

UM-F3000W-3.1
3rd Edition
August, 2009

Operating, Maintenance &
Installation Instructions
for
Navigation Echo Sounder
Model F-3000W



Japan Marina Co., Ltd.

36-2-1001 UDAGAWA-CHO, SHIBUYA-KU, TOKYO 150-0042, JAPAN
PHONE: (03)3461-3606 FAX: (03)3496-2078

sales@japan-marina.co.jp
www.japan-marina.co.jp



Bundesrepublik Deutschland
Federal Republic of Germany

Bundesamt für Seeschifffahrt und Hydrographie
Federal Maritime and Hydrographic Agency



EC TYPE EXAMINATION (MODULE B) CERTIFICATE

This is to certify that:

Bundesamt für Seeschifffahrt und Hydrographie, specified as a "notified body" under the terms of „Schiffssicherheitsgesetz“ of 9. September 1998 (BGBl. I, p. 2860) modified last 8. April 2008 (BGBl. I, p. 706), did undertake the relevant type approval procedures for the equipment identified below which was found to be in compliance with the Navigation requirements of Marine Equipment Directive (MED) 96/98/EC and the last modification by Directive 2009/26/EC.

Manufacturer **Japan Marina Co., Ltd. (JMC)**
Address **36-2-1001 Udagawa-cho, Shibuya-ku, Tokyo 150-0042, JAPAN**

Applicant **SAM Electronics GmbH**
Address **Behringstraße 120, 22763 Hamburg, GERMANY**

Annex A.1 Item **4.6 Echo sounding equipment**
(No & item designation)

Product Name **DEBEG 4630 / JMC F-3000 W**

Trade Name(s) **----**

Specified Standard(s)

IMO-Resolution A.224(VII) as amended by IMO-Resolution MSC.74(69) Annex 4	ISO 9875 Ed.3.0, 2000 as amended by Corr.1, 2006 IEC 60945 Ed.4.0, 2002
IMO-Resolution A.694(17)	IEC 62288 Ed.1.0, 2008
IMO-Resolution MSC.191(79)	IEC 61162-1 Ed.3.0, 2007

Based on the Directive 2008/67/EC, additional applied version: Directive 2009/26/EC
This certificate remains valid unless cancelled, expired or revoked.

Date of Re-issue: **2009-08-21**

Issued by: **Bundesamt für Seeschifffahrt und Hydrographie
Bernhard-Nocht-Str. 78, 20359 Hamburg, Germany
Notified body 0735**

Expiry date: **2010-12-31**

Certificate No.: **BSH/4612/4061387/09**

USCG-Module-B No.: **165.107/EC0735** Unique Identifier: **4061387**

This certificate consists of 2 pages.



Kai Jens Schulz-Reifer



This certificate is issued under the authority of the „Bundesministerium für Verkehr, Bau und Stadtentwicklung“.
V2009-08-19



Japan Marina Co., Ltd.

EC Declaration of Conformity

We, the undersigned,


Manufacturer	Japan Marina Co. Ltd.
Address	36-2-1001 Udagawacho, Shibuya-ku, Tokyo 150-0042
Country	Japan
Phone number	+81-3-3461-3606
Fax number	+81-3-3496-2078
E-mail	sales@japan-marina.co.jp

declare under our sole responsibility that the following equipment:

Description	Echo-sounding equipment (Navigation Sounder)
Manufacturer	Japan Marina Co. Ltd.
Brand	JMC
Equipment Name	F-3000W
Equipment Category	Protected equipment under IEC 60945 Ed. 4.0, 2002

conforms with the relevant requirements of the Marine Equipment Directive 96/98/EC of 20th December 1996 as last amended, (last modified by Directive 2009/26/EC, based on the following standards:

IMO Resolution A.224 (VII) as amended by MSC.74(69), Annex 4 IMO Resolution A.694(17) IMO Resolution MSC.191(79)	ISO 9875, Ed.3.0, 2000, as amended by Corr.1, 2006 IEC 60945 Ed.4.0, 2002 IEC 62288 Ed.1.0, 2008 IEC 61162-1 Ed.3.0, 2007
Conformity certified by EU Notified Body BSH EC Type Examination Certificate No. BSH/4612/4061387/09. USCG-Module-B No. 165.107/EC0735	

Name and position of person representing manufacturer or authorised representative	Hideaki Yoshihara, President
Signature 	Date 28th August, 2009

< WARNINGS > – 1/2

1. THE REAR PANEL-MOUNTED TRANSDUCER CONNECTORS ARE EMITTING EXTREMELY HIGH VOLTAGE RADIO-FREQUENCY PULSES. THESE CONNECTORS ARE COVERED WITH A SCREW-LOCKED PROTECTIVE RUBBER CAP WHEN THE EQUIPMENT IS INITIALLY DELIVERED.

TO AVOID COMING INTO CONTACT ACCIDENTALLY WITH THE CONNECTOR PINS, BE SURE TO PLACE THE PROTECTIVE CAP:

- OVER THE UNUSED, EXPOSED CONNECTOR, IF THE EQUIPMENT HAS A SINGLE TRANSDUCER PLUGGED IN, OR
- OVER EACH CONNECTOR WHENEVER EXPOSED PINS BECOME EASILY ACCESSIBLE, SUCH AS WHEN EITHER TRANSDUCER IS UNPLUGGED FOR INSPECTION OR SERVICING, AND

LOCK THE CAP WITH THE TWO SCREWS ATTACHED.

2. TO COMPLY WITH THE RELEVANT WHEEL-MARK TYPE APPROVAL REGULATIONS, THE EQUIPMENT MUST BE OPERATED ON EITHER 100 KHZ OR 50 KHZ CHANNEL.

OPERATION ON 200 KHZ IS NOT OFFICIALLY APPROVED, AND RESULTS OBTAINED FROM THAT FREQUENCY MUST NOT BE USED FOR NAVIGATIONAL PURPOSES.

3. THE ACCURACY OF THE ON-SCREEN DEPTH READOUT IS AFFECTED BY WATER TEMPERATURE, SALINITY, DEPTH AND OTHER UNDERWATER CONDITIONS AS WELL AS THE SHIP'S ROLL AND PITCH, HEEL AND TRIM.

TAKE THESE POSSIBLE ERROR-CAUSING FACTORS INTO CONSIDERATION WHEN USING THE DEPTH READOUT, SUCH AS WHEN NAVIGATING SHALLOW AREAS OR IN APPLICATIONS WHERE ACCURATE DEPTH READING IS CRITICAL.

4. DURING SHALLOW WATER OPERATION, THE EQUIPMENT MAY OCCASIONALLY READ TWICE THE ACTUAL DEPTH BY LOCKING ONTO THE SECOND BOTTOM ECHO*.

THE DIGITAL DEPTH READOUT SHOULD BE COMPARED WITH THE GRAPHIC BOTTOM INDICATION OR WITH SOUNDINGS DATA IN OFFICIAL PAPER CHARTS TO DETERMINE THE TRUE DEPTH.

TOTAL RELIANCE ON THE DIGITAL READOUT ALONE FOR DEPTH INFORMATION IS DANGEROUS AND MUST BE AVOIDED.

* See paragraph 3.4.2 for more information on the second bottom echo.

< WARNINGS > – 2/2

5. **WITH A TRANSDUCER DRAFT ENTERED, THE ON-SCREEN DIGITAL READOUT SHOWS THE DEPTH FROM THE WATERLINE AND NOT FROM THE TRANSDUCER OR FROM THE SHIP'S KEEL.**

GREAT CARE SHOULD, THEREFORE, BE TAKEN IN USING THE DEPTH READOUT WHEN NAVIGATING SHALLOW WATER AREAS. BE SURE TO SET THE DEPTH REFERENCE TO "BELOW SURFACE" (DBS) TO AVOID ANY MISUNDERSTANDING.

See paragraph 4.2 for more information on transducer draft.

6. **WHEN THE DEPTH REFERENCE INDICATION IS SET TO "BELOW KEEL," BE SURE TO ENTER THE APPROPRIATE KEEL OFFSET TO AVOID ANY MISUNDERSTANDING ABOUT THE DEPTH READOUT.**

See paragraph 4.10.8.3 for more information on keel offset.

7. **DO NOT SWITCH THE EQUIPMENT ON WITH THE TRANSDUCERS OUT OF WATER, SUCH AS WHILE THE VESSEL IS DRY-DOCKED, OR THE TRANSDUCER'S CERAMIC CRYSTALS MAY BE DAMAGED IRREPARABLY. DAMAGE CAUSED TO THE TRANSDUCER(S) BY SUCH ACTIONS IS NOT COVERED BY THE MANUFACTURER'S OR DEALER'S WARRANTY.**

8. **THE DISPLAY CABINET IS NOT WEATHERIZED FOR OUTDOOR INSTALLATION OR OPERATION. ANY DAMAGE CAUSED, WHETHER DIRECTLY OR INDIRECTLY, THROUGH WATER INTRUSION IS NOT COVERED BY THE MANUFACTURER'S OR DEALER'S WARRANTY.**

9. **NEITHER THE MANUFACTURER NOR ITS DEALER IS LIABLE FOR LOSS OF LIFE, BODILY INJURY OR DAMAGE TO THE PROPERTY ARISING FROM THE USE OF THIS EQUIPMENT OR FROM BEING, FOR ANY REASON, UNABLE TO OPERATE THE EQUIPMENT.**

< CAUTION >

The depth data to be stored automatically in non-volatile memory for later retrieval/analysis will be in NMEA-0183 DPT format (depth-below-transducer plus transducer draft and/or keel offset).




See paragraph 6.2 for more information on the stored data format.

To Installer of **F-3000W**

After installation of the transducers,

- register the assigned channel, frequency and mounting location of each transducer in the table below so that the operator can tell which transducer is in use for current sounding,
- attach an appropriate name/ID tag to the plug of each cable (or mark each plug appropriately) for ease of identifying transducers when the transducers are unplugged for maintenance or servicing, and
- do not turn the equipment on until the transducers are placed in water.

Channel-Transducer Assignments Table

Operating Channel	Frequency	Mounting Location					
		Aft		Middle		Fore	
							
		PORT	STB	PORT	STB	PORT	STB
Channel A (CH-A)	_____kHz						
Channel B (CH-B)	_____kHz						

Detailed installation instructions are given in section 9.

< **CAUTIONS** >

1. **Depth readings obtained from the 200 kHz-assigned channel must not be used for navigational purposes.**
2. **Dual frequency split-screen operation does not comply with the relevant IMO resolutions and is not type-approved.**
This mode of operation must not be used for navigational purposes.

To Readers of This Edition

This edition of the manual applies to the **F-3000W** with the following add-on hardware and software installed in the equipment:

- Hardware Version: 4630-AGC
- Add-on Hardware: *1&2AGC Board, part number M202AGC-B
- Software: *3Version 1.10 Revision 1.24 and greater
- Applicable Equipment Serial No.: 0360142 and greater

*1 *The AGC board can be installed in existing units with early serial numbers. Ask your dealer for information.*

*2 *Without the AGC board installed, the following features are not available:*

- *Automatic gain control*
The user must adjust the receiver gain manually using the appropriate gain control.
- *Automatic TVG setting*
The user must adjust the TVG level manually using the appropriate gain control.

Pressing ⁴**AUTO** will activate the function of automatic range selection alone.

*3 *The software version can be checked on the **SYSTEM MENU** page, accessible by turning the equipment on while holding down **MENU**.*

List of Abbreviations – 1/2

The abbreviations used in this manual and menus, on screen, control panel and rear panel are listed below.

A:	amperes
A–SCP:	A–scope display
AUTO:	Automatic ranging (automatic bottom tracking)
BR:	Braccia (Italian/Spanish fathoms)
BRT:	Brightness control key
BSH:	Bundesamt für Seeschifffahrt und Hydrographie (Federal Maritime and Hydrographic Agency, Germany)
BV:	Bureau Veritas (France), EU notified body for wheel mark certification
CCW:	Counterclockwise
CH:	Operating channel (transducer currently in use)
CH–A:	Operating channel A
CH–B:	Operating channel B
CLR:	Clear key
D:	Depth (part of cabinet dimensions)
dB:	decibels (unit of relative power strength)
DBK:	Header of NMEA–0183 data sentence (depth below keel)
DBS:	Header of NMEA–0183 data sentence (depth below surface)
DBT:	Header of NMEA–0183 data sentence (depth below transducer)
DFT:	Draft (transducer draft or depth from surface to transducer)
DIM:	Dimmer key
DIN:	Deutsches Institut für Normung (German Institute for Standardization)
DOS/V:	Disk Operating System/V (PC operating system)
DPT:	Header of NMEA–0183 data sentence (depth)
EN:	Europäische Norm (European Standard)
ENT:	Entry key
ESC/P:	EPSON standard code for Printers (printer control protocol)
FM:	fathoms (=6 feet)
FRQ:	Frequency (transducer frequency)
FREQ:	Frequency (transducer frequency)
FT:	feet
FWE:	Flash–memory write enable (flash memory programming)
GGA:	Header of NMEA–0183 /IEC 61162–1 data sentence (GPS position fix)
GND:	Ground
GPS:	Global Positioning System, GPS receiver/sensor
H:	Height (part of cabinet dimensions)
HH:MM:SS:	Time display format (hours, minutes and seconds)
hr:	hours
IEC:	International Electrotechnical Commission
IMO:	International Maritime Organization
ISO:	International Standardization Organization
I/O:	Input/Output
kg:	kilograms
KL:	Keel offset (depth from transducer to keel)
KT:	knots
kW:	kilowatts

List of Abbreviations – 2/2

LST:	Local standard time
L:	Live (hot side of single-phase AC power line)
LAT/LON:	Latitude/Longitude coordinates
LCD:	Liquid crystal display
m:	meters
mA:	milliamperes
min:	minutes
mm:	millimeters
MM/DD/YY:	Month, day and year (date indication format)
MTW:	Header of NMEA-0183 data sentence (water temperature)
N:	Neutral (grounded side of single-phase AC power line)
NC:	No connection (no internal connection)
NMEA:	U.S. National Marine Electronics Association
NR:	Noise reduction
Ω :	ohms
par.:	paragraph
para.:	paragraph
PF:	Picture feed (echogram feed rate)
PLBK:	Playback (review history of soundings and other data stored in memory)
rms:	root mean square (definition of effective mean power)
RGB:	Red, green and blue (3 original colors of light)
RH:	Relative humidity
RMC:	Header of NMEA-0183 data sentence (position, speed, time)
RX:	Receive
RXD:	Receive data
RNG:	Range (depth range)
STB:	Starboard
STC:	Sensitivity-Time Control
TEMP:	Temperature
TFT:	Thin-film transistor (technology of color LCD)
TVG:	Time-varied gain control
TX:	Transmit
TXD:	Transmit data (Send data)
UTC:	Universal time coordinated (=GMT in common usage)
V:	volts
VAC:	Volts AC
VDC:	Volts DC
VGA:	Video graphics array (screen resolution, 640×480 pixels)
VRM:	Variable Range Marker
VTG:	Header of NMEA-0183 data sentence (heading and speed)
W:	Width (part of cabinet dimensions)
W:	watts
ZDA:	Header of NMEA-0183 data sentence (UTC & date)

List of Contents

	Page
1. Product Description.....	1
2. Specifications.....	3
2.1. General Specifications	3
2.2. Echo Sounder Specifications	3
3. Basic Operating Instructions	7
3.1. Interpreting Navigation Sounder Screen	7
3.2. Control Panel Functions	13
3.3. Selecting Depth Ranges	26
3.3.1. Manual Selection	26
3.3.2. Automatic Selection	27
3.4. Interpreting Echo Display	28
3.4.1. Bottom Echo Colors	28
3.4.2. Multiple Bottom Echoes	29
3.4.3. Other Echoes	30
3.4.4. A-Scope Presentation of Echoes	31
3.5. Selecting Display Modes	32
3.6. Printing Out Echogram Screen	33
3.7. Switching Transducers (Operating Channels)	34
3.7.1. Introduction	34
3.7.2. Selecting Channels (Transducer Frequencies)	35
3.8. Indication of Transducer Location	36
3.9. Adjusting Receiver Gain Controls	36
3.10. Adjusting TVG Controls Manually	37
3.11. Retrieving Data History	38
3.11.1. Introduction	38
3.11.2. Displaying Data History Window	38
3.11.3. Retrieving Data Registered at Specific Date/Time	39
3.11.4. Reviewing Data History in Detail over Specific Section	40
3.12. Alarms	41
3.12.1. Introduction	41
3.12.2. Acknowledging Active Alarms	41
3.12.3. Acknowledging Power Removal Alarm	41
3.12.4. Depth Alarm	42
3.12.5. Bottom-Missing Alarm	43
3.12.6. Power Failure Alarm	44
3.12.7. Power Removal/Shutoff Alarm	44
3.13. Line Marker	45
4. Advanced Settings	46
4.1. Introduction	46

4.2. Entering Transducer Draft	46
4.2.1. Introduction	46
4.2.2. Entering Transducer Draft	47
4.3. Selecting Depth Reference Indications	50
4.3.1. Introduction	50
4.3.2. Selection Procedure	50
4.4. Echo Threshold Adjustment	52
4.4.1. Introduction	52
4.4.2. Adjusting Echo Threshold Level	52
4.5. White Line Adjustment	54
4.5.1. Introduction	54
4.5.2. Adjusting White Line Level	54
4.6. Selecting Transmit Power Levels	56
4.7. Selecting Time Passage Scales	57
4.8. Activating Echo Sounder Simulator	58
4.9. Selecting Types of Echo Display	59
4.10. Installation Settings	60
4.10.1. Introduction	60
4.10.2. Changing Echo Color Assignments	60
4.10.3. Selecting Depth Readout Units	63
4.10.4. Selecting Echo Dynamic Ranges	64
4.10.5. Entering Time Offset for Local Standard Time Readout	65
4.10.6. Setting Date and Time	66
4.10.7. Selecting Temperature Readout Units	67
4.10.8. Making Transducer-Related Settings	68
4.11. Selecting Types of Navigational Data To Be Output	71
4.11.1. Introduction	71
4.11.2. Selecting Outputs	71
4.12. Enabling Bottom-Missing Alarm	72
4.13. Selecting Depth Readout Response Times	73
4.13.1. Introduction	73
4.13.2. Selecting Depth Readout Response Times	73
5. Making Settings via SYSTEM MENU	74
5.1. Introduction	74
5.2. Selecting Background Colors	74
5.3. Performing Self-Diagnostic Function	75
5.4. Outputting Stored Data	76
5.5. Selecting Intervals for Data Output from Memory	76
5.6. Selecting Channels To Be Displayed	76
6. Outputting Stored Data for PC-based Applications	77
6.1. Introduction	77

6.2.	Data Output Format	77
6.3.	Outputting Stored Data	78
6.3.1.	Selecting Output Intervals	78
6.3.2.	Uploading Stored Data	79
7.	User-Level Trouble Shooting	81
7.1.	Introduction	81
7.2.	Depth Readout	81
7.3.	Switching Operating Channels	83
7.4.	Bottom Echo Appearance	83
7.5.	Alarms	84
7.6.	Data History Window	85
7.7.	Echogram Recalled from Memory	85
7.8.	Settings through Menu System	85
7.9.	Date/Time Indication	86
7.10.	Screen Hard Copy	86
7.11.	GPS-Derived Data Outputs	86
8.	User-Level Maintenance Instructions	87
8.1.	Maintenance on the Equipment Cabinet	87
8.2.	Maintenance on Electrical Connections	87
8.3.	Maintenance on The Transducers	87
8.4.	Servicing the Equipment	88
8.5.	Resetting the System	88
9.	Installation Instructions	89
9.1.	Equipment Cabinet Installation	89
9.1.1.	General Precautions	89
9.1.2.	Mounting	89
9.2.	Transducer Installation	91
9.2.1.	General Precautions	91
9.2.2.	Choosing Installation Location	91
9.2.3.	Matched Transducers	92
9.3.	Electrical Connections	96
9.3.1.	Introduction	96
9.3.2.	Power Supply Connections	96
9.3.3.	Connections to Transducers	100
9.3.4.	Connections through Digital I/O Interface Connectors	105
9.3.5.	Connector Pin Assignments	112
9.3.6.	Connections to Graphics Printer	114
9.3.7.	Connections to Water Temperature Sensor	115
9.3.8.	Connecting Alarm Outputs to External Alarm Devices	116
9.3.9.	Connecting Remote Reset Switch for Power Removal/Shutoff Alarm	117

1. Product Description

The **F-3000W** is a dual frequency navigation echo sounder designed to comply fully with IMO Resolution MSC.74(69) Annex 4, and is type-approved by BSH on the basis of compliance with DIN EN ISO 9875 specifications for wheel mark certification.

Equipped with a 10.4-inch daylight-viewing, high-contrast color TFT LCD screen, the **F-3000W** displays either the bottom contour alone in a single color of the user's choice or the full bottom topography using a total of 7 user-definable ease-on-the-eye analog strength-level colors that represent various layers of the bottom stratum.

Digital depth readout is also available in, easy-to-read fonts with a clear graphic indication of the reference of measurement (from the waterline, transducer or keel).

Fully automatic functions include range selection, receiver gain and TVG settings and transmit power level. Manual override is also possible in applications where you wish the range fixed or where you wish to control the gain, shallow gain suppression level or power level manually.

With appropriate optional sensors plugged in, or GPS-data sources connected to one of the rear panel interface connectors, the ship's LAT/LON coordinates, speed, heading and water temperature will also be displayed at the same time.

A battery-backed realtime calendar clock is built in to indicate the date and time in UTC or in the desired local time. With an appropriate GPS sensor plugged in, the time is automatically synchronized with the atomic-precision GPS time.

Up to 24 hours of sounding data will be stored in non-volatile memory at approximately two-second intervals, together with associated date and time, range and frequency in use plus position and water temperature, and can be played back easily with a devoted key. The user can review the stored data across any 15-minute segment at any point in time over the past 24 hours through a specially designed window.

The stored data can be output on demand in NMEA-0183 (IEC 61162)-compatible format via rear panel connectors for use in shore-based applications, and is protected against a system reset.

Equipped with a powerful 1 kW RMS dual frequency transceiver, the **F-3000W** operates on two different channels (channel A and channel B) separately or simultaneously. To match this feature, two display modes are selectable: full-screen page mode with echogram of either channel and split-screen page mode with each half screen showing echogram of different channel. A 200W low-power dual frequency transceiver is optionally available for operation using **ELAC** 50 and 200 kHz transducers or **STN ATLAS** 100 kHz transducer.

Three transducers, differing in frequency, are available, and a desired pair of frequencies (50 & 100 kHz, 50 & 200 kHz, or 100 & 100 kHz) can be selected for channels A and B at the time of ordering. They can be mounted at different locations and a devoted front panel key switches the operating channel.

If it is desired to display echogram for a longer period of time, lower feed rates (plot speeds) can be chosen without affecting the rate of sounding specified for the current depth range, thereby allowing the current information updating rate to be maintained regardless of the feed speed in use.

Possible interference from other echo sounders operating in the vicinity can be effectively eliminated or reduced with a 3-step noise reduction function.

1. Product Description (*continued – 2/2*)

The acquired data will also be output via RS-232C and RS-422 connectors simultaneously for use in applications requiring depth, date/time and position information, such as an ECDIS or a VDR systems. If water temperature data is needed, a thermistor sensor is optionally available and can be plugged into a devoted connector.

To obtain a hardcopy of the present echogram screen, a Centronics parallel port is also provided, which supports commercially available DOS/V-compatible monochrome graphics printers with ESC/P control protocol.

The built-in alarms include depth alarm, bottom-missing alarm, power failure alarm and power removal/shutoff alarm.

The depth alarm alerts the operator to decreasing depth (shallow alarm). A variable depth marker can be turned on to set the alarm depth graphically as well as digitally.

The bottom-missing alarm warns against the bottom echo being lost, becoming too weak or exceeding the current range limit with the equipment in the manual control mode.

The power failure alarm will be activated if the power line voltage drops below the factory-specified predetermined level.

The alarm activation status will be indicated both audibly and visually, and the alarm outputs will be separately available for driving externally connected alarm devices through a devoted connector.

The power removal/shutoff alarm, independently controlled by a devoted circuit based on a high-speed large capacity condenser, will be triggered in the event power is removed or shut off, emitting a repeating beep for several minutes continuously. A devoted reset switch is installed behind the hinged front lid (later serial number versions) to acknowledge the alarm and silence the warning sound.

Both AC and DC power supplies are built in as standard, making it possible to connect the equipment to both AC and DC backup power sources at the same time for uninterruptible operation. Should AC power outage occur in this configuration, the **F-3000W** will automatically switch to the backup power source.

2. Specifications

2.1. General Specifications

- Display Screen: 10.4 inch 7–analog RGB-color backlit TFT–LCD, VGA (640×480 pixels), with backlighting level adjustable in 10 steps. LCD module complies with IEC 62288 (Ed.1.0, 2008) requirements.
- Data Storage:
 - Numeric Data: Up to 24 hours of sounding data, depth range, frequency, associated UTC date/time, ^{*1}LAT/LON and ^{*2}water temperature readouts are automatically retained in flash memory protected from power shutoff or system reset.
 - Graphics Data: Graphics image (full color echogram) of approx. past 10 minutes in temporary storage.
- Data Retrieval: Stored sounding data (in IEC 61162–1/NMEA–0183 DPT format) of past 15 minutes, 1/3/6/12/24 hours can be retrieved from flash memory and can be graphically displayed in a devoted data history window, together with associated UTC date/time, and ^{*1}LAT/LON coordinates. All stored data can be output in IEC 61162/NMEA–0183 proprietary format on demand via rear panel **RS–232C**, **RS–422** and **I/O DATA** connectors simultaneously.
- Keypad Backlighting: Adjustable in 7 steps by front panel dimmer key
- Cabinet Dimensions: 366(W)×275(H)×110(D) mm, less mounting bracket
5.2 kg (cabinet) + 1.4 kg (mounting bracket)
- Power Requirements: 110 – 220 VAC (±10%), single phase or 11 – 40 VDC.
Power consumption: approx. 25W (DC) or 30VA (AC)
- Ambient Temperature: –15 to +55° C, 95% RH (operating, without condensation)
–40° C (storage)
- Compass Safe Distance: 1.8 meters for cabinet, 2.4 meters for mounting bracket
^{*1}Optional GPS sensor or external GPS data source required.
^{*2}Optional temperature sensors required.

2.2. Echo Sounder Specifications

- Modes of Operation:
 - **AUTO**^{*3} (default): Fully automatic selection and settings (depth range, gain, TVG and power settings)
 - **MANUAL**: Manual selection and settings of above parameters
- Depth Ranges (Maximum Range Limits, in meters):

	A	B	C	D	E	F	G	H
• Meters (m, default):	5	10	20	40	100	200	400	1000
• Fathoms (FM):	2.5	5	10	20	50	100	200	500
• Feet (FT):	20	40	100	200	400	1000	2000	4000
- Transducer Draft: Adjustable in 0.1–meter steps for each transducer.
- Keel Offset: Adjustable in 0.1–meter steps for each transducer.
^{*3}Function available with M202AGC–B AGC board installed

2.2. Specifications (continued – 2/4)

- Transducer Frequencies:
 - Standard: Dual frequency transducer (50 kHz & 200 kHz, **Radarsonics 570-50/200T**)
 - Option: 50 kHz (for **Radarsonics 570-50** transducer)
- Transmit Power: Approx. 1000W RMS max.(8 kW peak/peak) to **570-50/200** dual frequency transducer or **570-50** 50 kHz transducer
Level is adjustable in 4 steps automatically or manually.
 - AUTO (default): Appropriate power level for range in use
 - Manual: 1/1 (full power), 1/4, 1/25, and 1/100
- Transmit Pulse Lengths (approx., in milliseconds):

	A	B	C	D	E	F	G	H
• Meters (m) :	0.1	0.1	0.2	0.6	1.2	1.2	2.2	2.2
• Fathoms (FM):	0.1	0.1	0.2	0.6	1.2	2.2	2.2	2.2
• Feet (FT):	0.1	0.2	0.3	0.6	1.2	1.2	2.2	2.2
- Sounding Rates (per minute):

	A	B	C	D	E	F	G	H
• Meters (m):	120	120	120	120	60	30	30	30
• Fathoms (FM):	120	120	120	120	120	60	30	30
• Feet (FT):	120	120	120	120	60	30	30	30
- Velocity Standard: 1500.0 meters/second, fixed
- Minimum Detectable Depth: 1 meter or less (50 & 100 kHz), 50 cm (200 kHz)
- Accuracy of Measurement:
 - 20 meter range: Better than ± 0.5 meters
 - 200 meter range: Better than ± 5 meters
 - Other ranges: Better than $\pm 2.5\%$ of digital depth readout.
- Range Discrimination:
 - 20 meter range: Approx. 6.5 mm/m
 - 200 meter range: Approx. 0.65 mm/m
- Echogram Presentation: The bottom echo is initially displayed in red only. It can be displayed in up to 7 analog RGB colors through the menu system, depending on strength, with red representing the strongest echo level and blue, the weakest level (default settings). Color-strength assignments can be user-defined.
- Display Duration: Echogram of current sounding remains on screen for approx. 20-21 minutes, depending on depth range in use.
- Echo Dynamic Range: Change in echo indication to next stronger/weaker color normally represents a 3-dB change in strength. Other dynamic range options include 4, 5 and 6 dB.

2.2. Specifications (continued – 3/4)





- **Display Modes:** The following display modes are selectable:
 - Dual frequency (channel) split screen display (default)
 - Single frequency (channel) full screen display
 - Single frequency split screen display with left half screen showing bottom echogram recalled from memory.

- **Feed Rates (Plot Speed):** 1/2 (default), 1/1 (fast) and 1/4 (slow). The sounding rate for the depth range in use remains unchanged regardless of the feed rate selected.

- **Noise Reduction:** 3 steps (low, mid and high) and off (default)

- **Receiver Gain:** *1 Automatically adjusted for depth range in use; manually adjustable for each operating channel/frequency

- **TVG (STC):** *1 Automatically adjusted for depth range in use; manually adjustable for each operating channel/frequency

- **Audible and Visual Alarms:**
 The following alarms are enabled at all times with the equipment switched on:
 - **Depth:** Warns against decreasing depth, with alarm triggering depth user-presetable in 0.1-meter steps. Local alarm # 001
 - **Audible:** Beeps at approximately 1-second intervals. The sound can be muted by pressing  or with an appropriate software command entered via **RS-422/RS-232C** ports.
 - **Visual:** Blinks alarm symbol  and on-screen preset value on red background at approximately 1-second intervals.
 - **Bottom Missing:** Warns if bottom echo is lost or too weak to measure depth, or if depth exceeds the range limit, for 4 seconds or more. Local alarm # 002
 - **Audible:** Beeps at approximately 1-second intervals and lasts for 5 seconds. The sound can be muted with an appropriate software command entered via **RS-422/RS-232C** ports.
 - **Visual:** Blinks on-screen depth readout unit (**m**, **FM**, **BR** or **FT**) at approximately 1-second intervals.
 - **Lower Voltage:** Warns against dropping of power supply voltage below factory-specified level (11V) for DC-powered operation. Local alarm # 003
 - **Audible:** Beeps at approximately 1-second intervals. The sound can be muted by pressing  or with an appropriate software command entered via **RS-422/RS-232C** ports.
 - **Visual:** Blinks alarm symbol  and on-screen voltage readout on red background at approximately 1-second intervals.
 - **Power Removal/Shutoff:** Warns against removal or shutoff of power source for both AC and DC-powered operation. (Audible indication only, in the form of a beep occurring at approx. 1-second intervals for at least 5 minutes). The sound can be silenced by pressing rear panel "**POWER ALARM**" button (early s/n versions) or the alarm reset switch behind hinged front lid (later s/n versions).


*1 Automatic operation is available with AGC board installed.

2.2. Specifications (continued – 4/4)

■ External I/O Interface Specifications

- Online Data Outputs: IEC 61162-1/NMEA-0183-formatted data sentences (*1\$SDPT, \$SDBT, \$SDBK, *2\$PSKPDPT, *3\$SDMTW) via all rear panel interface connectors (**RS-232C**, **RS-422** and 8-pin **I/O DATA** connectors) simultaneously.

With an optional GPS sensor plugged in or an appropriate GPS data source connected, data sentences \$GPGGA, \$GPRMC and \$GPZDA can be selectively appended to the above output strings.

- Output Interval: 1 second
- Stored Data Outputs: IEC 61162-1/NMEA-0183-compatible proprietary format (*4\$PJMCN) via all rear panel interface connectors (**RS-232C**, **RS-422** and 8-pin **I/O DATA** connectors) simultaneously
- Data Inputs: IEC 61162-1/NMEA-0183 sentences (\$GPGGA, \$GPRMC, \$GPVTG, \$GPZDA) via above interface connectors
- Alarm Outputs:
 - Analog: Open-collector, 50V/800mA max., via **ALARM** connector
 - Digital: Alarm output sentence \$SDALR via **RS-422/RS-232C** connectors for each of depth alarm, bottom-missing alarm, and low-voltage alarm, complaint with IEC 61162-1 format
The output intervals are 30 seconds or 60 seconds depending on whether the alarm is active or inactive.
- Acknowledgement: Manually by pressing  or remotely by entering NMEA-0183/IEC 61162-1 \$ _ _ACK command via **RS-422/RS-232C** connectors for each of active alarms
- Printer Output: Centronics parallel, via “**PRINTER**” port for monochrome DOS/V printers with ESC/P control protocol

- Temperature Sensor: **T-200** thermistor (option, 5 k Ω /25°C) via **TEMP** connector
With the sensor connected, water temperature data will be appended to IEC 61162-1/NMEA-0183 format output strings. The **570-50T** has a **T-200** sensor embedded in its housing.

*1 Depth data will be output in meters only regardless of the depth readout unit in use.

*2 This proprietary format sentence is for use with the **SKIPPER IR 301** digital depth repeater.

*3 Temperature data is available when the **T-200** thermistor is plugged into the **TEMP** connector. or when the **570-50T** transducer (**T-200** sensor embedded) is connected.

*4 Depth data will be output in meters only regardless of the depth readout unit used in soundings.

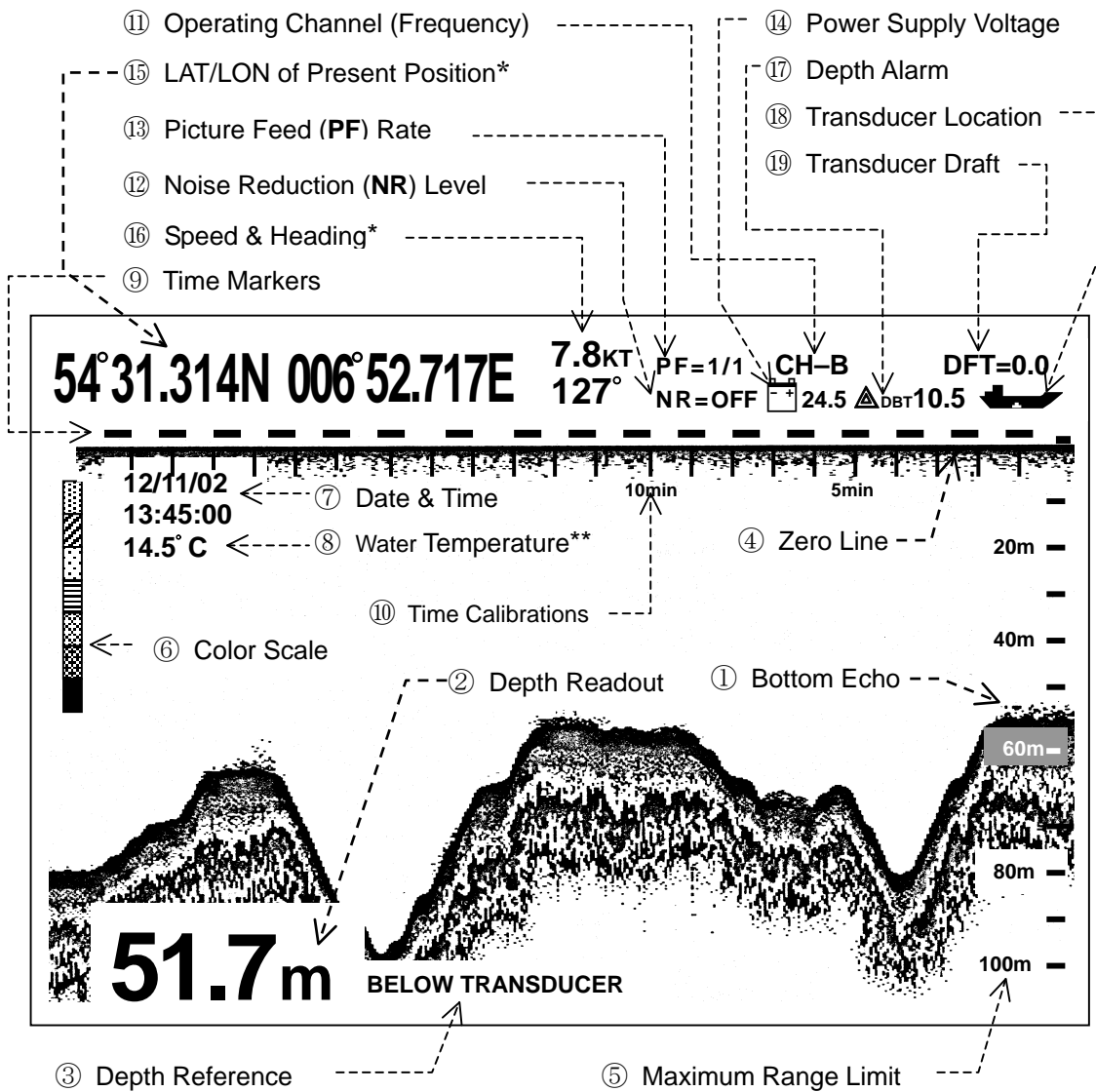
NOTE: Specifications other than those stipulated in IMO resolution MSC.74(69) Annex 4, IEC 60945, IEC 61162-1, IEC 62288 or in EN ISO 9875 are subject to change without notice or obligation.

3. Basic Operating Instructions

3.1. Interpreting Navigation Sounder Screen

The figure below illustrates a typical operating display showing the bottom topography using a low frequency transducer. A brief description of on-screen readouts and objects is given below.

Figure 3-1 Typical Full Screen Echogram Display



* Optional GPS sensor required. ** Optional temperature sensor required.

① Bottom Echo

The bottom echo stratum is shown in up to a total of seven different colors, depending on the strength. The colors that are used to display the bottom are shown on the color scale (⑥) in order of strength. Red, which is initially at the lower end of the scale, represents the strongest part of the echo (e.g. hardest layer of bottom stratum), and blue, initially at the upper end of the scale, represents the weakest part (e.g. softest layer of the bottom).

3.1. Interpreting Navigation Sounder Screen (continued – 2/6)

② Depth Readout

The depth to the bottom from the transducer is indicated here.

Readout Unit: **m**=meters (default), **FM**=fathoms, **BR**=braccia, **FT**=feet

Refer to paragraph 4.10.3 for details.

* To comply with IMO resolution MSC. 74(69), depth measurements must be made in meters.

To obtain a continuous, stable indication, the bottom echo (①) must be displayed in red, orange or yellow (or three user-defined strongest echo colors). The appropriate gain control should be adjusted accordingly. The TVG control may also have to be adjusted to prevent surface clutters from disturbing digital depth reading operation.

If the bottom echo is lost or too weak to measure depth for 4 seconds or more, or if the current depth exceeds the limit of the range in use for 4 seconds or more, the bottom-missing alarm will be triggered, blinking the current readout unit on a red background with digital readout turned off, and emitting a beep at approx. 1-second intervals. Increase the receiver gain or select a greater range to rectify this situation. See paragraph 3.12.5 for more details about the alarm function.

③ Depth Reference

The reference to which measured depth is to be referred is indicated here.

- **BELOW TRANSDUCER**: Depth referred to transducer (initial setting), **DBT**
- **BELOW SURFACE**: Depth referred to surface (waterline), **DBS**
- **BELOW KEEL**: Depth referred to ship's keel, **DBK**

See paragraph 4.3 for details.



④ Zero Line


This red, thick line is caused by a portion of transmitting energy leaking into the receiver, and its upper edge represents the on-screen position of the transducer face. When the transducer draft (⑱, depth from waterline to transducer) is entered, the zero line shifts toward the bottom by the amount of the draft. See paragraph 4.2 for greater details on draft entry. When the depth reference is set to "**BELOW KEEL**" with the correct keel offset (distance from transducer to keel) entered, the zero line shifts above scale line 0 by the amount corresponding to the offset, and its display is suppressed intentionally. See paragraph 4.10.8.3 for details.

Numerous small echoes just below the zero line are reflections from plankton concentrations, air bubbles and other tiny objects near the waterline.

The presence of the zero line in the strongest color*, except in the case of depth-below-keel (**DBK**) reference setting, indicates that both the transmitter and the receiver are working consistently. *See paragraphs 3.4.1 and 4.10.2.

