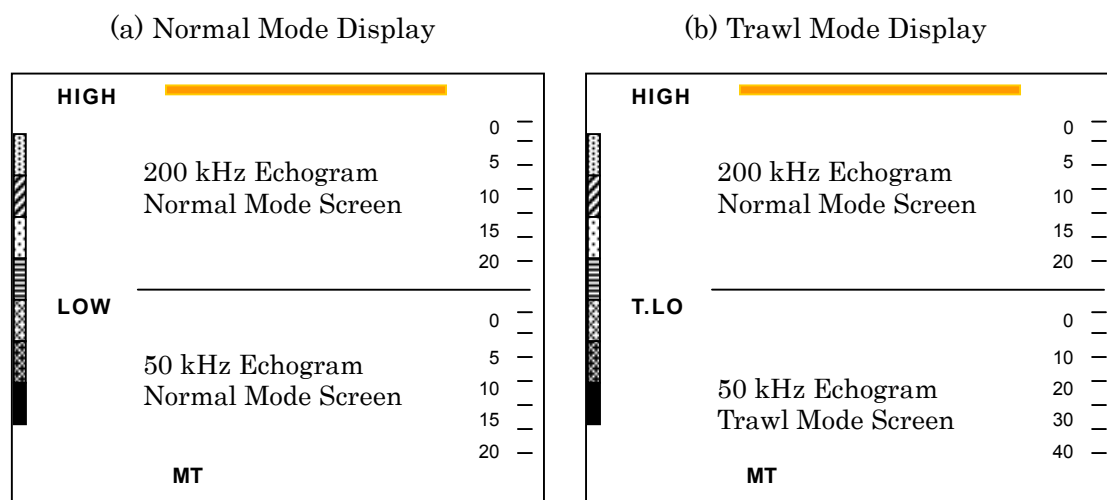


4.4.3. Split-Screen Display Modes

4.4.3.1. Introduction

The screen is split into upper and lower halves (initial setting) or right and left halves (user-made setting), with one half showing high frequency picture and the other half showing low frequency picture. Two range setting modes are selectable in split-screen dual frequency operation: Normal Mode and Trawl Mode. When the Normal Mode is selected, depth range setting is synchronized across both high and low frequency display areas. When the Trawl Mode is selected, the depth range can be set separately across each half screen.

Figure 4-4 Dual-Frequency Split-Screen Displays



HIGH = High Frequency (200 kHz)
LOW = Low Frequency (50 kHz)

T.HI = Trawl High Frequency (200 kHz)
T.LO = Trawl Low Frequency (50 kHz)

4.4.3.2. Selecting Screen Splitting Modes

To split the screen into the right and left halves instead of upper and lower halves as initially set, proceed as follows.

NOTE: Detailed instructions for selecting parameters via the menu system are given in section 5

Splitting for Dual Frequency Normal Mode Operation

Press **MENU** to display the **MENU** (i.e. to activate the menu system).

Select menu option “**1:DISPLAY**” using **▲** / **▼** and press **ENT**.

Select option “**6:DUAL FREQ SPLIT**” in the same manner.

Select option “**3:HIGH:LOW**” or “**4:LOW:HIGH**” in the same manner. Be sure to press **ENT** to complete your selection.

Press **MODE** to exit the menu system.

(continued on next page)

4.4.3.2. Selecting Screen Splitting Modes (*continued – 2/2*)

Splitting for Dual Frequency Trawl Mode Operation

- Press **MENU** to display the **MENU** (i.e. to activate the menu system).
- Select menu option “**1:DISPLAY**” using **▲** / **▼** and press **ENT**.
- Select option “**7:TRAWL MODE SPLIT**” in the same manner.
- Select option “**3:HIGH:LOW**” or “**4:LOW:HIGH**” in the same manner.
- Press **MODE** to exit the menu system.

4.5. Selecting Basic Ranges

4.5.1. Selecting Basic Ranges across Normal Mode Screen

The basic ranges during single frequency full screen mode of operation or during dual frequency split screen normal mode of operation can be selected by using the following pair of keys:

- 1** **▲** : Selects shallow (smaller) ranges.
- 3** **▼** : Selects deep (greater) ranges.

4.5.2. Selecting Basic Ranges across Trawl Mode Screen

When the equipment operates in the dual frequency trawl mode, the following set of keys selects the basic ranges across the trawl screen:

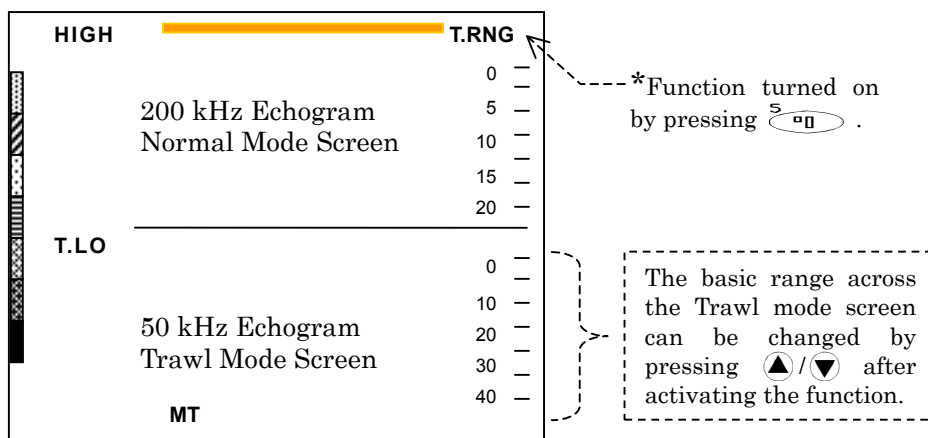
- 5** **□** : Activates the *range selecting function across the trawl screen.

Then,

- ▲** : Selects shallow (smaller) ranges.
- ▼** : Selects deep (greater) ranges.

NOTE: When the function is turned on, indication “T.RNG**” (for trawl range) shows up just above the top scale line on the upper half screen, as in the example below.*


Figure 4-5 Selecting Basic Range across Trawl Screen




4.6. Phasing (Shifting) Up/Down Selected Basic Range

4.6.1. Phasing Range Up/Down across Normal Mode Screen

The following pair of keys phases up/down the selected basic range, setting the upper limit for that range during single frequency operation or across the normal mode screen during dual frequency operation:




 : Phases the basic range upward (shifts the range in shallowing direction).



 : Phases the basic range downward (shifts the range in deepening direction).

The basic range across the trawl screen remains unchanged.

4.6.2. Phasing Range Up/Down across Trawl Mode Screen

Use  and  /  pair in the following manner.

Press  so that the indication “**T.SFT**” (for trawl display shift) shows up just above the top scale line on the normal screen as in the example below.



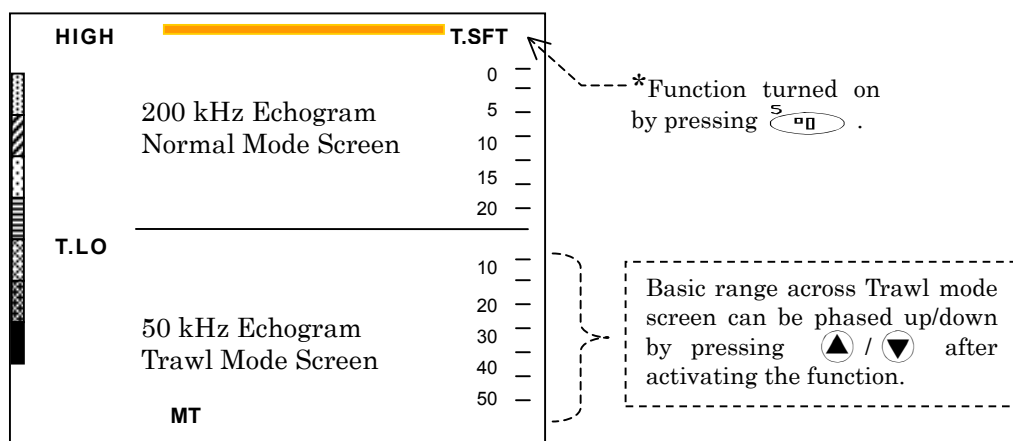

Press  /  to set the desired upper range limit.

Figure 4-6 Phasing Trawl Screen Range – Example



4.7. Selecting Expansion Modes

4.7.1. Introduction

The following two modes are selectable by repeatedly pressing  during single frequency full screen mode of operation for displaying echoes expanded.

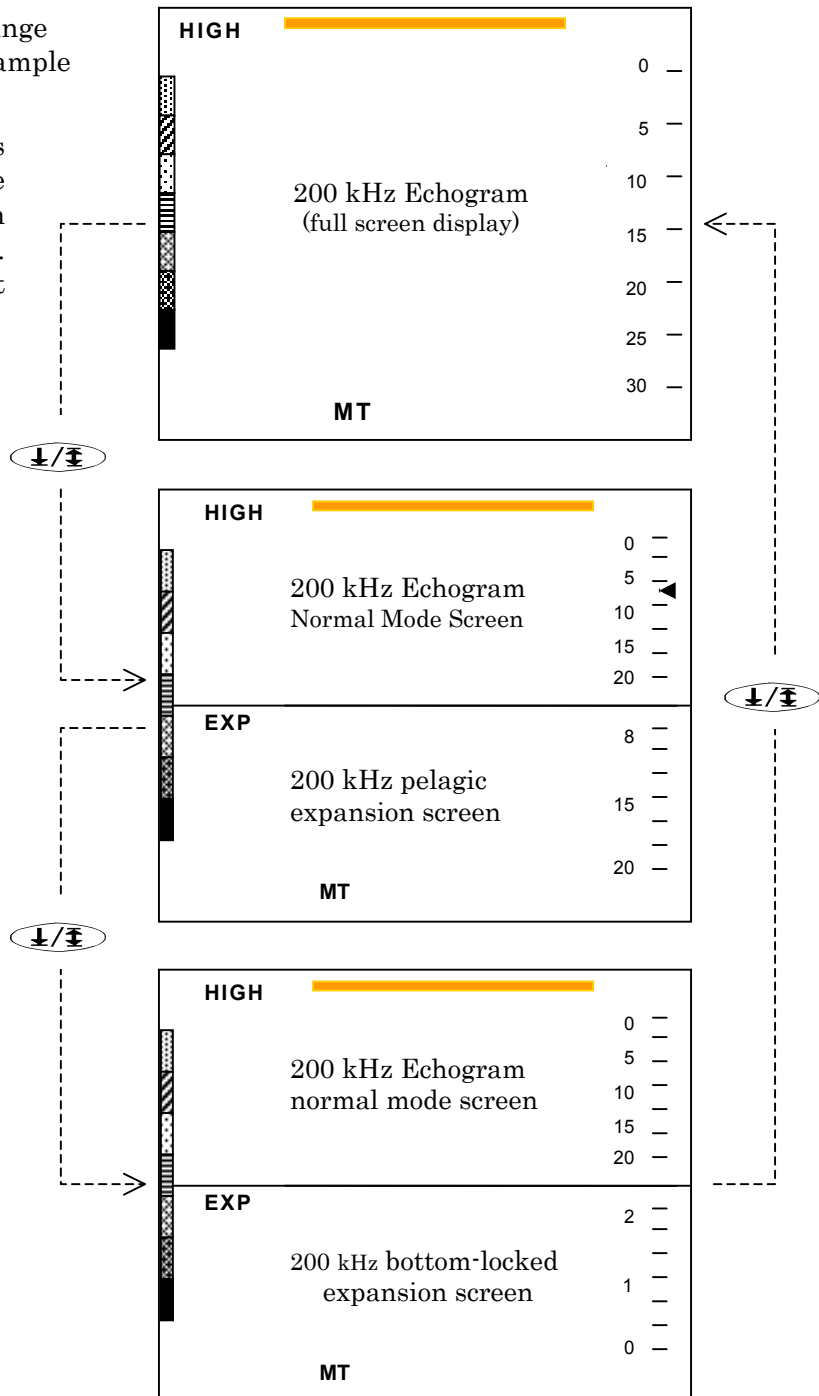
- Pelagic expansion (mid-water expansion) mode
- Bottom-locked expansion (bottom expansion) mode

Figure 4-7 Selecting Range Expansion Modes – Example

A third press returns you to normal single frequency full screen mode of operation. Figure 4-7 at right shows this sequence.


To activate either expansion mode of operation, **the equipment must be operated in the single frequency (high or low) full screen mode.**

Pressing the above key in dual frequency operation will sound a beep, indicating an operational error.



4.7.2. Selecting Expansion Ranges

Once either expansion mode is activated, the following set of keys selects the expansion ranges across the lower half screen:

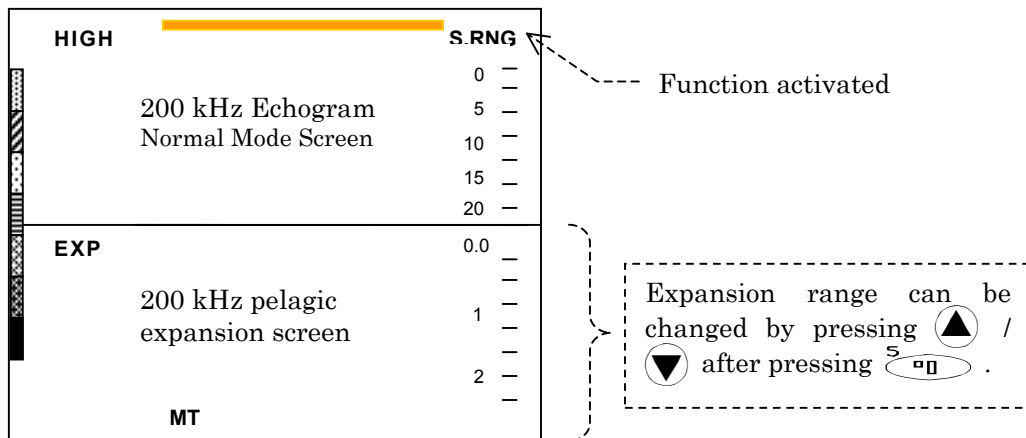
 : Activates the range selection function* across the expansion screen.

Then,

 : Selects shallow (smaller) ranges.




 : Selects deep (greater) ranges.

Figure 4-8 Selecting Basic Range across Expansion Screen



*NOTE: When the function is turned on, indication “S.RNG” (for sub range) shows up just above the top scale line on the upper half screen, as in the above example.

4.7.3. Setting Upper Range Limit for Mid–Water Expansion Range



The upper limit of the selected expansion range during mid–water expansion mode of operation can be set using  and  /  pair in the following manner:

Press  to turn on the upper range limit setting function.

This will turn on:

- the indication “S.SFT” above the top scale line on the normal screen, and
- an arrow–shaped pointer immediately to the left of that scale line, as in the example in Figure 4–9. The pointer position represents the upper limit of the expansion range in use.

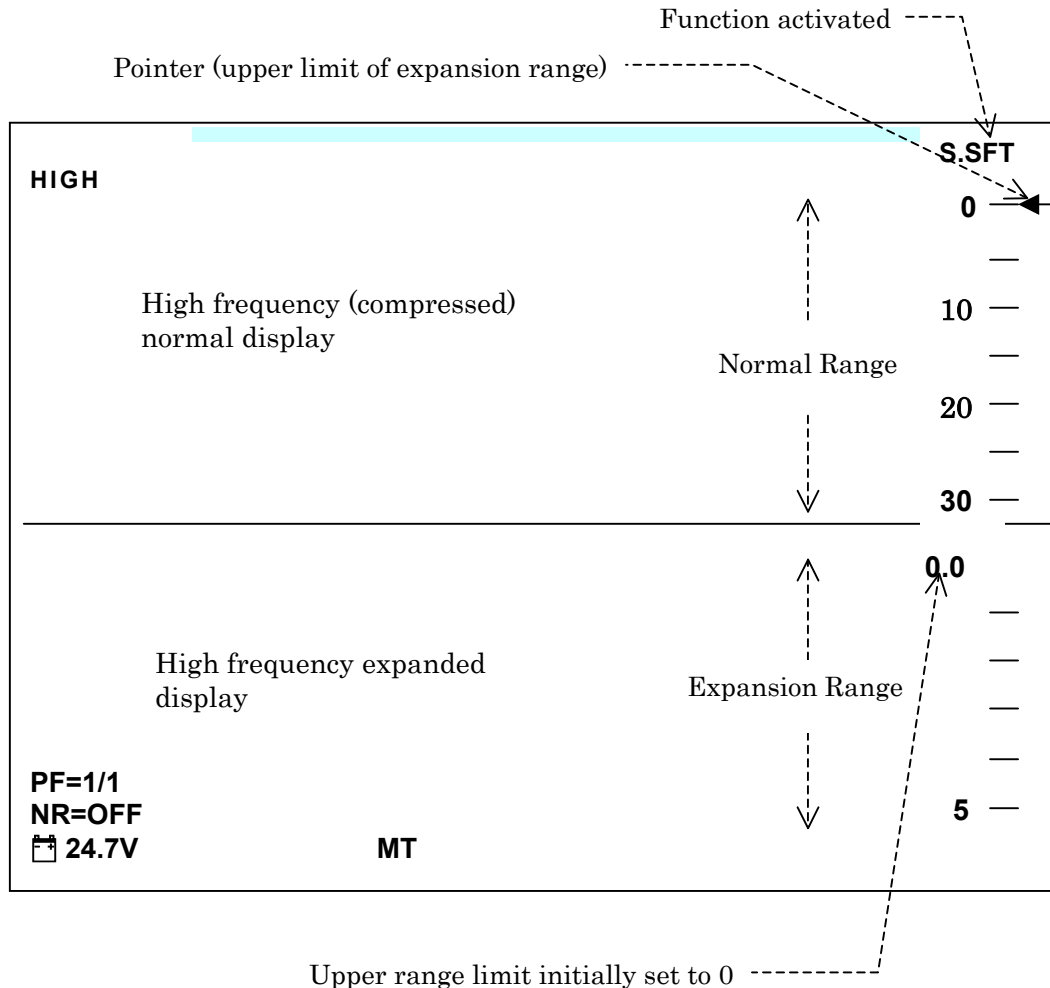
Press:

-  to shift the pointer downward, moving the upper range limit toward deepening direction.
-  to shift the pointer upward, moving the upper range limit toward shallowing direction.

(continued on next page)

4.7.3. Setting Upper Range Limit for Mid-Water Expansion Range (*continued- 2/2*)

Figure 4-9 Pelagic (Mid-Water) Expansion Operation Screen – Example



4.8. Setting Variable Range Marker (VRM)

The VRM can be turned on by simply pressing \triangle . The appearance of indication “VRM” just above the top scale line indicates that the function is activated. To turn it off, press the key two more times.

The VRM can be moved up/down across the screen by pressing \blacktriangle / \blacktriangledown .

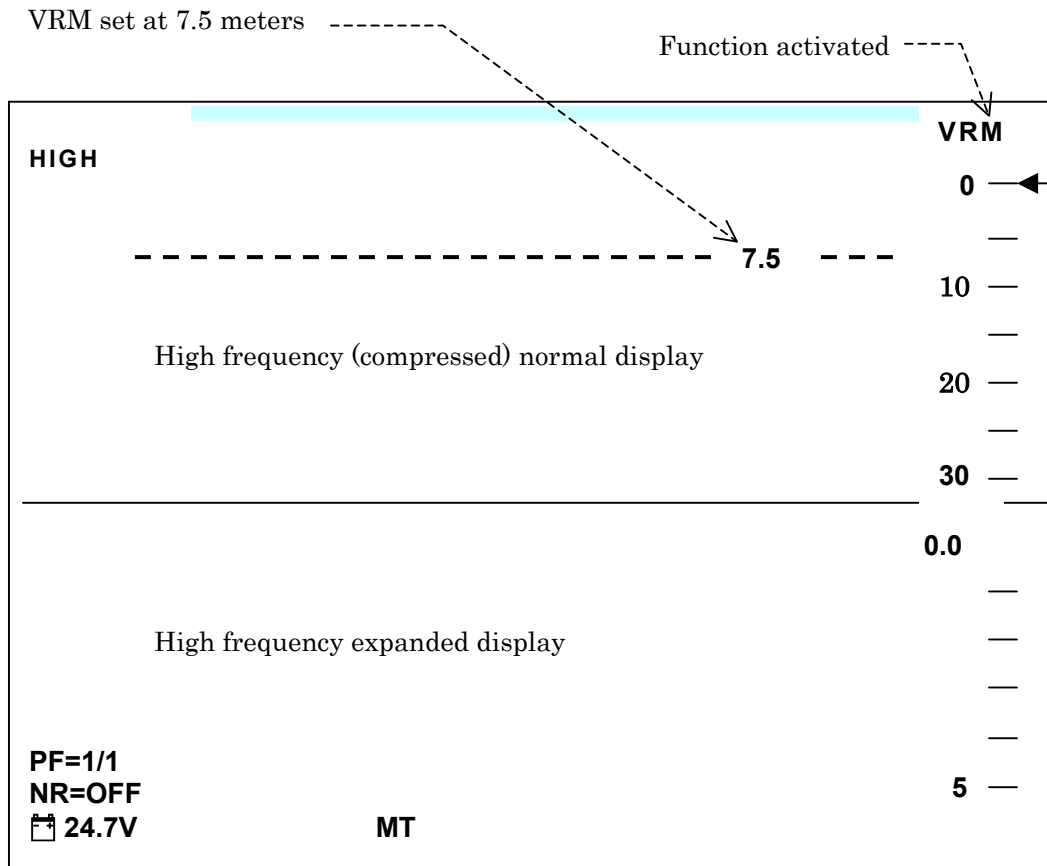
NOTES:

- (1) A second press of the key turns on the depth alarm function. Refer to paragraph 5.4.3 for details.
- (2) Pressing ENT with the VRM turned on sets the alarm depth at the marker position.

(continued on next page)

4.8. Setting Variable Range Marker (*continued – 2/2*)

Figure 4-10 Turning on and Moving VRM – Example



In the above example, which shows a pelagic expansion echogram across the lower half screen, the VRM can be moved only within the normal display area on the upper half screen. In the normal full screen mode of operation, the marker can be shifted to any where across the entire display area.

