KODEN

OPERATION MANUAL

NAVIGATIONAL ECHO SOUNDER

CVR-010

CVR-010 Operation Manual
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When part of the document needs to be revised, the document has advanced revision number.

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General Safety Warnings – *1/2*

(1) THE REAR–PANEL MOUNTED 3–PIN "TRANSDUCER" CONNECTOR RECEPTACLE IS EMITTING EXTREMELY HIGH VOLTAGE RF (RADIO–FREQUENCY) PULSES WHILE THE EQUIPMENT IS TURNED ON.

THE CONNECTOR IS NORMALLY COVERED WITH A SCREW–LOCKED PROTECTIVE RUBBER CAP WHEN THE EQUIPMENT IS INITIALLY DELIVERED.

TO AVOID COMING INTO ACCIDENTALLY CONTACT WITH ANY OF THE CONNECTOR PINS, BE SURE TO PLACE THE PROTECTIVE CAP OVER THE RECEPTACLE WHENEVER THE TRANSDUCER IS UNPLUGGED.

LOCK THE CAP WITH THE TWO SCREWS ATTACHED.

(2) TO COMPLY WITH THE RELEVANT WHEEL–MARK TYPE APPROVAL REGULATIONS, THE EQUIPMENT MUST BE OPERATED USING ONE OF THE TRANSDUCERS SPECIFIED IN THIS MANUAL. OPERATION WITH A TRANSDUCER OTHER THAN A SPECIFIED ONE IS NOT OFFICIALLY APPROVED, AND THE RESULTS OBTAINED WITH SUCH A TRANSDUCER 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.

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

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

See paragraph 7.4.2 (Multiple Bottom Echoes) for more information on the second bottom echo.

(5) 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 8.10.7.3 (Entering Keel Offset) for more information on the keel offset.

General Safety 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 FACE 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 8.2 (Entering Transducer Draft) for more information on the transducer draft.

(6) DO NOT SWITCH THE EQUIPMENT ON WITH THE TRANSDUCER OUT OF WATER, SUCH AS WHILE THE VESSEL IS DRY–DOCKED, OR THE TRANSDUCER'S CERAMIC CRYSTALS MAY BE DAMAGED IRREPARABLY.

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

(8) 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 UNABLE, FOR ANY REASON, TO OPERATE THIS EQUIPMENT.
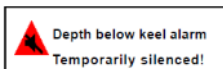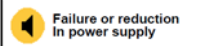
< CAUTION >
Environmental Safety – Equipment Disposal

The display cabinet and the transducer are considered environmentally safe in their original, assembled forms. However, if either unit is to be discarded for any reason, ensure full compliance with all pertinent national/local regulations/ordinances, and contact your dealer/the manufacturer for assistance or instructions before disposing of it.

Alert List Summary

The table below lists the types of active–state alerts the echo sounder provides and a summary of their presentations, causes, rectifications and acknowledgement methods.

Table 1-1 Alert List Summary

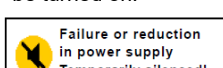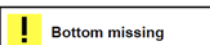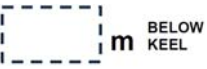| Alert Title (Alert Priority)	Presentation		Alert Cause	Suggested Rectification or Acknowledgement
	Visual	Acoustic		
IEC Standardized Alerts				
Depth below keel (Alarm) See paragraph 7.8.8 (Depth–below–Keel Alert) for details.	Depth below keel alarm Alert icon flashing in red color	A set of 3 short beeps repeating at 7–second intervals	Depth below keel reaches and decreases above user–preset alert depth.	• Check depth trend (deepening/shallowing) on echogram, and steer toward deeper areas, as necessary. • Acknowledge with CLR. • To temporarily silence acoustic presentation, press ALARM. The following visual presentation will then be turned on. Depth below keel alarm Temporarily silenced!
Power failure (Warning) See paragraph 7.8.9 (Power Failure Alert) for details.	Failure or reduction in power supply Alert icon flashing in yellowish orange color	A set of 2 short beeps repeating at 2–minute intervals	Vessel's power source voltage drops below 11V.	• Check ship's battery condition and/or its charging system. • Acknowledge with CLR. • To temporarily silence acoustic presentation, press ALARM. – The following visual presentation will then be turned on. Failure or reduction in power supply Temporarily silenced!
IEC Proprietary Alert				
Bottom missing (Caution) See paragraph 7.8.3 (Proprietary Alert) for details.	! Bottom missing Alert icon stationary in yellow color Blank depth readout m BELOW KEEL	None	• Auto control mode: – Bottom echo is too weak or is temporarily lost due to turbulent water streams around transducer. • Manual control mode: – Depth is out of range and/or receiver gain is too low and/or; – TVG setting is not appropriate.	• Operate echo sounder in auto control mode by pressing AUTO ; or – use higher receiver gain and/or TVG level settings. • Acoustic presentation will be turned off in 5 seconds.

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List of Contents *(1/3)*   Page

1. List of Figures and Tables

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Table No. Description   Page

2. List of Abbreviations

The abbreviations used in this manual and menus, on the echogram screen, control panel and display cabinet's rear panel are listed below.

ABS: Acrylonitrile Butadiene Styrene (thermoplastic polymer material)
ACN: Acknowledgement (header of IEC 61162–1 Ed. 5 command sentence)
ALC: Alert Cyclic List (header of IEC 61162–1 Ed. 5 alert output sentence)
ALF: Alert (header of IEC 61162–1 Ed. 5 alert output sentence)
ALM: Alarm (header of IEC 61162–1 Ed. 4/NMEA–0183 alarm output sentence)
A–SCP: A–Scope display
AUTO: Automatic control mode (automatic selection of range, gain and TVG)

BAM: Bridge Alert Management system
BR: Braccia (Italian/Spanish equivalent of fathoms)
BRT: Brightness control key
BS: Back Space (shifts character highlight to the left on data entry field)
BSH: Bundesamt für Seeschiffahrt und Hydrographie (Federal Maritime and Hydrographic Agency, Germany)

CAM: Central Alert Management system
CCW: Counterclockwise
CLR: Clear
Corr.:   Corrigendum
CR: Carriage Return code (cursor control code in software programming)
CW: Clockwise

D: Depth (part of cabinet dimensions)
dB: decibels (unit of relative power strength, 0 dBμ =1 μV)
DBK: Header of IEC 61162–1/NMEA–0183 data sentence (depth below keel)
DBS: Header of IEC 61162–1/NMEA–0183 data sentence (depth below surface)
DBT: Header of IEC 61162–1/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)
DPT: Header of IEC 61162–1/NMEA–0183 data sentence (depth)

Ed.:   Edition
EN: Europäische Norm (European Standards)
ENT: Entry key
ERR: Error (test result message from self–diagnostic tests)
E/S: Echo Sounder
ESC/P: EPSON Standard Code for Printers (printer control protocol)
EU: European Union
E/W: East and West

FM: fathoms (=6 feet)
FRQ, FREQ: Frequency (transducer frequency)
FT: feet/foot
FWE: Flash–memory Write Enable (flash memory programming)

GGA: Header of IEC 61162–1/NMEA–0183 data sentence (GPS position fix)
GND: Ground
GPS: Global Positioning System, GPS receiver/sensor

H: Height (part of cabinet dimensions)
HBT: Heartbeat (header of IEC 61162–1 Ed. 5 heartbeat supervision output sentence)
hex: hexadecimal notation
HH:MM:SS: Time display format (hours, minutes and seconds)
hr., hrs.: hour(s)

ID: Identifier (alert identifier)
IEC: International Electrotechnical Commission
I/F: interface
incl.:   including
INS: Integrated Navigation System (INS port = RS–422A/B port in this system)
IMO: International Maritime Organization
ISO: International Standardization Organization
I/O: Input/Output, rear–panel **I/O** connector

3   *(continued on next page)*

2. List of Abbreviations *(continued – 2/2)*

KL: Keel offset (depth from transducer to keel)
KT, KTS: knot(s)

LAT/LON: Latitudinal/Longitudinal coordinates
LCD: Liquid Crystal Display
LED: Light–Emitting Diode
LF: Line Feed code (cursor control code in software programming)
LST: Local Standard Time

m: meters
max.: maximum
MED: Marine Equipment Directive (EU directive)
min.: minutes, minimum
MM/DD/YY: Month, Day and Year (date indication format)
MTW: Header of IEC 61162–1/NMEA–0183 data sentence (water temperature)

NB: Notified Body (EU notified body)
NC: No Connection (no internal connections)
NMEA: U.S. National Marine Electronics Association
NR: Noise Reduction
N/S: North and South

OEM: Original Equipment Manufacturing

par., para.: paragraph
PF: Picture Feed (echogram feed rate, plotting speed)
PLBK: Playback (review history of soundings and other data stored in memory)
PWR: Power

QVGA: Quarter VGA (display screen resolution, 320X240 pixels)

ref.: refer to, reference is made to
rms: root mean square (definition of effective mean power)
REV, Rev.: Revision (revised firmware version)
RF: Radio Frequency (transducer frequency in this manual)
RGB: Red, Green and Blue (3 original colors of light)
RH: Relative Humidity
RMC: Header of IEC 61162–1/NMEA–0183 data sentence (position, speed, time)
RNG: Range (depth range)
RX: Receive, receiver
RXD: Receive Data

SD: Device identifier assigned to echo sounder in IEC 61162–1/NMEA–0183 sentence
SPST: Single–Pole–Single–Throw (on/off switch)
STB: Starboard, Strobe signal (signal to time data accessing in digital systems)
STD, Std.: Standard(s)
STG, stg.: Steering, steering compass

TEMP: Temperature
TFT: Thin–Film Transistor (manufacturing technology of color LCD)
TVG: Time–Varied Gain control
TX: Transmit, transmitter
TXD: Transmit Data (Send data)

UTC: Universal Time Coordinated (= GMT in common usage)

VER, Ver.: Version (firmware version)
VGA: Video Graphics Array (display screen resolution, 640 ×480 pixels)
VRM: Variable Range Marker
VTG: Header of IEC 61162–1/NMEA–0183 data sentence (heading and speed)

W: Width (part of cabinet dimensions), watts

XDUCER: Transducer

Z: GMT (mainly in military usage)
ZDA: Header of IEC 61162–1/NMEA–0183 data sentence (UTC and date)

3. Password–Protecting the Menu Settings

3.1. Introduction

· To prevent an unauthorized change in menu settings you have made, a 4–digit user–definable password can be set.

· Once a password is set, every time you press **MENU** to check or change some settings, a password entry window will pop up, asking you to enter the password before you can open the **MAIN MENU**.

<div align="center">< WARNING ></div>

· **BEFORE INITIALLY ENTERING THE DESIRED PASSWORD, BE SURE TO TAKE A NOTE OF IT, AND, IF NECESSARY, ADVISE ONLY AUTHORIZED USERS OF IT.**

· **FOR SECURITY REASONS, THE MANUFACTURER CANNOT HELP BREAK A USER–ENTERED PASSWORD.**

3.2. Setting a Password

· It is assumed that a normal echogram screen is showing with no menu turned on.

Figure 3-1 Password Entry Window

(1) While holding down **CLR** until two beeps are heard, press both **MENU** and **ENT** simultaneously.

- A password entry window should then show up, as illustrated at right.

(2) Enter the desired password consisting of 4 numerals, by pressing the appropriate numeric keys.

- Each character entered will be replaced by an asterisk (＊) for security reasons.

- An entry mistake can be erased by pressing ◆.

```
┌─────────────────────────────┐
│ MENU NEW1 PASSWORD          │
│ ┌─────────────────────────┐ │
│ │ █                       │ │
│ └─────────────────────────┘ │
│        ↖                    │
│         ╲ ─ ─ ─  Enter 4–digit password
│                  starting here.           │
│                                           │
│ [▲] = BS                                  │
│                                           │
│ PRESS [PAGE] TO EXIT ALL                  │
└───────────────────────────────────────────┘
```
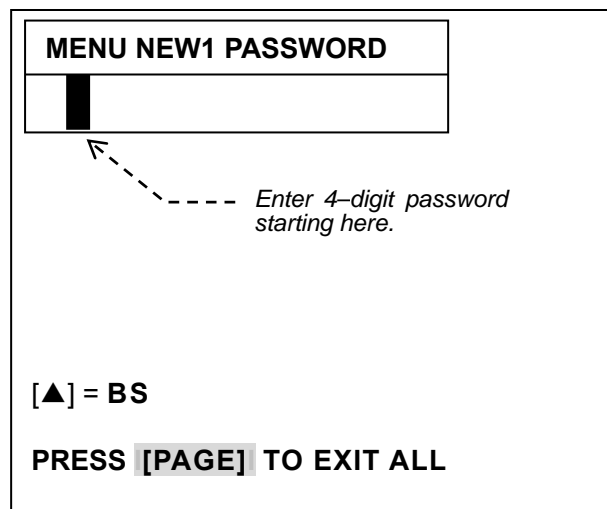
Figure 3-2 Entering Password

(3) Press **ENT**.

- The password entry field should then change as shown at right, asking you to enter the same password again.

(4) Re–enter the same password in the same manner.

(5) Press **ENT**.

```
┌──────────────────────────────┐
│M┌──────────────────────────┐ │
│ │ MENU NEW2 PASSWORD       │ │
│ │ ┌──────────────────────┐ │ │
│＊│ │ █                    │ │ │
│ │ └──────────────────────┘ │ │
└──└──────────────────────────┘─┘

┌──────────────────────────────┐
│M┌──────────────────────────┐ │
│ │ MENU NEW2 PASSWORD       │ │
│ │ ┌──────────────────────┐ │ │
│＊│ │＊＊＊＊ █             │ │ │
│ │ └──────────────────────┘ │ │
└──└──────────────────────────┘─┘
```

- The window will then be turned off, allowing the echogram screen to return.

- If an incorrect password was entered at step (3), the first password entry field (1) will return.

<div align="center">5</div>
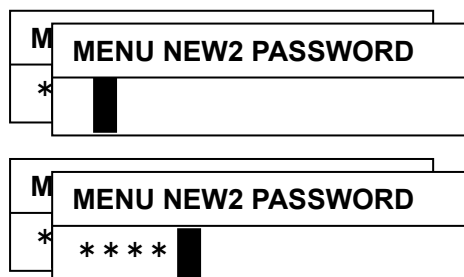
3. Password–Protecting the Menu Settings *(continued – 2/2)*

3.3. Changing or Removing the Password

- If you wish to change the current password or remove the password to allow free access to the menu system, execute the following steps:

Figure 3-3 Password Initialization Window

(1) Display a password initialization window by pressing both **MENU** and **ENT** simultaneously while holding down **CLR** , as in the figure at right.

```
MENU OLD PASSWORD
┌─────────────┐
│ █           │
└─────────────┘
        ↖
         ╲ ─ ─ ─ ─  Enter current password.


[▲] = BS

PRESS  [PAGE]  TO EXIT ALL
```

Figure 3-4 Changing / Removing Password – *1/2*

(2) Enter the current (existing) password and then press **ENT** .

- The password field will change, as shown at right.

```
MENU NEW1 PASSWORD
* █
```

Figure 3-5 Changing / Removing Password – *2/2*

(3) Enter a new password if you wish to change the current one, or simply press **ENT** to remove the current password.

- The password field will change, as shown at right.

```
MENU NEW2 PASSWORD
* █
```

(4) Re–enter the new password and press **ENT** (or press **ENT** one more time to remove the password).

- The password entry window will then be turned off.

- This completes the menu password change/removal procedure.

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4. Standard Components and Parts Supplied

· The following components and parts are initially supplied as standard for each unit of the **CVR–010** echo sounder, unless otherwise prearranged under a separate agreement with your dealer or the manufacturer.

· Upon receipt of the package, check your delivery against the list below and notify your dealer or the manufacturer immediately if any part is found missing.

Table 4-1 List of Standard Components and Parts Supplied

No.	Name and Description	Part No./Rating/Specs.	Q'ty
1	Echo sounder display unit	CVR–010	1 pc
2	Mounting bracket	SF–STD01	1 pc
3	Cabinet clamping knob	KG–B3/M8X15*1	2 pcs
4	Power cable	M402–PW01*2	1 pc
5	Fuse (for 24V DC and up)	2A, 5.2X20mm, slow–blow	2 pcs
6	Fuse (for 12V DC)	3A, 5.2X20mm, slow–blow	2 pcs
7	2–pin plug (for **ALARM ACK** receptacle)	CP111–2P*1	1 pc
8	6–pin plug (for **ALARM OUT** receptacle)	CP111–6P*1	1 pc
9	8–pin plug (for **I/O** receptacle)	CP111–8P*1	1 pc
10	3–pin plug (for **TRANSDUCER** receptacle)	HS21P–3*1	1 pc
11	User's manual (this publication)	OPERATION MANUAL	1 copy

*1: *Equivalents may be supplied, depending on availability or production lot.*

*2: *pre–terminated in 3–pin plug (part # CP111–3P) at one end*

5. Product Description

- The Model **CVR–010** is a single–channel navigation echo sounder designed to comply fully with IMO Resolution MSC.74(69) Annex 4, and is type–approved by an EU Notified Body (NB) on the basis of compliance with the DIN EN ISO 9875 and relevant IEC requirements for wheel mark certification. Equipped with a 5.7–inch daylight–viewing, LED–backlit color TFT LCD screen, the echo sounder displays the echogram using a total of seven user–definable ease–on–the–eye analog strength–level colors that represent various layers of the bottom stratum. The display can be set to show the bottom contour alone in a single color via a menu–driven procedure.

- Digital depth readout is also available using easy–to–read large fonts with a clear on–screen indication of the reference of measurement (from the waterline, the transducer or the keel), and in meters, fathoms or feet. To comply with the relevant IMO resolution, the depth reading must be indicated in meters for navigational purposes. With an optional GPS sensor plugged in, the ship's LAT/LON coordinates, speed and heading data will also be displayed at the same time.

- Up to 12 hours of sounding data will be stored in non–volatile memory at approximately two–second intervals, together with associated date and time, range in use plus position coordinates (with an optional GPS sensor plugged in). The user can review the stored data across any 15–minute segment at any point in time over the past 12 hours through a specially designed window easily accessible with a devoted key. The depth sounding history can be graphically displayed to show how the depth varied over the past hours. A list of detailed data is also available digitally via another window that can also be accessed with a single keystroke. The data can be output on demand in NMEA–0183 (IEC 61162–1 Ed. 5)–compatible format via the serial interface ports[*1] for use in shore–based applications, and is protected against the system reset.

- The built–in alerts include IEC–defined standardized alerts (depth–below–keel, power failure) and a proprietary alert (bottom–missing). The depth–below–keel alert (alert priority: alarm) warns the operator against decreasing depth above a user–preset alert–triggering depth. A variable depth marker can be turned on to set the desired alert depth graphically as well as digitally. The bottom–missing alert (alert priority: caution) warns against the bottom echo being lost, becoming too weak or exceeding the current range limit in manual mode operation. The power failure alert (alert priority: warning) will be activated if the power line voltage drops below the factory–specified predetermined level. The alert activation status will be presented acoustically and/or visually, and the alert outputs will be separately available for driving external alert devices through a devoted connector[*2].

- For remote alert management (BAM/CAM) purposes, the echo sounder, as an alert source, outputs the IEC 61162–1 Ed. 5 format alert–related sentences at the specified intervals for each alert in compliance with the BAM interface requirements via the rear–panel **RS–422–A/B** serial interface ports. When any of the above IEC becomes active, the output's status and intervals will be changed accordingly, and the active alert(s)[*3] can be remotely acknowledged with an appropriate software command from a BAM/CAM terminal or can be directly acknowledged with a suitable hardware on/off switch mounted at an easily accessible site and connected to the devoted connector[*4].

- NB–approved highly energy–efficient **TOKIN** 50 and 200 kHz ceramic transducers are available. User–supplied **ELAC** 50 and 200 kHz transducers can also be used for retrofit installations or if such devices are preferred. The desired frequency should be specified at the time of ordering so that a matched transceiver board is preinstalled in the display cabinet before delivery to the user.

- Both the receiver gain and TVG (anti–clutter) levels are automatically controlled for hands–free operation when the equipment is operating in the fully automatic mode (**AUTO**). Manual override of both functions is also possible.

- The display cabinet has a built–in rugged switch–mode DC power supply that assures reliable operation against a wide range of input voltage fluctuations. In an installation where an AC power source is available, the equipment can be operated primarily from the AC source through an optional **Model AC–2000** AC Power Adapter for an automatic changeover to the DC power source in the event of AC power outage.

[*1]: *rear–panel* **RS–422–A/B** *and* **I/O** *connectors*

[*2]: *rear–panel* **ALARM OUT** *connector*

[*3]: *Active depth–below–keel alert must only be acknowledged directly at alert source.*

[*4]: *rear–panel* **ALARM ACK** *connector*

6. Specifications

6.1. General Specifications

(1) Display Screen: 5.7 inch 7–analog RGB-color LED–backlit TFT–LCD, QVGA resolution, with backlighting level adjustable in 10 steps

The LCD module complies with IEC 62288 (Ed.2.0, 2014) standard.

(2) Data Storage: Up to 12 hours of soundings data, depth range, associated UTC date/time and LAT/LON readouts[1] are automatically retained in flash memory protected from power shutoff or system reset.

(3) Data Retrieval: Stored soundings data (IEC 61162–1/NMEA–0183 DPT format) of past 15 minutes, 1/3/6/12 hours can be retrieved from the internal flash memory and can be graphically displayed in a devoted soundings data history window, together with associated UTC date/time and LAT/LON coordinates[1].

All stored data can be output in NMEA proprietary format on demand via all rear–panel **RS–422–A/B** and **I/O** serial interface ports simultaneously.

(4) Keypad Backlighting: Adjustable in 7 steps by front panel dimmer key

(5) Cabinet Size & Weight: 248/196(W) × 216/196(H) × 102(D) mm with/without mounting bracket, 1.6 kg (cabinet) + 0.55 kg (mounting bracket)

(6) Power Requirements[2]: 11 – 40 VDC, 0.8A at 12V, 0.4A at 24V (typical)
Power consumption: less than 10W[3]

(7) Ambient Temperature: –15 to +55° C, 95% RH (operating, without condensation)
–40° C (storage)

(8) Compass Safe Distance: 1.00m (standard compass), 0.55m (steering compass)

(9) Waterproofing: IPX4 (protected equipment category under IEC 60945–2002)

6.2. Echo Sounder Specifications

(1) Modes of Operation:

  · **AUTO** (default): Fully automatic selection and settings (depth range, gain, TVG)
  · **MANUAL**: Manual selection and settings of above parameters

(2) Depth Ranges (Maximum Range Limits):

	A	B	C	D	E	F	G	H
· Meters (**m**, default):	5	10	20	40	100	200	400	800
· Fathoms (**FM**):	2.5	5	15	20	40	100	200	400
· Feet (**FT**):	20	40	100	200	400	1000	2000	4000

(3) Transducer Draft: Adjustable in 0.1–meter steps for each transducer

(4) Keel Offset[4]: Adjustable in 0.1–meter steps for each transducer

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[1]: *Optional GPS sensor or GPS data source (NMEA–0183 outputs) required*

[2]: *AC operation available with optional **AC–2000** adapter connected*

[3]: *Depth range:20m, screen brightness: maximum*

[4]: *Correct keel offset for transducer must be entered for remote alert management. See paragraph 8.10.7 (Making Transducer–Related Settings) for details.*

6. Specifications *(continued – 2/4)*

6.2. Echo Sounder Specifications *(2/4)*

(5) Transducer Frequencies *(and NB–approved Matched Transducers[1]):*

- 50 kHz   **TGM60–50–20L**, **LSE 297**
- 200 kHz   **TGM80–200–20L**, **LSE 313**

(6) Transmit Power: Approx. 600W RMS max. to **TGM series**[1] transducers
Approx. 200W RMS max. to **LSE series**[1] transducers

(7) Transmit Pulse Lengths *(in milliseconds):*

	A	B	C	D	E	F	G	H
· Meters (**m**) :	0.14	0.3	0.6	1.1	2.7	5.4	5.4	5.4
· Fathoms (**FM**):	0.14	0.3	0.6	1.1	2.7	5.4	5.4	5.4
· Feet (**FT**):	0.14	0.3	0.6	1.1	2.7	5.4	5.4	5.4

(8) 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

(9) Velocity Standard: 1500.0 meters/second; fixed

(10) Minimum Detectable Depth:

- 50 kHz: 1 meter
- 200 kHz: 50 centimeters

(11) Accuracy of Measurement:

- 20–meter range: Better than ±0.5 meters
- 200–meter range: Better than ±5 meters
- Other ranges: Better than ±2.5% of digital depth readout

(12) Range Discrimination:

- 20–meter range: 5 mm/m
- 200–meter range: 0.5 mm/m

(13) Echogram Presentation:

- Default: Bottom echo is displayed in red only.
- User–Definable: Bottom echo can be displayed in up to 7 analog RGB colors, depending on strength, with red representing the strongest echo level and blue, the weakest level (default settings).
Color–vs.–echo strength assignments can be user–defined.

(14) Display Duration: Approx. 20 minutes

(15) Echogram Feed Rate: Once every 2 seconds; e.g. once every 4 soundings on range below 40m and every 2 soundings on 100m range

(16) Echo Dynamic Range: Change in echo indication to next stronger/weaker color normally represents a 3–dB change in strength.
Other selectable dynamic ranges include 4, 5 and 6 dB.

(17) Noise Reduction: 3 steps *(low, mid and high)*, selectable via menu

(18) Receiver Gain: Automatically adjusted for depth range in use; manually adjustable in a total of 41 steps *(=level 0 to level 40)*

(19) TVG: Automatically adjusted for depth range in use; manually adjustable in a total of 31 steps *(=level 0 to level 30)*

---

[1]: *TGM and LSE type names are property of TOKIN Corp. and ELAC Nautik GmbH, respectively.*

6. Specifications *(continued – 3/4)*

6.2. Echo Sounder Specifications *(3/4)*

(21) Alerts *(1/2)*

(a) IEC–Defined Standardized Alerts[1]:

- · Alarm: Depth–below–keel alert, alerting to depth decreasing beyond user–preset level (keel offset)
- - Alert Category/Alert Priority: A/A(alarm)
- - Visual/Acoustic Presentations: Compliant with IEC 62923–1, Table 3
- - Alert ID: 3031
- · Warning: Power failure alert, alerting to power supply voltage reducing below default level (approx. 11V)
- - Alert Category/Alert Priority: B/W(warning)
- - Visual/Acoustic Presentations: Compliant with IEC 62923–1, Table 4
- - Alert ID: 3022

(b) IEC–Compliant Proprietary Alert[1]:

- · Caution: Bottom–missing alert, alerting to bottom echo being lost or becoming too weak to measure depth, or to depth exceeding current range limit, for 4 seconds or more
- - Alert Category/Alert Priority: B/C(caution)
- - Visual/Acoustic Presentations: Compliant with IEC 62923–1, Table 5
- - Alert ID: 10003

(22) Alert Interfaces for Remote Alert Management[2]

- · Hardware Interfaces: **RS–422– A**, **RS–422–B** (rear panel–mounted connectors)
- · Software Interfaces:
- - Command Sentences[3]:
    for depth–below–keel alert (alert priority=alarm):
      $CAACN,,,**3031**,**1**,**Q**,C∗hh<CR><LF>: Request or repeat alert sentence.
      $CAACN,,,**3031**,**1**,**S**,C∗hh<CR><LF>: Temporarily silence alert.
    for power failure alert (alert priority=warning):
      $CAACN,,,**3022**,**1**,**A**,C∗hh<CR><LF>: Acknowledge alert.
      $CAACN,,,**3022**,**1**,**Q**,C∗hh<CR><LF>: Request or repeat alert sentence.
      $CAACN,,,**3022**,**1**,**S**,C∗hh<CR><LF>: Temporarily silence alert.
      $CAACN,,,**3022**,**1**,**O**,C∗hh<CR><LF>: Transfer responsibility.
    for bottom–missing alert (alert priority=caution):
      $CAACN,,,**10003**,**1**,**Q**,C∗hh<CR><LF>: Request or repeat alert sentence.
    for heartbeat sentence:
      $CACRQ,HBT,∗hh<CR><LF>: Request heartbeat output.
- - Alert Output Sentences[4] (in normal state, except otherwise stated)
    for depth–below–keel alert (alert category=A):
      $SDALF,1,1,x,,A,A,**N**,,**3031**,,x,x,Depth below keel∗hh<CR><LF>
    for power failure alert (alert category=B), output in 2 sentences:
      $SDALF,2,1,x,,B,W,**N**,,**3022**,,x,x,Power failure∗hh<CR><LF>
      $SDALF,2,2,x,,,,,,**3022**,,x,x,Failure or reduction in power supply∗hh<CR><LF>
    for bottom–missing alert (alert category=B):
      $SDALF,1,1,x,,B,C,**N**,JMC,**10003**,,x,x,Bottom missing∗hh<CR><LF>
      $SDALF,1,1,x,,B,C,**A**,JMC,**10003**,,x,x,Bottom missing∗hh<CR><LF>: acknowledged
- - ALC Cyclic Alert List Sentence[4] (no active alert)
      $SDALC,xx,xx,00,0∗hh<CR><LF>
- - HBT Sentence[4] (equipment in normal state)
      $SDHBT,xx,**A**,x∗hh<CR><LF>
- - ARC Sentence[4] (alert handling command refused)
      $SDARC,hhmmss.ss,,x.x ,x.x,c∗hh<CR><LF>

[1]: *See paragraph 7.8 (Alerts) for details.* [2]: *See paragraph 13.4 (Remote Alert Management) for details.*
[3]: *Device ID used in those sample command formats=CA.* [4]: *See paragraph 13.4.3.2 (Software Alert Interfaces)*

6. Specifications (continued – 4/4)

6.2. Echo Sounder Specifications (4/4)

(23) External I/O Interface Specifications

- · External Interface Ports:
  - - Digital: Serial interface connectors **RS–422–A/B** and **I/O**
  - - Analog: Open–collector, 50V⁄800mA max., via **ALARM OUT** connector[*1]

- · Online Data Outputs: The following NMEA–0183 format data sentences are available from the above ports:
  - - Depth Outputs[*2]: $SDDPT, $SDDBT, $SDDBK, $PSKPDPT[*3]
  - - GPS–Derived Outputs: With optional GPS sensor plugged into **I/O** connector, outputs $GPGGA, $GPRMC and $GPZDA will be appended to the above depth data sentences.

  - - Alert Output Formats:
    - Digital: $SDALC, $SDALF, $SDHBT, $SDARC, $SDHBT
    - Analog: Open–collector, 50V⁄800mA max., via **ALARM OUT** connector[*1]

- · Stored Data Output Format: NMEA–0183–compatible proprietary format ($PJMCN[*4]) via **RS–422–A/B** and **I/O** connectors

- · Data Inputs: $GPGGA, $GPRMC, $GPVTG and $GPZDA via **I/O** connector

- · Alert Outputs:
  - - Analog: 2 channels, by mechanical relay and solid–state relay via **ALARM OUT** connector[*1]

  - - Mechanical Relay: Normally–open contact pair for depth–below–keel alert; Pins #3 and #4, Ratings: 50V, 0.8A

  - - Solid State Relay 1:   Normally–closed contact pair for power failure alert; Pins #1 and #2, Ratings: 50V, 0.8A

  - - Solid State Relay 2:   Normally–open contact pair for acknowledgement output; Pins #5 and #6, Ratings: 50V, 0.8A

NOTE: Specifications other than those stipulated in the relevant IMO resolutions, IEC standards or EN ISO 9875 standards are subject to change without notice or obligation.

[*1]: *See paragraph 13.3.6 (Connections to ALARM OUT connector) for details.*
[*2]: *The depth data will be output in meters only regardless of the depth readout unit in use.*
[*3]: *This format sentence is for exclusive use with **SKIPPER IR 301** digital depth repeaters.*
[*4]: *See paragraph 10.2 (Data Output Format) for details.*

7. Basic Operating Instructions

7.1. Interpreting Navigation Sounder Screen

· The figure below illustrates a typical operating display showing a full–color bottom topography. A brief description of on–screen readouts and objects is given in the following pages.

Figure 7-1 Typical Full–Screen Full–Color Echogram Display

⑨ 1–Minute Time Calibrations

⑧ Time Markers

54° 31.314N
006° 52.717E
01/06/2024
06:35:47

KL= 0 . 6
AUTO

⑰ Zero Line

⑥ Control Mode

⑦ Keel Offset

⑩ LAT/LON of Present Position *1

⑪ Date & Time

① Bottom Echo

② Color Sample Scale

③ Depth Readout

11.9m BELOW KEEL

24.5
GAIN=AT   TVG=AT
NR=OFF   ⚠DBK 10.5

⑤ Depth Reference

④ Depth Readout Unit
m : meters

⑯ Transducer Location

⑫ Depth Alert, set at 10.5m

⑬ Noise Reduction, initially turned off

⑭ Gain & TVG Levels, **AT** = automatic

⑮ Power Supply Voltage

*1: *Optional GPS sensor or GPS–derived NMEA–0183 data source to rear–panel **I/O** connector required*

7.   Basic Operating Instructions *(continued – 2/33)*

7.1.   Interpreting Navigation Sounder Screen *(2/5)*

① Bottom Echo

- The bottom echo is shown in up to a total of seven different colors, depending on the strength. The colors used to display the echoes are shown on the color sample scale (②) in order of strength. Red, initially at the lower end of the scale, represents the strongest part of the echo (i.e. hardest layer of bottom stratum), and blue initially represents the weakest part (i.e. softest layer of the bottom).

- It is possible to display only the bottom contour in a single color via the procedure. given in paragraph 7.9 (Selecting Types of Echo Display) for instructions.

② Color Sample Scale

- When the echo display*1 is set to show echoes in full colors, 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 8.10.2 (Changing Echo Color Assignments) for related information.

- An echo must be initially 3 decibels (dB) stronger or weaker than the adjacent strength level to be displayed in next stronger or weaker color. See paragraph 8.10.4 (Selecting Echo Dynamic Ranges) for greater details.

Figure 7-2 Initial Assignments of Echo Colors

Blue	------------>	<---------	Strength Level 1 (weakest echo)
Light Blue	--------->	<---------	Strength Level 2
Yellowish Green	----->	<---------	Strength Level 3
Green	------------>	<---------	Strength Level 4
Yellow	------------>	<---------	Strength Level 5
Orange	----------->	<---------	Strength Level 6
Red	------------>	<---------	Strength Level 7 (strongest echo)
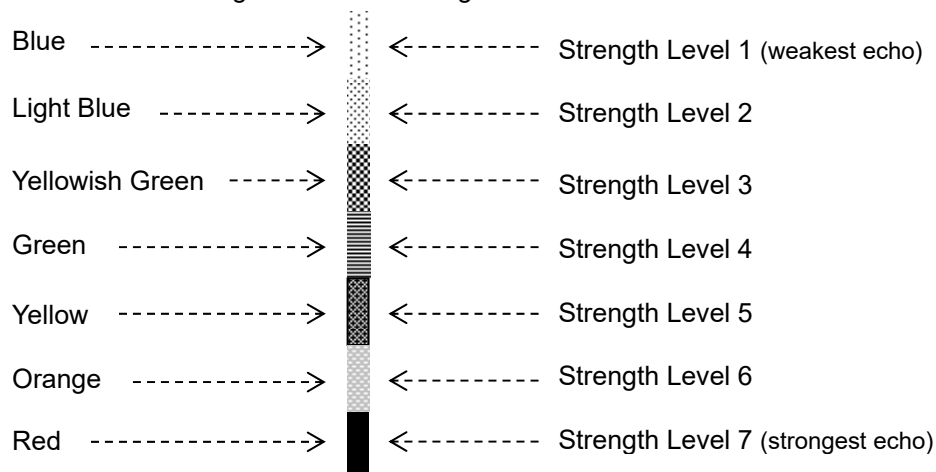
③ Depth Readout *(1/2)*

- The depth to the bottom from the selected reference (⑤) is indicated here. Refer to paragraph 8.10.3 (Selecting Depth Readout Units) for details

m=meters (initial setting); **FM**=fathoms; **FT**=feet

< C A U T I O N >
To comply with IMO resolution MSC.74(69), depth measurements must be made in meters (m) for navigational purposes.

