ELAC Nautik

HYDROGRAPHIC ECHOSOUNDER
HYDROSTAR 4300

Technical Manual

TH 52 596 8001 E

Edition: March 2010

Rev.: 009

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Changes and Document History

Issue	Revision	Contents	Pages	Revised by	Date
Januar 2006	003	New Layout	All	B. Schulze	Jan 06
September 06	004	Changed Layout, Fixed Table 1; Connection to RS422/232 converter added	All	B. Schulze	26.09.06
March 07	005	Added information on output	41	B. Schulze	06.03.07
July 07	006	Picture of connectors added	3	B. Schulze	19.07.07
July 08	007	Power input range	13-14	B. Schulze	25.07.08
December 09	008	Change of Logo	Cover sheet	B. Schulze	01.12.09
March 2010	009	RS 232 input to X4 corrected	4, 10	B. Schulze	08.03.10

Caution

When the equipment is switched on

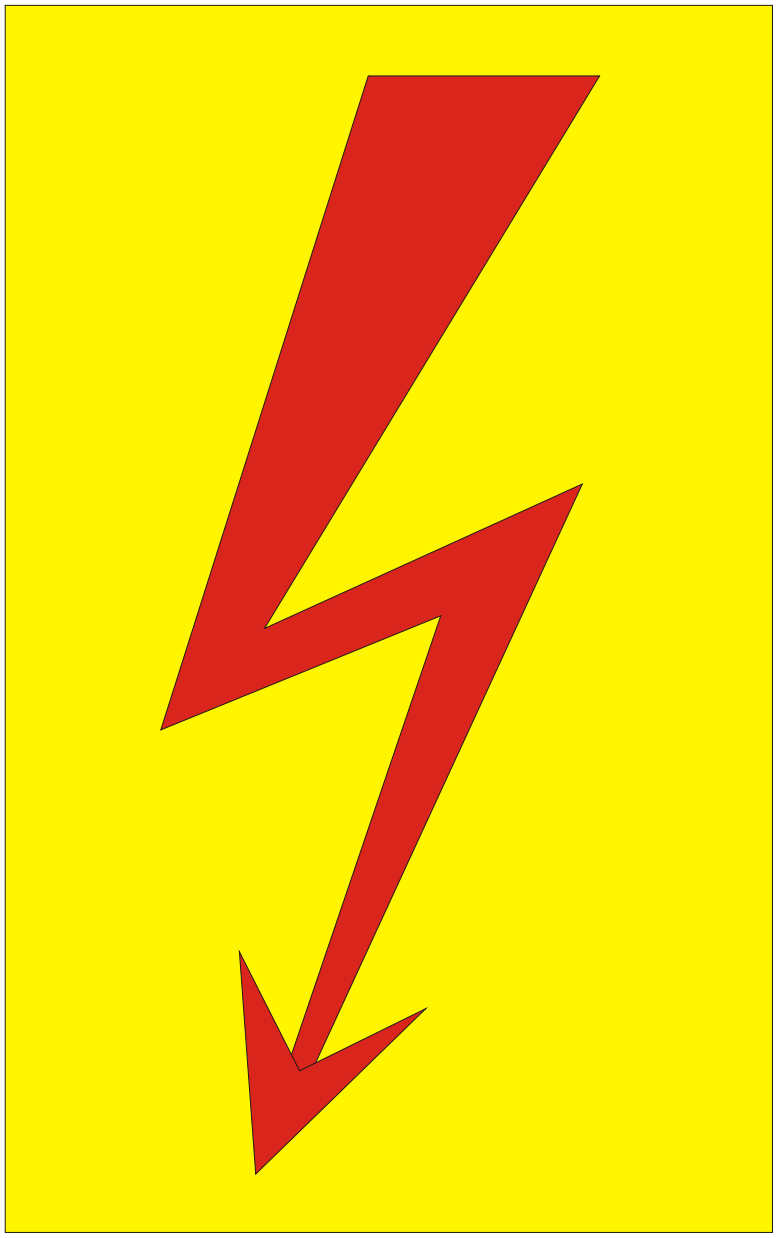
and transducers are activated

no diver

is permitted under water

Caution

Dangerous voltage when operating!



Switch off the Mains voltage before opening the unit.
Do not plug or unplug connectors under voltage.

Fundamental Safety Instructions

General remarks to hydroacoustic equipment **HYDROSTAR 4300:**

Even with a carefully selected transducer position and proper installation, the function of hydroacoustic equipment can be impaired by turbulence, acoustic noise or aerated water.

As main causes, the following can be stated:

- Propeller(s) running reversed;
- Thruster(s) in operation, especially at low speed ahead;
- Engine noise, transferred to the transducer either by the hull structure or through the water, the latter especially as bottom- reflection in shallow water.
- Losing contact with the water in extremely bad weather, as a result of violent pitching;
- Hot water discharges from power plants;
- Cold water layers in several sea areas.