During dual frequency operation, the VRM shows up in the following manner:

- Normal mode of operation

The marker shows up within only the upper half screen area when the screen is split horizontally (initial setting) or across both display areas when the screen is split vertically (optional setting). See paragraph 5.3.5 for screen splitting procedure.

- Trawl mode of operation

The marker shows up within the normal display area only.

4.9. Setting White Line Level

4.9.1. Introduction


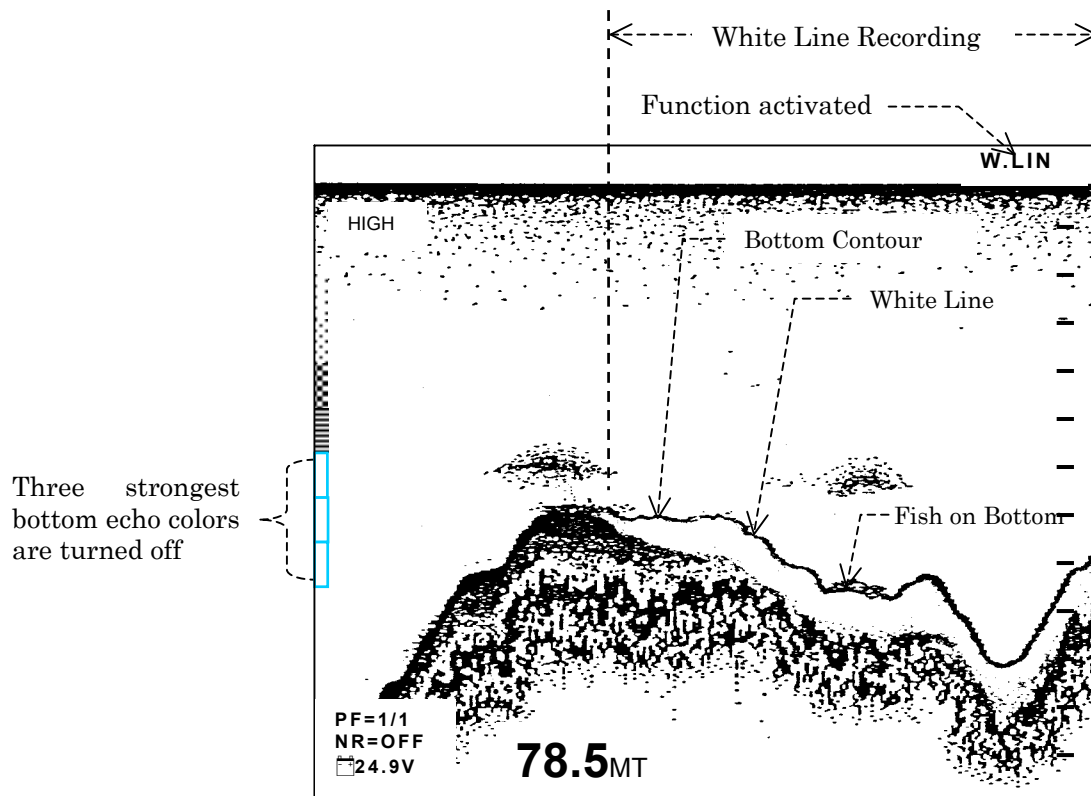


White Line is the function of separating the bottom echo from echoes of fish lying on or close to the bottom by suppressing only the bottom echo without reducing the receiver gain on the fish echoes. The function, which can be activated by pressing . Helps you find bottom-feeding fish that look like a part of the bottom echo and, therefore, are difficult to detect on the normal echo sounder screen. The figure below shows an example of how the function affects the way fish echoes near the bottom are displayed.

Figure 4-11 Effect of White Line Function – Example



4.9.2. Adjusting Suppression Level

The indication “**W.LIN**” (for White Line) will show up just above the top scale line as in the example above when the function is activated.

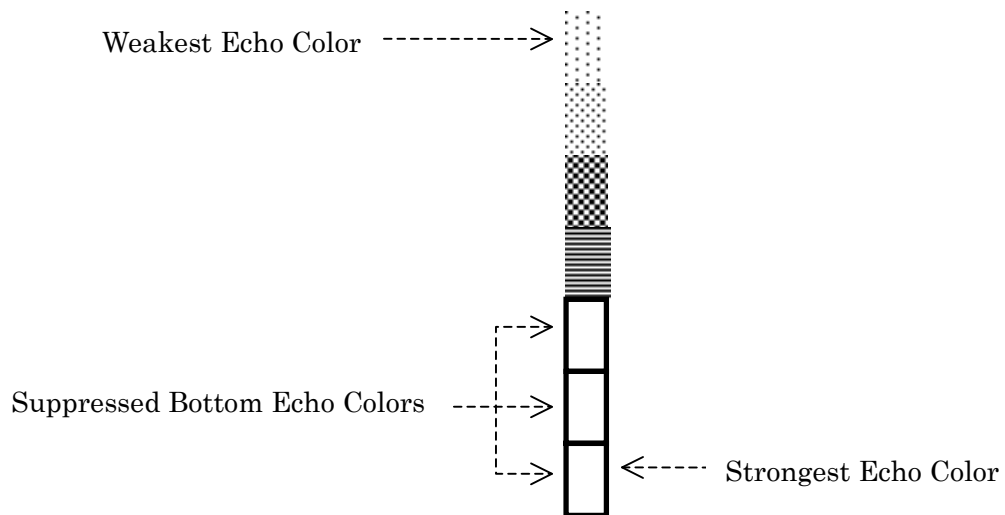
Pressing  will change the bottom surface into a thin contour line immediately followed by a blank area. As you press the key repeatedly, the colors that form the bottom echo will be erased one by one, the strongest intensity color first, allowing the blank area to widen (raising the white line level). The same effect can be achieved by repeatedly pressing .

The suppressed bottom echo colors are indicated on the color sample scale, as in the example above. The two weakest colors cannot be suppressed.



(continued on next page)

4.9.2. Adjusting Suppression Level (*continued – 2/2*)



Figure 4-12 Color Sample Scale Indication in White Line Operation – Example



If you wish to check the hardness of the bottom, too high a White Line level should be avoided.

Pressing  will restore the suppressed bottom echo colors, one at a time, weakest color first, thus narrowing the blank area (lowering the White Line level). The same effect can be achieved by repeatedly pressing .

NOTES:

- (1) Pressing  /  simulates the action of turning the white line gain control on a recording echo sounder.
- (2) White Line level adjustment affects the bottom echo only, and should not be confused with echo threshold adjustment described in the next paragraph.
- (3) The last White Line level used will be stored in memory and will be recalled on next power-up.

4.10. Setting Echo Threshold Level

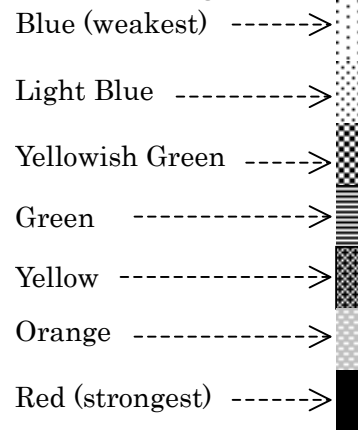
4.10.1. Introduction


Echoes are shown in up to seven different colors depending on their relative strengths. The color scale at the left edge on the echogram screen shows the colors that are used to indicate echo strengths, with the bottom-end color (initially red) representing the strongest echo and the top-end color (initially blue), the weakest echo.

Echo threshold adjustment consists of suppressing the display of weak color echoes, such as surface clutters, allowing only strong echoes to show up on the screen without decreasing the receiver gain.

Three strongest echo colors (initially, red, orange and yellow shown at right) cannot be suppressed.

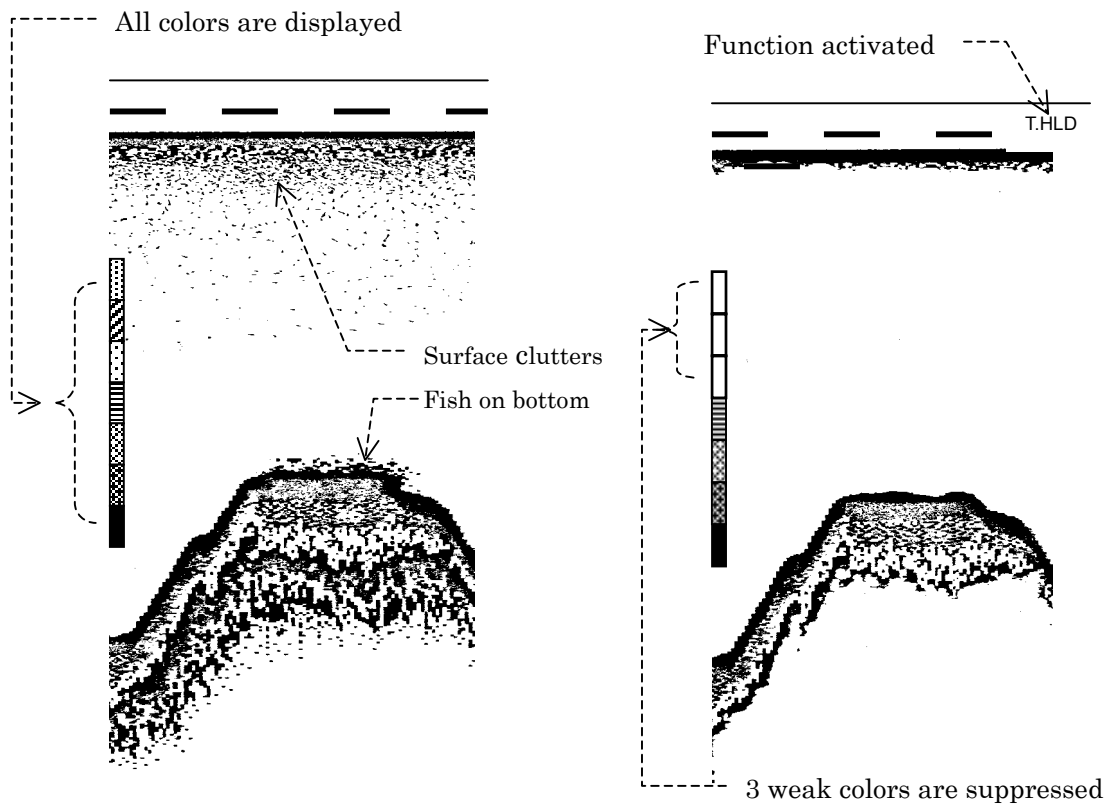
Figure 4-13
Color Scale and Initial Echo
Color Assignments



The function can be activated by pressing . The indication "T.HLD" (for threshold) will be turned on just above the top scale line.

4.10.2. Adjusting Echo Threshold Level



Figure 4-14 Effect of Echo Threshold on Echogram – Example





(continued on next page)

4.10.2. Adjusting Echo Threshold Level *(continued – 2/2)*

The example above shows how the echo threshold adjustment (with top 3 weak–strength colors suppressed) affects the way the echogram is displayed. The receiver gain level remains unaffected.

After the function is activated, the threshold level can be changed by pressing  /  .

-  : Suppresses weak echo colors.
-  : Restores suppressed colors.


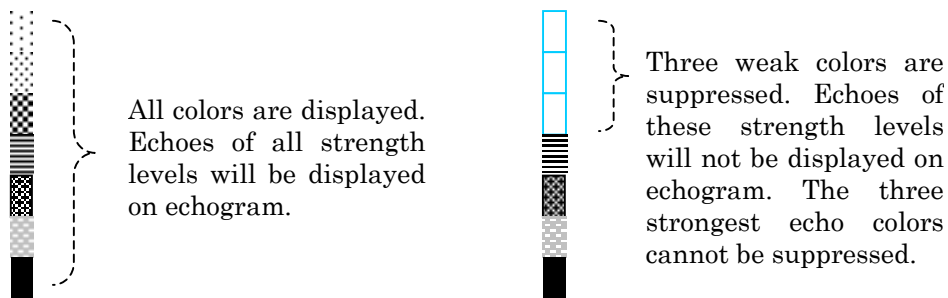
The same effect can be achieved by repeatedly pressing  .

Figure 4-15 Adjusting Echo Threshold Level – Example



NOTE: The last threshold level used will be stored in memory and will be recalled on next power-up.

4.11. Selecting Echogram Feed (PF) Rates

The echo sounder screen consists of a total of 640 dots (pixels) in horizontal direction. The echo picture initially moves one dot (i.e. 1/640) to the left each time transmission occurs. In shallow range operations, the sounding rate is very high, causing the echogram picture to move very rapidly (namely the picture feed rate becomes high).


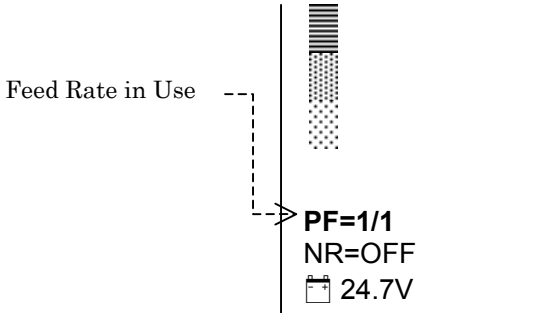
Up to five feed rates can be selected without changing the sounding rate in use. If you find the picture moving too fast, select one of the slow rates by pressing . The feed rate currently in use is indicated on-screen as in the example below.

Figure 4-16 On-Screen Indication of Operating Parameters - Example / PF Rate




The following feed rates are selectable:

- **PF=1/1:** Feeds every sounding.
- **PF=1/2:** Feeds every 2 soundings.
- **PF=1/4:** Feeds every 4 soundings.
- **PF=1/8:** Feeds every 8 soundings.
- **PF=1/16:** Feeds every 16 soundings.
- **PF=STOP:** Freezes picture feed.

4.12. Selecting Noise Reduction (NR) Levels

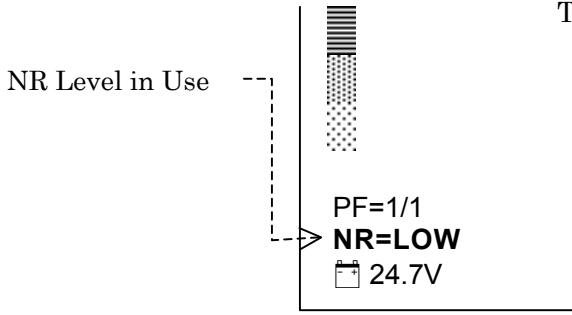
The noise reduction (**NR**) function is designed to reduce interference mainly from other echo sounders operating near your position. The function will also help reduce noise from other on-board equipment.

To activate the function and select the NR levels, press  repeatedly. The NR level currently in use is indicated on-screen, as in the example below. It is possible that the NR function will erase weak fish echoes.

< CAUTION >

If the purpose is to detect weak echoes, the **HIGH** NR level should be avoided.

Figure 4-17 On-Screen Indication of Operating Parameters - Example / NR Level



The following NR rates are selectable:

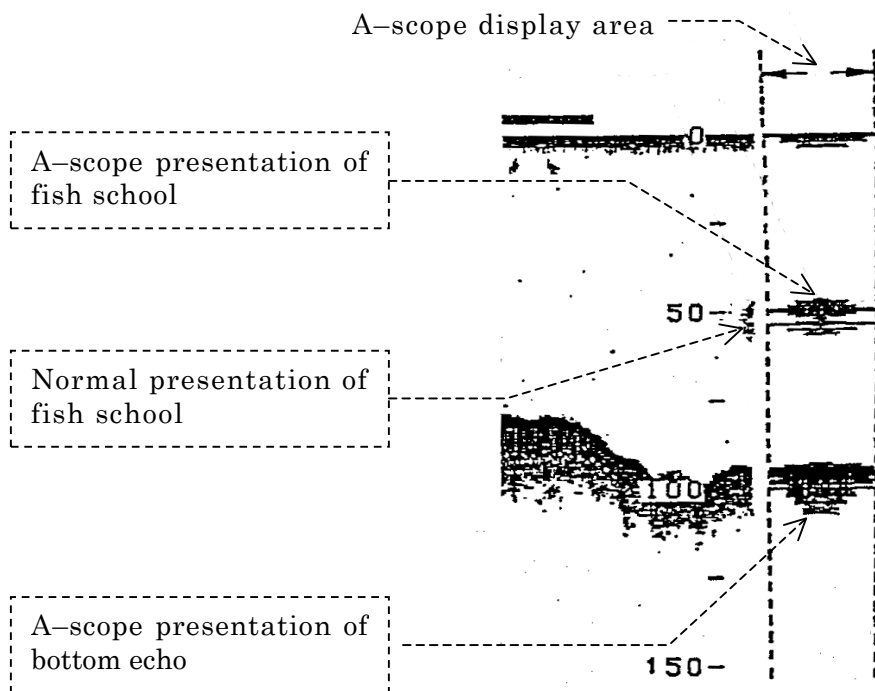
- **NR=OFF:** NR function turned off
- **NR=LOW:** Low NR level
- **NR=MID:** Medium NR level
- **NR=HIGH:** High NR level

4.13. A-Scope Display

4.13.1. Introduction

A-scope is the function of displaying echoes in the form of horizontal deflections. The larger the deflection, the stronger the echo. The A-scope function will help estimate instantly an approximate size of a fish school as soon as it is detected, thereby eliminating the need to wait for the whole block of echoes to become visible across the screen. You will find the function useful in looking for fast-moving fish, especially on deep ranges or at slow echogram feed rates. The figure below shows a typical example of A-scope display, which appears across a small area between the column of scale lines and the screen's right edge. The example shows that the relative strength of a fish school can be assessed before the entire echo structure shows up across the normal echogram screen.

Figure 4-18 A-Scope Function – Example



4.13.2. Turning A-Scope on/off

The A-Scope display is initially turned off in all display modes. To turn it on, simply press **A-SCP**

A second press turns it off again.

It can be turned on/off also via the menu system. Refer to paragraph 5.7 for details.

5. Selecting Operating Parameters via Menu System

5.1. Introduction

Of the operating parameters, those that do not have to be changed or selected frequently are accessible via a menu system. Such parameters include screen splitting mode, depth alarm mode, depth readout units, transducer draft, velocity standard and background colors. The menu system is of hierarchical structure, consisting of the main **MENU** and various submenus that can be accessed via the **MENU**. This section of the manual describes the procedure for selecting such parameters to customize the equipment's operation to your particular applications.

5.2. Activating the Menu System










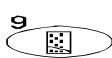

The menu system can be activated by pressing . This will turn the main **MENU** on as shown below.

Figure 5-1 Main Menu and Its Options

MENU	
1:DISPLAY	Selects display-related functions.
2:ALARM	Sets depth alarm and fish alarm.
3:DEPTH UNIT	Selects MT/FM/BR/FT readout units.
4:DRAFT	Enters transducer draft compensation.
5:VELOCITY	Enters velocity standard.
6:A-SCOPE	Turns on/off A-scope display.
7:DIMMER	Adjusts keypad dimmer level.
8:DYNAMIC RANGE	Selects echo dynamic ranges.
9:SIMULATION	Turns on/off built-in echo sounder simulator

The menu options can be selected by pressing the numeric keys that correspond to the option numbers. The currently selected option is shown in red. The following keys serve as numeric keys whenever the menu system is activated.

Table 5-1 Numeric Key Assignments

	Numeric "1"		Numeric "2"
	Numeric "3"		Numeric "4"
	Numeric "5"		Numeric "6"
	Numeric "7"		Numeric "8"
	Numeric "9"		Numeric "0"

(continued on next page)

5.2. Activating Menu System (continued – 2/2)

NOTES:

- (1) Be sure to press **ENT** to complete the selection or setting before exiting the menu mode (before returning to the echo sounder screen). Failing to do so will cancel your selection or setting.
- (2) To return to the echo sounder screen from any submenu, press **MODE**. To return to the previous menu, press **MENU**.

5.3. Selecting Display-Related Parameters

5.3.1. Introduction

The following selection procedures assume that the menu system is activated, with the main **MENU** currently showing. Selecting option “**1:DISPLAY**” turns on the following display-related function menu.

Figure 5-2 DISPLAY Submenu

1:DISPLAY	
1:COLOR	Selects background colors or echo color assignments
2:TEMPERATURE	Turns on/off temp. display and selects °C or °F.
3:NET DEPTH	Turns on/off display of *net’s depth & temperature.
4:GPS DATA	Turns on/off display of GPS-derived nav. data.
5:EXPANSION SPLIT	Selects screen split modes (bottom/pelagic expansion)
6:DUAL FREQ. SPLIT	Selects screen split modes (dual frequency mode)
7:TRAWL MODE SPLIT	Selects screen split modes (dual frequency trawl mode)

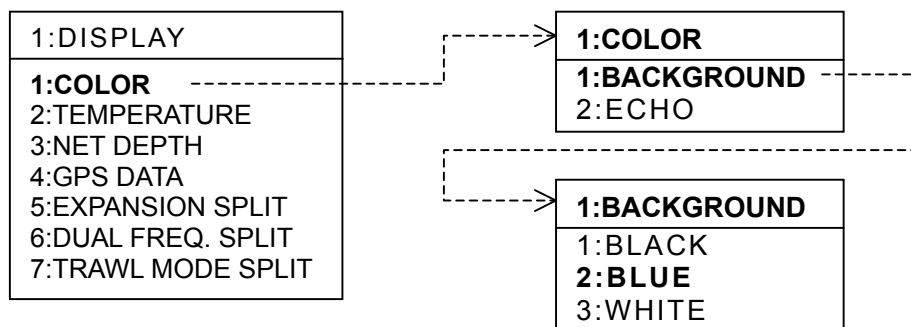
* *Depth and temperature data transmitted from transducer mounted on net.*

After selecting the desired parameter, be sure to press **ENT** to complete the selection. Pressing **MENU** before pressing **ENT** will cancel the selection and return you to the previous menu or to the echogram screen.

5.3.2. Selecting Echogram Background Colors


The background color for the echogram screen is initially blue. It can be set to black or white via the following menu-guided steps:


Figure 5-3 Selecting Background Colors




(continued on next page)



5.3.2. Selecting Echogram Background Colors (*continued – 2/2*)

Select “**1:COLOR**” by pressing .

Select “**1:BACKGROUND**” by pressing  again.

Press  to select “**1:BLACK**” or  to select “**3:WHITE.**”

Press  to complete the selection.