- To obtain an uninterrupted readout, the bottom echo (①) must remain displayed in red, orange or yellow (or three user–defined strongest echo colors). This is automatically accomplished when the echo sounder is operating in the automatic control mode (**AUTO**, paragraph ④).

*1: *Paragraph 8.9*, **MAIN MENU → 8:ECHO DISPLAY → 2:NORMAL DISPLAY**

7.   Basic Operating Instructions *(continued – 3/33)*

7.1.   Interpreting Navigation Sounder Screen *(3/5)*

③ Depth Readout *(2/2)*

・ If the unit is operating the unit in the manual control mode (**MANUAL**, paragraph ④), adjust the gain control accordingly. The TVG level may also have to be adjusted to prevent surface clutters from disturbing depth reading. See paragraph 6.6 (Adjusting TVG Level Manually) for details.

・ If the bottom echo is lost or too weak to measure depth uninterruptedly for 4 seconds or more, (or if the depth exceeds the current range limit continuously for 4 seconds or more when in the manual control mode), the bottom–missing alert will be triggered, turning on the stationary visual alert presentation (shown below) with the digital readout turned off, and emitting a beep at approx. 1–second intervals. To rectify this situation, activate the manual control mode, and increase the receiver gain and/or select a greater range. See paragraph 7.8.10 (Bottom–Missing Alert) for details about the alert function.

Figure 7-3 Visual Presentation of Bottom–Missing Alert

> **! Bottom missing**

④ Depth Readout Unit

・ The unit used in reading the current depth is indicated here. Refer to paragraph 8.10.3 (Selecting Depth Readout Units) for details.

m = meters (initial setting); **FM** = fathoms; **FT** = feet

・ The stored soundings data will be in meters regardless of the readout unit indicated.

⑤ Depth Reference

・ The reference to which measured depth is to be referred is indicated here. See paragraph 8.3 (Selecting Depth Reference Indications) for details.

- **BELOW TRANSDUCER**： Depth referred to transducer (initial setting), **DBT**
- **BELOW SURFACE**：   Depth referred to surface (waterline), **DBS**
- **BELOW KEEL** *[1]：   Depth referred to keel, **DBK** (for remote alert management)

⑥ Control Mode (**AUTO / MANUAL**)

・ The control mode can be changed from/to **AUTO / MANUAL** by pressing [AUTO] . The selected mode is indicated here.

AUTO = automatic control mode; **MANUAL** = manual control mode

⑦ Keel Offset (**KL= X.X**)

・ The distance between the keel and the transducer face, i.e. keel offset, is indicated.

・ The keel offset can be entered the menu system (access path: **MAIN MENU → 9:INSTALLATION SETTINGS→2:KEEL OFFSET**). See paragraph 8.10.7.3 (Entering Keel Offset) for details.

Figure 7-4 Time Marker Intervals – Example

⑧ Time Markers

・ An orange marker and a yellow marker alternately show up at 5–minute intervals on any depth range, as in the example at right.

<- - 5 min. - > <- - 5 min. - >
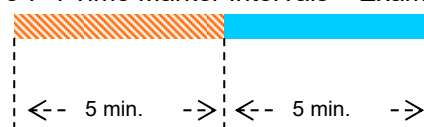
・ By counting the number of markers, you can check an approximate time period elapsed across a particular horizontal segment on the echogram screen.

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*[1]: *This depth reference is mandatory if the depth information is to be used for remote alert management compliant with the IEC BAM requirements.*

7. Basic Operating Instructions *(continued – 4/33)*

7.1. Interpreting Navigation Sounder Screen *(4/5)*

⑨ One–Minute Time Calibrations

- These graduations are displayed at one–minute intervals, allowing you to check the time passage to one minute across a given segment of the echogram.

Figure 7-5 One–Minute Time Calibrations
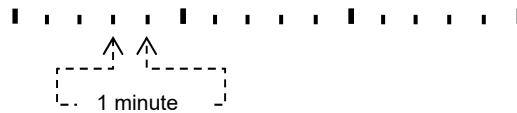
⑩ LAT/LON Coordinates of Present Position

- When an optional GPS sensor is plugged into the rear–panel **I/O** 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 will store the position data in memory along with digital depth reading and associated date/time data.

⑪ Date and Time

- The date is shown in DD/MM/YY(month/day/year) format. The time is in 24–hour HH:MM:SS (hours: minutes: seconds) format, and is UTC unless a local time offset is entered. See paragraphs 8.10.5 (Entering Time Offset for Local Standard Time Readout) and 8.10.6 (Setting Date and Time) for date/time preset instructions.

- With an optional GPS sensor plugged in, or a GPS data source connected, the time will be automatically synchronized with the GPS time.

⑫ Depth Alert

- The alert depth is indicated here. The abbreviation to the right of the ⚠ symbol indicates the depth reference used in setting the alert depth. See paragraph 8.3 (Selecting Depth Reference Indications) for more information on the depth reference.
  - **DBT**: depth–below–transducer (initial setting)
  - **DBS**: depth–below–surface (for agreement with nautical chart soundings)
  - **DBK**: depth–below–keel (mandatory for remote alert management)

- As soon as the current depth decreases beyond that value, the depth alert will be triggered and presented both acoustically and visually.

- The alert depth can be set via the following summarized steps:
  (1) Turn on the Variable Range Marker (**VRM**) by pressing 🔲 .
  (2) Repeatedly press ◄►/◄► to place the **VRM** at the desired alert depth.
  (3) Press 🔘 .

- If this equipment is to be used as an alert source in the remote alert management system, see paragraph 7.8.8 (Depth–below–Keel Alert) for details.

⑬ Noise Reduction Level, **NR = OFF/LOW/MID/HIGH**

- Echo sounders or sonars 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 via the menu system[*1]:
  - **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).

[*1]: *access path:* ***MAIN MENU → 4:NOISE REDUCTION***

7.   Basic Operating Instructions *(continued – 5/33)*

7.1.   Interpreting Navigation Sounder Screen *(5/5)*

⑭ Gain and TVG Levels, **GAIN=XX**, **TVG=XX**

・ The receiver gain and TVG levels currently in use are indicated.

・ When the equipment is working in the automatic control (**AUTO**) mode, both indications read "**AT** ." In the case of manual control (**MANUAL**) mode of operation, the current levels are numerically indicated (e.g. **GAIN=18**, **TVG=30**).

・ The receiver gain can be manually changed by pressing 🔲 once, followed by ◣/◣ . The indication **GAIN** is highlighted (**GAIN**) during setting.

・ The TVG level can be manually changed by pressing 🔲 twice first, followed by ◣/◣ . The indication **TVG** is highlighted (**TVG**) during setting.

⑮ Power Supply Voltage

・ The power supply voltage is indicated. If, for any reason, the voltage drops below 11V, the failure–or–reduction–in–power–supply alert will be triggered, acoustically and visually warning you of the trouble. See paragraph 7.8.9 (Power Failure Alert) for details.

Figure 7-6 Visual Presentation of Power Failure Alert

・ In the event that power is removed while the echo sounder is working, an acoustic alert will be triggered, sounding for several minutes. To silence this alert, press 🔲 .

**Failure or reduction
In power supply**
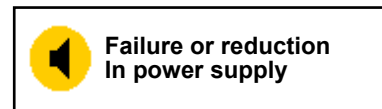
⑯ Transducer Location

・ The relative location of the transducer is indicated here. See paragraph 7.10.7.2 (Registering Relative Transducer Location) for greater details.

Figure 7-7 Relative Location of Transducer

Aft   Middle   Fore

⑰ Zero Line

・ This (initially 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 (paragraph ⑦, depth from waterline to transducer) is entered, the zero line shifts toward the bottom by the amount of draft. See paragraph 8.2 (Entering Transducer Draft) for details on draft entry procedure.

・ 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 8 .10.7.3 (Entering Keel Offset) for the keel offset entry procedure.

7.   Basic Operating Instructions *(continued – 6/33)*

7.2. 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 below and on the following pages.

Figure 7-8 Control Panel
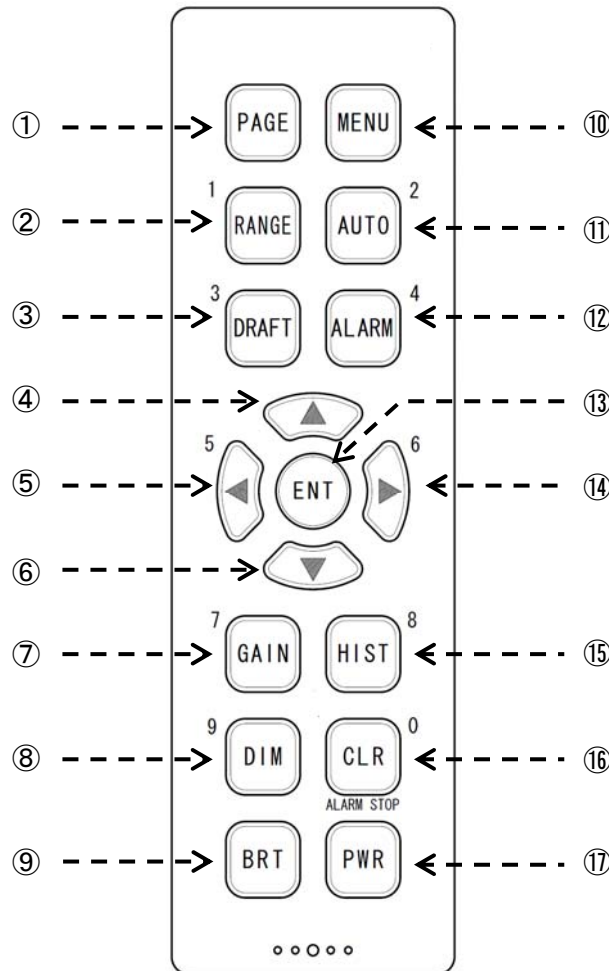
① Page Key [PAGE]

・   Pressing this key opens a data logging (**LOG**) window on the echogram screen to show up to 17 pages of list of stored data including soundings and their associated dates and times (plus position coordinates with an optional GPS sensor plugged in). Each page carries a total of 9 sets of data. To turn the page forward, press ◀ . To turn it backward, press ▶ . See paragraph 7.7.4 (Reviewing Detailed Soundings Data via LOG Window) for details. A second keypress closes the window. When a menu or a number of menus are currently displayed, pressing this key closes all menus at a time, returning you to the normal echogram screen.

・   Turning the equipment on while holding down this key opens the **SYSTEM MENU**, enabling you to:
   - select echogram background colors;
   - perform self–diagnostic tests;
   - output stored data to PC–based applications;
   - select menu languages;
   - set optimum TVG response depending on transducer installed.

・   See Section 9 (Making Settings via SYSTEM MENU) for details.

7. Basic Operating Instructions *(continued – 7/33)*

7.2. Control Panel Functions *(2/8)*

② Depth Range Key 〔RANGE〕

Figure 7-9 Indication of Activating Range Selection Function – Example

· Pressing this key activates the function of depth range selection, highlighting the lower range limit calibration, like the example at right.

· To select a desired range, press ⬇ (for greater ranges) or ⬆ (for smaller ranges).

· When a menu is currently displayed, this key acts as numeric key "**1**" to enter value **1** or to select menu option 1.
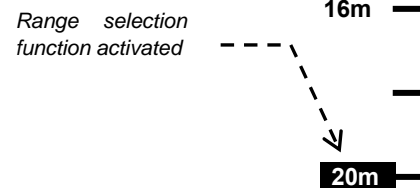
③ Transducer Draft Key 〔DRAFT〕

· To read depth from the surface, the appropriate transducer draft value (i.e. the distance between the waterline and the transducer face)[1] has to be entered. The draft is initially set at 0.0 meter (**DFT=0.0**).

Range selection function activated

12m

16m

20m

Figure 7-10 On–Screen Operating Parameter Indications – Example

· Pressing this key activates the function of entering the transducer draft.

· The legend "**DFT= 0.0**" just below the upper screen edge will be highlighted, like the example at right.

  - To enter the draft, press ⬆/⬇ .
  - To exit the mode, press 〔DRAFT〕 again.

· When a menu is currently displayed, this key acts as numeric key "**3**" to enter value **3** or to select menu option 3.

DFT= 0.0   0m
AUTO

Control Mode

Transducer Draft

4m
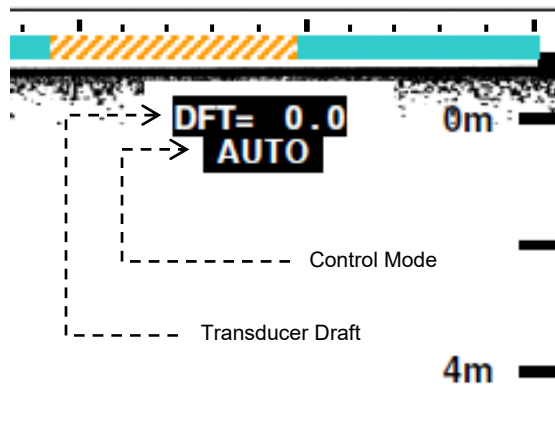
④ Up Key ⬆

· On normal echogram screen with no menu opened, pressing this key results in an operational error, causing the unit to beep three times in quick succession.

· When the variable range marker (**VRM**, ⑫) is turned on, pressing this key moves the marker upward (i.e. in the shallowing direction).

· When a menu with two or more options is currently displayed, pressing this key selects those options upward.
  - To finalize selection, press 〔ENT〕 .

· When selecting depth ranges (②), pressing this key selects smaller ranges.

[1]: *See paragraph 8.2 (Entering Transducer Draft) for details.*

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7.   Basic Operating Instructions *(continued – 8/33)*

7.2.   Control Panel Functions *(3/8)*

⑤ Left Key ◀

· On normal echogram screen, pressing this key will result in an operational error, causing the equipment to beep three times in quick succession.

· When a menu is currently displayed, this key acts as numeric key "**5**" to enter value **5** or to select menu option 5.

· When the soundings history window (**HISTORY**) is displayed (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[*1]) shown just below the scale.

⑥ Down Key ◣◢

· On normal echogram screen with no menu opened, pressing this key will result in an operational error, causing the unit to beep three times in quick succession.

· When the variable range marker (VRM) is turned on, pressing this key moves the marker downward (i.e. in the deepening direction).

· When a menu with two or more options is currently displayed, pressing this key selects those options downward. To finalize selection, press **ENT** .

· When selecting the depth ranges (②), pressing this key selects larger ranges.

⑦ Receiver Gain/TVG Key 🅶🅰🅸🅽

· When the equipment is operating in the automatic control (**AUTO**) mode, pressing this key once changes the control mode to "**MANUAL**," and highlights gain level indication "**GAIN=XX**" as in the example below.

· You can then adjust the receiver gain level manually by pressing ◣◢/◣◢ . The gain level is numerically shown as illustrated below.

· To return to "**AUTO**," press 🅰🆄🆃🅾 .

Figure 7-11 Parameter Indication in Manual Control Mode – Example

· Pressing the key twice highlights TVG level indication "**TVG=XX**," allowing you to set the TVG (initial gain suppression) using ◣◢/◣◢ .

· When a menu is currently displayed, this key acts as numeric key "**7**" to enter value **7** or to select menu option 7.
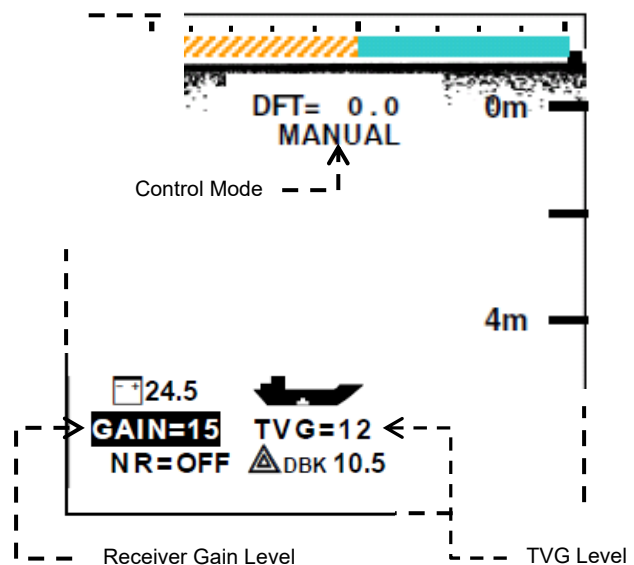
[*1]: *LAT/LON information is available with an optional GPS sensor or IEC 61162–1–compatible GPS–derived data source plugged into the rear–panel **I/O** connector.*

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(continued on next page)

7.   Basic Operating Instructions *(continued – 9/33)*

7.2.   Control Panel Functions *(4/8)*

⑧ Dimmer Key 🔲DIM

· Pressing this key changes the backlighting level of the keypad in a total of 6 steps. After the lowest level is reached, further keypress returns you to the highest level.

· When a menu is currently displayed, this key acts as numeric key "**9**" to enter value **9** or to select menu option 9.

⑨ Brightness Key 🔲BRT

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

⑩ Menu Key 🔲MENU

Figure 7-12 **MAIN MENU**

· A first keypress activates the menu system, opening the main menu (**MAIN MENU,** top menu of the system), as illustrated at right. A second keypress turns it off.

· The menu system allows you to make various settings that suit your operational requirements.

Option selected
(*highlighted in red background*)

```
┌─────────────────────────────┐
│ MAIN MENU                   │
│                             │
│ 1:TRANSDUCER DRAFT          │
│ 2:DEPTH REFERENCE           │
│ 3:ECHO THRESHOLD            │
│ 4:NOISE REDUCTION           │
│ 5: WHITE LINE               │
│ 6:HISTORY SCALE             │
│ 7:SIMULATION                │
│ 8:ECHO DISPLAY              │
│ 9:INSTALLATION SETTINGS     │
│                             │
│                             │
│ PRESS [MENU] TO PREVIOUS MENU│
│ PRESS [PAGE] TO EXIT ALL     │
└─────────────────────────────┘
```
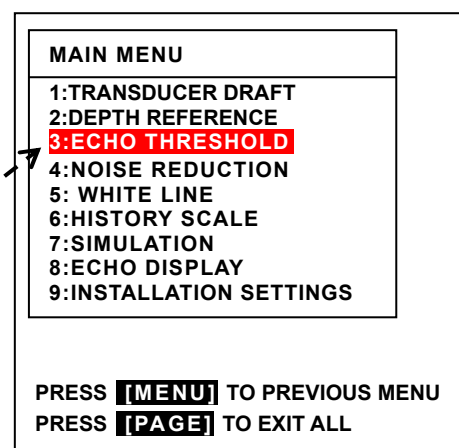
· Detailed instructions are given in Section 8 (Advanced Settings). · Menu options can be selected by pressing appropriate numeric keys. The one that is currently selected is shown highlighted in a red background.

- **1:TRANSDUCER DRAFT**:   Enters transducer draft.
- **2:DEPTH REFERENCE**:   Selects references to which measured depth is to be referred (i.e., waterline, transducer face or keel).
- **3:ECHO THRESHOLD**:   Selects weak echo suppression levels.
- **4:NOISE REDUCTION**:   Selects noise reduction levels.
- **5: WHITE LINE**:   Selects while line gain levels.
- **6:HISTORY SCALE**:   Selects time scales when playing back stored data.
- **7:SIMULATION**:   Turns on/off built–in echo sounder simulator.
- **8:ECHO DISPLAY**:   Selects single color bottom contour only or full color echoes for display.
- **9: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**) 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:TRANSDUCER SETTINGS: Registers transducer location or keel offset.
  7:DATA OUTPUT PORT: Selects data outputs for use by external devices.
  8:BOTTOM MISSING CAUTION: Enables/disables bottom–missing alert.
  9:DEPTH READOUT RESPONSE: Selects appropriate time periods for holding last valid depth data in bottom–missing condition to avoid frequent bottom searching operation.
  0:KEY BEEP SETTING: Turns on/off keypress beep.

7.   Basic Operating Instructions *(continued – 10/33)*

7.2.   Control Panel Functions *(5/8)*

⑪ Auto/Manual Control Mode Key [AUTO]

・   Pressing this key selects two control modes: **AUTO** and **MANUAL**.

・   The echo sounder is initially placed in the **AUTO** mode, selecting depth ranges and adjusting receiver gain and TVG levels automatically so that the bottom echo remains displayed in the lower half of the screen.

・   The illustrations below show an example of the on–screen parameters that indicate which mode the unit is currently operating in.

Figure 7-13 Parameter Indications in **AUTO** and **MANUAL** Control Modes – Example

Gain and TVG levels automatically adjusted   *Gain and TVG Levels manually adjusted*
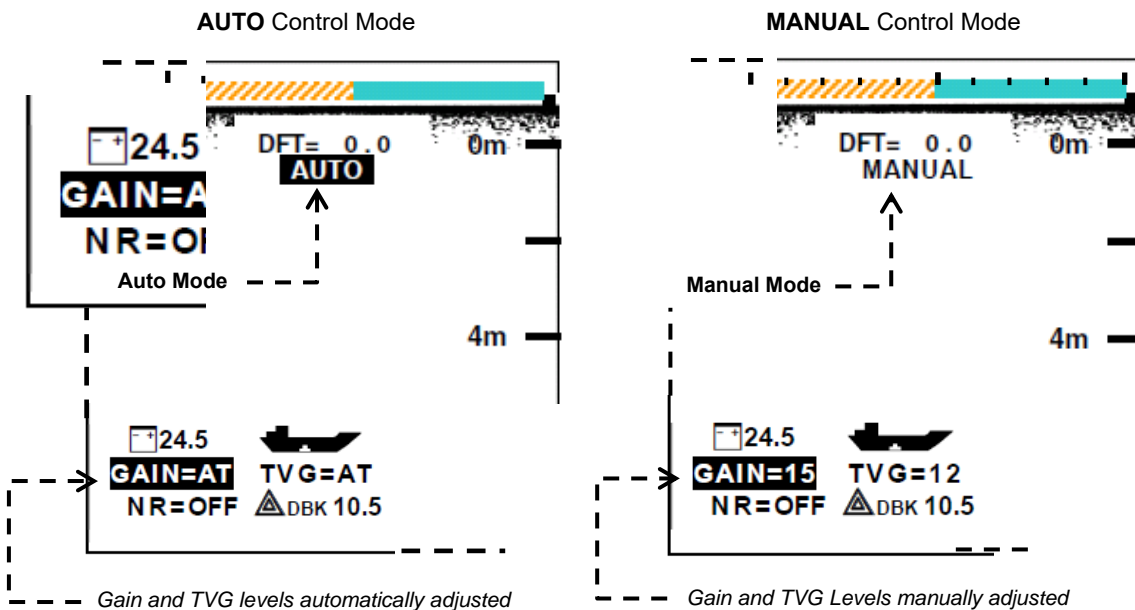
・   A first keypress changes the control mode to "**MANUAL**," allowing manual selection of depth ranges and manual setting of the gain/TVG level.

・   See paragraphs ② and ⑦ for the relevant summarized instructions.

< C A U T I O N >
When in the manual mode, the receiver gain must be adjusted so that the bottom echo remains displayed in red, orange or yellow (or one of the three strongest echo colors, if you have changed the color–vs.–strength assignments) for successful digital depth reading.

・   If you change the gain or TVG level while in the **AUTO** mode, the unit will be placed in the **MANUAL** mode.

・   See paragraph ⑦ for related information.

・   A second keypress changes the control back to "**AUTO**."

・   When a menu is currently displayed, this key acts as numeric key "**2**" to enter value **2** or to select menu option 2.

7. Basic Operating Instructions *(continued – 11/33)*

7.2. Control Panel Functions *(6/8)*

⑫ Alert/VRM Key [ALARM]

Figure 7-14 Variable Range Marker (VRM) – Example

VRM placed at 15.7m

10m —

- - - 15.7 - - - —

20m —

30m —

40m

· This key performs one of the following functions, depending on which one is currently showing, normal echogram or a menu.

(a) When only echogram is showing:

- Pressing the key once turns on the VRM (variable range marker), a horizontal dotted line with its current position readout, as in the example at right. A second keypress turns the VRM off.

- The VRM is used to set the alert depth for the depth–below–keel alert, and can be shifted upward/downward by pressing ⬥/⬥ .

- Pressing [ENT] sets the alert depth at the VRM position. See paragraph 7.8.8.1 (Setting Alert Depth) for details.

- Pressing and holding down the key for a few seconds displays a list of currently active alerts. See paragraph 7.8.4 (Displaying List of Active Alerts) for details.
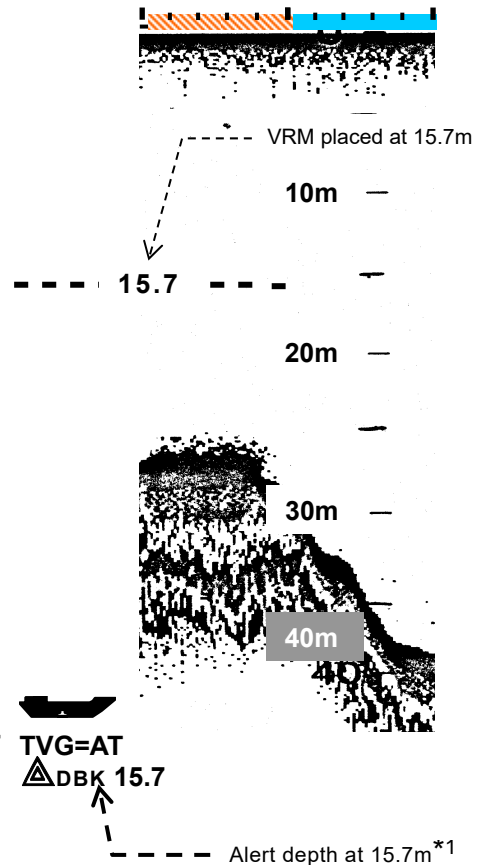
(b) When either of the depth–below–keel alert[2] or the power failure alert[3] becomes active, pressing the key will temporarily silence the acoustic alert, and turn on either of the following visual presentations (pop–up alert windows) to indicate the current alert status.

⊡ 24.5

GAIN=AT TVG=AT
NR=OFF ⚠DBK 15.7

- - - - Alert depth at 15.7m[1]

Figure 7-15 Visual Presentations of Temporarily Silenced Alerts

Depth below keel alarm
Temporarily silenced!

Failure or reduction in power supply
Temporarily silenced!
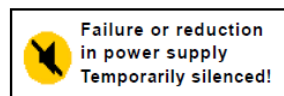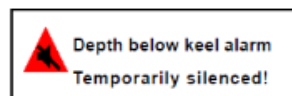
(c) When a menu is currently displayed, this key acts as numeric key "**4**" to enter value **4** or to select menu option 4.

⑬ Enter Key [ENT]

· On normal echogram screen with no menu opened or without VRM (⑫) on–screen, pressing this key will result in an operational error, causing the unit to beep three times in quick succession.

· When the VRM is currently showing, pressing this key sets the alert depth at that position and enables the depth alert function at the same time.

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

[1]: *Alert depth below keel (* ***DBK****)*

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7. Basic Operating Instructions *(continued – 12/33)*

7.2. Control Panel Functions *(7/8)*

⑭ Right Key

· On normal echogram screen, pressing this key will result in an operational error, causing the unit to beep three times in quick succession.

· When a menu is currently displayed, this key acts as numeric key "**6**" to enter value 6 or to select menu option 6.

· When the soundings history window (**HISTORY**)[1] is currently displayed (with **HIST** , paragraph ⑮), 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 (plus the LAT/LON coordinates[2]) shown just below the scale.

⑮ Soundings History Key **HIST**

Figure 7-16 Soundings History Window – Example

· Pressing this key opens a soundings history (**HISTORY**) window in the left half screen, as in the example at right, in which the history of depth soundings over the past 12 hours is shown graphically.

· The various types of data at the line cursor position are shown in the bottom section of the window, as in the example.

· The cursor can be moved by pressing / .

· To close the window, press **HIST** again or **CLR** .

Date, time, LAT/LON coordinates[2], depth, draft, keel offset, depth range in use, at Line Cursor position

PLAYBACK (12 HOURS)

0

4

← - - - - - - 12 hours - - - - - - → 8

- - - - Depth History

12

16

Time Passage Scale - - - →

20

17/04/24   54° 31.012N   15.9 DBT
09:24:12   006° 52.327E   m
   DFT =   0.0   KL = 0.6   RNG = 20

· The time span, 15 minutes in the above example, can be changed by pressing / . The following values are selectable: 5 minutes, 15 minutes, 30 minutes, 1 hour, 2 hours, 3 hours, 6 hours and 12 hours. Refer to paragraph 7.7 (Retrieving Soundings Data History) for details.

· When a menu is displayed, this key acts as numeric key "**8**" to enter value **8** or to select menu option 8.

---

[1]: *See paragraph 7.7 (Retrieving Soundings Data History) for related information.*

[2]: *LAT/LON information is available with an optional GPS sensor or NMEA–0183–compatible GPS–derived data source plugged into the rear–panel **I/O** connector.*

7.   Basic Operating Instructions *(continued – 13/33)*

7.2.   Control Panel Functions *(8/8)*

⑯ Clear/Alert Stop Key CLR

- This key preforms one of the following functions, depending on which one is currently showing, a single menu, a number of menus or the soundings data history window (Figure 7–27):

(a) When only echogram is showing:

  - When an acoustic alert is triggered (depth–below–keel or power failure alert)[1], pressing this key temporarily silences the alert sound, while allowing a visual alert presentation to remain displayed on screen.

(b) When a number of menus are showing at the same time:

  - Pressing this key closes all menus at a time and returns you to normal echogram screen. Be sure to press ENT to complete any setting before pressing this key.

(c) When the data history window is showing, pressing this key closes the window.

  - Turning the equipment on while holding down this key resets the system, returning all user–made settings to the factory's initial settings, while retaining the soundings, date/time data, etc. stored in memory. See paragraph 12.6 (Resetting the System) for details.

⑰ Power Key PWR

This key turns on/off the equipment. 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 to prevent an accidental/unintended shutoff.

< C A U T I O N >
Do not turn the unit off by unplugging the power cable or shutting off the ship's power source.

---

[1]: *See paragraph 7.8 (Alerts) for details.*

7.   Basic Operating Instructions *(continued – 14/33)*

7.3.   Selecting Depth Ranges

7.3.1.   Manual Selection

- A total of eight depth ranges are available in meters (**m**), fathoms (**FM**) or feet (**FT**), as illustrated below, and are automatically selected to display the bottom echo and read depth when the unit is working in the automatic control (**AUTO**) mode.

- In applications where you wish to monitor depth on a certain fixed range scale or where you wish to select range scales manually, press ▮RANGE▮ first. The control mode will then be switched to "**MANUAL**," (② in paragraph 7.2) and the desired range can be selected by pressing the following pair of keys:

  - ◆ to selects smaller ranges (in H–to–A direction)
  - ◆ to selects larger ranges (in A–to–H direction)

- All depth ranges start at scale line zero (0), unless a transducer draft*1 or keel offset*2 is entered.

- 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, the bottom–missing alert*3 will be triggered. See paragraph 7.8.10 (Bottom–Missing Alert) for details.

Figure 7-17 Depth Range Arrangement
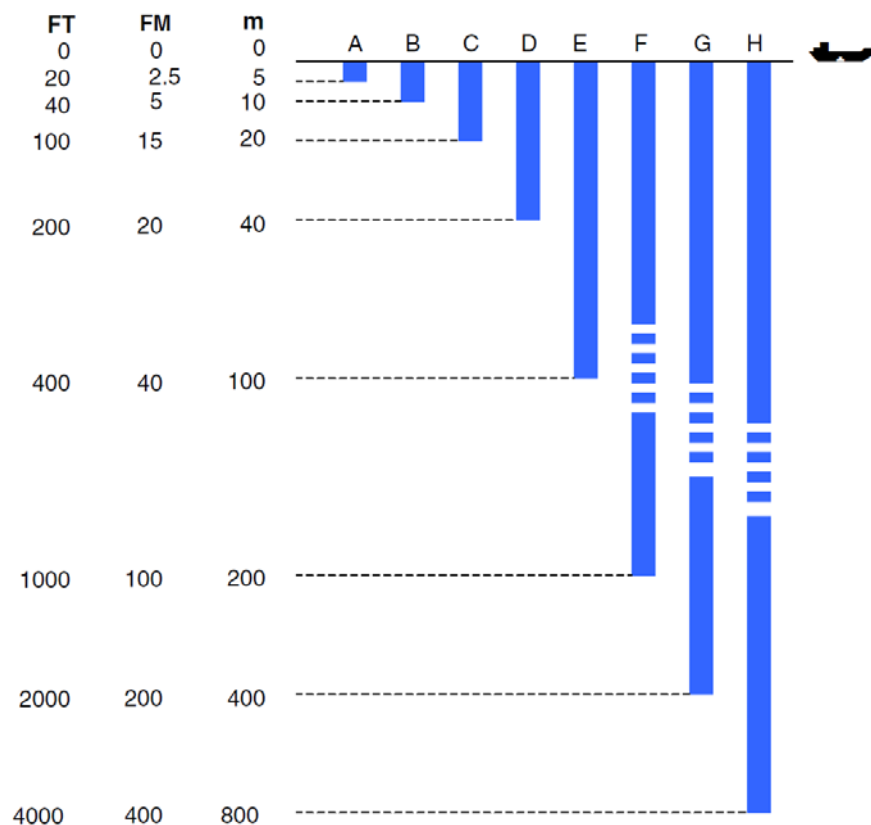
*1: *See paragraph 8.2 (Entering Transducer Draft) for details.*
*2: *See paragraph 8.10.7.3 (Entering Keel Offset) for details.*
*3: *This alert function is initially disabled. To enable the function, see paragraph 8.10.9 (Enabling Bottom–Missing Alert) for instructions.*

7.   Basic Operating Instructions *(continued – 15/33)*

7.3.   Selecting Depth Ranges *(2/2)*

7.3.2.   Automatic Selection (Automatic Mode of Operation)

・   The equipment is initially in the automatic control (**AUTO**) mode, selecting depth ranges, adjusting the receiver gain and TVG levels[*1] (shallow gain suppression level) – all automatically. The bottom echo will remain displayed in the lower half screen area regardless of changes in depth.

・   Pressing [AUTO] will switch the control to the manual mode (**MANUAL**)[*2]. A second keypress will switch it back to "**AUTO**."

・   The figure below illustrates an example of how depth range selection occurs with this mode 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.

Figure 7-18 Automatic Depth Range Selection – Example

Range D   Range C   Range B   Range A
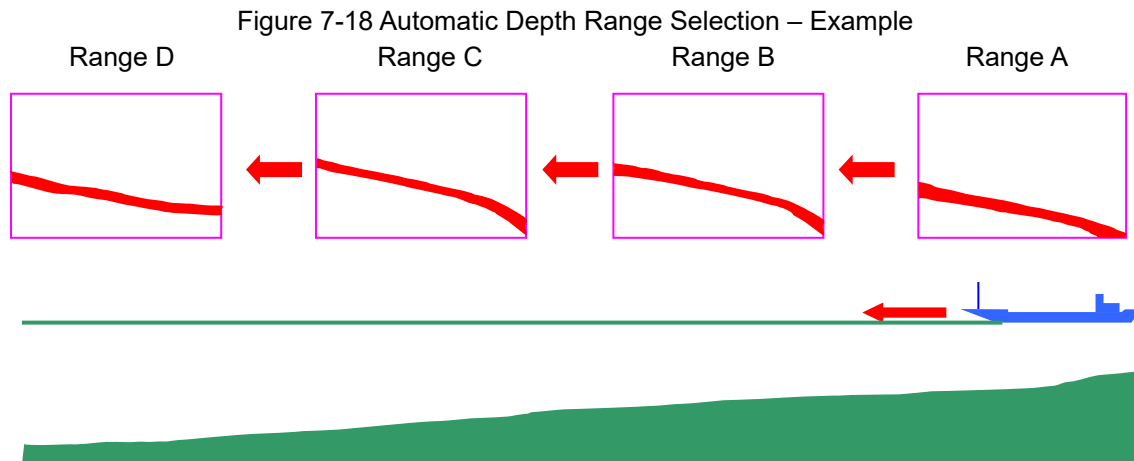
・   On–screen status indication "**AUTO**" will be turned on highlighted as in the example below to indicate that the unit is currently operating in the automatic control mode.