The list above is not complete; we will be pleased to assist with further information on request, see also Chapter 2 Installation.

The **HYDROSTAR 4300** Echosounder has been developed in accordance with state of the art standards and recognised safety regulations. Nevertheless, it may cause a risk to the user and / or third parties, or cause damage to the vessel and or other material property if the following rules are not complied with.

The **HYDROSTAR 4300** Echosounder must be used only in a technically faultless condition in accordance with its designated use and the instructions contained in this Technical Manual.

The **HYDROSTAR 4300** Echosounder is designed exclusively for use as a hydrographic echosounder. Using the system for purposes other than this is considered contrary to its designated use. The manufacturer can not be held responsible for any damage resulting from such misuse. The risk of such misuse lies entirely with the user.

Personnel operating the system must have read the Technical Manual, in particular the section on safety instructions before and during operation. Reading these after starting the system is too late. This especially applies to persons who work with the system only occasionally, e.g. during set-up or maintenance.

Always observe the maintenance/inspection intervals laid down in this Technical Manual.

Use only authorised spare parts and never replace defective fuses with any other ratings than specified.

Switch the system OFF immediately if a defect occurs with the electrical system.

Work on the system must only be carried out by a qualified technician or a specially trained person. Electrical engineering regulations must be observed at all times.

Observe all safety instructions and warnings attached to the system. Ensure that such safety instructions and warnings are always complete, visible and perfectly legible.

Never make any modifications, additions or conversions to the system without the manufacturer's full approval.

If the system is shut down for maintenance or repair, it must be secured against inadvertent switching ON by isolating the system from the mains power supply and attaching a sign to the front plate of the display and control unit stating that the unit must not be switched ON because maintenance or repair work is being carried out.

Always check and /or tighten any screwed connections, e.g. plugs, sockets and terminals, which may have been loosened during maintenance or repair work.

Check the system regularly for defective cables, connections etc.

Alterations within the **SERVICES** menu must only be made by qualified persons. Altering setting within this menu may lead to incorrect depth readings which in turn may lead to loss of life or limb.

Echosounder systems and remote indicators which detect and display the water depth from a single momentary value per transmission pulse, e.g. digital and pointer displays, can, over a period of time, display false readings. This is primarily valid in shallow water areas. For this reason, water depths displayed in this manner must be compared with the graphic presentation. at such intervals as to guarantee the ship's safety.

HYDROSTAR 4300 – Quick start

“ON“ switches the unit on, default display is shown, last settings are active.

“OFF“ switches the unit off if pressed more than 3 seconds.

“MARKER“ produces a vertical annotation of time and position on the paper.

„  **„** clears audible alarm indication.

“DIM“ ▼ or ▲ controls the brightness of keypad, paper and display.

Different menus are available for system settings:

“ENTER“ The **ENTER** key is used to call up menus and to confirm alterations.

“  “ The cursor keys select functions and are used to alter parameters.

Selected functions or parameter are highlighted.

“ESCAPE“ is used to abort alterations or to leave menus.

Four direct accessible menus are provided:

“RANGE“ enables manual range selection, phased ranges (50 m) or **AUTO** range (25 m).

“GAIN“ Default is **AUTO** gain; manual gain setting can be selected using cursor 

“PRINTER“ controls the paper recording speed (fast, slow, off). Furthermore it is used to select paper scale marks (5, 10, 20, 50 marks) and leads to the **MARKER** menu.

“GATE“ manual GATE setting for digitisation or **BOTTOM TRACK**, both with paper marking.

Table of content

1. Introduction

General Description

The HYDROSTAR 4300 is a single beam echo sounder designed specifically for hydrographic surveying. Bottom traces are printed on thermally sensitive paper, along with date/time, geographic position and other information selected by the operator. Depth and position data may also be output to an optional external display or other units, such as a computer or data recorder, via serial link. The system accepts motion and position data inputs from motion sensors (TSS, SeaTex) and navigation systems (GPS).

Operating parameters and options are entered through a pushbutton keyboard through hierarchical selection menus. Menus are displayed on a liquid crystal display (LCD). When not used for menu selection, the LCD shows depth, time, date, position (if available), and depth alarm settings (if enabled). Figure 1-1 shows the front of the Control/Display Unit.