⑤ Maximum Range Limit

The lower limit of the selected depth range is indicated here. The range can be changed by pressing  (greater ranges) or  (smaller ranges).

When the automatic bottom tracking function is activated (by pressing ) , the maximum range limit will change automatically so that the bottom echo is always displayed in the screen's lower half area. See paragraph 3.3.2 for details.

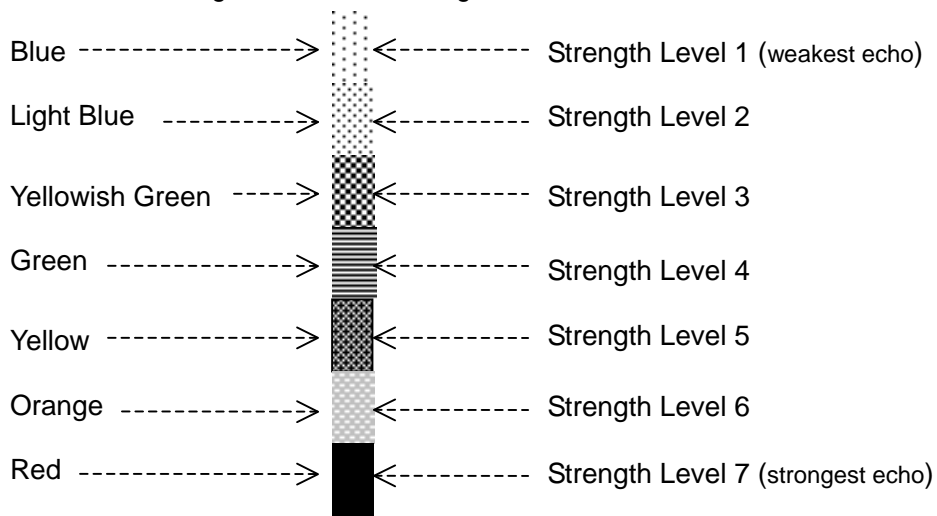
3.1. Interpreting Navigation Sounder Screen (*continued – 3/6*)

⑥ Color Scale

The colors used to display various echo strength levels are listed here in order of relative strength. The color that represents the strongest level is initially red, and the one that represents the weakest level is initially blue. The intervening colors simulate various mid strength levels. See paragraph 4.10.2 for related information.

An echo must be initially 5 decibels (dB) stronger or weaker than the adjacent strength level before it can be displayed in next stronger or weaker color. See paragraph 4.10.4 for greater details.

Figure 3-2 Initial Assignments of Echo Colors



⑦ Date and Time

Date is shown in MM/DD/YY (month/day/year) format. Time is in 24-hour HH:MM:SS (hours: minutes: seconds) format, and UTC unless a local time offset is entered. See paragraphs 4.10.5 and 4.10.6 for date/time preset instructions. With a GPS sensor plugged in, the time is synchronized with the GPS time.

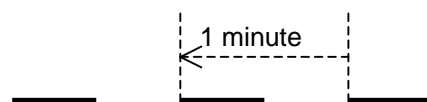
⑧ Water Temperature Indication

The water temperature is indicated here when an optional temperature sensor is plugged into the rear panel connector “TEMP.” See paragraph 4.10.7 for details.

Figure 3-3 Time Marker Interval – Example

⑨ Time Markers

Each marker shows up at one-minute intervals on any depth range, as in the example below. By counting the number of markers across a particular horizontal section, you can check how many minutes have elapsed while traveling across that section.



3.1. Interpreting Navigation Sounder Screen (continued – 4/6)

⑩ Time Calibrations

The screen is horizontally calibrated in time related to the echogram feed rate (PF rate, ⑬) in use, as follows:


- 1–minute intervals at **PF=1/1**
- 2–minute intervals at **PF=1/2**
- 10–minute intervals at **PF=1/4**
- 20–minute intervals at **PF=1/8**
- 40–minute intervals at **PF=1/16**

From the on–screen calibrations, you can estimate at a glance the time duration between two specific points on the current echogram.

< CAUTION >

The time interval between adjacent calibrations will change as you select feed rates. Therefore, if you switch to a different feed rate, the new calibrations will no longer apply to the current echogram.

⑪ Operating Channel (Transducer Frequency)


The operating channel (i.e. frequency of the transducer in use) for current depth measurement is indicated here. The channel can be switched by pressing . See paragraph 3.7 for more details.

- **CH–A:** Channel A
- **CH–B:** Channel B

< CAUTION >

To comply with the type–approval regulations, the equipment must be operated on the channel to which either the 50 kHz or 100 kHz transducer is assigned.


⑫ Noise Reduction (NR) Level

Echo sounders operating nearby or other onboard electronics can become a source of interference. Noise reduction (**NR**) is the action of preventing such interfering signals from cluttering the operating screen. The following NR levels can be selected by repeatedly pressing  :

- **NR=LOW:** Sets NR function at low reduction level.
- **NR=MID:** Sets NR function at medium reduction level.
- **NR=HIGH:** Sets NR function at high reduction level.
- **NR=OFF:** Disables NR function. (initial setting)

3.1. Interpreting Navigation Sounder Screen (continued – 5/6)

⑬ Picture Feed (PF) Rate

Echo picture (echogram) feeds automatically to the left at a rate with passage of time. The feed rate affects the duration of echo display across the screen, and can be changed in the following steps by pressing  :

- **PF=1/1**: Feeds once every sounding. (fastest feed rate – initial setting)
- **PF=1/2**: Feeds once every two soundings.
- **PF=1/4**: Feeds once every four soundings.
- **PF=1/8**: Feeds once every eight soundings.
- **PF=1/16**: Feeds once every 16 soundings. (slowest feed rate)
- **PF=STOP**: Freezes picture feed.

The rate of sounding for the range in use is not affected by feed rate selection.

The on–screen time calibration intervals change with the feed rate in use. See ⑩ for details.

⑭ Power Supply Voltage


The power supply voltage is indicated here while the equipment is operating from a DC power source (11 to 40V). When the equipment is powered by an AC power source, the indication changes to “**AC**” without a voltage value.

In a system where both DC and AC power sources are connected to the equipment at the same time, the AC power is automatically selected for echo sounder operation. In the event of AC power outage, the equipment will automatically switch to the DC power supply.

If, for any reason, the voltage drops below 11V during DC–powered operation, a power failure alarm will be activated, audibly and visually warning you of the trouble. See paragraph 3.12.6 for greater details.

Figure 3-4 Visual On–Screen Indication of Power Failure Alarm – Example



In the event that power is removed or shut off while the equipment is working from either AC or DC power source, an audible alarm will sound for several minutes. To silence this alarm, press either the button* marked **POWER ALARM** placed behind the hinged front lid or the rear panel button marked “**POWER ALARM**  .” See paragraph 3.12.7 for more details.

* This button, accessible by opening the hinged front lid, is installed in later serial number models.

⑮ LAT/LON of Present Position


When an optional GPS sensor is plugged into the rear panel “**I/O DATA**” connector or when a position data signal from other GPS receiver is fed to that connector, the equipment will display the latitude/longitude coordinates of your present position here and stores LAT/LON data in memory along with digital depth reading.

3.1. Interpreting Navigation Sounder Screen (continued – 6/6)

⑩ Speed and Heading





When an optional GPS sensor is plugged into the rear panel “I/O DATA” connector or when an appropriate data signal from other GPS receiver is fed to that connector, the equipment will display GPS-derived speed-over-the-ground (SOG) and heading (course-over-the-ground or COG) here.

⑪ Depth Alarm

The alarm depth is indicated here. The abbreviation to the right of the  symbol indicates the reference used in setting the alarm depth. See paragraph 4.3 for more information on the reference.

- **DBT**: depth below transducer (initial setting)
- **DBS**: depth below surface
- **DBK**: depth below keel

As soon as the current depth decreases beyond that value, the depth alarm will be triggered. The alarm depth can be set via the following steps. See paragraph 3.12.4 for greater details.

- (1) Turn on the Variable Range Marker (VRM) by pressing  .
- (2) Repeatedly press  /  to place VRM at the desired alarm depth.
- (3) Press  .

⑫ Transducer Location

The relative location of the transducer currently in use is graphically indicated here. See paragraph 4.10.8.2 for greater details.

Figure 3-5 Relative Location of Transducer in Use



⑬ Transducer Draft (or Keel Offset)

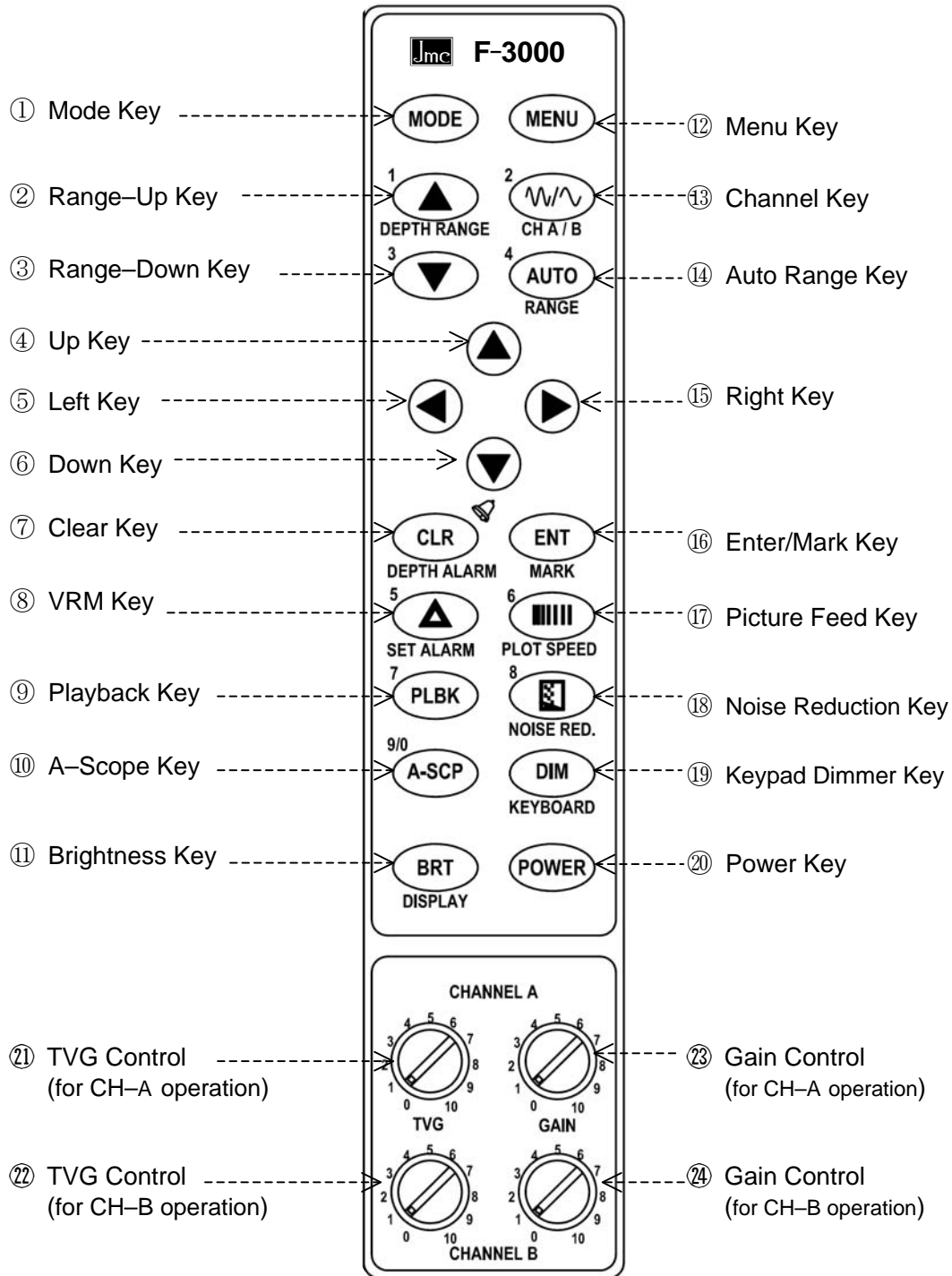
When the depth reference is set to “**BELOW SURFACE**” with the appropriate transducer draft entered, its value (depth from waterline to transducer) is displayed here in the form of “**DFT=X.X.**” See paragraphs 4.2 and 4.3 for more information.

When the depth reference is set to “**BELOW KEEL**” with the appropriate keel offset entered, the keel offset value is indicated here in the form of “**KL=X.X.**” See paragraphs 4.3 and 4.10.8.3 for more information.

3.2. Control Panel Functions

The figure below shows the control panel of the equipment. A summary description of the functions the keys and controls provide is given on the following pages.

Figure 3-6 Control Panel



3.2. Control Panel Functions (continued – 2/13)

① Mode Key

- On normal echogram screen with no menu opened

This key selects the following two display modes:


- Full screen mode

The entire screen area is used to display echoes received from operation on either channel A or channel B.


- Split screen mode

The screen is split into right and left half pages, with the right half showing current sounding while the left half showing echogram being recalled from memory.

NOTES:

- (1) Before echogram can be recalled from memory, you must store the current right half into memory by pressing . See paragraph 3.6 for more information.
- (2) When the screen is split to show channel A and channel B echograms across the right and left half pages, pressing this key returns the full screen page.

- On Menus

When a number of menus are being displayed, pressing this key closes all of them at a time, returning you to the normal echogram screen (i.e. performs the same function as ).

NOTE: Turning the equipment on while holding down this key for a few seconds opens a **SYSTEM MENU**. See section 5 for details.

② Range-Up Key

- On normal echogram screen with no menu opened

Selection of Depth Ranges

Pressing the key during normal sounder operation selects smaller depth ranges. For example, if the current depth range is 100 meters (0 to 100m), pressing the key once selects the 40 meter range (0 to 40m).

- On Menus

Entry of Numeric Data

When a menu is being opened for numeric data entry, pressing the key enters numeric value 1.

③ Range-Down Key

- On normal echogram screen with no menu opened

Selection of Depth Ranges

Pressing the key during normal sounder operation selects greater depth ranges. For example, if the current depth range is 100 meters (0 to 100m), pressing the key once selects the 200 meter range (0 to 200m).

- On Menus

Entry of Numeric Data

When a menu is being opened for numeric data entry, pressing the key enters numeric value 3.


3.2. Control Panel Functions (continued – 3/13)

④ Up Key

This key performs the following functions:


- On normal echogram screen with no menu opened

Moving Variable Range Marker (VRM)

When the VRM is turned on (by pressing ) , pressing the key moves it upward (toward shallowing direction).

- On Menus

- Selection of Menu Options

When a menu with two or more options is being opened, pressing the key selects those options downward. To complete the selection, press .

- Setting Echo Threshold Level

Repeated keypress selects 4 levels of weak echo suppression starting with the strongest level.

- Setting White Line Level


Repeated keypress selects 5 levels of bottom echo suppression starting with the weakest level.

- Entry of Transducer Draft or Keel Offset

Repeated keypress reduces the entered value in 0.1 unit steps.


- When data history window is opened

Selection of Retrieval Time Periods


When the data history window (**PLAYBACK**) is being opened (with ) , pressing this key selects shorter retrieval time periods (24 hours → 12 hours → 6 hours → 3 hours → 1 hour → 15 minutes). See para. 3.11 for details.

⑤ Left Key

- On Menus

This key is used to select a total of 10 different colors for each echo strength level on the **ECHO COLORS** submenu (via **MAIN MENU** → **INSTALLATION SETTINGS**) in the upward direction on the color sample strip while making settings via the menu system. Pressing  (**15**) returns to the previous color.

- When data history window is opened

When the data history window (**PLAYBACK**) is being opened (with ) , pressing this key moves the vertical line cursor to the left on the time passage scale, showing the depth registered at the date and time (and the LAT/LON coordinates* and water temperature**) shown just below the scale.




* LAT/LON information is available with an optional GPS sensor plugged into the rear-panel **I/O DATA** connector.

** Water temperature readout is available when the specified dual frequency transducer is used or when an optional T-200 temperature sensor is plugged in to the rear-panel **TEMP** connector.


3.2. Control Panel Functions (continued – 4/13)

⑥ Down Key

This key performs the following functions:

- On normal echogram screen with no menu opened
Moving Variable Range Marker (VRM)
When the VRM is turned on (by pressing ), pressing the key moves it downward (toward deepening direction).
- On Menus
 - Selection of Menu Options
When a menu with two or more options is being opened, pressing the key selects those options upward. To complete the selection, press .
 - Setting Echo Threshold Level
Repeated keypress selects 4 levels of weak echo suppression starting with the weakest level.
 - Setting White Line Level
Repeated keypress selects 5 levels of bottom echo suppression starting with the weakest level.
 - Entry of Transducer Draft or Keel Offset
Repeated keypress increases the entered value in 0.1 unit steps.
- When data history window is opened
Selection of Retrieval Time Periods
When the data history window (**PLAYBACK**) is being opened (with ) , pressing this key selects longer retrieval time periods (15 minutes → 1 hour → 3 hours → 6 hours → 12 hours → 24 hours). See para. 3.11 for details.

⑦ Clear Key

- On normal echogram screen with no menu opened
When an audible alarm is triggered (due to decreasing depth, missing bottom or decreasing power supply voltage), pressing this key silences the sound, while allowing a visual alarm indication to remain on screen.
- On menus
When a number of menus are being displayed, pressing this key closes all menus and returns you to the normal echogram screen. Be sure to press  to complete any setting before pressing this key.
- When the data history window is open
Pressing this key closes the window.

NOTE: Turning the equipment on while holding down this key resets the system, returning all user-made settings to the factory's defaults (initial settings), while retaining the sounding, date/time data etc. stored in the non-volatile memory.

3.2. Control Panel Functions (continued – 5/13)



⑧ VRM Key 

This key performs the following functions:

- On normal echogram screen with no menu opened

Turning on/off Variable Range Marker (VRM)

Pressing the key once turns on the VRM, a horizontal dotted line with depth indication to the right of its center, as in the example below. The appearance of “VRM” to the right of the frequency indication indicates that it is turned on. A second keypress turns it off.

The VRM is used to set the depth for the depth alarm, and can be shifted upward/downward by pressing  /  .


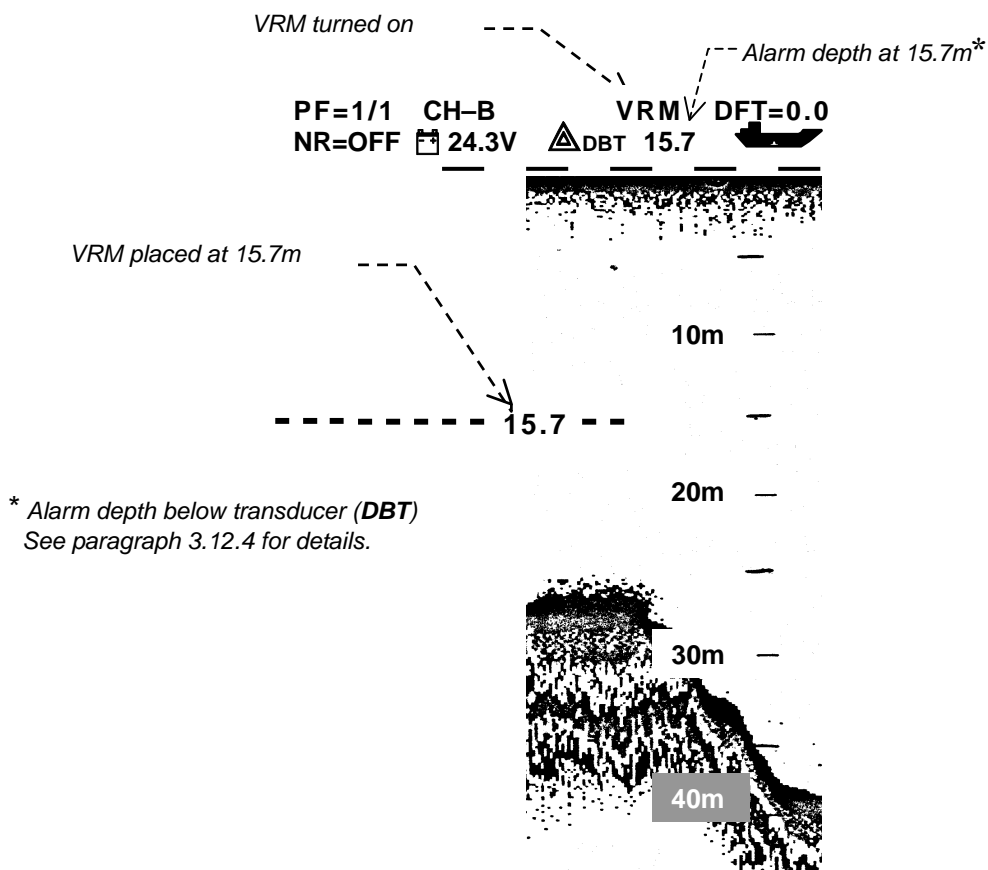
Pressing  sets the alarm depth at the VRM position. See Figure 3–7 below for an example.

Figure 3-7 Variable Range Marker – Example



- On menus

Entry of Numeric Data

When a menu is being opened for numeric data entry, pressing the key enters numeric value 5.



3.2. Control Panel Functions (continued – 6/13)

⑨ Playback Key 

This key performs the following functions:

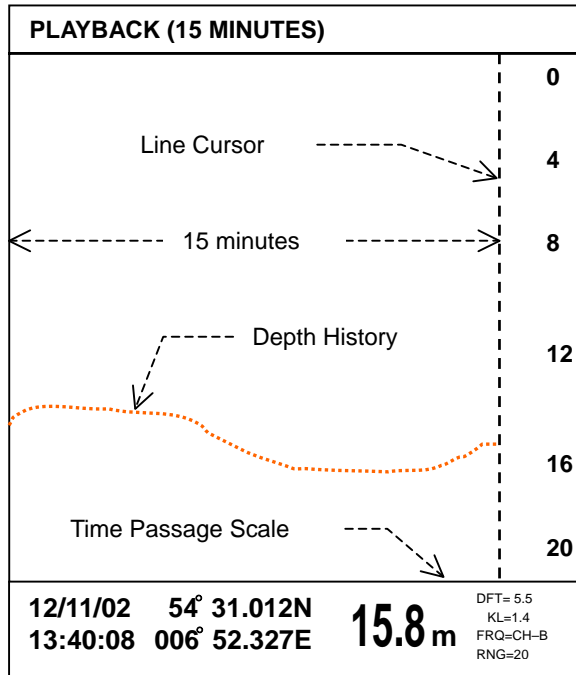
- On normal echogram screen with no menu opened

Pressing this key opens a data history (**PLAYBACK**) window in the left half screen, as in the example at right, in which the history of depth soundings over the past 15 minutes is shown graphically.



The various data at the line cursor position are shown in the bottom section of the window. The line cursor can be moved by pressing  / .

Date, time, LAT/LON coordinates*, depth, draft, keel offset, maximum range, frequency at Line Cursor position

Figure 3-8 Data History Window – Example



* Optional GPS sensor required.

The time span, 15 minutes in the above example, can be changed by pressing  / . The following values are selectable: 15 minutes, 1 hour, 3 hours, 6 hours, 12 hours, and 24 hours.

Refer to paragraph 3.11 for greater details.

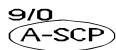
To close the window, press  or  again.

- On menus

Entry of Numeric Data

When a menu is being opened for numeric data entry, pressing the key enters numeric value 7.

3.2. Control Panel Functions (continued – 7/13)

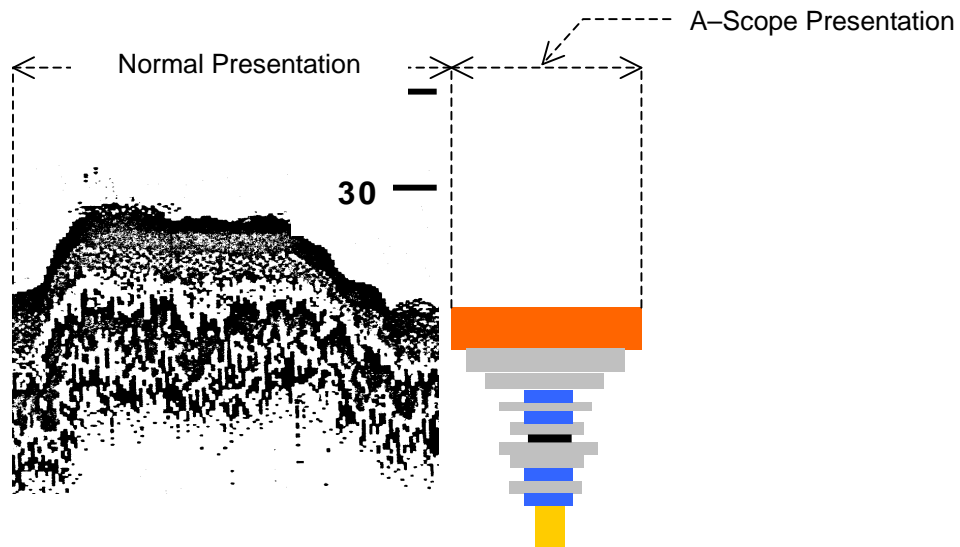
⑩ A-Scope Key 

This key performs the following functions:

- On normal echogram screen with no menu opened

Pressing this key activates an A-scope display across a small section from the screen right edge as shown in the example below. A second keypress turns it off.


Figure 3-9 A-Scope Function – Example



The A-scope display presents various echo strength levels in the form of horizontal deflections in addition to colors. The larger the deflection, the stronger the echo. The function helps estimate instantly an approximate size of an object 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 when operating on deep ranges or at slow picture feed (PF) rates. See paragraph 3.4.4 for more details.

- On menus

Entry of Numeric Data

When a menu is being opened for numeric data entry, pressing the key enters numeric value 9 or 0. A first press displays 9, and a second press, 0. To complete entry, press  just after the desired value is shown.

⑪ Brightness Key 

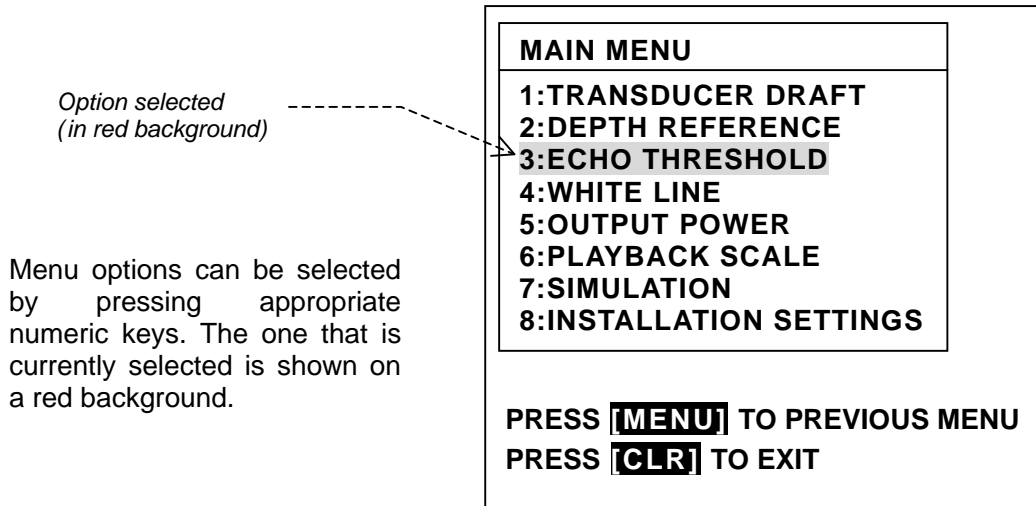
Pressing this key adjusts the screen brightness level in a total of 6 steps to suit the ambient lighting condition.

3.2. Control Panel Functions (continued – 8/13)

⑫ Menu Key

A first pressing of this key activates the menu system, opening a main menu (**MAIN MENU**), as illustrated below. A second keypress turns it off. The menu system allows you to make various settings that suit your operational requirements. Detailed instructions are given in section 4.


Figure 3-10 Main Menu



- **1:TRANSDUCER DRAFT:** Enters transducer draft for channels A and B.
- **2:DEPTH REFERENCE:** Selects references to which measured depth is to be referred (i.e., surface, transducer, or keel).
- **3:ECHO THRESHOLD:** Selects weak echo suppression levels.
- **4:WHITE LINE:** Selects bottom echo suppression levels.
- **5:OUTPUT POWER:** Selects power levels automatically or manually.
- **6:PLAYBACK SCALE:** Selects time scales when playing back stored data (soundings, date/time, channel, LAT/LON, etc.)
- **7:SIMULATION:** Turns on/off built-in echo sounder simulator.
- **8:INSTALLATION SETTINGS:** Opens a submenu with the following options:
 - **1:ECHO COLORS:** Assigns desired colors to echo strength levels.
 - **2:DEPTH UNIT:** Selects metric (**m**), fathom (**FM**), braccia (**BR**) or footage (**FT**) readout unit.
 - **3:DYNAMIC RANGE:** Selects echo dynamic ranges.
 - **4:UTC/LST (offset):** Selects UTC or local standard time (LST).
 - **5:CLOCK PRESET:** Presets built-in clock and calendar.
 - **6:TEMPERATURE:** Selects temperature readout units.
 - **7:TRANSDUCER SETTINGS:** Registers transducer location or keel offset.
 - **8:DATA INPUT PORT:** Selects input connectors to accept digital data input from external devices.

*NOTE: Turning the equipment on while holding down this key for a few seconds displays a **SYSTEM MENU** for selection of background colors or for execution of hardware checks. See section 5 for details.*

3.2. Control Panel Functions (continued – 9/13)

⑬ Channel Key 

This key performs the following functions:

- On normal echo sounder screen with no menu opened

Switching Operating Channels and Display Page

A first keypress after power-up activates dual channel operation, splitting the screen into right and left halves, and showing echogram from one channel across the right half page and echogram from the other channel across the left half page. A second keypress switches the display back to the full screen page with echogram from the other channel. A third keypress splits the screen again with channel A and channel B displays exchanged. Pressing the key one more time returns the first full-screen display. This sequence is illustrated in Figure 3-12.

NOTE: Pressing **MODE** returns the full-screen single channel display directly.

Figure 3-11 Operating Channel Indication – Example

< CAUTION >
Operation at 200 kHz is not type-approved; therefore, the channel to which the 200 kHz transducer is assigned must not be used for navigational purposes.

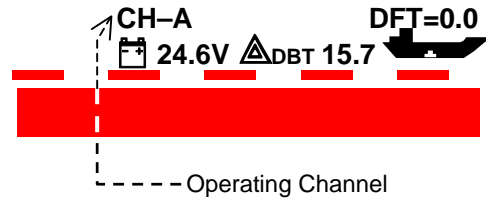
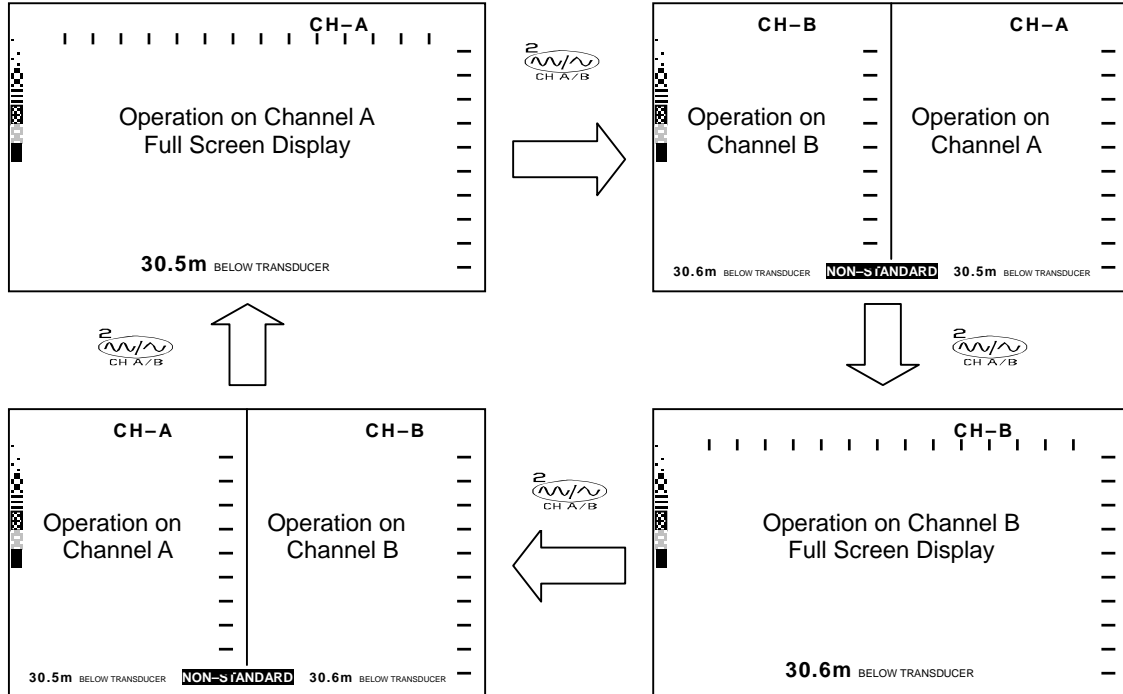


Figure 3-12 Switching Operating Channel and Dual Channel Display Format



- On Menu

Entry of Numeric Data

When a menu is being opened for numeric data entry, pressing the key enters numeric value 2.

3.2. Control Panel Functions (continued—10/13)

⑭ Auto Range Key

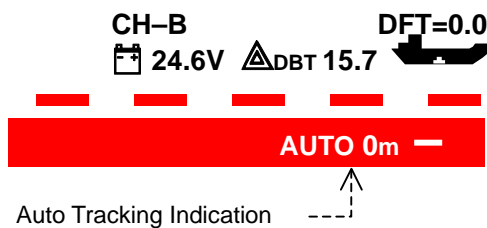
This key performs the following dual functions:

- On normal echo sounder screen with no menu opened

Turning on/off Automatic Bottom Tracking

Pressing the key once enables depth ranges to be automatically selected so that the bottom echo shows up in the lower half screen at all times, despite of changes in depth. See paragraph 3.3.2 for details.

Figure 3-13 Auto Tracking Indication – Example



NOTE: The bottom echo must be shown in red, orange or yellow (or one of the three strongest echo colors, if you have change the color assignments) by adjusting the appropriate gain control before this function can be utilized.


- On Menu

Entry of Numeric Data


When a menu is being opened for numeric data entry, pressing the key enters numeric value 4.

⑮ Right Key

- On Menu

This key is used to select a total of 10 different colors for each echo strength level on the **ECHO COLORS** submenu (via **MAIN MENU** → **INSTALLATION SETTINGS**) in the downward direction on the color sample strip while making settings via the menu system. Pressing  (⑤) returns to the previous color.

- When data history window is opened

When the data history window (**PLAYBACK**, Figure 3–7) is being opened (with ) , pressing this key moves the vertical line cursor to the right on the time passage scale, showing the depth registered at the date and time (and the LAT/LON coordinates* and water temperature**) shown just below the scale.

* LAT/LON information is available when an optional GPS sensor is plugged into, or external GPS data sentences are fed to, the **I/O DATA** connector.

** Water temperature readout is available when the specified dual frequency transducer is installed or when an optional temperature sensor is plugged in to the **TEMP** connector.


3.2. Control Panel Functions (continued – 11/13)

⑩ Enter Key 

This key performs the following functions:

- On normal echogram screen with no menu opened

Placing Line Marker & Initiating Storage of Current Graphic Screen

Pressing the key during normal sounding operation draws a red line marker vertically across the screen together with the current date/time and LAT/LON* stamping. At the same time, the right half of the current echogram is stored in memory. It can be recalled onto the left half screen by pressing  and can be output to a printer for a monochrome hard copy of the stored echogram via a **HARD COPY** menu that pops up when the key is pressed.

* An optional GPS sensor or external GPS data source is required.

- On Menus

Completing User-Made Settings or Selection of Menu Options

When you are making a setting or selecting menu options, pressing the key completes that setting or selection of that option.

⑪ Picture Feed Key 

This key performs the following functions:

- On normal echo sounder screen with no menu opened

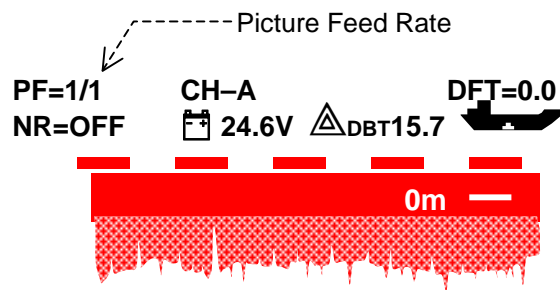
Selection of Echogram Feed Rates

Repeated pressing of the key selects the following echogram (picture) feed (PF) rates:

- **PF=1/1:** Feeds echogram once every transmission. (fastest rate)
- **PF=1/2:** Feeds echogram once every 2 transmissions.
- **PF=1/4:** Feeds echogram once every 4 transmissions.
- **PF=1/8:** Feeds echogram once every 8 transmissions.
- **PF=1/16:** Feeds echogram once every 16 transmissions. (slowest rate)
- **PF=STOP:** Freezes echogram feeding while sounding continues.

Figure 3-14 Picture Feed Rate Indication – Example

If you wish to monitor the current echogram for longer periods of time, select one of slower rates. The current sounding rate (i.e. depth readout updating intervals) remains unchanged regardless of the PF rate selected.




- On Menus

Entry of Numeric Data

When a menu is being opened for numeric data entry, pressing the key enters numeric value 6.

3.2. Control Panel Functions (continued – 12/13)

⑱ Noise Reduction Key 

This key performs the following functions:

- On normal echo sounder screen with no menu opened

Reduction of Noise Interference

Repeated pressing of the key activates the function of reducing the effect of noise interference coming from other onboard electronics or nearby echo sounders. The following levels of noise reduction (**NR**) are selectable:

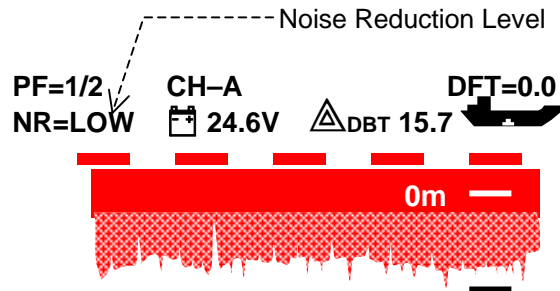
- **NR=LOW**: Selects low reduction level.
- **NR=MID**: Selects mid reduction level.
- **NR=HIGH**: Selects high reduction level.
- **NR=OFF**: Terminates the function (default).


Figure 3-15 Noise Reduction Level Indication – Example

- On Menu

Entry of Numeric Data

When a menu is being opened for numeric data entry, pressing the key enters numeric value 8.





⑲ Keypad Dimmer Key 

Repeated pressing of this key reduces the keypad backlighting level in steps. After the minimum level is reached, further keypress returns the maximum level.

⑳ Power Key 

This key turns on/off the equipment.

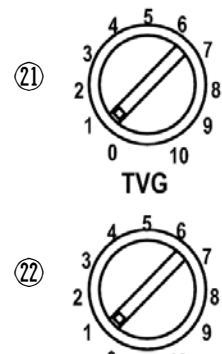
- To turn it on, lightly touch the key, release it, and then wait for a few seconds (until you hear a single beep).
- To turn it off, press and hold down the key for a few seconds (until you hear a series of beeps – two slow beeps followed by two quick beeps). This delayed action is intentional, preventing accidental shutoff.
- Turning it on while holding down  resets the equipment, returning all user-made settings to the factory's defaults.
- Turning it on while holding down  displays a **SYSTEM MENU**, from which you can select background colors or can perform memory checks..

3.2. Control Panel Functions (continued – 13/13)

Figure 3-16 TVG Controls

- ②① TVG Control (for operation on channel A)
- ②② TVG Control (for operation on channel B)

Controls ②① and ②② are time-varied gain (TVG) controls for high and low frequency operations, respectively. Each control is designed to reduce surface clutters (strong noise echoes near the waterline), thereby preventing them from disturbing digital depth reading or automatic bottom tracking without affecting the sensitivity necessary for bottom detection. This function is achieved by abruptly suppressing the receiver gain at the start of each transmission and gradually recovering it as transmitted energy travels deeper toward the bottom. At its fully counterclockwise (CCW) position, the TVG control provides a greatest level of initial gain suppression. When turned fully clockwise (CW), it produces no TVG effect.



If you experience difficulty with digital depth reading or automatic bottom tracking at normal gain settings, turn the appropriate TVG control in CCW direction to correct the problem. See paragraph 3.10 for additional information on TVG settings.

TVG effect becomes maximum at this position.
(see CAUTION below)

No TVG effect at this position.