Figure 7-19 On–Screen Indication of Automatic Control Mode

Automatic control mode
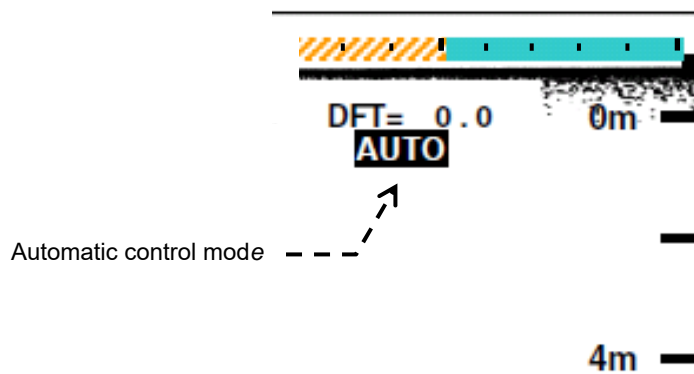
[*1]: *TVG: Time–varied gain. This function, which sharply reduces the receiver gain at the start of each sounding and gradually recovers the normal gain level with time, is used to prevent surface clutters and other noise–producing reflections near the surface from disturbing depth measuring operation.*

[*2]: *See paragraph 7.3.1 (Manual Selection) for details.*

7.   Basic Operating Instructions *(continued – 16/33)*

7.4. Interpreting Echo Display

7.4.1.   Bottom Echo in Full Colors

·   The echo sounder normally shows only the strongest part of the bottom echo in a single color (initially red). Echoes including the bottom reflection can however be displayed in up to a total of 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 – via the procedure*1 given in paragraph 8.9 (Selecting Types of Echo Display); 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 illustration below.

Figure 7-20 Initial Assignments of Bottom Echo Colors

Initial Color Assignments

Blue (weakest) ----->

Light Blue --------->

Yellowish Green ---->

Green ------------->

Yellow ------------>

Orange ----------->

Red (strongest) ---->

Bottom Echo
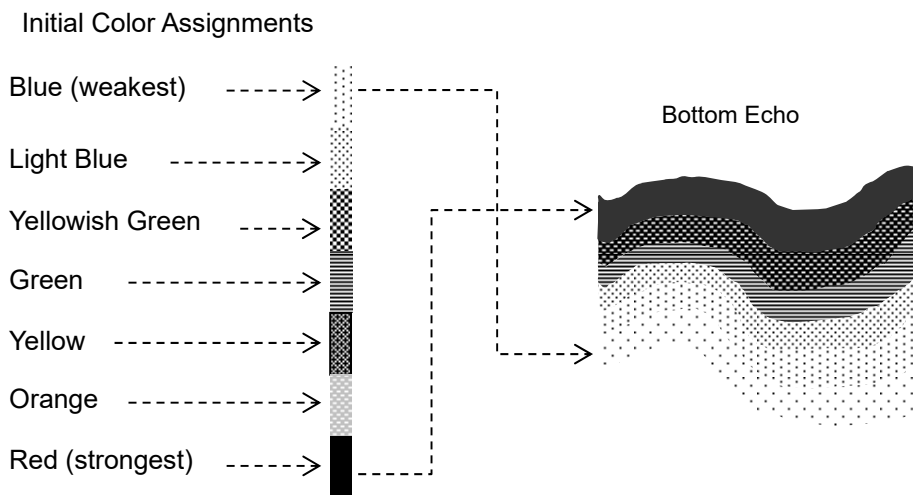
Figure 7-21 Initial Echo Dynamic Range

·   You can change those color assignments by selecting from a total of 10 different colors provided. See paragraph 8.10.2 (Changing Echo Color Assignments) for instructions.

·   There is initially an approximately 3 dB difference in strength between two adjacent colors, as illustrated in the figure at right, meaning that a particular color is approx. 1.4 times stronger or weaker than either adjacent color.

·   This difference, termed "echo dynamic range," can be changed to suit various bottom conditions (hard, soft, muddy, etc.). See paragraph 8.10.4 (Selecting Echo Dynamic Ranges) for instructions.

3 dB

3 dB

3 dB

3 dB

3 dB

3 dB

3 dB
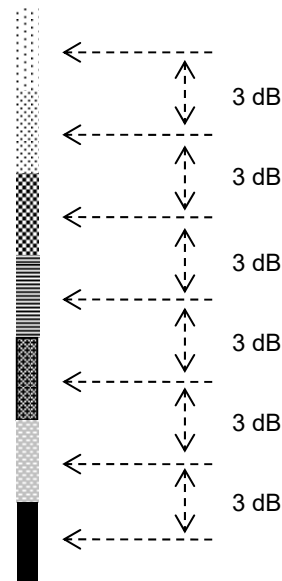
*1: **MAIN MENU→ 8:ECHO DISPLAY→ 2:NORMAL DISPLAY**

7.   Basic Operating Instructions *(continued – 17/33)*

7.4.   Interpreting Echo Display *(2/3)*

7.4.2.   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 7-22 Display of Multiple Bottom Echoes – Example
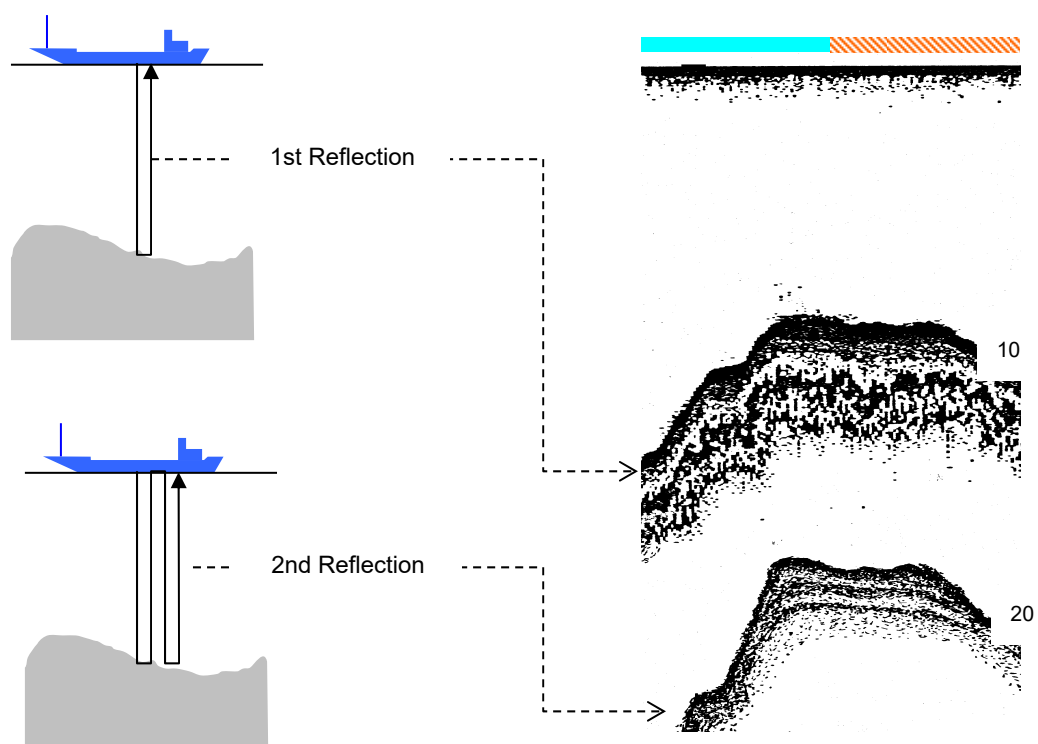
・   The effect of multiple reflections may be reduced by decreasing the receiver gain (through gain and/or TVG adjustment, paragraphs 7.5: Adjusting Receiver Gain Manually and 7.6: Adjusting TVG) when you are operating the unit in the manual control mode[*1].

・   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.***

*[*1]: Pressing* ▣ *switches the control between automatic mode and manual mode. When the unit is in the automatic control (**AUTO**) mode, attempting to change the receiver gain or TVG level also changes the mode to* "**MANUAL**."

7.   Basic Operating Instructions *(continued – 18/33)*

7.4.   Interpreting Echo Display *(3/3)*

7.4.3.   Other Echoes

·   When the echo display[1] is set to show echoes in full colors, the equipment will show echoes[2] from fish schools, temperature layers, and surface clutters (various tiny objects near the surface, like plankton concentrations and air bubbles), in addition to the bottom echo. 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 energy leaking into the receiver, and represents the on–screen position of the transducer.

·   When a transducer draft is entered (paragraph 8.2: Entering Transducer Draft), the zero line shifts down from the top scale calibration (scale 0) by the amount of the draft. When a keel offset is entered (paragraph 8.10.7.3: Entering Keel Offset), the zero line occurs above scale 0, and its display is suppressed.

Figure 7-23 Typical Display of Shallow Water Echoes

Zero Line

Surface Clutters
(air bubbles, plankton, etc.)

Fish School

Fish School

Bottom

*Current depth
(14.8m in this example)*

14.8m BELOW
KEEL
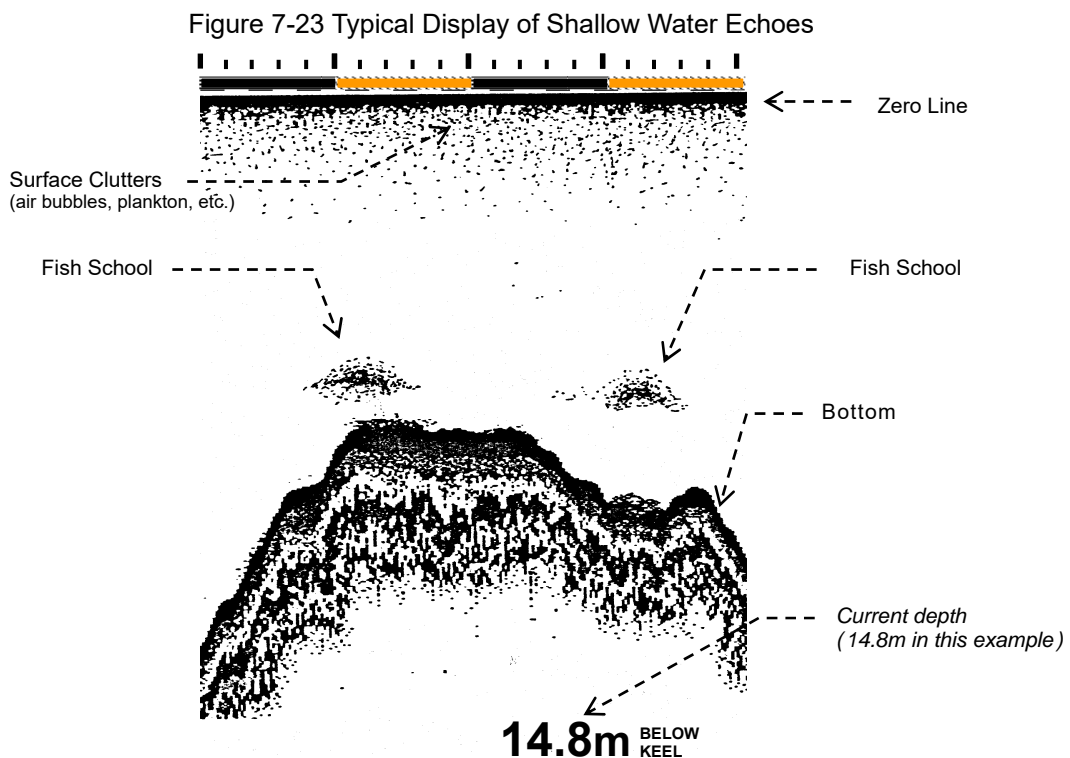
< WARNINGS >

1. **A LARGE FISH SCHOOL, ESPECIALLY ONE AT SHALLOW DEPTHS, CAN OCCASIONALLY PRODUCE AN EXTREMELY STRONG ECHO, CAUSING THE EQUIPMENT TO LOCK ONTO THAT ECHO AS THE BOTTOM. AN INCORRECT DIGITAL READOUT WILL OCCUR AS A RESULT.**

   BE SURE TO CONFIRM THE READOUT BY COMPARING IT WITH ON–SCREEN BOTTOM ECHO LOCATION. TOTAL RELIANCE ON THE DIGITAL DISPLAY IS DANGEROUS AND MUST BE AVOIDED, ESPECIALLY WHEN TRAVELING IN SHALLOW AREAS.

2. **WHEN TRAVELING OVER A SHALLOW BOTTOM, THE EQUIPMENT MAY OCCASIONALLY LOCK ONTO THE SECOND BOTTOM ECHO, READING TWICE THE ACTUAL DEPTH.**

   BE SURE TO COMPARE THE BOTTOM ECHO POSITION WITH THE DIGITAL DEPTH READOUT WHENEVER NAVIGATING SHALLOW WATER AREAS OR WHENEVER THE DIGITAL READOUT IS QUESTIONABLE. *See paragraphs 7.4.2 (Multiple Bottom Echoes) and 8.6 (White Line Adjustment) for related information.*

[1]: *Paragraph 8.9 (**MAIN MENU → 8:ECHO DISPLAY → 2:NORMAL DISPLAY**)*

[2]: *Those echoes are mostly suppressed by TVG with the unit in the automatic control mode.*

7.   Basic Operating Instructions *(continued – 19/33)*

7.5. Adjusting Receiver Gain Level Manually

・   The appropriate receiver gain level is automatically maintained while the unit is operating in the automatic control (**AUTO**) mode.

・   In situations where greater gain is required for stable depth reading operation, use the following steps:

(1)   Press ■ once to activate the manual control (**MANUAL**) mode. The current gain level will be indicated as in the example below.

Figure 7-24 Parameter Indication for Manual Gain Adjustment – Example

(2)   Repeatedly press ◆ to increase the gain until satisfactory results are obtained. Too high gain may, however, result in cluttering the screen, especially near the surface, leading to unstable operation. Pressing ◆ decreases the level.

(3)   The TVG level[*1] (shallow gain suppression level) may also have to be raised to prevent surface clutters from disturbing depth reading.

・   To return to the **AUTO** mode, press ■ .

・   Lack of receiver gain will trigger the bottom–missing alert. See paragraph 7.8.10 (Bottom–Missing Alert) for information on the alert function.

DFT= 0.0   0m
MANUAL

— Manual Control

GAIN=15 TVG=12
NR=OFF ⚠DBT 10.5

— Current gain level
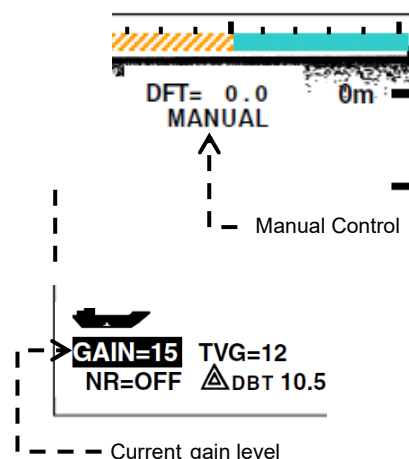
7.6. Adjusting TVG Level Manually

・   TVG stands for time–varied gain, and is designed to sharply drop the receiver gain at the start of each transmission, and then gradually recover the normal gain level as the transmitted signal travels deeper toward the bottom.

・   When the equipment is operating in the automatic control (**AUTO**) mode (initial setting), TVG is also automatically adjusted.

Figure 7-25 Adjusting TVG Level – Example

(a) Reflections near transducer face with no TVG effect
T V G = 0

(b) with maximum TVG effect
T V G = 3 0

Surface clutters (plankton, air bubbles and other small particles in suspension)

・   In situations where it is necessary to control the receiver gain manually to show the bottom in strong colors, for instance when traveling over a soft bottom giving a weak echo while in automatic mode of operation, you will also have to adjust the TVG level manually to reduce the effect of surface clutters for uninterrupted depth reading.

[*1]: *See paragraph 7.6 (Adjusting TVG Level Manually) for details.*

31

7.   Basic Operating Instructions *(continued – 20/33)*

7.6.   Adjusting TVG Level Manually *(2/2)*

< CAUTION >
With the TVG set at its maximum level during shallow depth operation, extremely weak bottom echo may result, triggering the bottom–missing alert.

Figure 7-26 Parameter Indication for Manual TVG Adjustment – Example

(1)   Press [GAIN] twice to activate the manual control (**MANUAL**) mode. The TVG level indication will then be highlighted as in the example at right.

(2)   You can now select up to 31 TVG levels (**TVG = 0**, minimum to **TVG = 30**, maximum) by pressing [▲]/[▼]. Repeatedly press [▲] to increase the TVG level until satisfactory results are obtained. Too high level at shallow depths may, however, weaken the bottom echo as well, leading to unstable depth reading operation. Pressing [▼] decreases the suppression level.

(3)   To return to the **AUTO** mode, press [AUTO].
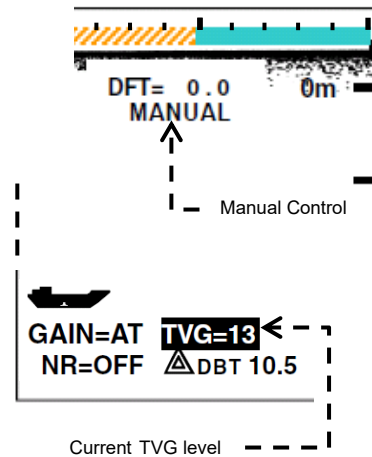
7.7.   Retrieving Soundings Data History

7.7.1.   Introduction

·   The equipment automatically stores depth, UTC date and time, maximum depth range used, and position data[*1] for a 12–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 "**HISTORY**" window.

7.7.2.   Displaying History Window

Figure 7-27 Echogram Screen with **HISTORY** Window Opened – Example

·   To display the **HISTORY** window, simply press [HIST]. It will show up over the echogram display, as in the example at right.

A second keypress[*2] turns the window off. The rest of the keys can be normally used to perform their assigned functions while the window is displayed.
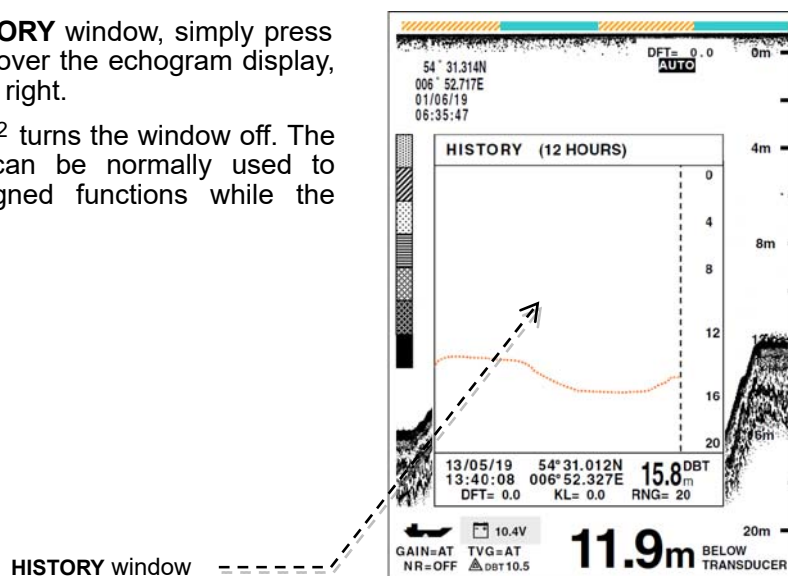
7. Basic Operating Instructions *(continued – 21/33)*

7.7. Retrieving Soundings Data History *(2/3)*

7.7.2. Displaying History Window *(2/2)*

・ A close–up view of a typical window is given in Figure 7–28. Data registered over the time scales of past 5 minutes,15 minutes, 30 minutes,1 hour, 2 hours, 3 hours, 6 hours and 12 hours can be retrieved. The history of depth soundings will be displayed graphically relative to the above time 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 shown in the window, close the window first by pressing **CLR** (or **HIST**) and then open it again by pressing **HIST** .

7.7.3. Retrieving Data Registered at Specific Date/Time

・ An example soundings 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.

・ 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 the current operation will be in white, indicating that discontinuity in time exists in the data being displayed.

・ To change the time passage scale, press ◢◣/◥◤ . The current scale is shown just above the upper edge of the window, as in the example.

Figure 7-28 Soundings Data History Window – Example

Time Passage Scale
Can be changed by pressing ◢◣/◥◤ .

HISTORY (12 HOURS)

0

Line Cursor
*Can be shifted to the left/right
by pressing ◁/▷ .*

4

8

Abbreviations Used in Window:
DBK: depth below keel
DBS: depth below surface
DBT: depth below transducer
DFT: transducer draft
KL: keel offset
RNG: depth range in use
m: meters

12 hours

Depth History

12

16

20

*Date, time, LAT/LON coordinates[1],
depth, transducer draft, keel offset,
depth range, at Line Cursor position*

13/05/24 54°31.012N
13:40:08 006°52.327E
DFT= 0.0   KL= 0.5

15.8 DBK
m
RNG= 20

Sounding data stored at line cursor position

(continued on next page)

7.   Basic Operating Instructions *(continued – 22/33)*

7.7.   Retrieving Soundings Data History *(3/3)*

7.7.3.   Retrieving Data Registered at Specific Date/Time *(2/2)*

· 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:

   5 min., 15 min., 30 min., 1 hr., 2 hrs., 3 hrs., 6 hrs. and 12 hrs.

· To close the window, press **HIST** again or **CLR**.

· On a large time scale, such as 12 hours, the line cursor moves in large steps, such as approx. 5 minute steps on the 12–hour scale or 2 min.24 sec. steps on the 6–hour scale, making it difficult to review the soundings history over a 15–minute segment of a specific point in time. This shortcoming can be corrected by first shifting the line cursor close to the desired point in time, and then selecting the smallest time scale. You can now check the data in 2–second steps over the 15–minute segment centered on the cursor position.

· **Deriving Stored Data for PC–Based Applications:**
   The data stored in memory can be uploaded to PC–based applications. See Section 10 (Outputting Stored Data for PC–Based Applications) for instructions.

7.7.4.   Reviewing Detailed Soundings Data History via LOG Window

· In order to check the numeric data in detail around the line cursor position in the **HISTORY** window, another window, titled "**LOG**," is provided and can be opened by pressing **PAGE** as in the example below.

Figure 7-29 Typical Echogram Screen with **LOG** Window Opened

LOG Window

- Up to a total of 17 pages of data can be accessed by pressing ◗ / ◖.

- Each page lists up to nine sets of data. Pressing ◅/◅ highlights those data sets.

- When either the upper or lower edge of the window is reached, further keypress reveals the next or previous 9 sets of data. The time span, 12 hours in the example at right, cannot be changed through this window.

- To change the span, open the **HISTORY** window first, and then press ◅/◅. To close the window, press **PAGE** again or **CLR**.

- Blue–colored data sets indicate that the data numbers are those stored until the equipment was turned off last time, and are not part of the current soundings.

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7.   Basic Operating Instructions *(continued – 23/33)*

7.8. Alerts

7.8.1.   Introduction

- The table below lists the alerts this echo sounder provides for safety in navigation. Two of the alerts are standardized alerts, and the rest is a proprietary alert. These alerts are defined under the relevant IEC standards[1] for remote alert management[2].

Table 7-1 IEC–Defined Alerts

Alert Title/Alert Description	Alert Identifier[2]	Alert Category[2]	Alert Priority[2]
Standardized Alerts			
Depth below keel	3031	A	A (Alarm)
Power failure/Failure or reduction in power supply	3022	B	W (Warning)
Proprietary Alert			
Bottom missing	10003	B	C (Caution)

7.8.2. Standardized Alerts

7.8.2.1.   Depth–below–Keel Alert

- This alert (priority: Alarm) alerts you acoustically and visually to the depth below the keel reaching, or shallowing beyond, the preset alert depth. For details, see paragraph 6.8.8 (Depth–below–Keel Alert). To utilize this function properly, the correct keel offset must first be entered for each transducer via the procedure given in paragraph 7.10.7.3 (Entering Keel Offset).

- When triggered, the alert will turn on the visual alert presentation (alert window), as shown below, in the screen's upper right area that shows the flashing red alert icon with the stationary alert title, and will, as the acoustic presentation, generate a set of 3 short, quick beeps repeating every 7 seconds.

Figure 7-30 Visual Presentation of Active Alert State for Depth–below–Keel Alert
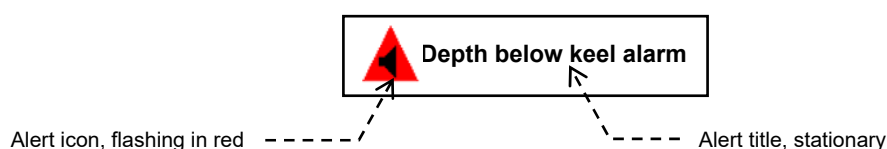
- Depending on the alert state and acknowledgement status, the icon symbol will change in the following manner:

Figure 7-31 Alert State Transition for Depth–below–Keel Alert
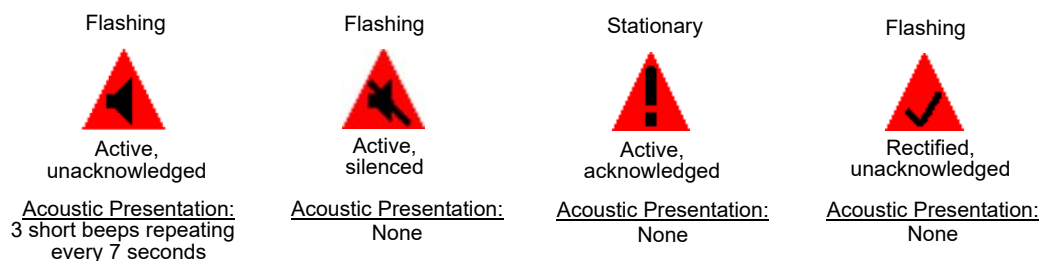
[1]: *IEC 61162–1 Ed. 5, IEC 62923–1, IEC 62923–2*
[2]: *Refer to paragraph 13.4 (Remote Alert Management) for details.*

7.   Basic Operating Instructions *(continued – 24/33)*

7.8.   Alerts *(2/8)*

7.8.2.   Standardized Alerts *(2/2)*

7.8.2.2.   Power Failure Alert

· This alert (priority: Warning) alerts you acoustically and visually to the ship's power supply voltage reducing below the factory–preset minimum level (approx. 11V) for reliable equipment operation. For details, see paragraph 7.8.9 (Power Failure Alert).

· When triggered, the alert will turn on the visual alert presentation (alert window), as shown in the figure below, in the screen's upper right area that shows the flashing yellowish orange alert icon and its stationary alert description, with a set of 2 short, quick beeps repeating every 2 minutes.

Figure 7-32 Visual Presentation of Active Power Failure Alert

Alert icon, flashing in yellowish orange - - - - - → **Failure or reduction in power supply** ← - - - - Alert description, stationary
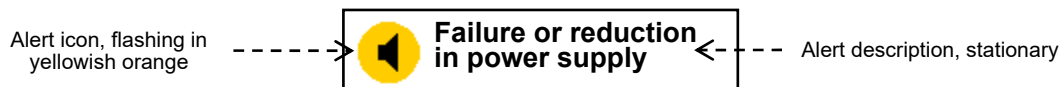
· The flashing alert icon and alert description will continue until the alert condition is rectified, namely the power supply voltage recovers to within the specified range (11 to 40 vdc), at which time the beeping stops.

· The icon symbol will change in the following manner, depending on the alert state and acknowledgement status.

Figure 7-33 Alert State Transition for Power Failure Alert

Flashing	Flashing	Stationary	Stationary	Flashing
Active, unacknowledged	Active, silenced	Active, acknowledged	Active, responsibility*1 transferred	Rectified, unacknowledged
Acoustic Presentation: 2 short beeps repeating every 2 minutes	Acoustic Presentation: None	Acoustic Presentation: None	Acoustic Presentation: None	Acoustic Presentation: None
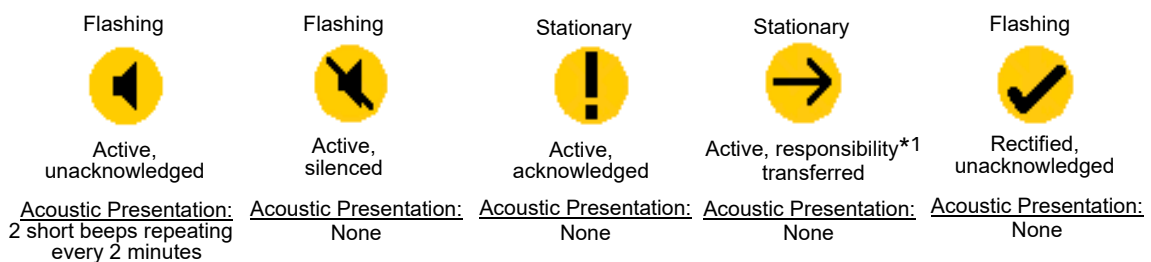
7.8.3.   Proprietary Alert

· The bottom–missing alert (priority: Caution) alerts you acoustically and visually to you to the bottom echo being lost or becoming too weak for depth measurement or exceeding the current range limit. For details, see paragraph 7.8.10 (Bottom–Missing Alert).

Figure 7-34 Visual Presentation of Active State for Bottom–Missing Alert

Alert icon, stationary in yellow - - - - - → **! Bottom missing** ← - - - - - Alert title, stationary

Acoustic Presentation
None
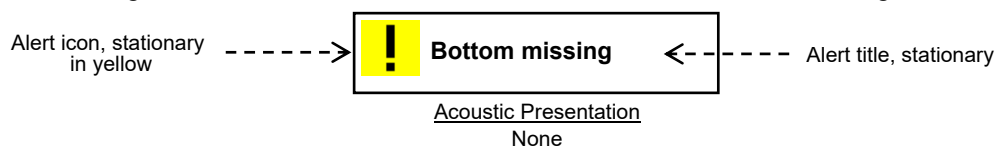
· When triggered, the alert will turn on its visual presentation, as in the figure above, in the screen's upper right area that shows the stationary yellow alert icon and alert title, while the digital depth readout display will go blank, as shown in the figure below.

Figure 7-35 Digital Depth Readout Display with Active Bottom–Missing Alert

No depth readout - - - - - →

m AUTO
BELOW KEEL
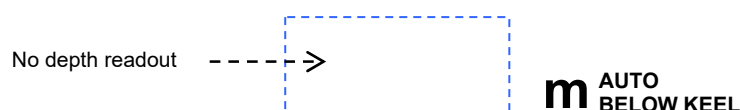
*1: *This alert state is available when alert handling is remotely controlled from the ship's central alert management (BAM/CAM) system. See paragraph 13.4 (Remote Alert Management).*

7.   Basic Operating Instructions *(continued – 28/33)*

7.8.   Alerts *(3/8)*

7.8.4.   Displaying List of Active Alerts

▪ The above IEC–defined alerts and proprietary alert will be presented visually and acoustically when they become active.

▪ A list of the currently active alerts can also be displayed by pressing and holding ▣ALARM down for a few seconds. A menu, like the example below, will pop up, showing a list of the currently active alert(s).

- Pressing ▣ALARM again or ▣MENU will turn off the alert list.

- Pressing ▣CLR will also turn off the list, and will, at the same time, acknowledge the active alert(s).

Figure 7-36 List of Active Alerts – Example
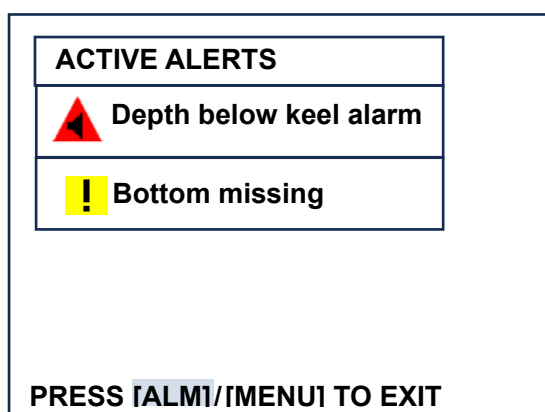
7.8.5.   Temporarily Silencing Active Alerts

▪ To temporarily silence, for any reasons, the acoustic presentation alone of an active alert, press ▣ALARM once.

- Pressing ▣ALARM again or ▣MENU will cancel the function, allowing the acoustic alert to continue.

- Either of the following visual alert presentations will pop up to indicate the temporary silencing of the active alerts. The alert icon will be displayed flashing.

Figure 7-37 Visual Presentations of Temporarily Silenced Active Alerts

- Pressing ▣CLR will also cancel the function, and will, at the same time, acknowledge the active alert(s).

- See paragraph 7.8.8 (Depth–below–Keel Alert) for details.

- The acoustic alert can also be remotely silenced with the appropriate ACN silence command from a BAM/CAM terminal. See paragraph 13.4 (Remote Alert Management) for details.

7.   Basic Operating Instructions *(continued – 29/33)*

7.8.   Alerts *(4/8)*

7.8.6.   Direct Acknowledgement of Active Alerts

7.8.6.1.   Introduction

· The following alerts, when they become active, can be acknowledged directly and/or remotely:

- Depth–below–keel alert (standardized alert, priority A=alarm) (direct acknowledgement only)

- Power failure alert (standardized alert, priority W=warning)

- Bottom–missing alert (proprietary alert, priority C=caution)

· The following paragraphs describe the direct acknowledgement procedure for each alert. For remote handling of the applicable alerts, refer to paragraph 13.4 (Remote Alert Management).

7.8.6.2. Direct Acknowledgement Procedure

· Simply press 🔲CLR to acknowledge the alert status and silence the acoustic presentation.

- The acoustic and visual presentations will be turned on again if the alert remains unacknowledged for approx. 30 seconds.

· The bottom–missing alert cannot be silenced with 🔲CLR ; the acoustic presentation will be muted automatically in 5 seconds.

· When 🔲CLR is pressed, pins #5 and #6 on the rear–panel **ALARM OUT** connector[1] will be internally shorted together for approx. 3 seconds as a signal to the alert management applications that the active alert has been acknowledged.

---

[1]: *See paragraph 13.3.6 (Connections to ALARM OUT Connector) for details.*

7.   Basic Operating Instructions *(continued – 30/33)*

7.8.   Alerts *(5/8)*

7.8.7.   Setting Depth Reference for Depth Alert

·   Depending on the depth reference selected, the depth alert can be triggered using the depth from the keel, from the transducer face or from the water surface.

·   To utilize the alert as an alert source in the ship's central alert management system (BAM/CAM) compliant with the relevant international standards[1], the depth reference must be the keel; hence the depth–below–keel (**DBK**) value has to be used.

-   See paragraphs 8.3 *(Selecting Depth Reference Indications)*[2] and 8.10.7.3 *(Entering Keel Offsets)*[3] for related information.

-   With no keel offsets entered, the depth reading will be referred to the transducer face, even if the on–screen reference indication is set to **DBK**.

·   If the echo sounder is to be operated standalone, the depth can be referred to the transducer face (depth–below–transducer, **DBT**), to the keel (depth–below–keel, **DBK**) or to the water surface (depth–below–surface, **DBS**), depending on the ship's navigational requirements.

7.8.8.   Depth–below–Keel Alert

7.8.8.1.   Setting Alert Depth

·   To utilize the depth–below–keel alert function, it is necessary to set the alert depth (alert–triggering depth) first, via the following steps:

Figure 7-38 Setting Alert Depth – Example

(1) Turn on the Variable Range Marker[4] (VRM) by pressing the ALARM button.