Presentation of water depth is made as either

- DBK depth below keel
- DBT depth below transducer
- DBS depth below surface

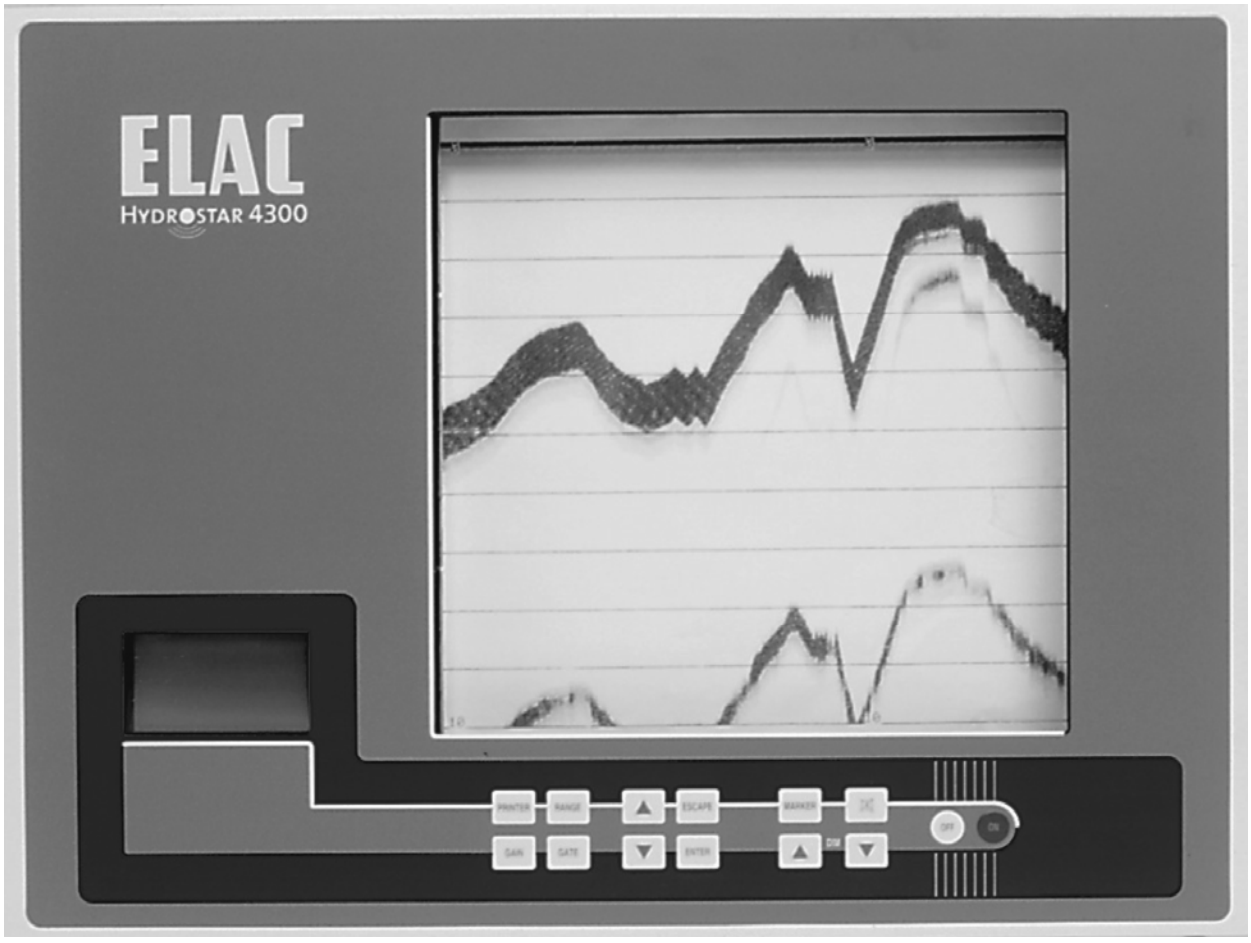


Figure 1-1 HYDROSTAR 4300 Display and Control Unit

System Configuration

The HYDROSTAR 4300 system includes a control/display unit, a transducer, power and data cables, and a transducer mounting kit. The control/display unit is mounted in a portable case and includes transmission and reception circuitry and power supply, chart recorder, data entry keypad and an LCD to display menu selections and operating data. The control/display unit is designed for portability but may be mounted in an optional tilting bracket or set into a console or control panel for permanent installation. The power cable is fitted with insulated alligator clamps for connection to any automobile or marine battery.

In general the HYDROSTAR 4300 is a single/dual frequency echo sounder operating at 28, 30, 33, 38, 50, 100, 200 or 210 kHz or as dual frequency unit. The system is normally configured for single-channel 200 kHz operation or a dual channel (30 kHz/200 kHz) transducer. Standard transducer cable length is 8 meters; extra length cables are available at extra cost. An external digital display unit (model DAZ-25) may be connected for remote depth readout.

Optional Equipment

The standard unit comes with a 200 kHz transducer, other possibilities are

- Transducers of different frequencies, e.g. 28, 30, 33, 38, 50, 100, 200, 210 kHz

or
- Dual frequency transducer LSE 218-10 at 30/200 kHz.
- Digital slave display

External Interfaces

The HYDROSTAR 4300 employs the following interfaces to receive and transmit data:

- RS 422 or RS232, NMEA navigation data and annotation input (e.g. GPS) (Connector X4)
- RS 232 digital or analogue heave sensor input, external marker signal (Connector X5)
- RS 422 digital slave display unit and relay closure for external alarm (Connector X8)
- RS422 or RS232 NMEA Data output (Connector X8)

All interface connections are made on the right side of the unit. Figure 1-2 shows a diagram of the system configuration, Fig 1-3 shows the connectors. Connector pin-outs are listed in Table 1. Message formats are listed in Chapter 7, Serial Input/Output Message Formats.