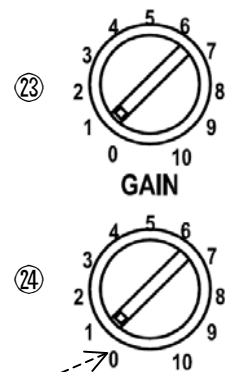
< CAUTION >

With the TVG control at its CCW position during shallow water operation, no bottom echo or extremely weak bottom echo may be received.

Figure 3-17 Gain Controls

- ②③ Gain Control (for operation on channel A)
- ②④ Gain Control (for operation on channel B)

Controls ②③ and ②④ are receiver gain controls for high and low frequency operations, respectively. Clockwise rotation increases the gain level, resulting in echoes showing in stronger colors (red, orange, yellow, etc.).



For stable digital depth reading or automatic bottom tracking operation, adjust the gain so that the bottom echo shows in red, orange or yellow (or one of the three strongest echo colors, if you have changed the color assignments).



Receiver gain is minimum at this position.



The TVG level (shallow gain suppression level) may also have to be increased (by turning the appropriate control, ②① or ②② in CCW direction) to prevent surface clutters from disturbing digital depth reading.

See paragraph 3.9 for additional information on gain settings.

3.3. Selecting Depth Ranges

3.3.1. Manual Selection

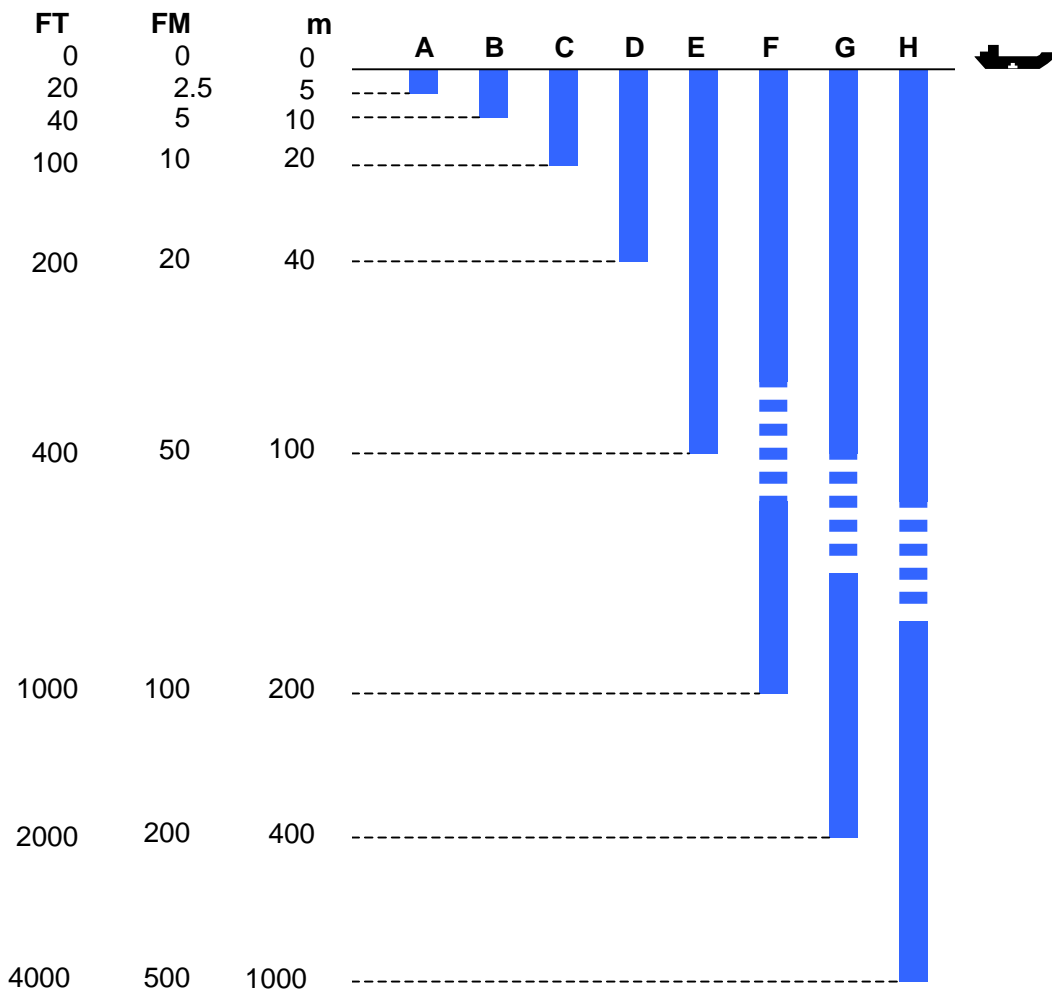
A total of eight depth ranges, illustrated in the figure below, can be selected by repeatedly pressing  / .

-  : Selects smaller ranges (in H-to-A direction).
-  : Selects larger ranges (in A-to-H direction).


All depth ranges start at scale line zero (0), unless a transducer draft* or a keel offset** is entered. No phased depth ranges are available. *Paragraph 4.2 **Paragraph 4.10.8.3.

Select depth ranges so that the bottom echo is displayed, preferably within the lower half part of the screen for ease of monitoring the changing depth graphically. If the depth exceeds the current range limit, a bottom-missing alarm will be triggered. See paragraph 3.12.5 for details.

Figure 3-18 Depth Range Arrangement



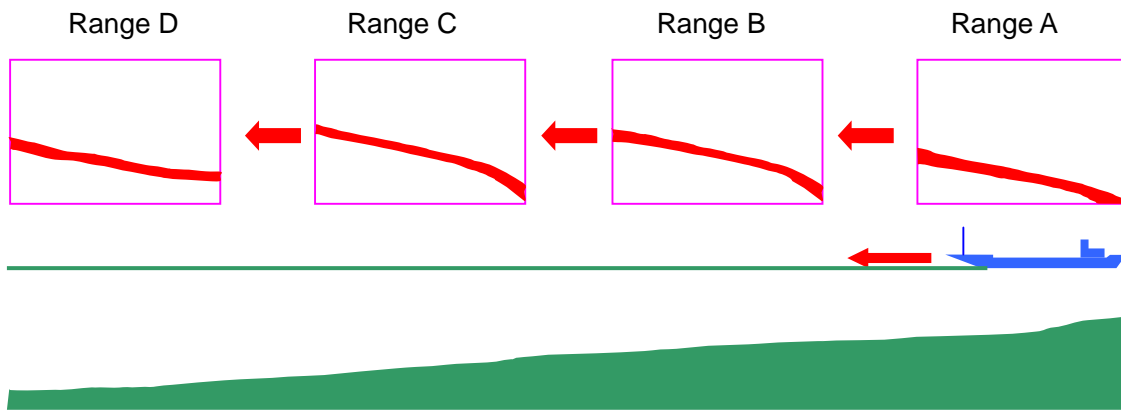
3.3.2. Automatic Selection

Pressing  will enable the equipment to select depth ranges automatically so that the bottom echo will always be displayed in the lower half screen area despite of changes in depth. The figure below illustrates an example of how depth range selection occurs with this function activated, as you travel over a gradually deepening bottom. As soon as the bottom shows up at the lower end of the scale lines on the current depth range, the next greater range will be automatically selected. When traveling over a gradually shallowing bottom, the range selection sequence is reversed. As soon as the bottom is registered in the upper half screen, the next smaller range will be switched in.

To take advantage of the function, you must adjust the appropriate gain control (for the currently active frequency) so that the upper part of the bottom echo is shown in red, orange or yellow (or in one of the three strongest echo colors if you changed the echo color assignment).

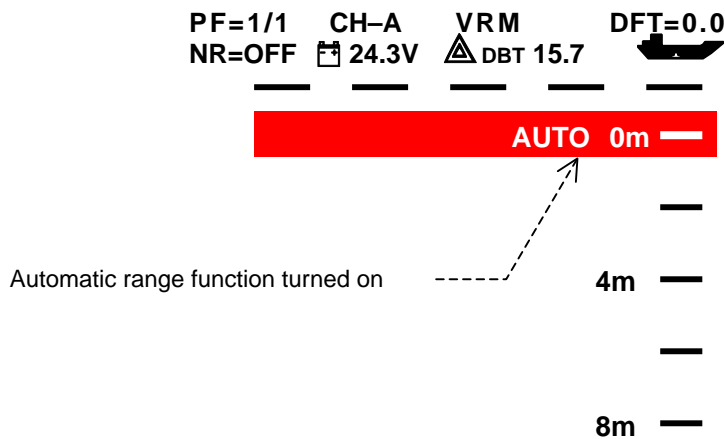
To terminate the function, press  again or press  / .

Figure 3-19 Automatic Depth Range Selection – Example



On-screen status indication “**AUTO**” will be turned on to the left of the top scale line to indicate that the function is currently activated, as in the example below.

Figure 3-20 On-Screen Indication of Automatic Ranging



3.4. Interpreting Echo Display

3.4.1. Bottom Echo Colors

The bottom echo will be displayed in up to seven different colors – initially, red, orange, yellow, green, yellowish green, light blue and blue, which represent the various layers of the bottom stratum in order of strength. Namely, red represents the strongest level, and blue, the weakest one. A colored bar (termed “color scale” in this manual) located at the left end of the screen indicates the colors that are currently assigned to display echoes, as in the figure below.

You can change those color assignments using a total of 10 different colors. See paragraph 4.10.2 for instructions.

Figure 3-21 Initial Assignments of Bottom Echo Colors

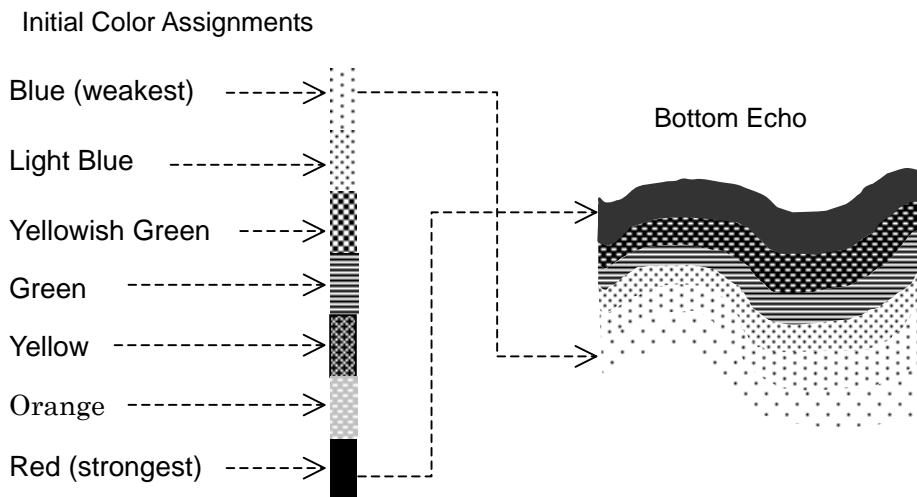
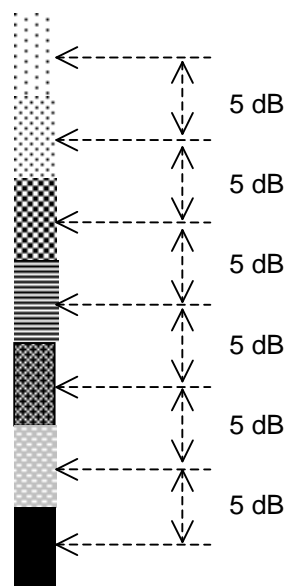


Figure 3-22 Initial Echo Dynamic Range

There is initially an approximately 5 dB difference in strength between two adjacent colors, as illustrated in the figure at right, meaning that a particular color is approx. 1.8 times stronger or weaker than either adjacent color. This difference, called the echo dynamic range, can be changed to suit various bottom conditions (hard, soft, muddy, etc.). See paragraph 4.10.4 for instructions.



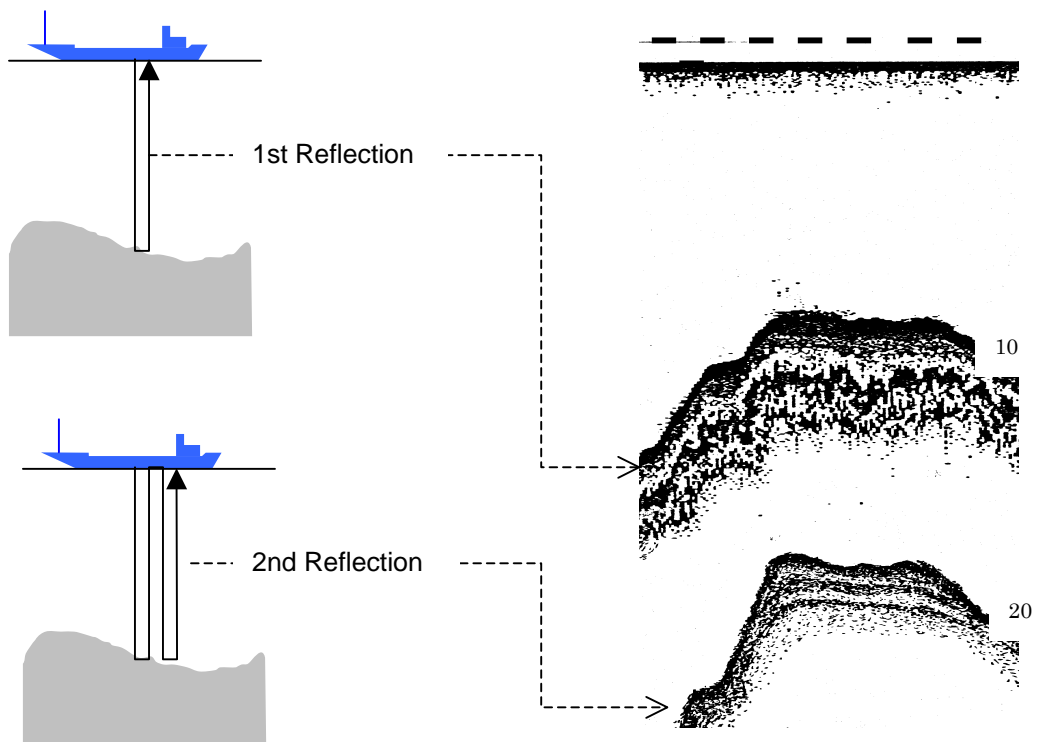
3.4.2. Multiple Bottom Echoes

When navigating a shallow water area, you may observe a bottom-like echo at twice the present depth, and sometimes also at three or four times the depth. This multiple echo phenomenon occurs when the first echo is reflected back and forth a number of times between the water surface and the bottom like reverberations.

In the case of the example below, a first reflection, which is used to register the depth, is bounced back to the bottom, and then back again to the transducer as a second reflection, thereby causing that echo to be recorded at twice the depth.

The appearance of multiple bottom echoes indicates that the bottom is relatively hard.

Figure 3-23 Multiple Bottom Echo Display – Example



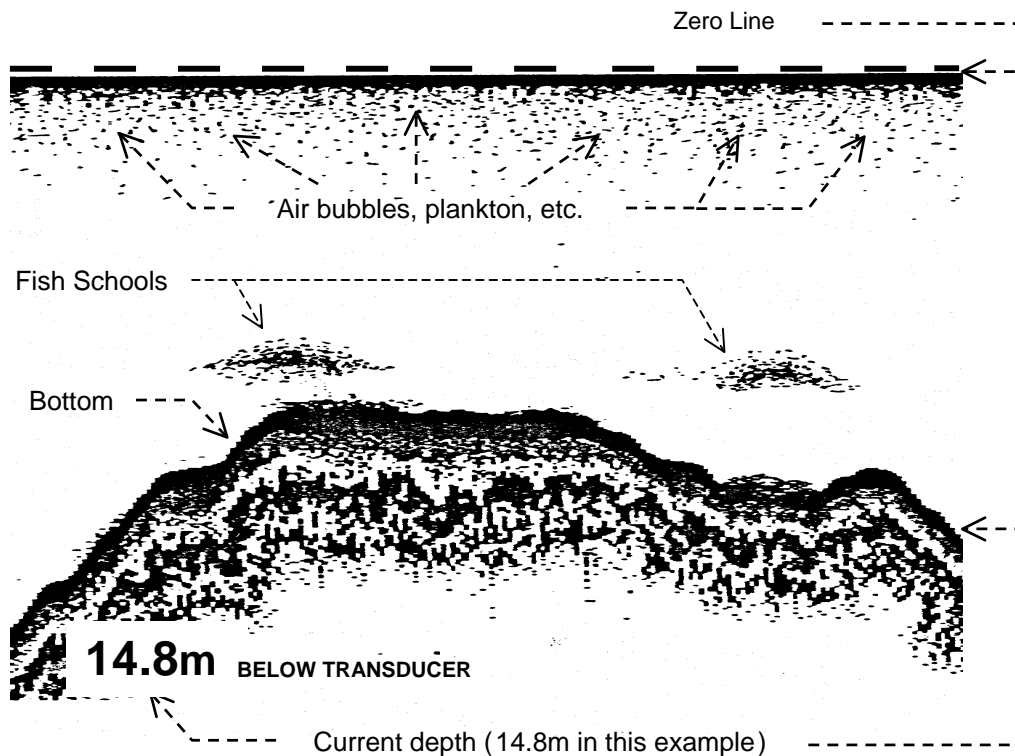
The effect of multiple reflections may be reduced by decreasing the receiver gain (through gain and/or TVG adjustment, paragraphs 3.9 and 3.10) or by reducing transmit power output (paragraph 4.6). To display the digital depth readout correctly or to utilize the automatic bottom tracking function (automatic depth range selection), however, the first echo must remain in red, orange or yellow (or in one of the three strongest colors if you change the echo color assignments). Occasionally a large school of fish or a temperature layer can also cause the equipment to lock onto it, thus producing an incorrect digital depth readout.

Whenever you have any doubt about the validity of digital depth reading, check the depth graphically against the on-screen scale calibrations to determine whether the current digital readout is valid or not. **A special caution should be exercised when using digital depth information while in shallow water operation because the second echo may be tracked for depth measurement, resulting in a digital readout twice the actual depth.**

3.4.3. Other Echoes

In addition to the bottom echo (and its multiple echoes), the equipment will show echoes from fish schools, temperature layers, and various tiny objects, like plankton concentrations and air bubbles. The figure below is an example of how such echoes show up on the screen. A thick line appearing in the strongest echo color at the upper edge of the echo display area is called a zero line, which is caused by a portion of transmitted ultrasonic power being leaked into the receiver. It represents the position on the screen of the transducer. When a transducer draft is entered (paragraph 4.2), the zero line shifts down from the top scale calibration mark (scale 0) by the amount of the draft. When a keel offset is entered (paragraph 4.10.8.3), the zero line occurs above scale 0, and its display is suppressed.

Figure 3-24 Typical Shallow Water Echo Display – Example



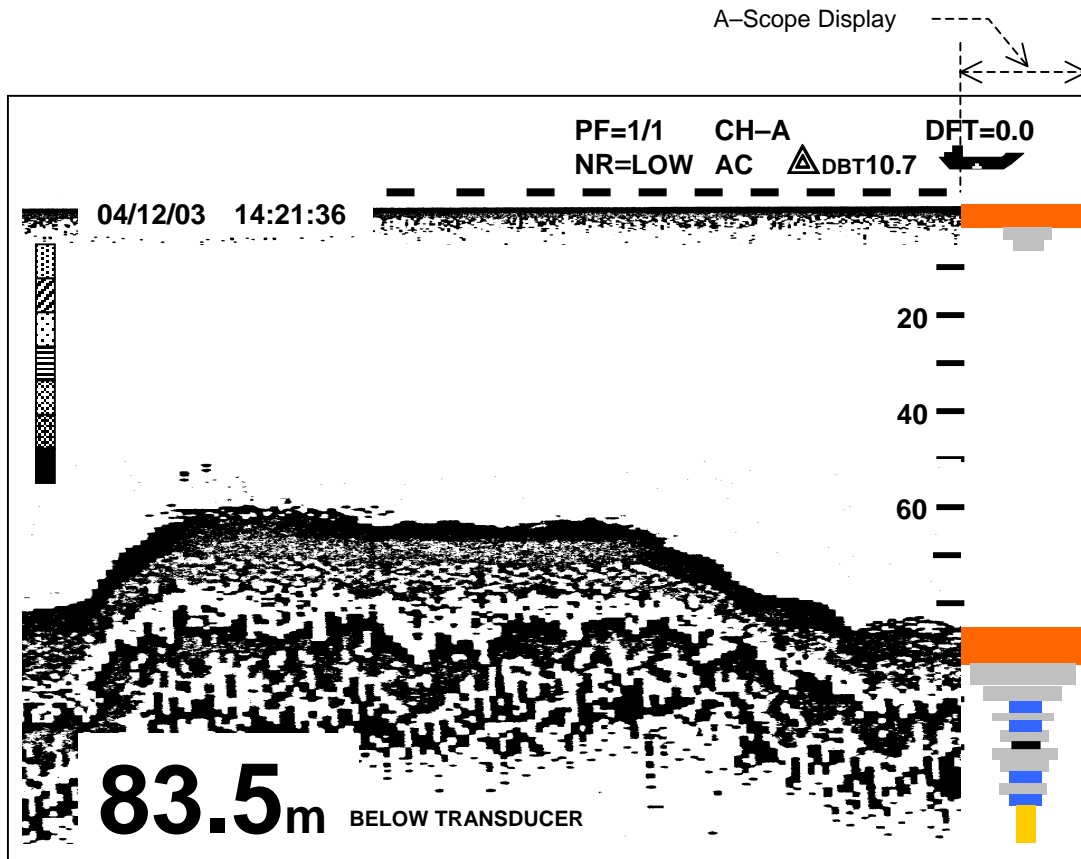
< WARNINGS >

1. A LARGE FISH SCHOOL, ESPECIALLY ONE LOCATED AT SHALLOW DEPTHS, CAN OCCASIONALLY PRODUCE AN EXTREMELY STRONG ECHO, CAUSING THE EQUIPMENT TO LOCK ONTO THAT ECHO AS THE BOTTOM ECHO. AN INCORRECT DIGITAL DEPTH READOUT WILL OCCUR AS A RESULT. IN SITUATIONS WHERE ACCURATE DEPTH INFORMATION IS OF VITAL IMPORTANCE, BE SURE TO CONFIRM THE READOUT BY COMPARING IT WITH THE ON-SCREEN BOTTOM ECHO LOCATION. TOTAL RELIANCE ON THE DIGITAL DISPLAY IS DANGEROUS AND MUST BE AVOIDED, ESPECIALLY WHEN TRAVELING IN SHALLOW WATER AREAS.
2. WHEN OPERATING IN SHALLOW WATER AREAS, THE EQUIPMENT MAY OCCASIONALLY LOCK ONTO THE SECOND BOTTOM ECHO, READING TWICE THE ACTUAL DEPTH. BE SURE TO COMPARE THE ON-SCREEN BOTTOM ECHO POSITION WITH THE DIGITAL DEPTH READOUT WHENEVER NAVIGATING SHALLOW WATER AREAS OR WHENEVER THE DIGITAL READOUT IS QUESTIONABLE. SEE PARAGRAPHS 3.4.2 AND 4.6 FOR RELATED INFORMATION.

3.4.4. A-Scope Presentation of Echoes

A-scope is a format of echo presentation, showing various echo strength levels in the form of horizontal deflections, as well as in colors. An example of A-scope display is given below. The size of deflection represents a relative strength level, i.e. the greater the deflection, the stronger the echo.

Figure 3-25 Typical Echo Sounder Screen with A-Scope Turned on – Example



To turn the A-scope display on, simply press $\frac{9/0}{A-SCP}$. To turn it off, press the key again.

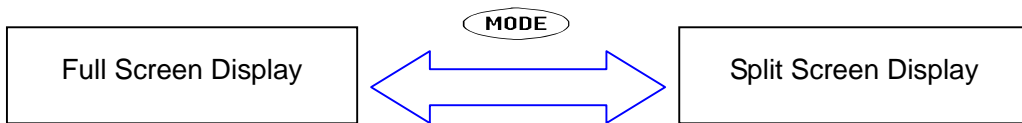
The A-scope display will help estimate instantly an approximate size of an object as soon as it is detected, thereby eliminating the need to wait for the whole block of echoes to become visible across the screen. You will find the function useful when operating on deep ranges or at slow echogram feed rates.

3.5. Selecting Display Modes

The following display modes are selectable by repeatedly pressing **MODE** as illustrated in the figure below.

- Full screen echogram display
- Split screen display* with right half area showing echogram of current sounding and left half showing graphic data** recalled from memory.

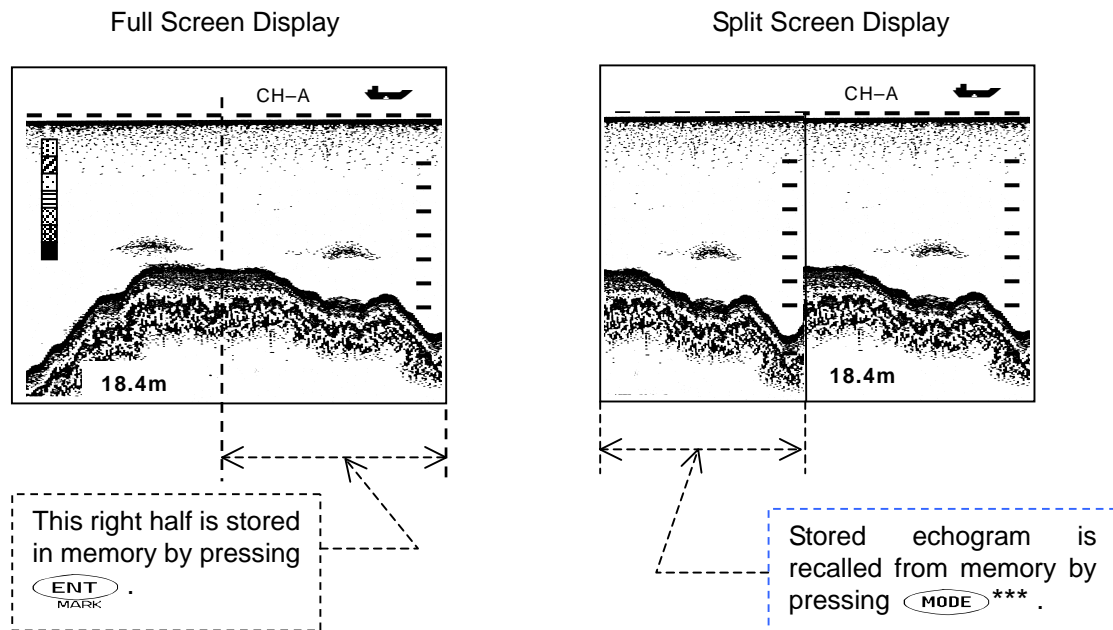
Figure 3-26 Selecting Display Modes



* Split-screen display is available also when dual channel operation is activated. See paragraph 3.7 for details.

** The right half of the current echogram can be stored in memory (by pressing **ENT MARK**) and recalled across the left half screen area.

Figure 3-27 Typical Full Screen and Split Screen Displays



** A **HARD COPY** menu pops up briefly over the recalled echogram display for printout of the stored echogram. Refer to paragraph 3.6 for details.

A second press of **MODE** returns to the full screen display.

< CAUTION >

The stored graphics data will be erased from memory when the equipment is turned off.


3.7. Switching Transducers (Operating Channels)

3.7.1. Introduction

In an **F-3000W** system where two transducers are plugged in, you can:

- switch them to monitor the depth from each location across the full screen area, or
- split the screen into right and left halves to monitor the depth from one transducer across the right half area and the depth from the other transducer across the left half area.

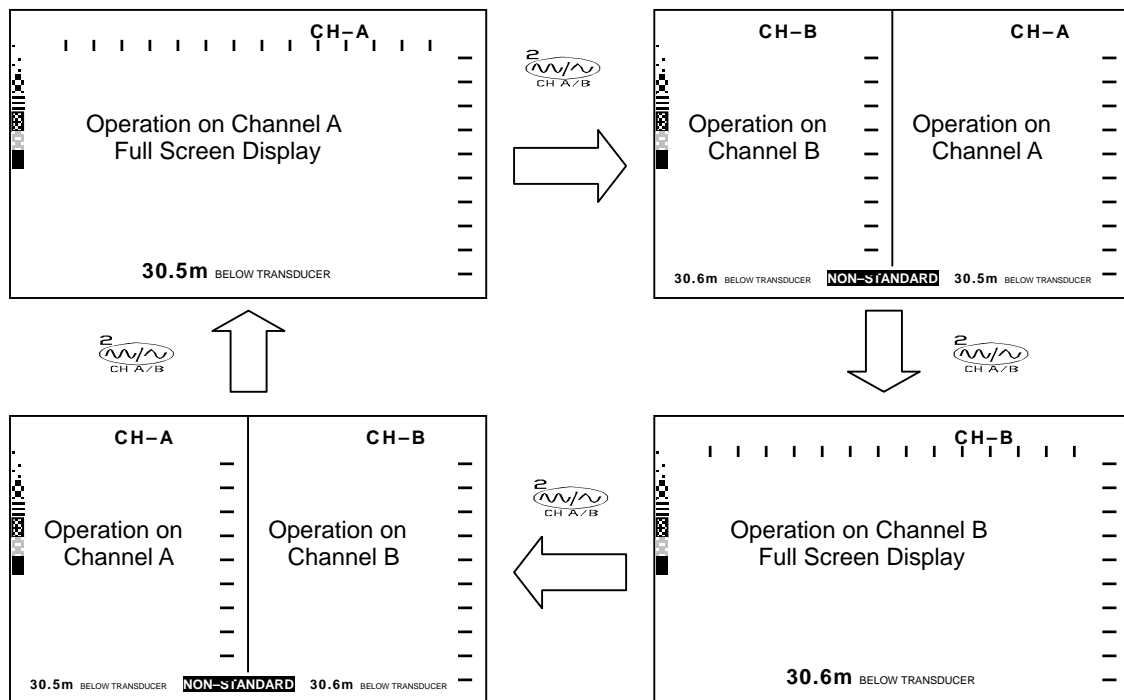
Each transducer is assigned a specified channel name (channel A or channel B) by the installer (or by the operator) at the initial setup time. Channel A (identified as **CH-A** on the screen) is initially assigned to a high frequency transducer, and channel B (**CH-B**), to a low frequency transducer. See the “Channel-Transducer Assignments” table on page iii for actual assignments in your system.


To switch between channel A and channel B or between single channel (full screen) operation and dual channel (split screen) operation, repeatedly press , as in the example illustrated below.

< CAUTION >

Dual channel operation (i.e. dual frequency operation) does not comply with the relevant IMO resolution and should not be used for navigational purposes. To warn the operator of this non-compliant usage, a warning message “NON-STANDARD” is turned on highlighted at the screen’s bottom near the partition during dual channel operation.

Figure 3-29 Switching Channels and Single/Dual Channel Operation – Example



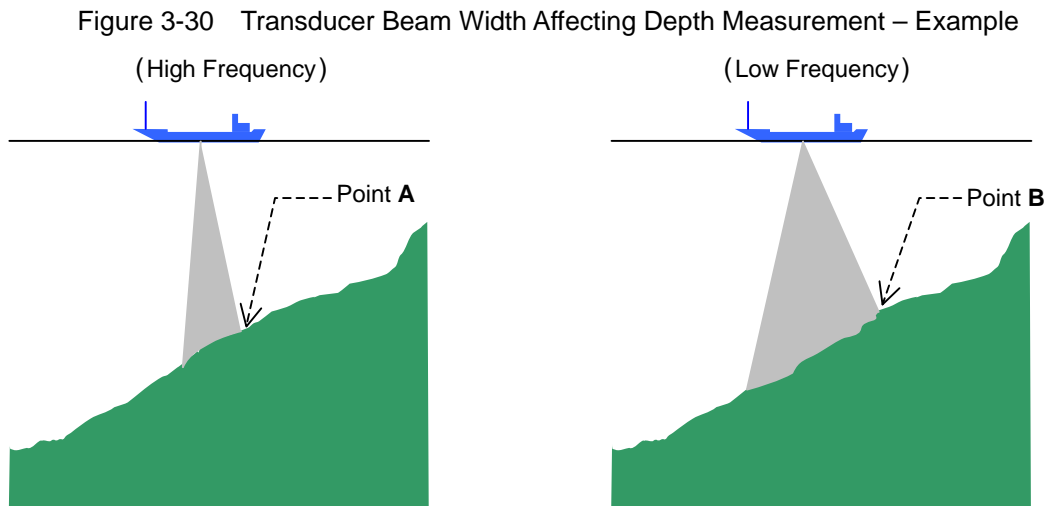
NOTE: Pressing  returns the full-screen single channel display directly.

3.7.2. Selecting Channels (Transducer Frequencies)

The depth readout may be slightly different between high frequency sounding and low frequency sounding. This phenomenon is due mainly to the difference in:

- the width of ultrasound beam between the two transducers. (See illustration below)
- the acoustic characteristics of the bottom stratum between the two frequencies

Low frequency operation will usually result in registering a thicker bottom echo than high frequency operation because of a wider beam coverage.



In the above example, point “A” to be registered as depth on high frequency echogram will be deeper than point “B” to be registered as depth on low frequency echogram due to narrow coverage of high frequency beam. See paragraph 9.2.3 for information on beam widths of the transducers.

3.7.2.1. High Frequency Operation

High frequency (100 kHz or 200* kHz) sounding uses a narrow beam transducer, thereby producing relatively satisfactory results under the following situations:

- where good echo resolution is required.
- where a better accuracy or a smaller detectable depth is required at shallow depths.
- where the bottom echo is often lost under heavy sea conditions, or when the ship is traveling in the wake of another vessel or going astern.

< CAUTION >

Operation at 200 kHz is not type-approved for navigational purposes.

3.7.2.2. Low Frequency Operation

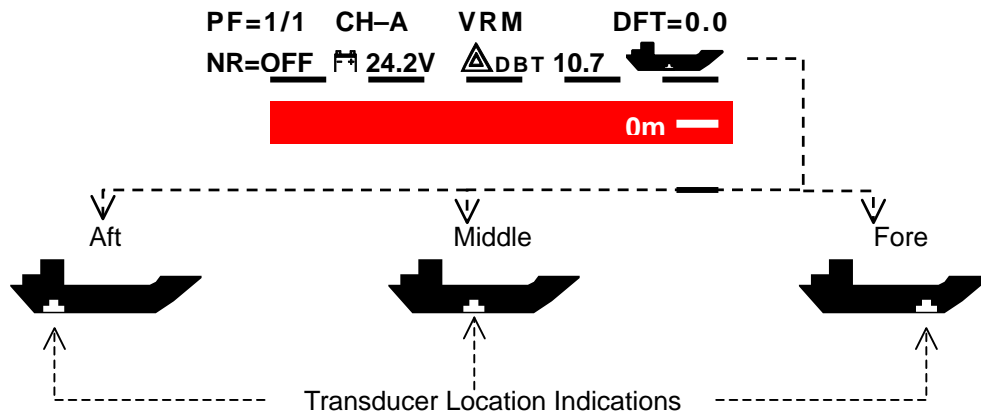
Low frequency (normally 50 kHz) operation uses a wide beam transducer with inherent extended depth-penetrating capability, thereby producing relatively satisfactory results under the following situations:

- where good echo sensitivity is required in deep water sounding.
- where operation takes place in deep water areas (in excess of 200 meters) most of the time.

3.8. Indication of Transducer Location

If your echo sounder system has two separate transducers (for channel A and channel B) installed at different locations (middle, fore or aft location in an alongships direction), a ship-shaped icon just above the top scale line graphically is provided to indicate the relative location of the transducer currently in use for sounding, as in the example below.

Figure 3-31 Indication of Channel A Transducer Location – Example



To utilize this function, you must first register the relative location of each transducer via the menu system. Refer to paragraph 4.10.8.2 for instructions.

3.9. Adjusting Receiver Gain Controls

The receiver gain control for each channel illustrated at right. Each control adjusts the rate of amplification of echo signals.

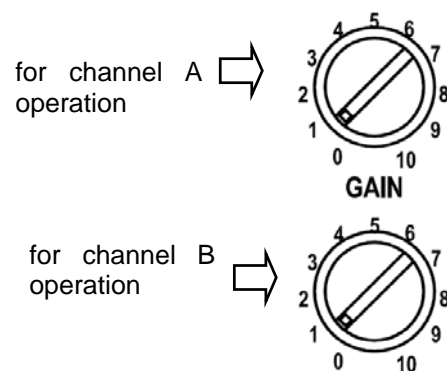
For stable digital depth reading or automatic bottom tracking operation, adjust the gain so that the bottom echo is always displayed in red, orange or yellow (or one of the three strongest echo colors, if you have changed the color assignments*).

The TVG** level (shallow gain suppression level) may also have to be increased to prevent surface clutters from disturbing digital depth reading.

* See paragraph 4.10.2 for details on user-definable colors.

** See paragraph 3.10 for details.

Figure 3-32 Receiver Gain Controls



Lack of receiver gain will cause the bottom-missing alarm to be triggered. See paragraph 3.12.5 for information on the alarm.

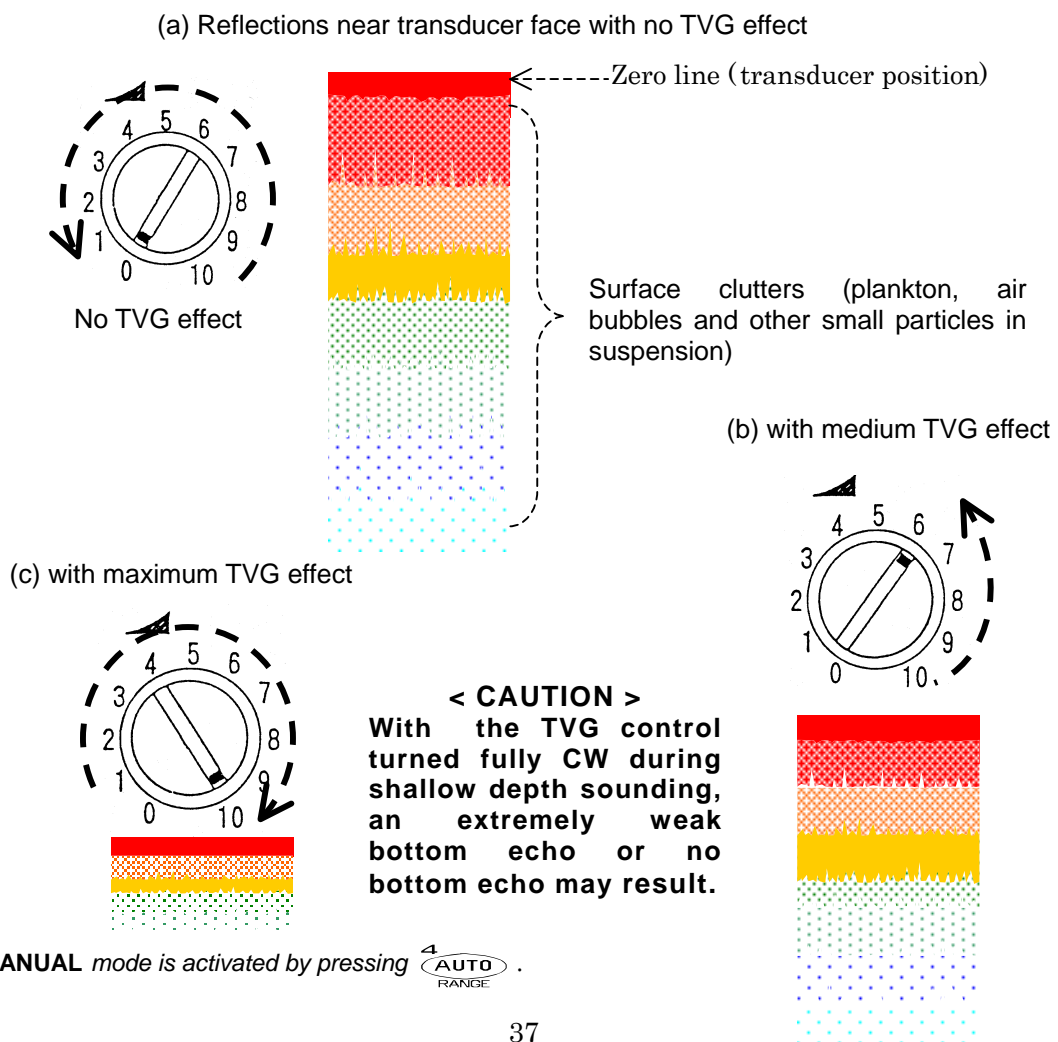
3.10. Adjusting TVG Controls Manually

TVG stands for time-varied gain. The TVG control is designed to sharply drop the receiver gain on each transmission, and then gradually recover the normal gain level as the transmitted signal travels deeper toward the bottom. When the equipment is working in the automatic control (**AUTO**) mode, both the initial gain drop level (TVG level) and the range of its effectiveness (TVG range) are automatically optimized for the depth range in use, and therefore the TVG controls are disabled. The following instructions apply when you are operating the unit in the *manual control (**MANUAL**) mode.