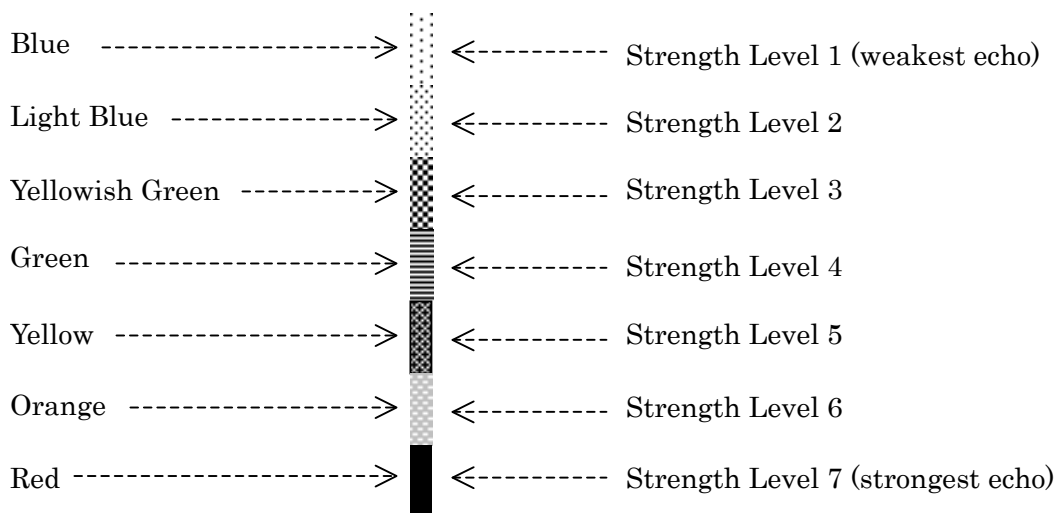
Press  to return to the previous menu or  to exit the menu system.

5.3.3. Changing Echo Color Assignments

5.3.3.1. Introduction

Echoes are displayed in up to seven different colors depending on their relative strength levels. The seven colors are initially assigned seven strength levels as illustrated below.

Figure 5-4 Initial Assignments of Echo Colors



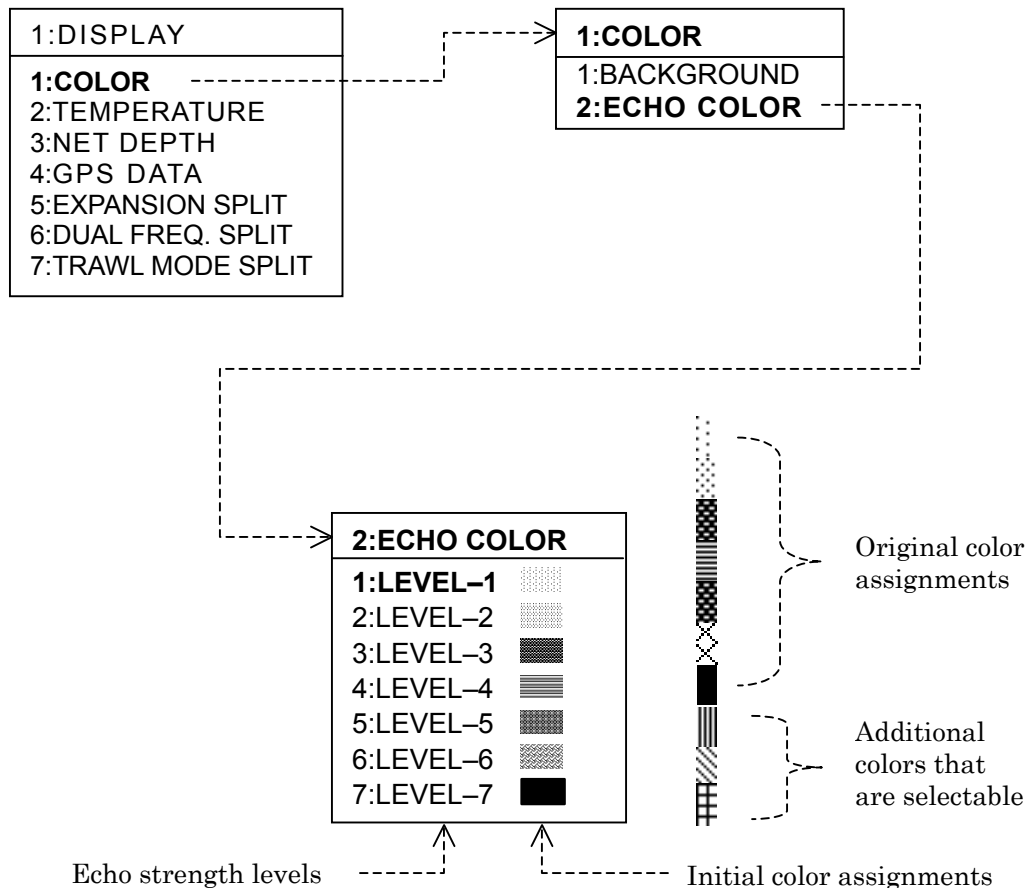
The top-end color (initially blue) represents the weakest echo, and the bottom-end color (initially red), the strongest echo. These initial assignments can be changed using a different set of colors the user selects from a total of 10 via the following steps.

(continued on next page)

5.3.3.2. Color Assignment Procedure

Access the **ECHO COLOR** submenu via the procedure illustrated below. A color scale consisting of 10 color samples will be displayed to the right of the menu as shown, of which the upper seven are original assignments.

Figure 5-5 Accessing Echo Color Assignment Menu



Options **LEVEL-1** through **LEVEL-7** in the **ECHO COLOR** submenu represents the seven echo strength levels. The color sample to the right of each option is the initial assignment.

Using \blacktriangle / \blacktriangledown , select the level for which you wish to change the color, and press **ENT** .

To cancel the selection, press **MENU** before pressing **ENT** .

Repeat step to change the color for other strength level.

Press **MENU** to return to the previous menu or **MODE** to exit the menu system.

5.3.4. Making Temperature Display Settings

5.3.4.1. Introduction

When a standard dual frequency transducer (see **CAUTION** below) is connected, or an external NMEA-0183 digital temperature sensor is plugged in, the equipment is capable of displaying surface water temperature graphically or numerically in degrees Celsius (°C) or Fahrenheit (°F) based on the temperature data from the temperature sensor (thermistor) embedded in the transducer housing.

< CAUTION >

The standard transducer supplied with this equipment is not compatible in temperature sensor characteristics with the type 706T dual frequency transducer or with the type 570-50/200 dual frequency transducer obtained direct from Radarsonics Inc. or from one of its dealers. Use of such a transducer will result in incorrect temperature readout.

Select the desired readout unit and display format via the following procedure.

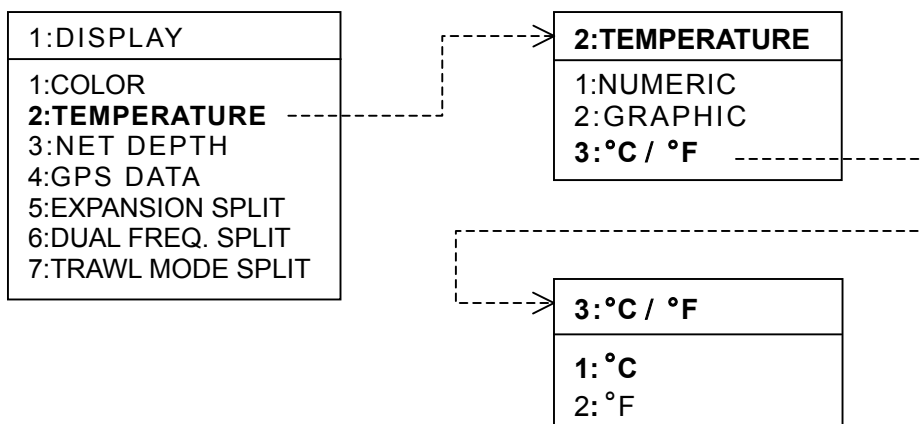
5.3.4.2. Selecting Readout Units

The temperature will be initially displayed in degrees Celsius (°C). If you wish to read in Fahrenheit (°F), proceed as follows.

Press **MENU** to display the main **MENU**.

Display the temperature readout unit selection menu (°C / °F) via the procedure illustrated below.

Figure 5-6 Selecting Temperature Readout Units



Press. **2** **▲**, selecting “**2:°F.**”

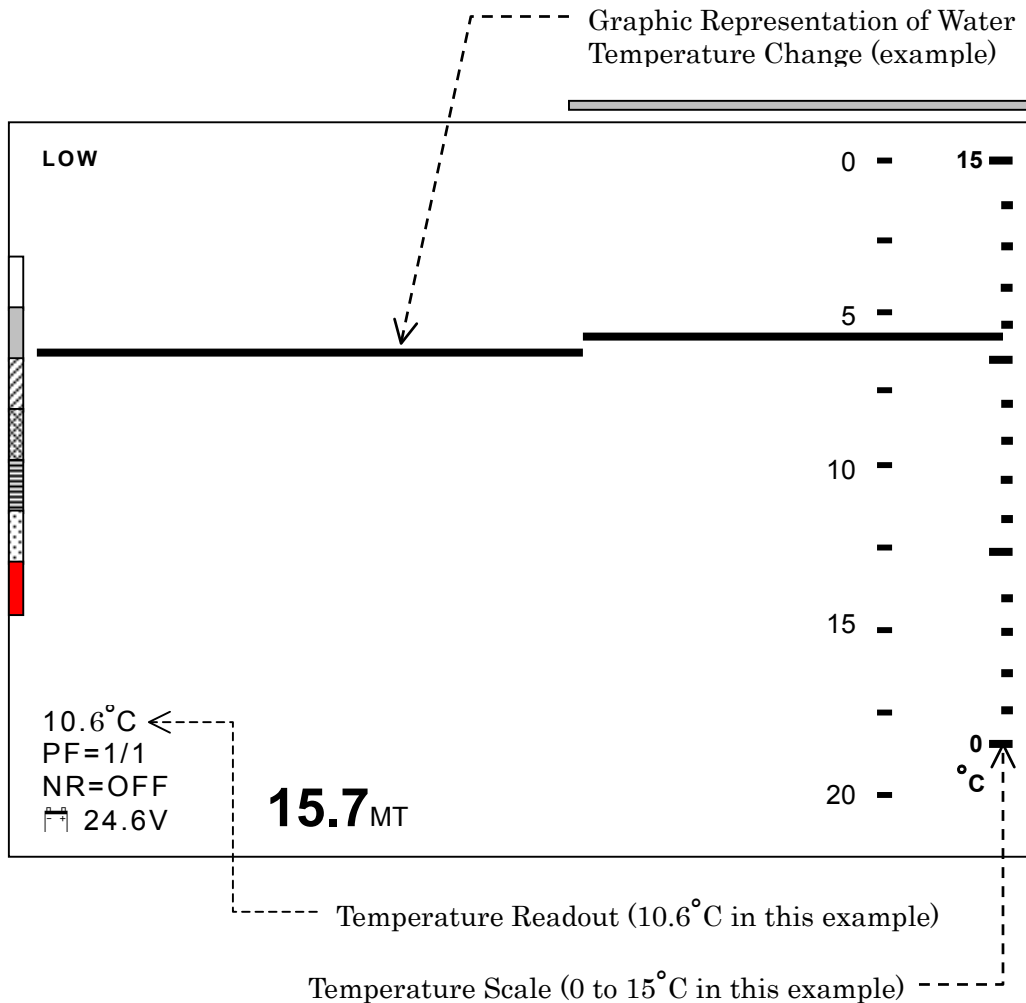
Press **ENT** to complete the selection, and then press **MENU** to return to the previous menu or **MODE** to exit the menu system.

5.3.4.3. Displaying Water Temperature

5.3.4.3.1. Introduction

The water temperature data, received either from the temperature sensor embedded in the standard transducer or from an external data source (NMEA-0183), can be displayed graphically as well as numerically, as in the example below.

Figure 5-7 Typical Temperature Data Display – Example



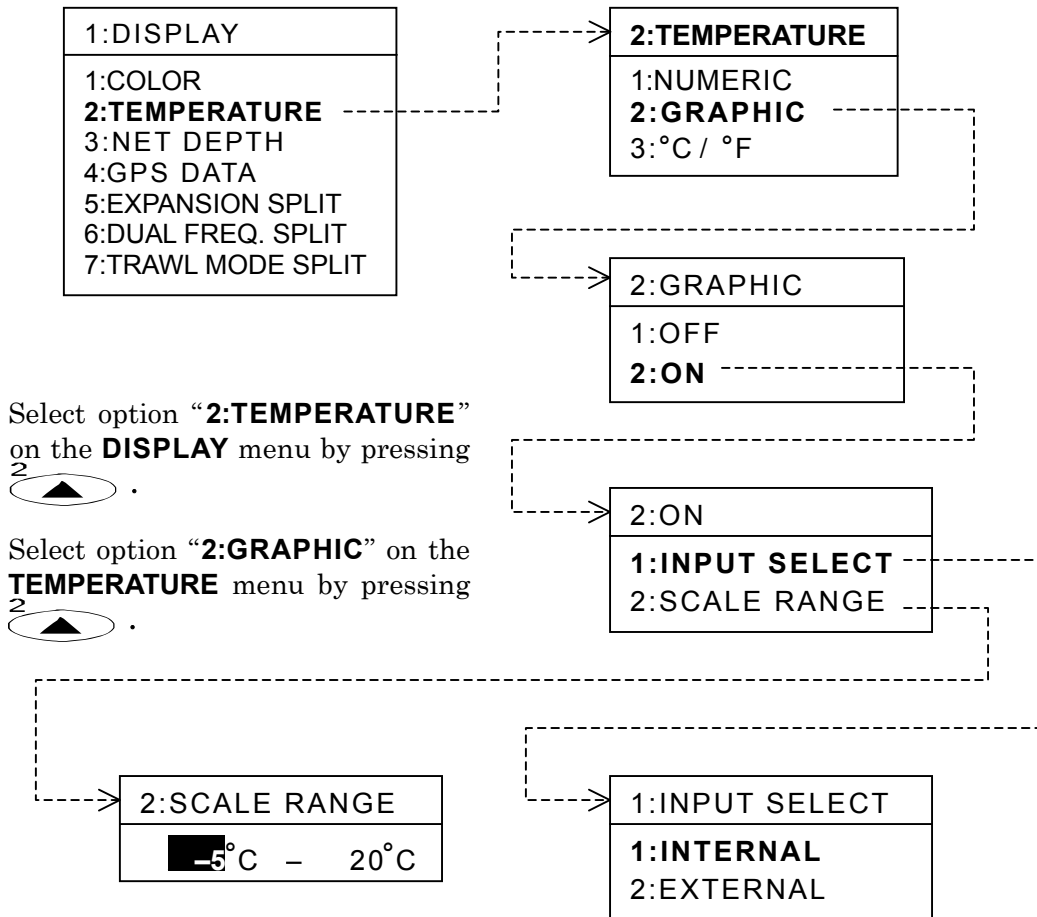
To display the data, follow the procedure described on the following pages. It is assumed that the standard dual frequency transducer (type 570-50/200T or 706-50/200T) is plugged into the 7-pin rear panel connector (**TRANSDUCERS**) or an external temperature sensor or temperature indicating device that provides an NMEA-0183 data sentence ($\$*XXMTW$) output is plugged into the 8-pin rear panel connector (**I/O DATA**).

* Device address (e.g. WI or SD)

5.3.4.3.2. Displaying Temperature Graphically

Temperature variation can be displayed graphically via the steps given below, together with digital readout. The figure below illustrates how to access various submenus related to graphical display of water temperature. It is assumed that the **DISPLAY** menu is already opened (**MENU** **1:DISPLAY**).

Figure 5-8 Accessing Temperature Display Setting Submenus



Select option “**2:ON**” on the **GRAPHIC** menu by pressing **2** .

Select option “**1:INPUT SELECT**” on the **ON** menu by pressing **1** .

If you are using the standard dual frequency transducer, check to be sure that option “**1:INTERNAL**” is currently selected on the **INPUT SELECT** menu. If you wish to use an external temperature indicator as the data source, select option “**2:EXTERNAL**” by pressing **2** .

Press **ENT** to complete the selection of the desired data input source.

Press **MENU** to return to the **ON** menu.

(continued on next page)

5.3.4.3.2. Displaying Temperature Graphically (*continued – 2/2*)


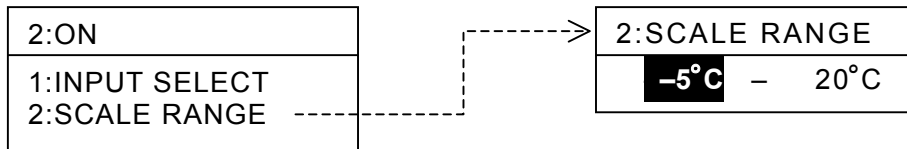






Select option “**2:SCALE RANGE**” on the **ON** menu by pressing  .

Figure 5-9 Setting Scale Range for Temperature Display – Example





The current lower and upper limits of the temperature scale are displayed, as in the example above.

- The number shown highlighted can be changed with  /  .
- The highlighted part (character highlight) can be shifted to the right/left with  /  .

Enter the lower scale limit (in 5-degree steps) by pressing  /  .

Shift the field highlight to the upper scale limit area by pressing  .

Enter the upper scale limit (in 5-degree steps) by pressing  /  .

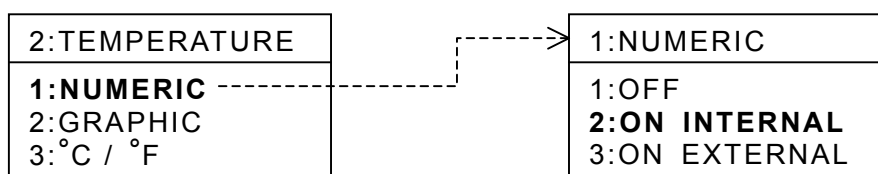
Press  to complete the entry, and  to exit the menu system.

5.3.4.3.3. Displaying Temperature Digitally

The temperature can be displayed digitally as in the example in Figure 5-7, independent of graphic display via the following procedure. It is assumed that the **TEMPERATURE** submenu is currently showing.

Select option “**1:NUMERIC**,” and press  .

Figure 5-10 Selecting Temperature Data Source



Select either of the following options, depending on the source of temperature data:

- **2:ON INTERNAL:** Select this option to use the temperature sensor embedded in the standard transducer.
- **3:ON EXTERNAL:** Select this option to use data from an external NMEA-0183 device plugged into the rear panel 8-pin **I/O DATA** connector.

Press  to complete the selection.

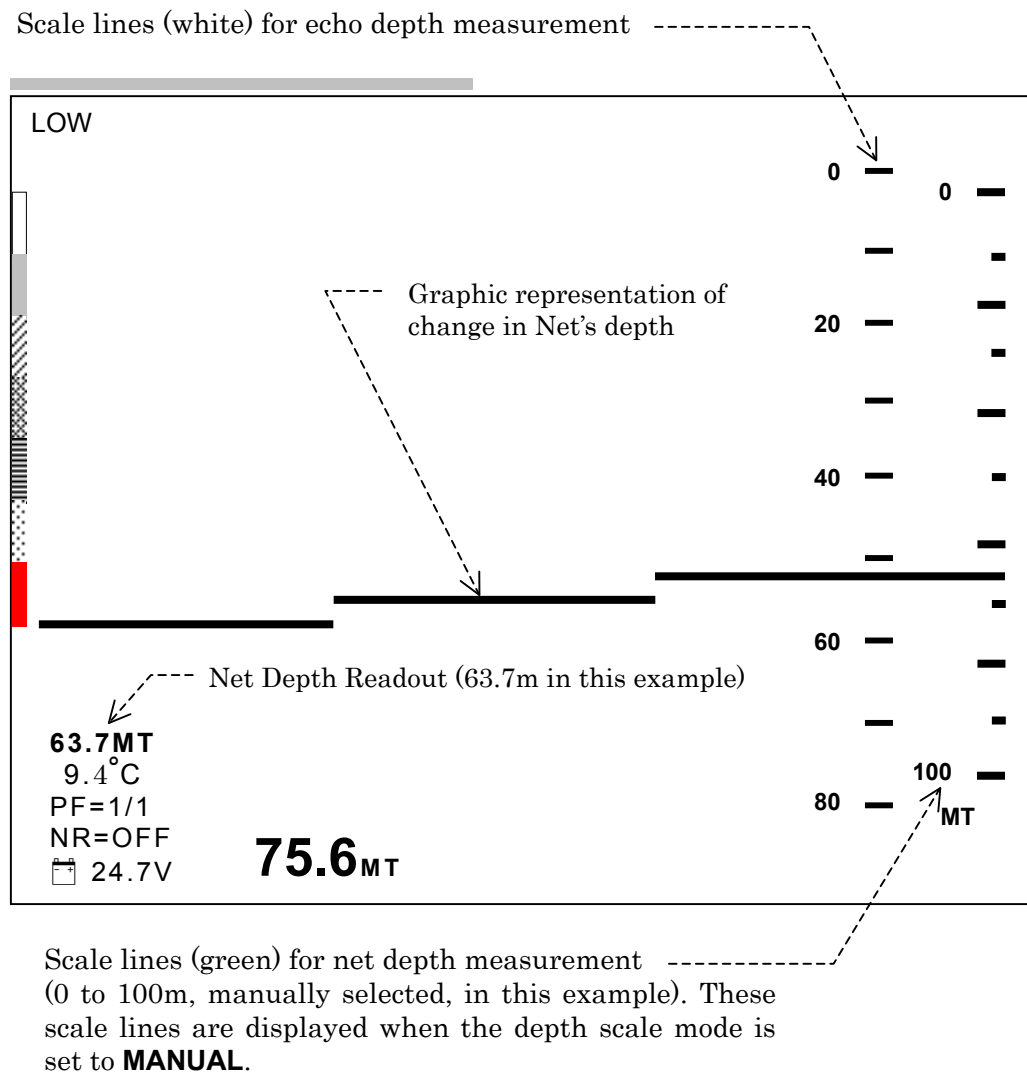
Press  to return to the **TEMPERATURE** submenu or  to exit the menu system.

5.3.5. Displaying Net Depth

5.3.5.1. Introduction

The depth data received from the pressure sensor attached to a fishing net or from other NMEA-0183 data source can be displayed digitally or graphically via the procedure described in the following paragraphs.