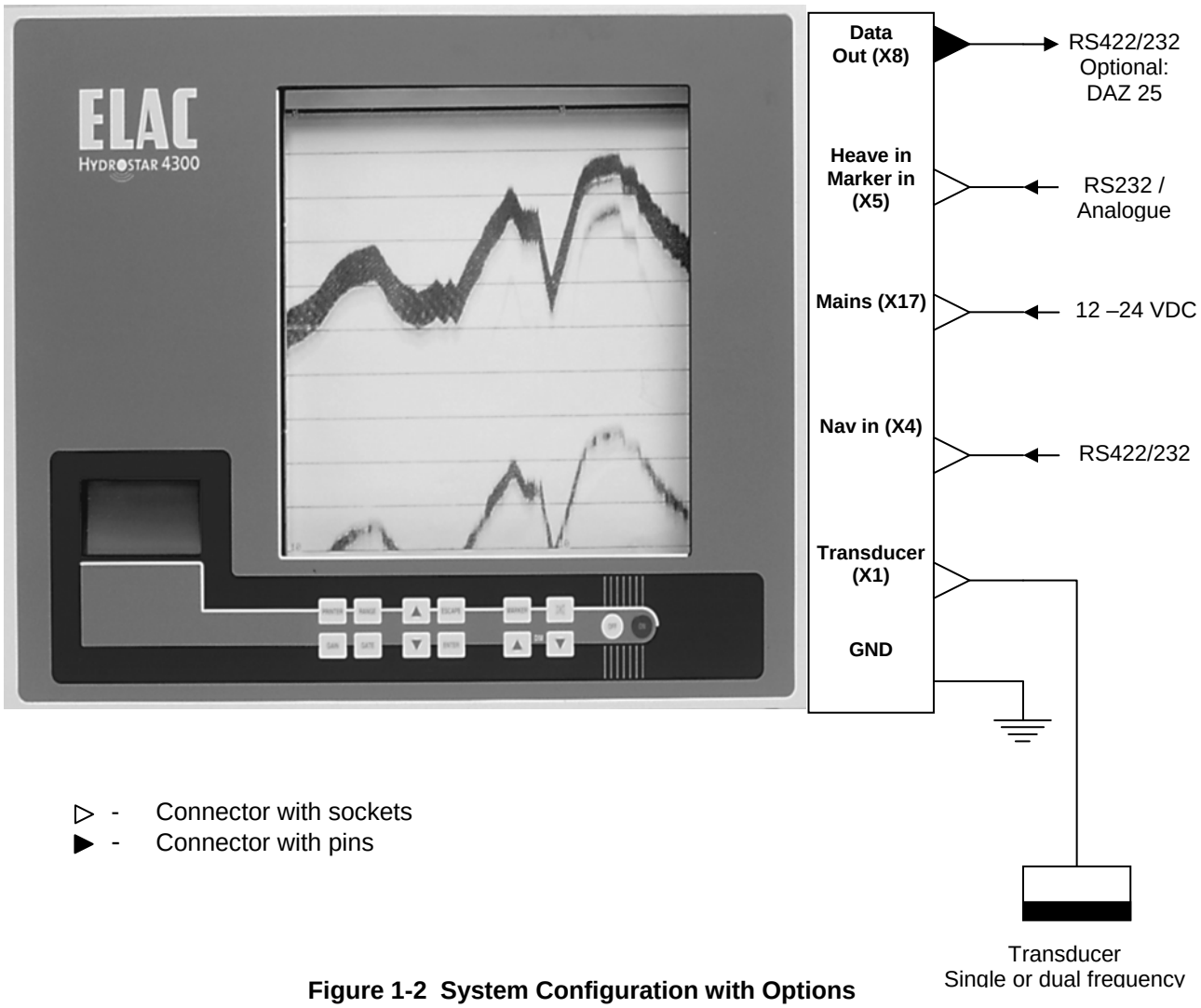


Figure 1-2 System Configuration with Options

Figure 1-3 Output connectors

	NAV IN	MARKER IN HEAVE IN	TRANSDUCER	MAINS	DATA OUT
Pin	**X4**	**X5**	**X1**	**X17**	**X8**
1	RxD+ (RS422) or GND (RS232)	Heave signal	LSE 1 High Frequency (200 kHz)	+DC 12-24 V	n.c.
2	RxD- (RS422) or RXD (RS232)	Heave ground	LSE 1 High Frequency (200 kHz)	GND in	n.c.
3	n.c.	Marker ext.	LSE 2 Low Frequency (30 kHz)	GND in	TXD + (RS422)
4	n.c.	Marker ext.	LSE 2 Low Frequency (30 kHz)	+DC 12-24 V	TXD RS232
5	n.c.	Ground RS 232	Shield	---	Alarm A **
6	n.c.	Heave RxD RS 232	---	---	START
7	---	n.c.	---	---	STOP
8	---	n.c.	---	---	TXD – (RS422)
9	---	---	---	---	Alarm B
10	---	---	---	---	n.c.
11	---	---	---	---	DAZ 25 Power +
12	---	---	---	---	n.c.
13	---	---	---	---	n.c.
14	---	---	---	---	GND RS232
15	---	---	---	---	DAZ 25 Power -