When the control is set fully clockwise, both the TVG level and the TVG range are at a maximum level. As you turn the control in the counterclockwise direction, the level and range will decrease. No TVG effect is available with the control fully counterclockwise.

In situations where digital depth reading is intermittent or erratic despite the bottom echo showing in red, orange or yellow (or in three user-defined strongest colors), suspect that surface clutters (explained below) are responsible, forcing such echoes to be accepted as random bottom reflections. To correct the problem, turn the appropriate TVG control in clockwise direction until normal readout bottom tracking function is restored or until such echoes become visible in weaker colors while keeping the bottom reflection in the same (three strongest) colors by slightly increasing the receiver gain as necessary.

Figure 3-33 Adjusting TVG Level – Example



3.11. Retrieving Data History

3.11.1. Introduction

The equipment automatically stores depth, UTC date and time, maximum depth range used, frequency* (operating channel) used, and position data** for a 24-hour period at intervals of two seconds. The following instructions enable the user to retrieve such data via an on-screen graphical user interface called the “data history window.”

* Frequency data will be stored in the form of channel ID “CH-A/B”, and not in actual frequency values.

** LAT/LON coordinates data will be stored when an appropriate GPS sensor is plugged into the rear panel I/O DATA connector.

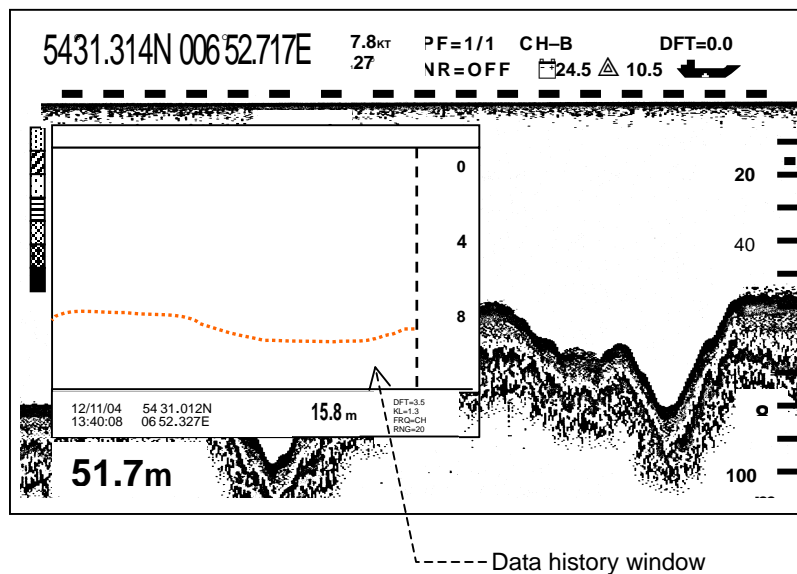
3.11.2. Displaying Data History Window

To display the data history window, simply press **7** **PLBK** *. It will show up over the left half area on the screen, as an example below. A second keypress** turns the window off. The rest of the keys can be used normally to perform their assigned functions while the window is being opened.

* When a menu is being shown, the **7** **PLBK** key acts as the numeric key to enter the numeric value of 7.

** Pressing **CLR** DEPTH ALARM also closes the window.

Figure 3-34 Echo Sounder Screen with Data History Window Opened – Example



A close-up view of a typical window is given in Figure 3–34. Data registered over the past 15 minutes, 1 hour, 3 hours, 6 hours, 12 hours and 24 hours can be retrieved.

The history of depth soundings will be displayed graphically relative to the above time (**PLAYBACK**) scales as well as digitally via the procedures detailed in the following paragraphs.

Once shown in the window, the data will not be automatically updated, though the current data will be continuously stored in memory. To update the data in the window, close the window first by pressing **CLR** DEPTH ALARM, and then open it again by pressing **7** **PLBK**.

3.11.3. Retrieving Data Registered at Specific Date/Time

An example data history window is illustrated below where the vertical axis represents the depth scale and the horizontal axis, the time passage. The history of soundings over the past 12 hours is displayed graphically, while the rest of the data stored at the line cursor position are digitally shown at the bottom of the window, as in the example below.

IMPORTANT

If, for any reason, the equipment was switched off before current operation, all previous data saved until that moment will be displayed in blue, while the data collected during current operation will be in white, indicating that discontinuity in time exists in the data being displayed.



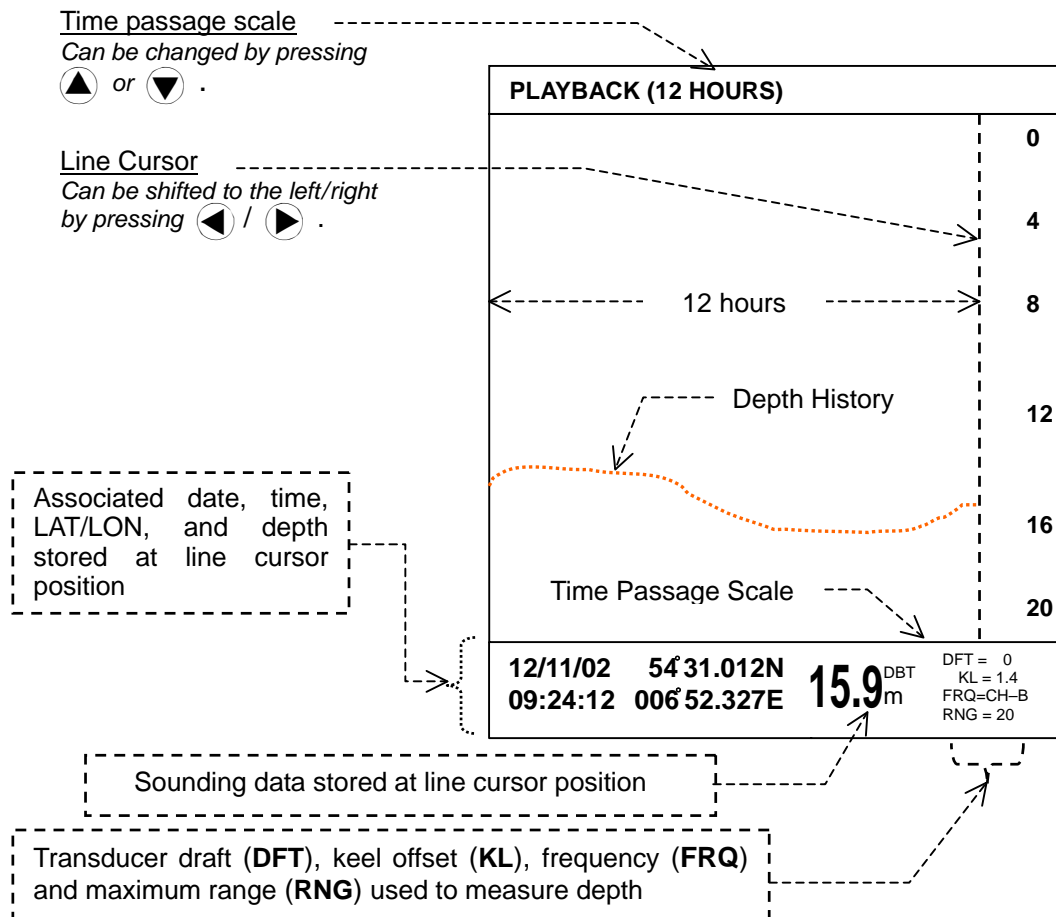






To change the time passage scale (**PLAYBACK** scale), press  or . The current scale is shown just above the upper edge of the window, as in the example.

Figure 3-35 Data History Window – Example



The various data at the line cursor position are shown in the bottom section of the window. The line cursor can be moved by pressing  / .

The time span, 12 hours in the above example, can be changed by pressing  / . The following values are selectable: 15 minutes, 1 hour, 3 hours, 6 hours, 12 hours, and 24 hours.

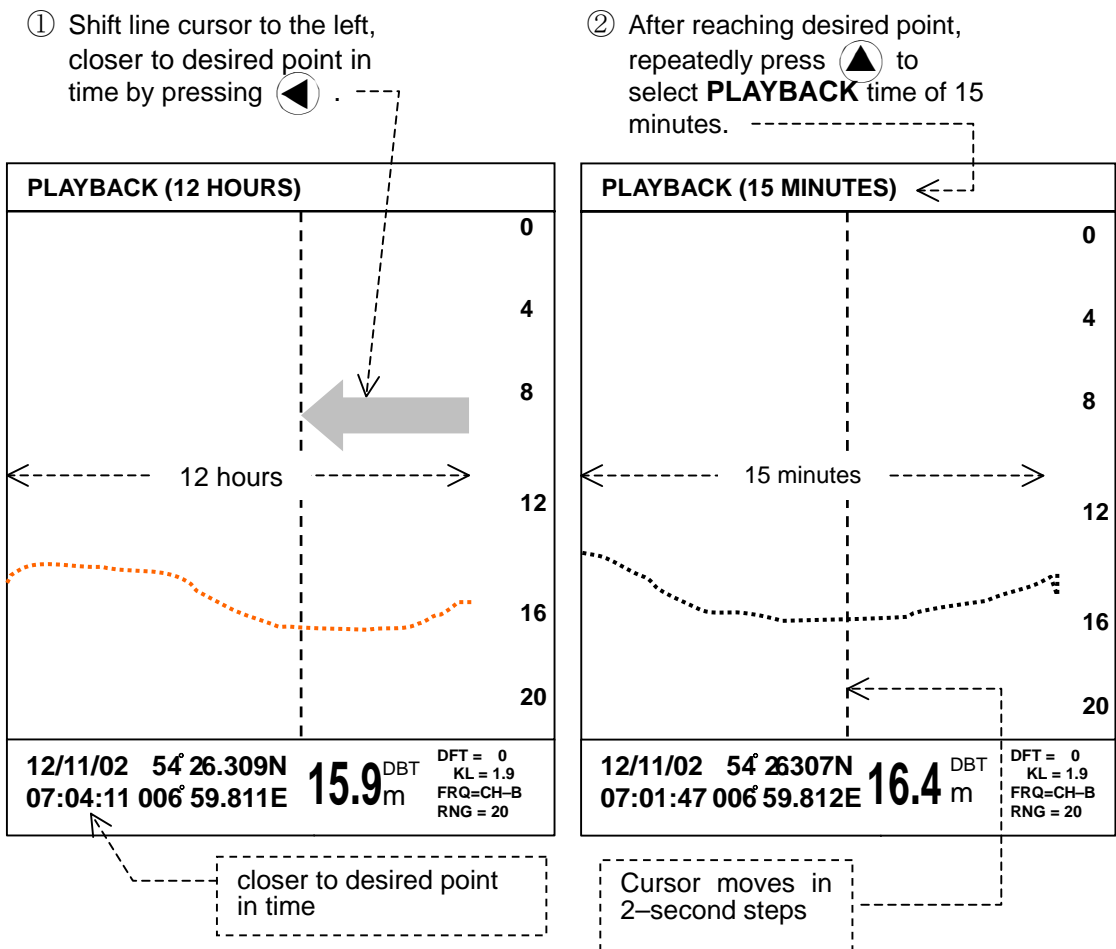
To close the window, press  again or .

3.11.4. Reviewing Data History in Detail over Specific Section

On a large time scale, such as 24 hours or 12 hours, the line cursor moves in large steps, such as 5 min. steps on 24-hour scale or 2 min.24 sec. steps on 12-hour scale, making it difficult to review the data history over a 15-minute section of a specific point in time.

This shortcoming can be corrected by first shifting the line cursor close to the desired point in time (①), and then selecting the smallest time scale (②), as in the example below. You can now check the data in 2-second steps over the 15 minute section centered on the cursor position.

Figure 3-36 Reviewing Data History in Detail on Long Time Scale – Example



Indication of Data Continuity/Discontinuity

If the color of the depth graphics and numeric data changes from white to blue or vice versa at a specific point in time while moving the line cursor, it indicates that the equipment was turned off at that point and that there is discontinuity in the data being displayed. The data stored until the power removal/shutoff are shown in blue, while the data from current operation are in white.

Deriving Stored Data for PC-Based Applications

The data stored in memory can be uploaded to PC-based applications. See section 6 for instructions.

3.12. Alarms

3.12.1. Introduction

To comply with the alarm ^{*1}requirements stipulated in the IMO Resolution for Navigational Echo Sounding Equipment, the following alarms are incorporated and enabled at all times while the equipment is switched on, except for the bottom–missing alarm.:

- Depth: Warns against decreasing depth. (Audible and visual indications)
Local alarm # 001 for INS applications
- ^{*2}Bottom–Missing: Warns against bottom echo being lost, becoming too weak for depth measurement, or exceeding current range limit. (Audible and visual indications). The audible indication will be turned off in 5 seconds automatically. Local alarm # 002 for INS applications.
This alarm is initially disabled. To enable it, see paragraph 4.12.
- Low Voltage: Warns against drop of power supply voltage below factory–specified level. (Audible and visual indications)
Local alarm # 003 for INS applications
- Power Removal: Warns against removal or shutoff of power source. (Audible indication only).


^{*1} Paragraph paragraphs 5.3.1 and 5.3.2. of MSC.74(69), Annex 4

^{*2} This alarm is not a requirement in the IMO resolution MSC.74(69).

3.12.2. Acknowledging Active Alarms

The first three alarms (depth, bottom–missing, low voltage), when they become active, can be acknowledged directly or remotely via the following procedure:

3.12.2.1. Direct Acknowledgement

Simply press  to silence the alarm sound, except for the bottom–missing alarm. If the alarm condition continues to exist, the visual indication will remain with the sound turned off. The bottom–missing alarm cannot be turned off with this key; the sound will be muted automatically in 5 seconds.


3.12.2.2. Remote Acknowledgement

This procedure applies when the echo sounder is linked to an onboard INS terminal via the rear panel **RS-422** or **RS-232C** connector. To acknowledge an active alarm from the INS terminal, enter the following format (NMEA-0183/IEC 61162-1) commands:

- \$ __ ACK , 001 , * hh < CR > < LF > for depth alarm
- \$ __ ACK , 002 , * hh < CR > < LF > for bottom–missing alarm
- \$ __ ACK , 003 , * hh < CR > < LF > for low voltage (power failure) alarm

Refer to paragraph 9.3.4.3 for detailed information on the alarm outputs.

3.12.3. Acknowledging Power Removal Alarm

The Power Removal alarm can be reset only manually by pressing the rear panel button marked “**POWER ALARM** .

NOTE: Later serial number version units have an additional alarm reset switch behind the hinged front lid. See paragraph 9.3.9 for related information.

3.12.4. Depth Alarm

3.12.4.1. Setting Alarm Depth

To utilize this function, you must set the alarm depth first, via the following steps.

Figure 3-37 Setting Alarm Depth – Example

VRM turned on ----- Alarm depth at 15.7m DBT*

PF=1/1 CH-B VRM DFT=0.0
NR=OFF 24.3V DBT15.7

- ① Turn on the Variable Range Marker (VRM)** by pressing .
- ② Repeatedly press / to place VRM at the desired alarm depth.
- ③ Press . This places the alarm depth at the VRM position.

* DBT=depth below transducer

** VRM is a horizontal dotted line with depth indication to the right of its center, as in the example at right. To turn it off, press again.

3.12.4.2. Depth Alarm Indications

As soon as the current depth decreases beyond the preset depth, the alarm will be triggered with the following audible and visual indications.

- Audible: Beeps at approximately 1–second intervals. The sound can be muted by pressing .
- Visual: Blinks alarm symbol together with on–screen preset value on red background at approximately 1–second intervals.

Figure 3-38 Visual Indication of Depth Alarm Being Triggered – Example

Alarm symbol blinks in red background -----

PF=1/1 CH-B VRM DFT=0.0
NR=OFF 24.6V DBT 15.7


- Digital: Outputs NMEA–0183/IEC 61162–1 format \$SDALR sentence for local alarm 001 via **RS–422/RS–232C** connectors at approx. 30–second intervals. See paragraph 9.3.4.3 for details.

3.12.5. Bottom–Missing Alarm

This alarm will be triggered when one of the following situations occurs and continues for 4 seconds or more, making it impossible for the equipment to register depth reliably:

- no bottom echo is received.
- the bottom echo has become too weak, showing in *1 weaker colors.
- the bottom echo has exceeded the present depth range limit. (This can happen when the unit is operating in the *2 **MANUAL** mode).

*1: yellow, green, blue, etc. or user–defined colors except two strongest ones

*2: Pressing  switches the control to the **AUTO** mode.

The bottom–missing alarm is initially disabled. To make the alarm available during the above operating conditions, refer to paragraph 4.12*3 for instructions.

*3: **MAIN MENU** → **9:INSTALLATION SETTINGS** → **9:BOTTOM MISSING ALM**

The active alarm condition is indicated audibly and visually in the following manner.


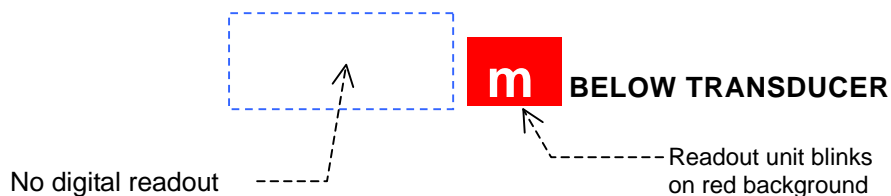
- Audible: Beeps at approximately 1–second intervals. The sound will be automatically turned off in 5 seconds. The  key cannot be used to mute the sound.
- Visual: Blinks depth readout unit (**m**, **FM**, **BR** or **FT**) on red background at approximately 1–second intervals without a depth value.
- Digital: Outputs NMEA–0183/IEC 61162–1 format \$SDALR sentence for local alarm 002 via **RS–422/RS–232C** connectors at approx. 30–second intervals. See paragraph 9.3.4.3 for details.

Figure 3-39 Visual Indication of Bottom–Missing Alarm



When you are operating the unit in the **MANUAL** mode,

- increase the receiver gain or select a greater depth range, or
- switch to the **AUTO** mode

to remedy this condition.

If the problem persists, especially when traveling over a rapidly changing bottom, refer to paragraph 4.13 and select a shorter readout response time*4 (**MEDIUM** or **FAST**).

*4: **MAIN MENU** → **9:INSTALLATION SETTINGS** → **0:DEPTH READOUT RESPONSE**

A continuing symptom indicates that the transducer in use is disconnected or has become defective.

3.12.6. Power Failure Alarm

If, for any reason, the voltage of the power source drops below the specified level during DC-powered operation, the power failure alarm will be triggered with the following audible and visual indications.



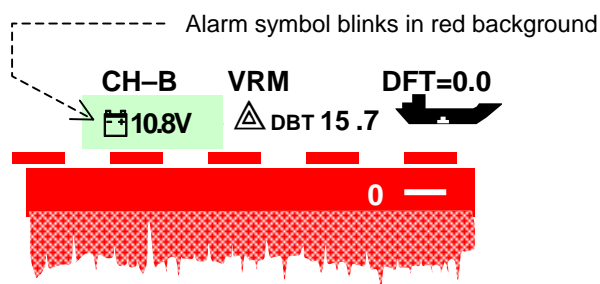
- Audible: Beeps at approximately 1-second intervals. The sound can be muted by pressing .
- Visual: Blinks alarm symbol  and on-screen voltage readout (DC-powered operation) on red background at approximately 1-second intervals.

Figure 3-40 Visual Indication of Power Failure Alarm Being Triggered – Example



- Digital: Outputs NMEA-0183/IEC 61162-1 format \$SDALR sentence for local alarm 003 via **RS-422/RS-232C** connectors at approx. 30-second intervals. See paragraph 9.3.4.3 for details.

NOTE: The power failure alarm is not available when the equipment operates off an AC power source. The equipment is designed to work normally over a wide voltage range (typically from approx. 80 to 240 volts a-c), eliminating the need for an alarm to alert the user to low voltage conditions.

In the event of power outage, a power removal/shutoff alarm will be triggered. See paragraph 3.12.7 below for details.

3.12.7. Power Removal/Shutoff Alarm

In the event that power is removed or shut off at the source (due, for instance, to accidental unplugging of power cable or to power outage) with the equipment in normal operation, an audible alarm will sound for several minutes to warn the operator of the power line trouble.


To silence this alarm, press the rear panel button* marked “**POWER ALARM** .”

Figure 3-41 Mute Button for Power Removal Alarm



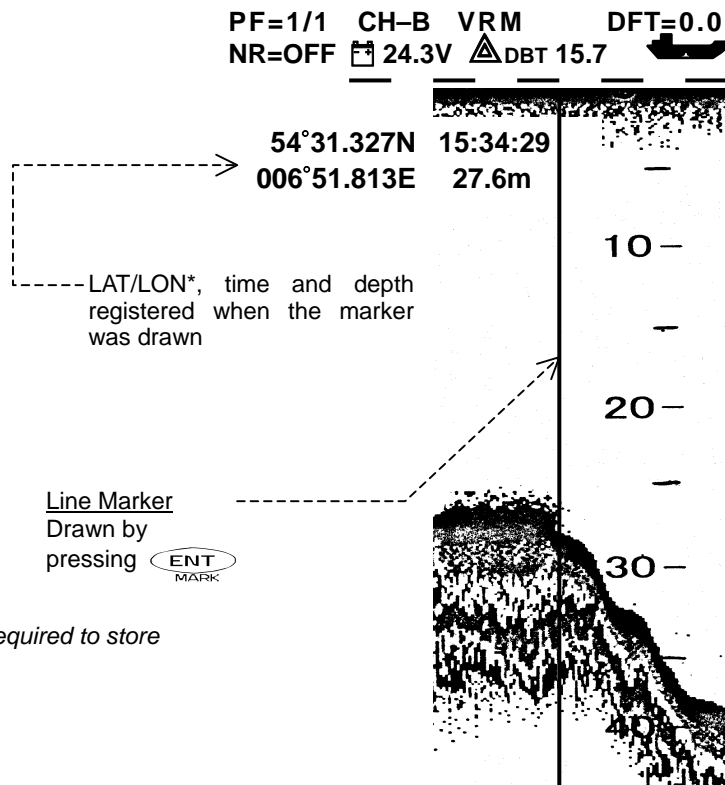
NOTE: Since no power is fed to the equipment under such conditions, the echogram screen is turned off and a visual alarm indication is not available.

* Later serial number version units have an additional alarm reset switch behind the hinged front lid. See paragraph 9.3.9 for related information.

3.13. Line Marker

Pressing **ENT** MARK during normal echo sounder operation will cause a red line to be drawn vertically across the screen at the current sounding position (i.e. extreme right edge of the active screen area), along with the current depth readout and time (and LAT/LON coordinates, if an optional GPS sensor is plugged into the rear panel I/O DATA connector). The marker will remain on-screen for approximately 20 minutes before it is scrolled to the left off the screen.

Figure 3-42 Drawing a Line Marker – Example



* An optional GPS sensor is required to store the position coordinates.

Storing/Recalling Graphics Data

Pressing **ENT** MARK also initiates the function of storing into memory the right half of the current echogram. The stored graphics data will be recalled onto the left half screen by pressing **MODE**. A second keypress turns the memory display off. The stored data will be erased from memory once the equipment is turned off. See paragraph 3.6 for details.

Hard Copy of Echogram

Stored echogram can be printed out with a suitable graphics printer** plugged into the rear panel “**PRINTER**” connector. A pop-up menu should be displayed for a few seconds over the recalled echogram when **MODE** is pressed. Select option “**START**” to initiate the printing action. See paragraph 3.6 for details.

** DOS/V-compatible printer with ESC/P control protocol

4. Advanced Settings

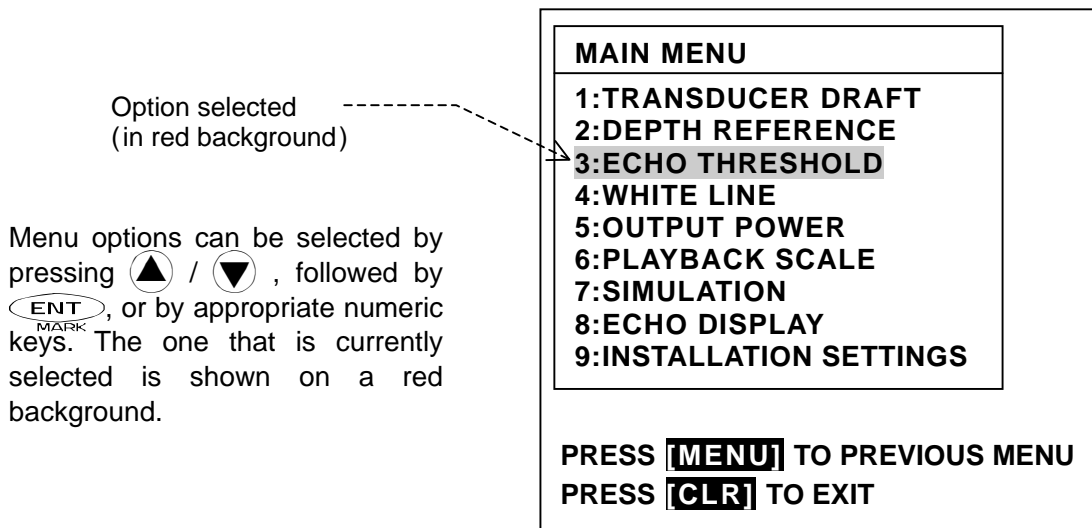
4.1. Introduction

The following settings that affect the way the equipment operates can be made via a menu system consisting of a main menu and a number of submenus accessible through various main menu options:

- Settings that you do not have to change frequently, such as the transducer draft and echo threshold level.
- Settings that should be made mainly at initial installation time, such as depth readout unit, keel offset, and local time offset.

To activate the menu system, simply press **MENU**. This opens the main menu (**MAIN MENU**), as illustrated below. A second keypress turns it off.

Figure 4-1 Main Menu



4.2. Entering Transducer Draft

4.2.1. Introduction

The transducer draft used in this manual refers to the depth from the water surface to the transducer face, as defined in Figure 4–2. The depth readout shown on the screen initially represents the depth to the bottom, measured from the transducer face (depth below transducer or **DBT**). If you wish to read depths from the waterline (to agree with spot soundings or bathymetric data on official charts), you have to add the draft to the on–screen depth readout (for each transducer in a multiple–transducer configuration). The following procedure will allow you to enter the desired draft in 0.1 unit steps (0.1 meter/ fathom/braccia/foot steps) so that both digital depth readout and graphical indication reflect the draft, automatically reading depth from the waterline.

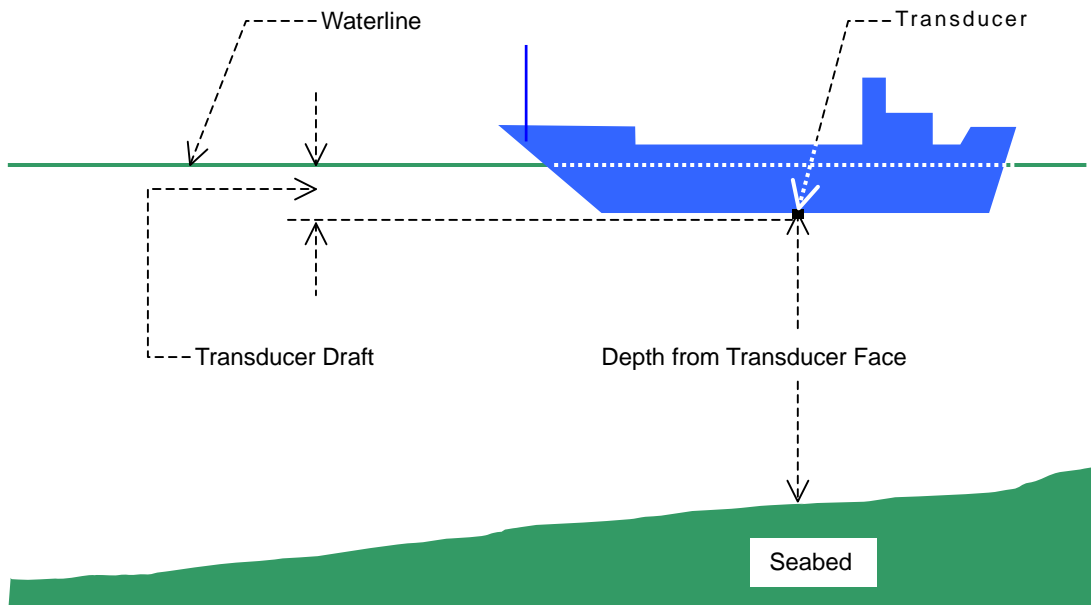
< WARNING >

WITH A TRANSDUCER DRAFT ENTERED, THE ON–SCREEN DIGITAL READOUT SHOWS THE DEPTH FROM THE WATERLINE AND NOT FROM THE KEEL. GREAT CARE SHOULD, THEREFORE, BE TAKEN IN USING DEPTH DATA WHEN NAVIGATING SHALLOW WATER AREAS.

NOTE: To read depth from the keel, you must first register the keel offset (distance from the transducer face to the keel). Refer to paragraph 4.10.8.3 for details.

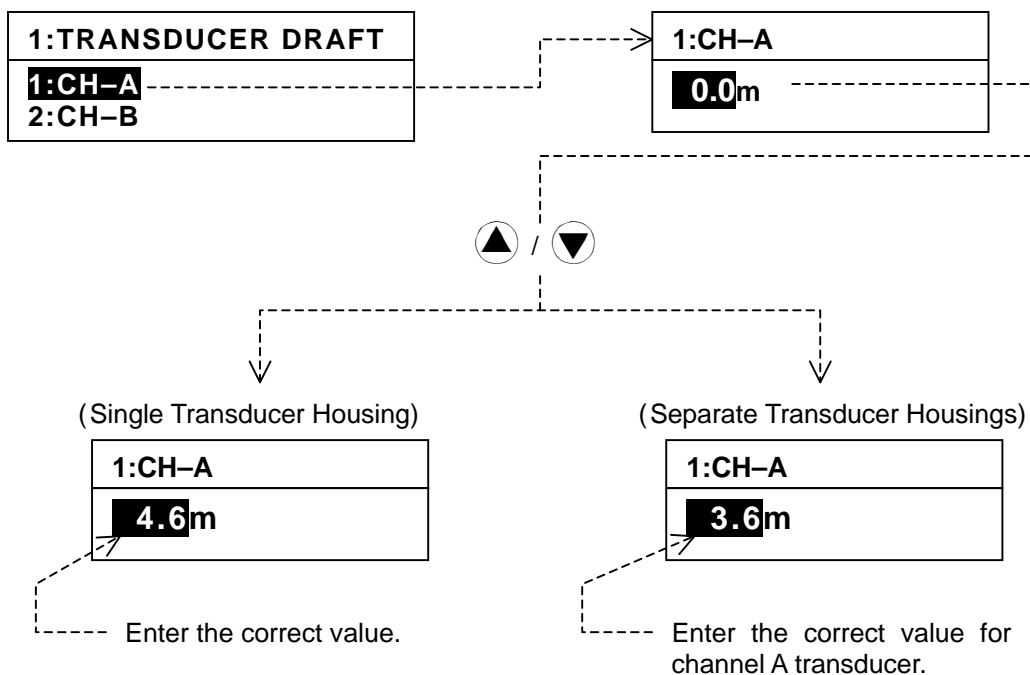
4.2.2. Entering Transducer Draft

Figure 4-2 Concept of Transducer Draft (for Dual Freq. Transducer Installation)



- ① Press **MENU** , displaying the **MAIN MENU**.
- ② Select **"1:TRANSDUCER DRAFT"** by pressing **DEPTH RANGE** or by pressing **▲** / **▼** , followed by **ENT MARK** . This turns a **TRANSDUCER DRAFT** submenu on.

Figure 4-3 Entering Transducer Draft for Channel A Operation – Example



Enter the correct value.

Enter the correct value for channel A transducer.

4.2.2. Entering Transducer Draft (continued – 2/3)

The draft can be entered separately for the high frequency transducer and low frequency transducer. Depending on the transducer configuration of your installation, enter the same draft when a single-housing dual-frequency transducer, such as the 706-50/200 or 550-50/200, is installed or separate drafts when two transducers are separately installed, via the following steps.





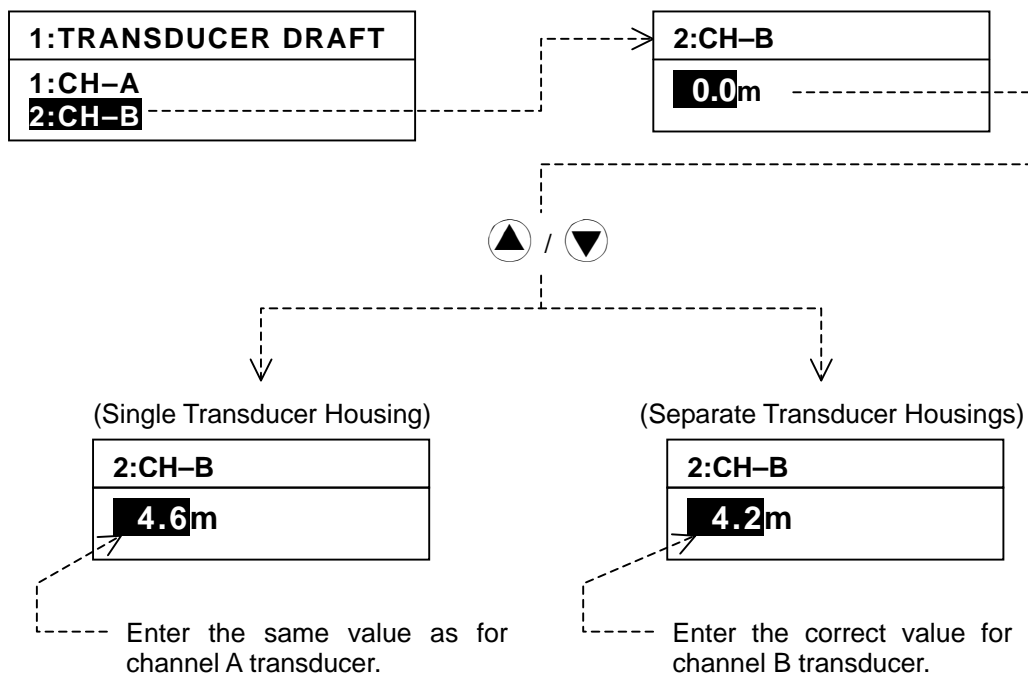


- ③ Select option “1:CH-A,” and press .
- ④ Enter the correct draft of the dual frequency transducer or of the low frequency transducer by repeatedly pressing  / . *Numeric keys cannot be used for draft entry.*
- ⑤ Press  to complete the entry for low frequency operation. The **TRANSDUCER DRAFT** menu should then be displayed again.
- ⑥ Select “2:CH-B” and, similarly enter the same draft for dual-frequency transducer installation or the correct draft of the channel B transducer for multiple transducer installation.

Figure 4-4 Entering Transducer Draft for Channel B Operation – Example

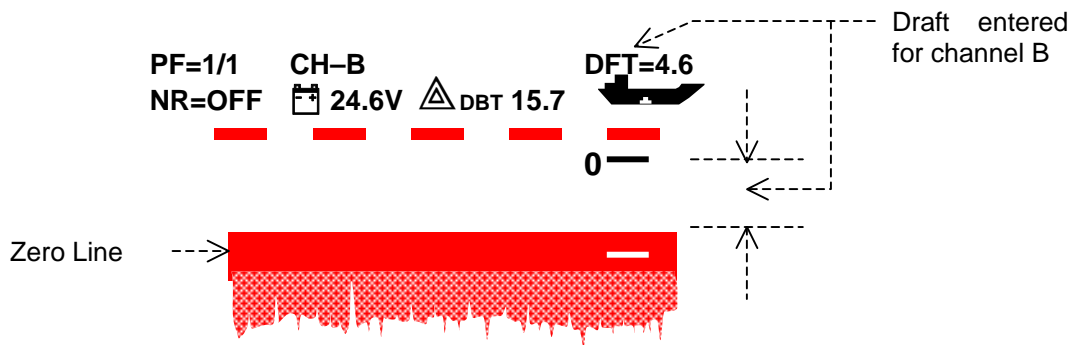


- ⑦ Press  to complete the entry for high frequency operation and then  to exit the menu system.

4.2.2. Entering Transducer Draft (continued – 3/3)

An example below indicates how the draft entry affects the way the echogram shows up in high frequency operation. Note that the zero line occurs at the depth of the draft. The digital depth readout will be the depth-below-transducer (DBT) value plus the draft.

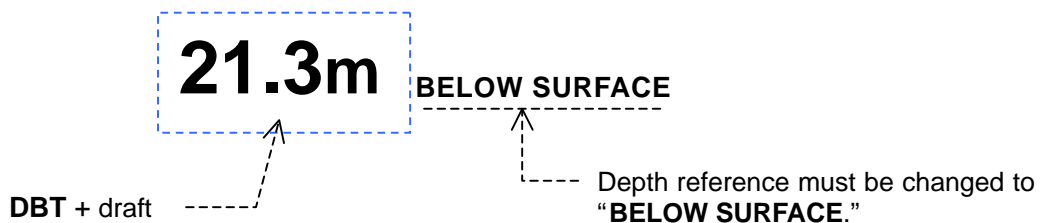
Figure 4-5 Indication of Transducer Draft on Echogram Screen – Example



The depth reference indication must be changed accordingly to “**BELOW SURFACE**,” as in the example below, via the procedure in paragraph 4.3.

MENU → **MAIN MENU** → **2:DEPTH REFERENCE** → **1:BELOW SURFACE** → **ENT**

Figure 4-6 Digital Depth Readout with Transducer Draft Entered – Example



< WARNING >

WITH A TRANSDUCER DRAFT ENTERED, THE ON-SCREEN DIGITAL READOUT REPRESENTS THE DEPTH FROM THE WATERLINE AND NOT FROM THE TRANSDUCER OR FROM THE SHIP’S KEEL. GREAT CARE SHOULD, THEREFORE, BE TAKEN IN USING THE DEPTH READOUT FOR SHALLOW WATER NAVIGATION. BE SURE TO SET THE DEPTH REFERENCE TO “BELOW SURFACE” TO AVOID ANY MISUNDERSTANDING THAT CAN LEAD TO GROUNDING OR OTHER SERIOUS DAMAGE.

4.3. Selecting Depth Reference Indications

4.3.1. Introduction

The **F-3000W** navigation sounder is designed to indicate one of the following types of depth information at a time, depending on whether or not transducer-related settings (draft* and keel offset** entries) are made:

- Depth below Transducer face (**DBT**, initial setting)
- Depth below Surface (**DBS**, depth below waterline, with transducer draft entered)
- Depth below Keel (**DBK**, with keel offset entered)

* See paragraph 4.2. ** See paragraph 4.10.8.3.

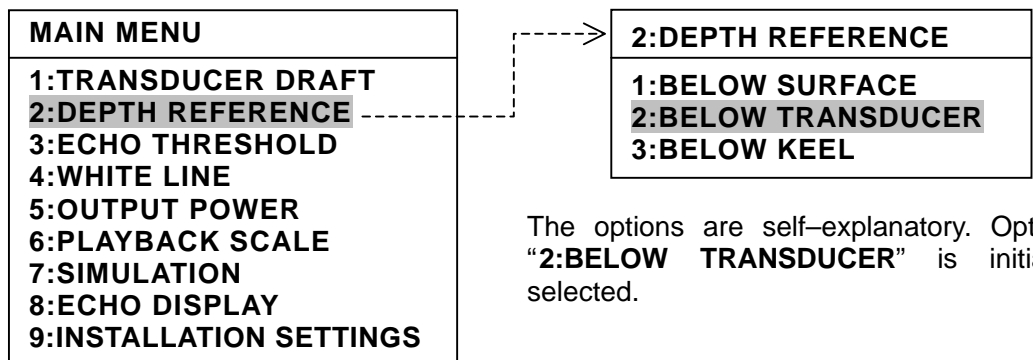
Select the appropriate depth reference indication via the procedure described below.

NOTE: Depth data will be stored in NMEA-0183 DPT format, i.e. DBT value with separate draft and/or keel offset regardless of whether DBS or DBK indication is chosen). See section 6 for details.

4.3.2. Selection Procedure

- ① Press **MENU**, displaying the **MAIN MENU**.
- ② Select “**2:DEPTH REFERENCE**” by pressing **2** or by pressing **CH A/B** or by pressing **▲** / **▼**, followed by **ENT**. This turns a **DEPTH REFERENCE** submenu on.

Figure 4-7 Selecting Depth Reference Indications



The options are self-explanatory. Option “**2:BELOW TRANSDUCER**” is initially selected.

- ③ Select the desired indication by pressing the appropriate numeric key.
 - **BELOW SURFACE:** Indicates current depth value being referred to waterline. Correct transducer drafts must be entered via steps in paragraph 4.2 to utilize this indication.
 - **BELOW TRANSDUCER:** Indicates current depth value being referred to the face of the transducer selected.
 - **BELOW KEEL:** Indicates current depth value being referred to the keel. Correct keel offsets must be entered via steps in paragraph 4.10.8.3 to utilize this indication.