(2) Repeatedly press the up/down buttons to place VRM at the desired alert depth.

(3) Press **ENT**, setting the alert depth to the VRM position.

-   The example at right shows that the depth alert is set at 15.7m from the keel (DBK= depth–below–keel). The keel offset value can be entered via the procedure given in paragraph 8.10.7.3 *(Entering Keel Offset)*.

-   Resetting[5] the system will remove the VRM (and reset the alert depth).

VRM placed at 15.7m

10m —

15.7

20m —

30m —

40m

TVG=AT
⚠**DBK 15.7** ← - - - *Alert depth at 15.7m*
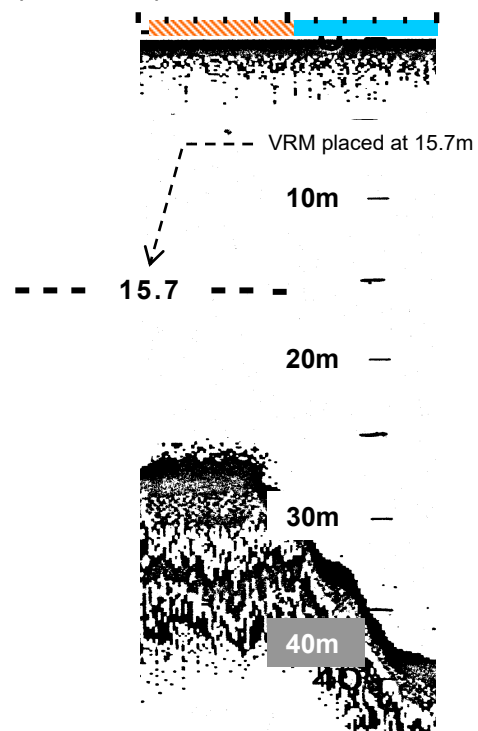
[1]: IEC 61162–1 Ed. 5, IEC 62923–1, IEC 62923–2

[2]: MENU→MAIN MENU→2:DEPTH REFERENCE→ 1:BELOW SURFACE/2:BELOW TRANSDUCER/ 3:BELOW KEEL

[3]: MENU →MAIN MENU→9:INSTALLATION SETTINGS→ 7:TRANSDUCER SETTINGS→ 2:KEEL OFFSET

[4]: VRM is a dotted horizontal line with depth indication, as in the example above. To turn it off, press ALM again.

[5]: See paragraph 12.6 (Resetting the System) for details.

7. Basic Operating Instructions *(continued – 31/33)*

7.8. Alerts *(6/8)*

7.8.8. Depth–below–Keel Alert *(2/2)*

7.8.8.2. Depth–below–Keel Aert Presentations

▪ Depending on the alert state and acknowledgement status, the visual and acoustic presentations change as described in this paragraph. The visual presentation is available in the form of a pop–up alert window with a flashing or stationary red alert icon and a stationary alert title inside, as in the figure below.

Figure 7-39 Visual Presentation of Active Depth–below–Keel Alert

▪ The alert icon will flash, remain stationary or vary its shape, as summarized in the table below, and will switch on/off the acoustic presentation.
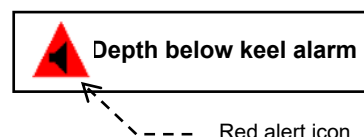
Table 7-2 Visual and Acoustic Presentations of Depth–below–Keel Alert

Alert State/ Acknowledgement Status	Visual Presentation (Red Icon)		Acoustic Presentation
Active, unacknowledged	Flashing		A set of 3 beeps repeating every 7 seconds
Active, silenced*1	Flashing		None
Active, acknowledged*2	Stationary		None
Rectified, unacknowledged	Flashing		None
Normal (no active state)	None		None

Figure 7-40 Visual Presentation for Temporary Silencing of Depth–below–Keel Alert

▪ To temporarily silence the acoustic presentation, press 🔲 or enter the ACN silence command*1 remotely from the BAM/CAM terminal. This will turn on another visual alert presentation with its icon flashing, as in the figure at right. The acoustic alert (beeping) will be silenced for approx. 30 seconds, at which time the visual presentation will be turned off automatically.
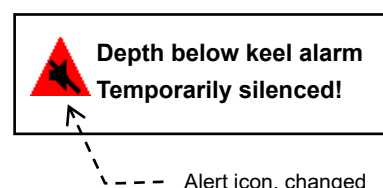
Figure 7-41 Visual Presentation for Operational Error in Remote Alert Handling

▪ Remote acknowledgement of this alert is prohibited due to the relevant IEC BAM interface requirements. Attempting to remotely acknowledge*1 the active state alert will turn on an operational error–indicating alert window, flashing, as shown at right. The flashing presentation will remain for approx. 10 seconds, after which it will be turned off automatically.
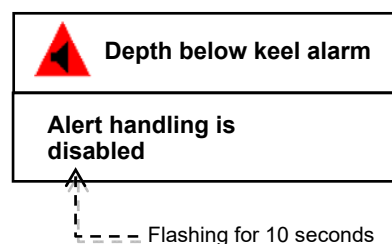
*1: *See paragraph 13.4.3 (Alert Interfaces) for details.*

*2: *The alert must only be acknowledged directly by pressing 🔲 on the equipment's control panel.*

7. Basic Operating Instructions *(continued – 32/33)*

7.8. Alerts *(7/8)*

7.8.9. Power Failure Alert

- Depending on the alert state and acknowledgement status, the visual and acoustic presentations change as described in this paragraph. The visual presentation is available in the form of a pop–up alert window with a flashing yellowish orange–colored alert icon and its stationary alert description inside, as in the figure below.

Figure 7-42 Visual and Acoustic Presentations of Active Power Failure Alert

Yellowish orange alert icon - - - - → **Failure or reduction In power supply** ← - - - - Alert description

- Depending on the alert state and acknowledgement status, the alert icon will flash or remain stationary and vary its shape, as summarized in the table below, and will switch on/off the acoustic presentation.

Table 7-3 Visual and Acoustic Presentations of Power Failure Alert

Alert State Acknowledgement Status	Visual Presentation (Yellowish Orange Icon)		Acoustic Presentation
Active, unacknowledged	Flashing		A set of two short, quick beeps repeating every two minutes
Active, silenced*1	Flashing		None
Active, acknowledged	Stationary		None
Active, responsibility transferred*2	Stationary		None
Rectified, unacknowledged	Flashing		None
Normal (no active state)	None		None

*1: *Temporarily silencing of the power failure alert can be done remotely with the appropriate ACN command from a BAM/CAM terminal as well as directly by pressing* ▣ALARM *on the equipment's control panel. See paragraph 13.4 (Remote Alert Management) for details. The visual presentation (Figure 7-37) will be turned on to indicate the alert state.*

*2: *The alert handling responsibility can be transferred to a BAM/CAM terminal via the appropriate ACN alert handling command. See paragraph 13.4 (Remote Alert Management) for details. Direct handling of this command is not available.*

7. Basic Operating Instructions *(continued – 33/33)*

7.8. Alerts *(8/8)*

7.8.10. Bottom–Missing Alert

- This proprietary alert (alert priority: caution) will be triggered when one of the following situations occurs and will continue for 4 seconds or more, making it impossible for the echo sounder to register depth uninterruptedly:

  - no bottom echo is received;
  - the bottom echo has become too weak, showing in weaker colors*1; or
  - the bottom echo has exceeded the present depth range limit. This can occur when the unit is operating in the *MANUAL" mode. Pressing ⊞ switches the control to the "**AUTO**" mode.

- The alert function is initially disabled. To enable the function, refer to paragraph 8.10 .9 (Enabling Bottom–Missing Alert) for instructions.

- When the alert becomes active, the alert status will be visually presented in the form of a stationary alert presentation with a stationary yellow alert icon and alert name, as the figure below. No acoustic presentation is available for the alert.

Figure 7-43 Visual Presentation of Bottom–Missing Alert

Alert icon (yellow and stationary)
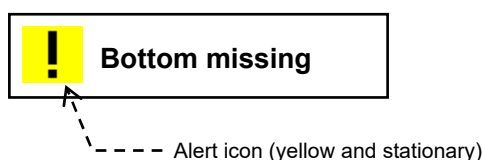
Figure 7-44 On–Screen Presentation of Active Bottom–Missing Alert
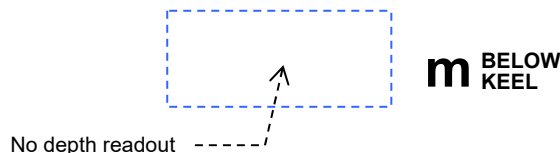
No depth readout

- When you are operating the echo sounder in the **MANUAL** mode*2,
  - increase the receiver gain or select a greater depth range, or
  - switch to the **AUTO** mode with ⊞
    to rectify this condition.

Figure 7-45 Recovery of Depth Readout after Rectification of Alert Condition – Example

Readout (example) restored
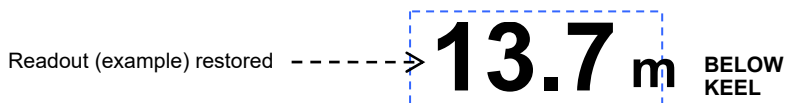
- If the problem persists, especially when traveling over precipitously changing depths, refer to paragraph 8.10.10 (Selecting Depth Readout Response Times), and select a shorter readout response time*3 (**MEDIUM** or **FAST**).

- A continuing symptom indicates that the transducer in use is disconnected or its cable has become defective. Ask your dealer for assistance.

---

*1: *yellow, green, blue, etc. or user–defined colors except two strongest ones*
*2: *See paragraph 7.3.1 (Manual Selection) for details.*
*3: *access path: **MAIN MENU → 9:INSTALLATION SETTINGS → 0:DEPTH READOUT RESPONSE***

8. Advanced Settings

8.1. Introduction

▪ The following settings that affect the way the equipment operates can be made via a menu system consisting of a main menu (**MAIN MENU**, top menu of the system) and a number of associated submenus accessible through the main menu options:

  - settings that you do not have to change frequently, such as the transducer draft and echo threshold level, and

  - 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 🔲. This opens the **MAIN MENU**, as illustrated below. A second keypress turns it off.

Figure 8-1 **MAIN MENU**

Option selected
(*highlighted in red back ground*)

```
┌────────────────────────────────┐
│ MAIN MENU                      │
│ 1:TRANSDUCER DRAFT             │
│ 2:DEPTH REFERENCE              │
│ 3:ECHO THRESHOLD               │
│ 4:NOISE REDUCTION              │
│ 5:WHITE LINE                   │
│ 6:HISTORY SCALE                │
│ 7:SIMULATION                   │
│ 8:ECHO DISPLAY                 │
│ 9:INSTALLATION SETTINGS        │
│                                │
│                                │
│ PRESS [MENU] TO PREVIOUS MENU  │
│ PRESS [PAGE] TO EXIT ALL       │
└────────────────────────────────┘
```

▪ Menu options can be selected by pressing 🔼/🔽, followed by **ENT**, or by pressing appropriate numeric keys.

▪ The one that is currently selected is shown highlighted in a red background.

8.2. Entering Transducer Draft

8.2.1. Introduction

▪ The following procedure does not apply if the echo sounder is to be used as an alert source in the ship's bridge/central alert management (BAM/CAM) system. Skip to paragraph 8.3.2 (Selection Procedure), followed by paragraph 8.10.7.3 (Entering Keel Offsets).

▪ The transducer draft used in this manual refers to the depth from the water surface to the transducer face, as defined in Figure 8–2 (Transducer Draft). The depth readout 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.

▪ 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 OR TRANSDUCERS. GREAT CARE SHOULD, THEREFORE, BE TAKEN IN USING DEPTH DATA WHEN NAVIGATING SHALLOW WATER AREAS.

▪ After transducer draft entry, be sure to change the on–screen depth reference indication (initially **DBT**) to **DBS** (depth–below–surface) via the procedure given in paragraph 8.3 (Selecting Depth Reference Indications).

8.   Advanced Settings *(continued – 2/22)*

8.2.   Entering Transducer Draft *(2/2)*

8.2.2.   Draft Entry Procedure

・ Enter the correct transducer draft of your vessel via the following steps:

(1) Press [MENU] , displaying the **MAIN MENU**.

(2) Select option **1:TRANSDUCER DRAFT** by pressing [RANGE] (numeric key "**1**") or by pressing ◆/◆ first, followed by [ENT] . This turns on the associated submenu.

Figure 8-2 Transducer Draft

(3) Enter the correct draft by repeatedly pressing ◆/◆ . Numeric keys cannot be used for draft entry.

(4) Press [ENT] to complete the entry, and then [PAGE] to exit.

NOTE: The transducer draft can be directly entered using [DRAFT] *and* ◆/◆ *while normal echogram is showing. See paragraph 7.2 (Control Panel Functions), subparagraph ③ for details.*

・ The example below indicates how the draft entry affects the way the echogram shows up. 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. The depth reference indication must be changed accordingly to "**BELOW SURFACE**" via the steps[1] given in paragraph 8.3 (Selecting Depth Reference Indications).

Figure 8-3 Entering Transducer Draft – Example

1:TRANSDUCER DRAFT

0.0m

◆/◆

1:TRANSDUCER DRAFT

4.2m

Enter the correct value.

Figure 8-4 On–Screen Indication of Transducer Draft – Example
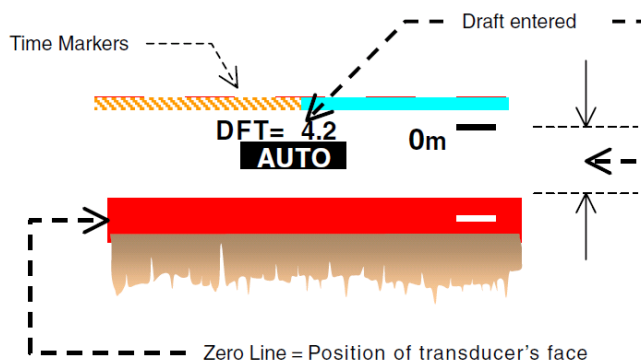
[1] : *Menu access path:* [MENU] → **MAIN MENU** → **2:DEPTH REFERENCE** → **1:BELOW SURFACE** → [ENT]

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8.   Advanced Settings *(continued – 3/22)*

8.3.   Selecting Depth Reference Indications

8.3.1.   Introduction

- The echo 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[*1] and keel offset[*2] entries) were made in advance:
  - 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)

- Depth data will be stored in IEC 61162–1/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 10 (Outputting Stored Data for PC–Based Applications) for details.

8.3.2.   Selection Procedure

- Select the desired or matched reference indication via the following steps:

Figure 8-5 Selecting Depth Reference Indications

(1) Press [MENU] , displaying the **MAIN MENU**.

(2) Select option "**2:DEPTH REFERENCE**."

- This turns on the associated submenu, as shown at right.

- Option "**2:BELOW TRANSDUCER**" is initially selected.

```
MAIN MENU

1:TRANSDUCER DRAFT
2:DEPTH REFERENCE
        2:DEPTH REFERENCE

        1:BELOW SURFACE
        2:BELOW TRANSDUCER
        3:BELOW KEEL
```

(3) Select the desired indication by pressing the appropriate numeric key.
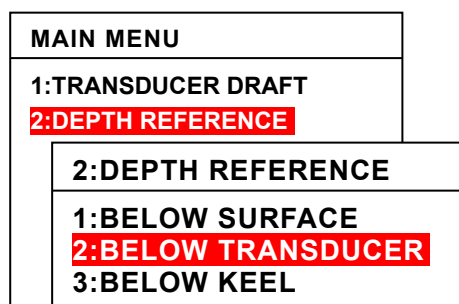
- **BELOW SURFACE**: Indicates the current depth value being referred to the waterline. The correct transducer draft must be entered via steps given in paragraph 8.2 (Entering Transducer Draft) to utilize this indication.

- **BELOW TRANSDUCER**: Indicates the current depth value being referred to the face of the transducer.

- **BELOW KEEL**: Indicates the current depth value being referred to the keel. The correct keel offset must be entered via steps given in paragraph 8.10.7.3 (Entering Keel Offset) to utilize this indication. **This option is mandatory if the depth information is to be used for remote alert management.**

(4) Press [ENT] to complete the selection, and then [PAGE] to exit the menu system.

(5) Enter the appropriate transducer draft[*1] or keel offset[*2], if "**1:BELOW SURFACE**" or "**3:BELOW KEEL**" is chosen.

- **Alert Depth Indications**:
  The reference of the alert depth setting will change accordingly as you choose the desired depth reference, as in the example below:

Figure 8-6 Alert Depth Setting Indications – Example

⚠ DBT **6.5**   ⚠ DBS **6.5**   ⚠ DBK **6.5**

Depth below transducer   Depth below surface   Depth below keel

[*1]: *See paragraph 8.2 (Entering Transducer Draft) for details.*

[*2]: *See paragraph 8.10.7.3 (Entering Keel Offset) for details. The DBK readout is required for remote alert management using the alert handling protocol standard (IEC 61162–1 Ed. 5).*

8.   Advanced Settings *(continued – 4/22)*

8.4. Echo Threshold Adjustment

8.4.1. Introduction

· When the echo display[*1] is set to show echoes in full colors, echoes including the bottom reflection are shown in up to seven different colors depending on their relative strengths. The color sample 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. The three strongest echo colors (initially, red, orange and yellow) cannot be suppressed.

8.4.2. Adjusting Echo Threshold Level

· Select the desired echo threshold level via the following steps:

(1) Press 🔲 , displaying the **MAIN MENU**.

(2) Select option "**3:ECHO THRESHOLD**" by pressing 🔲 (numeric key "**3**") or ⬆/⬇ , followed by 🔘 . This turns the associated submenu with a threshold level entry field, and the color sample 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 8-7 Adjusting Echo Threshold Level – Example

(3) Enter the desired echo threshold with ⬆/⬇ or with the appropriate numeric key.

-   The suppressed colors are indicated blank on the color sale, as in the example at right.

3:ECHO THRESHOLD

3

New threshold level
Can be changed by pressing ⬆/⬇ .

Three weak colors are suppressed. The echoes at these strength levels will not be displayed on the echogram.

The three strongest echo colors cannot be sup–pressed.
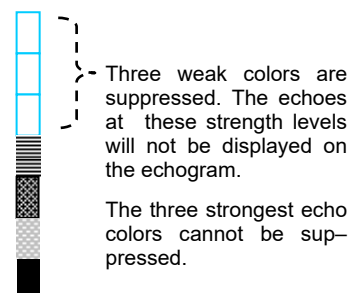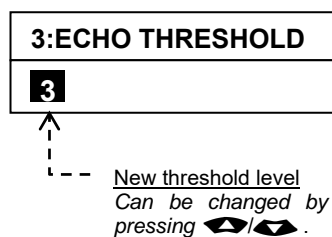
(4) Press 🔘 to complete the entry, and then 🔲 to exit the menu mode.

Figure 8-8 Effect of Echo Threshold on Echogram – Example

· The example at right shows how the echo threshold adjustment (with the top three weak–strength echo colors suppressed) affects the way the echogram is presented.

· The receiver gain level will remain unaffected.

NOTE: Fish echoes can be sup–pressed also by setting the echo display to showing the bottom echo in a single color via the following menu option access path:

MAIN MENU → 8:ECHO DISPLAY → 1:BOTTOM CONTOUR

All colors are displayed

Three weak colors are suppressed

Surface clutters

Fish on bottom

[*1]: *Paragraph 8.9,* **MAIN MENU → 8:ECHO DISPLAY → 2:NORMAL DISPLAY**

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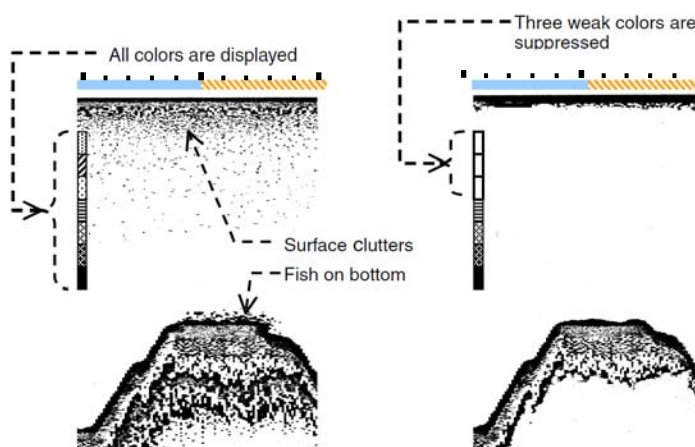
8.   Advanced Settings *(continued – 5/22)*

8.5. Reducing Noise Interference

▪   The effect of noise interference coming from other onboard electronics or nearby echo sounders can be reduced via the menu system in the following manner:

Figure 8-9 Selecting Noise Reduction Levels

(1) Press 🔲MENU , displaying the **MAIN MENU**.

(2) Select menu option "**4:NOISE REDUCTION**" by pressing 🔲ALARM (numeric key "**4**") or ◣/◢ , followed by 🔲ENT . This turns the associated submenu on, as shown at right.

The following levels of noise reduction (**NR**) are selectable from the submenu:

- **1:NR=LOW**: Selects low reduction level.
- **2:NR=MID**:   Selects medium reduction level.
- **3:NR=HIGH**: Selects high reduction level.
- **4:NR=OFF**:   Terminates the function (initially selected).

MAIN MENU
1:TRANSDUCER DRAFT
2:DEPTH REFERENCE
3:ECHO THRESHOLD
4:NOISE REDUCTION

4:NOISE REDUCTION
1:OFF
2:LOW
3:MID
4:HIGH

Figure 8-10 Noise Reduction Level Indication – Example

GAIN=AT TVG=AT
NR=LOW

11.9m BELOW KEEL

20m

Noise Reduction Level
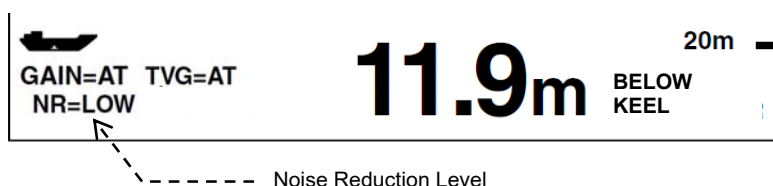
(3) Enter the desired echo threshold with ◣/◢ or appropriate numeric key.

- The selected **NR** level is indicated as in the example above.

(4) Press 🔲ENT to complete the entry, and then 🔲PAGE to exit the menu mode.

8.6. White Line Adjustment

8.6.1. Introduction

▪   The white line adjustment[*1] 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 usually difficult to detect on normal echogram.

8.6.2. Adjusting White–Line Level

▪   Select the desired white line level via the following steps:

(1) Press 🔲MENU , displaying the **MAIN MENU**.

(2) Select menu option "**5:WHITE LINE**" by pressing ◁ (numeric key "**5**") or ◣/◢ , followed by 🔲ENT .

[*1]: *This function is available when the echo display is set to* **NORMAL DISPLAY** *via the procedure given in paragraph 8.9 (Selecting Types of Echo Display).*

(continued to next page)

8.   Advanced Settings *(continued – 6/22)*

8.6.   White Line Adjustment *(2/2)*

8.6.2.   Adjusting White–Line Level *(2/2)*

-   This turns on the associated **WHITE LINE** submenu with a white line level entry field, and the color sample 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 8-11 Adjusting White Line Level – Example

```
┌─────────────────────────────────────┐
│ 5:WHITE LINE                         │
├─────────────────────────────────────┤
│ ▮3▮                                  │
└─────────────────────────────────────┘
```

New white line level
Can be changed by pressing
◆ / ◆ .

These colors in bottom echo structure will be suppressed.
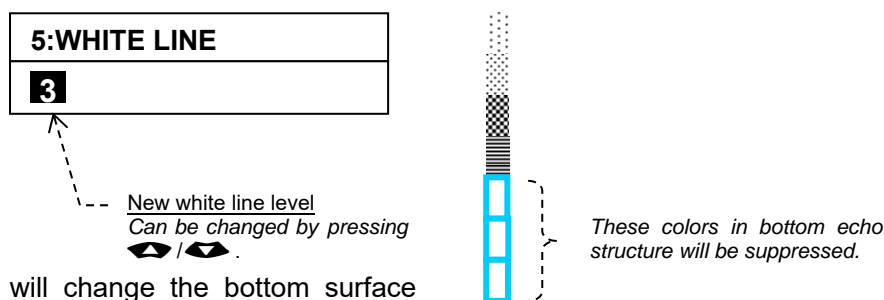
(3) Pressing ◆ will change the bottom surface into a thin contour line immediately followed by a blank area. As you press the key repeatedly, the colors that form the bottom stratum will be erased one by one, allowing the blank area to widen (raising the white–line level). This blank area is popularly known as the "white line" in recording type echo sounders.

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

(4) Pressing ◆ restores the suppressed bottom–echo colors one at a time, thus narrowing the blank area (namely, lowering the white line level).

(5) After the desired whiteline level is reached, press **ENT** to complete the setting, and then **PAGE** to exit the menu mode.

Figure 8-12 Typical White–Line Echogram
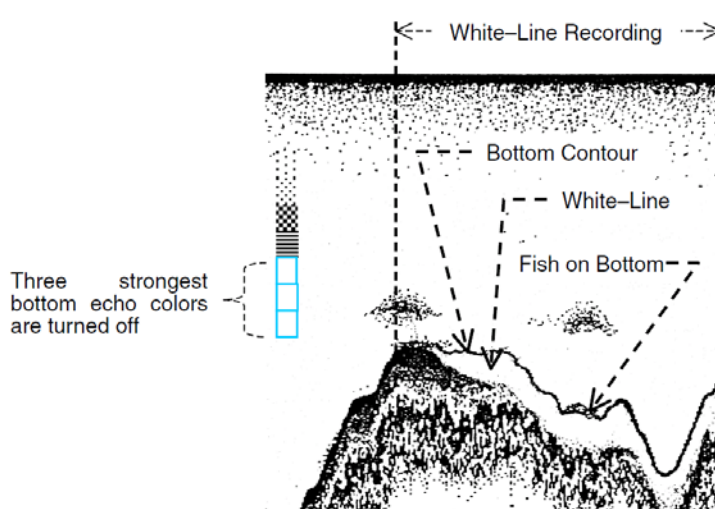
NOTES:

1. The 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 subsequent power–up.

8. Advanced Settings *(continued – 7/22)*

8.7. Selecting Time Passage Scales

Figure 8-13 Selecting Time Scales

- Selecting option "**6:HISTORY**" on the **MAIN MENU** opens the associated submenu as shown at right, allowing you to select the time passage scales (**HISTORY** scales) for reviewing stored data via the soundings data **HISTORY** window[*1].

- The following scales are selectable as in the submenu:
  - 5 minutes, 15 minutes, 30 minutes
  - 1 hour, 2 hours, 3 hours, 6 hours and 12 hours

- The selected scale applies also when reviewing the soundings data via the **LOG** window[*2].

- To select the desired scale, proceed as follows:

(1) Using ▲/▼ [*3] or the appropriate numeric key, select the desired scale, and press ENT .

(2) Press PAGE to exit the menu mode.

```
MAIN MENU
1:TRANSDUCER DRAFT
2:DEPTH REFERENCE
3:ECHO THRESHOLD
4:NOISE REDUCTION
5:WHITE LINE
6:HISTORY SCALE
```

```
6:HISTORY SCALE
1:  5 MINUTES
2:15 MINUTES
3:30 MINUTES
4:  1 HOUR
5:  2 HOURS
6:  3 HOURS
7:  6 HOURS
8:12 HOURS
```

Figure 8-14 Soundings Data History Window – Example

```
HISTORY   (12 HOURS)
                              0
                              4
Current time passage scale    8
       ←------ 12 hours ------→
                              12
                              16
                              20
13/05/24   54°31.012N  15.6 DBK
13:40:08   006°52.327E       m
   DFT= 0.0   KL= 0.6   RNG= 20
```
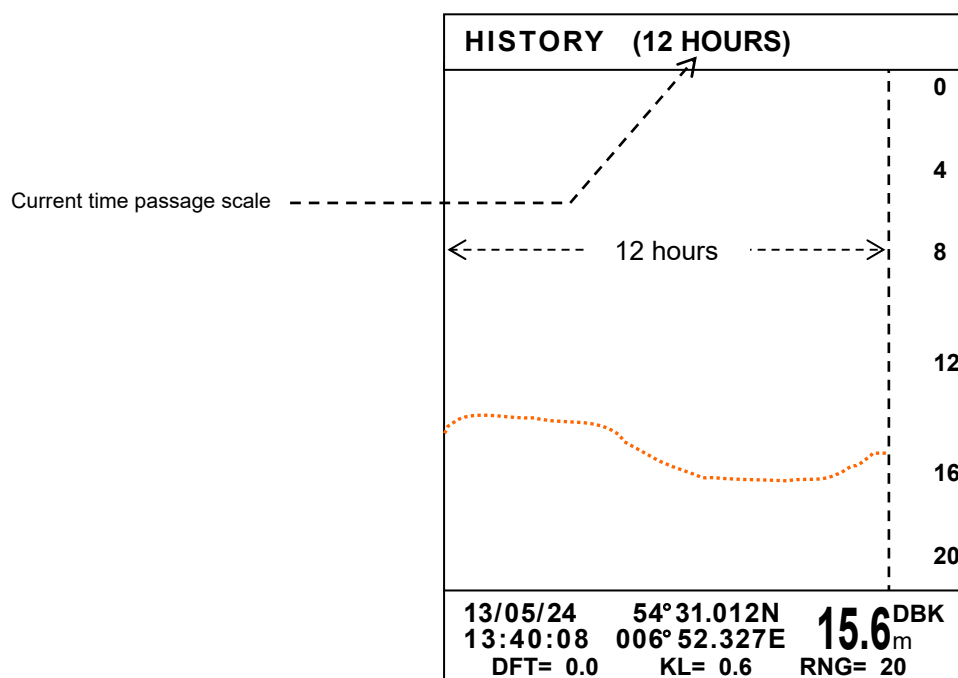
[*1]: *See paragraph 7.7 (Retrieving Soundings Data History) for details.*

[*2]: *See paragraph 7.7.4 (Reviewing Detailed Soundings Data History via LOG Window) for details.*

[*3]: *When the **HISTORY** window is already open, pressing either of these keys selects the time passage scales directly. See paragraph 7.7 (Retrieving Soundings Data History) for details.*

8. Advanced Settings *(continued – 8/22)*

8.8. Activating Echo Sounder Simulator

· An echo sounder simulator function 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:

Figure 8-15 Activating Echo Sounder Simulator

(1) Press [MENU] , displaying the **MAIN MENU**.

(2) Select option "**7:SIMULATION**" by pressing [GAIN] (numeric key "**7**") or by pressing [▲] / [▼], followed by [ENT] .

   - This turns on the associated submenu, as shown at right.

(3) Select option "**2:ON**[*1]" by pressing [AUTO] (numeric key "**2**") or [▼], followed by [ENT] .

   - This activates the simulator, automatically selecting the 0–20 meter range[*2] (or 0–15 fathom/0–100 foot range) and starting to show echogram.

MAIN MENU
1:TRANSDUCER DRAFT
2:DEPTH REFERENCE
3:ECHO THRESHOLD
4:NOISE REDUCTION
5:WHITE LINE
6:HISTORY SCALE
7:SIMULATION

7:SIMULATION
1:OFF
2:ON

· To avoid the simulated echogram from being mistakenly regarded as a "live" echogram with the equipment in actual service, the following caution message (**SIMULATION**) will be displayed highlighted, blinking just above the digital depth readout:

Figure 8-16 Indication of **SIMULATION** Mode – Example

SIMULATION
11.4m BELOW KEEL
20m

(4) Press [PAGE] to exit the menu mode.

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

· **Bottom–Missing Alert**:

   - The bottom–missing alert (alert priority: caution), 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 alert sound (acoustic presentation) will be automatically muted in 5 seconds. However, if you choose a shallow range (5– or 10–meter range) that does not cover the present depth, the alert will be triggered again.

   · For more information about the alert, see paragraph 7.8.10 (Bottom–Missing Alert).

[*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 first pressing [RANGE] , followed by [▲] / [▼] after normal echogram screen returns.*

8.   Advanced Settings *(continued – 9/22)*

8.9. 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 menu option "**8:ECHO DISPLAY**" by pressing [HIST] or by pressing ⬥/⬥ , followed by [ENT] . This turns on the associated submenu, as shown below.

Figure 8-17 Selecting Types of Echo Display

MAIN MENU

1:TRANSDUCER DRAFT
2:DEPTH REFERENCE
3:ECHO THRESHOLD
4:NOISE REDUCTION
5:WHITE LINE
6:HISTORY SCALE
7:SIMULATION
8:ECHO DISPLAY

8:ECHO DISPLAY

1:BOTTOM CONTOUR
2:NORMAL DISPLAY

This color can be changed via the procedure in paragraph 8.10.2.

Color sample scale is turned on.
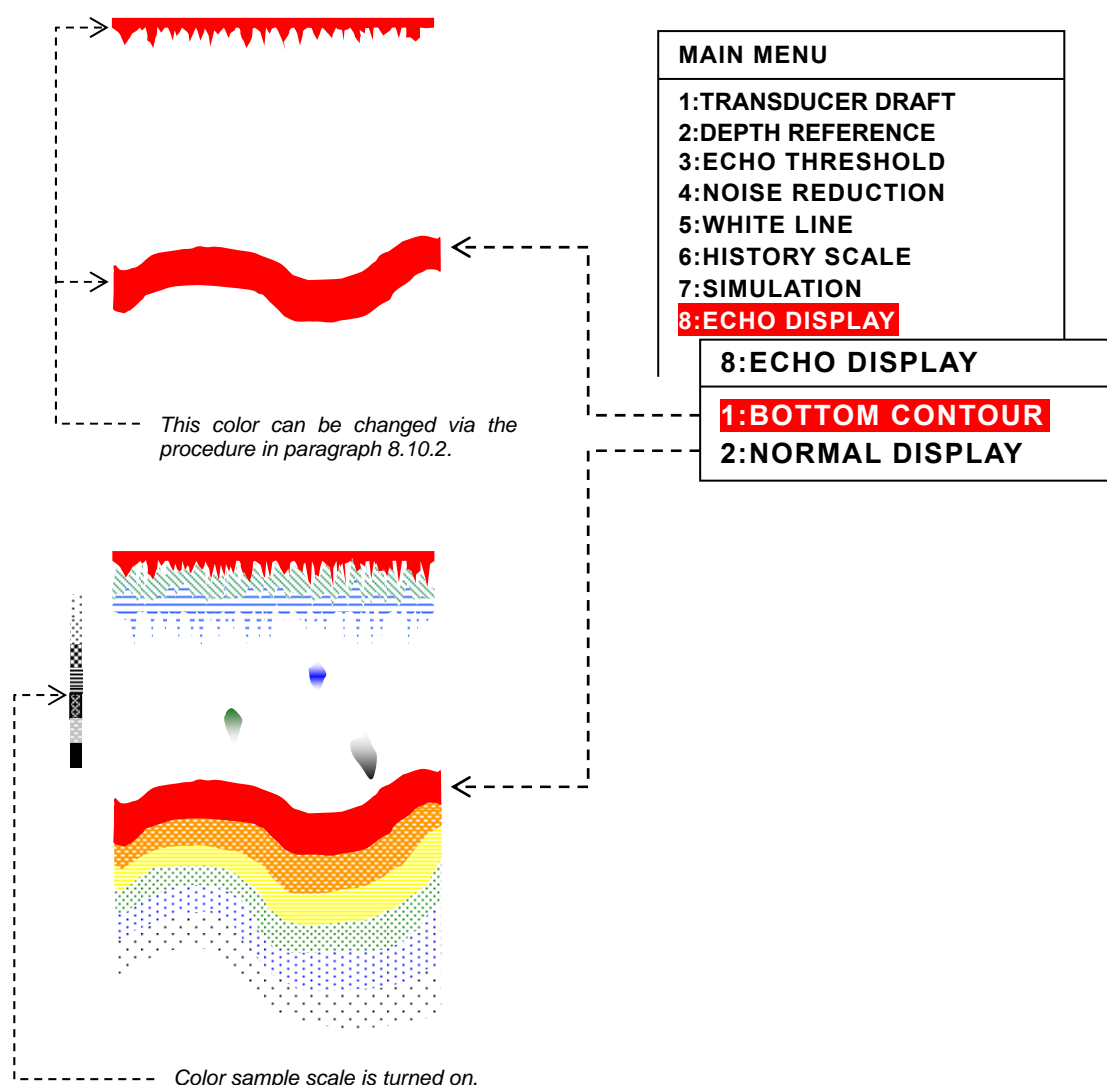
(3) Press [AUTO] (numeric key "**1**") first, and then [ENT] .