Table 1: Pin-out Connections

LEGEND: n.c. = not connected

--- = not available

Floating Transistor output Blanking + : open Collector

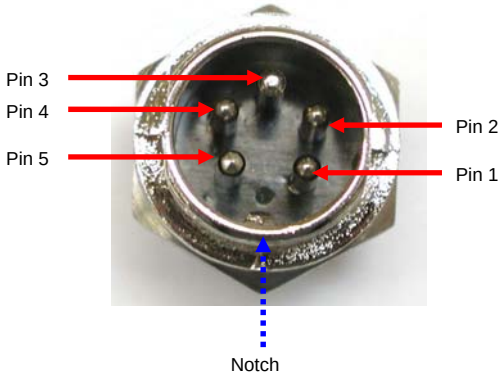
Blanking - : open Emitter

** Alarm relay, normal open; contact rating: Umax 28 VDC

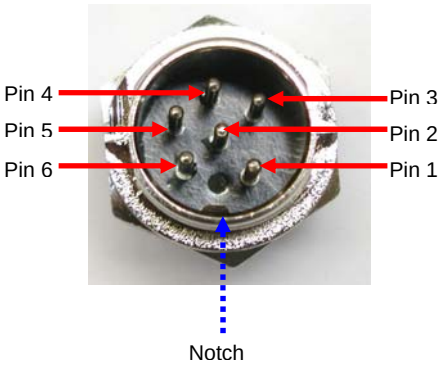
Imax 1 A

Max. switching Power: 5W

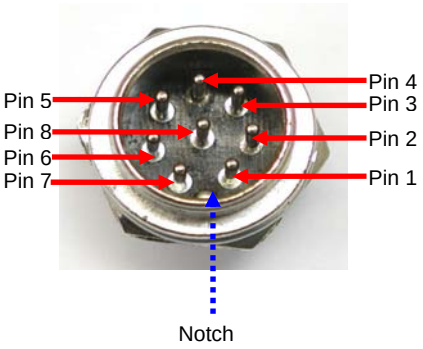
Pin Layout of the connectors:



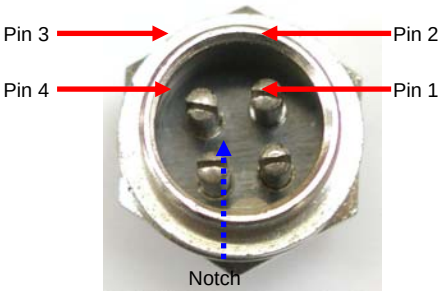
X1 – Transducer (5-way Connector)



X4 – Nav In (6-way Connector)



X5 – Marker/Heave In (8-way Connector)



X17 – Mains (4-way Connector)

Technical Data

Operating Power	12 to 24 VDC; nom. 24 VDC @ 2.5 A (peak current > 6 A); AC supply by an external power supply
Power consumption	Approx. 30 W
Operating temperature	0° C to + 55° C (0° to 130° F)
Housing	Aluminium case
Protection code	IP 53
Transducer impedance	50 to 150 Ω
Pulse lengths	0.3; 1; 3 ms, (set by range scale)
Depth ranges (meters)	0-5 m 0-10 m 0-25 m 0-50 m 0-100 m 0-250 m 0-500 m 0-1000 m or the equivalent in feet or fathoms
Phased ranges	0-50 m, 50-100m, up to 450-500 m
Autophase	25 m window centred on the actual depth, Up to max. 500 m
Digital depth information	150 % of the selected range
Resolution	centimetre resolution up to 50 m decimetre resolution up to 250 m
Accuracy	+/- 0.5%
Echo information display	Digital depth on display; Serial output via NMEA 0183 message; Graphic presentation on thermo sensitive paper
Paper characteristics	Paper width: 214 mm, Length of paper roll: 27 m
Soundings /s	Range dependent,

Range(m)	Soundings / s
5	12,5
10	12,5
25	5
50	5
100	2.5
250	1
500	0.67
1000	0.4

Paper advance fast	Range dependent

Range(m)	Paper Advance (mm/min)		
	slow	normal	fast
5	43,5	87	174
10	43,5	87	174
25	17,5	35	70
50	17,5	35	70
100	8,75	17,5	35
250	3,5	7	14
500	1,75	3,5	7
1000	0,875	1,75	3,5