4.3.2. Selection Procedure (continued – 2/2)



- ④ Press  to complete the selection, and then  to exit the menu system.
- ⑤ Enter the appropriate transducer draft (paragraph 4.2) or keel offset (paragraph 4.10.8.3), if “**1:BELOW SURFACE**” or “**3:BELOW KEEL**” is chosen.

Figure 4-8 Digital Readouts with Different Depth Reference Indications – Example

(1) Depth–below–Transducer (**DBT**) Indication

16.8m BELOW TRANSDUCER

(2) Depth–below–Surface (**DBS**) Indication

21.3m BELOW SURFACE

(3) Depth–below–Keel (**DBK**) Indication

14.9m BELOW KEEL

Alarm Depth Indication

The reference of the alarm depth setting will change accordingly as you choose the desired depth reference, as in the example below.

Figure 4-9 Alarm Depth Setting Indications – Example



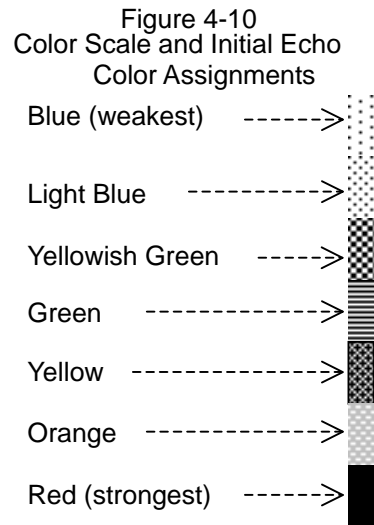
4.4. Echo Threshold Adjustment

4.4.1. 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.

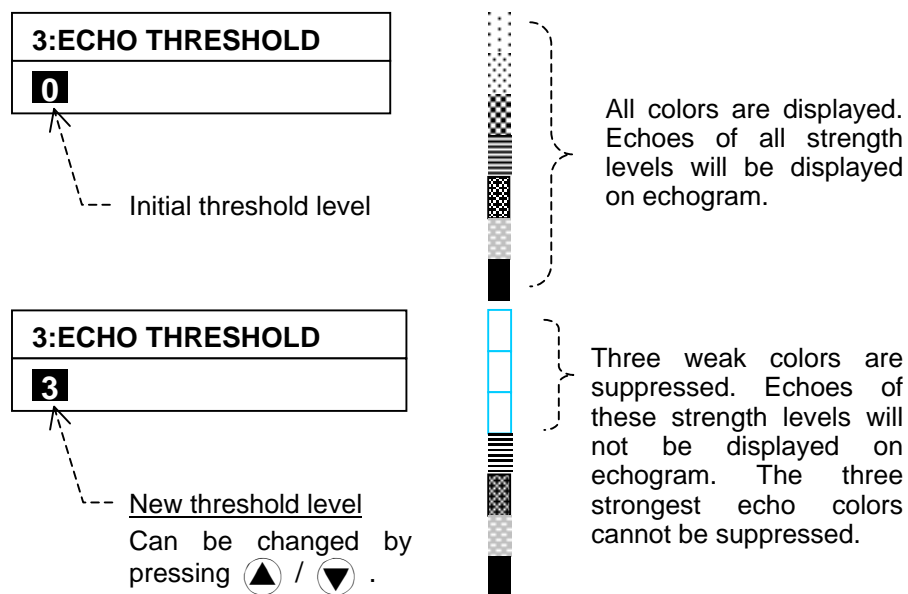
Three strongest echo colors (i.e. red, orange and yellow shown at right) cannot be suppressed.



4.4.2. Adjusting Echo Threshold Level

- ① Press **MENU**, displaying the **MAIN MENU**.
- ② Select "**3:ECHO THRESHOLD**" by pressing **3** or by pressing **▲** / **▼**, followed by **ENT**. This turns on an **ECHO THRESHOLD** submenu with a threshold level entry field, and a color scale to the right, as in the example below. The numeric value in the entry field represents the current suppression level, and is initially zero, allowing all echo colors to be displayed.

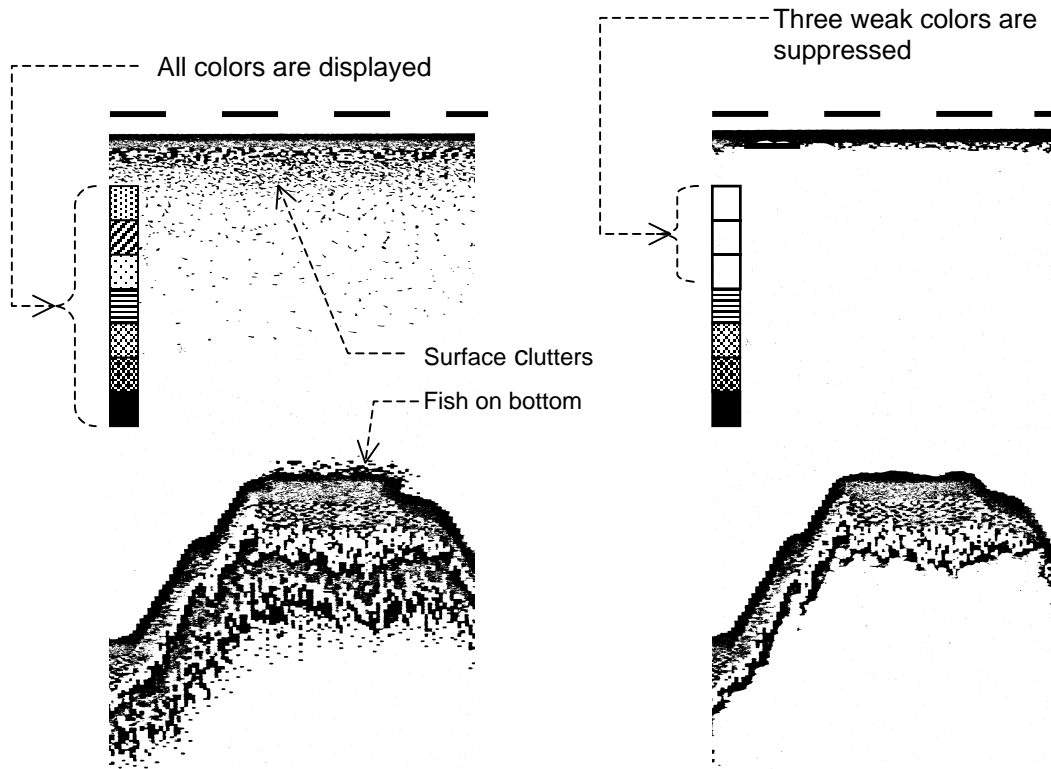
Figure 4-11 Adjusting Echo Threshold Level – Example



4.4.2. Adjusting Echo Threshold Level (continued – 2/2)

- ③ Enter a desired threshold level by pressing ▲ / ▼ or appropriate numeric key. The suppressed colors are indicated blank on the color scale, as in the example below.
- ④ Press **ENT** MARK to complete the entry, and then **CLR** DEPTH ALARM to exit the menu mode.

Figure 4-12 Effect of Echo Threshold on Echogram – Example



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

4.5. White Line Adjustment

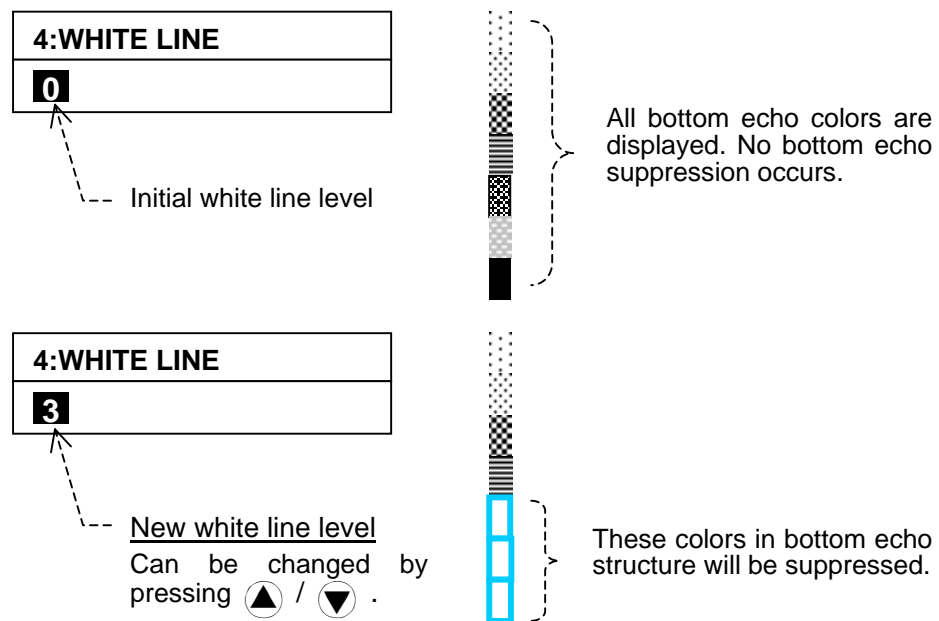
4.5.1. Introduction

The white line adjustment consists of separating the bottom echo from echoes of fish or other objects lying on or close to the bottom by suppressing the strongest colors of the bottom stratum without reducing the receiver gain on fish and other objects in suspension. The purpose of the function is to facilitate detection of fish echoes that look like a part of the bottom echo and, therefore, are difficult to detect on the normal echogram.

4.5.2. Adjusting White Line Level

- ① Press **MENU**, displaying the **MAIN MENU**.
- ② Select **4:WHITE LINE** by pressing **AUTO RANGE** or by pressing **▲** / **▼**, followed by **ENT MARK**. This turns on a **WHITE LINE** submenu with a white line level entry field, and a color scale to the right. The numeric value in the entry field represents the current level, and is initially zero, allowing all echo bottom colors to be displayed.

Figure 4-13 Adjusting White Line Level – Example



- ③ 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 stratum will be erased one by one, allowing the blank area to widen (raising the white line level). This blank area is popularly known as the “white line” in a recording echo sounder.

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

4.5.2. Adjusting White Line Level (continued – 2/2)


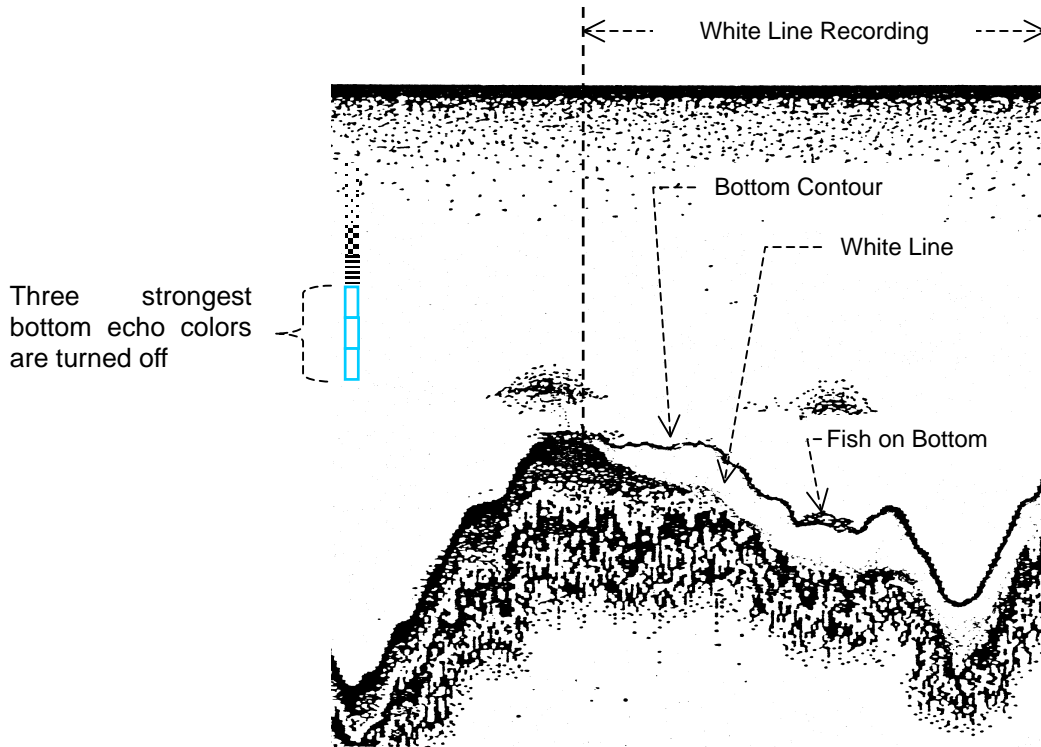


- ④ Pressing  will restore the suppressed bottom echo colors, one at a time, thus narrowing the blank area (lowering the White Line level).

Figure 4-14 Typical White Line Recording



- ⑤ After the desired white line level is reached, press  to complete the setting, and then  to exit the menu mode.

NOTES:

- (1) *White Line level adjustment affects the bottom echo only, and should not be confused with echo threshold adjustment described in the preceding paragraph.*
- (2) *The last White Line level used will be stored in memory and will be recalled on next power-up.*
- (3) *The digital depth reading operation or automatic bottom tracking will not be affected while the bottom contour remains red or orange (or in one of the two user-definable strongest colors). See paragraph 4.10.2 for user-definable color assignments.*

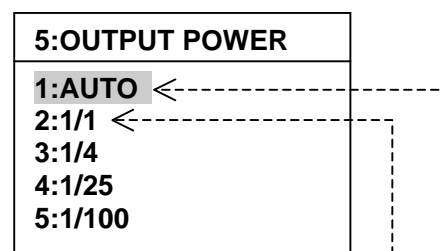
4.6. Selecting Transmit Power Levels

Four levels of transmitter power output are available and can be selected automatically manually. The equipment is initially set so that the appropriate power level is automatically selected for the depth range in use. There should normally be no need to change this setting to manual selection. However, under some special bottom conditions, the user may need more power in shallow water soundings to show the sea bed echo in strong colors (e.g. yellow, red and orange). To manually select power levels, follow the procedure described below.

- ① Press **MENU**, displaying the **MAIN MENU**.

Figure 4-15 Selecting Transmit Power Levels

- ② Select **"5:OUTPUT POWER"** by pressing **5** or by pressing **▲** / **▼**, followed by **ENT**. This turns on a **POWER OUTPUT** submenu, as shown at left.



Full power on all ranges

Appropriate level selected according to range in use

Note that option **"1:AUTO"** is currently selected, so that the equipment will choose the level that best suits the depth range in use. The other options are as follows:

- **2:1/1:** Full power (no power reduction)
- **3:1/4:** Approx. 1/4 of full power (6 dB down from full power level)
- **4:1/25:** Approx. 1/25 of full power (14 dB down from full power level)
- **5:1/100:** Approx. 1/100 of full power (20 dB down from full power level)

- ③ Using **▲** / **▼** or appropriate numeric key, select the desired level and press **ENT**.

If you experience difficulty getting a strong bottom echo on shallow ranges at high gain settings, try **1/4** or **1/1**. Options **"1/25"** and **"1/100"** may be useful to avoid locking onto the second bottom echo (paragraph 3.4.2) in shallow water operation, which results in a depth readout twice the actual depth.

< CAUTION >

If the power is set to "1/25" or "1/100" for shallow water sounding, be sure to return to "AUTO" or "1/1" after leaving shallow water areas.

Note, however, that high TVG settings (TVG control set fully or nearly CCW) will result in a weak bottom echo. Check the setting of the appropriate TVG control before selecting high power levels on shallow ranges. See paragraph 3.10 for more information on TVG settings.

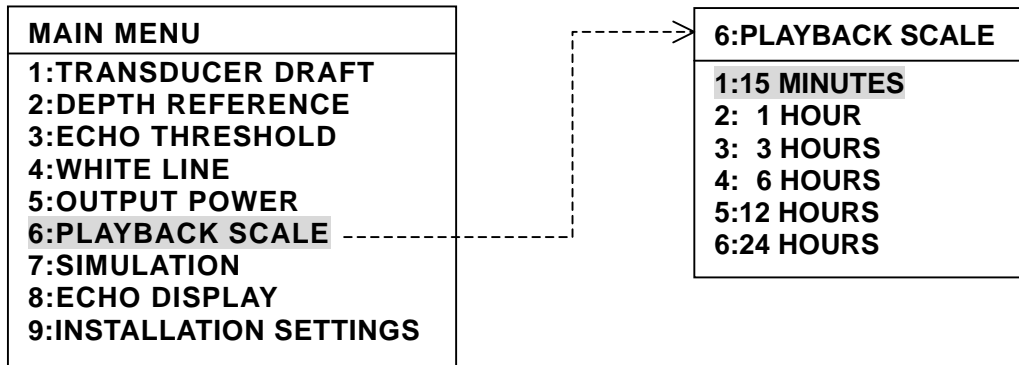
- ④ Press **CLR** to exit the menu mode.

4.7. Selecting Time Passage Scales

Selecting option “6:PLAYBACK SCALE” on the **MAIN MENU** opens a **PLAYBACK SCALE** submenu as shown below, allowing you to select the time passage scales (**PLAYBACK** scales) to be used when reviewing stored data via the data history window*. The following scales are selectable: 15 minutes, 1 hour, 3 hours, 6 hours, 12 hours and 24 hours, as in the submenu.

* *NOTE: See paragraph 3.11 for details.*

Figure 4-16 Selecting Time Scales



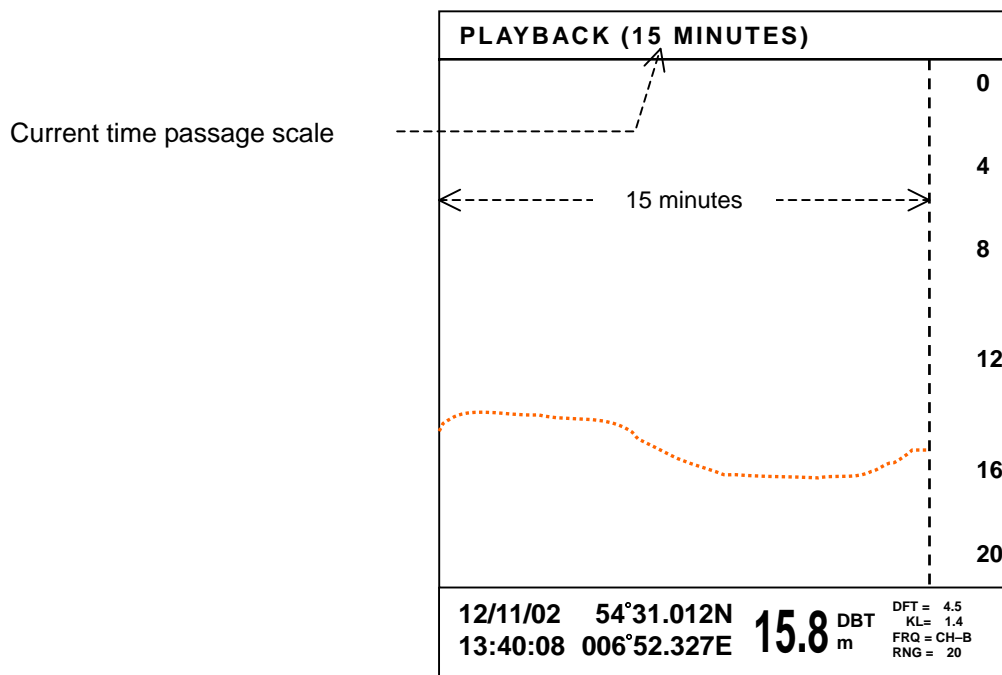
- Using / ** or the appropriate numeric key, select the desired scale, and press



** *NOTE: When the data history window is already open, pressing either of these keys selects the time passage scales directly. See paragraph 3.11.3 for details.*

- Press to exit the menu mode.

Figure 4-17 Data History Window – Example

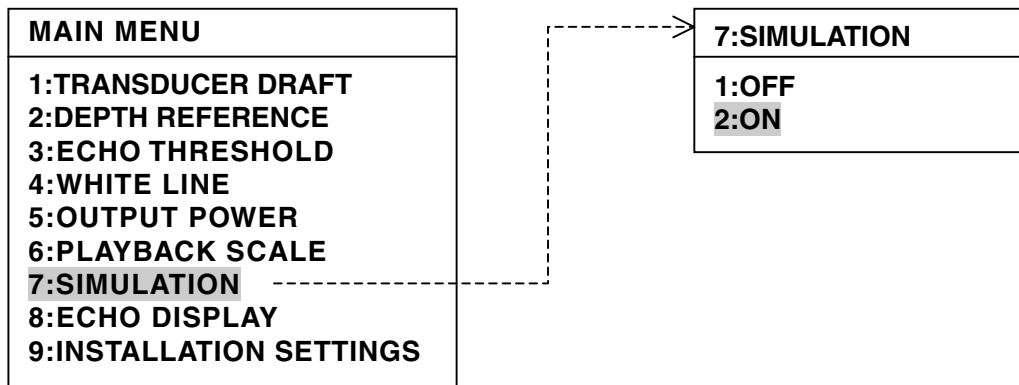


4.8. Activating Echo Sounder Simulator

An echo sounder simulator program is built in to simulate actual sounding operation, enabling you to learn how each control key or operating parameter affects the way the echogram is drawn without having to connect an underwater transducer. The simulator can be activated via the following menu steps:

- ① Press **MENU**, displaying the **MAIN MENU**.
- ② Select “**7:SIMULATION**” by pressing **7 PLBK** or by pressing **▲** / **▼**, followed by **ENT MARK**. This turns on a **SIMULATION** submenu, as shown below.

Figure 4-18 Activating Echo Sounder Simulator



- ③ Select “***12:ON**” by pressing **2 CH A/B** or **▼**, followed by **ENT MARK**. This activates the simulator, automatically selecting the 0–20 meter *2 range (or 0–15 fathom/0–100 foot range) and starting to show an echogram.

To avoid the simulated echogram from being regarded as a “live echogram” with the equipment in actual service, the following caution message will be displayed highlighted at the screen’s lower right corner:

SIMULATION

*1 This “**ON**” setting will not be stored in memory. Once the equipment is turned off and then on again, the simulator will be set back to “**OFF**.”

*2 The range can be changed by pressing **1 DEPTH RANGE** / **3** after the simulator is turned on.

- ④ Press **CLR DEPTH ALARM** to exit the menu mode.

The gain and TVG controls are disabled and do not affect the echogram appearance while the equipment is operating in the simulator mode.

Bottom–Missing Alarm

The bottom–missing alarm, which should be automatically triggered with no bottom echo or weak bottom echo received, will be turned off as soon as you set the simulator to “**ON**.”

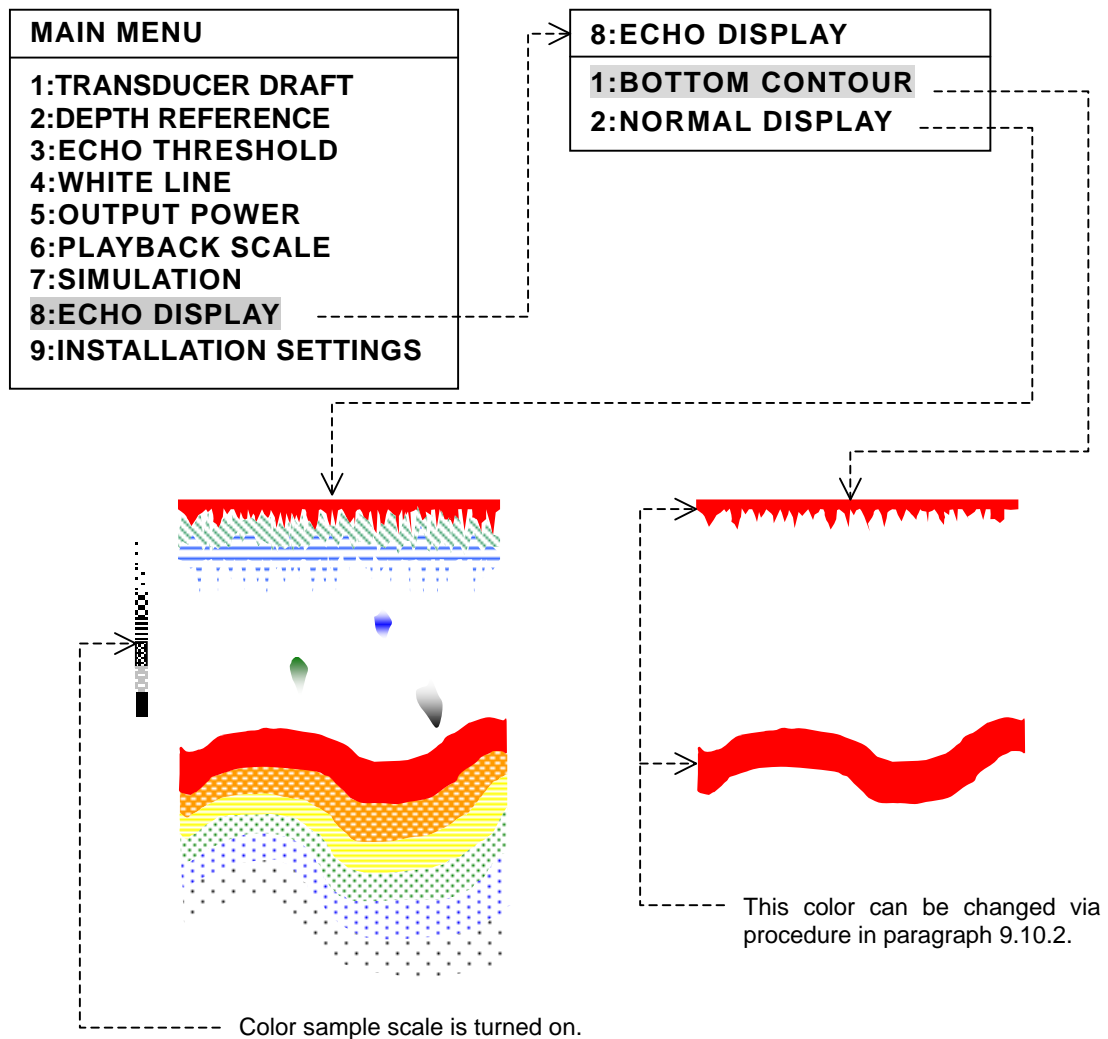
The alarm sound will be muted automatically 5 seconds after it is triggered. However, if you choose a shallow range (5– or 10–meter range) that does not cover the present depth, the alarm will be triggered again. For more information about the alarm, see paragraph 4.12.

4.9. Selecting Types of Echo Display

Initially the equipment shows only the strongest part of the bottom echo in a single color (initially red) with most of other echoes including fish echoes suppressed. If you wish to show all echoes in full colors, proceed as follows:

- ① Press **MENU**, displaying the **MAIN MENU**.
- ② Select "**8:ECHO DISPLAY**" by pressing **8** or by pressing **▲** / **▼**, followed by **ENT** MARK. This turns on an **ECHO DISPLAY** submenu, as shown below.

Figure 4-19 Selecting Types of Echo Display



- ③ Press **CLR** DEPTH ALARM to exit the menu mode.

NOTE: The strongest echo color (strength level 7, initially red) can be changed via the instructions given in paragraph 4.10.2.

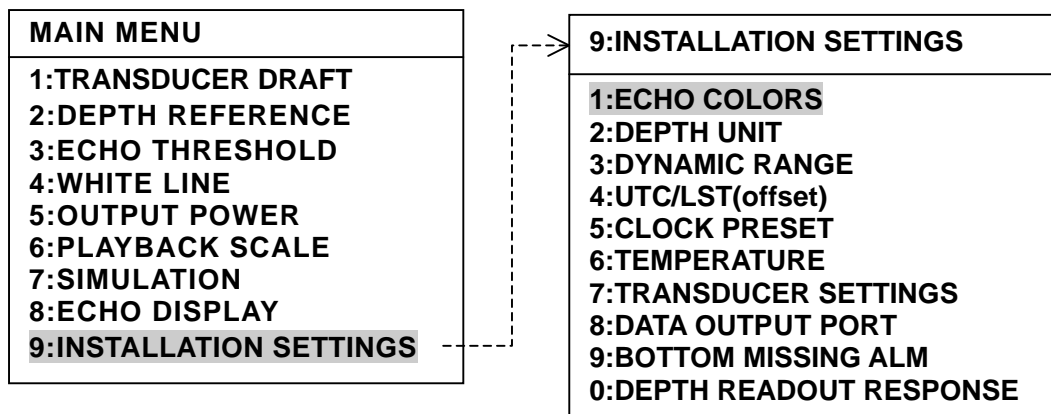
4.10. Installation Settings

4.10.1. Introduction

The following settings that should be normally made after initial installation and do not have to be changed frequently during normal operation are placed under the **MAIN MENU** option “**9:INSTALLATION SETTINGS.**”

- Changing echo color assignments (**1:COLOR**)
- Selection of depth readout units (**2:DEPTH UNIT**)
- Selection of echo dynamic ranges (**3:DYNAMIC RANGE**)
- Entry of time offset for local time readout (**4:UTC/LST (offset)**)
- Setting built-in clock (**5:CLOCK PRESET**)
- Selection of water temperature readout units (**6:TEMPERATURE**)
- Registration of transducer sites and keel offset (**7:TRANSDUCER SETTINGS**)
- Selection of types of data to be output (**8:DATA OUTPUT PORT**)
- Enabling/disabling bottom-missing alarm (**9:BOTTOM MISSING ALM**)
- Selection of digital depth readout response times (**0:DEPTH READOUT RESPONSE**)

Figure 4-20 Accessing **INSTALLATION SETTINGS** Options



To gain access to the **INSTALLATION SETTINGS** submenu, simply press $\frac{9/0}{A-SCP}$. The following instructions assume that the submenu is currently being opened.

4.10.2. Changing Echo Color Assignments

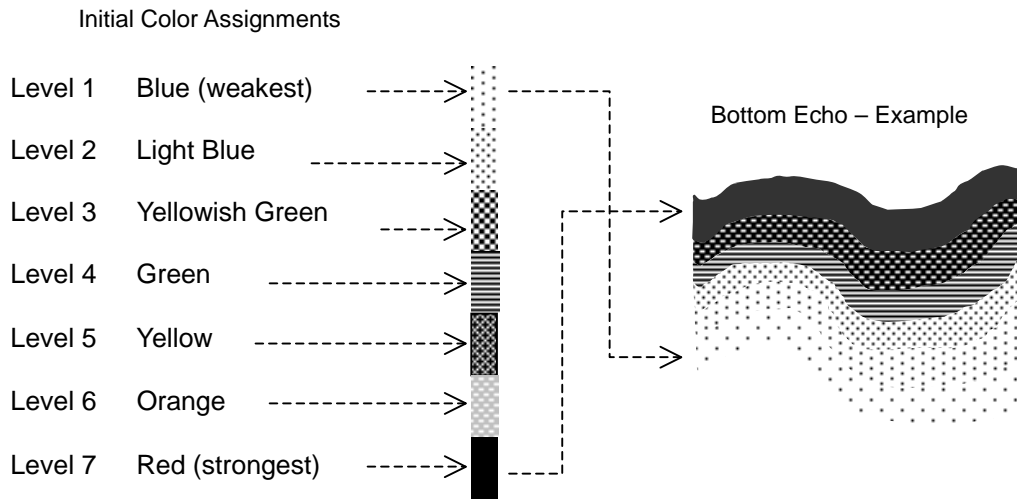
4.10.2.1. Introduction

Echoes will be displayed in up to seven different colors – initially, red, orange, yellow, green, yellowish green, light blue and blue in order of strength. Namely, red represents the strongest level, and blue, the weakest one. The color scale located at the left end of the echogram screen indicates the colors that are currently used to display the echogram, with the bottom end color assigned as the strongest level.

You can change those color assignments using a total of 10 different colors via the menu-guided steps described below.

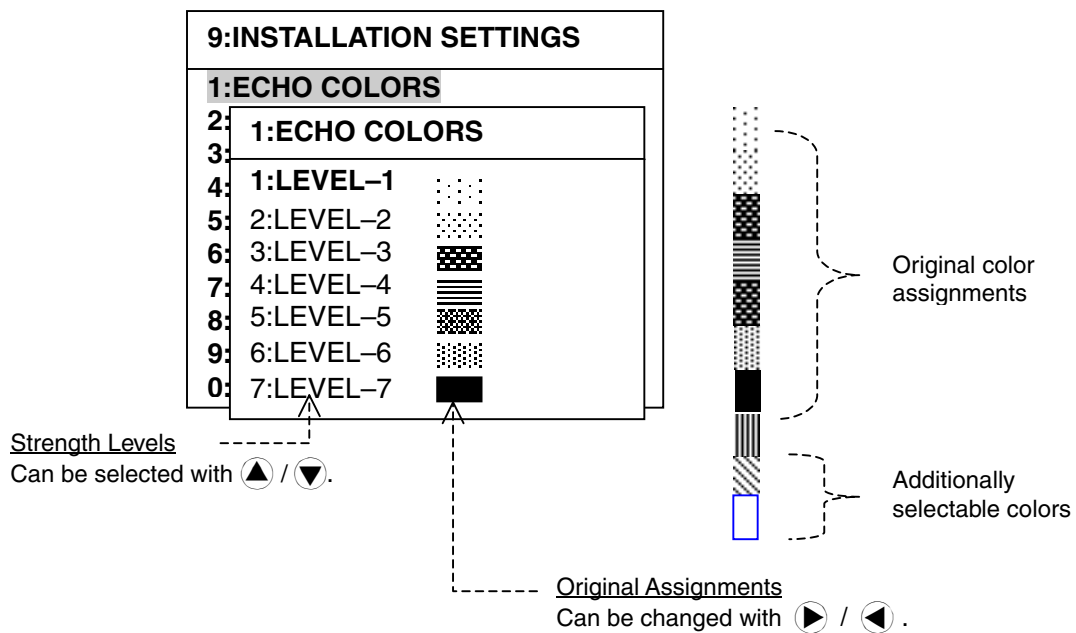
4.10.2.1. **Introduction** (continued – 2/2)

Figure 4-21 Initial Echo Colors Assignments









NOTE: The level 7 color (initially red) is used to show the bottom contour when the **ECHO DISPLAY** option is set to “**BOTTOM CONTOUR**” in paragraph 4.9.

Figure 4-22 Accessing **ECHO COLORS** Submenu



4.10.2.2. Changing Assignments

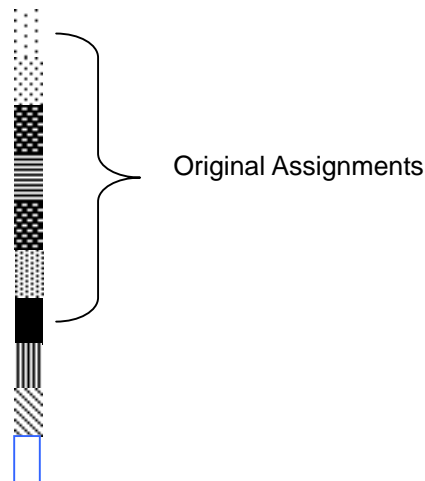
- ① Selecting option “1:ECHO COLORS” opens an **ECHO COLORS** submenu with a color scale consisting of 10 color samples to the right, as in Figure 4–22. The upper seven color samples on the scale represent the original assignments.
- ② Options **LEVEL–1** through **LEVEL–7** in the submenu represents the seven echo strength levels. The color sample to the right of each option is the original assignment. Using  / , select the level for which you wish to change the color.
*NOTE: Numeric keys cannot be used to select the options on the **ECHO COLORS** submenu.*
- ③ Repeatedly press either  or  until the desired color shows up.
- ④ Repeat steps ② and ③ to change the color for other strength level.
The  key does not have to be pressed to complete the setting.
- ⑤ Press  to return to the echogram screen.

4.10.2.3. Returning to Original Assignments

The upper seven color samples on the 10–color sample scale in Figure 4–23 indicate the original assignments.

To return to the original assignments, repeat the above steps ② through ④, selecting the colors in the same order as on the color sample scale.

Figure 4-23 Color Sample Scale



4.10.3. Selecting Depth Readout Units

The on–screen depth readout is initially in meters (**m**). You can read depth in fathoms (**FM**), braccia (**BR**) or feet (**FT**) via the steps described below. However, depth information to be stored in memory for later off–line retrieval will be in meters despite of the readout unit selected. See paragraph 6.1 for greater details.

< CAUTION >

In order to operate the equipment in compliance with *IMO Resolution MSC.(69)74 Annex 4*, the depth readout indication must be in meters.


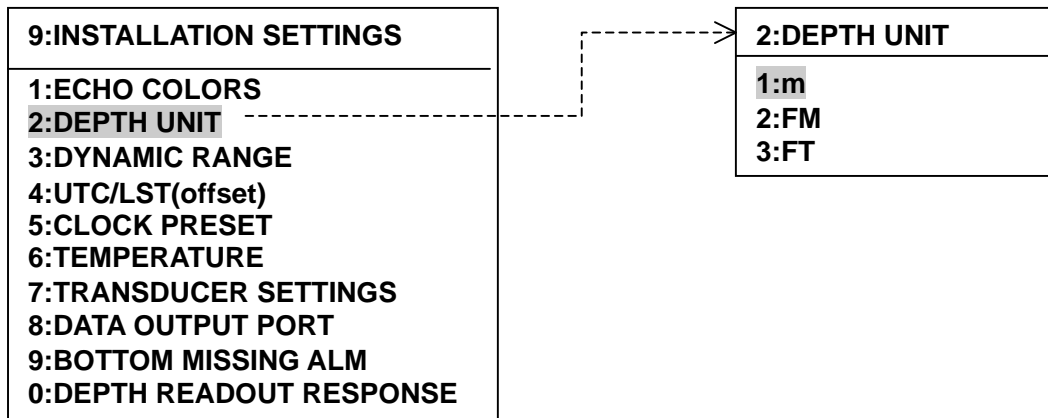



- ① Select “2:DEPTH UNIT” by pressing , opening a **DEPTH UNIT** submenu as shown below. The options available on the submenu should be self–explanatory.

Figure 4-24 Accessing **DEPTH UNIT** Submenu



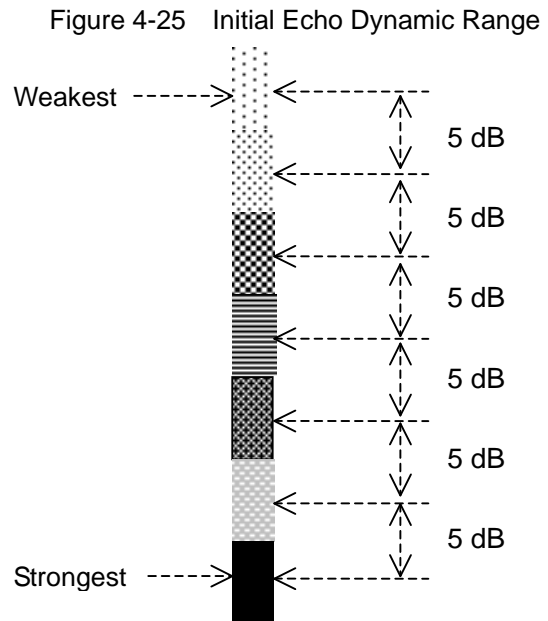
- ② Select the desired unit by pressing the appropriate numeric key. For example, to read depths in fathoms, select “2:FM” by pressing .
- ③ Press  to complete the selection, and  to exit the menu mode.

4.10.4. Selecting Echo Dynamic Ranges

4.10.4.1. Introduction

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 following selectable dynamic ranges: 3 dB, 4 dB, 5 dB and 6 dB. Selecting a greater dynamic range will require 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 the 5 dB setting still produces majority of echoes in strong colors. A 6-dB change represents a change of approx. 2 times in strength.

The following instructions will allow you to select the value that best suits your needs.

4.10.4.2. Dynamic Range Selection Procedure

- ① Select "**3:DYNAMIC RANGE**" by pressing , opening a **DYNAMIC RANGE** submenu.
- ② Select the desired range by pressing the appropriate numeric key.
- ③ Press to complete the selection, and to exit the menu mode.

Figure 4-26
DYNAMIC RANGE Submenu

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

4.10.5. Entering Time Offset for Local Standard Time Readout

4.10.5.1. Introduction

The date and time readouts displayed at the screen's upper left corner are initially UTC (Universal Time Coordinated) date and time. To display the information referenced to your local standard time (LST), enter the appropriate time offset (difference between LST and UTC) via the steps given in the next paragraph. Major offsets from UTC are listed below:

• Bangkok:	+7 house	• Honolulu:	-10 hours*
• Djakarta:	+7 hours	• New York:	-5 hours*
• Ho Chi Minh	+7 hours	• Houston:	-6 hours*
• Hong Kong:	+8 hours	• San Francisco:	-8 hours*
• Kuala Lumpur:	+8 hours	• Rio de Janeiro:	-3 hours
• Mumbai (Bombay):	+5.5 hours	• Lima:	-5 hours
• Perth:	+8 hours*	• Izmir:	+2 hours
• Seoul:	+9 hours	• Gdansk:	+1 hour*
• Singapore:	+8 hours	• Hamburg:	+1 hour*
• Sydney:	+10 hours*	• Marseilles	+1 hour*
• Taipei:	+8 hours	• Oslo:	+1 hour*
• Tokyo:	+9 hours	• Sankt-Peterburg:	+3 hours*
• Wellington:	+12 hours		

*Add 1 hour for Daylight Saving Time.