Figure 5-11 Net Depth Display (in **MANUAL** Depth Scale Mode) – Example

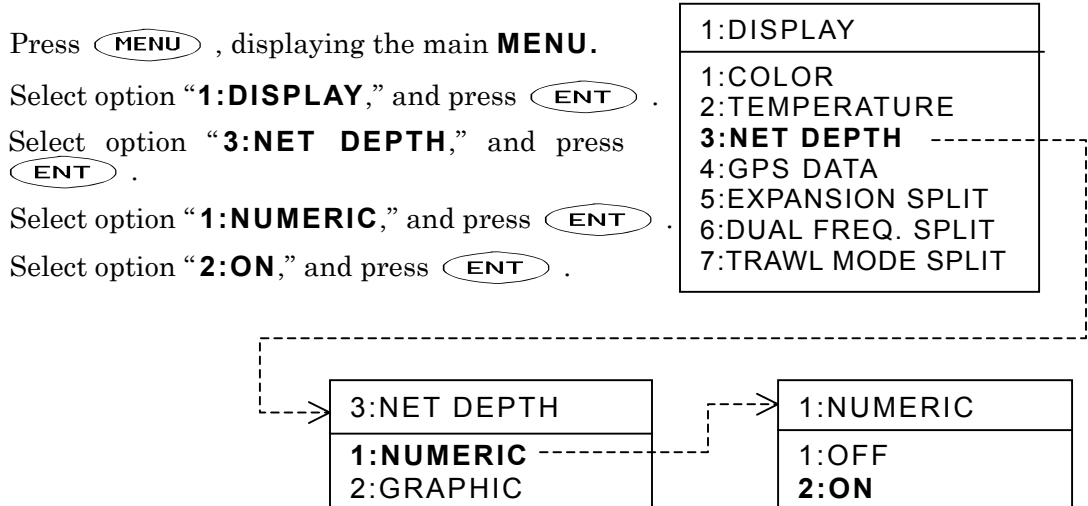


It is assumed that an appropriate depth data sentence (\$*XXDBS, \$*XXDBT or \$*XXDPT) is fed to the rear panel **I/O DATA** connector (across pins #1 and #2).

*NOTE: Device address (e.g. SD=sounder)

5.3.5.2. Displaying Net Depth Digitally

Figure 5-12 Turning on Numeric Temperature Display



Press **MENU** to return to the **NET DEPTH** submenu or **MODE** to exit the menu system.

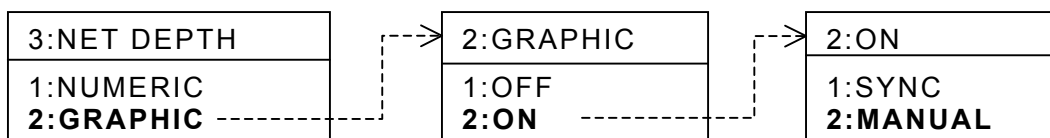
5.3.5.3. Displaying Net Depth Graphically

A change in the depth of net can be displayed graphically via the steps given below, together with digital depth readout. It is assumed that the **NET DEPTH** submenu, accessible through **MENU 1:DISPLAY 3:NET DEPTH** path, is currently showing.

Select option “**2:GRAPHIC**,” and press **ENT** .

Select option “**2:ON**,” and press **ENT** .

Figure 5-13 Selecting Depth Scale Modes



The following options on depth scale setting are selectable:

- **1:SYNC:** The depth scale is synchronized with the basic depth range in use. For example, if the current basic range is 80 meters, the depth scale for the net’s depth indication is also set to 80 meters automatically. The scale lines will then be displayed in green.
- **2:MANUAL:** The net’s depth scale can be manually selected by pressing / , independently of the basic range in use.

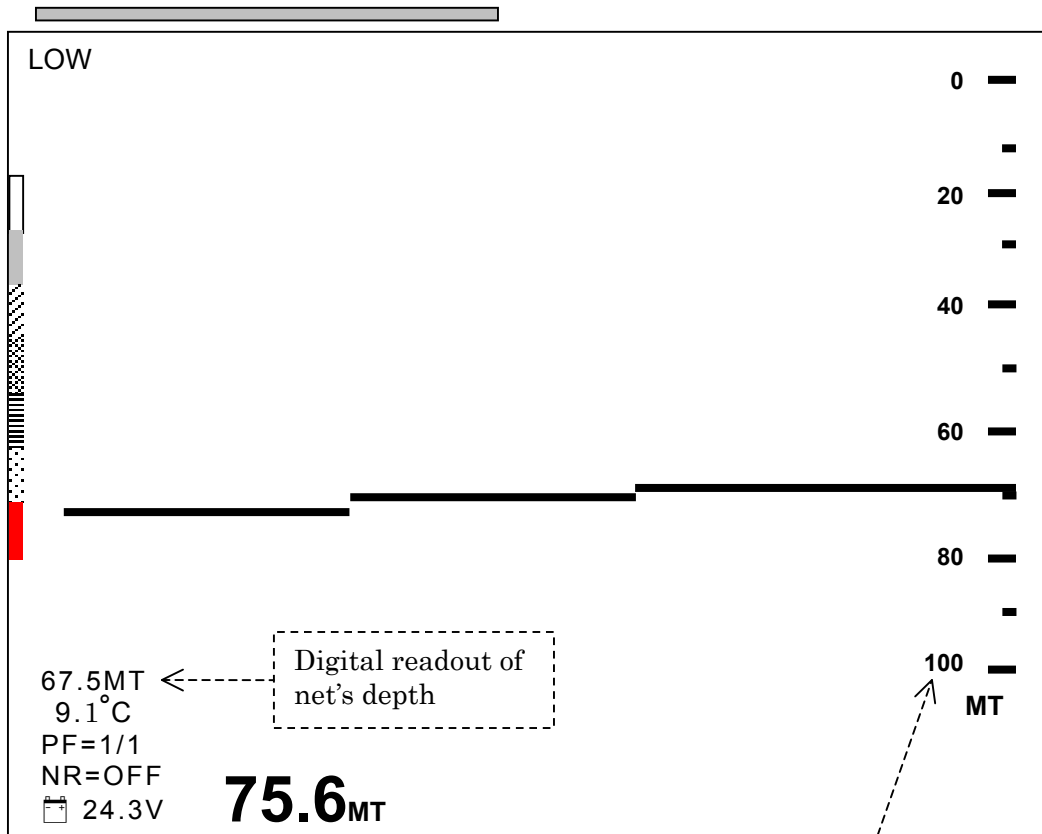
(continued on next page)

5.3.5.3. Displaying Net Depth Graphically (*continued – 2/2*)

Select the desired depth scale mode (**SYNC** or **MANUAL**), and press **ENT**.

- If you select “**SYNC**,” a single set of green-colored scale lines will be turned on for both echo display and net depth indication, as in the example below.

Figure 5-14 Net Depth Display in **SYNC** Depth Scale Mode – Example



Green-colored scale lines for measuring both echo depth and net depth.

- If you select “**MANUAL**,” a **MANUAL** submenu, like the example at right is displayed. You can then select the maximum scale limit for net depth indication, by pressing **▲** / **▼**.

Two sets of scale lines, separately colored white and green, will be displayed, as in the example in Figure 5-11.

2:ON
1:SYNC
2:MANUAL

2:MANUAL
100MT

Complete the selection by pressing **ENT**.

Press **MODE** to exit the menu system.

5.3.6. Turning GPS-Derived Navigational Data On/Off

The equipment can display position, heading and speed data near the screen's lower edge as in the example below when an appropriate GPS receiver or navigator that outputs such data in the NMEA-0183 format is plugged into the rear panel "I/O DATA" connector. The navigational data can be displayed via the following steps.

Figure 5-15 Echo Sounder Screen with GPS-Derived Data Turned on – Example

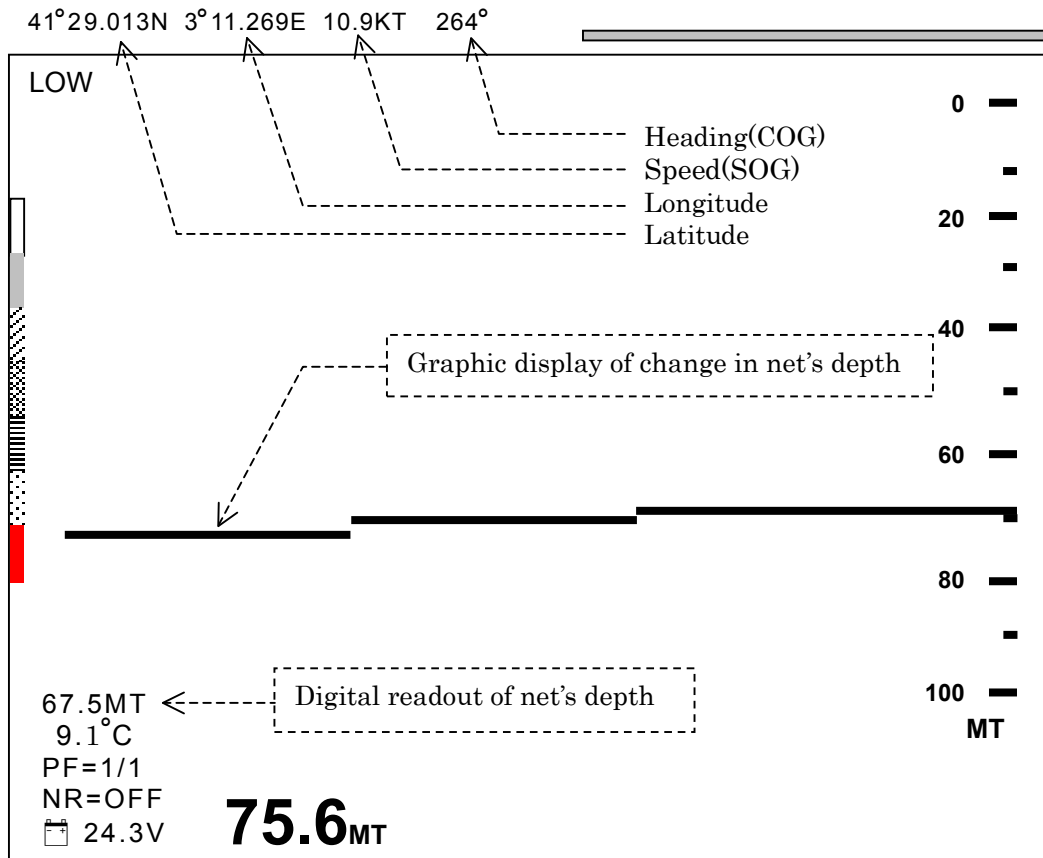


Figure 5-16 Accessing GPS DATA Menu

It is assumed that the **DISPLAY** menu is showing.

Select option "4:GPS DATA" by pressing **4** (down arrow).

Select "2:ON" by pressing **2** (up arrow).

Press **ENT** to complete the entry, and then press **MENU** to return to the previous menu or **MODE** to exit the menu system.

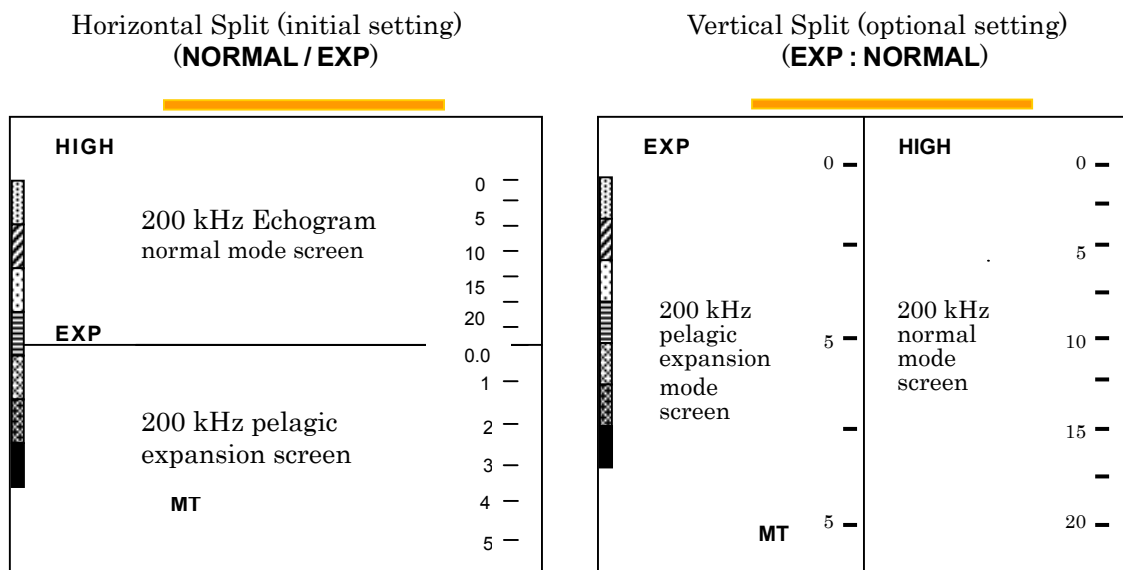
- | |
|--------------------|
| 1:DISPLAY |
| 1:COLOR |
| 2:TEMPERATURE |
| 3:NET DEPTH |
| 4:GPS DATA |
| 5:EXPANSION SPLIT |
| 6:DUAL FREQ SPLIT |
| 7:TRAWL MODE SPLIT |

- | |
|-------------|
| 4:GPS DATA |
| 1:OFF |
| 2:ON |

5.3.7. Selecting Screen Split Modes in Expansion Mode of Operation

When either expansion mode of operation (pelagic expansion or bottom-locked expansion) is activated (by pressing \downarrow/\uparrow), you can display the expanded echogram across the lower half screen or the left half screen. The screen is initially split horizontally with the expanded echogram showing across the lower half. To display it across the left half screen, select the vertical splitting mode via the procedure described below.

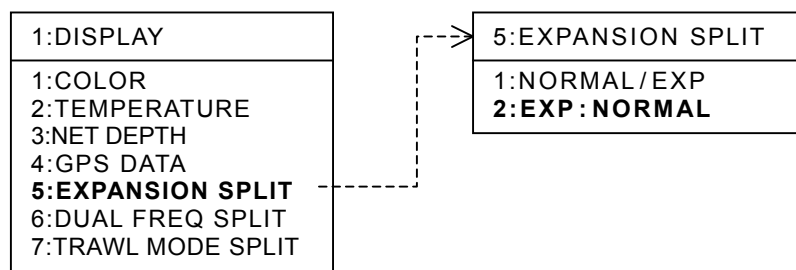
Figure 5-17 Changing Screen Split Mode for Expansion Mode of Operation
(Example)



It is assumed that the **DISPLAY** menu (**MENU 1:DISPLAY**) is currently showing.

Press $\overset{5}{\square}$, selecting option “**5:EXPANSION SPLIT.**”

Figure 5-18 Accessing Split Mode Selection Menu for Expansion Operation



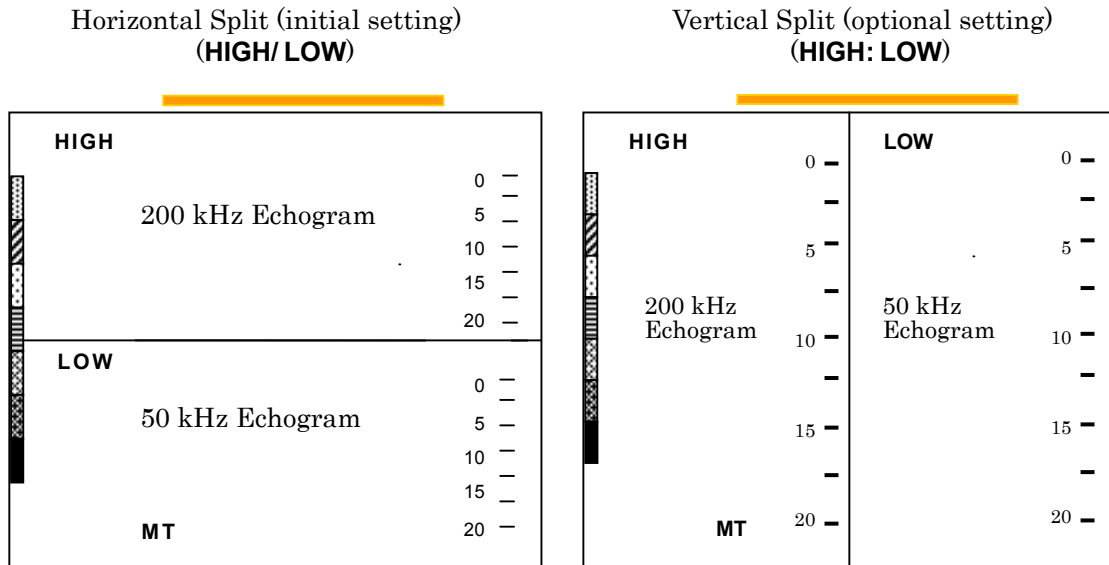
Press $\overset{2}{\blacktriangle}$, selecting “**2:EXP : NORMAL.**”

Press \square to complete the selection, and then press \square to return to the previous menu or \square to exit the menu system.

5.3.8. Selecting Screen Split Modes in Dual Frequency Normal Mode of Operation

When the dual frequency normal mode of operation is activated, the screen is initially split horizontally into upper and lower halves, with high frequency echogram showing across the upper half screen, and low frequency echogram across the lower half screen. The screen can be split vertically to show the high and low frequency images across the right-half and left-half screens, via the instructions given below.

Figure 5-19 Changing Screen Split Mode for Dual Frequency Operation



It is assumed that the **DISPLAY** menu (**MENU 1:DISPLAY**) is currently showing.


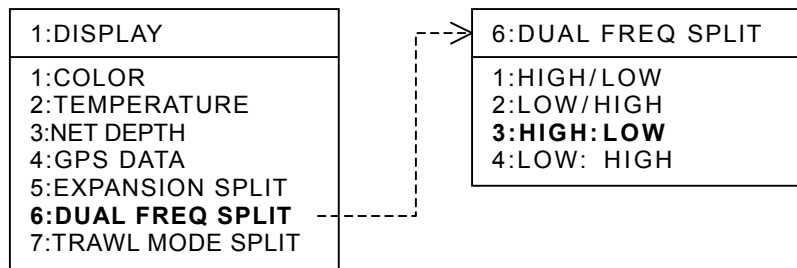
Press **6** , selecting option “**6:DUAL FREQ. SPLIT.**”

Figure 5-20 Accessing Split Mode Selection Menu for Dual Frequency Operation



Select “**3:HIGH: LOW**” or “**4:LOW: HIGH**” using the appropriate numeric key.

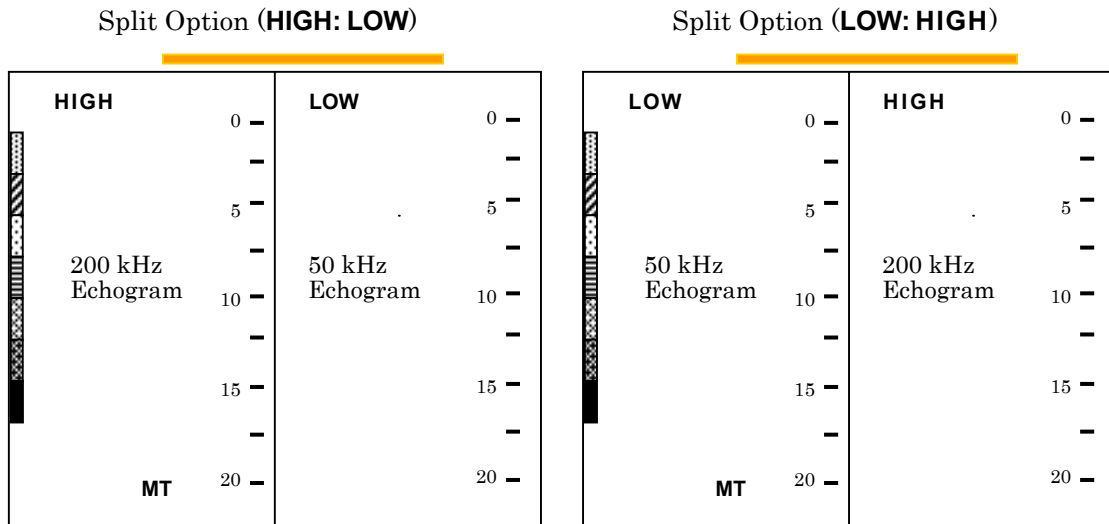
Depending on which option to choose at this step, you can switch the high frequency display and low frequency display, as illustrated in the example below.

(continued on next page)

5.3.8. Selecting Screen Split Modes in Dual Frequency Normal Mode of Operation
(continued – 2/2)

(continued)

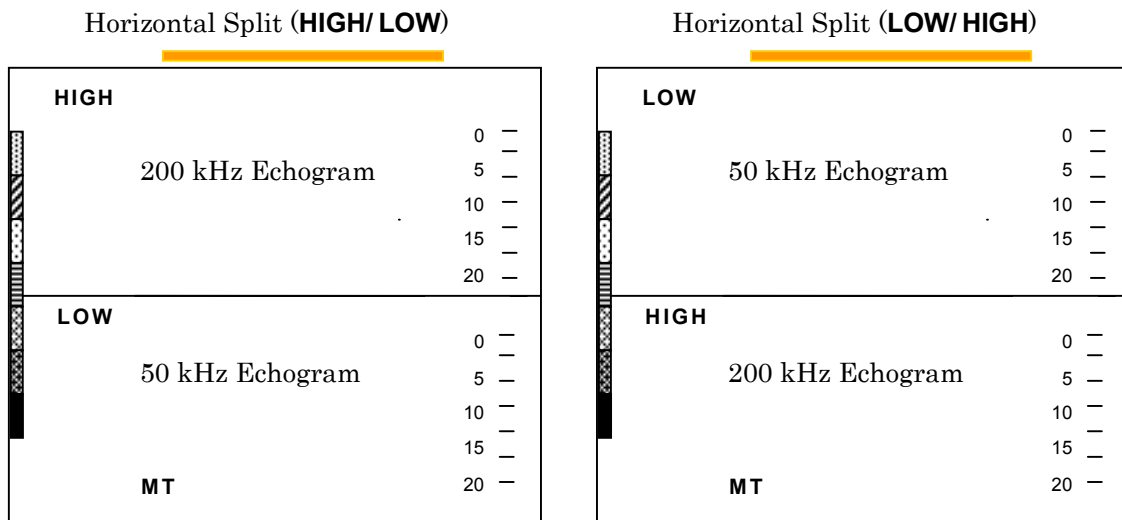
Figure 5-21 Switching Vertically Split Displays – Example



Press **ENT** to complete the selection, and then press **MENU** to return to the previous menu or **MODE** to exit the menu system.