Thermal printer head resolution	1600 dots, 8 dots/mm
Scale lines	selectable 5, 10, 20 or 50 lines
Display size (Operational display)	60 mm*32.5 mm, 128*64 dots
Depth correction	Transducer - Surface :Draft up to 9.9 m
	Transducer - Keel: Trim up to 4.9 m
Standard frequencies	28, 30, 33, 38, 50, 100, 200, 210 kHz
Two channel version	Any combination of the frequencies above
Output power	range and transducer dependent
	up to approx.1000 W
Dimensions	47 x 35 x 21 cm
Weight	approx. 17 kg

Electromagnetic Compatibility

The HYDROSTAR 4300 conforms to specifications laid down in DIN* EN 60945, version September 1997, Maritime navigation and radio communication equipment and systems.
The declaration of conformity, in accordance with European Community guideline 89/336/EG, is shown in Figure 1-3.

- DIN (**D**eutsches **I**nstitut für **N**ormung) = German Standards Institute

communications
ELAC Nautik

EC-Approval

This is to confirm that the product

HYDROSTAR 4300

is manufactured according to the essential protection regulations regarding electromagnetic compatibility issued by the Council of the European Community for alignment with the individual statuary orders of the several EC members (89/336/EWG).

This declaration is valid for all units manufactured according to the actual valid production drawings at the issuing date of this approval.

The following standards have been applied regarding the electromagnetic compatibility of the product:

DIN EN 60945; edition September 1997
Navigation and communication units and -systems for seagoing vessels

This declaration is issued for

L-3 Communications ELAC Nautik GmbH
Neufeldtstraße
D-24118 Kiel

Gerhard Zinke ..... EMV-Manager

Kiel,
August 99

.....
Dr.L. Hogrefe/General Manager

Figure 1-1 Copy of the Original Declaration of Conformity

2. Installation

The **HYDROSTAR 4300** is a portable echo sounder, but may be mounted into a rack, using the 4 holes at the backside of the unit. In any case the echo sounder must be grounded by connecting the earth screw of the **HYDROSTAR 4300** to the ship's hull. This connection should be made using a cable with at least 2.5 mm^2 diameter. For clear display readings a viewing angle of ± 50° perpendicular to the display is recommended. No direct sun should influence the visibility of the display.

The transducer should be installed near the ship's keel. Points to remember when installing a transducer are:

- Turbulence in the water can affect the reliability of the soundings. Choose a location for installation where turbulence is at a minimum. Never paint the active surface of the transducer.

After the installation of the transducer, the system has to be set up to account for:

- Transducer installation depth below the water surface.
- Transducer installation height relative to the lowest part of the ship's keel.
- Blocking depth, a setting to prevent false depth readings caused by resonance of non-ELAC transducers**. This setting should always be Zero if an Elac transducer is used.**
- Frequency of the transducer(s).
- Installation position of the transducer, e.g. BOW, AFT, Port, Starboard, (if a dual frequency transducer is installed).

If a transducer is installed in dry dock, the height difference between the active transducer surface and the lowest part of the keel and the distance between the waterline and the transducer surface should be measured. These data are needed to compensate the differences when the system is initially set up. The transducer frequency can be found in the shipping papers.
Connect the system and peripheral equipment, i.e. external PC, remote display unit etc. in accordance with the Hydrostar LAZ 4300 circuit diagram which can be found in Chapter 8 "Relevant drawings" of this Manual.

Connection to a Computer

The Hydrostar 4300 can be connected to a PC or GPS using a RS232 or RS422 interface. Depth data can be send out and position data or annotations can be send into the echo sounder. This is especially useful if a Hydrographic Survey Software (like Hypack Max) is used to collect the depth data and annotate the paper in the HS 4300.

Use the **Nav In** (Connector X4) connection to **input data** (from a GPS or Software) into the echo sounder.
Use the **Data out** (Connector X8) to **output depth data** via a serial line to a PC or other equipment.