(4) Press [PAGE] to exit the menu mode.

▪ The strongest echo color (strength level 7, initially red) can be changed via the instructions given in paragraph 8.10.2 (Changing Echo Color Assignments).

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8.   Advanced Settings *(continued – 10/22)*

8.10. Installation Settings

8.10.1. Introduction

▪ The following settings that should be normally made after initial installation and does 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**)
  - Registration of transducer sites and keel offset[*1] (**6:TRANSDUCER SETTINGS**)
  - Selection of types of data to be output (**7:DATA OUTPUT PORT**)
  - Enabling/disabling bottom–missing alert (**8:BOTTOM MISSING CAUTION**)
  - Selection of digital depth readout response times (**9:DEPTH READOUT RESPONSE**)
  - Turning on/off of keypress beep (**0:KEY BEEP SETTING**)

Figure 8-18 Accessing **INSTALLATION SETTINGS** Options

```
MAIN MENU

1:TRANSDUCER DRAFT
2:DEPTH REFERENCE
3:ECHO THRESHOLD
4:NOISE REDUCTION
5:WHITE LINE
6:HISTORY SCALE
7:SIMULATION
8:ECHO DISPLAY
9:INSTALLATION SETTINGS
```

```
9:INSTALLATION SETTINGS

1:ECHO COLORS
2:DEPTH UNIT
3:DYNAMIC RANGE
4:UTC/LST(offset)
5:CLOCK PRESET
6:TRANSDUCER SETTINGS
7:DATA OUTPUT PORT
8:BOTTOM MISSING CAUTION
9:DEPTH READOUT RESPONSE
0:KEY BEEP SETTING
```

▪ To gain access to the **INSTALLATION SETTINGS** submenu, simply press DIM (numeric key "**9**").

▪ The following instructions assume that the submenu is currently displayed.

*1: *Entry of keel offset is mandatory for remote alert management compliant with IEC 61162–1 Ed. 5 protocol standard.*

8.   Advanced Settings *(continued – 11/22)*

8.10.   Installation Settings *(2/13)*

8.10.2.   Changing Echo Color Assignments

8.10.2.1.   Introduction

- When the echo display[*1] is set to full color presentation, echoes will be displayed in up to seven different colors – initially, red, orange, yellow, green, yellowish green, light blue and blue in order of echo strength; namely, red represents the strongest level, and blue, the weakest one.

- The color sample scale shown 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–driven steps described in the following paragraph (8.10.2.2).

Figure 8-19 Initial Echo Colors Assignments
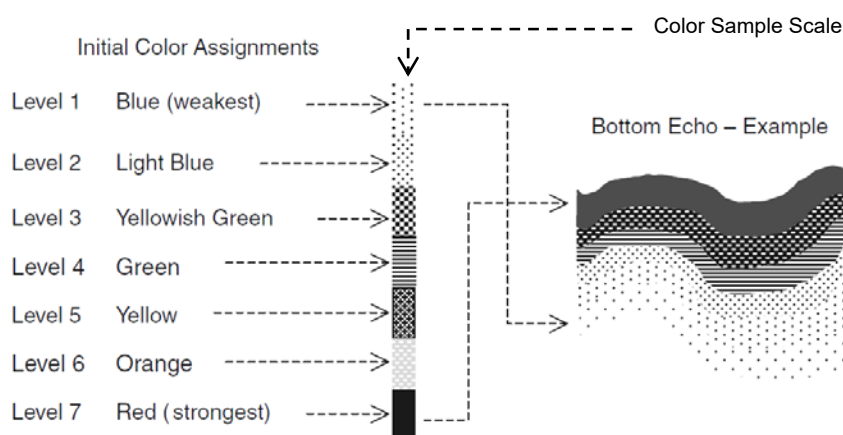
Figure 8-20 Accessing **ECHO COLORS** Submenu
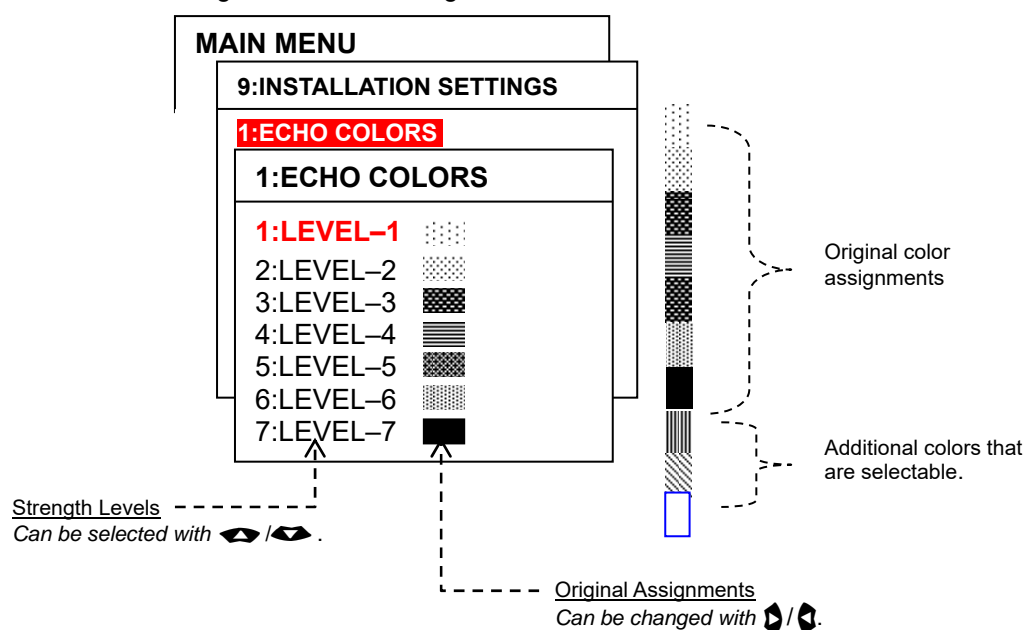
[*1]: *Paragraph 8.9 (Selecting Types of Echo Display);* ***MAIN MENU*** → ***8:ECHO DISPLAY*** → ***2:NORMAL DISPLAY***

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8.   Advanced Settings *(continued – 12/22)*

8.10.   Installation Settings *(3/13)*

8.10.2.   Changing Echo Color Assignments *(2/2)*

8.10.2.2.   Changing Assignments

▪ Change the echo color assignments via the following steps to suit your applications:

(1) Selecting option "**1:ECHO COLORS**" on the **INSTALLATION SETTINGS** menu opens the associated submenu with a color sample scale consisting of 10 color samples to the right, as in Figure 8–20 (Accessing **ECHO COLORS** Submenu).

    - The upper seven color samples on the scale represent the original assignments.

(2) Options **LEVEL–1** through **LEVEL–7** on the submenu represent the seven relative 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 ◗/◖ 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 ⟨PAGE⟩ to return to the echogram screen.

8.10.2.3.   Returning to Original Assignments

▪ The upper seven color samples on the 10–color sample scale shown below represent 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 8-21 Color Sample Scale

Original Assignments

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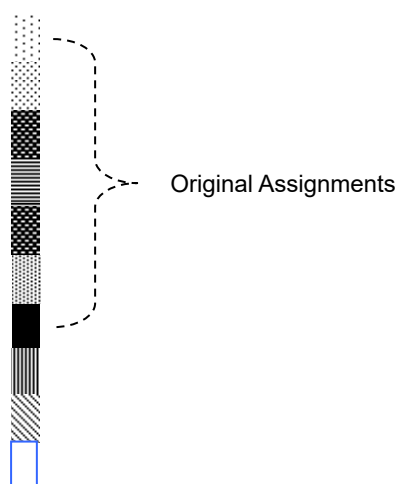
8.   Advanced Settings *(continued – 13/22)*

8.10.   Installation Settings *(4/13)*

8.10.3.   Selecting Depth Readout Units

8.10.3.1.   Introduction

∙ The on–screen depth readout is initially in meters (**m**).

∙ You can read depth in fathoms (**FM**) or feet (**FT**) via the steps described below.

∙ Soundings data to be stored in memory for off–line retrieval will be in meters regardless of the readout unit selected.

∙ See Section 10 (Outputting Stored Data for PC–Based Applications), paragraph 10.1 (Introduction) for details.

< C A U T I O N >
In order to operate the equipment in compliance with *IMO Resolution MSC.(69)74 Annex 4*, the depth readout indication must be in meters.

8.10.3.2.   Readout Unit Selection Procedure

∙ Select the desired readout unit via the following steps:

Figure 8-22 Accessing **DEPTH UNIT** Submenu

(1) Select "**2:DEPTH UNIT**" by pressing [AUTO] (numeric key "**2**"), opening the submenu as shown at right.

(2) Select the desired unit by pressing the appropriate numeric key.

 - For example, to read depths in fathoms, select "**2:FM**" by pressing [AUTO].

(3) Press [ENT] to complete the selection.

(4) Press [PAGE] to exit the menu mode.

```
MAIN MENU

1:TRANSDUCER DRAFT
2:DEPTH REFERENCE
3:ECHO THRESHOLD
4:NOISE REDUCTION
5:WHITE LINE
6:HISTORY SCALE
7:SIMULATION
8:ECHO DISPLAY
9:INSTALLATION SETTINGS
```

```
9:INSTALLATION SETTINGS

1:ECHO COLORS
2:DEPTH UNIT
3:
```

```
2:DEPTH UNIT

1:m
2:FM
3:FT
```

55
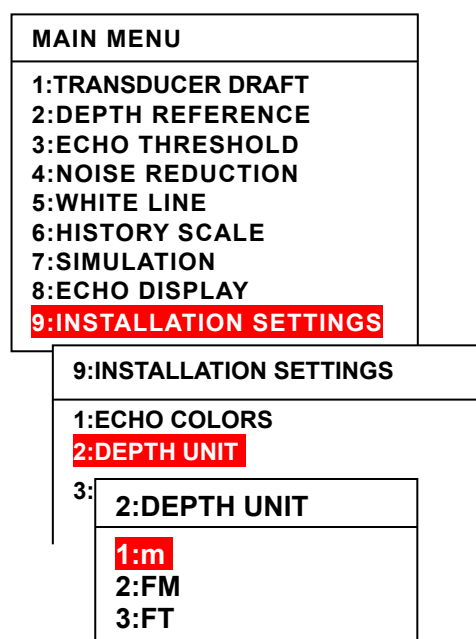
8.   Advanced Settings *(continued – 14/22)*

8.10.   Installation Settings *(5/13)*

8.10.4.   Selecting Echo Dynamic Ranges

8.10.4.1.   Introduction

Figure 8-23 Initial Echo Dynamic Range

- Echoes are displayed using up to seven different colors, depending on their relative strengths.

- The colors that are currently used to show echoes are indicated in the form of a color sample scale at the screen's left edge, with the top color (initially blue) and bottom end colors (initially red) representing the weakest echoes 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: **initial 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: optional 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 value, if 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 above information does not apply when the echo display is set to show only the bottom contour in a single color (initially red). To display echoes in full colors, see instructions given in paragraph 8.9 (Selecting Types of Echo Display).

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

8.10.4.2.   Dynamic Range Selection Procedure

Figure 8-24 **DYNAMIC RANGE** Submenu

- Select the desired echo dynamic range via the following steps:

(1) Select option "**3:DYNAMIC RANGE**" by pressing [DRAFT], opening the associated submenu.

(2) Select the desired value by pressing the appropriate numeric key.

(3) Press [ENT] to complete the selection, and then press [PAGE] to exit.

3:DYNAMIC RANGE
1:3dB
2:4dB
3:5dB
4:6dB
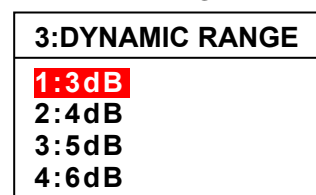
8.   Advanced Settings *(continued – 15/22)*

8.10.   Installation Settings *(6/13)*

8.10.5.   Entering Time Offset for Local Standard Time Readout

8.10.5.1.   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 (time difference between LST and UTC) via the procedure described in the next paragraph. The major time offsets from UTC are listed below.

Table 8-1 Major UTC Offsets

- Bangkok:	+7 hours	- Honolulu:	−10 hours[*1]
- Chittagong:	+6 hours	- New York:	−5 hours[*1]
- Djakarta:	+7 hours	- Houston:	−6 hours[*1]
- Dubai (Gulf Standard Time):	+5 hours	- San Francisco:	−8 hours[*1]
- Ho Chi Minh:	+7 hours	- Rio de Janeiro:	−3 hours
- Hong Kong:	+8 hours	- Lima:	−5 hours
- Kuala Lumpur:	+8 hours	- Papeete	−10 hours
- Mumbai (Bombay):	+5.5 hours	- Barcelona:	+1 hour[*1]
- Perth:	+8 hours[*1]	- Izmir:	+2 hours[*1]
- Seoul:	+9 hours	- Piraeus:	+2 hours[*1]
- Singapore:	+8 hours	- Gdansk:	+1 hour[*1]
- Sydney:	+10 hours[*1]	- Hamburg:	+1 hour[*1]
- Taipei:	+8 hours	- Marseilles:	+1 hour[*1]
- Tokyo:	+9 hours	- Oslo:	+1 hour[*1]
- Vladivostok:	+10 hours	- St. Petersburg (Russia):	+3 hours[*1]
- Wellington:	+12 hours	- Reykjavik:	±0 hours

8.10.5.2.   Time Offset Entry Procedure

- Enter the desired time offset via the following steps:

(1) Select option "**4:UTC/LST(offset)**" by pressing numeric key ⬛, opening the associated submenu, ready for entering a time offset.

- Initially an offset of +00 hours 00 minutes (+00:00) is entered as shown at right to display the UTC time. The **+** sign should be initially highlighted and blinking.

- The character highlight can be edited by pressing ◢◣/◥◤, and can be shifted to the right/left by pressing ◢/◣.

(2) Enter the desired time offset.

- The **+/−** sign is switched by pressing ◢◣/◥◤.

(3) Press 🔲 to complete the entry, and then 🔲 to exit the menu mode.

- To return to the UTC readout, enter 00:00 at step (2).

- Memory storage of data is done in UTC date/time regardless of on–screen LST readout. See paragraph 10.1 (Introduction) for details.

Figure 8-25 Entering Time Offset
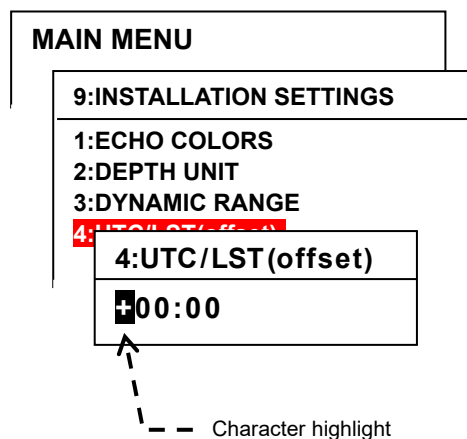
*1: *Add 1 hour for Daylight Saving Time (DST) or Central European Summer Time (CEST).*

8.   Advanced Settings *(continued – 16/22)*

8.10.   Installation Settings *(7/13)*

8.10.6.   Setting Date and Time

▪   After deciding which time reference to display, UTC or LST (local standard time), via the preceding procedure (paragraph 8.10.5: Entering Time Offset for Local Standard Time Readout), 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 sentence ($GPRMC or $GPZDA) comes in.

(1) Select option "**5:CLOCK PRESET**" by pressing numeric key ◀, opening the associated submenu, ready for entering the current date and time.

-   The date must be entered in the Day/Month/Year (DD/MM/YY) format.

-   The time must be entered in the 24–hour (hh:mm:ss) format.

Figure 8-26 Setting Date and Time

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

(2) Enter the current date using ▲ / ◀ and ◢◣/◣◢.

-   Press ▲ / ◀ to shift the highlight to the character to be edited.

-   Press ◢◣/◣◢ to edit the highlighted character.

(3) Press **ENT** to complete the entry.

(4) Press **PAGE** to exit the menu mode.

```
MAIN MENU
 ┌─────────────────────────────┐
 │ 9:INSTALLATION SETTINGS      │
 │                              │
 │ 1:ECHO COLORS                │
 │ 2:DEPTH UNIT                 │
 │ 3:DYNAMIC RANGE              │
 │ 4:UTC/LST(offset)            │
 │ 5:CLOCK PRESET               │
 │   ┌──────────────────────────┐
 │   │ 5:CLOCK PRESET           │
 │   │ DD/MM/YY      hh:mm:ss   │
 │   │ 13/06/24      00:00:00   │
 │   └──────────────────────────┘
```

Character highlight
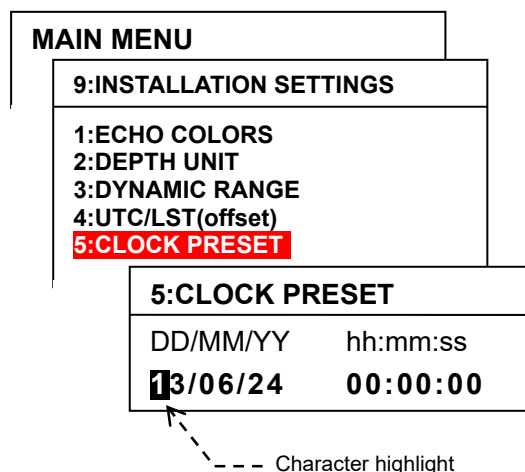
Figure 8-27 Entering Current Date and Time – Example

(Entering Date)

5:CLOCK PRESET	
DD/MM/YY	hh:mm:ss
13/06/24	00:00:00

Character highlight

(Entering Time)

5:CLOCK PRESET	
DD/MM/YY	hh:mm:ss
13/06/24	14:30:00

Character highlight
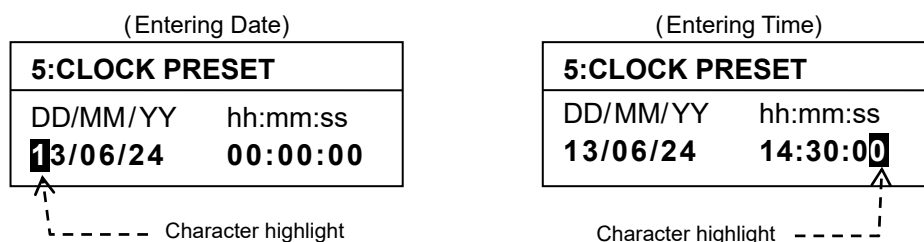
▪   The built–in clock is battery–backed, eliminating the need to set the date and time again after the equipment is switched off and then on again.

8. Advanced Settings *(continued – 17/22)*

8.10. Installation Settings *(8/13)*

8.10.7. Making Transducer–Related Settings

8.10.7.1. Introduction

Figure 8-28 Accessing **TRANSDUCER SETTINGS** Submenu

- In order to read depth from the keel or to graphically indicate the relative location of the transducer, you must make the following menu settings related to the transducer at initial installation time.

  - Registering transducer location
  - Entering keel offset

- These settings are grouped under option "**6:TRANSDUCER SETTINGS**" accessible via option "**9:INSTALLATION SETTINGS,**" as shown at right.

- The following instructions assume that the associated **TRANSDUCER SETTINGS** submenu is currently displayed.

```
MAIN MENU
  ┌──────────────────────────────┐
  │ 9:INSTALLATION SETTINGS      │
  │                              │
  │ 1:ECHO COLORS                │
  │ 2:DEPTH UNIT                 │
  │ 3:DYNAMIC RANGE              │
  │ 4:UTC/LST(offset)            │
  │ 5:CLOCK PRESET               │
  │ 6:TRANSDUCER SETTINGS        │
  │    ┌─────────────────────────┐
  │    │ 6:TRANSDUCER SETTINGS   │
  │    │                         │
  │    │ 1:LOCATION              │
  │    │ 2:KEEL OFFSET           │
  └────┴─────────────────────────┘
```
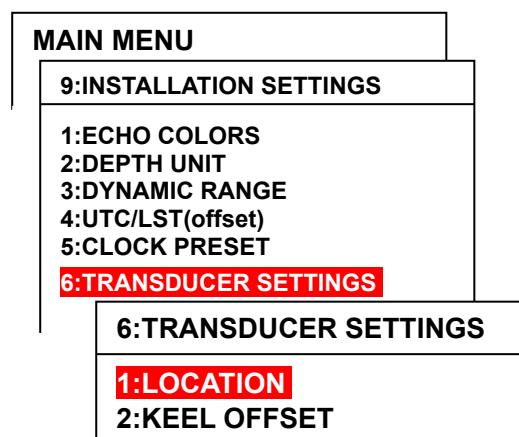
8.10.7.2. Registering Relative Transducer Location

- The ship–shaped symbol (e.g. ◣▬▬) shown to the right of the power supply voltage readout near the lower left corner of the echogram screen indicates the relative location of the transducer. Three symbols are selectable to represent the installation site on–screen, as illustrated below.

Figure 8-29 Indication of Relative Transducer Sites

Aft   Middle   Fore

- To show the appropriate location of the transducer, register the site via the following steps:

Figure 8-30 Registering Transducer Site and On–Screen Indication – Example

(1) Select "**1:LOCATION**" by pressing [RANGE] (numeric key "**1**"), opening the associated submenu, as shown at right.

(2) Select the appropriate option by pressing the corresponding numeric key.

(3) Press [ENT].

(4) Press [PAGE] to exit the menu mode.

- The example at right shows that the transducer is located in the ship's middle (alongships) position and the depth is referred to the transducer (DBT, initial setting).

```
1:LOCATION
┌────────────────┐
│ 1:FORE         │
│ 2:MIDDLE       │
│ 3:AFT          │
└────────────────┘
```

GAIN=AT TVG=AT
NR=OFF ⚠DBT 15.7
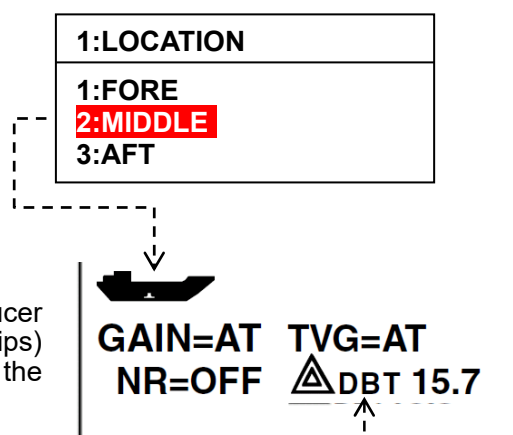
< CAUTION >
Depth reference must be DBK (depth–below–keel) for remote alert management. See paragraph 8.10.7.3 for instructions.

8.   Advanced Settings *(continued – 18/22)*

8.10.   Installation Settings *(9/13)*

8.10.7.   Making Transducer–Related Settings *(2/2)*

8.10.7.3.   Entering Keel Offset

▪ The following setting is mandatory for remote alert management using the default IEC 61162–1 Ed. 5 BAM protocol. To read depth from the keel, the keel offset has to be measured and its value has to be entered via the steps given below.

Figure 8-31 Keel Offset – Example

(1) Select "**2:KEEL OFFSET**" by pressing [AUTO] (numeric key "**2**"), opening the associated submenu, as illustrated at right.

(2) Enter the correct offset value by repeatedly pressing [▲]/[▼].

(3) Press [ENT] to complete the entry.

(4) Press [PAGE] to exit the menu mode.

(5) Set the depth measurement reference to "**BELOW KEEL**" via the procedure described in paragraph 8.3 (Selecting Depth Reference Indications).

▪ An example below indicates how the keel offset entry affects the status indicators in the lower part of the screen with the depth reference set to "**BELOW KEEL**."

Figure 8-32 Entering Keel Offset – Example
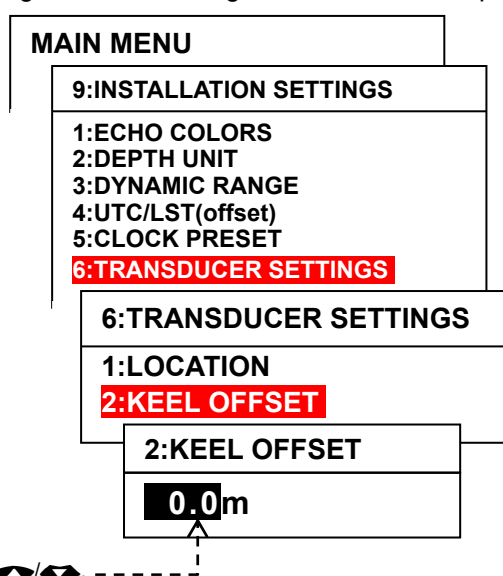
Enter the correct offset by pressing [▲]/[▼].

Figure 8-33 Indication of Depth Reference with Keel Offset Entered – Example

- 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 alert depth will be depth–below–keel (**DBK**) values.
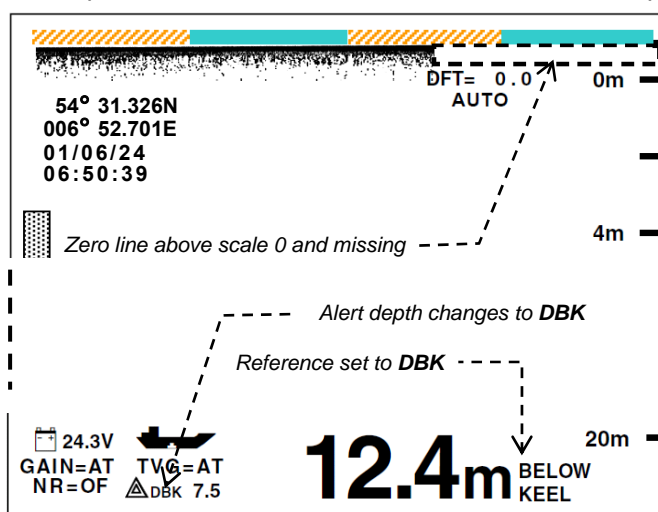
8.   Advanced Settings *(continued – 19/22)*

8.10.   Installation Settings *(10/13)*

8.10.8.   Selecting Data Outputs

8.10.8.1.   Introduction

Figure 8-34 Accessing **DATA OUTPUT PORT** Submenu

- You can select types of data, including those from a GPS receiver, to be output via the serial interface ports*1.

- This function should help reduce possible overloading problems that may occur if an external device connected is not capable of processing a large amount of output data or if such a device receives a data type that is not supported by the device's software.

- For remote alert management purposes, the depth–below–keel (**DBK**) output is required, which is initially turned off.

```
MAIN MENU
  9:INSTALLATION SETTINGS
  – – – – – – – – – – – – –
  – – – – – – – – – – – – –
  7:DATA OUTPUT PORT
    7:DATA OUTPUT PORT
    1:DEPTH (DPT)          OFF
    2:DEPTH (DBT)          OFF
    3:DEPTH (DBK)          ON
    4:DEPTH (PSKPDPT)      OFF
    5:L/L    (GGA)         OFF
    6:GPS    (RMC)         OFF
    7:OTHERS              OFF
```
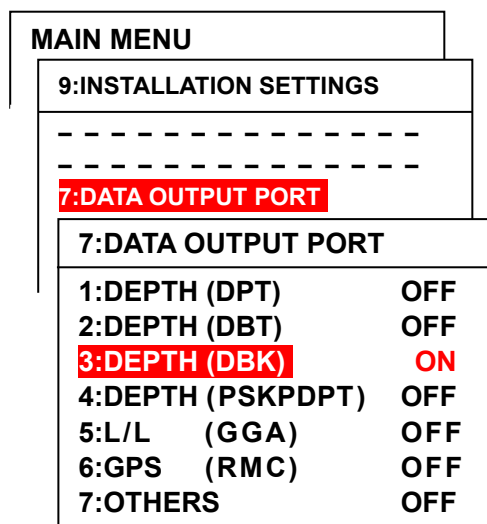
8.10.8.2.   Data Type Selection Procedure

- Select the types of data you wish to output or stop outputting, via the following steps:

(1) Press ⬛MENU to open the **MAIN MENU**, and select option "**9:INSTALLATION SETTINGS**" by pressing ⬛DIM .

(2) Select option "**7:DATA OUTPUT PORT**" by pressing ⬛GAIN , opening the associated submenu, as shown above. The options on the menu represent the data types that can be output. The right–hand column shows the on/off status of each output.
   - **DEPTH (DPT)**:   Depth data in $SDDPT output sentence
   - **DEPTH (DBT)**:   Depth–below–transducer data in $SDDBT output sentence
   - **DEPTH (DBK)***2:   Depth–below–keel data in $SDDBK output sentence
   - **DEPTH (PSKPDPT)***3: Depth data in $PSKPDPT output sentence
   - **GPS (RMC)***4:   Minimum recommended data in $GPRMC output sentence
   - **OTHERS***4:   Any IEC 61162–1/NMEA–0183 data other than above

- Initially, depth information (**DPT**) only is output. The rest of the data are initially turned off, as indicated "**OFF**." To allow other types of data to be output, execute the following additional steps:

(3) Highlight the desired data type by pressing ◀▶/◀▶ .

   - For remote alert management from the BAM/CAM system, select data type **DEPTH (DBK)**. Be sure to enter the correct keel offset beforehand via the procedure given in paragraph 8.10.7.3 (Entering Keel Offset). Numeric keys cannot be used to select the menu options in this case.

(4) Press either ◀ or ▶ so that the status changes from "**OFF**" to "**ON**."

(5) Press ⬛ENT to complete the setting.

(6) Press ⬛PAGE to exit the menu system.

- To disable a particular data type, set its status to "**OFF**" at step (4).

*1: *rear–panel **RS–422–A/B** and **I/O** connectors*
*2: *This output is required for remote alert management compliant with the IEC 61162–1 Ed. 5 protocol standard.*
*3: *This data format is for use with the **SKIPPER IR 301** digital depth repeater only.*
*4: *These data sentences are available with an optional GPS sensor or GPS–derived data source plugged in.*

8.   Advanced Settings *(continued – 20/22)*

8.10.   Installation Settings *(11/13)*

8.10.9.   Enabling Bottom–Missing Alert

8.10.9.1.   Introduction

・ The bottom–missing alert function is described in paragraph 7.8.10 (Bottom–Missing alert).

Figure 8-35 Enabling Bottom–Missing Alert

・ The function is initially disabled so that no alerting beeps will be generated and no visual presentation available when the echo sounder has failed to properly track the bottom echo or when the current depth is outside the lower range limit in the manual control mode*[1] of operation.

```
MAIN MENU

    9:INSTALLATION SETTINGS

    1:ECHO COLORS
    2:DEPTH UNIT
    3:DYNAMIC RANGE
    4:UTC/LST(offset)
    5:CLOCK PRESET
    6:TRANSDUCER SETTINGS
    7:DATA OUTPUT PORT
    8:BOTTOM MISSING CAUTION

        8:BOTTOM MISSING CAUTION

        1:OFF
        2:ON
```
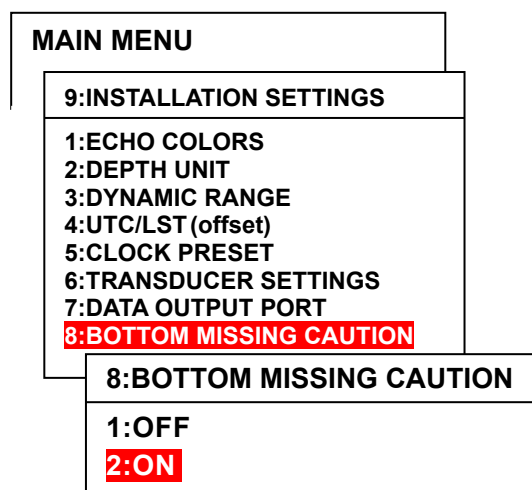
8.10.9.2.   Enabling Alert Function

・ To enable the function, follow the steps given below.

(1) Press **MENU** to open the **MAIN MENU**, and then **DIM** to select option "**9:INSTALLATION SETTINGS**."

(2) Select option "**8:BOTTOM MISSING CAUTION**" by pressing **HIST** .

- The associated submenu will then open to show the current enabled/disabled (**ON**/**OFF**) status. Initially, the status should be set to "**1:OFF**," indicating that the function is disabled.

(3) Press **AUTO** , selecting "**2:ON**," as shown above.

(4) Press **ENT** to complete the setting.

(5) Exit the menu system by pressing **PAGE** .

・ With the function enabled, the acoustic presentation will be generated for approximately 5 seconds after the alert is triggered and will then be automatically turned off, while the visual presentation will remain on–screen until the bottom echo is recovered with a reasonable strength.

Figure 8-36 Visual Presentation of Bottom–Missing Alert

```
! Bottom missing
```

・ The alert output sentence (in $SDALF format) will, however, be continually available (at 30–second intervals) via the serial interface port (rear–panel **RS–422–A/B** connector) while the alert remains active. See paragraph 13.4.3.2.5 (Alert Output Sentences) for details.

---

*[1] : *See paragraph 7.3 (Selecting Depth Ranges) for details.*

8.   Advanced Settings *(continued – 21/22)*

8.10.   Installation Settings *(12/13)*

8.10.10.   Selecting Depth Readout Response Times

8.10.10.1.   Introduction

- The echo sounder can sometimes fail to receive a solid bottom signal due to turbulence or a layer of bubbles covering the transducer or when traveling over a precipitously sloping bottom contour that returns the echo to directions other than the transducer. 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 sharply over short distances, select shorter time periods (depth readout response times) during which the equipment holds the last depth value, via the following steps:

8.10.10.2.   Response Time Selection Procedure

- Select the desired readout response time via the following steps:

Figure 8-37 Selecting Depth Readout Response Times

(1) Press to open the **MAIN MENU**, and then press to select option "**9:INSTALLATION SETTINGS**."

(2) Highlight option "**9:DEPTH READOUT RESPONSE**" by pressing again.

  - The associated submenu will then be turned on, as shown at right.

  - Option "**1:SLOW (STANDARD)**" should be initially selected. This setting should suffice in most operating conditions and will be suitable for general navigational applications.

  - The equipment will hold the last sounding data for a period ranging from approx. 6 to 24 seconds depending on the range currently in use before resuming the bottom echo searching sequence.

MAIN MENU

9:INSTALLATION SETTINGS

1:ECHO COLORS
2:DEPTH UNIT
3:DYNAMIC RANGE
4:UTC/LST (offset)
5:CLOCK PRESET
6:TRANSDUCER SETTINGS
7:DATA OUTPUT PORT
8:BOTTOM MISSING CAUTION
9:DEPTH READOUT RESPONSE

9:DEPTH READOUT RESPONSE

1:SLOW (STANDARD)
2:MEDIUM
3:FAST
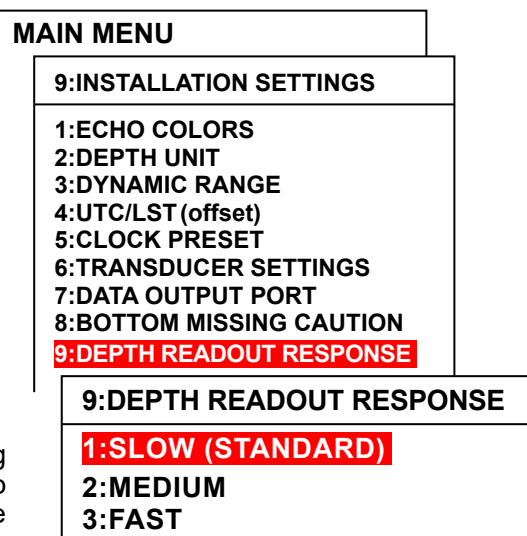
(3) If a faster response is desired, select either "**2:MEDIUM**" or "**3:FAST**" using the appropriate numeric key and . Approximate periods to hold the last valid depth readout are as listed in the table below.