Similarly, you can switch the high and low frequency displays in the horizontal split mode, as in the example below when you choose either option “1:HIGH/LOW” or “2:LOW/HIGH” at step above.

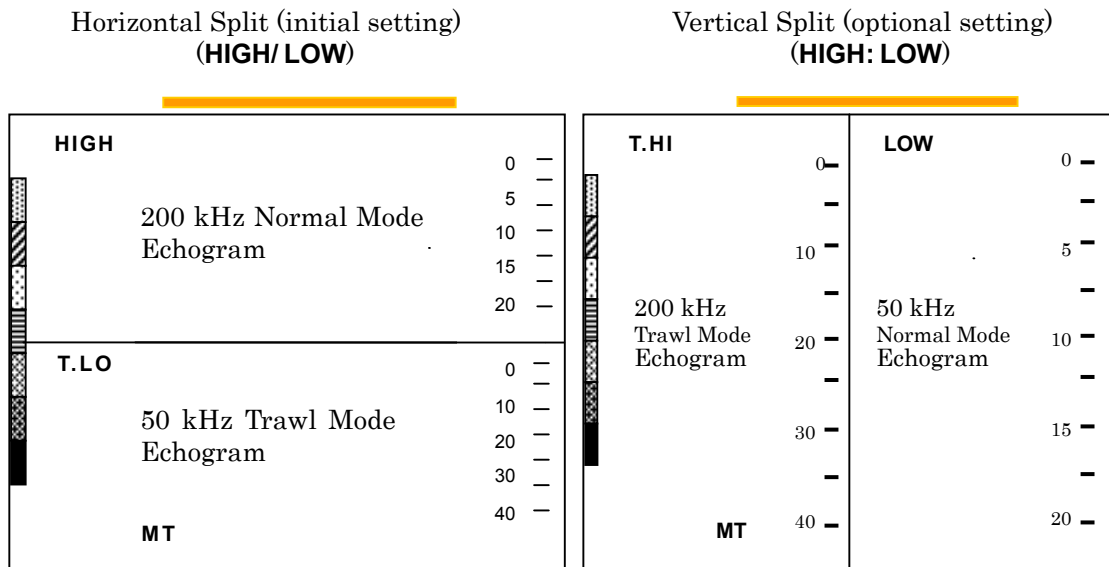
Figure 5-22 Switching Horizontally Split Displays – Example



5.3.9. Selecting Screen Split Modes in Dual Frequency Trawl Mode of Operation

When the dual frequency trawl mode of operation is activated, the screen is initially split horizontally into upper and lower halves, with high frequency echogram showing across the upper half screen, and low frequency echogram across the lower half screen. The screen can be split vertically to show the high and low frequency images across the right-half and left-half screens, via the instructions given below.

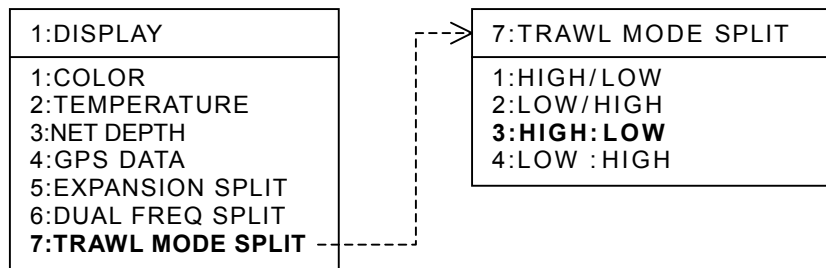
Figure 5-23 Changing Screen Split Mode for Dual Frequency Trawl Mode Operation



It is assumed that the **DISPLAY** menu (**MENU 1:DISPLAY**) is currently showing.

Press **7** , selecting option “**7:TRAWL MODE SPLIT.**”

Figure 5-24 Accessing Split Mode Selection Menu for Trawl Mode Operation



Select “**3:HIGH: LOW**” or “**4:LOW: HIGH**” using the appropriate numeric key.

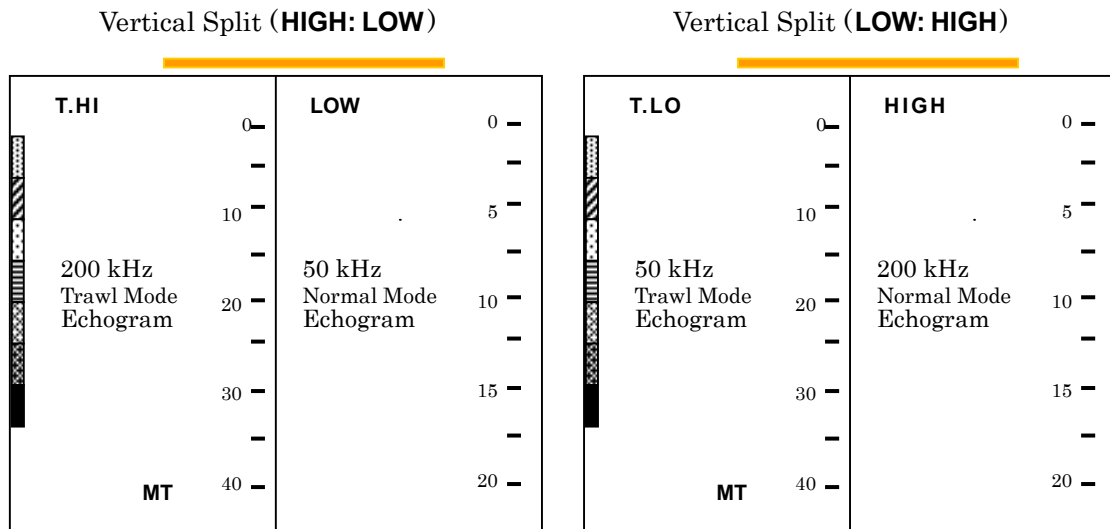
Depending on which option to choose at this step, you can switch the high/low frequency display and trawl mode display, as illustrated in the example below.

(continued on next page)

5.3.9. Selecting Screen Split Modes in Dual Frequency Trawl Mode of Operation
(continued – 2/2)

(continued)

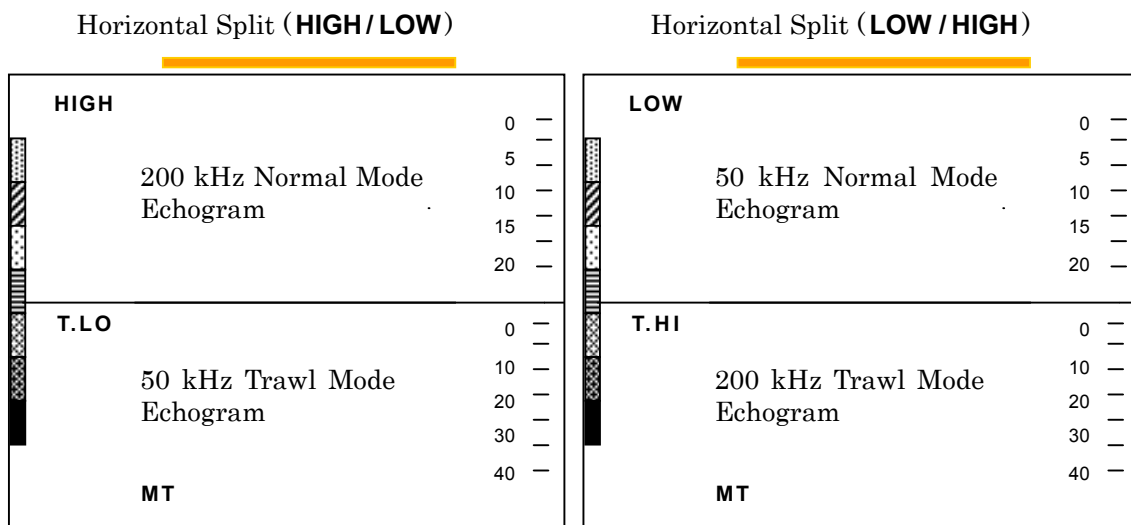
Figure 5-25 Switching Vertically Split Displays – Example



Press **ENT** to complete the selection, and then press **MENU** to return to the previous menu or **MODE** to exit the menu system.

Similarly, you can switch the high and low frequency displays in the horizontal split mode, as in the example below when you choose either option “1:HIGH/LOW” or “2:LOW/HIGH” at step above.

Figure 5-26 Switching Horizontally Split Displays – Example



5.4. Selecting Alarm Functions

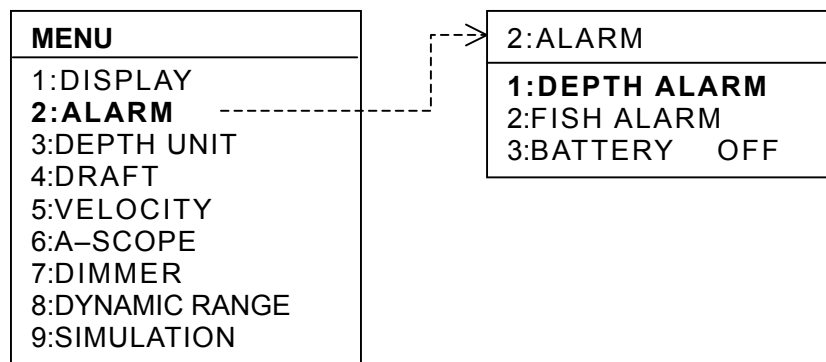
5.4.1. Introduction

Three types of audible/visual alarms are built in:

- Depth Alarm: Alarms against decreasing depth or increasing depth.
- Fish Alarm: Alarms against detection of fish echoes.
- Battery Alarm: Alarms against dropping power source voltage.

Selecting “**2:ALARM**” on the main **MENU** provides the following options:

Figure 5-27 Accessing **ALARM** Submenu



5.4.2. Activating Depth Alarm

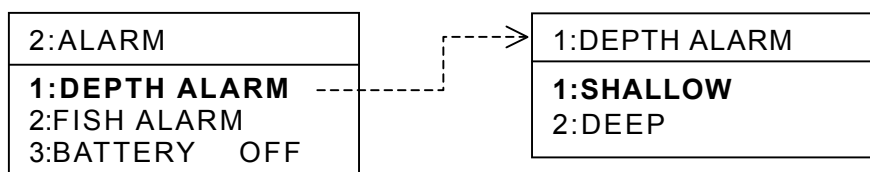
5.4.2.1. Selecting Depth Alarm Modes

The depth alarm can be activated in either of the following modes:


- Shallow Mode: Alarms against depth decreasing beyond preset depth (default).
- Deep Mode: Alarms against depth increasing beyond preset depth (option).




The shallow mode is initially selected. The deep mode can be selected via the following steps. It is assumed that the **ALARM** submenu (**MENU 2:ALARM**) is currently showing.

Figure 5-28 Selecting Depth Alarm Modes



Press ¹ , selecting option “**1:DEPTH ALARM.**” Check to be sure that option “**1:SHALLOW**” is shown in red, indicating that it is currently selected.

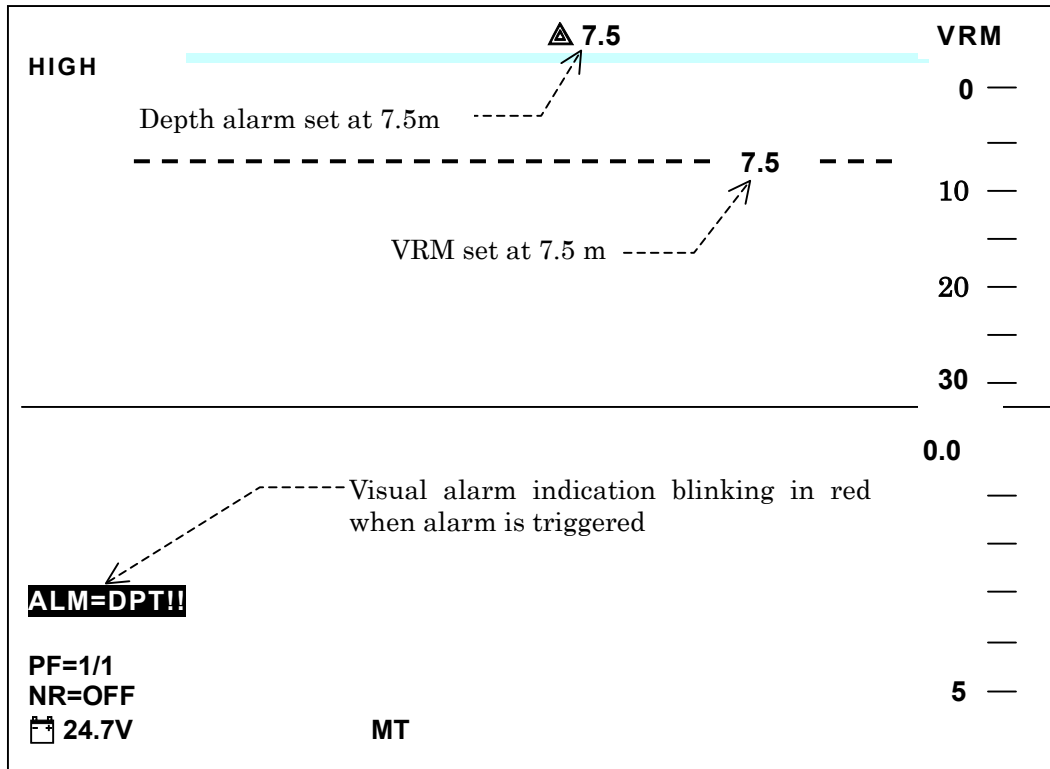
Press ² , selecting “**2:DEEP.**”

Press  to complete the selection, and then press  to return to the previous menu or  to exit the menu system.

5.4.2.2. Setting Alarm Depth

To preset the alarm depth, turn the variable range marker (VRM) on by pressing \triangle first, and after bringing the marker to the desired depth using \blacktriangle / \blacktriangledown , press ENT . See paragraph 4.8 for details on the VRM.

Figure 5-29 Depth Alarm Indication – Example



The alarm depth is indicated near the center on the upper screen edge in the form of ($\triangle XX.X$) where $XX.X$ represents the alarm depth, as in the above example.

As soon as the alarm depth is reached, the audible alarm will be turned on, beeping at approximately 1-second intervals. At the same time, the visual alarm indication (**ALM=DPT!!**) will be turned on, blinking in red in step with beeping above the PF rate display in the screen's lower left corner, as illustrated above.

5.4.2.3. Turning Depth Alarm Off

To disable the depth alarm, simply press \triangle once (or twice) so that the on-screen indication ($\triangle XX.X$) is turned off.

To activate the function again, press \triangle again and then ENT .

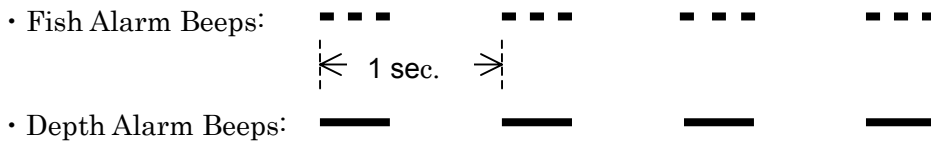
To silence the audible alarm, press any key. The alarm function will, however, remain activated, and will be triggered again as soon as the depth reaches the preset alarm depth.

5.4.3. Activating Fish Alarm

5.4.3.1. Introduction

The fish alarm function is designed to alert you to detection of fish schools audibly in the form of a set of three quick beeps repeating at approximately one second intervals, allowing you to distinguish it from the depth alarm which sounds a relatively slow beep repeating also at one second intervals, as illustrated below.

Figure 5-30 Alarm Beep Formats



The fish alarm is initially turned off. The following procedure allows you to turn the alarm function on and set the minimum echo strength level and size that can trigger the alarm.

5.4.3.2. Setting Alarm Triggering Level

It is assumed that the main **MENU** is currently showing.

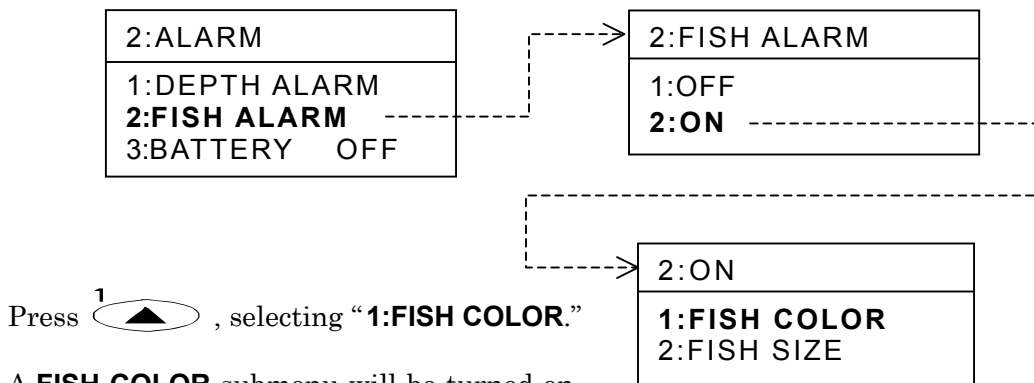
Press , selecting option “**2:ALARM.**”

Press again, selecting option “**2:FISH ALARM.**”

Press again, selecting option “**2:ON.**”

You have now activated the fish alarm function. Proceed to the following additional steps to set the alarm triggering level.

Figure 5-31 Setting Fish Alarm Parameters



A **FISH COLOR** submenu will be turned on, and a color sample scale will also be displayed to the right, as in Figure 5-32.

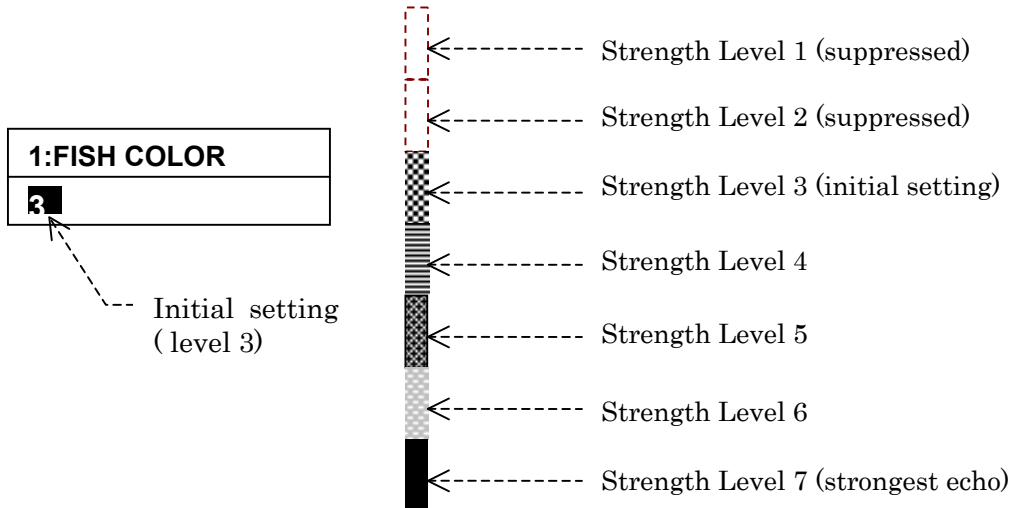
(continued on next page)

5.4.3.2. Setting Alarm Triggering Level (*continued – 2/2*)

(continued)

Fish echoes displayed using the colors that are shown on the color strip will trigger the alarm.

Figure 5-32 Setting Minimum Alarm–Triggering Strength Level

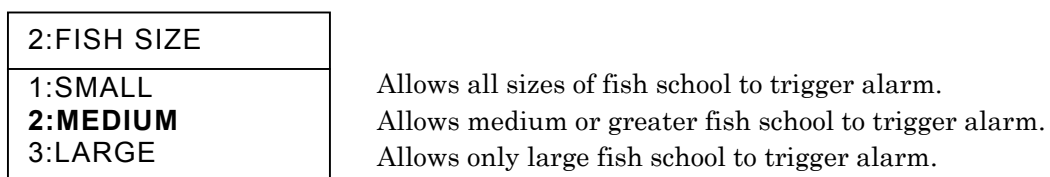


Initially, strength level 3 is selected. At this setting, fish echoes equal to or stronger than level 3 will trigger the alarm. To change the setting, proceed as follows:

Press \blacktriangle / \blacktriangledown to set the desired level, and then **ENT** to complete the setting. The **ON** submenu will return.

Press $\overset{2}{\blacktriangle}$, selecting option “**2:FISH SIZE**.” A **FISH SIZE** submenu will then be displayed.

Figure 5-33 **FISH SIZE** Submenu



Three relative fish school sizes are selectable as shown above. Option “**2:MEDIUM**” is initially selected. At this setting, fish schools of medium or larger size will trigger the fish alarm, and small fish schools will be ignored.

Press the appropriate numeric key to specify the desired size. For example, to set the size to “**3:LARGE**,” press $\overset{3}{\blacktriangledown}$.

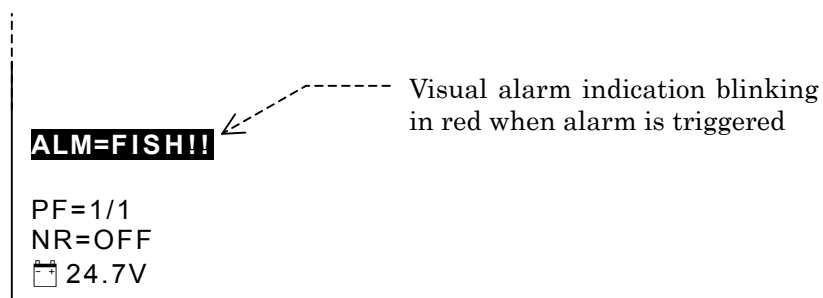
Press **ENT** to complete the selection.