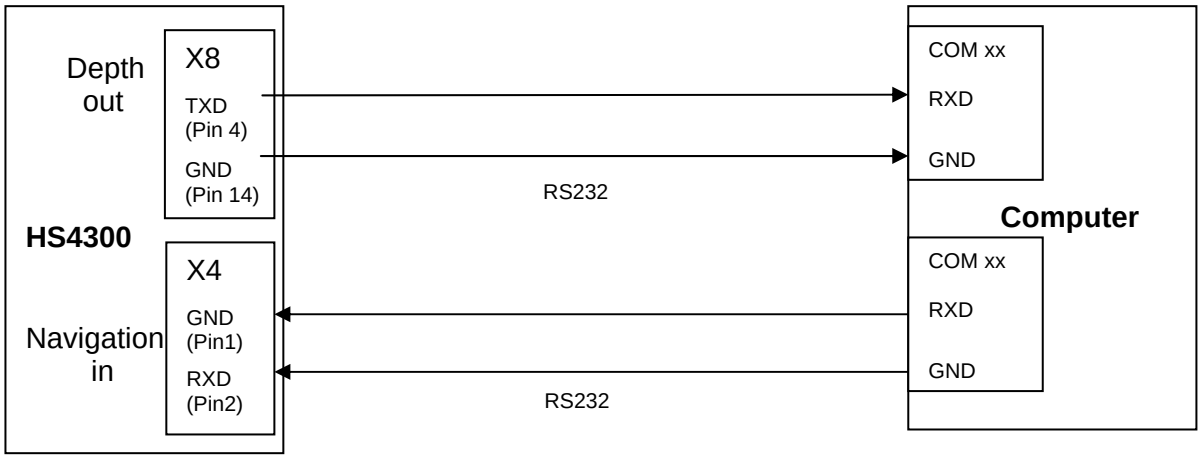


Figure 2-1: Serial connection to a Computer using two COM ports

Another possibility is to use one COM port on the PC. Then a connection looks like this:

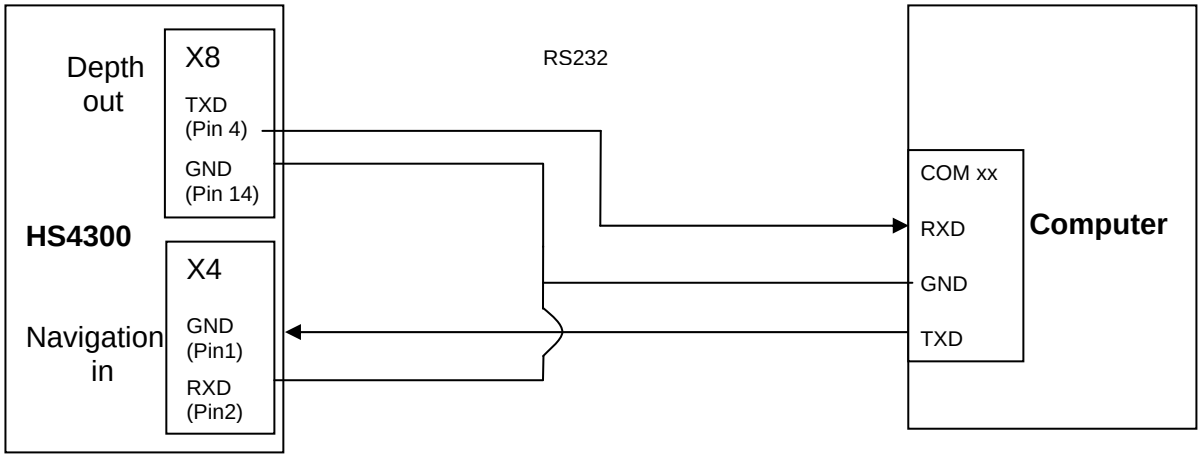


Figure 2-2: Serial connection to a computer using one COM port

The HydroStar 4300 can be connected to a PC via a RS232/422 Converter in case long distances (> 10 m) between the echo sounder and the PC need to be covered (Figure 2-3).

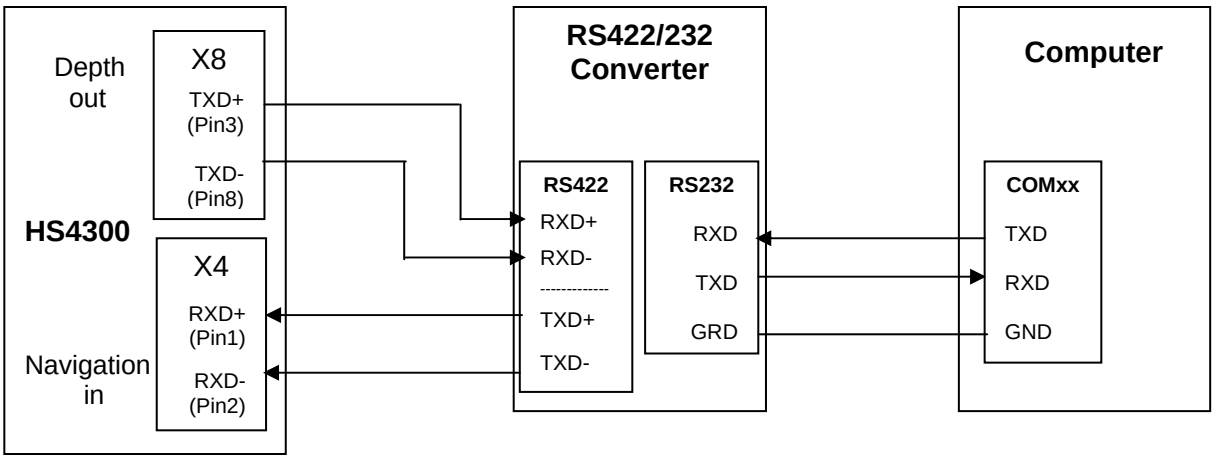


Figure 2-3: Serial connection to a computer using a RS232/422 converter

When using a RS422/232 converter:

- The cable between the converter and the computer is normally described in the manual. It is however a standard RS232 cable, but due to the fact that you have 3 degrees of freedom (DB9 or DB25 on either side and null-modem or "straight") it is difficult to specify.