Table 8-2 Last Readout Holding Periods

Response / 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

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8.   Advanced Settings *(continued – 22/22)*

8.10.   Installation Settings *(13/13)*

8.10.11.   Turning off Keypress Beep

Figure 8-38 Turning off Keypress Beep

- Initially the unit responds to your keypress with a brief beep. If you wish to turn this sound off, follow the steps give below.

(1) Press 🔲MENU to open the **MAIN MENU**, and then 🔲DIM to select menu option "**9:INSTALLATION SETTINGS**."

(2) Highlight option "**0:KEY BEEP SETTING**" by pressing 🔲DIM (numeric key "**0**").

   - The associated submenu will then be turned on as shown at right.

(3) Press 🔲RANGE (numeric key "**1**") to highlight option "**1:OFF**."

(4) Press 🔘ENT to confirm the setting and then press:

   - 🔲PAGE to exit the menu mode and return to the echogram screen; or

   - 🔲MENU to return to the previous menu.

MAIN MENU

9:INSTALLATION SETTINGS

1:ECHO COLORS
2:DEPTH UNIT
3:DYNAMIC RANGE
4:UTC/LST (offset)
5:CLOCK PRESET
6:TRANSDUCER SETTINGS
7:DATA OUTPUT PORT
8:BOTTOM MISSING CAUTION
9:DEPTH READOUT RESPONSE
0:KEY BEEP SETTING

0:KEY BEEP SETTING

1:OFF
2:ON

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9. Making Settings via SYSTEM MENU

9.1. Introduction

- The following functions are available through the "**SYSTEM MENU**" shown below, which is accessible by turning the equipment on while holding down [PAGE] or [MENU] :

  - Selection of screen background colors
  - Execution of hardware integrity checks (self–diagnostic function)
  - Uploading of stored data to PC–based applications
  - Selection of data output intervals
  - Selection of menu languages
  - Selection of TVG response characteristics

Figure 9-1 **SYSTEM MENU**

SYSTEM MENU
1:BACKGROUND
2:SYSTEM CHECK
3:OUTPUT STORED DATA
4:OUTPUT INTERVAL
5:LANGUAGE
6:AUTO TVG RESPONSE

- A summary of the **SYSTEM MENU** options is given below.

  - **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 the serial interface ports[1]. See Section 9 (Outputting Stored Data for PC–Based Applications) for details.
  - **4:OUTPUT INTERVAL**:   Selects intervals at which stored data is to be uploaded. See Section 10 (Outputting Stored Data for PC–Based Applications) for details.
  - **5:LANGUAGE**:   Selects languages to be used in menus. Current version supports English and Russian.
  - **6:AUTO TVG RESPONSE**:   Selects optimum gain suppression characteristics for transducer installed.

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

9.2. Selecting Background Colors

Figure 9-2 Selecting Screen Background Colors

- Select the desired background color via the following steps:

(1) Selecting option "**1:BACKGROUND**" opens the associated **BACKGROUND** submenu with three options, as illustrated at right.
  - Initially "**BLUE**" is selected, so that the echogram shows on a blue background.

(2) Using the appropriate numeric key, select the colors that best–suits the ambient lighting condition, and press [ENT] to complete the selection.

(3) Press [PAGE] to exit the **SYSTEM MENU** mode.

SYSTEM MENU
1:BACKGROUND

1:BACKGROUND
1:BLACK
2:BLUE
3:WHITE

[1]: *rear–panel **RS–422–A/B** and **I/O** connectors*

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9. Making Settings via SYSTEM MENU *(continued – 2/4)*

9.3. Performing Self–Diagnostic Function

Figure 9-3 Initiating Self–Diagnostic Function – Example

- Selecting menu option "**2:SYSTEM CHECK**" (by pressing 🅰️) opens the associated **SYSTEM CHECK** submenu, initiating the self–diagnostic function automatically, as in the example at right. The following hardware components will be checked for integrity:

  - **VIDEO MEMORY**:   Memory for displaying text and graphics data
  - **PROGRAM MEMORY**:   Flash memory storing firm–ware
  - **WORK MEMORY**:   CPU's work area for program execution and data processing
  - **T/R UNIT**:   Transceiver board

SYSTEM MENU
1:BACKGROUND
2:SYSTEM CHECK

2:SYSTEM CHECK	
VIDEO MEMORY	OK!!
PROGRAM MEMORY . .	OK!!
WORK MEMORY	OK!!
T/R UNIT	OK!!

Result of check ⤺

Hardware to be checked

- The result of each check will be indicated as follows:
  - **OK!!**:   Hardware is functioning normally.
  - **ERR!!**:   Hardware malfunction is detected.

- Press 📄 to exit the **SYSTEM MENU** mode, or any other key to return to the **SYSTEM MENU**.
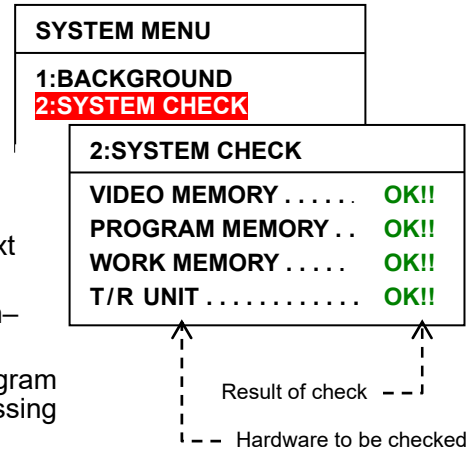
9.4. Outputting Stored Data

Figure 9-4 Executing Stored Data Output Function

- Selecting option "**3:OUTPUT STORED DATA**" allows stored sounding data to be output via the serial interface ports[1].

- See paragraph 10.3 (Outputting Stored Data) for a detailed description of the function available by executing this option.

SYSTEM MENU
1:BACKGROUND
2:SYSTEM CHECK
3:OUTPUT STORED DATA
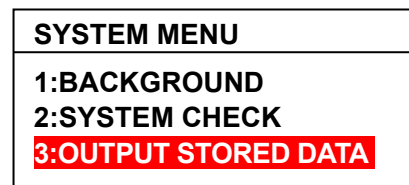
9.5. Selecting Intervals for Data Output from Memory

Figure 9-5 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 serial interface ports[1].

- See paragraph 10.3.2 (Selecting Output Intervals) for a detailed description of the function available by executing this option.

- Selection of output intervals does not affect the output interval (=1 second) of realtime depth data (NMEA–0183 format DBT, DPT[2], DBK[2], DBS[2] and PSKPDPT[2] data sentences).

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

4:OUTPUT INTERVAL
1:   2 SEC
2:   6 SEC
3: 10 SEC
4: 20 SEC
5: 60 SEC
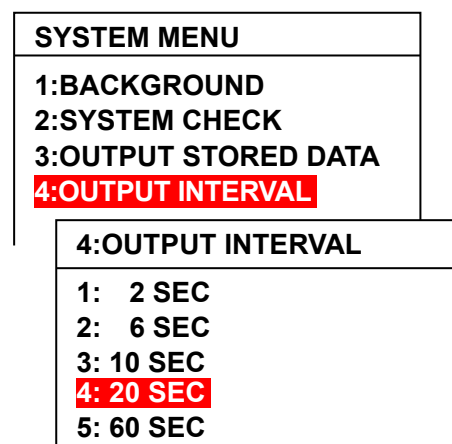
[1]: *rear–panel **RS–422 A/B** and **I/O** connectors*

[2]: *These outputs are initially turned off. To derive the desired output, refer to paragraph 8.10.8 (Selecting Data Outputs) for instructions. The DBK (depth–below-keel) output is required for remote alert management.*

9.   Making Settings via SYSTEM MENU *(continued – 3/4)*

9.6. Selecting Menu Languages

Figure 9-6 Selecting Menu Languages – Example

▪ Selecting option "**5:LANGUAGE**" displays the languages that you can select to indicate various options in the menu system.

▪ The current software version supports English and Russian, as in the example at right. Other languages may be added in later versions.

- Initially English is selected as the menu language.

▪ If you wish to display the menu options in Russian (or other available language), proceed via the following steps:

```
SYSTEM MENU

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

        5:LANGUAGE

        1:ENGLISH
        2:RUSSIAN
```

(1) Select option "**5:LANGUAGE**" by pressing ◀ (numeric key "**5**").

(2) Highlight the desired option by pressing the appropriate numeric key.

(3) Press **ENT** to complete the selection. The **SYSTEM MENU** should then return.

(4) Press **PAGE** to return to the normal echogram screen, unless you wish to make additional settings on the **SYSTEM MENU**.

9.7. Selecting AUTO TVG Characteristics for Installed Transducer

9.7.1. Introduction

▪ To take full advantage of the automatic TVG function, two sets of initial gain suppression curves (initial gain suppression level–versus–depth or TVG response characteristics) are incorporated and optimized for each of the approved 50 kHz and 200 kHz transducers.

▪ Selecting **SYSTEM MENU** option "**6: AUTO TVG RESPONSE**" displays the list of the transducers that can be used for your echo sounder, as in the example below.

Figure 9-7 Selecting Auto TVG Characteristics for 50 kHz Transducers

```
SYSTEM MENU

1:BACKGROUND
2:SYSTEM CHECK
3:OUTPUT STORED DATA
4:OUTPUT INTERVAL
5:LANGUAGE
6:AUTO TVG RESPONSE

      6:AUTO TVG RESPONSE

      1:LSE297
      2:TGM–60–50
```

▪ The following procedure assumes that a **TOKIN**[1] 50 kHz transducer (**TGM60–50** series) is mounted in your installation.

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9.   Making Settings via SYSTEM MENU *(continued – 4/4)*

9.7.   Selecting AUTO TVG Characteristics for Installed Transducer *(2/2)*

9.7.2.   TVG Characteristics Selection Procedure

・ Select the menu option that matches the transducer installed, via the following steps:

(1) Select option "**2:TGM–60–50**" by pressing 🔲 (numeric key "**2**").

   - If your system uses an **ELAC** 50 kHz transducer, select option "**1:LSE297**."

(2) Press 🔘 to complete the selection. The **SYSTEM MENU** should then return.

(3) Press 🔲 to return to the normal echogram screen, unless you wish to make additional settings on the **SYSTEM MENU**.

・ In the case of a 200 kHz installation, the menu options will be **LSE313** and **TGM–80–200**, as shown below.

   - Select the applicable option in the same manner.

   - For example, If your system uses a **TOKIN** 200 kHz transducer, choose option "**TGM–80–200**."

Figure 9-8 Selecting Auto TVG Characteristics for 200 kHz Transducers

7:AUTO TVG RESPONSE
1:LSE313
2:TGM–80–200

10. Outputting Stored Data for PC–Based Applications

10.1. Introduction

・ Various types of data stored in non–volatile memory can be output via the serial interface ports*1 for processing or analysis in PC–based applications.

・ The soundings information retrieved from memory is in meters and in IEC 61162–1/NMEA–0183 DPT format (consisting of depth–below–transducer, draft and keel offset), regardless of whether other readout unit (**FM** or **FT**) is selected via the procedure in paragraph 8.10.3 (Selecting Depth Readout Units).

・ 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, preventing the saved data from being altered or updated.

10.2. Data Output Format

・ The data sets are output with the latest one first, and in the manufacturer's proprietary format complying with IEC 61162–1/NMEA–0183 data sentence specifications, as detailed below:

Figure 10-1 Output Format of Stored Data

$$\$PJMCN, x.x, x.x, x.x, 50, ddmmyy, hhmmss, \textit{(continued to next line)}$$
①   ②   ③   ④   ⑤   ⑥   ⑦

$$IIII.III, a, yyyy.yyy, a * hh <CR><LF>$$
⑧   ⑨   ⑩   ⑪ ⑫   ⑬   ⑭

① Talker Identifier (proprietary)

② Depth below transducer*2 in meters, varying in length; null if depth information was temporarily unavailable

③ Offset*2; positive (+) = transducer draft, negative (−) = offset from transducer to keel; null if no data is entered

④ Depth range used, in meters*3

① Transceiver frequency, in kHz; 50 = 50 kHz, 200 = 200 kHz

② Date (day/month/year format) referenced to UTC; fixed in length

⑦ UTC time (hours/minutes/seconds), derived from internal clock or from GPS time when a valid position fix was available; fixed in length

⑧ Latitudinal coordinate (to 1/1000 minutes), varying in length; null when a valid GPS position fix was temporarily unavailable

⑨ Latitudinal sign (N/S); null when a valid GPS position fix was temporarily unavailable.

⑩ Longitudinal coordinate (to 1/1000 minutes), varying in length; null when a valid GPS position fix was temporarily unavailable

⑪ Longitudinal sign (E/W); null when a valid GPS position fix was temporarily unavailable

⑫ Checksum

⑬ Carriage return

⑭ Line feed

*1: *rear–panel **RS–422–A/B** and **I/O** connectors*

*2: *If both offsets were entered, two $PJMCN sentences will be output with the same DBT value; one contains the transducer draft, and the other, the keel offset. To enter the offsets, refer to paragraph 8.2 (Entering Transducer Draft) and/or paragraph 8.10.7 (Making Transducer–Related Settings) for instructions.*

*3: *If depth measurements were made in fathoms or feet, the equivalent metric values listed n Table 13-2 (Equivalent Maximum Range Scales in Fathoms and Feet) are used to represent the maximum depth range in use.*

10. Outputting Stored Data for PC–Based Applications *(continued – 2/3)*

10.3. Outputting Stored Data

10.3.1. Introduction

Figure 10-2 **SYSTEM MENU**

- The function of outputting stored data sentences can be initiated through the **SYSTEM MENU**[*1] described in Section 9 (Making Settings via SYSTEM MENU).

```
SYSTEM MENU

1:BACKGROUND
2:SYSTEM CHECK
3:OUTPUT STORED DATA
4:OUTPUT INTERVAL
5:LANGUAGE
6:AUTO TVG RESPONSE
```

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

  - **3:OUTPUT STORED DATA**: Outputs stored data to PC applications via all serial interface ports[*2].

  - **4:OUTPUT INTERVAL**: Selects intervals at which data are to be uploaded.

- The following instructions assume that the **SYSTEM MENU** is currently displayed, and a suitable PC terminal is plugged into one of the rear–panel **RS–422–A/B** or **I/O** connectors with appropriate data logging software running, such as the Windows hyper terminal (e.g., set to text capture mode).

10.3.2. Selecting Output Intervals

Figure 10-3 Selecting Data Output Intervals

- The time interval at which stored data are to be output is selectable from 2, 6, 10, 20 and 60 seconds, and is initially set to 20 seconds.

- At the initial rate, it will take up to approx. 8 minutes to upload all data stored to capacity.

- If the application requires data at a shorter or longer interval, select the desired value via the following steps.

```
SYSTEM MENU

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

    4:OUTPUT INTERVAL

    1:  2 SEC
    2:  6 SEC
    3:10 SEC
    4:20  SEC
    5:60  SEC
```

(1) Select **SYSTEM MENU** option "**4:OUTPUT INTERVAL**" by pressing [ALARM] , opening the associated submenu, as shown at right.

(2) Using the appropriate numeric key, select the time interval that best serves the current purpose.

(3) Press [ENT] to complete the selection.

  - The submenu will then be closed.

(4) Proceed to paragraph 10.3.3 (Uploading Stored Data) to activate the data uploading function.

[*1]: *The menu can be opened by first turning the equipment off and then turning it on again while holding down* [MENU] .

[*2]: *rear–panel RS–422–A/B and I/O connectors*

10. Outputting Stored Data for PC–Based Applications *(continued – 3/3)*

10.3. Outputting Stored Data *(2/2)*

10.3.3. Uploading Stored Data

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

Figure 10-4 Uploading Stored Data – *1/2*

> **SYSTEM MENU**
>
> **1:BACKGROUND**
> **2:SYSTEM CHECK**
> **3:OUTPUT STORED DATA**
> **4:OUTPUT INTERVAL**
> **5:LANGUAGE**
> **6:AUTO TVG RESPONSE**

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

⤒
`- - - -` *Blinking*
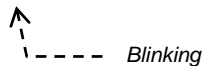
(1) Select "**3:OUTPUT STORED DATA**" by pressing 🄳🅁🄰🄵🅃 (numeric key "**3**").

- 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.

(2) Press 🄴🄽🅃 to start the data uploading process.

- A 4–to–5 digit down counter[1] should then show up in the middle between the menu and two message lines, as in the example below.
- The counter reading will become 0 upon completion of uploading, when the counter will be turned off.

Figure 10-5 Uploading Stored Data – *2/2*

43097

⤒
`- - - -` Down counter (example)

PRESS [MENU] TO PREVIOUS MENU
PRESS [CLR] TO BREAK

(3) To cancel or terminate the uploading before it completes, press 🄲🄻🅁 .

(4) Press 🄿🄰🄶🄴 to exit the **SYSTEM MENU** mode, returning to the normal echogram screen.

[1]: *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)

11. User–Level Trouble Shooting

11.1. Introduction

· A list of common troubles the user may experience in the course of 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 firmware version[*1] installed in the equipment.

< WARNING >

DANGEROUS HIGH RF VOLTAGE PULSES ARE PRESENT ON THE TRANSDUCER CONNECTOR PINS WHEN THE EQUIPMENT IS SWITCHED ON. THE USER MUST NOT TOUCH, OR CONNECT ANY TEST TOOL TO, THOSE CONNECTOR PINS.

11.2. Depth Readout

Symptom	Suggested Solution
No depth readout *No bottom echo or very weak bottom shows, triggering the bottom–missing alert[*2] at all times.*	1. Check if transducer is properly plugged into rear–panel **TRANSDUCER** connector. 2. Activate automatic control (**AUTO**) mode by pressing 🔲, if unit is in manual control mode now. 3. If **AUTO** mode still does not correct problem, check current **AUTO TVG** response characteristics via procedure given in paragraph 9.7 (Selecting AUTO TVG Characteristics for Installed Transducer), and select appropriate option that matches your transducer.
Intermittent depth readout *Digital readout is intermittent regardless of the bottom display in one of the strongest colors.*	· Bottom echo is often lost when ship is: - heavily pitching or rolling; - traveling in the wake of another vessel; - going astern; or - traveling over steeply changing bottom over short distances. · Select shorter readout response time, e.g. **MEDIUM** or **FAST** (ref. paragraph 7.10.10: Selecting Depth Readout Response Times).
Impossible to measure depth shallower than 5 meters *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.*	1. Activate automatic control (**AUTO**) mode by pressing 🔲, if the unit is currently operating in manual control (**MANUAL**) mode. 2. If **AUTO** mode still does not correct problem, check the current **AUTO TVG** response characteristics via the instructions given in paragraph 9.7 (Selecting AUTO TVG Characteristics for Installed Transducer), and select the appropriate option that matches your transducer.

[*1] : *The firmware version number can be displayed by switching the equipment off first and then switching it on again while holding down* 🔲 .

[*2] : *The bottom–missing alert function is initially disabled. See paragraph 8.10.9 (Enabling Bottom–Missing Alert) for related information.*

11. User–Level Trouble Shooting *(continued – 2/4)*

11.2. Depth Readout *(2/2)*

Symptom	Suggested Solution
Depth readout is twice actual depth. *The digital depth indication is twice the actual depth in shallow water soundings.*	・ Symptom indicates that second bottom echo is displayed at twice true depth, with second echo being locked onto for depth measurement (ref. paragraph 7.4.2: Multiple Bottom Echoes). ・ If the unit is operating in manual control (**MANUAL**) mode, reduce receiver gain by pressing ⬛ first, followed by ◆ and/or increase TVG level by pressing twice, followed by ◆. ・ See paragraphs 7.5 (Adjusting Receiver Gain Level Manually) and 7.6 (Adjusting TVG Level Manually) for instructions.

11.3. **Automatic Range Selection**

Symptom	Suggested Solution
Erratic operation regardless of strong bottom echo *Automatic depth range selection is erratic regardless of the bottom display in one of the strongest colors.*	・ Bottom echo is often lost when ship is: - heavily pitching or rolling; - moving in the wake of another vessel; - going astern; or - traveling over steeply changing bottom over short distances. ・ Select shorter readout response time, e.g. **MEDIUM** or **FAST** (ref. paragraph 8.10.10: Selecting Depth Readout Response Times).

11.4. **Bottom Echo Appearance**

Symptom	Suggested Solution
Only thin bottom contour is visible. *The bottom contour is shown in a dotted line, followed by a blank area.*	・ Symptom indicates that whiteline function has been activated (ref. paragraph 8.6: White Line Adjustment). ・ To display the bottom echo in full colors, set whiteline level to 0 using ◆/◆ after accessing **WHITE LINE** submenu via path (**MAIN MENU→5:WHITE LINE**). ・ See also paragraph 8.9 (Selecting Types of Echo Display) if you wish to see echoes in full colors, and check to be sure echo display option is set to **2:NORMAL DISPLAY**.
Only strong echo colors are visible. *The bottom echo is shown in a few strong colors only.*	・ Symptom indicates that echo display threshold is set at high level (ref. paragraph 8.4: Echo Threshold Adjustment). ・ To display the bottom echo in full colors, set threshold level to 0 using ◆/◆ after accessing **ECHO THRESHOLD** submenu via menu path (**MAIN MENU → 3:ECHO THRESHOLD**). ・ See also paragraph 8.9 (Selecting Types of Echo Display), and check to be sure display option is set to option **2:NORMAL DISPLAY**.

11. User–Level Trouble Shooting *(continued – 3/4)*

11.4. Bottom Echo Appearance *(2/2)*

Symptom	Suggested Solution
Most echoes are visible in strong colors. *Most of the echoes remain in strong colors regardless of gain and TVG adjustments.*	• Symptom indicates that small echo dynamic range is selected. Check current setting via menu access path (**MAIN MENU → 9:INSTALLATION SETTINGS → 3:DYNAMIC RANGE**) (ref. paragraph 8.10.4: Selecting Echo Dynamic Ranges). • Select option "**5 dB**" or "**6 dB**," if other value is currently selected.

11.5. Alerts

Symptom	Suggested Solution
Bottom–missing alert is on at all times. *The bottom–missing alert is triggered and no depth readout is available regardless of the presence of a solid bottom echo.*	Symptom indicates that bottom echo is displayed in weak colors. 1. Activate automatic control (**AUTO**) mode by pressing ⏻, if unit is currently in manual control (**MANUAL**) mode. 2. If you wish to continue **MANUAL** mode operation, increase the receiver gain by pressing ⏻ first, followed by ◆.
Unable to set depth–below–keel alert *The alert depth cannot be set at a new VRM position.*	After shifting VRM to new position, press ⏻ (ref. paragraph 7.8.8: Depth–below–Keel Alert).

11.6. Soundings Data History Window

Symptom	Suggested Solution
Soundings data HISTORY window is not updated. *The various data showing in the **HISTORY** window are not updated.*	• **HISTORY** window is designed to show past 12 hours of data from moment ⏻ is pressed. • Data shown in window are not updated automatically, though current data are continuously stored in memory. • To update displayed data, turn window off with ⏻ first and then turn it on again by pressing ⏻ (ref. paragraph 7.7: Retrieving Soundings Data History).

11.7. Settings through Menu System

Symptom	Suggested Solution
Operation does not reflect settings made through menu system.	Press ⏻ each time a setting is made, before closing current submenu (ref. paragraph 8.1: Introduction).

11. User–Level Trouble Shooting *(continued – 4/4)*

11.8. Date/Time Indication

Symptom	Suggested Solution
Last date and time readouts are not remembered on next power–up. *The date and time information you set through the menu system is lost after the equipment is switched off.*	· Symptom indicates that internal backup battery (type **CR2025**) for built–in real time clock is dead. · Ask your dealer or authorized engineer to replace existing battery installed on internal main PCB. **< WARNING >** **HIGH VOLTAGES EXIST INSIDE THE CONSOLE CABINET. THE USER MUST NOT OPEN THE CABINET.**
Incorrect local date/standard time *Incorrect local date and time readouts result after a GPS sensor is plugged in.*	Symptom indicates that correct UTC time offset is not entered or no time offset is entered. 1. Check current offset via menu access path: **MAIN MENU → 9:INSTALLATION SETTINGS → 4:UTC/LST (offset).** (ref. paragraph 8.10.5: Entering Time Offset for Local Standard Time Readout) 2. Enter correct time offset. Be sure to press 🔘 before exiting current submenu (ref. paragraph 8.10.6: Setting Date and Time).

11.9. GPS–Derived Data Outputs

Symptom	Suggested Solution
No GPS–derived data outputs are available with a specified GPS sensor/external GPS data source plugged into the I/O connector.	· GPS data outputs (LAT/LON, speed, heading, etc.) from this equipment are initially turned off. · See paragraph 8.10.8 (Selecting Data Outputs) for instructions to make them available.

12. User–Level Maintenance Instructions

12.1. Introduction

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

12.2. 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 the cabinet from the vessel and place it in dry storage.

· ***Be sure to switch the equipment off before removing electrical connections from the rear panel.***

< WARNING >
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.

12.3. 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 cables from the rear panel, and check to be sure that contact surfaces, including the pins in the rear–panel mounted connectors are free from corrosion.

  - Check the connections at the power source for freedom from any sort of corrosion.

  - Correct any problem using a high quality contact–cleaning agent (contact rejuvenator).

< WARNING >
SANDPAPER WILL DAMAGE THE CONTACT SURFACE AND MUST NOT BE USED IN PLACE OF A CONTACT CLEANER.

12.4. Maintenance on The Transducer

· 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 transducer, 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.

12. User–Level Maintenance Instructions *(continued –2/3)*

12.5. Servicing the Equipment

- If the equipment shows any sign of malfunction, contact your dealer for assistance.

- 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.***

12.6. 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 `CLR` until a quick beep is heard. The following message will be very briefly displayed at the screen's upper left corner:

Figure 12-1 System Reset Message

CLEAR BACKUP MEMORY

- The normal echogram screen will then return. This completes the resetting procedure.

(3) Reregister the desired set of operating parameters again, such as alert depth, date/time, UTC offset, transducer draft, keel offset[*1], etc., through the menu system.

- See Section 8 (Advanced Settings) for the relevant setting instructions.

[*1]: *The keel offset must be entered again if the vessel's BAM/CAM system uses this equipment as an alert source in its remote alert management. See paragraph 8.10.7.3 (Entering Keel Offset) for details.*

12. User–Level Maintenance Instructions *(continued –3/3)*

12.7. Temporary Display of A–Scope

12.7.1. Introduction

- The A–scope is a format of echo presentation, showing various echo strength levels in the form of horizontal deflections, as well as in colors.

- This function is provided mainly for ease of performance checks, maintenance or alignment by authorized service engineers and can be activated via the following keystrokes:

12.7.2. Turning A–Scope on

(1) Turn the equipment off.

(2) Turn it on again while holding down the combination of 〖RANGE〗 and 〖ENT〗.

Figure 12-2 Typical Echogram Screen with A–Scope Turned on

- An example display is shown at right. The size of deflection represents a relative strength level, i.e. the greater the deflection, the stronger the echo.

- The display will remain for approx. 5 minutes and will then be turned off automatically.

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

- To turn it off quickly, shut down the unit by pressing and holding down 〖PWR〗 for a few seconds.

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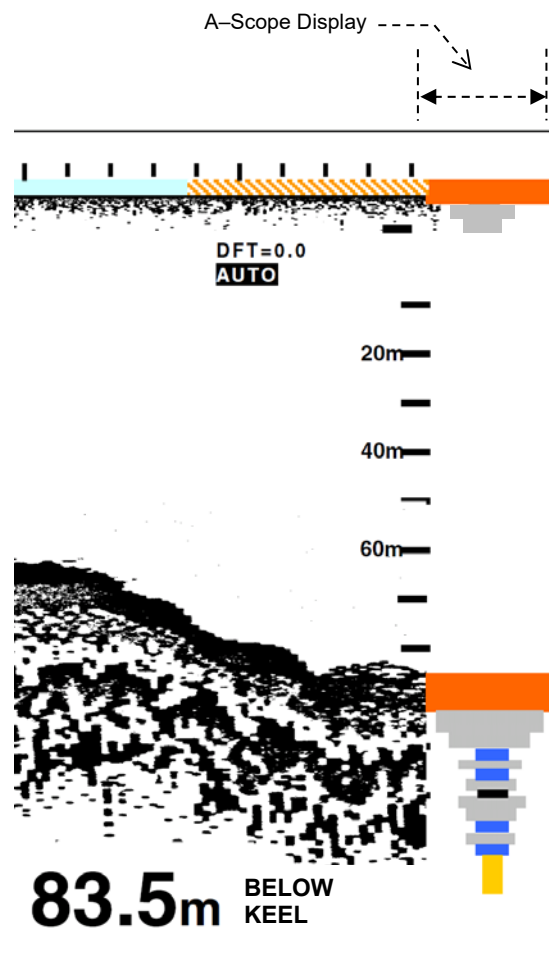
13.   Installation Instructions

13.1.   Display Cabinet Installation

13.1.1.   General Precautions

· The display 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.

· **<u>Additional Requirements</u>**:
   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.

13.1.2.   Mounting

13.1.2.1.   Mounting the Display Cabinet

· The display cabinet is primarily designed to be mounted on a tabletop with the mounting bracket supplied and weights approximately 2.2 kg in total. The dimensions necessary for installation are given in Figure 13–1. 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 four mounting holes (7 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.

< WARNINGS >

1. EXTREMELY HIGH VOLTAGE PULSES ARE PRESENT ON THE PINS IN THE REAR–PANEL "TRANSDUCER" CONNECTOR–RECEPTACLE WHILE THE EQUIPMENT IS ENERGIZED.

  - **TO PREVENT AN ACCIDENTAL CONTACT WITH ANY OF THOSE EXPOSED PINS, THE RECEPTACLE MUST BE COVERED WITH THE SUPPLIED PROTECTIVE CAP WHENEVER THE TRANSDUCER IS UNPLUGGED.**

  - **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.

· Be sure to attach the serrated plastic washer to the inside of each arm before placing the cabinet in the bracket. This pair of washers is supplied separately in the plastic bag that contains the power cable, fuses, plugs, etc., and prevents the cabinet from leaning forward or backward with the clamping knobs tightened.

· After tilting the cabinet to a desired viewing angle, tighten the clamping knobs firmly.

13. Installation Instructions *(continued – 2/28)*

13.1. Display Cabinet Installation *(2/2)*

13.1.2. Mounting *(2/2)*

13.1.2.2. Display Cabinet Mechanical and Environmental Specifications

Figure 13-1 Installation Dimensions of Display Cabinet
（Dimensions in millimeters）
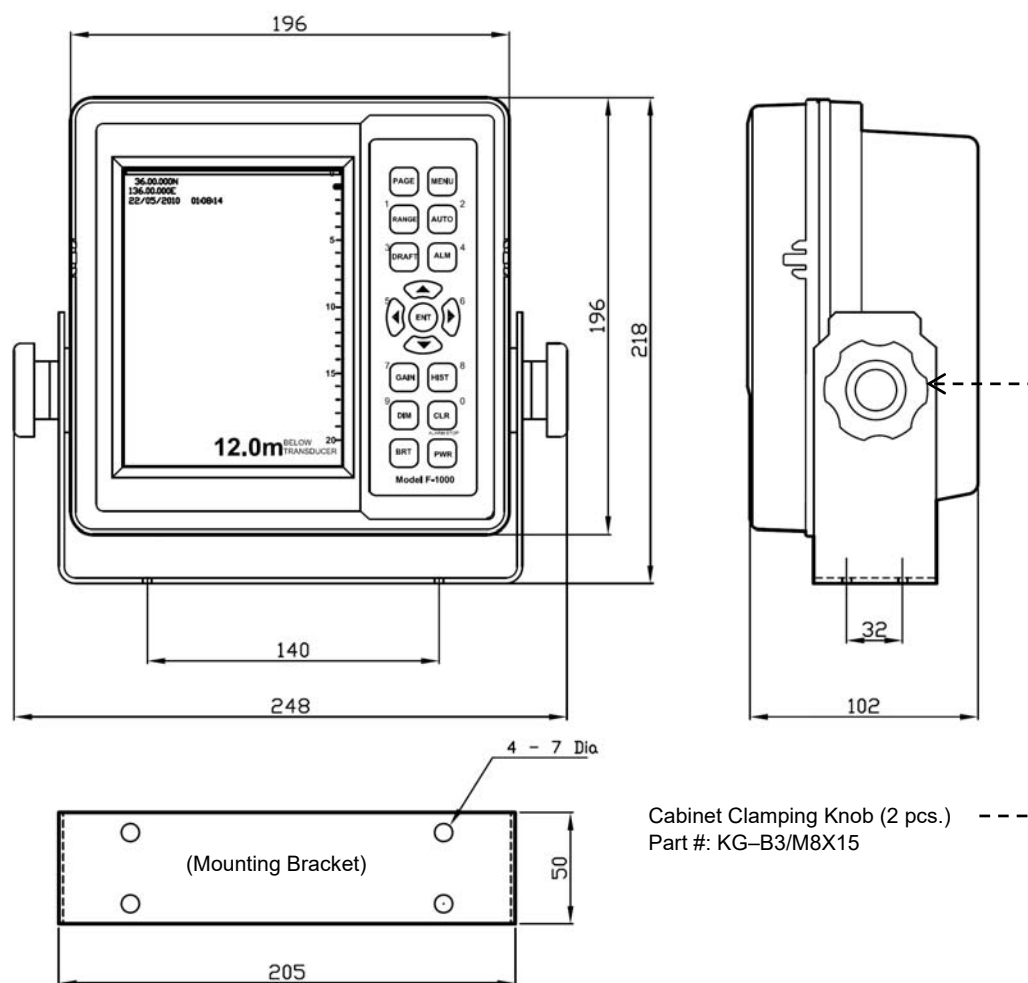
- Weight: 1.6 kg (cabinet) + 0.55 kg (mounting bracket)
- Ambient Temperature: –15 to +55˚ C, 95% RH (operating, without condensation)
                                  –40˚ C (storage)
- Compass Safe Distance: 1.00m (standard compass), 0.55m (steering compass)

13.   Installation Instructions (continued – 3/28)

13.2.   Transducer Installation

13.2.1.   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 HIT, DROPPED OR HANDLED ROUGHLY. DAMAGE TO THE TRANS– DUCER 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._

13.2.2.   Choosing Installation Locations

· 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.

· The 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 transducer.

· 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 will be somewhere between *1/3* and *1/2* of the vessel's length from the fore.

· The transducer should be installed on, or close to, the vessel's centerline. On deep– keeled vessels, care must be taken to ensure that its energy beam (data shown in Table 13–1 in paragraph 13.2.5: Transducer Dimensions) 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 8.10.7.3 (Entering Keel Offset) for related information. For remote alert management compliant with the BAM requirements, the DBK depth data is required.

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

13. Installation Instructions *(continued – 4/28)*

12.2. Transducer Installation *(2/5)*

13.2.3. Matched Transducers

- The equipment is designed to operate properly with one of the following NB–approved transducers:
    - **TGM60–50** series 50 kHz transducers (600W RMS, standard: 20m cable)
    - **TGM50–200** or **TGM80–200**series 200 kHz transducers (600W RMS, standard: 20m cable)
- In addition to the above, the following transducers may be used, if supplied by your dealer with their matched transceiver boards. The dimensions of those transducers are given in the following pages.
    - **ELAC LSE 297** 50 kHz transducer (200W RMS, standard: 40m cable)
    - **ELAC LSE 313** 200 kHz transducer (200W RMS, standard: 40m cable)
- 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 applicable ship's classification society or a notified body to comply with the relevant requirements for EU wheel mark certification.