Press **MENU** to return to the previous menu or **MODE** to exit the menu system.

5.4.3.3. Visual Indication of Fish Alarm

As soon as fish echoes of the specified strength and size are detected, the audible alarm will be turned on, emitting a set of 3 quick beeps repeating at approximately 1-second intervals. At the same time, the visual alarm indication (**ALM=FISH!!**) will be turned on, blinking in red above the PF rate display in the screen's lower left corner, as in the example below.

Figure 5-34 Visual Indication of Fish Alarm Being Triggered – Example



Turning Fish Alarm Off

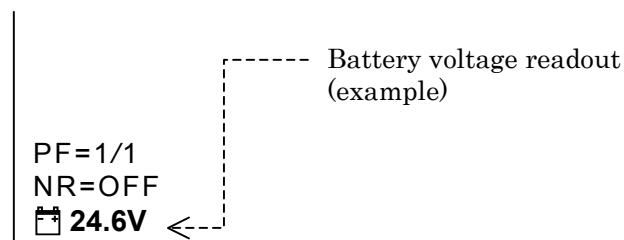
To disable the fish alarm, select “**1:OFF**” on the **FISH ALARM** submenu at step . Be sure to press **ENT** before exiting the menu system.

5.4.4. Activating Battery Alarm

5.4.4.1. Introduction

The equipment has a function of monitoring the voltage of the ship's battery that powers the equipment. The voltage readout is displayed in the screen's lower left corner, as in the example below.


Figure 5-35 Battery Voltage Readout – Example




If you wish to be alerted to the voltage dropping below a specific level, activate the battery alarm function and set the alarm voltage via the procedure described below.

5.4.4.2. Accessing Alarm Function and Setting Alarm Voltage

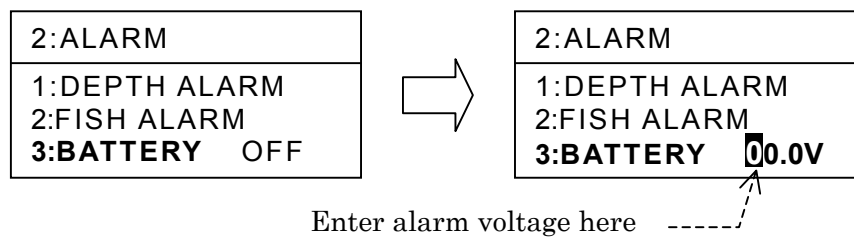
It is assumed that the main **MENU** is currently showing.



Press , selecting option “**2:ALARM.**”



Press , selecting option “**3:BATTERY ALARM.**”



This will turn on a 3–digit data entry field to the right, with the leftmost digit showing highlighted and blinking. You can now enter the desired alarm voltage.




Figure 5-36 Setting Battery Alarm



Enter the desired alarm voltage (in 0.1V steps over 10.1 to 40V range) using the appropriate numeric keys and/or  /  . A voltage value below 10.1V cannot be entered.

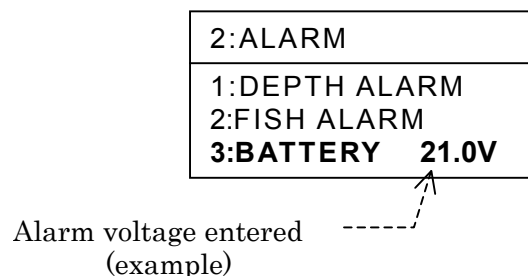
The field highlight can be shifted to the right/left by pressing  /  .

-  shifts the field highlight to the right.
-  shifts the field highlight to the left.

Press  to complete the entry, and then  to return to the previous menu or  to exit the menu system.

You have now turned the battery alarm function on.

Figure 5-37 Turning Battery Alarm on

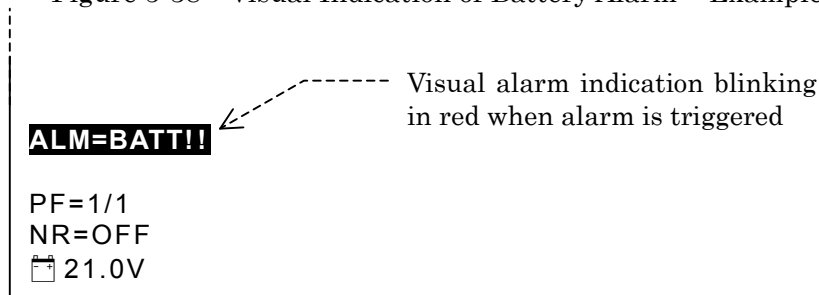


NOTE: Entering an alarm voltage value activates the battery alarm.

5.4.4.3. Alarm Indications

As soon as the power source voltage drops below the alarm voltage set as above, your equipment will indicate that condition audibly by means of a long beep repeating at approx. one second intervals and visually in the form of the following message blinking in red just above the battery voltage readout.

Figure 5-38 Visual Indication of Battery Alarm – Example



These indications will continue until the voltage goes up above the alarm voltage.

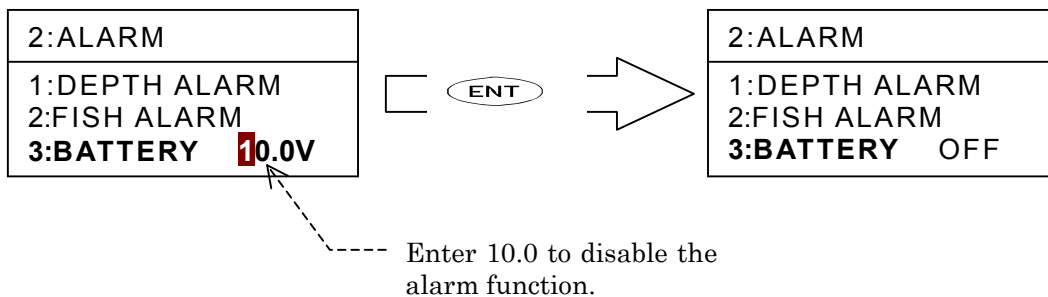
To silence the audible alarm, press any key. The alarm function will, however, remain activated, and will be triggered again as soon as the voltage drops below the preset alarm level.

5.4.4.4. Disabling Battery Alarm

The battery alarm can be disabled by entering a value below 11V (e.g. 10.0) in the data entry field on the **ALARM** submenu at step .

Be sure to press **ENT** to complete the entry. The field indication will then change to “**OFF**” as shown below.

Figure 5-39 Turning Battery Alarm off



5.5. Selecting Depth Readout Units

The equipment initially reads depths in meters. To read depths in fathoms, braccia (Italian/Spanish fathoms) or feet, proceed as follows:

Press **MENU**, opening the main **MENU**.


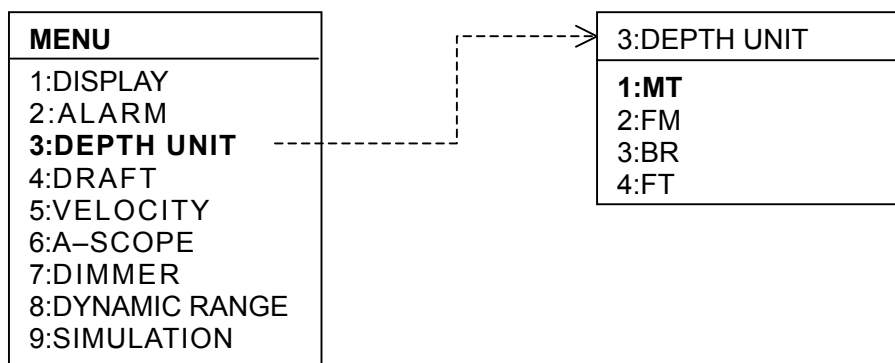
Press **3** , selecting option “**3:DEPTH UNIT**.”

Figure 5-40 Accessing **DEPTH UNIT** Submenu






The following options are selectable on the **DEPTH UNIT** submenu:

- **1:MT**: Reads depths in meters (initial setting)
- **2:FM**: Reads depths in fathoms (optional)
- **3:BR**: Reads depths in braccia (optional)
- **4:FT**: Reads depth in feet (optional)

Select the desired unit by pressing the appropriate numeric key.

For instance:

- To read depths in fathoms, select “**2:FM**” by pressing **2** .
- To read depths in braccia, select “**3:BR**” by pressing **3** .
- To read depths in feet, select “**4:FT**” by pressing **4** .

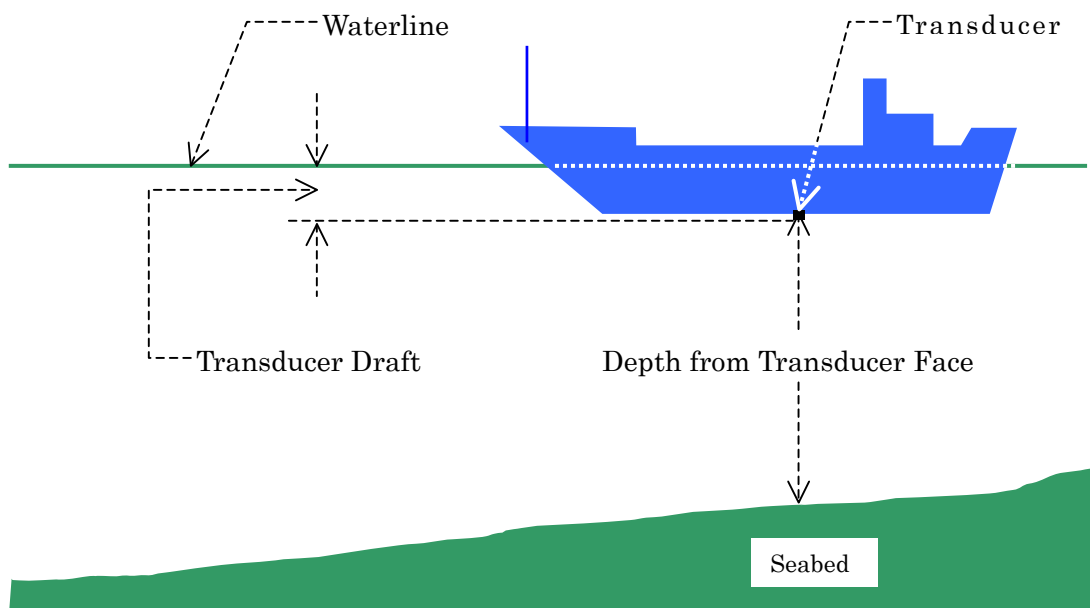
Press **ENT** to complete the selection, and then press **MENU** to return to the previous menu or **MODE** to exit the menu system.

5.6. Entering Transducer Draft in Depth Readout (Draft Compensation)

5.6.1. Introduction

The transducer draft used in this manual refers to the depth from the water surface to the transducer face, as illustrated in the figure below.

Figure 5-41 Depth Measurement



The depth readout shown on the screen initially represents the depth to the bottom, measured from the transducer face. If you wish to read depths from the water surface, you have to add the draft to the on-screen depth readout. The following procedure will enable you to automatically compensate for the draft, reading depths from the surface.

< CAUTION >

The depth readout will be referred to the surface, and not to the transducer face after entry of a draft. Exercise caution accordingly especially when navigating shallow water areas.

5.6.2. Draft Entry Procedure

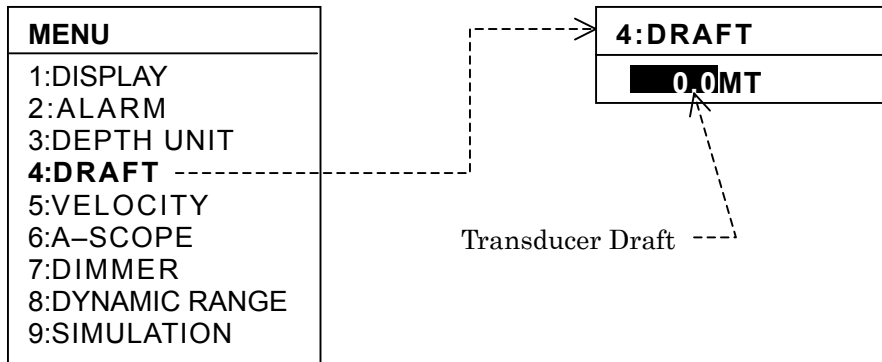
Press **MENU** , displaying the main **MENU**.

Select “**4:DRAFT**” by pressing **4**  . This turns the **DRAFT** submenu on.

(continued on next page)

5.5.2. Draft Entry Procedure (*continued – 2/2*)

Figure 5-42 Accessing Draft Entry Menu



The current draft (initially 0.0 meters) is showing highlighted blinking, indicating that the equipment is ready to accept entry of a draft.

Enter your draft to **0.1 MT** (meters), 0.1 **FM** (fathoms) or 0.1 **BR** (braccia) by repeatedly pressing / .

- Pressing will increase the draft in 0.1–unit steps.
- Pressing will decrease the draft in 0.1–unit steps.

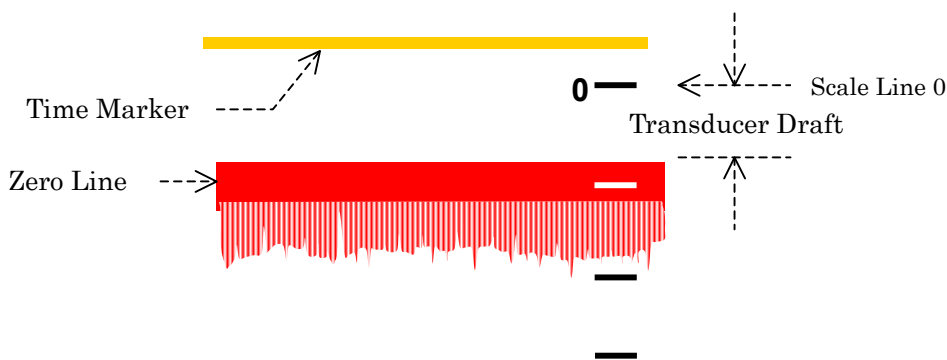
NOTE: Numeric keys cannot be used to enter a transducer draft.

Press to complete the entry.

Press to return to the previous menu or to exit the menu system.

The on–screen digital depth readout will reflect this compensation, automatically adding the transducer draft to the reading. The zero line on the echogram will also be shifted down by the same amount, as in the example below.

Figure 5-43 Effect of Transducer Draft Entry on Echogram – Example



5.7. Adjusting Velocity Standard

5.7.1. Introduction

Depth measurement is based on the assumption that sound travels in water at a constant speed. This speed is termed the “velocity standard.” Most echo sounders use 1500 meters/second as the velocity standard in measuring depths in seawater. However, the velocity varies slightly with depth, water temperature, salinity, etc., thereby resulting in some measurement errors. To compensate for such errors, the equipment is capable of adjusting the velocity standard in one meter steps over the ± 100 meter/sec. range centered at 1500 meters/second. This function will be useful for applications that require a high degree of measurement accuracy.

Adjusting the velocity standard will affect the on-screen depth reading in the following manner:

- Velocity standard set below 1500 meters/second

Depth reading will be shallower than the measurement based on 1500 m/sec.

- Velocity standard set above 1500 meters/second

Depth reading will be deeper than the measurement based on 1500 m/sec.

5.7.2. Adjustment Procedure

Press **MENU**, displaying the main **MENU**.

Select “**5:VELOCITY**.” by pressing **5** **□□**. This turns the **VELOCITY** submenu on, as shown below.

Figure 5-44 **VELOCITY** Submenu



Field highlight blinking

You can now enter the desired velocity standard in 10 meter–steps by repeatedly pressing **▲** / **▼**.

- Pressing **▼** will increase the standard in 10 meter steps.
- Pressing **▲** will decrease the standard in 10 meter steps.

NOTE: Numeric keys cannot be used to enter a velocity standard.

Press **ENT** to complete the entry, and then press **MENU** to return to the previous menu or **MODE** to exit the menu system.

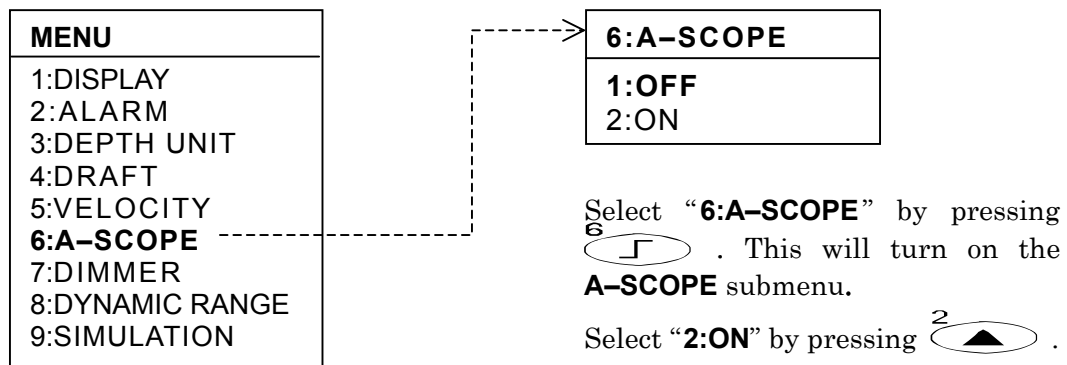
NOTE: The 1500 meters/second standard (initial setting) should be appropriate in most seawater depth-measuring applications.

5.8. Turning A-Scope On/Off

The A-scope display, which is described in detail in paragraph 4.13, can also be turned on/off via the menu system, as follows:

Press **MENU**, displaying the main **MENU**.

Figure 5-45 Turning A-Scope On/Off via Menu System



Press **ENT** to complete the selection, and then press **MENU** to return to the previous menu or **MODE** to exit the menu system.

*NOTE: The same effect can be achieved by pressing **A-SCP** while on the echogram screen with no menus displayed.*

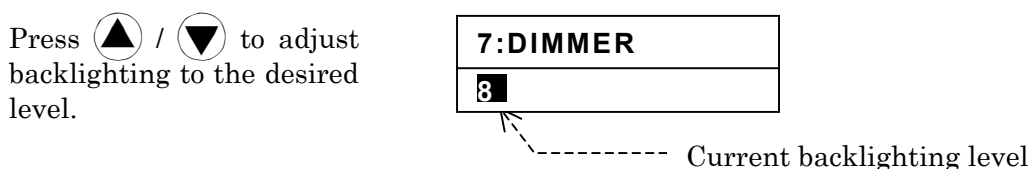
5.9. Adjusting Keypad Backlighting Level

The keypad is backlit for ease of operation during hours of darkness. The backlighting level can be changed in 9 steps from level 0 (backlighting turned off) to level 8 (maximum backlighting level) via the menu system as follows:

Press **MENU** to display the main **MENU**.

Press **7** (the key with vertical bars), selecting option "7:DIMMER." This will turn on the following submenu with the current backlighting level shown in a numeric value ranging from 0 (minimum) to 8 (maximum) as in the example below.

Figure 5-46 DIMMER Submenu for Keypad Backlighting Level Adjustment



Press **▲** / **▼** to adjust backlighting to the desired level.

Press **ENT** to complete the setting, and then press **MENU** to return to the previous menu or **MODE** to exit the menu system.

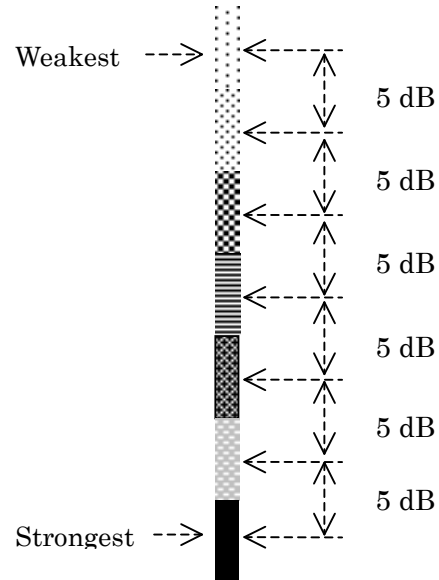
5.9. Selecting Echo Color Dynamic Ranges

5.9.1. Introduction

Figure 5-47 Initial Echo Dynamic Range

Echoes are displayed using up to seven different colors depending on their strengths. The colors that are currently used to show echoes are indicated in the form of a color scale at the screen's left edge, with the top color (initially blue) and bottom end colors (initially red) representing the weakest and strongest echoes, respectively. The echo dynamic range refers to how much change in echo strength must occur before an echo can be displayed in adjacent stronger or weaker color. The equipment offers the following selectable dynamic ranges: 3 dB, 4 dB, 5 dB and 6 dB.


Selecting a greater dynamic range requires a greater change in strength for an echo to be displayed in a next strong color.



- 3 dB: optional setting, suitable for working over soft grounds where the bottom echo shows in weak colors. This dynamic range will cause otherwise weak echoes to show in strong colors. Successful bottom tracking and digital depth readout requires the bottom echo to be displayed in red or orange (or user-assigned colors). A 3-dB change represents a change of approx. 1.4 times in strength.
- 4 dB: optional setting, a compromise between 3 and 6 dB. A 4-dB change represents a change of approx. 1.6 times in strength.
- 5 dB: initial setting, suitable for operation at mid and greater depths or over hard grounds. If you experience situations where otherwise weak echoes, such as air bubbles and plankton concentrations, show up in stronger colors at normal gain settings, try this range or 6 dB. A 5-dB change represents a change of approx. 1.8 times in strength.
- 6 dB: optional setting. Try this if 5dB setting still produces majority of echoes in strong colors. A 6-dB change represents a change of approx. 2 times in strength.

Select the value that best suits your needs, via the following steps.

5.9.2. Dynamic Range Selection Procedure

Select "**8:DYNAMIC RANGE**" by pressing **8** , opening a **DYNAMIC RANGE** submenu.

Select the desired range by pressing the appropriate numeric key.



Press **MENU**  to return to the previous menu or **MODE**  to exit the menu system.

Figure 5-48

DYNAMIC RANGE Submenu

8:DYNAMIC RANGE	
1:	3dB
2:	4dB
3:	5dB
4:	6dB

5.10. Activating Echo Sounder Simulator

The equipment has a built-in simulator for echo sounder operation. It can be activated via the following steps.

Press **MENU**, displaying the main **MENU**.

Select “**9:SIMULATION**” by pressing **9**. This will turn on the **SIMULATION** submenu.

Select “**2:ON**” by pressing **2**.