4.10.5.2. Time Offset Entry Procedure


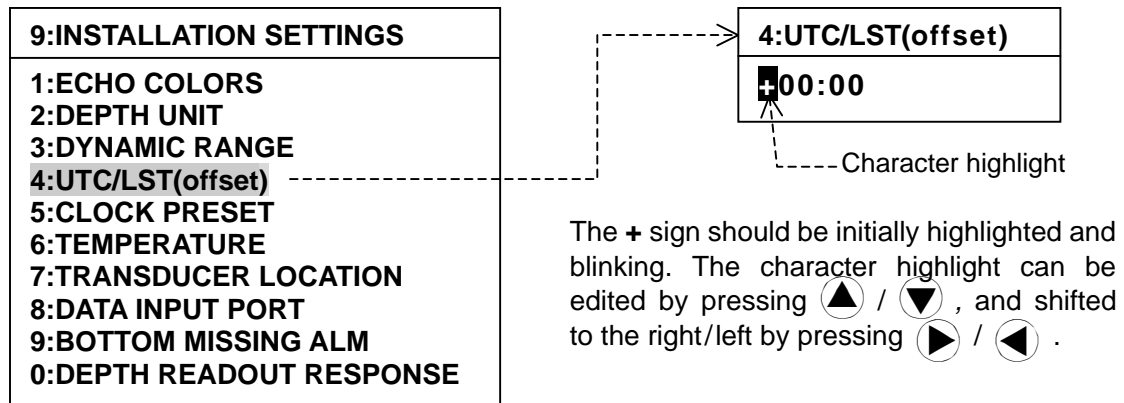




- ① Select option "4:UTC/LST (offset)" by pressing numeric key , opening a **UTC/LST (offset)** submenu, ready for entering a time offset. Initially an offset of +00 hours 00 minutes (+00:00) is entered to display the UTC time, as shown below.

Figure 4-27 Entering Time Offset



- ② Enter the desired time offset. The +/- sign is switched by pressing  or .
- ③ Press  to complete the entry.
- ④ Press  to exit the menu mode.

To return to the UTC indication, enter 00:00 at step ②.


NOTE: Memory storage of data is done in UTC date/time despite of on-screen LST readout. See paragraph 6.1 for greater details.

4.10.6. Setting Date and Time

After deciding which time reference to display, UTC or LST (local standard time), via the preceding procedure (paragraph 4.10.5), set the date and time via the steps outlined below.

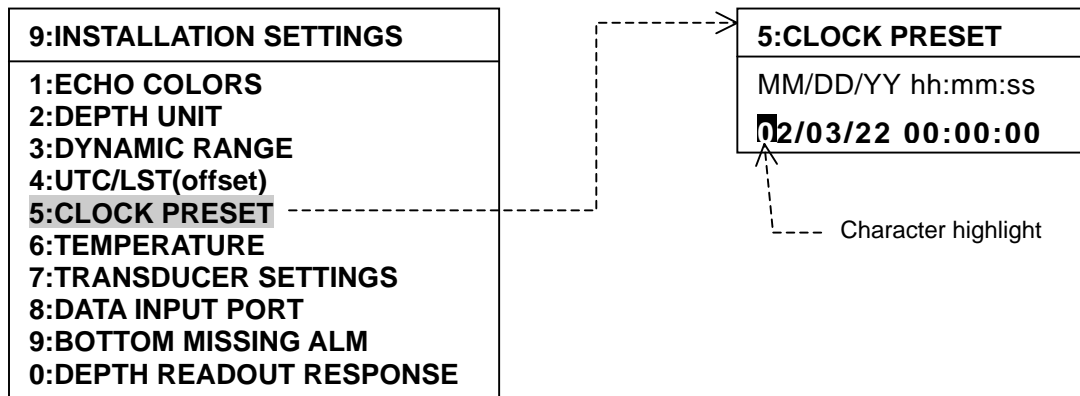
< CAUTION >

If you plan to plug in a GPS sensor, be sure to enter the correct UTC time offset before setting the date and time, or an incorrect date/time readout will result when a GPS-derived data stream (\$GPRMC or \$GPZDA) comes in.

- ① Select option “**5:CLOCK PRESET**” by pressing numeric key , opening a **CLOCK PRESET** submenu, ready for entering the current date and time.
 - The date must be entered in Month/Day/Year (MM/DD/YY) format.
 - The time must be entered in 24-hour (hh:mm:ss) format.

The highlighted and blinking character (character highlight) can be edited.

Figure 4-28 Setting Date and Time











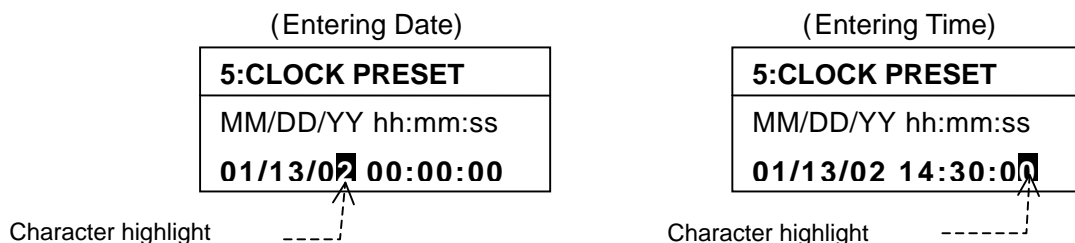


- ② Enter the current date using  /  and  /  .
 - Press  /  to shift the highlight to the character to be edited.
 - Press  /  to edit the highlighted character.

Figure 4-29 Entering Current Date and Time – Example



- ③ Press  to complete the entry.
- ④ Press  to exit the menu mode.

The built-in clock is battery-backed, eliminating the need to set the date and time again after the equipment is switched off and on again.

4.10.7. Selecting Temperature Readout Units

With an optional T-200 temperature sensor* plugged into the 4-pin rear panel connector “TEMP,” or with the specified dual frequency transducer connected, the equipment is capable of displaying surface water temperature in degrees Celsius (°C) or Fahrenheit (°F). The temperature data will not be stored in memory for later retrieval.

The following instructions will allow you to turn on/off the temperature display and select the two readout units (°C and °F).

< CAUTION >

Use of sensor other than the T-200 or of a dual frequency transducer other than the specified will result in an incorrect temperature readout.


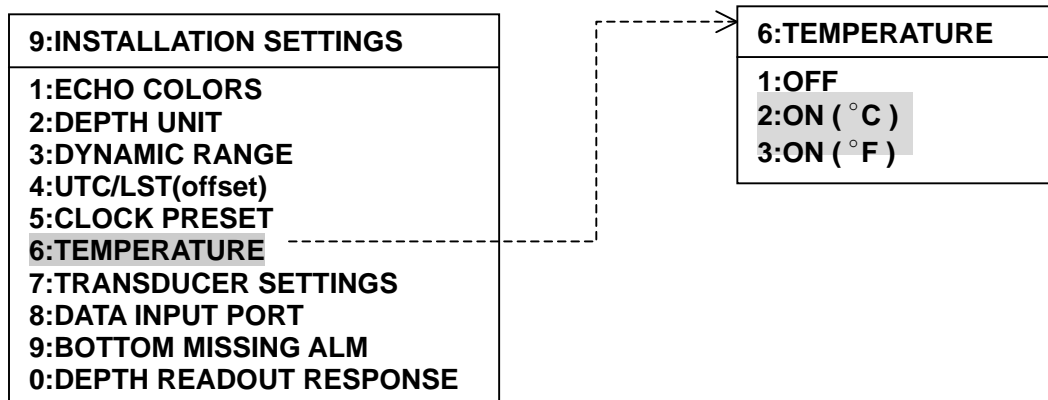


- ① Select option “**6:TEMPERATURE**” by pressing numeric key  , opening a **TEMPERATURE** submenu as shown below.

Figure 4-30 Selecting Temperature Readout Units




Option “**2:ON (° C)**” is initially selected so that the temperature readout is turned on and in degrees Celsius.

- ② Select the desired unit by pressing the appropriate numeric key.
- ③ Press  to complete the selection, and  to exit the menu mode.

NOTE: Selecting either readout unit turns the temperature display on automatically.

Turning off Temperature Display

To turn off the temperature display, select “**1:OFF**” at step ②, and press .

4.10.8. Making Transducer-Related Settings

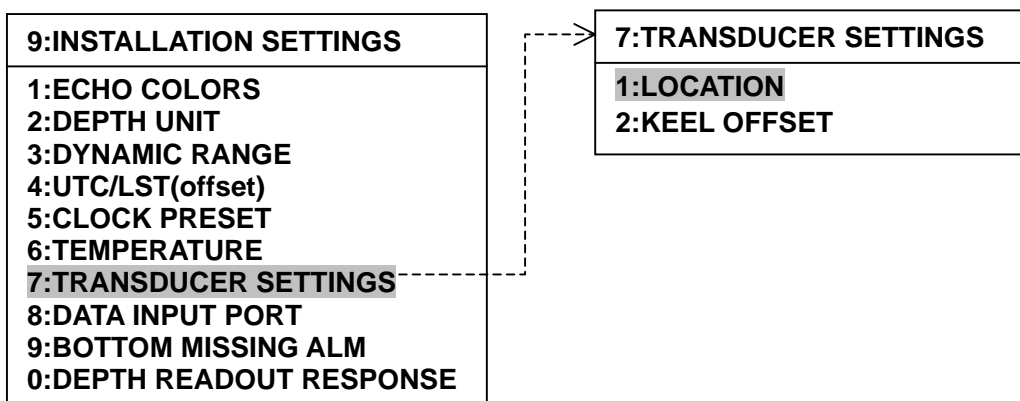
4.10.8.1. Introduction

In order to read depth from the keel or to graphically indicate the relative location of the transducer being used for current sounding, you must make the following menu settings related to the transducer(s) at initial installation time.

- Registering transducer locations
- Entering keel offset

These settings are grouped under option “**7:TRANSDUCER SETTINGS**” accessible through **MAIN MENU** option “**9:INSTALLATION SETTINGS**.”

Figure 4-31 Gaining Access to **TRANSDUCER SETTINGS** submenu



It is assumed that the **TRANSDUCER SETTINGS** submenu is being accessed.

4.10.8.2. Registering Relative Transducer Locations




In a system where two transducers are installed, the ship-shaped symbol () shown just above the scale line 0 is designed to indicate the relative location of the transducer that is being used for current sounding. Three sites are selectable for each transducer: Aft, Middle and Fore, as illustrated below.

Figure 4-32 Indication of Transducer Site



To take advantage of this feature, you must register the relative sites of the high and low transducers via the following steps:

- ① Select “**1:LOCATION**” by pressing numeric key , opening a **LOCATION** submenu.
- ② Press , selecting option “**1:CH-A**” (for channel A).
- ③ Select the appropriate option by pressing the corresponding numeric key.

4.10.8.2. Registering Relative Transducer Locations (continued – 2/2)





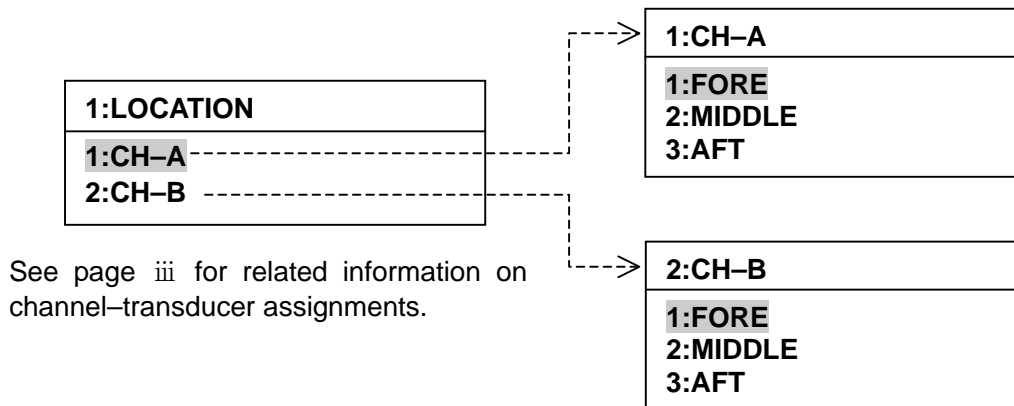
- ④ Press .
- ⑤ Select “2:CH-B” by pressing .
- ⑥ Select the appropriate option by pressing the corresponding numeric key.
- ⑦ Press .
- ⑧ Press  to exit the menu mode.

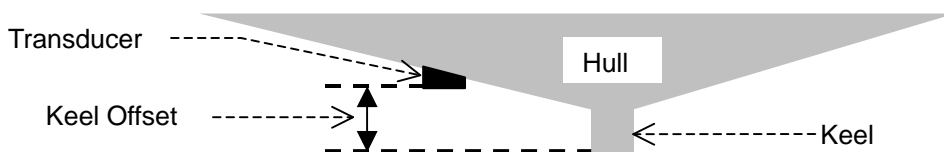
Figure 4-33 Registering Transducer Sites




4.10.8.3. Entering Keel Offsets




To read depth from the keel, you must first register the keel offset (distance from the transducer face to the bottom end of the keel in the vertical plane, as defined in the example below). In a multiple-transducer installation (with two transducers installed in separate housings), it is necessary to enter the appropriate keel offsets separately for channel-A transducer and channel-B transducer.

Figure 4-34 Keel Offset – Example



- ① Select “2:KEEL OFFSET*” by pressing numeric key , opening a **KEEL OFFSET** submenu.

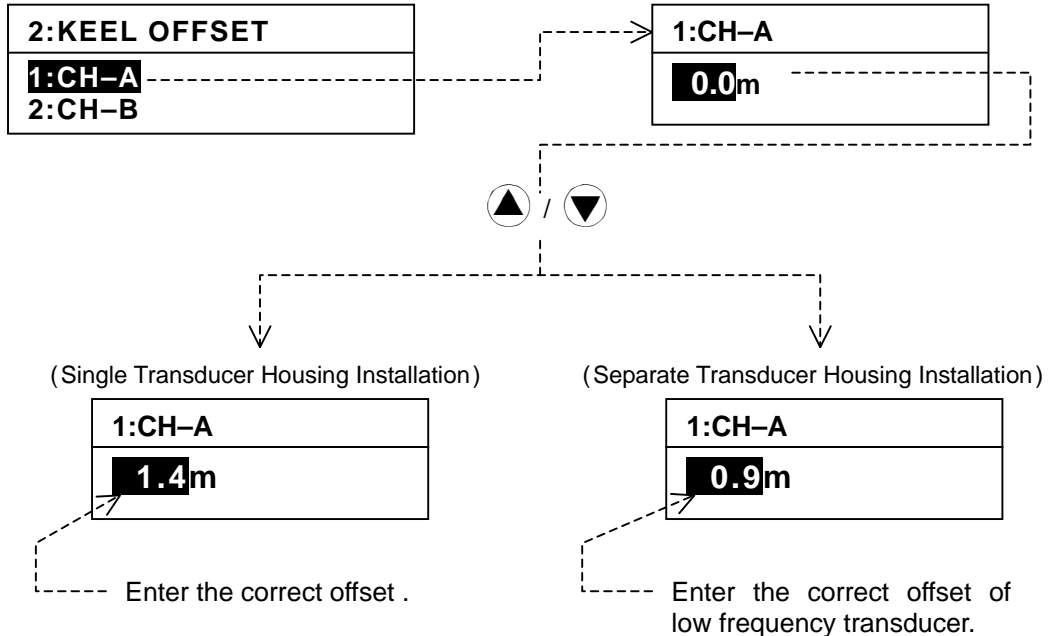
* via **MAIN MENU**→8:INSTALLATION SETTINGS→7:TRANSDUCER SETTINGS path

- ② Press , selecting option “1:CH-A “ (channel A).
- ③ Enter the correct keel offset of the channel-A transducer by repeatedly pressing  / . *Numeric keys cannot be used for entry of keel offset.*

4.10.8.3. Entering Keel Offsets (continued – 2/2)

- ④ Press **ENT** to complete the entry for channel-A operation. The **KEEL OFFSET** menu should then be displayed again.

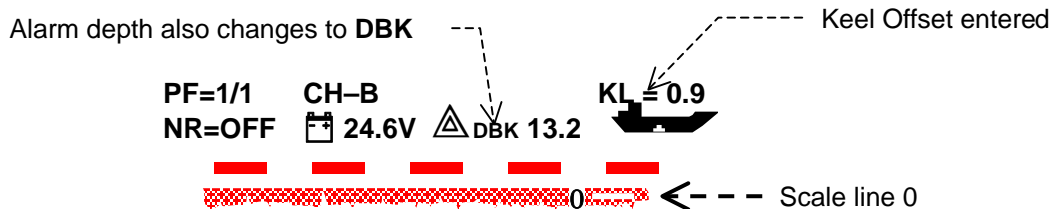
Figure 4-35 Entering Keel Offset for Channel-A Transducer – Example



- ⑤ Select "2:CH-B" and, similarly enter the same offset value for single transducer housing installation or the correct offset of the channel-B transducer for separate transducer housing installation.

An example below indicates how the keel offset entry affects the status indicators in the upper part of the screen with the depth reference set to "BELOW KEEL*." Note that the zero line (i.e. start of transmission) occurs above scale line 0, but its display is suppressed. The digital depth readout and alarm depth will be a depth-below-keel (DBK) value.

Figure 4-36 Indication of Depth Reference with Keel Offset Entered – Example



*The depth reference must be changed accordingly to "BELOW KEEL," as in the example below, via the procedure in paragraph 4.3.

MENU → MAIN MENU → 2:DEPTH REFERENCE → 3:BELOW KEEL → **ENT**

4.11. Selecting Types of Navigational Data To Be Output

4.11.1. Introduction

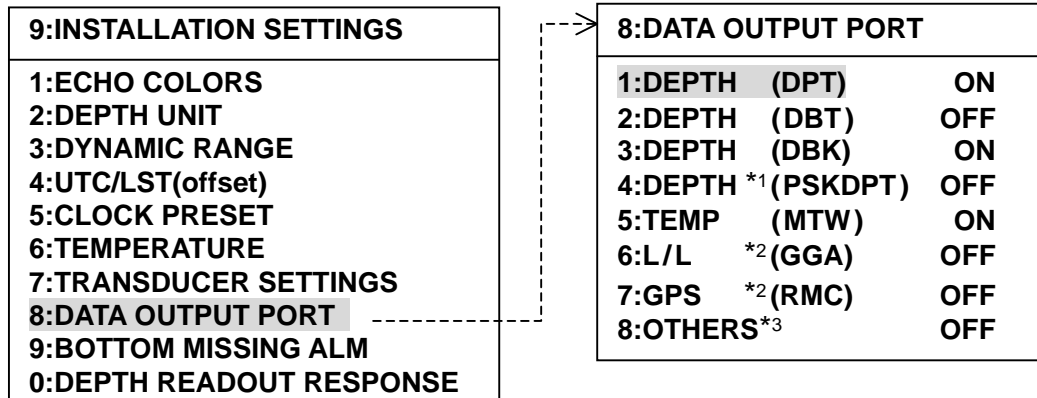
Types of navigational data available as IEC 61162–1/NMEA–0183 format outputs through the rear panel interface connectors include internally generated depth data and those received via externally connected sensors, such as a GPS sensor. They can be individually turned on/off via the following procedure so that an externally connected device can choose only the desired one without being overloaded due to reception of unnecessary data outputs.

NOTE: Alarm output (\$SDALR) sentences are available at 1-minute or 30 second intervals via the rear panel RS–422/RS–232C connectors, depending on whether or not an alarm condition exists, and will not be affected by executing the following steps. See paragraph 9.3.4.3 for details.

4.11.2. Selecting Outputs

- ① Press **MENU** to open the **MAIN MENU**, and select “**9:INSTALLATION SETTINGS**” by pressing **A-SCP**.
- ② Select “**8:DATA OUTPUT PORT**” by pressing **A-SCP** again. A **DATA OUTPUT** submenu will then be opened, listing the on/off status of each output, as in the example below. Initially the depth (**DPT**) and temperature (**MTW**) data are enabled as indicated “**ON**” in the status column.

Figure 4-37 Accessing **DATA OUTPUT PORT** Submenu



*1: Depth data **PSKDPT** is for use with a **SKIPPER IR 301** Digital Depth Repeater.

*2: These data will be available when an optional GPS sensor or an appropriate GPS data source is plugged into the **I/O DATA** connector.

*3: Outputs other than the above, e.g. date/time (ZDA), speed/heading. (VTG)

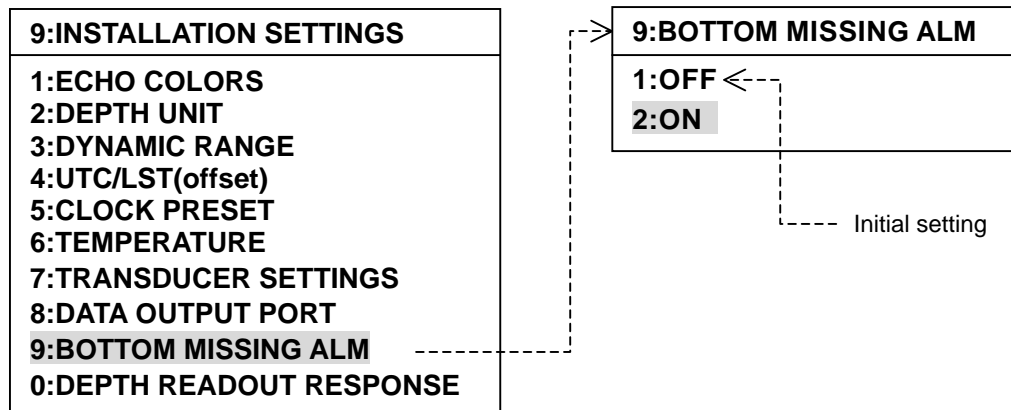
To enable other data to be output, follow the steps below:

- ③ Using **▲** / **▼**, highlight the output you wish to turn on/off.
NOTE: Numeric keys cannot be used at this step.
- ④ Press **▶** / **◀** so that the status indication changes to **ON** or **OFF**.
- ⑤ Press **ENT** to complete the current setting.
- ⑥ Exit the menu system by pressing **CLR**.

4.12. Enabling Bottom–Missing Alarm

The bottom–missing alarm (paragraph 3.12.5) is initially disabled so that no warning beeps will be heard when the equipment has failed to capture a solid bottom echo. To enable the function, follow the steps given below.

Figure 4-38 Enabling Audible Indication of Bottom–Missing Alarm



- ① Press **MENU** to open the **MAIN MENU**, and select “**9:INSTALLATION SETTINGS**” by pressing **A-SCP**.
- ② Select “**9:BOTTOM MISSING ALM**” by pressing **A-SCP** again. A **BOTTOM MISSING ALM** submenu will then be opened to show the current enabled/disabled status.
Initially, the status should be set to “**1:OFF**,” indicating that the function is disabled.
- ③ Press **2/V/V**, selecting “**2:ON**,” as shown above.
- ④ Press **ENT** to complete the setting.
- ⑤ Exit the menu system by pressing **CLR**.

*NOTE: The audible alarm cannot be silenced with **CLR**.

With the alarm enabled, the *alarm sound will be heard for approximately 5 seconds after the alarm is triggered and will then be automatically turned off, while the visual indication will remain on–screen until the bottom echo is recovered.

The alarm output sentence (\$SDALR) will, however, be continually available (at 30–second intervals) via the rear panel **RS–232C/RS–422** connectors while the alarm remains active. See paragraph 9.3.4.3 for details.

4.13. Selecting Depth Readout Response Times

4.13.1. Introduction

The equipment sometimes fails to receive a solid bottom signal due to turbulence or a layer of bubbles covering the transducers or when traveling over a precipitously sloping bottom that returns the echo to directions other than the transducers.

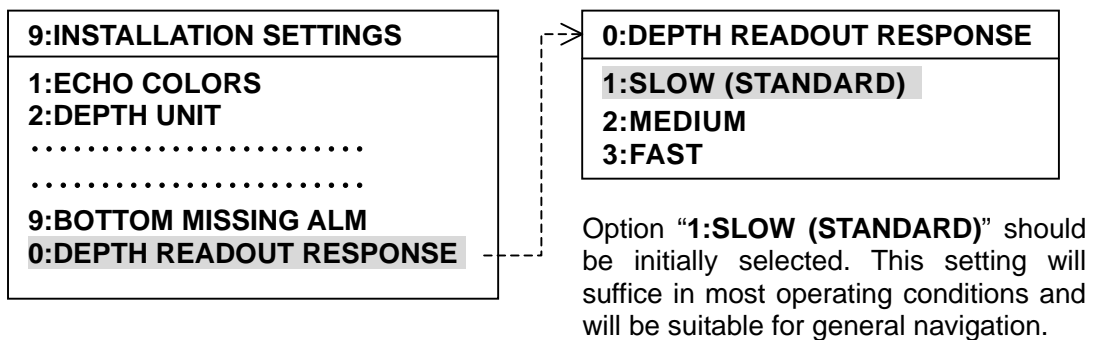
If the lost—bottom condition occurs only briefly, the equipment will hold* the last measured depth readout until the echo is recovered. However, if such a condition continues in excess of a certain period of time, the echo sounder will reset the last data, starting to search for the bottom by switching the depth ranges one by one, the smallest range first. During that period, no depth readout will be available. This bottom searching operation can take up to approx. 30 seconds at a time.

If you wish to see the change in depth more quickly when navigating areas where the bottom structure varies greatly over short distances, select shorter time periods (depth readout response times) during which the equipment holds the last depth value, via the following steps.

4.13.2. Selecting Depth Readout Response Times

- ① Press **MENU** to open the **MAIN MENU**, and highlight **“9:INSTALLATION SETTINGS”** by pressing **9/0** **A-SCP** once, followed by **ENT** **MARK** or by pressing **▲** / **▼** and **ENT** **MARK**.
- ② Highlight **“0:DEPTH READOUT RESPONSE”** by pressing **9/0** **A-SCP** twice, followed by **ENT** **MARK** or by pressing **▲** / **▼** and **ENT** **MARK**. The **DEPTH READOUT RESPONSE** submenu will then be turned on as shown below.

Figure 4-39 Selecting Depth Readout Response Times



The equipment will hold the last data for a period ranging from approximately 6 to 24 seconds depending on the range currently in use before starting the bottom searching process again.

- ③ If a faster response is desired, select either **“2:MEDIUM”** or **“3:FAST”** using the appropriate numeric key and **ENT** **MARK**.

*NOTE: Approximate periods to hold the last depth measurement are as follows:

Table 4-1 Last Readout Holding Periods

Option \ Range	40 meters	100 meters	1000 meters
1:SLOW (STANDARD)	6 seconds	12 seconds	24 seconds
2:MEDIUM	5 seconds	10 seconds	20 seconds
3:FAST	3.5 seconds	7 seconds	14 seconds

5. Making Settings via SYSTEM MENU

5.1. Introduction

The following functions are available through a devoted menu called a **SYSTEM MENU**, which is accessible by turning the equipment on while holding down the **MODE** key:

- Selection of background colors for echogram screen
- Execution of hardware integrity checks (self-diagnostic tests)
- Uploading of stored data to PC-based applications
- Selection of data output intervals*¹
- Selection of channels to be displayed

Figure 5-1 **SYSTEM MENU**

SYSTEM MENU
1:BACKGROUND
2:SYSTEM CHECK
3:OUTPUT STORED DATA
4:OUTPUT INTERVAL
5:DISPLAY CHANNEL

The options on the **SYSTEM MENU** and their summarized functions are as follows:

- **1:BACKGROUND:** Selects three background colors for echogram screen.
- **2:SYSTEM CHECK:** Executes hardware integrity checks.
- **3:OUTPUT STORED DATA:** Outputs stored data to PC applications via rear panel serial data connectors (**RS-232C**, **RS-422** and **I/O DATA**). See paragraphs 6.1 through 6.3 for details.
- **4:OUTPUT INTERVAL:** Selects intervals*¹ at which stored data are to be uploaded. See paragraph 6.3 for details.
- **5:DISPLAY CHANNEL:** Determines which channel echogram to display (channel-A, channel-B or both). See paragraph 3.5 for details.

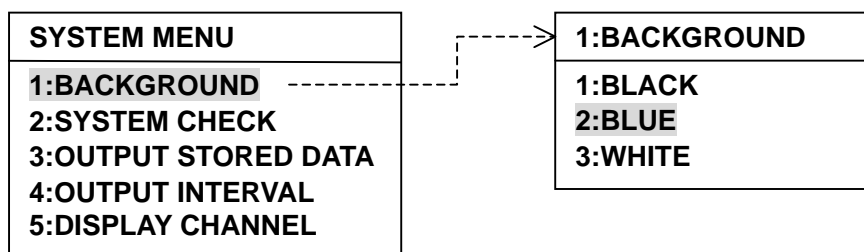
The following instructions assume that the **SYSTEM MENU** is being opened.

*¹: The output intervals of the alarm output sentences will not be affected.

5.2. Selecting Background Colors

- ① Selecting option “**1:BACKGROUND**” opens a **BACKGROUND** submenu with three options, as illustrated below. Those options are self-explanatory. Initially “**BLUE**” is selected, so that the echogram shows on a blue background.

Figure 5-2 Selecting Screen Background Colors



- ② Using the appropriate numeric key, select the colors that best suits the ambient lighting conditions, and press **ENT** to complete the selection.
- ③ Press **CLR** to exit the system menu mode.

5.3. Performing Self-Diagnostic Function


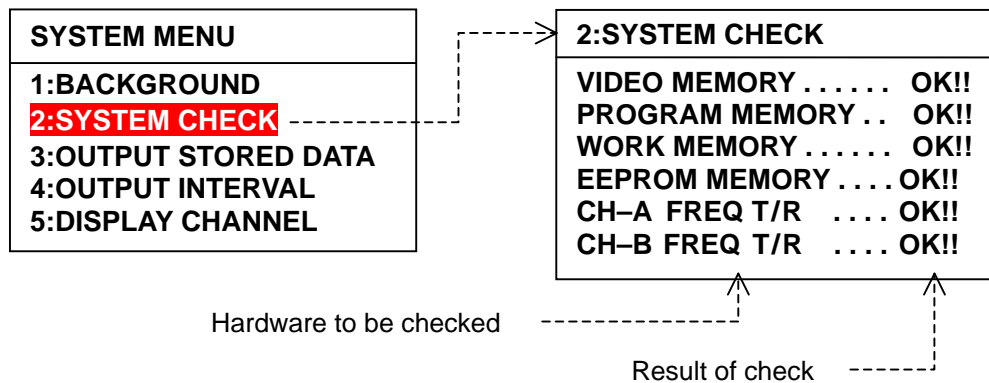
Selecting option “2:SYSTEM CHECK” by pressing  opens a **SYSTEM CHECK** submenu, initiating the built-in self-diagnostic test function automatically, as in the example below.

Figure 5-3 Initiating Self-Diagnostic Function – Example



The following hardware components will be checked for integrity:

- **VIDEO MEMORY:** Memory for displaying graphics data
- **PROGRAM MEMORY:** Flash memory storing software
- **WORK MEMORY:** CPU's work area for program execution
- **EEPROM MEMORY:** Electrically Erasable/Programmable ROM (EEPROM) storing user-made settings
- **CH-A FREQ T/R:** Channel-A transceiver*¹
- **CH-B FREQ T/R:** Channel-B transceiver*¹

The result of each check will be indicated as follows:

- **OK!!:** Hardware is functioning normally.
- **ERR!!:** Hardware malfunction is detected.

*¹: The appearance of zero line (paragraph 3.4.3) in the strongest echo color, except in the case of the DBK depth reference setting (paragraph 4.3), also indicates that both the transmitter and the receiver are working consistently.

Press  to exit the **SYSTEM MENU** mode, or any other key to return to the **SYSTEM MENU**.

5.4. Outputting Stored Data

Figure 5-4 Executing Stored Data Output Function

Selecting option “**3:OUTPUT STORED DATA**” allows stored sounding data to be output via the rear panel interface connectors. See paragraph 9.3.4 for a detailed description of the function available by executing this option.

SYSTEM MENU
1:BACKGROUND
2:SYSTEM CHECK
3:OUTPUT STORED DATA
4:OUTPUT INTERVAL
5:DISPLAY CHANNEL

5.5. Selecting Intervals for Data Output from Memory

Figure 5-5 Selecting Stored Data Output Intervals

Selecting option “**4:OUTPUT INTERVAL**” allows you to select the time intervals at which the stored data strings are to be output via the rear panel interface connectors. See paragraph 9.3.4 for a detailed description of the function available by executing this option.

4:OUTPUT INTERVAL
1: 2 SEC
2: 6 SEC
3: 10 SEC
4: 20 SEC
5: 60 SEC

NOTE: Selection of a desired interval does not affect the output interval (1 sec.) of realtime depth data (DBT, DPT, PSKPDPT and DBK).

5.6. Selecting Channels To Be Displayed





Initially you can choose single-channel full-screen display (channel-A or channel-B) or dual-channel split-screen display (channel-A and channel-B) by pressing .


Figure 5-6 Selecting Channels To Be Displayed

If, for any reason, you wish to display the echogram of either channel only across the full screen area at all times regardless of the dual channel display capability, select the desired channel via the following procedure.

5:DISPLAY CHANNEL
1:CHANNEL-A
2:CHANNEL-B
3:DUAL CHANNELS

- ① Select option “**5:DISPLAY CHANNEL**” by pressing .
- ② Highlight the desired option by pressing the appropriate numeric key.
- ③ Press  to complete the setting. The **SYSTEM MENU** should then return.
- ④ Press  to return to the normal echogram screen.

< CAUTION >

Once a single channel is selected via the above steps, pressing  in an attempt to select the other channel or dual channel display will sound two quick beeps to indicate an operational error.

6. Outputting Stored Data for PC-based Applications

6.1. Introduction

Various types of data stored in non-volatile memory can be output via rear panel connectors (**RS-232C/RS-422** and **I/O DATA** ports) for processing or analysis in PC-based applications. The soundings information retrieved from memory is in meters and in NMEA-0183/IEC 61162-1 DPT format (consisting of depth-below-transducer, draft and keel offset), regardless of whether other readout unit (FM, FT, or BR) is selected via paragraph 4.10.3, and the date/time information is in UTC even if a local time offset was entered. The echo sounder functions are disabled while the stored data are being uploaded to a PC or other host system, thereby preventing the saved data from being altered or updated.

6.2. Data Output Format

The data sets are output with the latest one first, and in the manufacturer's proprietary format complying with NMEA-0183 data sentence specifications, as detailed below:

Figure 6-1 Output Format of Stored Data

\$PJMCN, X.X,X.X, X.X, A, ddmyy, hhmmss, (continued to next line)
 ① ② ③ ④ ⑤ ⑥ ⑦
lll.lll, a, yyyy.yyy, a * h h <CR><LF>
 ⑧ ⑨ ⑩ ⑪ ⑫ ⑬ ⑭

- ① Talker Identifier (proprietary)
- ②* Depth below transducer in meters, varying in length; null if depth information was temporarily unavailable.
- ③* Offset; positive (+) = transducer draft, negative (-) = offset from transducer to keel. Null if no data is entered
- ④ Depth range used, in meters**
- ⑤ Operating channel (transducer) used; A = channel A, B = channel B
- ⑥ Date (day/month/year) referenced to UTC, fixed in length.
- ⑦ UTC time (hours/minutes/seconds), derived from internal clock or from GPS time if valid position fix was available. Fixed in length.
- ⑧ Latitude coordinate (to 1/1000 minutes), varying in length; null if valid GPS position fix was temporarily unavailable.
- ⑨ Latitude sign (N/S); null if valid GPS position fix was temporarily unavailable.
- ⑩ Longitude coordinate (to 1/1000 minutes), varying in length; null if valid GPS position fix was temporarily unavailable.
- ⑪ Longitude sign (E/W); null if valid GPS position fix was temporarily unavailable.
- ⑫ Checksum
- ⑬ Carriage return
- ⑭ Line feed

*If both offsets were entered, two \$PJM CN sentences will be output with the same depth-below-transducer value; one contains the transducer draft, and the other, the keel offset.

6.2. Data Output Format (continued – 2/2)

** If depth measurements were done in fathoms or feet, the following metric values are used to represent the maximum depth range in use:

Value (m) ④	Max. range in fathoms	Value (m) ④	Max. range in feet
4.5m	2.5	6.1m	20
9.0m	5	12.2m	40
18.2m	10	30.6m	100
36.5m	20	61.2m	200
91.4m	50	122.5m	400
182.8m	100	306.4m	1000
365.7m	200	612.8m	2000
914.4m	500	1225.6m	4000

6.3. Outputting Stored Data

The function of outputting stored data sentences can be initiated through the **SYSTEM MENU*** described in section 5.

* The menu can be opened by first turning the equipment off and then turning it on again while holding down **MODE**.

The following **SYSTEM MENU** options are related to the function:

- **3:OUTPUT STORED DATA:** Outputs stored data to PC applications via rear panel serial data connectors (**RS-232C / RS-422 / I/O DATA**).
- **4:OUTPUT INTERVAL:** Selects intervals at which data are to be uploaded.

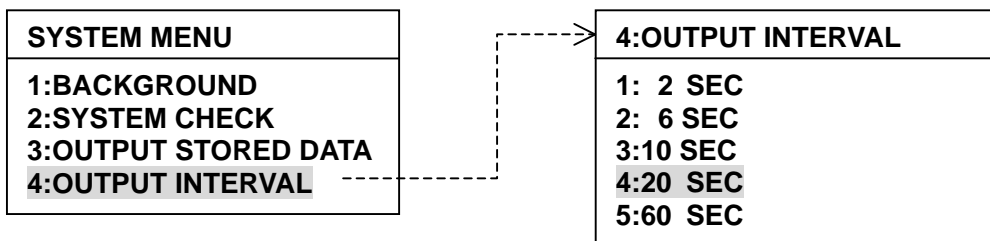
The following instructions assume that the **SYSTEM MENU** is being opened, and a suitable PC is plugged into the **RS-232C**, **RS-422** or **I/O DATA** port with appropriate data processing software, such as Windows' hyper terminal (set to text capture mode), running.

6.3.1. Selecting Output Intervals





The time interval at which stored data sentences are to be output is selectable from 2, 6, 10, 20 and 60 seconds, and is initially set to 20 seconds. At this rate, it will take up to approximately 8 minutes to upload all data stored to capacity. If the current application requires data at a shorter or longer interval, select the desired one via the following steps.

- ① Select option "**4:OUTPUT INTERVAL**" by pressing **AUTO RANGE** or **▲ / ▼** and **ENT MARK**, opening an **OUTPUT INTERVAL** menu, as shown below.

Figure 6-2 Selecting Data Output Intervals



6.3.1. Selecting Output Intervals *(continued – 2/2)*






- ② Using the appropriate numeric key (or  /  and ), select the time interval that best serves the current purpose.
- ③ Press  to complete the selection. The **OUTPUT INTERVAL** menu will then be closed.
- ④ Proceed to the next paragraph to activate the data uploading function.


6.3.2. Uploading Stored Data

After choosing the desired output interval via the preceding procedure, activate the data uploading function in the following manner:

Figure 6-3 Uploading Stored Data – Step (1)

SYSTEM MENU
1:BACKGROUND
2:SYSTEM CHECK
3:OUTPUT STORED DATA
4:OUTPUT INTERVAL

- ① Select “**3:OUTPUT STORED DATA**” by pressing   (or  /  and ). The equipment is now ready to start uploading data.

The key symbol **[ENT]** in the “**PRESS [ENT] TO START**” message below the menu should start blinking highlighted, prompting you to press  to execute the function.

PRESS **[MENU]** TO PREVIOUS MENU
PRESS **[ENT]** TO START


Blinking to prompt pressing of 

Figure 6-4 Uploading Stored Data – Step (2)

SYSTEM MENU
1:BACKGROUND
2:SYSTEM CHECK
3:OUTPUT STORED DATA
4:OUTPUT INTERVAL



- ② Press to start the data uploading process. A 4–to 5–digit down counter* should then show up in the middle between the menu and two message lines, as in the example at left. The counter reading becomes 0 upon completion of uploading, when the counter is turned off.

43097

-----Down counter (example)

PRESS **[MENU]** TO PREVIOUS MENU
PRESS **[CLR]** TO EXIT ALL

6.3.2. Uploading Stored Data *(continued – 2/2)*

- ③ To terminate the uploading before it completes, press  .
- ④ Press  to exit the **SYSTEM MENU** mode, returning to the normal echo sounder screen.