< WARNINGS >

1. **USE OF A TRANSDUCER OTHER THAN THE ABOVE IS PROHIBITED UNDER THE RELEVANT NB[*1] TYPE APPROVAL REGULATIONS, AND CAN RESULT IN EITHER SERIOUS DAMAGE TO THE TRANSDUCER/TRANSCEIVER OR EXTREMELY POOR DEPTH DETECTION PERFORMANCE.**

2. **DO NOT SWITCH THE EQUIPMENT ON UNTIL THE TRANSDUCER IS IMMERSED IN WATER, OR DAMAGE TO THE TRANSDUCER CRYSTALS CAN RESULT.**

13.2.4. Selection of AUTO TVG Response Characteristics for Transducers

Figure 13-2 Selecting **AUTO TVG** Characteristics for Transducers

- To maximize the automatic TVG (**AUTO TVG**) function, two sets of optimized TVG response characteristics (initial gain suppression level–versus–depth response curves) are incorporated for each of the approved 50 kHz and 200 kHz transducers.

- Be sure to select the TVG response that matches the installed transducer via the **SYSTEM MENU**. See paragraph 9.7 (Selecting AUTO TVG Characteristics for Installed Transducer) for instructions.

- If your installation uses an **ATLAS/ELAC** transducer, select option "**LSE297**."

```
SYSTEM MENU

1:BACKGROUND
2:SYSTEM CHECK
3:OUTPUT STORED DATA
4:OUTPUT INTERVAL
5:LANGUAGE
6:AUTO TVG RESPONSE
```

```
6:AUTO TVG RESPONSE*1

1:LSE297
2:TGM–60–50
```

Options for 200 kHz Transducers

```
6:AUTO TVG RESPONSE*2

1:LSE313
2:TGM–80–200
```

[*1]: *Options provided for 50 kHz transducers*
[*2]: *If the TOKIN 200 kHz transducer is to be used, select option* ***TGM–80–200****, as shown above.*

13.   Installation Instructions (continued – 5/28)

13.2.   Transducer Installation (3/5)

13.2.5.   Transducer Dimensions

Figure 13-3 **TOKIN TGM** Series Transducer Dimensions
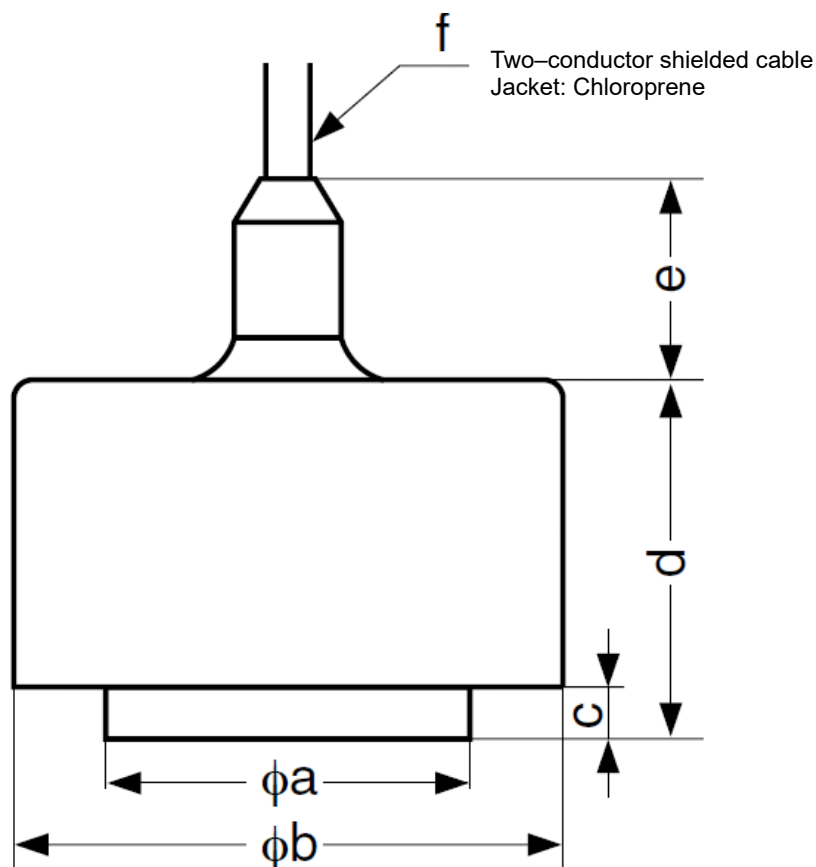
Table 13-1 Installation Dimensions of **TOKIN TGM** Series Transducers

Specifications	50 kHz	200 kHz	
	TGM60–50	**TGM50–200**	**TGM80–200**
Beam Width (@−3dB points)	33 degrees	11 degrees	7 degrees
Cable Length (standard)[*1]	20m		
Φa (face diameter)	69.5 mm		100 mm
Φb (outer diameter)	89.5 mm		120.0 mm
c	5.0 mm		7.0 mm
d	60.0 mm		45.0 mm
e	60.6 mm		30.0 mm
f (cable diameter)	11 mm		

[*1]: *12m cable version is optionally available.*

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13.   Installation Instructions *(continued – 6/28)*

13.2. Transducer Installation *(4/5)*

13.2.5. Transducer Dimensions *(2/3)*

Figure 13-4 Recommended Steel Housing (Blister) Structure – Example

< CAUTIONS >

1. **Each housing must be approved in construction and material by the relevant ship's classification society or an EU–notified body before it is permitted for through–hull installation.**

2. **When locally designing a matched steel housing for through–hull installation, the exact dimensions of the delivered transducer should be measured first, and then the steel housing should be fabricated on the basis of the actual measurements.**

84
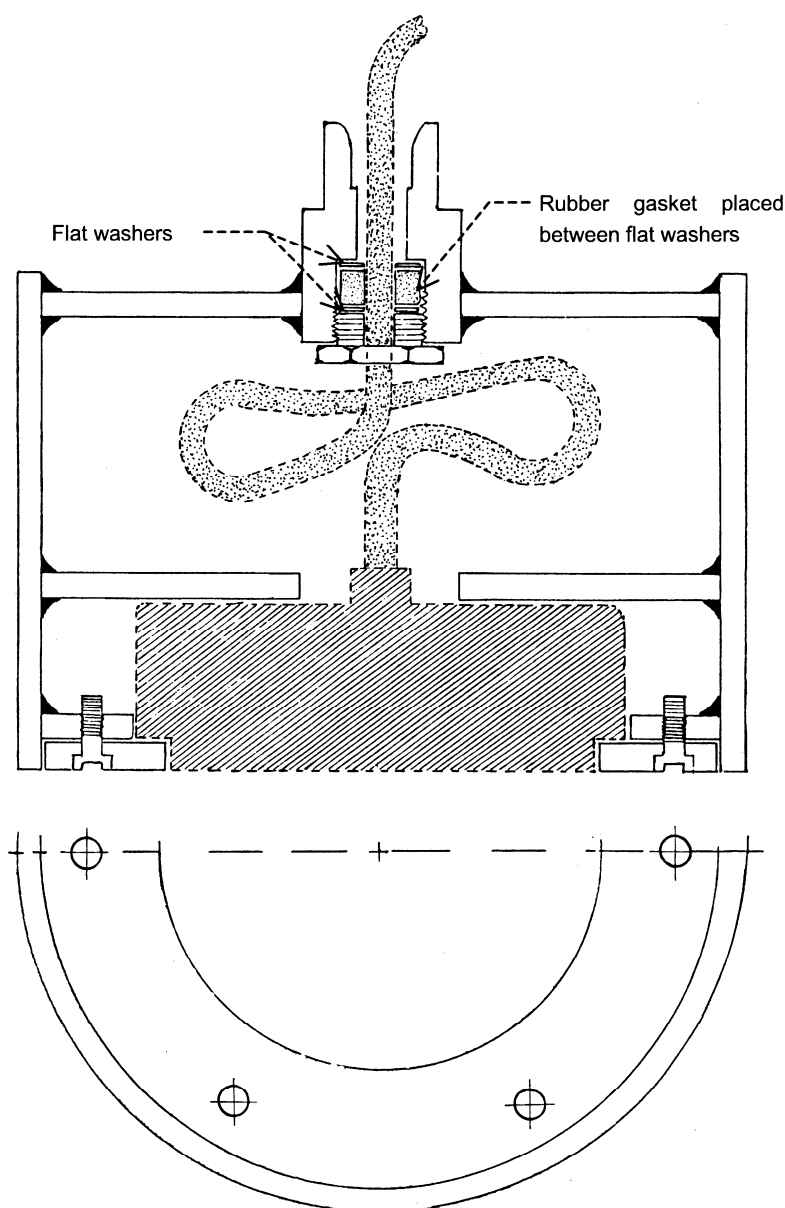
13.   Installation Instructions *(continued – 7/28)*

13.2.   Transducer Installation *(5/5)*

13.2.5.   Transducer Dimensions *(3/3)*

Figure 13-5 **ELAC** Transducers

LSE 297 50 kHz & **LSE 313** 200 kHz
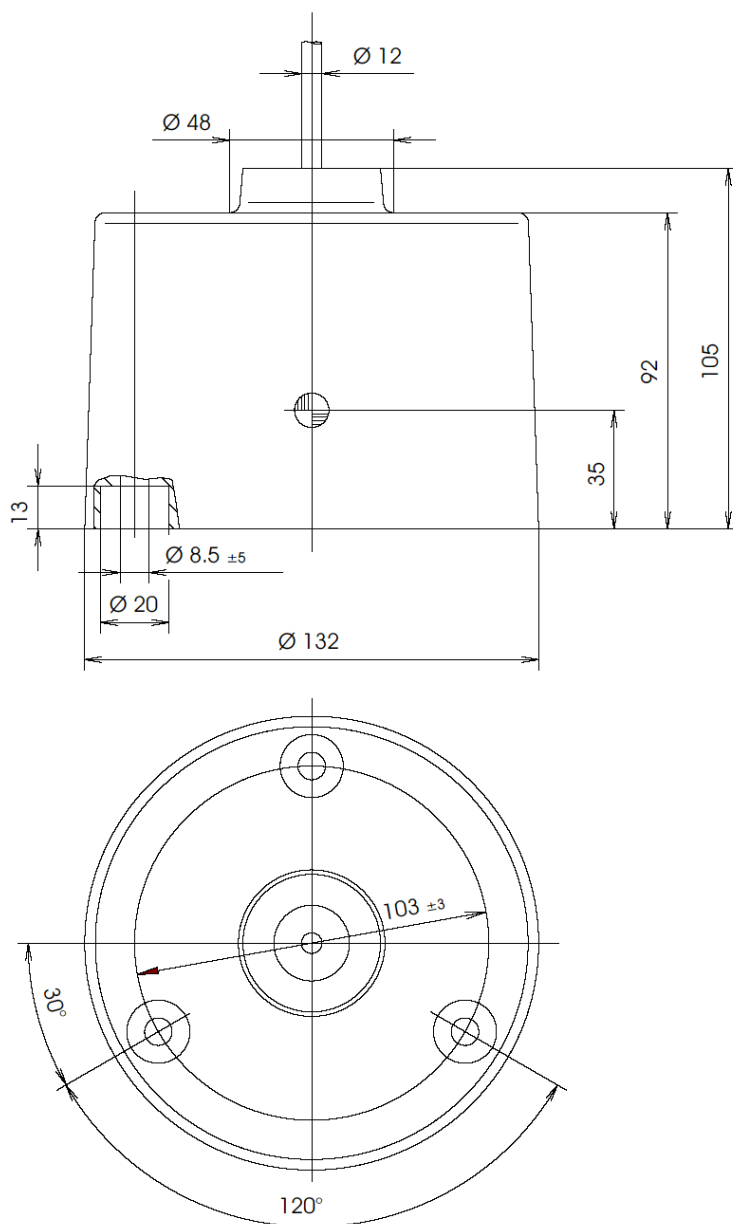
13.   Installation Instructions *(continued – 8/28)*

13.3.   Electrical Connections

13.3.1.   Introduction

- All electrical connections to the equipment are to be made via the rear panel connector receptacles illustrated at right.

- Some of the cables supplied with the unit 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 mating plugs are supplied separately.

- A summary description of the pin assignments on each connector is given below. Detailed wiring instructions are described in the following pages.

Figure 13-6 Rear Panel Connectors
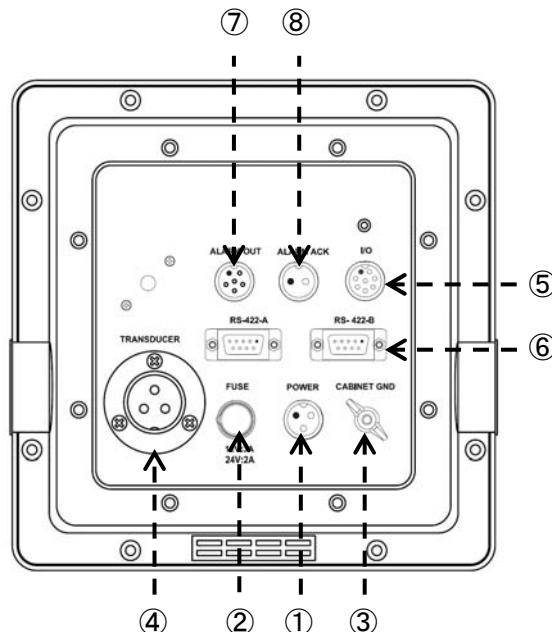
① Power Supply Receptacle (**POWER**)
- Pin #1: DC Input (–)   · Pin #2: Ground   · Pin #3: DC Input (20–24V+)*1

② Fuse Holder (**FUSE**)
- Fuse Ratings: 3A (12V), 2A (24V)   · Fuse Size & Type: 5.2 dia.X20 mm, slow–blow

③ Cabinet Ground Terminal (**CABINET GND**)
  NOTE: This terminal is isolated from the negative power line.

④ Transducer Receptacle (**TRANSDUCER**)
- Pins #1 & #3: Transmit/Receive (to crystals)   · Pin #2: Ground (to cable's shielding)

HIGH VOLTAGE RF PULSES ARE PRESENT WITH THE EQUIPMENT SWITCHED ON.

⑤ General–Purpose I/O Interface Receptacle (**I/O**)
- Pin #1: NMEA In (+)   · Pin #2: NMEA In (–)   · Pin #3: NMEA Out
- Pins #4, #5, #6: Reserved   · Pin #7: 12V/200 mA output   · Pin #8: Ground

⑥ RS–422 Receptacles (**RS–422–A**, **RS–422–B**)
- Pins #1 – #4: Not in use   · Pin #5: Ground   · Pin #6: RX (–)
- Pin #7: RX (+)   · Pin #8: TX (–)   · Pin #9: TX (+)

⑦ Alert Output Receptacle (**ALARM OUT**)
- Pins #1 & #2: Solid–state relay output (normally open) for Power Failure Alert
- Pins #3 & #4: Mechanical relay output (normally closed) for Depth–below–Keel Alert
- Pins #5 & #6: Alert acknowledgement output (shorting of these pins)

⑧ Alert Acknowledgement Receptacle (**ALARM ACK**)
- Pins #1 & #2: To external on/off (SPST) switch to acknowledge and reset active alert

*1: *NB–approved power source voltage range. The equipment safely operates over an 11–40V range.*

13.   Installation Instructions *(continued – 9/28)*

13.3.   Electrical Connections *(2/11)*

13.3.2.   Power Supply Connections

13.3.2.1.   Power Supply Requirements and Power Cord Routing

· The equipment is powered by a DC power source (20–24V)[*1], floating ground. The ship's power source must be capable of continuously supplying at least 3A at 24 VDC for proper start–up and reliable operation.

· 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 should be powered by an independent power supply for best results.

13.3.2.2.   Connections
< WARNING >
REVERSING THE POWER CORD POLARITY WILL BLOW THE FUSE THE INSTANT THE CORD IS PLUGGED INTO THE UNIT, EVEN IF IT IS SWITCHED OFF.

(1) Connect the cable' s conductors to the ship's power source as follows:
  - White (or red) conductor: to positive (+) terminal (20 to 24 VDC)[*1]
  - Black conductor: to negative (−) terminal (DC In −)
  - Shield (braid, green) :   to ship's earth–grounding point (Ground)

Figure 13-7 **POWER** Receptacle Pin Assignments

POWER

Pin #1: DC In (−)   Pin #3: 11 – 40V (**+**)

(2) Plug the other end of the cable into the 3–pin receptacle marked "**POWER**" on the equipment's rear panel. Be sure to tighten the coupling ring on the plug body.

Pin #2: Ground
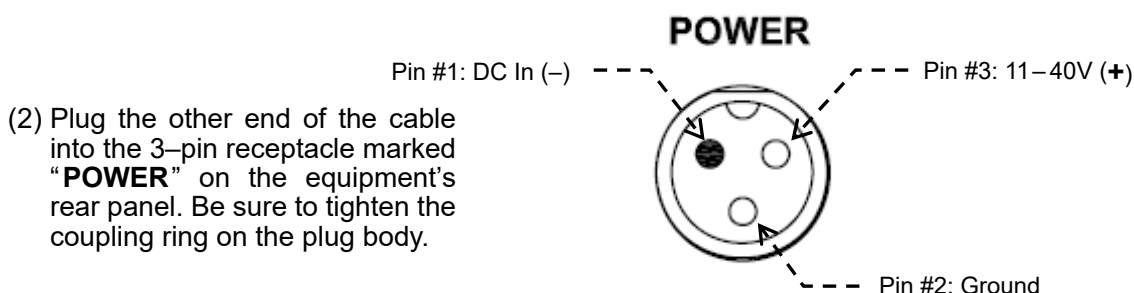
13.3.2.3.   Installing the Fuse
< WARNING >
AN INCORRECTLY RATED FUSE OR INCORRECT TYPE FUSE WILL BLOW AT POWER–UP OR WILL NOT PROTECT THE EQUIPMENT IN THE REMOTE EVENT OF A TROUBLE OVERLOADING ITS POWER SUPPLY.

· The equipment is usually delivered without a fuse installed in the rear panel fuse holder marked "**FUSE**."

· The appropriate fuse rating depends on the nominal power supply voltage, as follows:

Figure 13-8 Fuse Holder

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

FUSE

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

FUSE
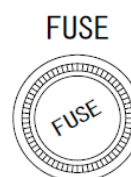
[*1]: *NB–approved power source voltage range. The equipment safely operates over an 11–40V range.*   Fuse Size: 5.2 dia.X20 mm

13.   Installation Instructions *(continued – 10/28)*

13.3.   Electrical Connections *(3/11)*

13.3.2.   Power Supply Connections *(2/2)*

13.3.2.4.   Grounding the Display Cabinet

Figure 13-9 Ground Terminal

- The display cabinet, which is electrostatically coated inside, can be grounded to the ship's earth ground without grounding the negative line of the power source.

CABINET GND

- In an installation where it is required, or desirable, to ground the cabinet for safety reasons or EMC*1 compliance, connect from the wing nut–fitted ground terminal on the rear panel to the ship's nearest earth ground using a thick wire. The ground wire should be as short as possible to reduce the chance of picking up interference from other electronics.

13.3.3.   Connections to Transducer

- The transducer is supplied with its integral cable. A three–hole female–type plug is separately supplied for terminating the cable for connection to the display 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 TRANSDUCER PLACED IN THE AIR, OR DAMAGE TO THE TRANSDUCER CRYSTAL WILL RESULT.

- **Cable Extensions:**
  - In an installation 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 for extension**.

Figure 13-10 Terminating Transducer Cable
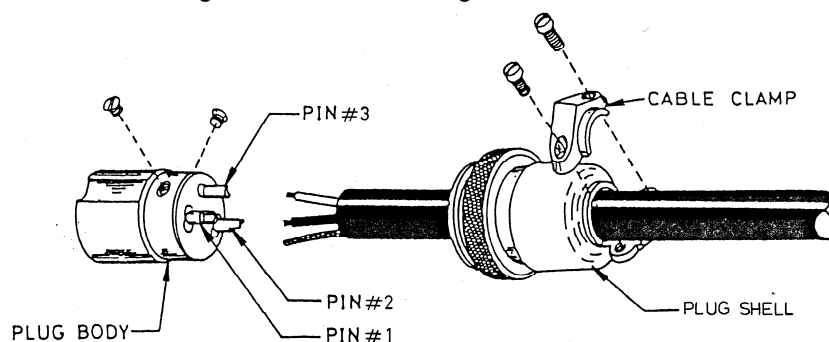
- **Slide the plug shell over the cable first**, and solder the conductors to the three pins on the plug body as follows:
  - One conductor to: pin #1*2
  - Shield (braid) to: pin #2
  - Other conductor to: pin #3*2

*1: *EMC = electromagnetic compatibility*
*2: *Connections to pin #1 and pin #3 may be reversed without affecting transducer performance.*

13.   Installation Instructions *(continued – 11/28)*

13.3.   Electrical Connections *(4/11)*

13.3.3.   Connections to Transducer *(2/2)*

· 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.

· The transducer can now be plugged into the three–pin connector receptacle (**TRANSDUCER**, Figure below) on the rear panel.
  - Observe the following **< WARNING >**.

< WARNING >

· **EXTREMELY HIGH RADIO–FREQUENCY VOLTAGE PULSES ARE PRESENT ACROSS PINS #1 AND #3 ON THE TRANSDUCER RECEPTACLE WHEN THE EQUIPMENT IS SWITCHED ON, EXCEPT WHILE IN THE SIMULATION MODE.**

· **WHENEVER THE TRANSDUCER IS UNPLUGGED FROM THE CABINET,**
  - **BE SURE TO AVOID COMING INTO CONTACT WITH ANY OF THOSE PINS AND**
  - **PLACE THE PROTECTIVE RUBBER CAP OVER THE CONNECTOR.**

· Turn the equipment off, push the plug into the receptacle as far as it goes, and then screw the coupling ring onto the threaded part of the receptacle until it stops.

· **Receptacle Pin Assignments:**
  - Pin #1 : Transmitter Output/Receiver Input
  - Pin #2 : Cabinet Ground (isolated from power line)
  - Pin #3 : Transmitter Output/Receiver Input

· Pins 1 and 3 are electrically balanced and may be reversed without affecting transducer performance.

Figure 13-11 **TRANSDUCER** Receptacle Pin Assignments
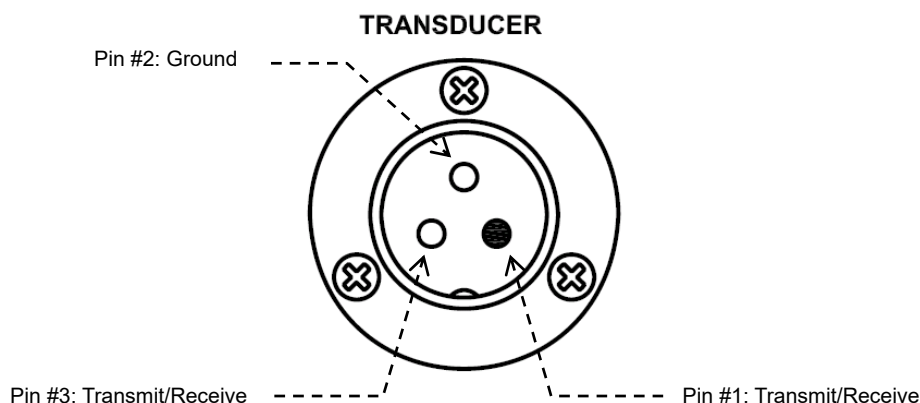
13. Installation Instructions *(continued – 12/28)*

13.3. Electrical Connections *(5/11)*

13.3.4. Connections through Serial Interface Ports

13.3.4.1. Introduction

- The equipment is designed to interface with various external devices (e.g. BAM/CAM or PC terminals) that output or accept digital data signals compliant with the following communications protocol standards:
  - IEC 61162–1 Ed. 5
  - IEC 62923–1 and IEC 62923–2 (for remote alert management)
- The serial interface ports (rear–panel **RS–422–A/B** and **I/O** connector receptacles) are provided for interfacing with such onboard applications.

13.3.4.2. Approved Digital Displays

- The following digital display units are approved by the NB as options to the echo sounder:
  - **Plath UDR**
  - **SKIPPER IR 301**
  - **9205T/ELAC DAZ 25/DEBEG 4650 T/FILIA 522**
  - **Consilium SD 2–3**
  - **SAM 4900**

13.3.4.3. Input Data Sentences

- The following IEC 61162–1/NMEA–0183 data sentences can be input via one of the above serial interface ports for display on–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)
  - $GPZDA (derives UTC date & time)

13.3.4.4. Output Data Sentences

13.3.4.4.1. Realtime Output Data

- The following IEC 61162–1/NMEA–0183 formatted data sentences can be output in real time at 4800 baud via all three connectors at the same time. No hand–shaking protocol is used to control data transfer.
- **Some of the outputs are initially disabled**. Refer to the relevant instructions given in paragraph 8.10.8 *(Selecting Data Outputs)* to enable the desired outputs to become available through the interface connectors.
- The alert output sentences and other related output formats are discussed in paragraph 13.4 *(Remote Alert Management)*.

- $SDDPT (depth with transducer draft or keel offset)

Figure 13-12 $SDDPT Output Sentence Format

$$\text{\$SDDPT}, \underset{①}{x.x}, \underset{②}{x.x}, \underset{③}{x.x} * \underset{④}{hh} \text{<CR><LF>}$$

① Depth below transducer, in meters

② Positive value represents transducer draft (transducer to waterline, in meters), and negative value, keel offset (transducer to keel, in meters)

③ Range scale in use

④ Checksum

13.   Installation Instructions *(continued – 13/28)*

13.3.   Electrical Connections *(6/11)*

13.3.4.   Connections through Serial Interface Ports *(2/5)*

13.3.4.4.   Output Data Sentences *(2/3)*

13.3.4.4.1   Realtime Output Data *(2/2)*

 - $PSKPDPT (proprietary depth data for **SKIPPER IR 301**[*1] digital depth repeater)

Figure 13-13 $PSKDDPT Output Sentence Format

$PSKPDPT, x.x,x.x, x.x, , ,FWD*hh<CR><LF>
①   ②   ③   ④ ⑤   ⑥

① Depth below transducer, in meters
② Positive value represents transducer draft (transducer to waterline, in meters), and negative value represents keel offset (transducer to keel, in meters)
③ Range scale in use
④ Null fields (E/S channel number, bottom echo strength, etc. are not output)
⑤ Transducer location; FWD=forward, AFT=aft, MID[*1]=middle
⑥ Checksum

 - $SDDBT (depth below transducer)

Figure 13-14 $SDDBT Output Sentence Format

$SDDBT, x.x,f,x.x,M, x.x,F*hh<CR><LF>
①   ②   ③   ④

① Depth below transducer, in feet
② Depth below transducer, in meters
③ Depth below transducer, in fathoms
④ Checksum

 - $SDDBK (depth below keel)

Figure 13-15 $SDDBK Output Sentence Format

$SDDBK, x.x,f,x.x,M, x.x,F*hh<CR><LF>
①   ②   ③   ④

① Depth below keel, in feet
② Depth below keel, in meters[*2]
③ Depth below keel, in fathoms
④ Checksum

[*1]: *Not supported by **IR 301**. "SKIPPER" is a trade name/logo of Jotron Skipper A/S.*

[*2]: *This metric DBK value is to be used for depth–below–keel alert in remote alert management. See paragraphs 8.10.7.3 (Entering Keel Offset) and 13.4 (Remote alert Management) for related information.*

13.   Installation Instructions *(continued – 14/28)*

13.3.   Electrical Connections *(7/11)*

13.3.4.   Connections through Serial Interface Ports *(3/5)*

13.3.4.4.   Output Data Sentences *(3/3)*

13.3.4.4.2.   On–Demand Output Data

· The following IEC 61162–1 (NMEA–0183)–based proprietary sentence can be output on demand from the non–volatile (flash) memory at 4800 baud. No hand–shaking protocol is used to control data transfer.

   - $PJMCN (On–Demand Output Sentence Format)

Figure 13-16 $PJMCN Output Sentence Format

$$\$PJMCN, \underset{①}{} x.x, \underset{②}{} x.x, \underset{③}{} x.x, \underset{④}{} H, \underset{⑤}{} ddmmyy, \underset{⑥}{} hhmmss, \text{ (continued to next line)}$$

$$\underset{⑧}{llll.lll}, \underset{⑨}{a}, \underset{⑩}{yyyy.yyy}, \underset{⑪}{a} * \underset{⑫}{hh} <CR> <LF>$$

① Talker Identifier (proprietary)
② Depth below transducer*[1] 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 Offset*[1]; positive (+) = transducer draft, negative (−) = offset from transducer to keel
④ Maximum depth range used, in meters
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 Latitudinal coordinate (to 1/1000 minutes), varying in length; null if valid GPS position fix was temporarily unavailable
⑨ Latitudinal sign (N/S); null if valid GPS position fix was temporarily unavailable
⑩ Longitudinal coordinate (to 1/1000 minutes), varying in length; null if valid GPS position fix was temporarily unavailable
⑪ Longitudinal sign (E/W); null if valid GPS position fix was temporarily unavailable
⑫ Checksum

· If the depth measurement was made in fathoms or feet, the equivalent metric values listed in the table below are used to represent the maximum depth range in use.

Table 13-2 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

*[1]: *If both offsets were entered, two $PJMCN sentences will be output with the same depth–below–transducer value; one contains the transducer draft, and the other, the keel offset.*

13.   Installation Instructions *(continued – 15/28)*

13.3.   Electrical Connections *(8/11)*

13.3.4.   Connections through Serial Interface Ports *(4/5)*

13.3.4.5.   Connector Pin Assignments

(1) **RS–422** Connector Pin Assignments
   - Connections from a BAM/CAM terminal are to be plugged into either the **RS–422–A** or the **RS–422–B** receptacles shown in the figure below. A standard D–Sub9 female–type plug*1 mates with these connectors.

Figure 13-17 **RS–422** Connector Pin Assignments
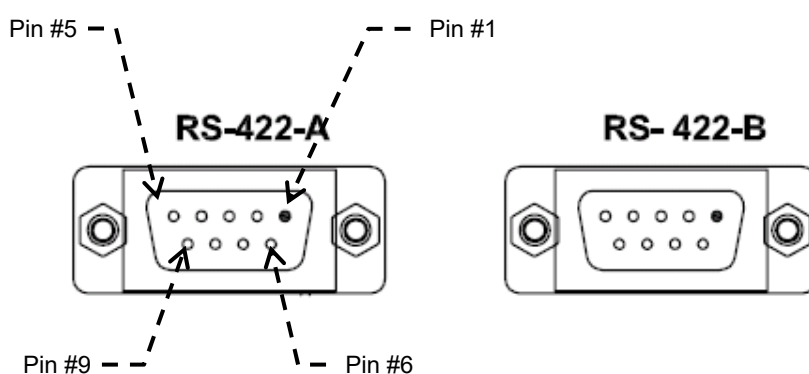
   - The pin assignments are given below. The same assignments apply to both connectors. Of the nine pins, the following are used for data communication, and the rest, left unused:

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

*1: *HDEB–9S or equivalent, to be optionally supplied*

13. Installation Instructions *(continued – 16/28)*

13.3. Electrical Connections *(9/11)*

13.3.4. Connections through Serial Interface Ports *(5/5)*

13.3.4.5. Connector Pin Assignments *(2/2)*

(2) **I/O** Connector Pin Assignments

· The eight pins are identified as illustrated below. The mating plug (part #CP111–8P) is separately supplied.

Figure 13-18 General Purpose **I/O** Interface Connector Pin Assignments
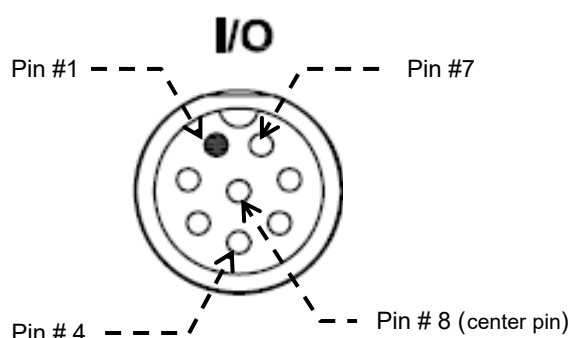
· The pins are assigned the following functions:

- Pin #1: RXD + (IEC 61162–1/NMEA–0183 input from GPS, BAM/INS device)
- Pin #2: RXD – (Return path for pin #1)
- Pin #3: TXD + (IEC 61162–1/NMEA–0183 output to BAM/CAM device)
- Pin #4: FWE (Enables programming mode. ***Do not connect any device except when updating firmware***. See **<CAUTION>** below).
- Pin #5: TXD (Programming data I/O, with hand–shaking)
- Pin #6: RXD (Programming data I/O, with hand–shaking)
- Pin #7: 12V (+12 V output, 200 mA max. See *NOTE* and **< WARNING >** below).
- Pin #8: GND (TXD–, common ground for pin #7 and firmware programming tool)

· Connections should be made using a short length of good quality two–conductor <u>shielded</u> cable.

· To avoid interference from other onboard electronics, the shield should be grounded at both the equipment cabinet and the external device connected.

· Use pin #8 for grounding on 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. Observe <**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.

13.   Installation Instructions *(continued – 17/28)*

13.3.   Electrical Connections *(10/11)*

13.3.5.   Connections to ALARM ACK Connector

· If you wish to acknowledge and reset an active alert (**DEPTH BELOW KEEL ALERT**[*1] or **POWER FAILURE ALERT**[*2]) with a switch located away from the echo sounder, connect a suitable single–pole–single–throw (SPST) switch to this connector so that the two pins on the connector get short–circuited together when the switch is turned on (or closed).

Figure 13-19 **ALARM ACK** Connector Pin Assignments

· No polarity consideration is required.

· The mating plug (part #: CP111–2P) is separately supplied.

Pin #1:
ACK IN +

Pin #2:
ACK IN –
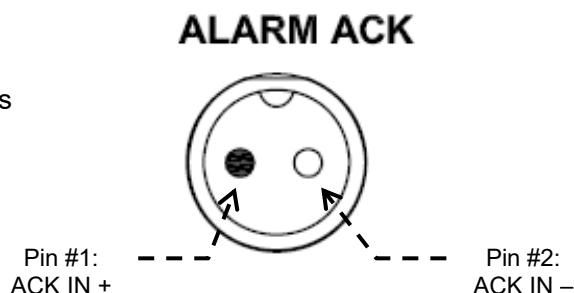
· When the above pins are shorted together, the acoustic presentations for the depth–below–keel alert and power failure alert will be turned off.

· The open/closed statuses of pin pairs #1–#2 and #5–#6 on the **ALARM OUT** connector will remain unchanged when the **ALARM ACK** pins are shorted together.

· See paragraph 13.3.6 (Connections to **ALARM OUT** Connector) for related information.

· Technical Information

  - The two pins (ACK+ and ACK–) on the connector are a pair of normally–open solid–state relay contacts with approx. 3.3V on the ACK+ pin.

  - Shorting these pins together with an external on/off switch will cause approx. 0.3mA current to flow through the relay drive transistors, enabling the equipment to detect an alert acknowledgement signal.