Press **ENT** to complete the setting, and then press **MENU** to return to the previous menu.

Select the following basic ranges:

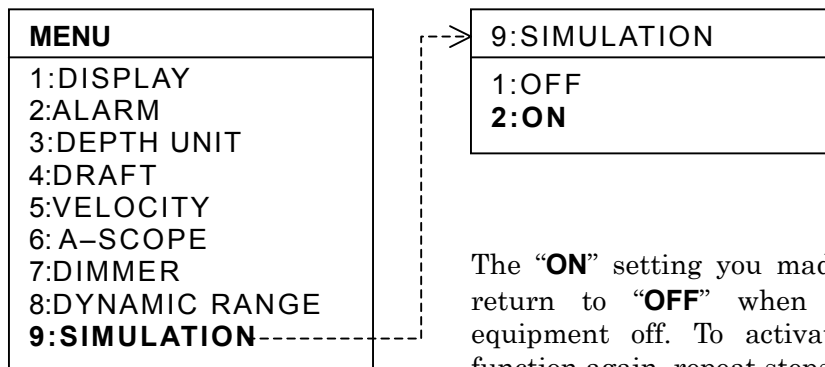
- 0 – 20 for depth readout calibration **MT** (meters)
- 0 – 10 for depth readout calibration **FM** (fathoms) or **BR** (braccia)
- 0 – 60 for depth readout calibration **FT** (feet)

Basic ranges can be selected by pressing **1** / **3**. For details, refer to paragraph 4.5.

The readout units (**MT/FM/BR/FT**) can be selected via the instructions given in paragraph 5.5.

The gain and TVG controls do not affect the way the sonograph shows up.

Figure 5-49 Accessing SIMULATION Submenu



NOTE: When the equipment is displaying echoes from the simulator, there is no noticeable difference in the way echoes show up between high frequency operation and low frequency operation.

6. User-Level Maintenance Instructions

To ensure long-term trouble-free operation, the user should regularly follow the maintenance instructions described in this section.

6.1. Maintenance on the Equipment Cabinet

Keep the equipment away from sea splashes, direct sunlight and other heat-generating sources, and make sure that air around the cabinet is circulating freely. If the equipment is not going to be used for prolonged periods of time, dismount it from the vessel and place it in dry storage. Be sure to switch the equipment off before removing electrical connections from the rear panel.

< WARNINGS >

- 1. EXTREMELY HIGH VOLTAGES EXIST INSIDE THE CABINET. THE USER MUST NOT OPEN THE CABINET.**
- 2. CHEMICAL SOLVENTS, SUCH AS PAINT THINNERS AND BENZINES, MUST NOT BE USED TO CLEAN THE CABINET OR SCREEN FILTER, OR PERMANENT DAMAGE TO THOSE PARTS WILL RESULT.**

To clean the cabinet surface, ethyl alcohol (ethanol) is recommended. Cleaning agents available for personal computers or household cleaners may also be used if they are safe to ABS plastic or acrylic parts.

Cleaning the acrylic filter on the LCD screen should be a maintenance routine to avoid using a high brightness level. To clean the screen filter, use a piece of slightly wet cloth. If stains persist, the cloth may be moistened with neutral household detergent.

6.2. Maintenance on Electrical Connections

The high humidity marine environment can cause electrical contacts in the rear panel connectors to corrode. Vibrations and shocks that are normally encountered on the vessel in motion can cause the electrical contacts to become loosened. Corroded or loose contacts will become responsible for erratic, intermittent operation or poor performance. To avoid such possible problems, conduct the following maintenance operations at least once a year:

- 1) Unplug all the cables from the rear panel, and check to be sure that contact surfaces, including the pins in the rear-panel mounted receptacles are free from corrosion.
- 2) Check the connections at the ship's power source for freedom from any sort of corrosion.
- 3) Correct any problem using a high quality contact-cleaning agent (contact rejuvenator).

< WARNINGS >

- 1. BE SURE TO TURN THE EQUIPMENT OFF BEFORE REMOVING / INSTALLING THE CONNECTIONS FROM / TO THE REAR PANEL CONNECTORS.**
- 2. SANDPAPER WILL DAMAGE THE CONTACT SURFACE AND MUST NOT BE USED.**

6.3. Maintenance on The Transducers

Marine growth on the transducer face will cause the sensitivity (ability to detect weak echoes) to drop gradually. Whenever there is an opportunity to access the installed transducers, check for any growth of barnacles or weed on the face. Carefully remove such growth using a piece of wood or sandpaper, taking care not to score the face material.

< CAUTION >

Painting the transducer face will degrade the sensitivity.

6.4. Servicing the Equipment

If the equipment shows any sign of malfunction, contact your dealer for assistance. Dangerous high voltages are present inside the equipment cabinet. Do not open the cabinet in an attempt to correct the problem.


There are no user-serviceable parts inside.

6.5. Resetting the System


Resetting is the action of clearing all user-entered data and/or operational settings from the non-volatile (flash) memory on the internal CPU board, returning to the factory's default settings. However, the various settings you have made through the menu system, such as the screen split mode, depth readout unit, dynamic range, etc. for later review or retrieval will be protected against erasure.

If you are repeatedly experiencing difficulty getting the equipment work the way you have programmed or if, for any reason, you wish to initialize all settings to the factory defaults, execute the resetting procedure described below.

Switch the equipment off.

Switch it on again while holding down the  key (VRM key) until two quick beeps are heard.

The **LANGUAGE MENU** should show up after execution. Select then the desired menu language via the instructions given in paragraph 4.3.

Pressing  after selecting the desired language will return to the normal echogram screen.

This completes the resetting procedure.

< CAUTION >

All data stored in memory will be lost. Be sure to take a note of the important settings you have made, such as the transducer draft, velocity standard, battery alarm voltage, fish alarm triggering levels, etc. before resetting the system.

Register the desired operating parameters again through the menu system via the instructions given in the paragraphs of section 5.

7. Installation Instructions

7.1. Display Cabinet Installation

7.1.1. General Precaution

The display cabinet is constructed to withstand humid and corrosive atmosphere normally encountered in the marine environment, but it is not designed to be installed or operated outside. Serious damage will result to electronic parts inside the cabinet when the unit is exposed to salt water spray. **Damage caused by exposure to water spray will not be covered by the warranty.**

7.1.2. Installation Site Requirements

For long term trouble-free service, the proposed site for installation should be:

- dry, well-ventilated and free as much as possible from shocks and engine vibrations.
- smooth and flat, and
- away as much as possible from areas of high temperature

< WARNINGS >

- 1. DO NOT PLACE THE UNIT IN AN UNVENTILATED, SEALED ENCLOSURE, SUCH AS A THEFT-DETERRENT CABINET, OR OVERHEATING AND MALFUNCTION WILL RESULT.**
- 2. DAMAGE CAUSED BY EXPOSURE TO WATER SPRAY OR TO DIRECT SUNLIGHT WILL NOT BE COVERED BY THE MANUFACTURER'S WARRANTY.**

The display unit weighs approximately 5.8 kg with the bracket attached. Make sure that the mounting surface is strong enough to support the unit against shocks or vibrations that are likely to be encountered with the ship cruising at its maximum speed. Appropriate reinforcement measures should be incorporated, if necessary.

7.1.3. Installing the Display Unit

The equipment cabinet is designed to be mounted on a tabletop with the mounting bracket supplied. The dimensions necessary for installation are given in Figure 7-2. Provide sufficient clearance behind the cabinet for cabling termination and maintenance checks.

Using a total of five appropriate wood screws or bolt/nut combinations through its five mounting holes (8.5 mm in diameter each), secure the bracket to the selected site.

Make sure that the mounting surface is strong enough to support the unit against shocks or vibrations that are likely to be encountered with the ship in motion.

(to be continued on next page)

7.1.3. Installing the Display Unit (*continued – 2/3*)

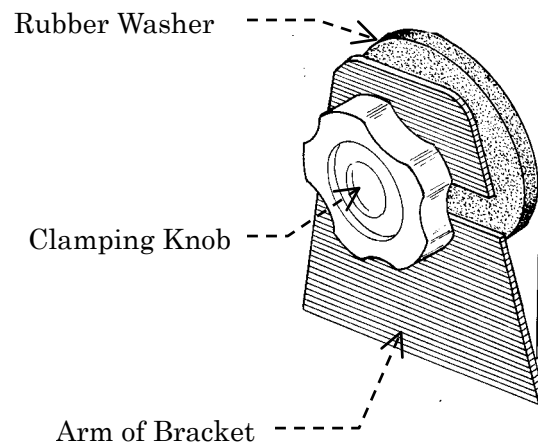
< WARNINGS >

1. **DO NOT PLACE THE UNIT IN AN UNVENTILATED, SEALED ENCLOSURE, SUCH AS A THEFT-DETERRENT CABINET, OR OVERHEATING AND MALFUNCTION WILL RESULT.**
2. **DAMAGE CAUSED BY EXPOSURE TO WATER SPRAY OR TO DIRECT SUNLIGHT WILL NOT BE COVERED BY THE MANUFACTURER'S WARRANTY.**

Figure 7-1 Placing Cabinet in Mounting Bracket

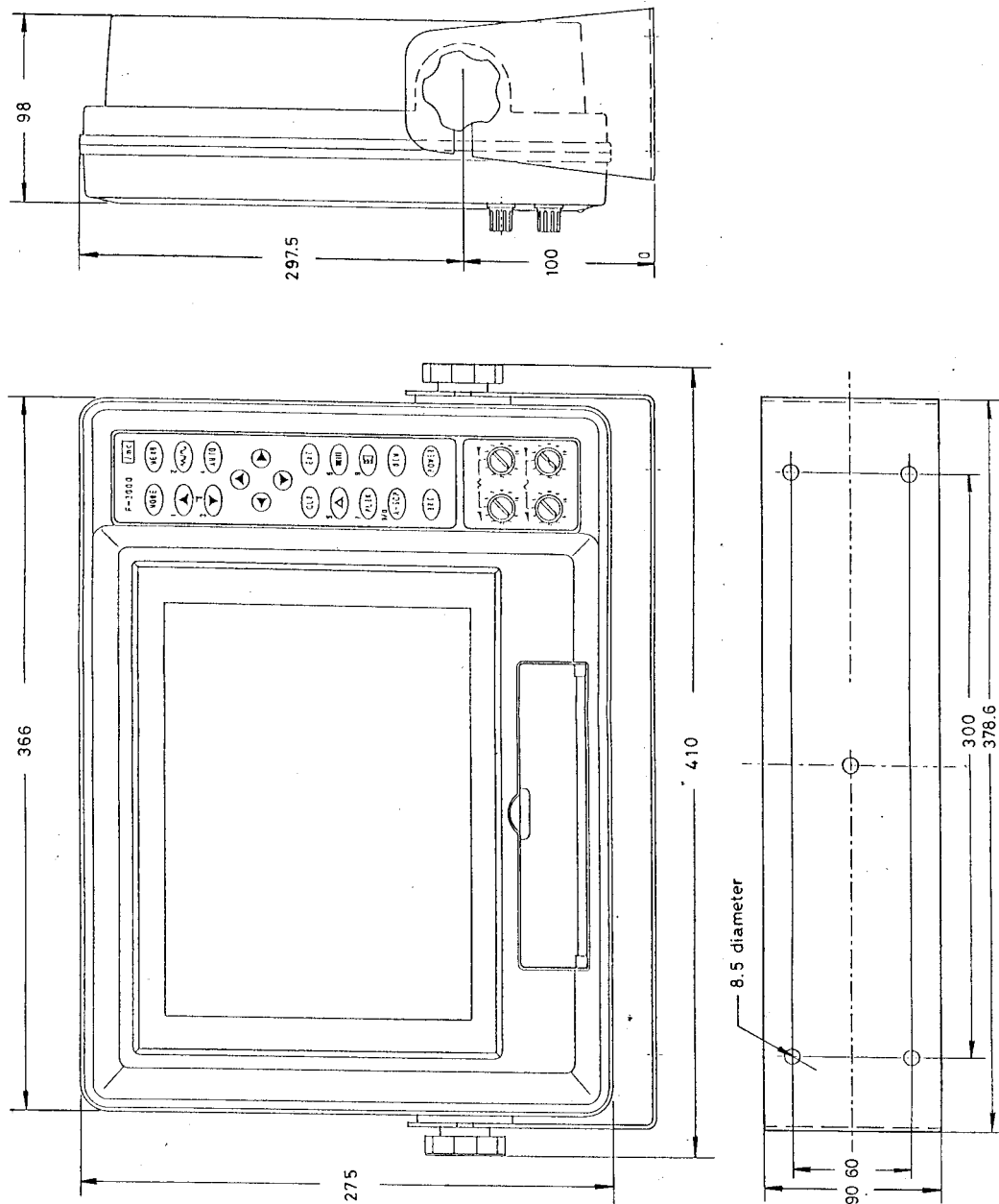
Place the cabinet in the bracket as shown in Figure 7-1, using a pair of the clamping knobs supplied.

After tilting the cabinet to a desired viewing angle, tighten each clamping knob firmly, while swaying the upper part of the cabinet back and forth.



7.1.3. Installing the Display Unit (*continued – 3/3*)

Figure 7-2 Installation Dimensions of V-3002 Cabinet
(Dimensions in millimeters)



- Weight: 4.5 kg (cabinet) + 1.3 kg (mounting bracket)
- Ambient Temperature: -15 to +55°C, 95% RH (operating, without condensation)
-40°C (storage)
- Compass Safe Distance: 1.2 meters

7.2. Transducer Installation

7.2.1. Introduction

The installation should be planned in advance, keeping in mind the standard cable length (10 meters) integrally connected to the transducer. In an installation where a longer cable is required, it is recommended that the transducer be ordered with the correct cable length instead of extending the existing cable with an additional cable. If the existing cable has to be extended, be sure to use the same type of cable supplied by the manufacturer. Use of extension cable not approved by the manufacturer will seriously degrade the transducer performance. **Coaxial cables cannot be used.**

7.2.2. Matched Transducer

The built-in transceiver board is designed to match the following transducer supplied with the equipment by the manufacturer.

- Radarsonics type 706-50/200T dual-frequency ceramic transducer with beam angles of $14^\circ \times 20^\circ$ at 50 kHz and 7° at 200 kHz at -3 dB points

The above transducer is molded in a bronze housing, designed for through-hull installation in wooden vessels.

For installation in steel-hulled vessels, a plastic housing version is optionally available together with stainless steel mounting hardware. Specify the following part number:

- 570-50/200T

Steel blisters that comply with the specifications of the relevant ships classification society must be prepared by the user.

< WARNING >

USE OF TRANSDUCER OTHER THAN THE ABOVE CAN RESULT IN EITHER DAMAGE TO THE TRANSDUCER OR POOR DEPTH DETECTION PERFORMANCE.

< CAUTION >

A similar dual frequency transducer available direct from Radarsonics Inc. or from its dealers may be used for fish finding operations but an incorrect water temperature readout will result.

7.2.3. Installation Location

The transducer installation location and method of installation will greatly affect the fish/bottom detecting capability of this equipment. Careful consideration must be given to selecting the mounting location and deciding the method of installation that best suit the vessel. Air bubbles and turbulent streams, which occur when the vessel is in motion, will most seriously degrade the transducer performance. Each transducer should be located well clear of any water intake/discharge line and also clear of any projections along the hull that might disturb the smooth flow of water around the transducer. On deep-keeled vessels, care must be taken to ensure that the energy beam ($14^\circ \times 20^\circ$ at 50 kHz, 7° at 200 kHz) of the transducer will not be blocked by the keel.

(to be continued on next page)

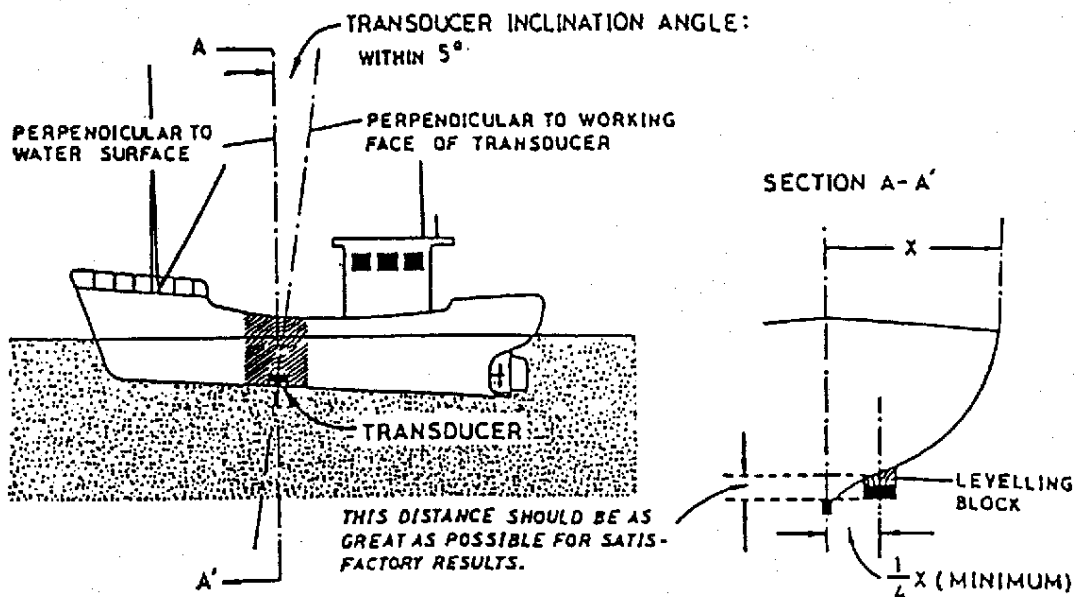
7.2.3. Installation Location (*continued - 2/2*)

< CAUTIONS >

- **Transom-mounting should not be used for commercial fishing applications because of the transducer face being immersed in propeller-caused turbulence.**
- **Inside-the-hull mounting will cause a serious impedance mismatch between the transducer and the transceiver. The manufacturer will not guarantee depth detection performance, if such a mounting method is employed.**
- **Do not paint the transducer face, or performance degradation will result.**

Although the appropriate location depends on the type of vessel and cruising speeds, a practical choice will be somewhere between 1/3 and 1/2 of the vessel's length from the fore. Unless a fairly flat area (with dead rise angle less than 10°) is available on the hull for installation, an appropriate leveling block must be used to enable the sound energy to be projected vertically downward. Also, to minimize the influence of noise from the propellers, it is recommended that the transducer be mounted so that its face is inclined toward the fore within 5 degrees from vertical. The leveling block should be designed accordingly to meet this requirement as well. The more the transducer protrudes from the hull, the better the depth performance becomes.

Figure 7-3 Recommended Transducer Mounting Location

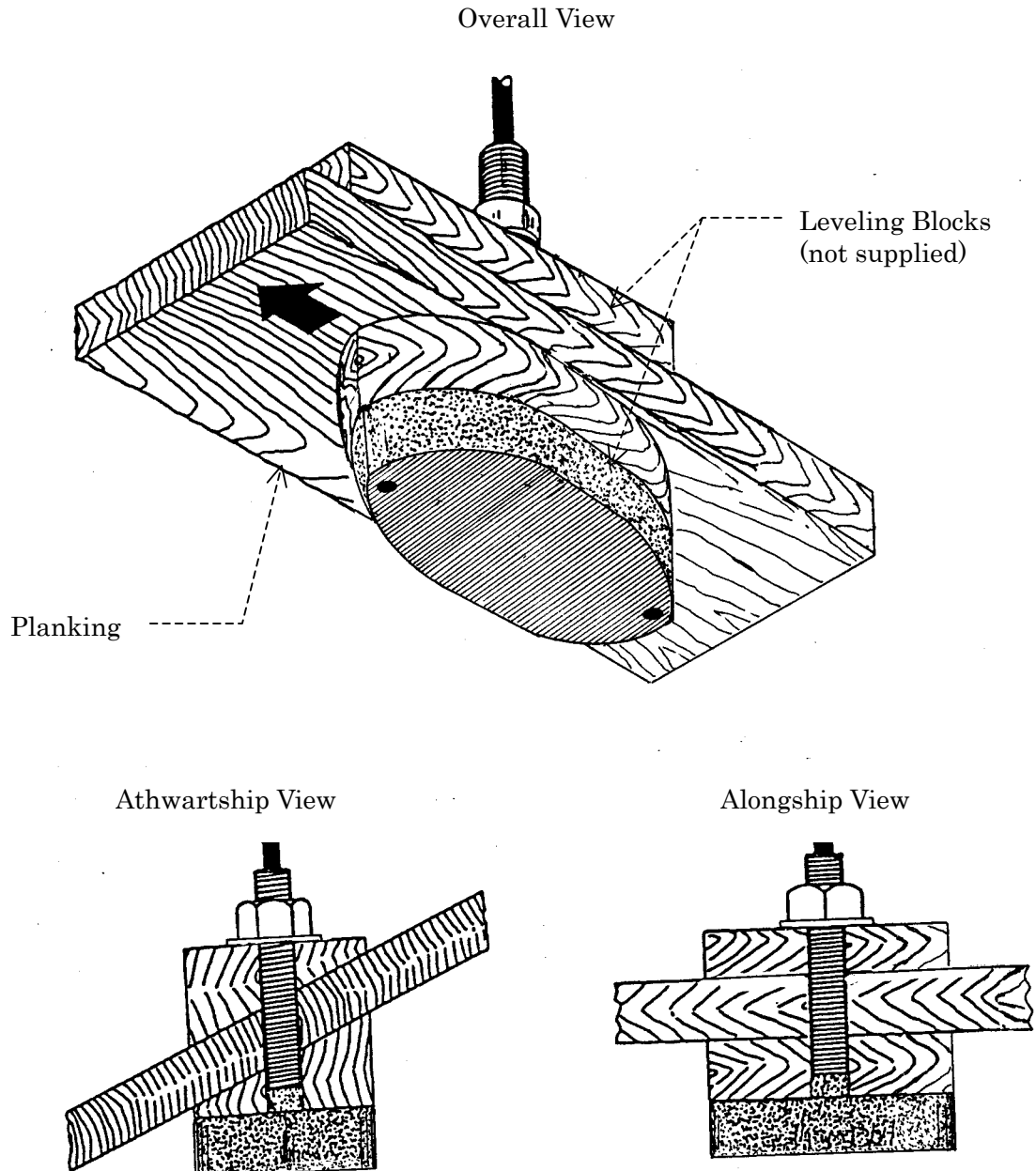


To ensure a watertight installation, apply a liberal amount of high quality marine caulking/sealing compound inside the mounting hole, over the threaded stem of the transducer, mounting bolts, if used to install leveling blocks, etc. Do not over-tighten the nut over the stem. If the wooden hull is dry at the time of installation, allow for possible swelling of the planking when the vessel is in water again.