* *NOTE: The number of counter digits represents the number of output data sentence blocks terminated by carriage return (CR) and line feed (LF) codes, and its approximate maximum value varies with the output interval selected, as follows:*

43,200 (2 secs), 14,400 (6 secs), 8,640 (10 secs), 4,320 (20 secs), 1,440 (60 secs)

7. User-Level Trouble Shooting

7.1. Introduction

A list of common troubles the user may experience while operating the equipment is given below along with recommended remedies for such troubles. If a problem persists, contact your dealer for assistance, giving as much information as possible about the symptom, operating frequency, control and menu settings used, serial number of, and software version* installed in, the equipment.

* The software version number can be displayed by switching the equipment off first and then switching it on again while holding down **MODE** and **MENU** simultaneously.

< WARNING >

HIGH VOLTAGES EXIST INSIDE THE EQUIPMENT CABINET. THE USER MUST NOT OPEN THE CABINET IN AN ATTEMPT TO ACCESS INTERNAL PARTS.

7.2. Depth Readout

Symptom	Remedy
<p>No depth readout on shallow ranges (5m, 10m, 20m, 40m)</p> <p><i>No bottom echo or very weak bottom shows, triggering the bottom-missing alarm at all times.</i></p>	<ol style="list-style-type: none"> 1. Check if selected transducer is properly plugged into appropriate rear panel connector. 2. Turn appropriate gain control clockwise until bottom shows in one of 3 strongest colors (e.g. red/orange). (ref. paragraph 3.9) 3. Check TVG setting. If the control is set fully CCW, turn it clockwise until bottom appears in one of 3 strongest colors (e.g. red/orange). (ref. paragraph 3.10) 4. Check if the current range covers the depth being worked. Select next greater range or activate automatic bottom tracking function by pressing AUTO RANGE. (ref. paragraph 3.3.2) 5. Check output power setting via menu system (MAIN MENU → 5:OUTPUT POWER). Select option "3:1/4" or "2:1/1" if other option is currently selected. (ref. paragraph 4.6)
<p>No depth readout on deep ranges (100m, 200m, 400m, 1000m)</p> <p><i>No bottom echo or very weak bottom shows, triggering the bottom-missing alarm at all times.</i></p>	<ol style="list-style-type: none"> 1. Turn appropriate gain control clockwise until bottom shows in one of 3 strongest colors (e.g. red/orange/yellow). (ref. paragraph 3.9) 2. Select low frequency channel if high frequency channel is currently used. (ref. paragraph 3.7) 3. Check output power setting via menu system (MAIN MENU → 5:OUTPUT POWER). Select option "1:AUTO" or "2:1/1" if other option is currently selected. (ref. paragraph 4.6)


7. User-Level Trouble Shooting (continued – 2/6)

7.2. Depth Readout (continued – 2/2)

Symptom	Remedy
<p>Intermittent depth readout</p> <p><i>Digital readout is intermittent despite of the bottom display in one of the strongest colors.</i></p>	<p>The bottom echo is often lost when the ship is:</p> <ul style="list-style-type: none"> • heavily pitching or rolling, • in the wake of another vessel, • going astern, or • traveling over steeply changing bottom over short distances. <p>Select high frequency channel, if available, to alleviate problem when working on shallow ranges. (ref. paragraph 3.7), or select shorter readout response time, e.g. MEDIUM or FAST) (ref. paragraph 4.13).</p>
<p>Depth being registered shallower than actual depth</p> <p><i>The depth directly below is registered shallower than the actual depth when traveling over a sloping bottom.</i></p>	<p>The beam width of the transducer affects the depth readout. (ref. paragraph 3.7)</p> <p>Select high frequency channel, if current sounding is on low frequency channel, provided that bottom still shows in one of 3 strongest colors.</p>
<p>Impossible to measure depth shallower than 5 meters</p> <p><i>The zero line (thick line below the top scale line) is too thick, blocking reception of the bottom echo from shallow depths immediately below the transducer.</i></p>	<ol style="list-style-type: none"> 1. Select high frequency channel if current sounding is on low frequency channel. 2. Check output power setting via menu system (MAIN MENU → 5:OUTPUT POWER). Select “1:AUTO” or “5:1/100” if other setting is used. (ref. paragraph 4.6) 3. Use appropriate TVG control to reduce surface clutters. (ref. paragraph 3.10)
<p>Depth readout is twice actual depth</p> <p><i>The digital depth indication is twice the actual depth in shallow water soundings.</i></p>	<p>The symptom indicates that a second bottom echo is displayed at twice the depth of the true bottom, with the second echo being locked onto for depth measurement. (ref. paragraph 3.4.2).</p> <ol style="list-style-type: none"> 1. Turn the appropriate gain control counterclockwise until both bottom echoes are displayed in weaker colors, activating the bottom-missing alarm. Then gradually increase the gain until the first bottom shows in one of the strongest colors. 2. Check the output power setting via (MENU → 5:OUTPUT POWER). Try “1/100” or “1/25” during shallow water operation. Be sure to return the setting to “1:AUTO” after leaving shallow water areas. (ref. paragraph 4.6)





7. User-Level Trouble Shooting (continued – 3/6)

7.3. Switching Operating Channels

Symptom	Remedy
<p>Impossible to switch to other channel or to dual channel display</p> <p>Pressing  causes error-indicating beeps.</p>	<p>Display channel is fixed at current channel.</p> <p>Select dual channel display via procedure given in paragraph 5.6.</p> <p>This change in setting should be made with prior permission from system administrator or appropriate authorized person.</p>





7.4. Bottom Echo Appearance

*NOTE: The following symptoms and remedy suggestions apply when the echo display is set to show the bottom echo in full colors (via the procedure in paragraph 4.9 **MAIN MENU** → **8:ECHO DISPLAY** → **2:NORMAL DISPLAY**).*

Symptom	Remedy
<p>Only bottom contour is visible.</p> <p><i>The bottom contour is shown in a dotted line, followed by a blank area.</i></p>	<p>The symptom indicates that the white line function has been activated. (ref. paragraph 4.5)</p> <p>To see the bottom echo in full colors, set the white line level to 0 using  /  after accessing WHITE LINE submenu via (MAIN MENU → 4:WHITE LINE).</p>
<p>Only strong echo colors are visible.</p> <p><i>The bottom echo is shown in a few strong colors only.</i></p>	<p>The symptom indicates that the echo display threshold is set at a high level. (ref. paragraph 4.4)</p> <p>To see the bottom echo in full colors, set the threshold level to 0 using  /  after accessing ECHO THRESHOLD submenu via (MAIN MENU → 3:ECHO THRESHOLD).</p>
<p>Most echoes are visible in strong colors.</p> <p><i>Most of the echoes remain in strong colors despite of gain and TVG adjustments.</i></p>	<p>The symptom indicates that a small echo dynamic range is selected. Check the current dynamic range setting via (MAIN MENU → 9:INSTALLATION SETTINGS → 3:DYNAMIC RANGE). (ref. paragraph 4.10.4).</p> <p>Select 5 dB or 6 dB, if other value is currently selected.</p>




7. User-Level Trouble Shooting (continued – 4/6)

7.5. Alarms




Symptom	Remedy
<p>Bottom-missing alarm is on at all times.</p> <p><i>The bottom-missing alarm is triggered and no depth readout is available regardless of the presence of the bottom echo.</i></p>	<p>Symptom indicates that bottom echo is displayed in weak colors. If automatic control (AUTO) mode does not help solve this problem, switch to MANUAL (by pressing ) , and try suggestions below.</p> <ol style="list-style-type: none"> 1. Turn appropriate gain control clockwise until bottom shows in one of 3 strongest colors (e.g. red/orange/yellow, paragraph 3.9) if echo display is set to show bottom in full colors, or until bottom shows in strongest color if echo display is set to show bottom contour only. See paragraph 4.9 for related information. 2. Check TVG setting. If applicable control was set fully clockwise, turn it counterclockwise until bottom appears in one of 3 strongest colors. (ref. paragraph 3.10) if echo display is set to show bottom in full colors or until bottom shows in strongest color if echo display is set to show bottom contour only. See paragraph 4.9 for related information. 3. Check output power setting via menu system (MAIN MENU → 5:OUTPUT POWER). Select option “3:1/4” or “2:1/1” if other option is currently selected. (ref. paragraph 4.6).
<p>Unable to set depth alarm</p> <p><i>The alarm depth cannot be set at a new VRM position.</i></p>	<p>After shifting VRM to new position, press  . (ref. paragraph 3.12.4)</p>
<p>Unable to mute audible alarm</p> <p><i>The audible alarm continues sounding even if no alarm condition exist, and cannot be muted by pressing .</i></p>	<p>Symptom indicates that power line failure or power cable disconnection has occurred at ship's power source, triggering power removal/shutoff alarm.</p> <p>Locate rear panel switch marked “POWER ALARM  ” and press it. (ref. paragraph 3.12.7). Later serial number models have an additional alarm reset switch just behind the front hinged lid.</p>

7. User-Level Trouble Shooting (continued – 5/6)


7.6. Data History Window

Symptom	Remedy
<p>Data history window is not updated.</p> <p><i>The various data showing in the data history window are not updated.</i></p>	<p>The data history window is designed to show the past 24 hours of data from the moment when  is pressed.</p> <p>The data in the window are not updated automatically, though the current data are continuously stored in memory.</p> <p>To update the data, turn the window off first by pressing  , and then turn it on by pressing  . (ref. paragraph 3.11)</p>

7.7. Echogram Recalled from Memory


Symptom	Remedy
<p>Full color echogram is not stored.</p> <p><i>The right half of the current echogram cannot be stored in memory and cannot be recalled onto the left half screen area by pressing  .</i></p>	<p>Press  first to store the right half of the current echogram, and then press  to recall it across the left half screen area. (ref. paragraphs 3.5 & 3.6)</p>
<p>Stored full color echogram is erased.</p> <p><i>The recalled full color echogram on the left half screen is erased after the equipment is switched off.</i></p>	<p>The present software version does not support permanent storage of full color graphics data.</p>

7.8. Settings through Menu System



Symptom	Remedy
<p>Operation does not reflect settings made through menu system.</p>	<p>Press  each time a setting is made, before closing the menu. (ref. paragraph 4.1)</p>

7. User-Level Trouble Shooting (continued – 6/6)

7.9. Date/Time Indication

Symptom	Remedy
<p>Last date and time readouts are not remembered on next power-up.</p> <p><i>The date and time information you set through the menu system is lost after the equipment is switched off.</i></p>	<p>The symptom indicates that the backup battery (type CR2025) for the built-in real time clock is dead.</p> <p>Ask your dealer or authorized engineer to replace the existing battery installed on the internal main PCB.</p> <p style="text-align: center;">< WARNING > HIGH VOLTAGES EXIST INSIDE THE DISPLAY CABINET. THE USER MUST NOT OPEN THE CABINET.</p>
<p>Incorrect local date/standard time</p> <p><i>Incorrect local date and time readouts result after a GPS sensor is plugged in.</i></p>	<p>The symptom indicates that the correct UTC time offset is not entered or no time offset is entered.</p> <ol style="list-style-type: none"> 1. Check current offset via: MAIN MENU → 9:INSTALLATION SETTINGS → 4:UTC/LST (offset). (ref. paragraph 4.10.5) 2. Enter correct time offset. Be sure to press  before exiting menu system. (ref. paragraph 4.10.6)

7.10. Screen Hard Copy

Symptom	Remedy
<p>Right half echogram cannot be printed out.</p>	<p>Press  first to store the right half of the current echogram in memory, and then press  to display the HARD COPY menu. (ref. paragraph 3.6)</p>
<p>Screen hard copy is available only in monochrome.</p>	<p>The present software version does not support colored printout of the echogram screen, even if a color graphics printer is connected.</p>

7.11. GPS-Derived Data Outputs

Symptom	Remedy
<p>No GPS derived data outputs are available with a GPS sensor plugged into I/O DATA connector.</p>	<p>GPS-derived data outputs (\$GPGGA, \$GPRMC, etc.) are initially turned off. See paragraph 4.11.2 for instructions to make them available.</p>

8. User-Level Maintenance Instructions

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

8.1. 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 BENZENES, MUST NOT BE USED TO CLEAN THE CABINET OR SCREEN FILTER, OR PERMANENT DAMAGE TO THOSE PARTS WILL RESULT.**

To clean the cabinet surface, a neutral-type household detergent intended for office equipment is recommended.

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 a neutral type detergent.

8.2. Maintenance on Electrical Connections

The high humidity marine environment can cause electrical contacts in the rear panel connectors to corrode over time. Vibrations and shocks 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:

- 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.
- Check the connections at the ship's power source for freedom from any sort of corrosion.
- 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 CONTACT SURFACES AND MUST NOT BE USED.**

8.3. Maintenance on The Transducers

Marine growth on the transducer face will cause the sensitivity (ability to detect weak echoes) to drop over time. 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.

8.4. 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.

8.5. 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 soundings data, date/time, and other information that were automatically stored in the memory intended 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.

- ① Switch the equipment off.
- ② Switch it on again while holding down  until two quick beeps are heard. The following message will be very briefly displayed at the screen's upper left corner:

CLEAR BACKUP MEMORY

The normal echogram screen will then return.

This completes the resetting procedure.

- ③ Register the initial operating parameters, such as alarm depth, date/time, UTC offset, transducer draft, keel offset, transducer/channel assignments, location, etc., through the menu system.

9. Installation Instructions

9.1. Equipment Cabinet Installation

9.1.1. General Precautions

The equipment cabinet is constructed to withstand the humid and corrosive marine environment, but is designed to be installed or operated inside the wheelhouse or chartroom. Serious damage will result to the electronics inside the cabinet when it is exposed to salt water spray or splash.

Additional 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.
- away as much as possible from high temperature outlets (such as exhaust fans and heaters), and as much as possible from areas where the unit is likely to be constantly exposed to direct sunlight.

9.1.2. Mounting

The equipment cabinet is primarily designed to be mounted on a tabletop with the mounting bracket supplied and weights approximately 6.6 kg in total. The dimensions necessary for installation are given in Figure 9-2. 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.

Precaution for Panel Mounting

The following precaution applies to early serial number units that do not have an additional power alarm reset switch behind the hinged lid on the front panel.

If panel mounting is planned, be sure to install a remote alarm reset switch near the cabinet and run a suitable length of two-conductor cable to the switch from the five-pin spare connector on the rear panel. Wire a push-button on/off switch across pins #1 and #2. See paragraph 9.3.9 for details.

< WARNINGS >

1. **EXTREMELY HIGH VOLTAGE PULSES ARE PRESENT ON THE PINS IN EACH REAR-PANEL TRANSDUCER CONNECTOR WITH THE EQUIPMENT SWITCHED ON. TO PREVENT FROM AN ACCIDENTAL CONTACT WITH ANY OF THOSE PINS WHENEVER THE TRANSDUCER IS UNPLUGGED, EACH CONNECTOR MUST BE COVERED WITH THE PROTECTIVE CAP SUPPLIED. BE SURE TO LOCK THE CAP WITH THE TWO SCREWS ATTACHED.**
2. **DO NOT PLACE THE UNIT IN AN UNVENTILATED, SEALED ENCLOSURE, SUCH AS A THEFT-DETERRENT CABINET, OR OVERHEATING AND MALFUNCTION WILL RESULT.**
3. **DAMAGE CAUSED BY EXPOSURE TO WATER SPRAY OR TO DIRECT SUNLIGHT WILL NOT BE COVERED BY THE MANUFACTURER'S WARRANTY.**

9.1.2. Mounting (continued – 2/2)

Place the cabinet in the bracket as shown in Figure 9–1, using a pair of the clamping knobs supplied.

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

Figure 9-1 Placing Cabinet in Mounting Bracket

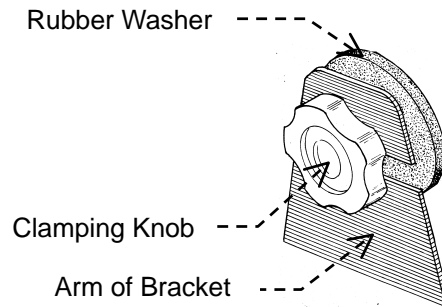
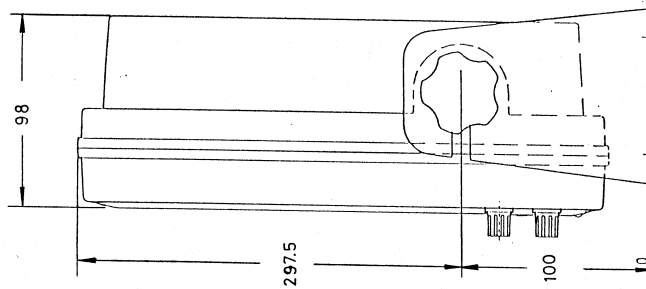


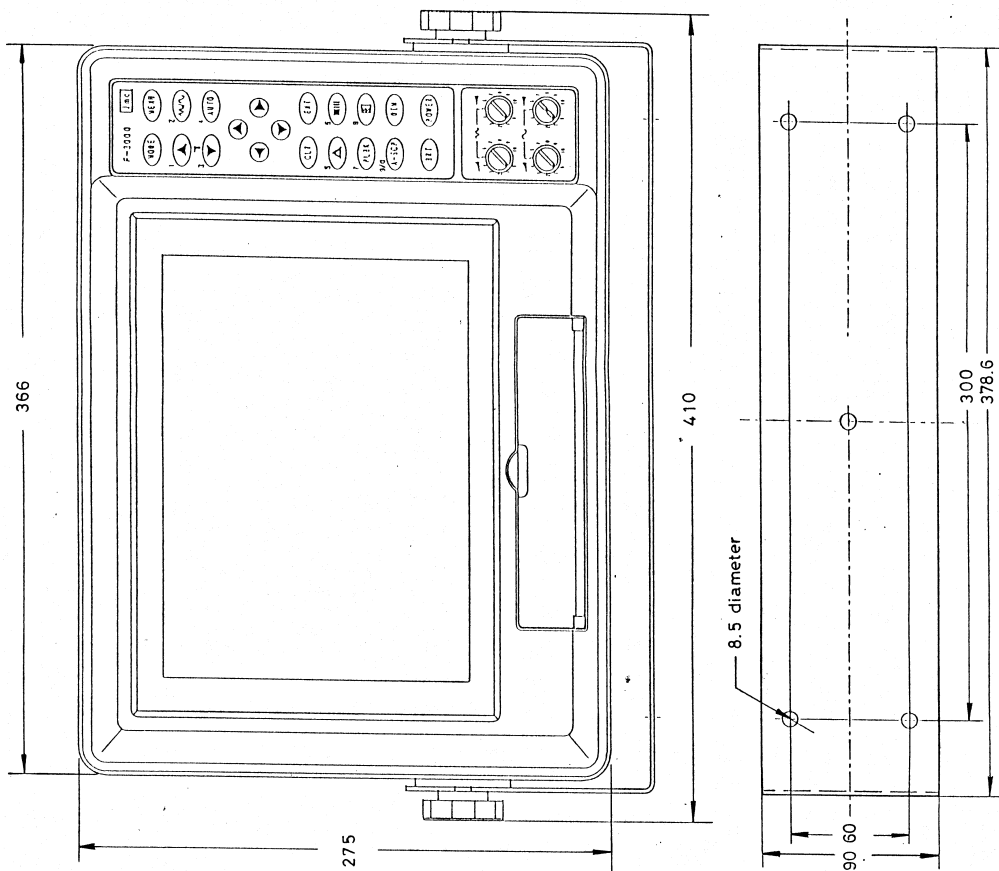
Figure 9-2 Installation Dimensions of Display Unit



Dimensions in millimeters

Weight:
5.2 kg (cabinet) +
1.4 kg (mounting bracket)

Compass Safe Distances:
1.8 meters for cabinet,
2.4 meters for mounting bracket



9.2. Transducer Installation

9.2.1. General Precautions

The installation should be planned in advance, keeping in mind the standard cable length integrally connected to the transducer. In an installation where a longer cable is required, it is recommended that the transducer be ordered with the desired 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.

< WARNINGS >

1. **DO NOT LIFT THE TRANSDUCER BY HOLDING ITS CABLE OR THE INTERNAL CABLE WIRING WILL BE DAMAGED DUE TO ITS WEIGHT.**
2. **THE TRANSDUCER IS A DELICATE PIECE OF ELECTRONICS, AND MUST NOT BE DROPPED OR HANDLED ROUGHLY. DAMAGE TO THE TRANSDUCER FACE CAN RESULT IN SERIOUS PERFORMANCE DEGRADATION.**

< CAUTION >

Use of extension cable not approved by the manufacturer will seriously degrade the transducer performance. Coaxial cables cannot be used.

9.2.2. Choosing Installation Location

The transducer location and method of installation will greatly affect the bottom detecting capability of any echo sounding 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 generated by the vessel in motion will most seriously degrade the bottom tracking performance. Each transducer should be located away from, and forward of, the propellers and shafts, well clear of any water intake/discharge line, hull openings, outlets, sea chests, and any other projections along the hull that might disturb the smooth flow of water around the transducers. It is recommended that the transducer be located on the side where the ship's propellers will move downwards to prevent them from pushing air bubbles up against the hull.

< CAUTIONS >

- **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 hull and cruising speeds, a practical choice for a first transducer will be somewhere between 1/3 and 1/2 of the vessel's length from the fore. A second transducer may be mounted in the aft third of the vessel.

Each transducer should be installed on, or close to, the vessel's centerline. On deep-keeled vessels, care must be taken to ensure that the energy beam (paragraph 9.2.3) of the transducer will not be blocked by the keel. If depth from the keel (DBK) is to be read, be sure to measure, and take a note of, the keel offset (distance from the transducer face to the keel in vertical plane) at this step. See paragraph 4.10.8.3 for related information.

There should be sufficient space inside the hull to allow access to the transducer housing, cable, stuffing tube, etc.

9.2.3. Matched Transducers

The equipment is designed to operate with the following transducers supplied by the manufacturer, or can be configured to work into existing transducers in a retrofit situation with appropriate matched transceiver boards installed.

- Dual Frequency: Type **570–50/200T** dual frequency transducer in single ABS housing, with beam angles of 14° X 20° at 50 kHz and 7° at 200 kHz. Power rating: 1kW RMS, Cable length: 15 meters
See < **WARNING #2** > below.
- Single Frequency: Type **570–50** 50 kHz single frequency transducer in ABS housing, with beam angle of 12°. Power rating: 1 kW RMS, Cable length: 15 meters (33 meters for OEM models)
- Single Frequency: Type **570–200** 200 kHz single frequency transducer in ABS housing, with beam angle of 4.5°. See < **WARNING #2** > below.
Power rating: 1 kW RMS, Cable length: 15 meters
- Single Frequency: 100 kHz (user-supplied, new or retrofit installation)

< WARNINGS >

1. **USE OF TRANSDUCER OTHER THAN THE ABOVE CAN RESULT IN EITHER DAMAGE TO THE TRANSDUCER/TRANSCIVER OR POOR DEPTH DETECTION PERFORMANCE.**
2. **USE OF 200 KHZ TRANSDUCER IS NOT TYPE-APPROVED. AN INSTALLATION WITH A 200 KHZ TRANSDUCER ALONE IS ILLEGAL.**
3. **DO NOT SWITCH THE EQUIPMENT ON UNTIL THE TRANSDUCERS ARE PLACED INTO WATER, OR DAMAGE TO THE CERAMIC CRYSTALS CAN RESULT.**

< CAUTION >

To help the user identify high and low frequency transducers easily after they are installed, mark each plug appropriately or attach to each plug a suitable tag with an appropriate ID (e.g. CH-A or CH-B).

The dimensions of matched transducers are given in the following pages. For installation in a steel-hulled vessel, the user (or the shipyard) must design and prepare an appropriate housing/blister that may have to be certified by the ship's classification society or a notified body to comply with the relevant specifications.

Figure 9-3 Type **570-50/200T** Dual Frequency Transducer
(excluding Steel Housing/Blister)

Housing material: ABS

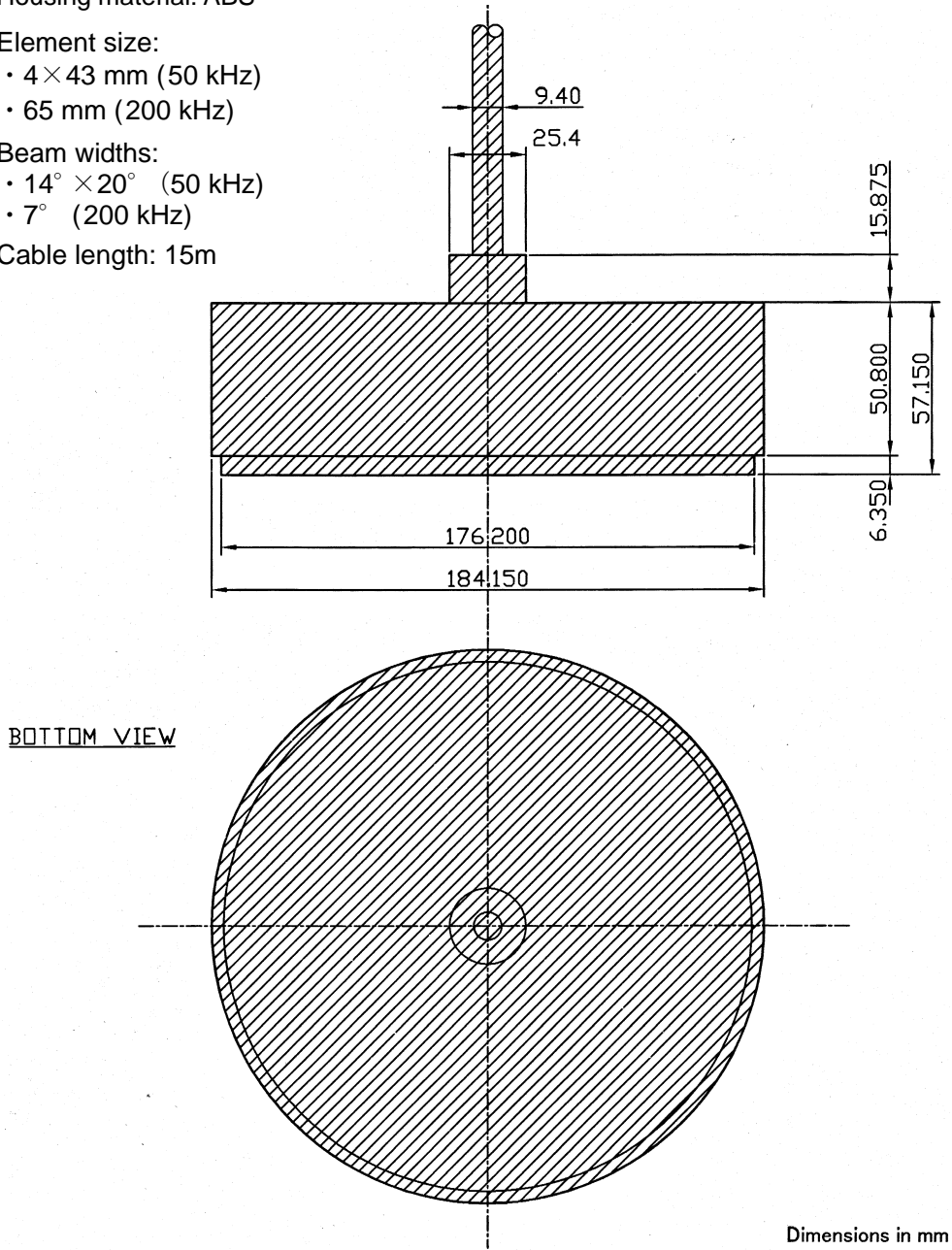
Element size:

- 4×43 mm (50 kHz)
- 65 mm (200 kHz)

Beam widths:

- 14° × 20° (50 kHz)
- 7° (200 kHz)

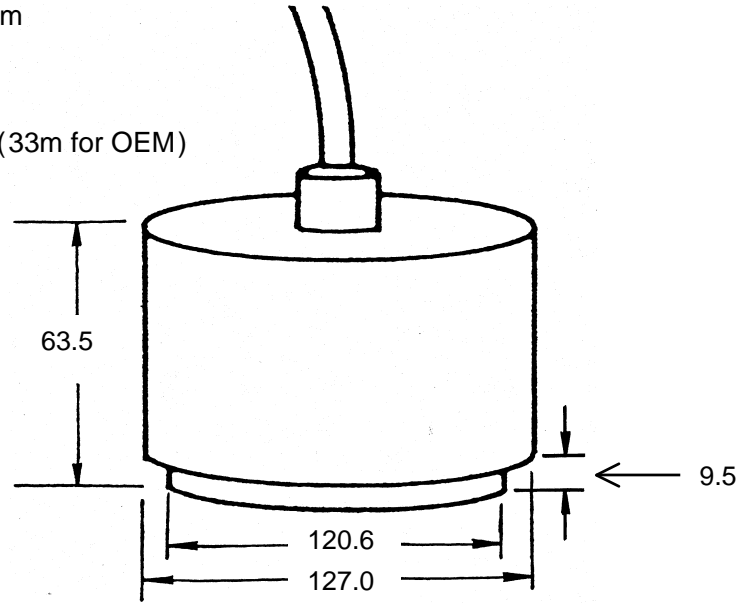
Cable length: 15m



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

Figure 9-4 Types **570-50** & **570-200** Transducers
(excluding Steel Housing/Blister)

Housing material: ABS
Element size: 60 mm
Beam widths:
• 12° (**570-50**)
• 4.5° (**570-200**)
Cable length: 15m (33m for OEM)

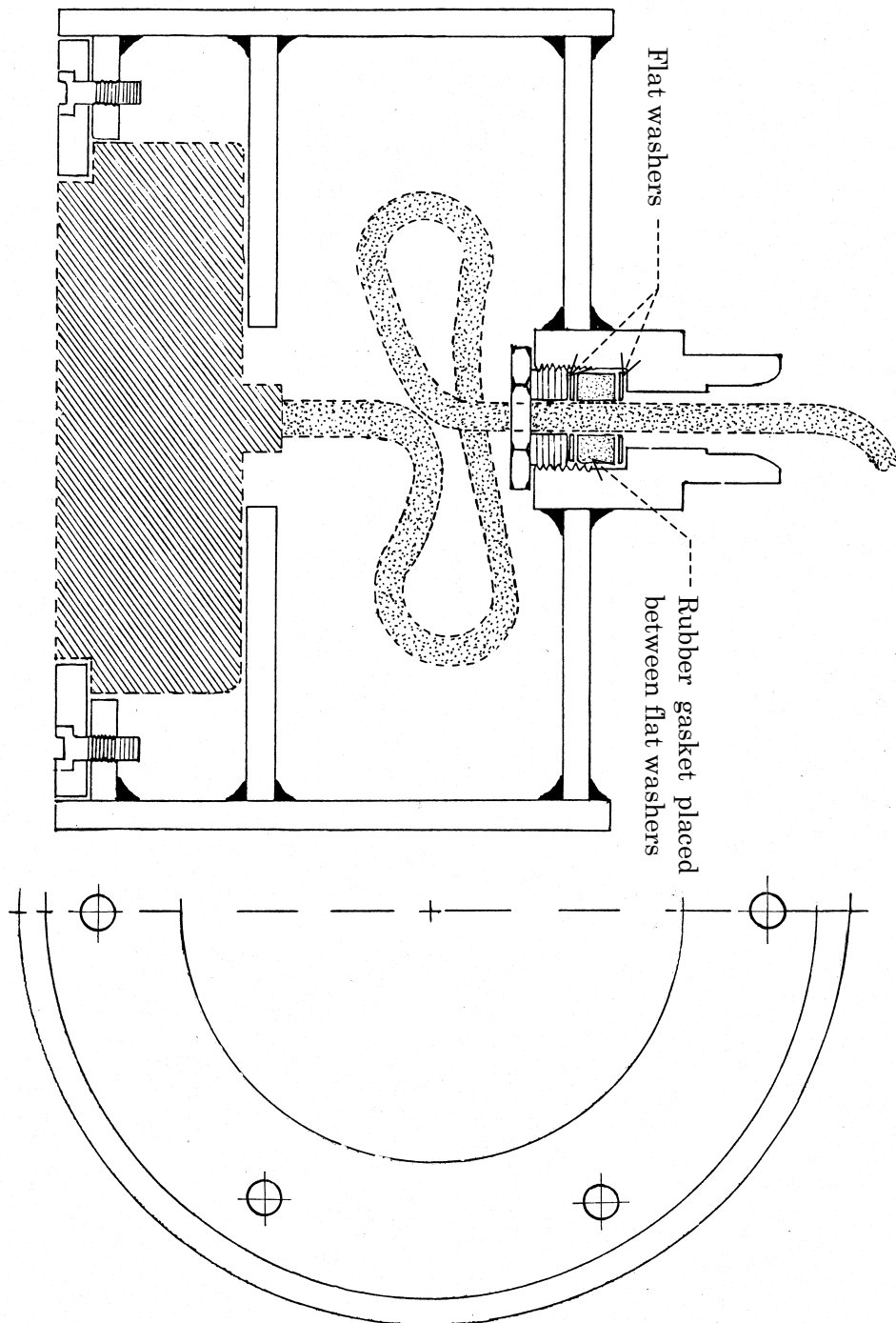


Dimensions in millimeters

NOTE: The above dimensions are nominal values published by the transducer manufacturer (Radarsonics Inc.). When designing a matched steel housing for through-hull installation, the dimensions should be determined on the basis of the exact size of the transducer unit to be installed.

Figure 9-5 Recommended Steel Housing (Blister) Structure – Example

NOTE: The dimensions should be determined on the basis of the exact size of the ABS transducer housing to be installed.



9.3. Electrical Connections

9.3.1. Introduction

All electrical connections to the equipment cabinet 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 with optional components have already been terminated in plugs, ready for immediate plugging into the cabinet. For the cables that require installation of plugs by soldering, appropriate plugs are separately supplied.

9.3.2. Power Supply Connections

9.3.2.1. Power Supply Requirements

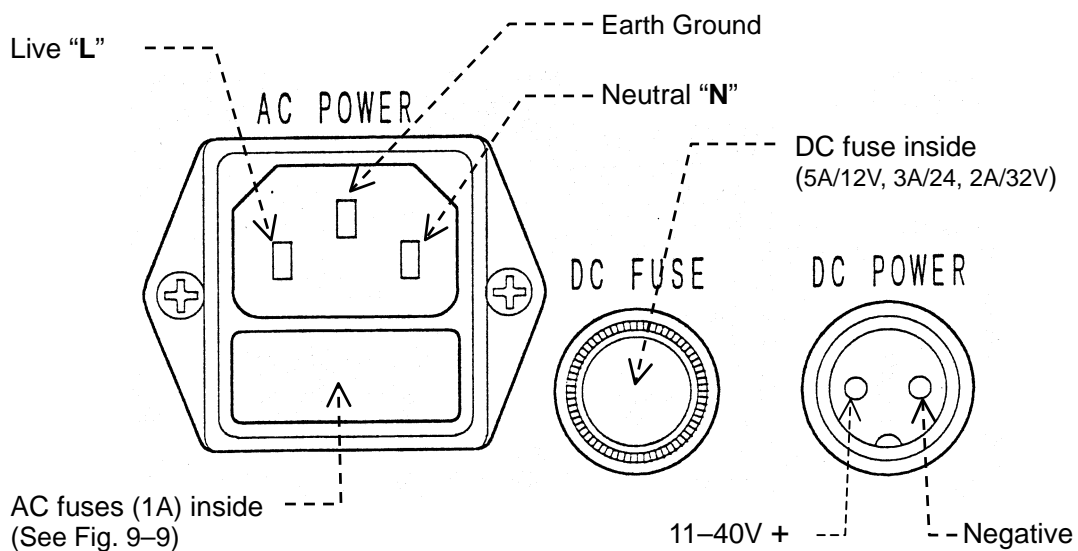
The equipment is powered by a DC power source between 11 and 40 volts, floating ground, or an AC power source between 110 and 220 volts ($\pm 10\%$). The ship's power source must be capable of continuously supplying at least 5A at 12 VDC or 3A at 24 VDC (DC-power source) or at least 50VA (AC-power source) for proper start-up and reliable operation.

Both AC and DC power connections may be made at the same time, in which case the equipment will normally operate from the AC source. In the event of an AC power outage, the equipment will automatically switch over to the DC source for uninterrupted operation.

< CAUTION >

Use of a low current capacity supply or slow response supply, especially if it is a switch-mode regulator type, will produce an instantaneous voltage drop at power-up, making it impossible to turn the equipment on or resulting in erratic operation.

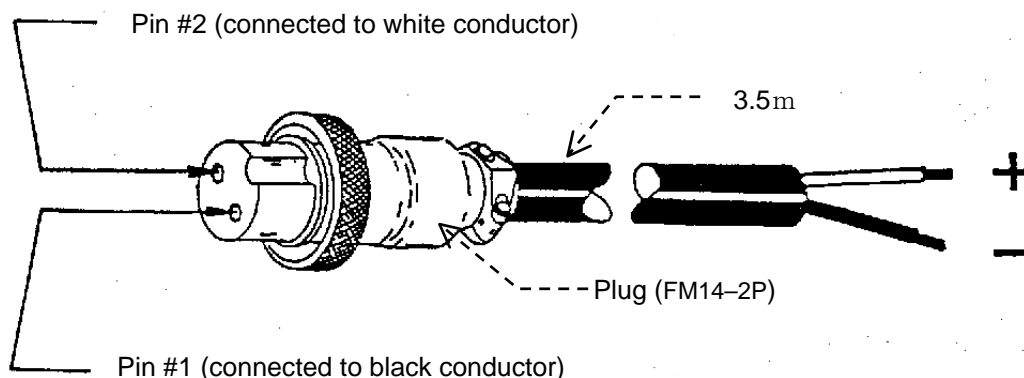
Figure 9-6 Rear Panel Power Supply Connectors and Fuse Holders



9.3.2.2. DC Connections

A 3.5-meter 2-conductor cord is supplied for connection between the cabinet and the ship's power source system. The cord is terminated in a 2-hole female type plug at one end, and open-ended at the other end, as illustrated below. The plug mates with the 2-pin receptacle marked "DC POWER" on the rear of the cabinet, and the two conductors (white and black) at the other end are to be connected to the ship's power source (battery terminals).

Figure 9-7 DC Power Cord



- White Conductor to positive (+) terminal (11 to 40 VDC)
- Black Conductor to negative (-) terminal

After making the connections to the power source as above, push the plug into the **POWER** receptacle as far as it goes, and then screw the coupling ring on the plug until it stops.

< WARNING >

REVERSING THE DC POWER CORD POLARITY WILL BLOW THE FUSE THE INSTANT THE CORD IS PLUGGED INTO THE CABINET, EVEN IF THE UNIT IS SWITCHED OFF.

9.3.2.3. AC Connections

A power cord is normally not supplied with the equipment. A suitable length of 3-conductor cord, terminated in a 3-prong female plug, such as the one shown in Figure 9-8, must be prepared by the user. If you plan to operate from a 220 VAC source, be sure to use a cord with the appropriate insulation voltage rating.

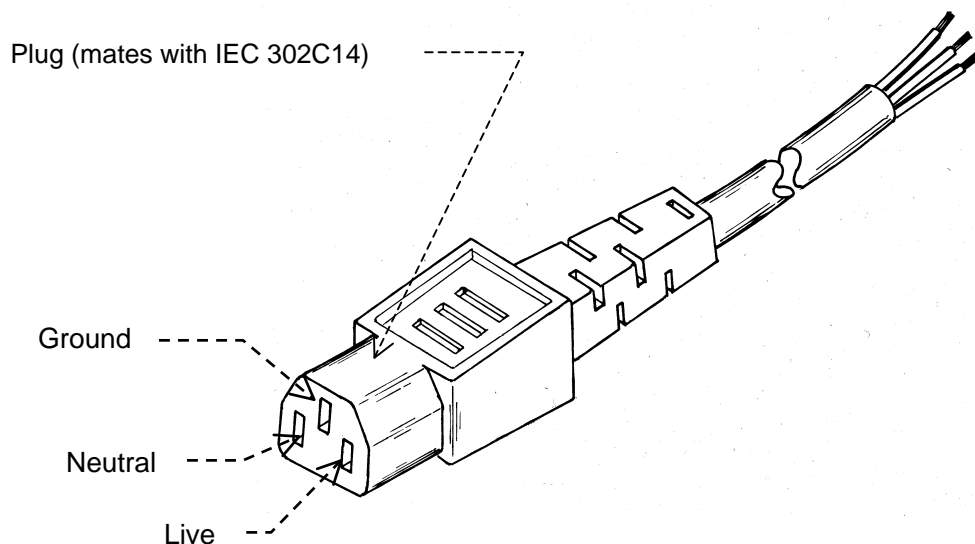
Connect the three conductors of the cord as follows:

- Conductor **L** ("live") to "hot" terminal of power source
- Conductor **N** ("neutral") to "neutral" terminal of power source
- Conductor **GND** (ground) to ship's earth ground

Refer to Figures 9-6 and 9-8 to identify the conductors. Conductors L and N may be reversed without damage to the equipment if the power source is of the single-phase AC system, but an increased hum noise level may result. Conductor GND must be connected to the ship's earth ground to prevent an electrical shock hazard.