Figure 13-20 **ALARM ACK** Connector Circuit

ALARM ACK Connector
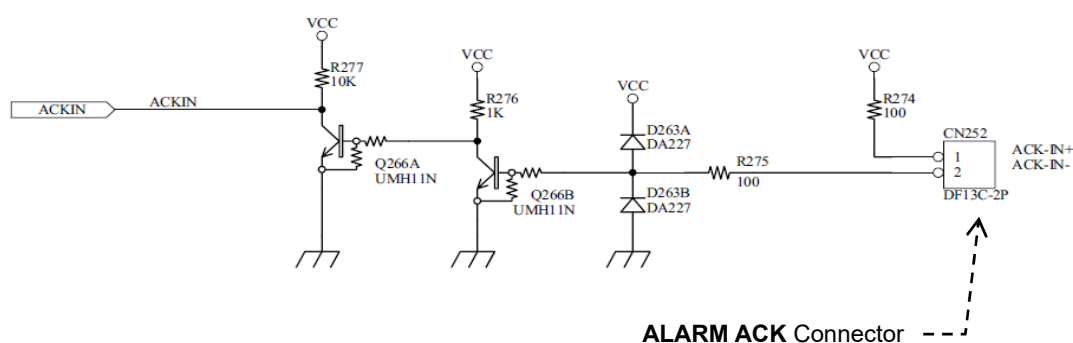
[*1]: *Alert ID 3031 for IEC 61162–1 Ed. 5 alert handling protocol. See paragraph 13.4.3.2.2 (a) for details.*
[*2]: *Alert ID 3022 for IEC 61162–1 Ed. 5 alert handling protocol. See paragraph 13.4.3.2.2 (b) for details.*

13.   Installation Instructions *(continued – 18/28)*

13.3.   Electrical Connections *(11/11)*

13.3.6.   Connections to ALARM OUT Connector

· The **ALARM OUT** connector is provided to separately drive remotely mounted alert condition indicating devices when either the **DEPTH BELOW KEEL ALERT**[*1] or the **POWER FAIL ALERT**[*2] becomes active, and to allow the user to acknowledge and reset the active alert from such a location.

· *The open/closed status of the relay contacts assumes that the equipment is currently in its energized condition (turned on).*

Figure 13-21 **ALARM OUT** Connector Pin Assignments

Mating Plug: CP111–6P

Pin #1:
POWER FAILURE ALERT–A

Pin #2:
POWER FAILURE ALERT–B

Pin #3:
DEPTH–BELOW–KEEL ALERT–A

Pin #5:
ACK–OUT–A

Pin #6 (center pin):
ACK–OUT–B

Pin #4:
DEPTH–BELOW–KEEL ALERT B
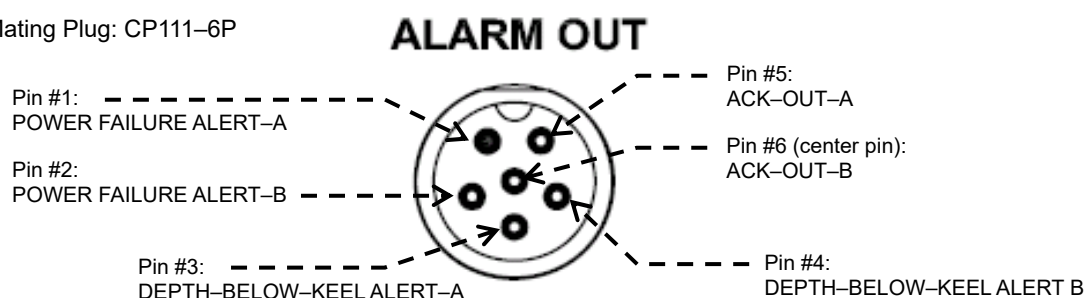
- Pins #1 and #2:   These pins are connected to a pair of normally–closed solid–state relay contacts, which will open when the **POWER FAILURE ALERT**[*2] is triggered.
Maximum contact ratings: 50V AC/DC, 0.8A

- Pins #3 and #4:   These pins are connected to a pair of normally–closed mechanical relay contacts, which will open when the **DEPTH BELOW KEEL ALERT**[*1] is triggered.
Maximum contact ratings: 125V AC/50V DC, 0.3A AC/0.8A DC

- Pins #5 and #6:   These pins are connected to a pair of normally–open solid–state relay contacts, which will be closed for 3 seconds when ▣ is pressed. Closure of pins #5 and #6 is used to inform the connected application that the active alert was reset.
Maximum contact ratings: 50V AC/DC, 0.8A
The open/closed status of this pin pair is not affected when the ALARM ACK connector pins are shorted with a user–actuated remote switch.

Figure 13-22 **ALARM OUT** Connector Circuit
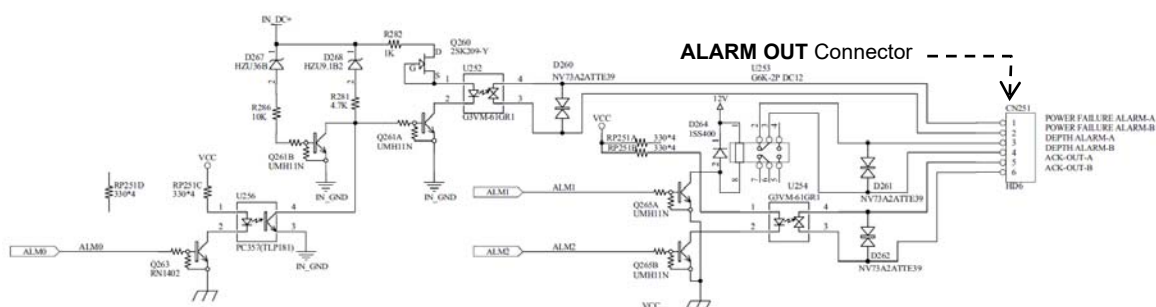
[*1]: *Alert ID 3031 for IEC 61162–1 Ed. 5 alert handling protocol. See paragraph 13.4.3.2.1 (Alert Handling Commands) for details.*

[*2]: *Alert ID 3022 for IEC 61162–1 Ed. 5 alert handling protocol. See paragraph 13.4.3.2.1 (Alert Handling Commands) for details.*

13. Installation Instructions *(continued – 19/28)*

13.4. Remote Alert Management

13.4.1. Introduction

13.4.1.1. List of Alerts Supported for Remote Alert Management

- The table below lists the titles, IDs, categories and priorities of the alerts the echo sounder (EUT) supports for remote alert management compliant with the relevant IEC standards[*1].

Table 13-3 List of Alerts for Remote Alert Management

Alert Title (Alert Text)	ID	Category	Priority	Escalation Properties	Responsibility Transfer
Depth below keel	3031	A	A (Alarm)	None	Not supported
Power failure (Alert Text) Failure or reduction in power supply	3022	B	W (Warning)	If the alert is left un–acknowledged for two minutes or more after it becomes active, the escalation counter field in the $SDALF alert output sentence will increment by one and its acoustic alert (2 quick beeps) will be generated. When the counter value 9 is reached, it will return to 0. The above process will repeat until the alert is acknowledged. See Figure 13-28 for the $SDALF output format.	When the equipment receives a $_ _ ACN command type **O** from the BAM/CAM, it will turn on the visual presentation (Figure 13-25) and will issue a $SDALF alert output sentence with its alert state field set to "**O**." When the equipment receives a $_ _ ACN com–mand type **A** from the system, it will turn off the visual indication if the alert condition is rectified. See Figure 13-24 for the $_ _ACN alert handling command format. If the active condition remains unrectified, the visual presentation will change the state transition icon as shown below, while the $SDALF output sentence will set its alert state field to "**A**" from "**O**". See Figure 13-28 for the $SDALF output format.
Bottom missing[*2]	10003	B	C (Caution)	None	Not supported

13.4.1.2. Supported Equipment Type

- For remote alert management purposes in compliance with the relevant IEC standard[*1], the echo sounder (EUT) supports the function type **P** (defined in IEC standard 62923–1 Ed. 2018–08, paragraph 4.2), making it a piece of BAM–compliant equipment.

- The echo sounder acts as a standalone alert source and is not a CAM in the remote alert management system.

[*1]: *IEC 62923–1 Ed. 1 paragraph 4.2 (excerpt): "For each EUT, the manufacturer should declare which functionality types are embedded in the EUT."*
[*2]: *Proprietary alert*

13.   Installation Instructions *(continued – 20/28)*

13.4.   Remote Alert Management *(2/10)*

13.4.2. Unsupported Alert–Related Functions

· The echo sounder does not support the following functions specified in the relevant IEC standards for BAM–compliant equipment:

(a) Speech output:

· The echo sounder does not provide a speech output, and the related requirements stated in the IEC standards[*1] are not applicable.

(b) Functionality alert grouping:

· The echo sounder does not support the functionality alert grouping specified in the relevant IEC standard[*2]. The equipment provides only three alerts (depth below keel, power failure, bottom missing), which are different in category or priority, eliminating the need to group the alerts in terms of functionality.

(c) Alert aggregation:

· The echo sounder does not support the alert aggregation function specified in the relevant IEC standard[*3]. The equipment provides only the following three alerts differing from each other in priority. Since the BAM–compliant equipment is required to aggregate only alerts with the same priority and category, the functional requirement does not apply to this equipment.
  - Depth–below–keel alert (category=A, priority=A, alert ID=3031)
  - Power failure alert (category=B, priority=W, alert ID=3022)
  - Bottom–missing alert (category=B, priority=C, alert ID=10003)

(d) Type Q "CAM functions":

· The echo sounder operates as a standalone alert source with function type P in a BAM system, and does not support the function type Q specified in the relevant IEC standard[*4].

· The equipment is not an INS system. For the case that an INS is installed, a separate CAM system is not permitted to be installed on board.

(e) Type R "Revaluation functions":

· The echo sounder is a function type P equipment, and does not support function type R (alert revaluation function) specified in the relevant IEC standard[*5].

(f) Type S "Legacy alert conversion functions":

· The echo sounder does not support the legacy remote alert management system based on the IEC 61162–1 Ed. 4 standard and does not support the type S functions specified in the relevant IEC standard[*6].

[*1]: *IEC 62923–1, Table 3*

[*2]: *IEC 62923–1, paragraph 6.7 (Functional alert grouping)*

[*3]: *IEC 62923–1, paragraph 6.8 (Alert aggregation)*

[*4]: *IEC 62923–1, Annex B*

[*5]: *IEC 62923–1, paragraph 3.1.28 (Type R "revaluation function")*

[*6]: *IEC 62923–1, Annex H*

13.   Installation Instructions *(continued – 21/28)*

13.4.   Remote Alert Management *(3/10)*

13.4.3.   Alert Interfaces

13.4.3.1.   Hardware Alert Interface

▪ For remote alert management purposes, the echo sounder provides the **RS–422–A** and **RS–422–B** connector ports on the equipment's rear panel as the hardware alert interface. Each port supports bilateral serial data communications and functions in the same manner.

▪ There is no difference between the two in the electrical characteristics so that either of them can be used for alert handling for the user's convenience.

▪ The connector is of standard D–Sub 9–pin female–type connector receptacle, and the pin (hole) ID numbers and their functional assignments are given in the figure below. The mating plug (part # HDEB–9 or equivalent) is optionally supplied.

Figure 13-23 RS–422 Serial Interface Connector
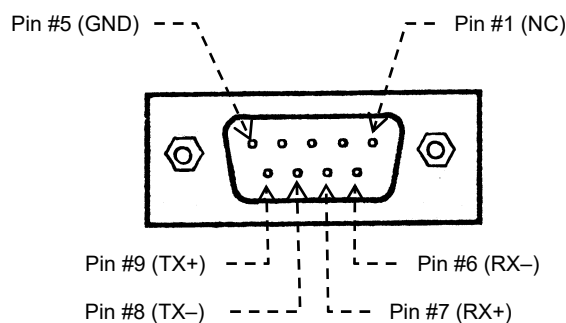
▪ The other rear–panel serial interface connector (**I/O**) does not support the BAM–compliant communications protocol and cannot serve as an alert interface.

13.4.3.2.   Software Alert Interfaces

▪ The echo sounder supports the set of command sentences and alert output sentences described in the following subparagraphs (13.4.3.2.1 to 13.4.3.2.5) as the software alert interfaces for use in BAM–compliant remote alert management applications.

13. Installation Instructions *(continued – 22/28)*

13.4. Remote Alert Management *(4/10)*

13.4.3. Alert Interfaces *(2/8)*

13.4.3.2 Software Alert Interfaces *(2/8)*

13.4.3.2.1. Alert Handling Commands

- The following command format is used to remotely handle the alerts generated in the echo sounder, in compliance with the alert handling protocol compliant with the relevant IEC BAM interface requirements:

Figure 13-24 $_ _ ACN Alert Handling Command Format

$_ _ ACN **,** hhmmss.ss **,** aaa **,** x.x **,** x.x **,** c **,** a * hh <CR><LF>
  ①   ②   ③   ④   ⑤   ⑥ ⑦ ⑧

① Device identifier (e.g. CA= Bridge/Central Alert Management, IN=INS device)
② Time field: Command release time; null (option)
③ Manufacturer mnemonic code*1 : null
④ Alert identifier:
  - 3031=Depth–below–keel alert (priority: alarm)
  - 3022=Power failure alert (priority: warning)
  - 10003=Bottom–missing alert (priority: caution)
  - 0=command request to alert IDs 3031 and 3022
⑤ Alert instance: null
⑥ Alert command type:
  - A = acknowledge*2
  - Q = request/repeat information
  - O = transfer responsibility*3
  - S = silence*4
⑦ Sentence status flag (**C**=command sentence, fixed)
⑧ Checksum

- Remote acknowledgement and responsibility transfer commands for alert ID 3031 (priority: alarm) are not supported. This alert has to be directly acknowledged at the alert source (i.e. with **CLR** on the equipment's control panel), compliant with the relevant BAM requirements.

13.4.3.2.2. Supported Command Types (Examples)

- The following command formats use the device identifier (talker ID) "**CA**" as an example. The time field and manufacturer mnemonic code field are normally "null." The time field may contain the command release time, depending on the talker type (BAM/CAM terminal).

(a) Command types supported for depth–below–keel alert (priority: alarm)

  - $CAACN **,,,3031,1,Q,** C * hh <CR><LF>: Request or repeat alert sentence.
    Example: $CAACN **,,,3031,** 1 **,Q,** C * 6C
  - $CAACN **,,,3031,1,S,** C * hh <CR><LF>: Temporarily silence alert*4.
    Example: $CAACN **,,,3031,** 1 **,S,** C * 6E

*1: *Alert IDs 3031 and 3022 are standardized alerts and this field should be null (IEC 61162–1 paragraph 8.3.7).*

*2: *The equipment does not support this command type for alert ID 3031.The equipment will display the message "**Alert handling is disabled**" flashing for approx. 10 seconds when it receives this command, and will send the appropriate $SDARC sentence back to the BAM/CAM. See paragraph 13.4.3.2.4 (Denial of Invalid Commands) for details.*

*3: *The equipment does not support this command type for alert ID 3031. When the equipment receives the transfer request from the BAM/CAM for alert ID 3022, it will display the appropriate alert state transition icon (Figure 6-33) plus alert description text "**Failure or reduction in power supply**." The visual alert presentation (Figure below) will remain displayed until the equipment receives an ACN command type "A" from the BAM/CAM system.*

Figure 13-25 Responsibility Transferred Indication for Power Failure Alert

*4: *The echogram screen will show the message "**Depth below keel alarm ∕ Temporarily silenced!**," flashing for approx. 30 seconds, when this command is executed.*

Failure or reduction in power supply
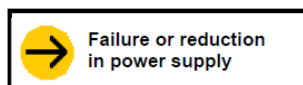
13.   Installation Instructions *(continued – 23/28)*

13.4.   Remote Alert Management *(5/10)*

13.4.3.   Alert Interfaces *(3/8)*

13.4.3.2   Software Alert Interfaces *(3/8)*

13.4.3.2.2.   Supported Command Type Examples *(2/2)*

(b) Command types supported for power failure alert (priority: warning)
   - $CAACN,,,**3022**,**1**,**A**,C*hh<CR><LF>: Acknowledge alert.
     Example: $CAACN,,,**3022**,1,**A**,C*7E
   - $CAACN,,,**3022**,**1**,**Q**,C*hh<CR><LF>: Request or repeat alert sentence.
     Example: $CAACN,,,**3022**,1,**Q**,C*6E
   - $CAACN,,,**3022**,**1**,**S**,C*hh<CR><LF>: Temporarily silence alert.
     Example: $CAACN,,,**3022**,1,**S**,C*6C
   - $CAACN,,,**3022**,**1**,**O**,C*hh<CR><LF>: Transfer responsibility.
     Example: $CAACN,,,**3022**,1,**O**,C*70

(c) Command type supported for bottom–missing alert (priority: caution)
   - $CAACN,,,**10003**,**1**,**Q**,C*hh<CR><LF>: Request or repeat alert sentence.
     Example: $CAACN,,,**10003**,1,**Q**,C*5F

(d) Command types for all alerts provided in this equipment (alert ID field=0)
   - $CAACN,,,**0**,**1**,**A**,C*hh<CR><LF>: Acknowledge alert[*1].
     Example: $CAACN,,,**0**,1,**A**,C*4D
   - $CAACN,,,**0**,**1**,**Q**,C*hh<CR><LF>: Request or repeat alert sentence.
     Example: $CAACN,,,**0**,1,**Q**,C*5D
   - $CAACN,,,**0**,**1**,**S**,C*hh<CR><LF>: Temporarily silence alert.
     Example: $CAACN,,,**0**,1,**S**,C*5F
   - $CAACN,,,**0**,**1**,**O**,C*hh<CR><LF>: Transfer responsibility[*1].
     Example: $CAACN,,,**0**,1,**O**,C*43

(e) Command type supported for heartbeat supervision (HBT) sentence[*2]
   - $CACRQ,HBT*hh<CR><LF>: Request heartbeat supervision sentence output.

13.4.3.2.3.   HBT Sentence and Responsibility Transfer

· The echo sounder outputs appropriate HBT sentences either automatically at the specified intervals (120 seconds) or on entry of a query command[*3] from the BAM/CAM system. The equipment is a standalone alert source, and not a CAM. Since the depth–below–keel alert is a category–A and priority–A alert (alarm), the use of responsibility transfer command (command type "O") will be denied with the following on–screen flashing text message:

Figure 13-26 On–Screen Indication of Refusing Invalid Command from BAM/CAM

Responsibility transfer is denied

· For the category–A alert, the equipment is not required to monitor HBT sentences from the BAM/CAM (issued at 30 second intervals). The responsibility transfer command is permitted for the category–B alert (power failure).

· If the equipment fails to receive the HBT sentence within the above specified period, the BAM/CAM is considered not active, and the equipment will then take back the alert handling responsibility, while displaying the above error message and sending back the appropriate $SDARC (alert command refused) sentence[*4] to the BAM/CAM.

   - To turn off the error message, press either 🄰🄻🄰🅁🄼 or 🄲🄻🅁 . Pressing 🄲🄻🅁 will acknowledge the active alert as well as turn off the message.

[*1]: *Invalid command types for depth–below–keel alert*
[*2]: *See paragraph 13.4.3.2.5 (c) Figures 13-32 and 13-33 for output sentence format.*
[*3]: *example: $CACRQ,HBT*30 <CR><LF>*
[*4]: *See paragraph 13.4.3.2.4 (Denial of Invalid Commands) for details.*

13. Installation Instructions *(continued – 24/28)*

13.4. Remote Alert Management *(6/10)*

13.4.3. Alert Interfaces *(4/8)*

13.4.3.2 Software Alert Interfaces *(4/8)*

13.4.3.2.4. Denial of Invalid Commands

- The equipment refuses to accept the following ACN command types (examples) invalid for the handling of alert ID 3031 (depth–below–keel, priority=alarm). The command release time field is null in the example sentences.

  - Acknowledge alert: $CAACN,,,**3031,1,A**,C∗hh<CR><LF>
  - Transfer responsibility: $CAACN,,,**3031,1,O**,C∗hh<CR><LF>

- When there is no active state for alert ID 3022 (power failure, priority=warning), execution of those commands will also be denied.

- Attempting to execute the above commands under such alert–normal states will cause the equipment to send an ARC format sentence (alert command refused, format shown below) back to the BAM/CAM, indicating the denial of the request. At the same time, the error message "***Alert handling is disabled***" will be displayed, flashing on the echogram screen for approx. 10 seconds.

Figure 13-27 $SDARC Sentence Format

$$\underset{①}{\underline{\text{$SDARC}}} , \text{hhmmss.ss} , , \underset{②}{} \underset{③}{x.x} , \underset{④}{x.x} , \underset{⑤}{} \underset{⑥}{c} ∗ \underset{⑦}{hh} <CR> <LF>$$

① Device identifier (SD=echo sounder)

② Time field: time data derived from time field data in received ACN command sentence or derived from equipment's internal real–time clock if time field in command sentence is null

③ Manufacturer mnemonic code: null

④ Alert Identifier (3031=depth–below–keel alert, 3022=power failure alert, 0= all alerts)

⑤ Alert instance (1 – 99)

⑥ Refused alert command (A=acknowledge, O=transfer responsibility)

⑦ Checksum

- $SDARC Sentence Examples for Depth–below–Keel Alert (ID=3031):

(a) Alert in active state:

  - $SDARC,041347,,**3031**,,**A**∗2E (for command: $CAACN,041245,,3031,,**A**,C∗64[*1])
  - $SDARC,041146,,**3031**,,**O**∗23 (for command: $CAACN,041045,,3031,,**O**,C∗60[*1])

(b) Alert non–existent (in normal state):

  - $SDARC,xxxxxx,,**3031**,,**S**∗hh (for command: $CAACN,xxxxxx,,3031,,**S**,C∗hh[*1])

- $SDARC Sentence Examples for Power Failure Alert (ID=3022):

(a) Alert non–existent (in normal state):

  - $SDARC,xxxxxx,,**3022**,,**A**∗hh (for command: $CAACN,xxxxxx,,3022,,**A**,C∗hh[*1])
  - $SDARC,xxxxxx,,**3022**,,**S**∗hh (for command: $CAACN,xxxxxx,,3022,,**S**,C∗hh[*1])
  - $SDARC,xxxxxx,,**3022**,,**O**∗hh (for command: $CAACN,xxxxxx,,3022,,**O**,C∗hh[*1])

[*1]: *Checksum values (hh) in sample command sentences apply to device ID=CA (central alert management system).*

13.   Installation Instructions *(continued – 25/28)*

13.4. Remote Alert Management *(7/10)*

13.4.3. Alert Interfaces *(5/8)*

13.4.3.2   Software Alert Interfaces *(5/8)*

13.4.3.2.5.   Alert Output Sentences

- The alert–related output sentences available as a part of the software alert interfaces of the equipment are listed below. The device identifier is SD for all sentences.
  - $SDALF alert output sentence
  - $SDALC cyclic alert list sentence
  - $SDHBT heartbeat supervision sentence

(a) $SDALF Alert Sentences *(1/2)*

This sentence is used to report an alert condition and alert state of the echo sounder, and will be output each time the alert information in the sentence changes or on reception of a request command. The sentence format is given below.

Figure 13-28 $SDALF Sentence Format

$SDALF,x,x,x,hhmmss.ss,a,a,a,aaa,x.x,x.x,x.x,x,c- - -c✱hh <CR> <LF>
① ② ③   ④   ⑤ ⑥ ⑦ ⑧ ⑨   ⑩   ⑪   ⑫ ⑬   ⑭

① Total number[*1] of ALF sentences for this message
② Sentence number, (1–2)
③ Sequential message identifier
④ Time of last change
⑤ Alert category[*2]:
  - A=depth–below–keel alert, - B = power failure alert or bottom–missing alert
⑥ Alert priority: A=alarm, W=warning, C=caution
⑦ Alert state: A =active – acknowledged, S =silenced, N =normal state, O = responsibility transferred, U = rectified (resolved) – unacknowledged, V = active – unacknowledged
⑧ Manufacturer mnemonic code[*3] (null for standardized alerts, "JMC" for proprietary alert)
⑨ Alert identifier:
  - 3031= depth–below–keel alert
  - 3022= power failure alert
  - 10003= bottom–missing alert
  - 0=command request to alert IDs 3031 and 3022
⑩ Alert instance (1 to 999999)
⑪ Revision counter (1 to 99)
⑫ Escalation counter (0 to 9)
  NOTE: This field is valid only for alert ID 3022. If the alert is left unacknowledged for 2 minutes after it becomes active, the counter value will increment by 1 and its acoustic alert (2 beeps) will be generated. This whole process will continue until the alert is acknowledged. When the counter value reaches 9, it will return to 0.
⑬ Alert text:
  - Depth below keel (for ID 3031)
  - Failure or reduction in power supply (for ID 3022),
  - Bottom missing (for ID 10003)
⑭ Checksum (hex)

[*1]: *The $SDALF alert output sentence for alert ID 3022 consists of 2 lines to accommodate the alert title and alert text.*

[*2]: *Category A alert for which graphical information at the task station directly assigned to the function generating the alert is necessary, as decision support for the evaluation of the alert–related condition; Category B alert where no additional information for decision support is needed besides the information which can be presented using alert source and alert description text (IEC 61162–1 definition).*

[*3]: *Alert IDs 3031 and 3022 are IEC standardized alerts and this field should be null (IEC 61162–1 paragraph 3.7). For proprietary alert ID 10003, this field is "JMC". See the example $SDALF sentences on next page.*

13.　Installation Instructions *(continued – 26/28)*

13.4.　Remote Alert Management *(8/10)*

13.4.3.　Alert Interfaces *(6/8)*

13.4.3.2　Software Alert Interfaces *(6/8)*

13.4.3.2.5.　Alert Output Sentences *(2/4)*

(a) $SDALF Alert Sentences *(2/2)*

Alert output sentences like the examples below will be output when an active alert state develops or when an alert request is received from the BAM/CAM system.

- Depth–below–keel alert (priority: A=alarm, category: A)
  - $SDALF,1,1,x,,A,A,**V**,,**3031**,x,x,x,Depth below keel*hh<CR><LF>: unacknowledged
  - $SDALF,1,1,x,,A,A,**A**,,**3031**,x,x,x,Depth below keel*hh<CR><LF>: acknowledged
  - $SDALF,1,1,x,,A,A,**U**,,**3031**,x,x,x,Depth below keel*hh<CR><LF>: rectified
  - $SDALF,1,1,x,,A,A,**N**,,**3031**,x,x,x,Depth below keel*hh<CR><LF>: normal state

- Power failure alert (priority: W=warning, category: B)
  - $SDALF,2,**1**,x,,B,W,**V**,,**3022**,x,x,x,Power failure*hh<CR><LF>: unacknowledged
    $SDALF,2,**2**,x,,,,,,**3022**,x,x,x,Failure or reduction in power supply*hh<CR><LF>
  - $SDALF,2,**1**,x,,B,W,**A**,,**3022**,x,x,x,Power failure*hh<CR><LF>: acknowledged
    $SDALF,2,**2**,x,,,,,,**3022**,x,x,x,Failure or reduction in power supply*hh<CR><LF>
  - $SDALF,2,**1**,x,,B,W,**U**,,**3022**,x,x,x,Power failure*hh<CR><LF>: rectified
    $SDALF,2,**2**,x,,,,,,**3022**,x,x,x,Failure or reduction in power supply*hh<CR><LF>
  - $SDALF,2,**1**,x,,B,W,**S**,,**3022**,x,x,x,Power failure*hh<CR><LF>: temporarily silenced
    $SDALF,2,**2**,x,,,,,,**3022**,x,x,x,Failure or reduction in power supply*hh<CR><LF>
  - $SDALF,2,**1**,x,,B,W,**O**,,**3022**,x,x,x,Power failure*hh<CR><LF>:responsibility transferred
    $SDALF,2,**2**,x,,,,,,**3022**,x,x,x,Failure or reduction in power supply*hh<CR><LF>
  - $SDALF,2,**1**,x,,B,W,**N**,,**3022**,x,x,x,Power failure*hh<CR><LF>: normal state
    $SDALF,2,**2**,x,,,,,,**3022**,x,x,x,Failure or reduction in power supply*hh<CR><LF>

- Bottom–missing alert (priority: C=caution, category: B)
  - $SDALF,1,1,x,,B,C,**A**,**JMC**,**10003**,,x,x,Bottom missing*hh<CR><LF>: acknowledged
  - $SDALF,1,1,x,,B,C,**N**,**JMC**,**10003**,,x,x,Bottom missing*hh<CR><LF>: rectified
    NOTE: The acoustic presentation (alert sound) will be automatically turned off in several seconds, and the temporary silence command is not supported for this alert.

(b) $SDALC Cyclic Alert List Sentences *(1/2)*

- The $SDALC cyclic alert list sentence provides condensed ALF information and contains the identifying data for each present alert of one alert source, allowing the receiver (BAM/CAM) to understand which ALF sentence has been missed. Retransmission of the lost ALF messages can be requested with the appropriate ACN command. The sentence is output at least once every 30 seconds, regardless of whether or not an active alert state exists. The sentence format is given below. The device identifier is SD.

Figure 13-29 $SDALC Sentence Format

$SDALC,xx,xx,xx,x.x,aaa,x.x,x.x,x.x,·········,aaa,x.x,x.x,x.x*hh<CR><LF>
　　　　①　②　③　④　⑤　⑥　⑦　⑧　　⑨　　　⑩　　　⑪

① Total number of sentences for this message: (01 to 99)
② Sentence number (01 to 99)
③ Sequential message identifier (01 to 99)
④ Number of alert entries
⑤ Manufacturer mnemonic code ⎫
⑥ Alert identifier (3031, 3022, 10003) ⎬ Alert entry 1
⑦ Alert instance ⎪
⑧ Revision counter ⎭
⑨ Additional alert entries
⑩ Alert entry *n*
⑪ Checksum

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13.   Installation Instructions *(continued – 27/28)*

13.4.   Remote Alert Management *(9/10)*

13.4.3.   Alert Interfaces *(7/8)*

13.4.3.2   Software Alert Interfaces *(7/8)*

13.4.3.2.5.   Alert Output Sentences *(3/4)*

(b) $SDALC Cyclic Alert List Sentences *(2/2)*

· When a single active alert exists, a sentence like the following example will be output:

Figure 13-30 $SDALC Sentence Format with Active Depth below Keel Alert – Example *(1/2)*

$SDALC **,** 01 **,** 01 **,** 32 **,** 1 **, ,** 3031 **,** 1 **,** 4 ＊ 19 <CR> <LF>
①   ②   ③   ④⑤   ⑥   ⑦   ⑧   ⑨

① Total number of sentences for this message: 1
② Sentence number: 1
③ Sequential message identifier: 32
④ Number of alert entries: 1
⑤ Manufacturer mnemonic code: null*[1]
⑥ Alert identifier: 3031 (＝depth–below–keel alert)
⑦ Alert instance: 1
⑧ Revision counter: 4
⑨ Checksum: 19 hex

· <u>No active alert entry:</u>
 - $SDALC **,** xx **,** xx **,** 00 **,** 0 ＊ hh<CR><LF>

· <u>Depth–below–keel alert (alarm) entered:</u>
 - $SDALC **,** xx **,** xx **,** xx **,** 1 **, ,** **3022** **,** 1 **,** 1 ＊ hh <CR><LF>

· <u>Power failure alert (warning) entered:</u>
 - $SDALC **,** xx **,** xx **,** xx **,** 1 **, ,** **3031** **,** 1 **,** 1 ＊ hh<CR><LF>

· <u>Bottom–missing alert (caution) entered:</u>
 - $SDALC **,** xx **,** xx **,** xx **,** 1 **,** **JMC** **,** **10003** **,** 1 **,** 1 ＊ hh <CR><LF>

· When two active alerts (ID 3031: depth–below–keel alert and ID 3022: power failure alert) simultaneously exist, a sentence in following example format will be output:

Figure 13-31 $SDALC Sentence Format with Dual Alert Entry – Example *(2/2)*

$SDALC **,** 01 **,** 01 **,** 46 **,** 2 **, ,** 3031 **,** 1 **,** 63 **, ,** 3022 **,** 1 **,** 65 ＊ 6E <CR><LF>
①   ②   ③   ④⑤   ⑥   ⑦   ⑧⑨   ⑩   ⑪   ⑫   ⑬

① Total number of sentences for this message: 1 (example)
② Sentence number: 1 (example)
③ Sequential message identifier: 46 (example)
④ Number of alert entries: 2 (for alert IDs 3031and 3022)
⑤ Manufacturer mnemonic code: null*[1]
⑥ Alert identifier: 3031 (＝depth–below–keel alert)
⑦ Alert instance: 1 (example)
⑧ Revision counter: 63 (example)
⑨ Manufacturer mnemonic code: null*[1]
⑩ Alert identifier: 3022 (＝power failure alert)
⑪ Alert instance: 1 (example)
⑫ Revision counter: 65 (example)
⑬ Checksum: 6E hex (example)

*[1]: *Alert IDs 3031 and 3022 are standardized alerts and this field should be null (IEC 61162–1 paragraph 3.7). For proprietary alert ID 10003, manufacturer code JMC is entered.*

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13.   Installation Instructions *(continued – 28/28)*

13.4.   Remote Alert Management *(10/10)*

13.4.3.   Alert Interfaces *(8/8)*

13.4.3.2   Software Alert Interfaces *(8/8)*

13.4.3.2.5.   Alert Output Sentences *(4/4)*

(c) $SDHBT heartbeat supervision sentence

▪ This sentence is normally output at 120–second intervals in the following example format:

Figure 13-32 Normal Output Format of $SDHBT Sentence – Example

$SDHBT , 120 , A , 0 * 27 <CR> <LF>
　　　　①　　②　③　④

① Configured autonomous repeat interval in seconds: 120 seconds, fixed
② Equipment operating status: A (=Equipment is in normal operation)
  - A = Equipment is in normal operation.
  - V = Equipment is not in normal operation.
③ Sequential sentence identifier[*1] : 0 (example)
④ Checksum: 27 hex (example)

▪ When a query command[*2] is entered via the RS–422 interface port, the format will change like the example below, replacing the repeat interval field ① with a null field.

Figure 13-33 On–Demand Output Format of $SDHBT Sentence – Example

$SDHBT , , A , 9 * 1D <CR> <LF>
　　　①　②　③　④

① Configured autonomous repeat interval: null
② Equipment operating status: A (=Equipment is in normal operation)
  - A = Equipment is in normal operation.
  - V = Equipment is not in normal operation.
③ Sequential sentence identifier[*1] : 9 (example)
④ Checksum: 00 hex (example)

[*1]: *This field provides a message ID number from 0 to 9 that is assigned sequentially and is incremented for each new sentence. After number 9 is reached, the field resets to 0.*
[*2]: *IEC–61162–1 format command, e.g. $CASDQ , HBT * 36 <CR> <LF>*

14. Recommended Spare Parts

‐ A list of the spare parts recommended for the maintenance and servicing for three to five years is given below.

‐ Replacing parts should be done by your dealer or a qualified service engineer.

‐ The part numbers of PCB's to be delivered may slightly change depending on the production lot; however, spare PCB's will be plug–for–plug compatible with the existing ones installed in the unit.

< CAUTION >
There are no user serviceable parts inside the display cabinet. The user should not open the cabinet for inspection, replacing suspected parts, or attempting to change the alignments/hardware settings.

Table 14-1 Recommended Spare Parts

Part Name	Part Number	Quantity
‐ Fuses:		
- for 12V DC operation:	3A/5.2X20mm	2
- for 24V/32V DC operation:	2A/5.2X20mm	2
‐ Connector Plugs:		
- **POWER** Plug:	CP111–3P	1
- **TRANSDUCER** Plug:	HS21P–3	1
- **I/O** Plug[1]:	CP111–8P	1
- **RS–422–A/B** Plug[1]:	HDEB–9S	1
- **ALARM ACK** Plug[1]:	CP111–2P	1
- **ALARM OUT** Plug[1]:	CP111–6P	1
‐ Power Cord (pre–terminated in mating plug):	M402–PW01	1
‐ Printed Circuit Boards (PCBs):		
- Transceiver PCB[2] (50 kHz):	M815–T50	1
- Transceiver PCB[2] (200 kHz):	M815–T200	
- Main PCB:	M815–MAIN–B[3]	1
- Key PCB:	M815–KEY–A[3]	1
‐ TFT–LCD Module (LCD panel):	LQ057AC111	1

[1]: *Not needed unless these connections are used for your installation.*

[2]: *Specify the transducer frequency of your installation when ordering. These boards are designed to match the specified **TOKIN** transducers only. If your system uses one of **ELAC/ATLAS** transducers, ask your dealer for information on appropriate replacement boards. **USE OF A MISMATCHED TRANSCEIVER BOARD CAN DESTROY AN ELAC/ATLAS TRANSDUCER.***

[3]: *Production lot number; subject to change*

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