7.2.3. Installation Location (continued)

The figure below shows a typical through-wooden hull installation of the standard transducer. The leveling blocks shown must be supplied by the dockyard.

Figure 7-4 Through-Hull Installation of Standard Transducer



The housing dimensions of each transducer are given in Figures 7-5 and 7-6 on next page.

Figure 7-5 Dimensions of Model 706-50/200T Transducer

NOTE: Dimensions are in millimeters unless otherwise specified.

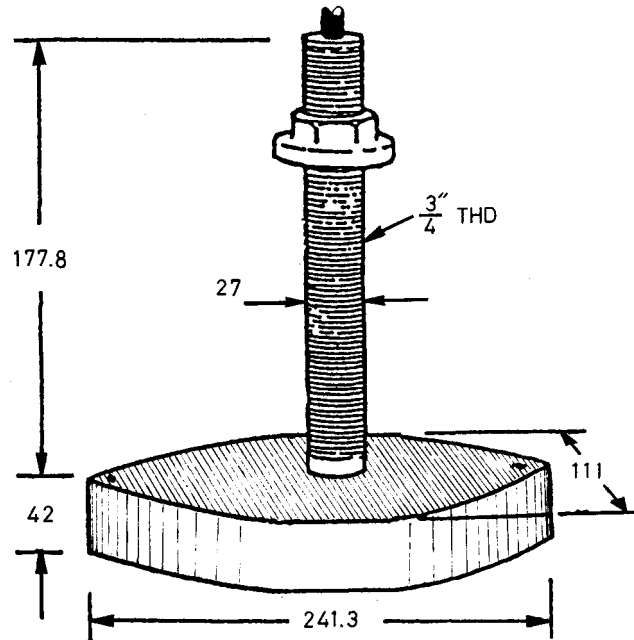
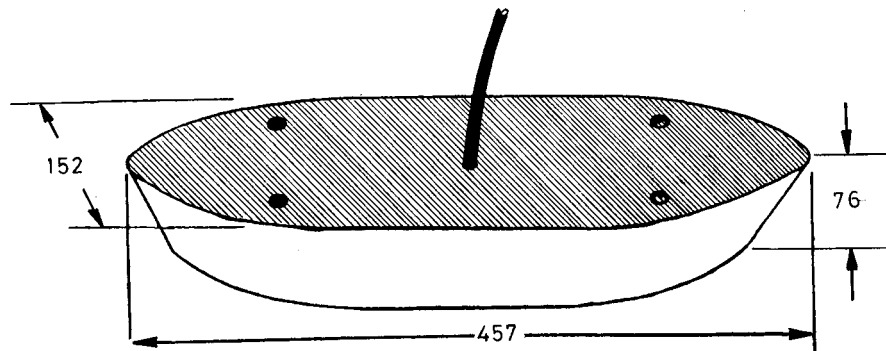


Figure 7-6 Dimensions of Model 706-50/200T-3000 Transducer and Model 1106 Stainless Steel Stuffing Tube



NOTE: Stuffing tube is optional.

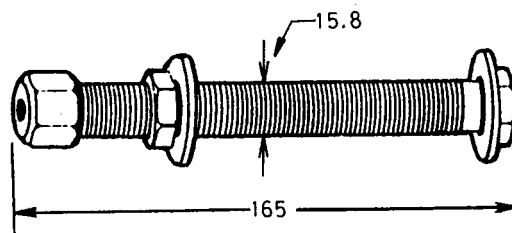


Figure 7-7 Type 570-50/200 Dual Frequency Transducer
(excluding Steel Housing/Blister)

Housing material: ABS

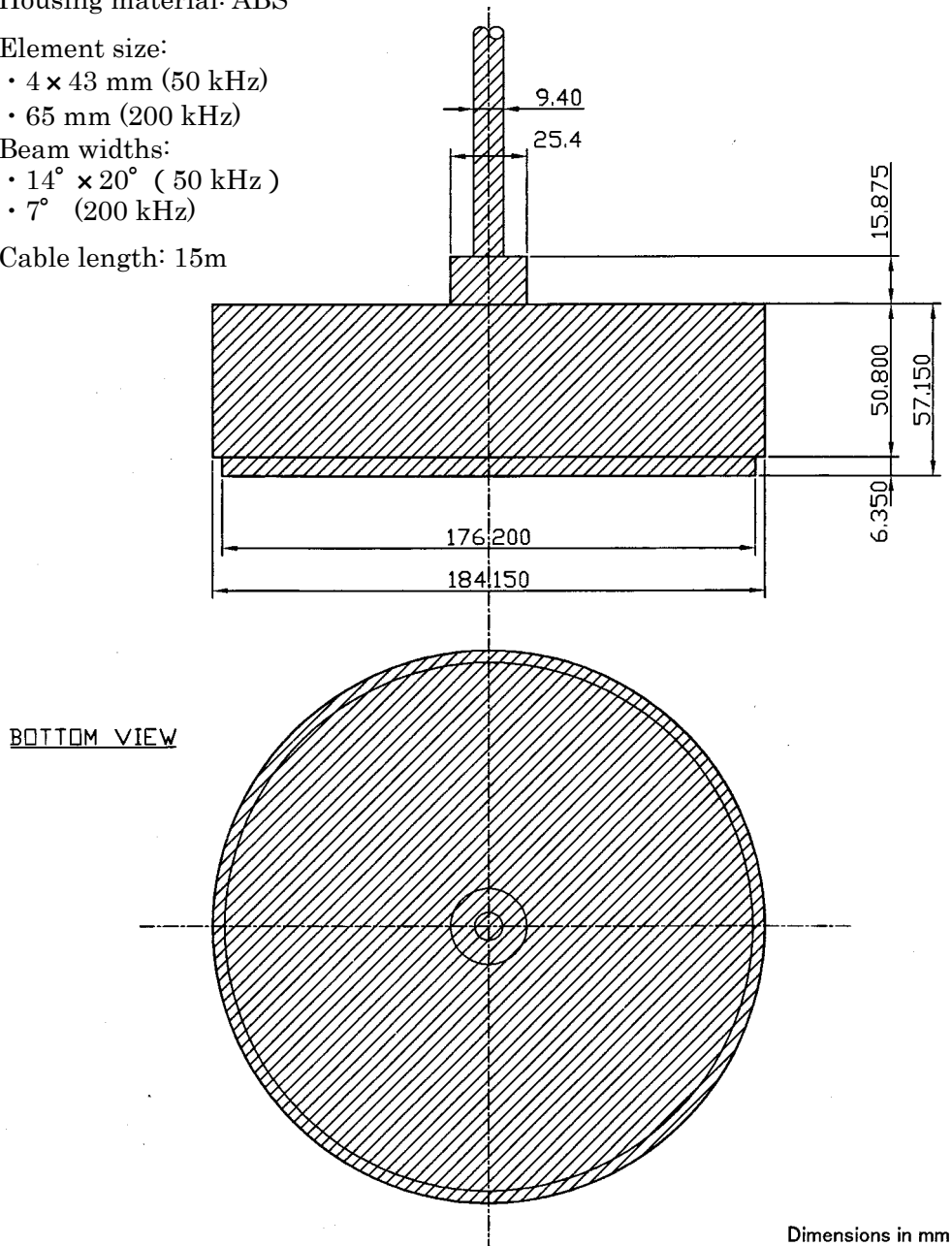
Element size:

- 4 x 43 mm (50 kHz)
- 65 mm (200 kHz)

Beam widths:

- 14° x 20° (50 kHz)
- 7° (200 kHz)

Cable length: 15m



NOTE: RADARSONICS DUAL FREQUENCY TRANSDUCER
FREQUENCY : 50 / 200 KHz
STANDARD TRANSDUCER WITH 15M CABLE (9.4mm dia)

7.3. Electrical Connections

7.3.1. Introduction

All electrical connections to the equipment are to be made via the connector receptacles (jacks) installed on the rear panel of the display cabinet. Some of the cables supplied with the equipment or optional components have already been terminated in plugs, ready for immediate plugging in to the display unit. For the cables that require installation of plugs by soldering, appropriate plugs are separately supplied.

7.3.2. Power Supply Connections

7.3.2.1. Power Supply Requirements

The equipment is powered by an external d-c power source between 11 and 40V, and consumes approximately 30W. The power supply must, however, be capable of supplying at least 5A at 12V or 3A at 24V on a continuous basis for proper start-up and reliable operation. The rear panel of the display cabinet is isolated at d-c level from the negative line of the power source to meet the floating ground requirements.

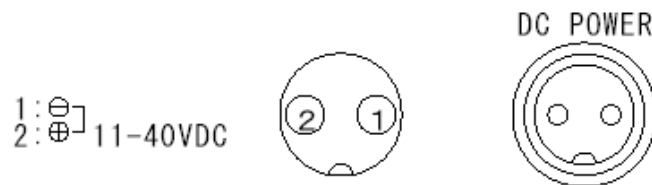
< CAUTION >

Use of a low current capacity supply or slow-response type power supply will experience an instantaneous voltage drop at power-up, making it impossible to turn the equipment on or causing the display screen to flicker each time transmission occurs.

7.3.2.2. Connections

A two-meter two-conductor cable (Figure 7-9), terminated in a two-hole female type plug at one end, is supplied for connection to the ship's power supply. The plug mates with the two-pin male type receptacle marked "DC POWER" on the rear pane (Figure 7-8 below). The other end of the cable is open-ended, consisting of separate black and white conductors with approximately 2 cm of insulation removed, ready for connection to the ship's battery terminals.

Figure 7-8 Rear Panel Power Receptacle



Connect the cable to the power source as follows:

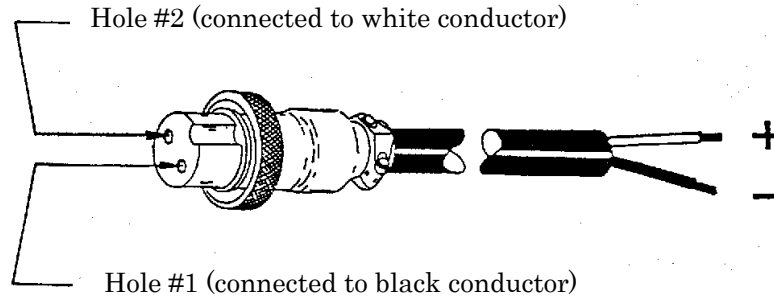
- black (connected to hole #1*) to negative (–) terminal
- white (connected to hole #2*) to positive (+) terminal

**NOTE: The hole ID numbers are indicated in raised letters on the plug face, and the ID numbers of their mating pins are printed on the rear panel.*

(continued on next page)

7.3.2.2. Connections (continued – 2/2)

Figure 7-9 Power Cable



< WARNING >

REVERSING THE CABLE POLARITY WILL CAUSE THE FUSE TO BLOW THE INSTANT THE CABLE IS PLUGGED INTO THE DISPLAY UNIT, EVEN IF THE UNIT IS SWITCHED OFF.

After making the connections to the power source as above, push the plug into the **DC POWER** receptacle as far as it goes, and then screw the coupling ring on the plug until it stops so that the plug won't come loose under constant vibration caused when the ship is in motion.

7.3.2.3. Routing the Power Cable

To minimize the chance of picking up electrical interference, it is recommended that the power cable be connected directly to the ship's battery, and not via other terminals or power distribution board used in common with other electronics. Ideally the unit should be powered by an independent power supply for best results.

7.3.2.4. Installing the Fuse

The equipment is usually delivered without a fuse installed in the rear panel fuse holder marked "**DC FUSE.**" The appropriate fuse rating depends on the power supply voltage, as follows:

- **5A** (5 amperes, slow-blow) for operation off 12V (nominal)
- **3A** (3 amperes, slow-blow) for operation off 24V (nominal)
- **2A** (2 amperes, slow-blow) for operation off 32V (nominal)

Figure 7-10 Fuse Holder



Two pieces of each rating are separately supplied. Unscrew the fuse holder cap, install the correctly rated fuse in place, and replace the cap.

< CAUTIONS >

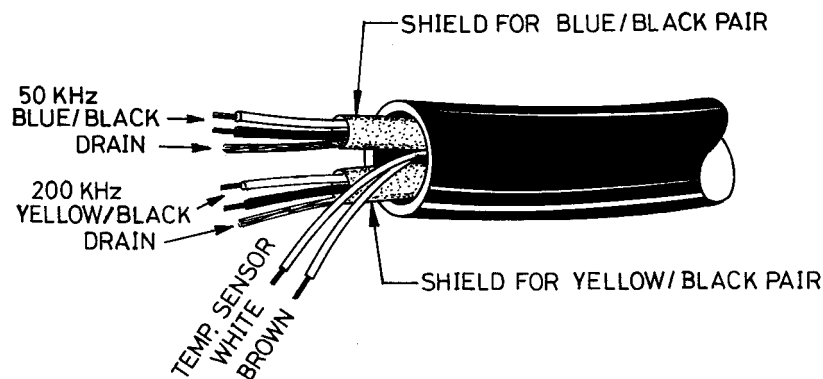
- **Be sure to switch the unit off before installing the fuse.**
- **An incorrectly rated fuse or incorrect type fuse will blow the instant the unit is turned on or will not protect the equipment in the event of a trouble.**

7.3.3. Transducer Connections

The transducer cable is of 8-conductor shielded type as illustrated in the figure below, and usually supplied without connector termination. The cable must be terminated in a seven-hole female type plug, before it can be connected to the display unit. The mating plug is supplied for this purpose.

Disassemble the plug, *slide the plug housing over the cable first*, and solder the conductors (6 signal wires and 2 drain wires) of the cable to the seven pins on the plug as follows:

Figure 7-11 Transducer Cable Structure



Two pairs of shielded conductors are connected to the transducer crystals inside the housing, and must be correctly identified before they can be soldered to the plug.

- Blue/Black pair: connected to 50 kHz crystal
- Yellow/Black pair: connected to 200 kHz crystal

Brown and white conductors are connected to the thermistor temperature sensor embedded in the transducer housing.

After disassembling the plug and passing the coupling ring over the cable, solder the conductors and drains to the pins on the plug as follows:

- Blue of blue/black pair to pin # 1 (50 kHz transmit/receive)
- Black of blue/black pair to pin # 2 (50 kHz transmit/receive)
- Drain (shield) of blue/black pair to pin # 7 (ground)
- Yellow of yellow/black pair to pin # 3 (200 kHz transmit/receive)
- Black of yellow/black pair to pin # 4 (200 kHz transmit/receive)
- Drain (shield) of yellow/black pair to pin # 7 (ground)
- Brown to pin # 5 (temperature sensor input)
- White to pin # 6 (temperature sensor input)

< CAUTION >

Switching the two black conductors will result in extremely poor depth performance or no echo reception.

7.3.3. Transducer Connections (*continued-2/2*)

Pins # 1 and # 2, connected to 50 kHz transmitter, are electrically balanced and the connections to these pins may be reversed without affecting transducer performance.

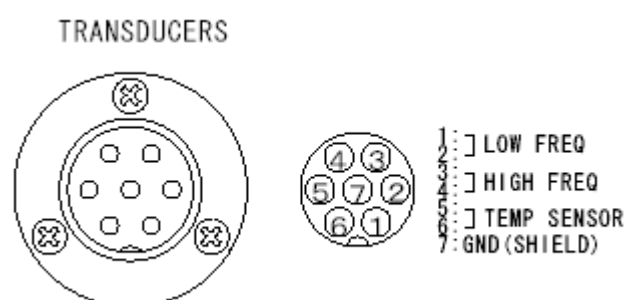
Pins # 3 and # 4, connected to 200 kHz transmitter, are electrically balanced and the connections to these pins may be reversed without affecting transducer performance.

Pins # 5 and # 6, connected to temperature sensor, are not polarized, and connections to these pins may be reversed without affecting temperature readout.

Figure 7-12 Rear Panel Transducer Receptacle

Care should be taken to ensure that no stray strands of wire or no excess solder on any pin touch the inside walls of the plug when the plug is assembled again.

Assemble the plug, tightening the screws firmly. The transducer can now be plugged into the display unit.



Push the plug into the **TRANSDUCERS** receptacle (Figure 7-12) on the rear panel as far as it goes, and tighten the locking ring on the plug.

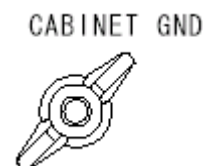
< WARNING >

DO NOT TURN THE EQUIPMENT ON WITH THE TRANSDUCER IN THE AIR, OR SERIOUS DAMAGE TO THE TRANSDUCER CRYSTALS WILL RESULT.

7.3.4. Grounding the Display Cabinet

Figure 7-13 Cabinet Ground Terminal

The display cabinet, internally coated with electrically conductive material, can be grounded to the vessel's earth ground without grounding the negative line of the power source. In installations where it is required, or desirable, to ground the cabinet for safety reasons or EMC (electro-magnetic compatibility) compliance, connect from the wing nut marked "**CABINET GND**" on the rear panel directly to an appropriate earth ground using a thick wire.



The grounding wire should be as short as possible to minimize the chance of picking up interference from other on-board equipment

7.3.5. Connections to NMEA-0183 Devices

7.3.5.1. Introduction

The equipment is designed to interface with various types of external devices that output or accept data signals in the NMEA-0183 format. The 8-pin jack marked “**I/O DATA**” on the rear panel is provided for this purpose, and an 8-hole female type mating plug is separately supplied.

The types of data that can be transferred between the equipment and an external device are as follows:

Inputs (RXD from external device to this equipment)

- \$GPGGA (present position LAT/LON coordinates)
- \$GPVTG (speed-over-ground and heading/course-over-ground)

Outputs (TXD from this equipment to external device every 2 seconds)

- \$SDDBS (depth below surface); see *NOTE 1*
- \$SDDBT (depth below transducer); see *NOTE 1*
- \$SDDPT (depth with transducer offset); see *NOTE 1*.
- \$SDMTW (water temperature) ; see *NOTE 2*.
- \$GPGGA ; see *NOTE 3*.

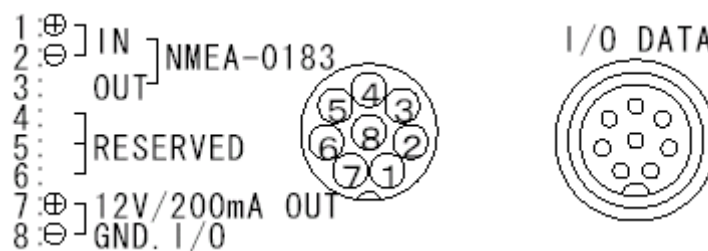
NOTES:

1. *The depth data is available only when the bottom echo is displayed in red or orange. Adjust the appropriate gain/TVG controls if necessary.*
2. *The temperature data included in this sentence is correct only when the Radarsonics 706-50/200T or 570-50/200 transducer supplied by the manufacturer is connected.*
3. *This data sentence is the same as the input sentence, and available only when an appropriate GPS sensor is plugged into the I/O DATA connector.*

7.3.5.2. Connector Pin Assignments

The pin assignments of the **I/O DATA** connector are given below. The pin ID numbers are printed on the rear panel. Connections should be made using a short length of good quality two-conductor shielded cable. To avoid interference, the shield should be grounded at both ends. Use pin #8 for grounding on the display unit side.

Figure 7-14 **I/O DATA** Connector Pin Assignments



(continued on next page)

7.3.5.2. Connector Pin Assignments (*continued*)

NOTE: A 12V regulated DC voltage is available from pins #7 (+) and #8 (-) for powering a light-duty external device, such as the TPS-512 sounder/plotter simulator or a GPS sensor.

Figure 7-15 **I/O DATA** Connector Pin Assignments

- Pin #1: RX DATA +
 - Pin #2: RX DATA -
 - Pin #3: TX DATA + :
 - Pin #4:
 - Pin #5:
 - Pin #6:
 - Pin #7:
 - Pin #8:
- from external NMEA data sending device
(GPS sensor, simulator, plotter, etc.)
- to NMEA data receiving device (echo sounder, PC, etc.)
- to specified flash memory programmer; see
WARNING below.
- 12VDC output, 200mA (max.); see **CAUTION** below.
- Cabinet/chassis ground

< WARNING >

DO NOT CONNECT ANY DEVICE OR WIRE OTHER THAN THE SPECIFIED FLASH MEMORY PROGRAMMER TO THESE PINS, OR THE EQUIPMENT WILL GET LOCKED UP, FORCING YOU TO UNPLUG THE POWER CABLE TO TURN IT OFF.

< CAUTION >

The DC output is current-limited to 1A for protection against a momentary short, but the current drain must not exceed 200 mA at any time for continuous-duty applications.

7.3.5.3. Connections to External GPS Sensor/Track Plotter (Wiring for Input Interfacing)

If you wish to use an external GPS sensor that outputs NMEA-0183 formatted position/speed/heading data, or a JMC brand GPS track plotter, as the data source, connect it to the **I/O DATA** receptacle as follows:

Table 7-1 NMEA-0183 Input Connections

I/O DATA Receptacle	NMEA-0183 Output (from GPS sensor or plotter)
Pin #1	TX+ (SD+)
Pin #2	TX- (SD-)
Pin #7	12 VDC (see <i>NOTE</i>)
Pin #8	Ground

NOTE: . If you wish to power the GPS sensor from this pin, make sure that its current drain will not exceed 200 mA at any time. If the sensor is to be operated from an external power supply, this pin must remain unconnected.

7.3.5.4. Connections to Data Receiving Device (Wiring for Output Interfacing)

To derive NMEA-0183 output, such as temperature and depth data, from this equipment for on-board or shore-based applications, connect from the **I/O DATA** receptacle to such a data-receiving device as follows:

Table 7-2 NMEA-0183 Output Connections

I/O DATA Receptacle	NMEA-0183 Input Port (Data Receiving Device)
Pin #3	RX+ (RD+)
Pin #8	Ground