9.3.2.3. AC Connections *(continued – 2/2)*

Figure 9-8 Typical AC Power Cord



9.3.2.4. Power Cord Routing

To minimize the chance of picking up extraneous electrical interference, it is highly recommended that the power cord be connected direct to the ship's power source, and not via other terminals or power distribution board that are used in common with other on-board electronics. Ideally, the equipment cabinet should be powered by an independent power supply for best results.

9.3.2.5. Installing the Fuse

< WARNING >

AN INCORRECTLY RATED FUSE OR INCORRECT TYPE FUSE WILL BLOW AT POWER-UP OR WILL NOT PROTECT THE EQUIPMENT IN THE REMOTE EVENT OF A TROUBLE OVERLOADING THE POWER SUPPLY.

For DC-powered operation

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 nominal power supply voltage as follows:

- **5A** (5 amperes) for operation off 12 VDC nominal
- **3A** (3 amperes) for operation off 24 VDC nominal
- **2A** (2 amperes) for operation off 32 VDC nominal

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

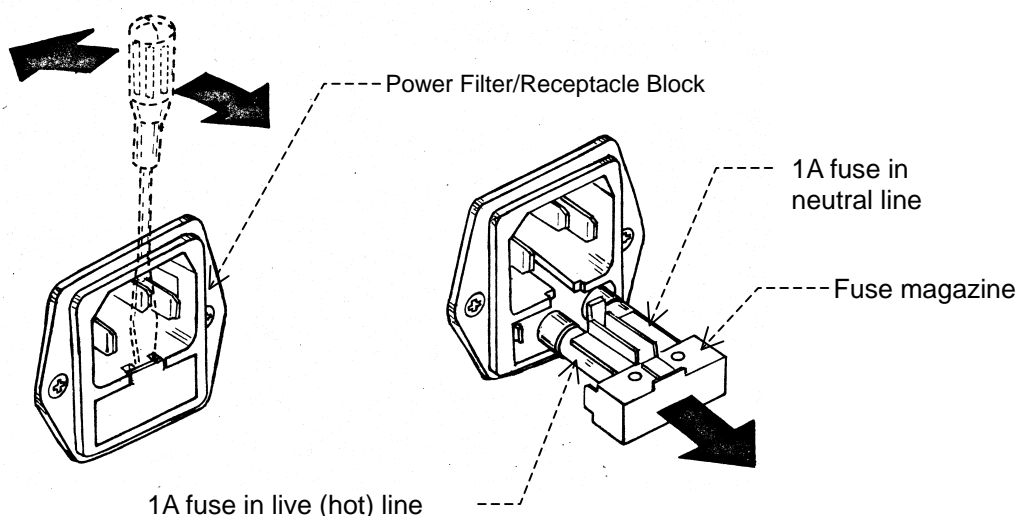
9.3.2.5. Installing the Fuse (continued – 2/2)

For AC-powered operation

Two pieces of 1 ampere (1A, type 5×20mm) fuse are already installed in the fuse magazine in the AC power filter/receptacle block marked “AC POWER.” (one in the “live” or “hot” line, the other in the “neutral” line) when the equipment is initially installed.

To gain access to the fuses for service purposes, pry open the block with a flat blade (8–10 mm wide) placed inside the tab portion, pulling out the fuse magazine as illustrated below. Observe < **WARNING** > below.

Figure 9-9 Gaining Access to AC Line Fuses



< **WARNING** >

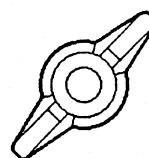
FORCING-OPEN WITH A SMALL BLADE CAN DAMAGE THE TAB.

9.3.2.6. Grounding the Equipment Cabinet

The display cabinet, which is electrostatically coated inside, can be grounded to the vessel's earth ground without grounding the negative line of the ship's power line. In situations where it is required, or desirable, to ground the cabinet for safety reasons or EMC* compliance, connect from the wing-nut-fitted ground terminal on the rear panel to an appropriate earth ground in the vessel using a thick wire. The ground wire should be as short as possible to reduce the chance of picking up interference from other electronics.

Figure 9-10 Ground Terminal

CABINET GND



*EMC = electromagnetic compatibility, a set of CE-mark specifications for the level of immunity against external interference and for the level of interference emission from this equipment.

9.3.3. Connections to Transducers

9.3.3.1. Connections to Dual Frequency Transducer

Introduction

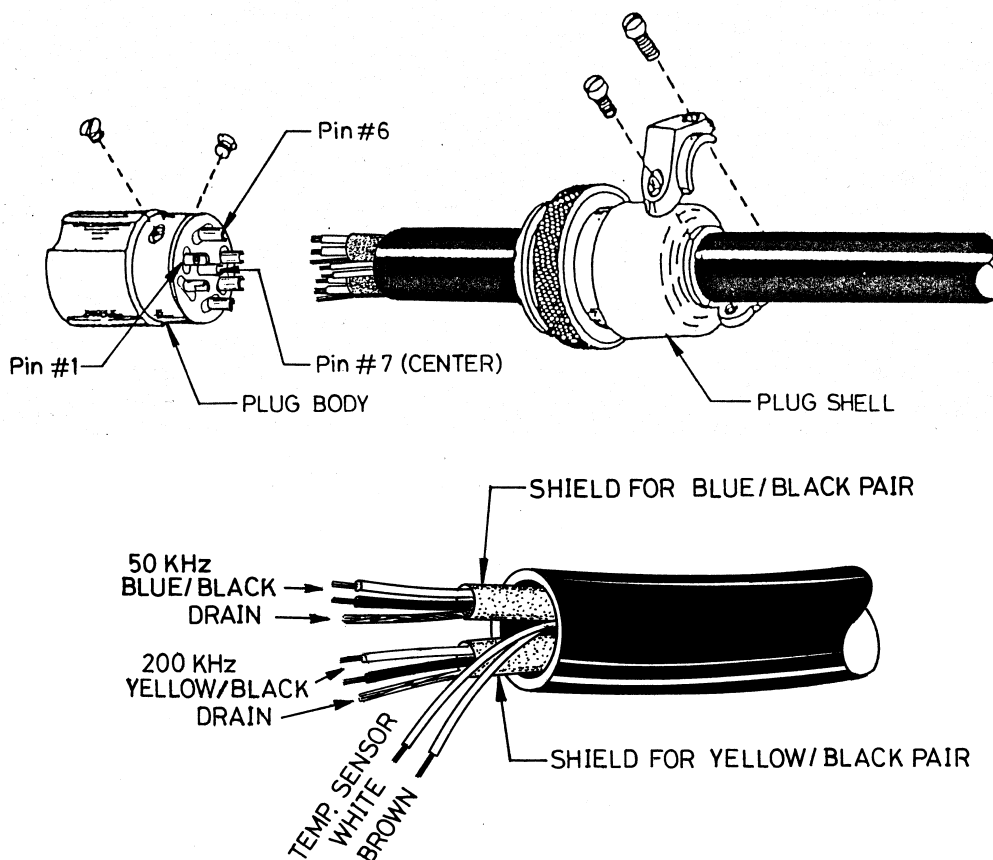
The transducer cable is of 8-conductor shielded type as illustrated in the figure below, and usually supplied without connector termination. The cable must be terminated in a 7-hole female type plug (HS21P-7) separately supplied.

For connections to the two 3-pin **TRANSDUCERS** receptacles on the rear panel, a cable adapter kit (Figure 9-13) is separately supplied, terminated in a 7-pin receptacle (HS21R-7) at one end, and two 3-pin plugs (HS21P-3) and one 4-pin plug (FM14-4P) at the other end, and is designed to convert a single 8-conductor cable from the dual frequency transducer into a pair of 3-conductor cables, one for high frequency connection, and the other for low frequency connection, and a two-conductor cable for the termination of the built-in temperature sensor.

Conductor Identification and Soldering to Plug

Disassemble the plug (HS21P-7), **slide the plug shell (housing) over the cable first**, and solder the conductors (6 signal wires and 2 drain wires) of the cable to the seven pin terminals on the plug body as follows:

Figure 9-11 Terminating Dual Frequency Transducer Cable



9.3.3.1. **Connections to Dual Frequency Transducer** (*continued – 2/4*)

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

The brown and white conductors are internally connected to the thermistor temperature sensor embedded in the transducer housing. See < **CAUTION** > below.

< **CAUTION** >

Model 570–50/200 transducers available direct from Radarsonics Inc. or its dealers have a thermistor sensor of different characteristics built in that is not compatible with the equipment hardware. Using such a transducer will result in an incorrect temperature reading.

After disassembling the plug and passing the coupling ring over the cable, solder the conductors and drains to the pins on the plug body, 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.

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 embedded temperature sensor, are not polarized, and connections to these pins may be reversed without affecting temperature readout.

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 shell when the plug body is inserted into the shell. Assemble the plug, tightening the screws firmly. The transducer cable can now be plugged into the 7–pin male–type receptacle (HS21R–7) on the cable adapter.

9.3.3.1. **Connections to Dual Frequency Transducer** (continued – 3/4)

Connecting Cable Adapter to Transducer Receptacles on Rear Panel

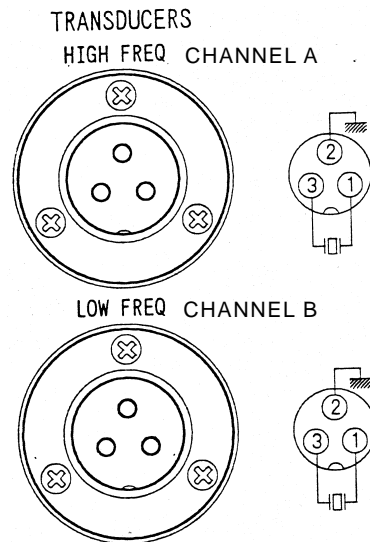
Figure 9-12 Transducer Receptacles

The two 3-hole plugs of the cable adapter are labeled “**200KHz**” (channel A) for high frequency connections, and “**50KHz**” (channel B) for low frequency connections. Their mating receptacles are installed on the rear panel, as shown at right.

The upper receptacle is assigned channel A (**CH-A**), and the lower receptacle, channel B (**CH-B**).

Push the **200KHz** plug into the **HIGH FREQ./CHANNEL A** receptacle, and the **50KHz** plug into the **LOW FREQ./CHANNEL B** receptacle, as far as they go.

Screw the coupling ring of each plug onto the threaded part of the receptacle, and tighten it.



Receptacle Pin Assignments

- Pin No. ① : Transmitter Output/Receiver Input
- Pin No. ② : Cabinet Ground (isolated from power line)
- Pin No. ③ : Transmitter Output/Receiver Input

< **WARNING** >

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

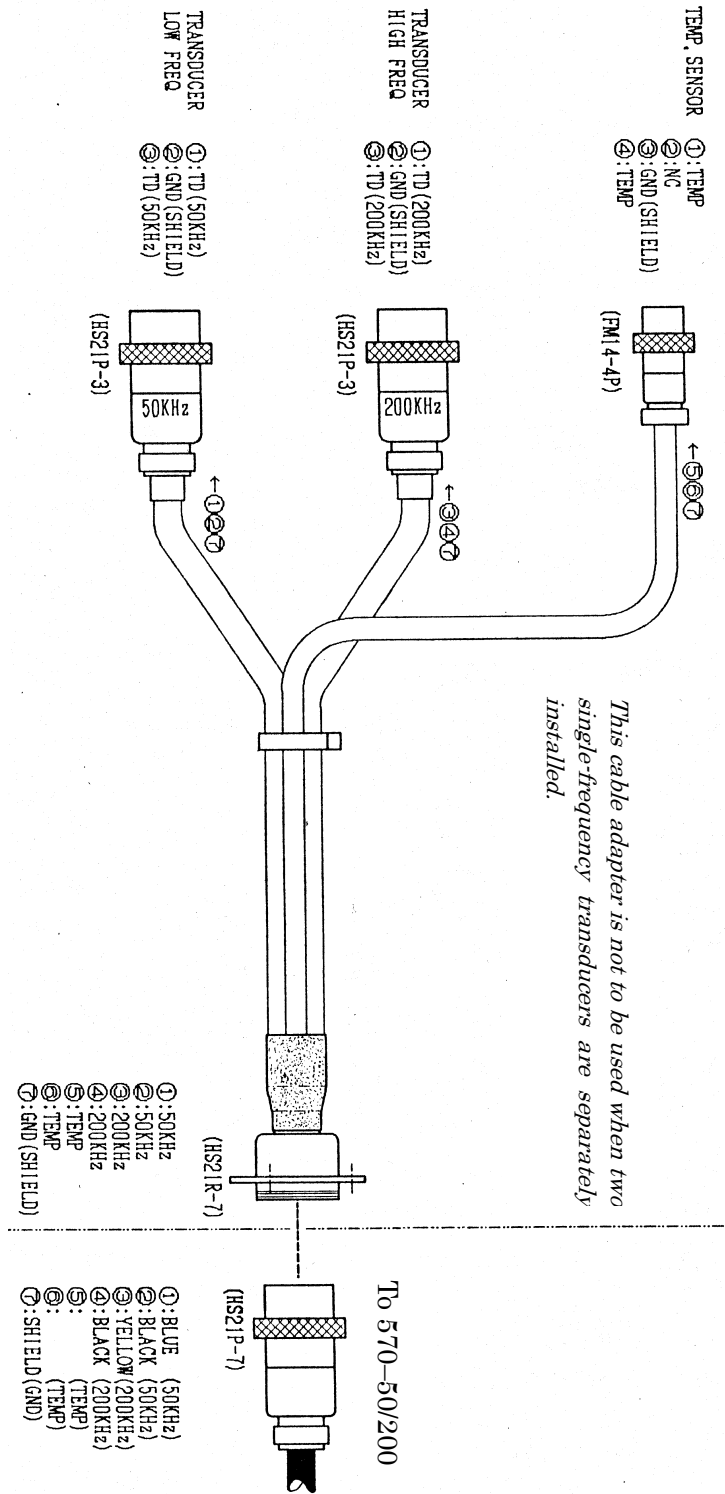
After installation of the transducers, register the assigned channel, frequency and mounting location of each transducer in the table below so that the operator can tell which transducer is in use for current sounding.

Table 9-1 Channel–Transducer Assignments Table

Operating Channel	Frequency	Mounting Location					
		Aft		Middle		Fore	
		PORT	STB	PORT	STB	PORT	STB
Channel A (CH-A)	_____kHz						
Channel B (CH-B)	_____kHz						

9.3.3.1. Connections to Dual Frequency Transducer (continued – 4/4)

Figure 9-13 Cable Adapter for Connections to Dual Frequency Transducer



9.3.3.2. Connections to Single Frequency Transducers

Each transducer is supplied with its integral cable (15 meters standard, 33 meters for OEM models). A three-hole female type is separately supplied for terminating the cable for connection to the equipment cabinet. With the aid of the illustration below, disassemble the plug, taking care not to lose the small screws.

< WARNING >

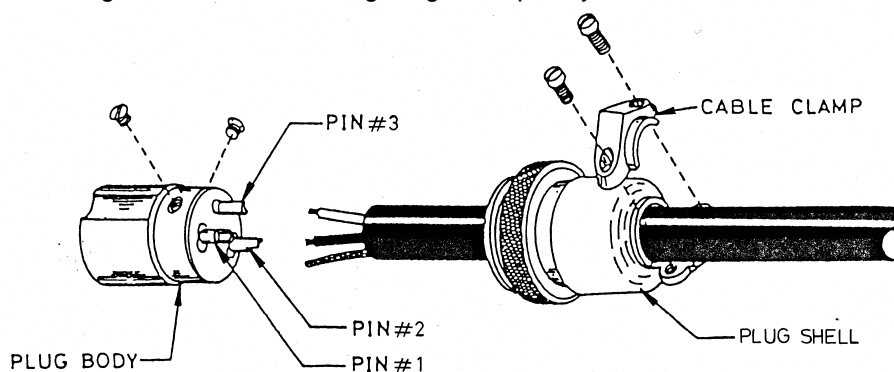
DO NOT TURN THE EQUIPMENT ON WITH THE TRANSDUCERS PLACED IN THE AIR, OR DAMAGE TO THE TRANSDUCER CRYSTAL WILL RESULT.

Cable Extensions

In installations where the existing integral cable must be extended, be sure to use the same type of cable supplied by the manufacturer. Use of additional cable not approved by the manufacturer will seriously degrade the depth detection performance. All joints must be made by soldering and properly insulated. "Twist-and-tape" connections must be avoided.

Coaxial cables are electrically unbalanced and cannot be used.

Figure 9-14 Terminating Single Frequency Transducer Cable



Slide the plug shell over the cable first, and solder the conductors to the three pins on the plug body as follows:

- One conductor to pin #1
 - Shield (braid) to pin #2
 - Other conductor to pin #3
- The pin ID numbers are marked in raised letters on the face of the plug body. Pins #1 and #3 are balanced, and may be reversed.

Care should be taken to ensure that no stray strands of wires or excess solder on any pin touches the inside wall of the plug shell when the plug is reassembled.

Reassemble the plug, tightening the screws firmly.

Each transducer can now be plugged into the appropriate 3-prong receptacle (Figure 9-12) on the rear panel. Turn the equipment off, push the plug into the correct receptacle as far as it goes, and screw the coupling ring onto the threaded part of the receptacle until it stops.

- Channel A (or high frequency) transducer to Receptacle marked "**HIGH FREQ / CHANNEL A**"
- Channel B (or low frequency) transducer to Receptacle marked "**LOW FREQ / CHANNEL B**"

9.3.4. Connections through Digital I/O Interface Connectors

The equipment is designed to interface with various external devices that output or accept digital data signals in the IEC 61162-1/NMEA-0183 format. Rear panel interface connectors “RS-232C”, “RS-422” and “I/O DATA” are provided for this purpose.

9.3.4.1. Input Data and Command Sentences

Input Data:

The following GPS-derived IEC 61162-1/NMEA-0183 format data sentences can be input via one of the above I/O interface connectors to display position coordinates, speed, heading, and date and time over the echogram screen:

- \$GPGGA (derives LAT/LON position fix only)
- \$GPRMC (derives UTC date and time only, if \$GPZDA sentence is not available)
- \$GPVTG (derives speed-over-ground and course-over-ground or heading)
- \$GPZDA (derives UTC date and time)

Input Command – Alarm Acknowledgement:

The following IEC 61162-1/NMEA-0183 format command sentence can be input via the **RS-422/RS-232C** connector to remotely acknowledge a currently active alarm from an INS terminal:

- \$--ACK, xxx*hh <CR> <LF>

- ① Talker identifier (e.g. **IN** for INS terminal, **RA** for radar)
- ② Local alarm number:
001: Depth alarm
002: Bottom-missing alarm
003: Low voltage alarm (power failure alarm)
- ③ Checksum (hex). User must calculate the appropriate value.
Exclusive OR'ing of 8 data bits of each character between “\$” (not included) and “*” (not included)
- ④ Carriage return code (OD hex)
- ⑤ Line feed code (OA hex)

[Example]:

To acknowledge the active depth alarm (local alarm number 001) from a Radar system (e.g. RA), the following command must be sent to the echo sounder:

\$RAACK, 001 *47 <0D> <0A>

For information on the alarm output sentence format, see paragraph 9.3.4.3.

9.3.4.2. Navigational Output Data Sentences (continued – 2/3)

Realtime Output Data (2/2):

- \$SDDBK (depth below keel)

\$SDDBK, XXXX.X,f, XXXX.X,M, XXXX.X,F*hh<CR> <LF>
 ① ② ③ ④ ⑤ ⑥

- ① Depth below keel, in feet (fixed decimal point, non leading-zero suppression)
- ② Depth below keel, in meters (fixed decimal point, non leading-zero suppression)
- ③ Depth below keel, in fathoms (fixed decimal point, non leading-zero suppression)
- ④ Checksum ⑤ Carriage return ⑥ Line feed

- \$SDMTW (water temperature)

\$SDMTW, x.x, C*hh <CR> <LF>
 ① ② ③ ④ ⑤

- ① Temperature in degrees
- ② Temperature unit ; **C** = Celsius, **F** = Fahrenheit
- ③ Checksum ④ Carriage return ⑤ Line feed

NOTE: This data sentence is output when an optional T-200 sensor is plugged into the rear panel TEMP connector or when a Type 570-50T. 50 kHz transducer is connected

- Other IEC 61162-1/NMEA-0183 Sentences (GPS-derived Data Sentences)

The same sentences that are input to the equipment from an external GPS data source (e.g. \$GPGGA, \$GPRMC, \$GPVTG, \$GPZDA). will be *output without modification by the system's software. as they are received.

**NOTE: Those output sentences are initially turned off. To make them available, see paragraph 4.11.2 for instructions.*

9.3.4.2. Navigational Output Data Sentences (continued – 3/3)

On-demand Output Data:

The following IEC 61162–1/NMEA–0183–based proprietary sentence can be output at 4800 baud on demand. No hand–shaking protocol is used to control data flow.

● \$PJM CN, X.X, X.X, X.X, A, ddmmyy, hhmmss, (continued to next line)

① ② ③ ④ ⑤ ⑥ ⑦

llll.lll, a, yyyy.yyy, a * h h <CR> <LF>

⑧ ⑨ ⑩ ⑪ ⑫ ⑬ ⑭

- ① Talker Identifier (proprietary)
- ②*³ Depth–below–transducer in meters, varying in length; null if depth information was unavailable (i.e. if bottom was not received in one of two strongest colors).
- ③*³ Offset; positive (+) = transducer draft, negative (–) = offset from transducer to keel
- ④ Maximum depth range used, in meters*⁴
- ⑤ Operating channel used; A = channel A, B = channel B
- ⑥ Date (day/month/year) referenced to UTC, fixed in length.
- ⑦ UTC time (hours/minutes/seconds), derived from internal clock or from GPS time if valid position fix was available. Fixed in length.
- ⑧ Latitude coordinate (to 1/1000 minutes), varying in length; null if valid GPS position fix was temporarily unavailable.
- ⑨ Latitude sign (N/S); null if valid GPS position fix was temporarily unavailable.
- ⑩ Longitude coordinate (to 1/1000 minutes), varying in length; null if valid GPS position fix was temporarily unavailable.
- ⑪ Longitude sign (E/W); null if valid GPS position fix was temporarily unavailable.
- ⑫ Checksum ⑬ Carriage return ⑭ Line feed

*³: If both offsets were entered, two \$PJM CN sentences will be output with the same depth–below–transducer value; one contains the transducer draft, and the other, the keel offset.

*⁴: If the depth measurement was done in fathoms or feet, the following metric values are used to represent the maximum depth range in use:

Table 9-2 Equivalent Maximum Range Scales in Fathoms and Feet

Value (m) ④	Max. range in fathoms	Value (m) ④	Max. range in feet
4.5m	2.5	6.1m	20
9.0m	5	12.2m	40
18.2m	10	30.6m	100
36.5m	20	61.2m	200
91.4m	50	122.5m	400
182.8m	100	306.4m	1000
365.7m	200	612.8m	2000
914.4m	500	1225.6m	4000

9.3.4.3. Alarm Output Data Sentences

9.3.4.3.1. Introduction

The following NMEA-0183/IEC 61162-1 formatted alarm output sentences will be available via the **RS-422/RS-232C** ports for each alarm type, every 60 seconds or 30 seconds, except for the power-removal/shutdown alarm, depending on whether the alarm becomes active or is acknowledged manually on the equipment's control panel or by the corresponding software command (paragraph 9.3.4.1, **Input Command – Alarm Acknowledgement**).

\$SDALR,① ②,③,④,⑤ECHO SOUNDER:Depth alarm*⑥hh<⑦CR><⑧LF>

- ① UTC in hours, minutes and seconds
e.g. 141200 = 14 hours, 12 minutes, 00 seconds
- ② Local alarm number:
 - 001 = Depth alarm
 - 002 = Bottom-missing alarm (see *NOTE* below)
 - 003 = Low voltage (power failure) alarm
- ③ Alarm activity status:
 - A = active (i.e. alarm condition exists)
 - V = inactive (i.e. alarm condition is non-existent)
- ④ Alarm acknowledgement status:
 - A = acknowledged
 - V = unacknowledged
- ⑤ Alarm description text
 - ECHO SOUNDER:Depth alarm
 - ECHO SOUNDER:Bottom missing alarm
 - ECHO SOUNDER:Low voltage alarm
- ⑥ Checksum ⑦ Carriage return ⑧ Line feed

**NOTE: The bottom-missing alarm function is initially disabled, and no output data will be available even if the alarm condition exists. To enable the function, execute the following keystrokes:*

(MAIN MENU → 9 : INSTALLATION SETTINGS → 9 : BOTTOM MISSING ALM) → ON.

See paragraph 4.12 for more information.

9.3.4.3.2. Alarm Sentence Output Intervals

- (1) None of the alarms is currently active.

The echo sounder will output the following sentences every 60 seconds:

- \$SDALR,xxxxxx,001,V,V,ECHO SOUNDER:Depth alarm* hh<CR><LF>
- \$SDALR,xxxxxx,002,V,V,ECHO SOUNDER:Bottom missing alarm* hh<CR><LF>
- \$SDALR,xxxxxx,003,V,V,ECHO SOUNDER:Low voltage alarm* hh<CR><LF>


- (2) Alarm condition occurs.

Depth alarm (local alarm # 001)

- (a) The instance the depth registers at, or above, the user–preset depth, the echo sounder will output the following sentence:

- \$SDALR,xxxxxx,001,A,V,ECHO SOUNDER:Depth alarm* hh<CR><LF>

- (b) The above sentence will be repeated every 30 seconds.

- (c) Upon pressing of  or receiving an *1ACK command for local alarm #001 from the INS, the echo sounder will change the alarm acknowledgement status as follows:

- \$SDALR,xxxxxx,001,A,A,ECHO SOUNDER:Depth alarm* hh<CR><LF>

- (d) The above sentence will be repeated every 30 seconds.

- (e) The instance the depth registers below the preset limit again, the sounder will change the alarm status to its normal condition again, as follows:

- \$SDALR,xxxxxx,001,V,V,ECHO SOUNDER:Depth alarm* hh<CR><LF>

- (f) The above output will be repeated every 60 seconds.

*1: \$ _ _ ACK , 001 , * hh < CR > < LF > to acknowledge depth alarm

9.3.4.3.2. Alarm Sentence Output Intervals (continued – 2/2)

Bottom–missing alarm (local alarm # 002)

The output will be available only when the relevant function setting (**MAIN MENU** → **9: INSTALLATION SETTINGS** → **9: BOTTOM MISSING ALM**) is set to **ON**.

- (a) The instant the bottom echo is lost, the audible alarm will be activated, and at the same time the following sentence will be output every 30 seconds:

• \$SDALR , xxxxxxx, 002 , A , V , ECHO SOUNDER : Bottom missing alarm * hh < CR > < LF >

- (b) Five seconds later, the alarm sound alone will be automatically turned off, but the above sentence will continue at 30–second intervals.

*NOTE: The sound cannot be silenced with  during the above 5–second period, but can be turned off with an *2ACK command.*

- (c) After receiving an *2ACK command for local alarm 002 from the INS, the echo sounder will output the following sentence:

• \$SDALR , xxxxxxx, 002 , A , A , ECHO SOUNDER : Bottom missing alarm * hh < CR > < LF >

- (d) The above sentence will then be repeated at 30–second intervals.

- (e) Upon recovering of the bottom echo, the sounder will change the alarm acknowledgement status to the normal condition as follows:

• \$SDALR , xxxxxxx, 002 , V , V , ECHO SOUNDER : Bottom missing alarm * hh < CR > < LF >


- (f) The above sentence output will then be repeated at 60–second intervals.

Low voltage alarm (local alarm # 003)

- (a) The instance the DC power source voltage falls to, or below, the factory–preset level (11V) , the sounder will output the following sentence:

• \$SDALR , xxxxxxx, 003 , A , V , ECHO SOUNDER : Low voltage alarm * hh < CR > < LF >

- (b) The above sentence will be repeated every 30 seconds.

- (c) Upon pressing of  or receiving an *3ACK command for local alarm #003 from the INS, the sounder will change the alarm acknowledgement status as follows:

• \$SDALR , xxxxxxx, 003 , A , A , ECHO SOUNDER : Low voltage alarm * hh < CR > < LF >

- (d) The above sentence will be repeated every 30 seconds.

- (e) The instance the voltage rises again above the preset limit, the sounder will change the alarm status as follows:

• \$SDALR , xxxxxxx, 003 , V , V , ECHO SOUNDER : Low voltage alarm * hh < CR > < LF >

- (f) The above output will be repeated every 60 seconds.

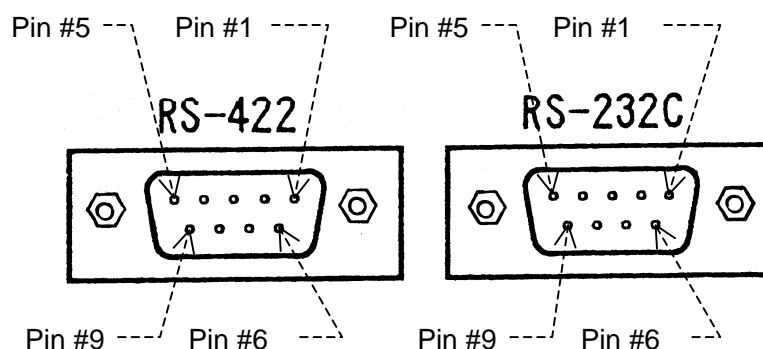
*3: \$ _ _ ACK , 003 , * hh < CR > < LF > to acknowledge active low voltage alarm

9.3.5. Connector Pin Assignments

● RS-232C Connector Pin Assignments

The pins are identified as illustrated below. The mating plug is a standard 9-pin D-sub connectors commercially available for PC peripherals.

Figure 9-15 RS-232C and RS-422 Connector Pin Assignments



Of the nine pins, the following three are used for data transfers, and the rest are left unused:

- Pin #2: RX
- Pin #3: TX
- Pin #5: Ground

Data sentences are automatically output in real time with the equipment working normally. The data stored in flash memory will be output with a command invoked from the **SYSTEM MENU**. See section 5 for details. No hand-shaking protocol is used between the transmitter (**F-3000W**) and a data receiver.

● RS-422 Connector Pin Assignments

The pins are identified as illustrated above. The mating plug is a standard 9-pin D-sub connectors commercially available for PC peripherals.

Of the nine pins, the following five are used for I/O communications, and the rest are left unused:

- Pin #5: Ground
- Pin #6: RX+ (RX DATA +)
- Pin #7: RX- (RX DATA -)
- Pin #8: TX+ (TX DATA +)
- Pin #9: TX- (TX DATA -)

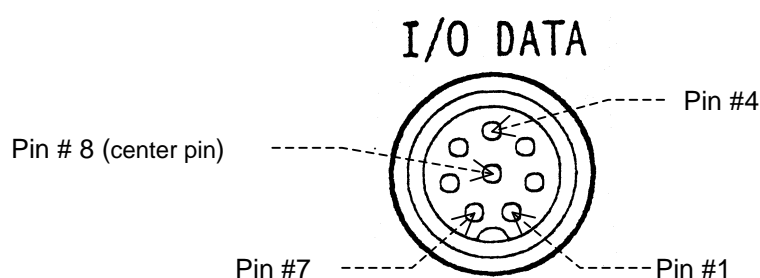
Data sentences are automatically output in real time with the equipment working normally. The data stored in flash memory will be output with a command invoked from the **SYSTEM MENU**. See section 5 for details. No hand-shaking protocol is used between the transmitter (**F-3000W**) and a data receiver.

9.3.5. Connector Pin Assignments *(continued – 2/2)*

● I/O DATA Connector Pin Assignments

The eight pins are identified as illustrated below. The mating plug (part # FM14–8P) is separately supplied.

Figure 9-16 I/O DATA Connector Pin Assignments



The pins are assigned the following functions.

- Pin #1: RXD + (NMEA–0183 input from GPS data source)
- Pin #2: RXD – / TXD– (Common to RXD–/TXD–)
- Pin #3: TXD + (NMEA–0183 output)
- Pin #4: FWE Enables programming mode. (Do not connect any device in the field). See **< CAUTION >** below.
- Pin #5: TXD } Programming data I/O, with hand–shaking
- Pin #6: RXD }
- Pin #7: 12 VDC output, 200 mA maximum. See *NOTE* and **< WARNING >** below.
- Pin #8: Chassis Ground

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 the equipment cabinet and the external device connected. Use pin #8 for grounding the cabinet side.

*NOTE: A 12V regulated DC voltage is available from pins #7 (+) and #8 (ground) for powering light-duty external devices, such as a GPS sensor. See **< WARNING >** below.*

< WARNING >

THE DC OUTPUT IS CURRENT–LIMITED TO 1A FOR PROTECTION AGAINST A MOMENTARY SHORT. HOWEVER THE CURRENT DRAIN MUST NOT EXCEED 200 MA AT ANY TIME FOR CONTINUOUS–DUTY APPLICATIONS.

< CAUTION >

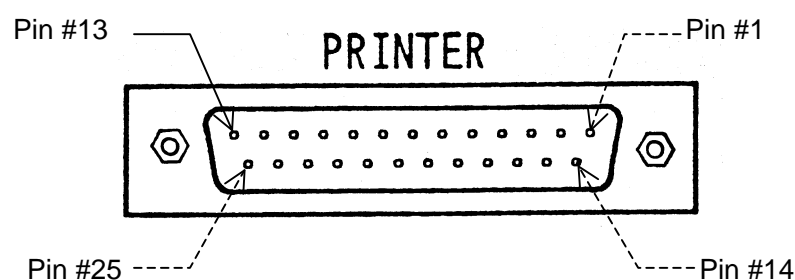
Connecting any device other than the specified programmer to this pin can cause the equipment to be locked or to work erratically.

9.3.6. Connections to Graphics Printer

A DOS/V-compatible graphics printer* that supports the ESC/P protocol can be plugged into the 25-pin Centronics parallel connector “**PRINTER**” on the rear panel to obtain a monochrome hard copy of the right half of the current echogram screen. See paragraph 3.6 for instructions for activating the printer function.

* Such as OKI Microcline 280

Figure 9-17 Centronics Parallel Connector Pin Assignments



The pin assignments and communications protocol are compatible with the standard Centronics parallel output specifications, as follows:

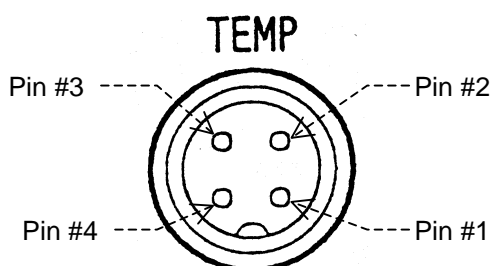
- Pin #1: STB Strobe
- Pin #2: D0 Data bit 0
- Pin #3: D1 Data bit 1
- Pin #4: D2 Data bit 2
- Pin #5: D3 Data bit 3
- Pin #6: D4 Data bit 4
- Pin #7: D5 Data bit 5
- Pin #8: D6 Data bit 6
- Pin #9: D7 Data bit 7
- Pin #10: NC No internal connection
- Pin #11: BUSY Printer is busy
- Pins #12 – #17: NC No internal connection
- Pins #18 – #25: GND Ground

9.3.7. Connections to Water Temperature Sensor

The 4-pin receptacle **TEMP** is provided to connect an optional **T-200** water temperature sensor (thermistor sensor, 5 k Ω at 25 $^{\circ}$ C) in a multiple transducer installation. Observe < **CAUTIONS** > 1 below. The sensor has an integral two-conductor shielded cable (10 meters standard), normally terminated in a 4-hole female-type mating plug.

If the type **570-50/200T** dual frequency transducer is installed, identify the cable terminated with a 4-hole plug from the cable adaptor kit, and push that plug into the **TEMP** connector. Observe < **CAUTIONS** > 2 below.

Figure 9-18 Temperature Sensor Connector Pin Assignments



The pin assignments are given below.

- Pin #1: **TEMP1** Thermistor sensor
- Pin #2: **NC** No internal connection
- Pin #3: **GND** Ground (shield of cable)
- Pin #4: **TEMP2** Thermistor sensor

Connections to pins #1 and #4 may be reversed without affecting temperature reading.

< CAUTIONS >

1. Connecting a thermistor other than the specified one will result in incorrect temperature readouts.
2. The type **550-50/200** transducer obtained directly from Radarsonics Inc. or from one of its dealers has a thermistor sensor of different electrical characteristics. Use of such a transducer will result in incorrect temperature readouts.

9.3.8. Connecting Alarm Outputs to External Alarm Devices

The following alarm outputs are separately available from the **ALARM** connector for driving external audible/visual alarm control switches:

- Depth Alarm: Pin #1 (**SHALLOW**)
- Bottom–Missing Alarm: Pin #3 (**BOTTOM**)
- Power Failure Alarm: Pin #5 (**POWER**)

Each output circuit is in open–collector configuration with the following specifications:

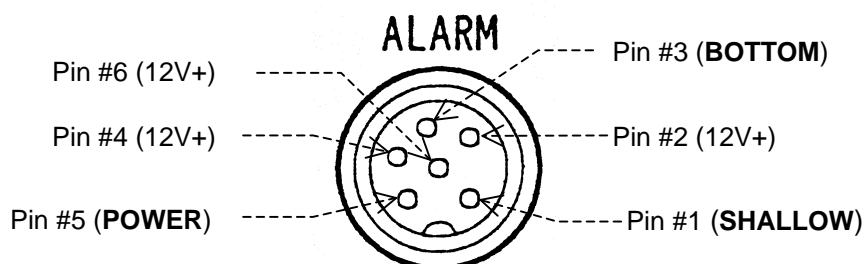
- Polarity: NPN
- Collector Voltage (V_C): 50V maximum
- Sink Current (I_C): 800 mA maximum

NOTE: The alarm output data sentences (NMEA–0183/IEC 61162–1 formatted \$SDALR sentences) are not available from this connector. They are output via the RS–422/RS–232C connectors. See paragraph 9.3.4.3.

Care should be taken not to exceed the maximum ratings when an external power supply is to be used as the collector voltage source. If a heavy–duty power relay is to be driven, or if the target device requires power consumption in excess of the above ratings, an appropriate buffer amplifier must be placed between the output and such a device.

To drive a small mechanical relay with each output, a 12V+ regulated DC supply is available from pins #2, #4 and #6, which may be used as the collector voltage for each output. Observe < **WARNING** > below when using this internal power source.

Figure 9-19 **ALARM** Connector Pin Assignments



< **WARNING** >

WHEN EACH OUTPUT IS TO BE USED TO DRIVE A MECHANICAL RELAY, BE SURE TO PLACE A SPIKE–ABSORBING DIODE* ACROSS THE RELAY’S PRIMARY SIDE (COIL), OR THE OUTPUT TRANSISTOR WILL BE DESTROYED.

** High speed switching diodes, such as the MA–165 and the 1S1588 or equivalents, are recommended. The cathode side of the diode must be connected to 12V+.*


To drive a small power DC relay, use the following connections:

- Depth Alarm: Pins #1 (alarm output) and #2 (12V+)
- Bottom–Missing Alarm: Pins #3 (alarm output) and #4 (12V+)
- Power Failure Alarm: Pins #5 (alarm output) and #6 (12V+)

9.3.9. Connecting Remote Reset Switch for Power Removal/Shutoff Alarm

9.3.9.1. Introduction

The following instructions apply to early serial number units that are to be panel-mounted and do not have an additional alarm reset button behind the hinged lid on the front panel.

The rear panel push button switch marked "**POWER ALARM**  " is designed to silence the power removal/shutoff buzzer which is activated when power to the equipment is shut off, or removed, at the source.

With the cabinet panel-mounted, it is impossible for the user to access the button. To solve this problem, install a push-button type on/off switch on the panel close to the cabinet, and run a suitable length of two-conductor wire from the switch to the *5-pin spare connector-receptacle on the equipment's rear panel.

** This connector is installed only on early serial number units. Units that do not carry the 5-pin connector have an additional reset switch inside the cabinet, accessible by opening the hinged front lid.*

Later serial number units have an additional reset button that is parallel-connected to the rear panel button, and accessible by opening the hinged lid on the front panel.

9.3.9.2. Connections

The 5-pin spare connector is not marked. The figure below helps identify the pin assignments.

Figure 9-20 Alarm Reset Switch and Spare Connector for Remote Reset Switch



Run the two-conductor cable from pins #1 and #2 on the connector to the push-button switch.

*NOTE: Pins #1 and #2 are parallel-wired internally to the **POWER ALARM** switch.*