- The cable between the converter and the HydroStar 4300 is a bit more complex. First of all, there is no real standard pin-out for RS422 interfaces and no standard connector. So you need to look at the manual of the converter and find out which pins or terminals are RXD+, RXD-, TXD+ and TXD-. It is paramount to connect RXD- with TXD-, and RXD+ with RXD- for both directions of data flow.

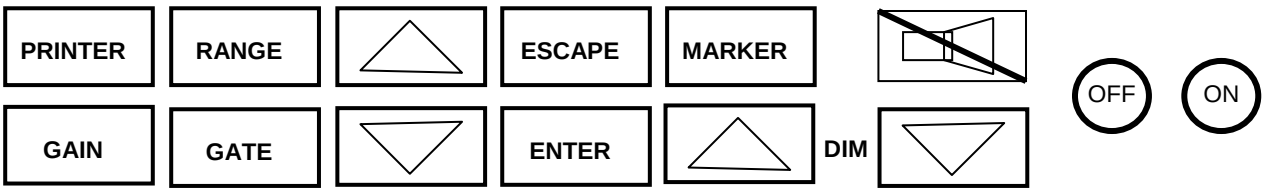
RS232 cables are pretty prone to electromagnetic influx, so keep RS232 cables short. RS422 cables are conveying digital data as differential voltages, so they are much more resilient against any influx. If longer cables are needed (> 15 m length), use RS422 cables.

A complete pin-out information of HydroStar4300 can be found on page 2 (Table 1).

3. Operating Instructions

All equipment settings are made through menu entries displayed in the LCD window to the left of the front cover pushbuttons. The figure shows the pushbutton arrangement. Button functions are described below.

Switching the system ON/OFF



Switching ON

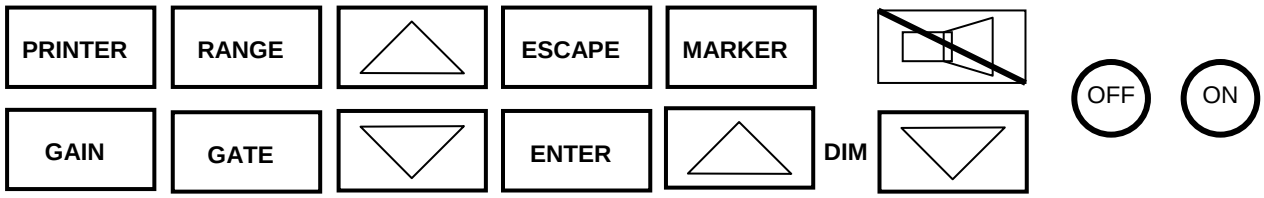
Before energising the echo sounder, ensure that there is sufficient paper on the supply roll (left side of chart recorder mechanism). If necessary, install a new roll of chart paper following the directions in Chapter 5, Equipment Maintenance. If moored or at anchor, verify that diving operations are not being conducted in the vicinity of the vessel. Do not energise the echo sounder in dry-dock; transducers should not be pulsed in air.

To switch the system on, press and release the **ON** button. The system will switch **ON** and load the parameter settings which were selected when the system was last switched **OFF**. Press the DIM selector (up or down) to set the desired level of LCD backlighting.

Switching OFF

The echo sounder has a time delay power down feature to prevent accidental shutdown. Press and hold the **OFF** button for at least three seconds, until the LCD display screen and chart lighting goes dark. All parameters entered prior to shutdown are stored in non-volatile memory and are recalled when the system is powered up again.

Front panel operator controls



- **CURSOR**: Used to move within a **MENU** or to alter parameters.
  The cursor may be used to select from a range of numbers (0, 1, 2,…9) or toggle through choices in sequence(on/off; fast, slow, stop). Cursor position is indicated where the word, letter or number appears as light text on a dark background. A parameter must be selected with the cursor before it can be changed.

- **ESCAPE**: Used to leave a menu or to abort parameter settings.

- **ENTER**: Used to call up menus or confirm parameter settings within menus.

- **DIM**: (Horizontally arranged) Used to set the display backlighting level, keypad and recorder illumination.

- **MARKER**: When pressed, causes a vertical annotation of date and time and position to be printed on the chart.

- **ALARM**: (Loudspeaker symbol) Used to acknowledge audible depth alarms.

- **GAIN**: Selects automatic gain control or a manual gain level.

- **RANGE**: Selects basic depth scales, depth gated scales, or auto phase scale mode

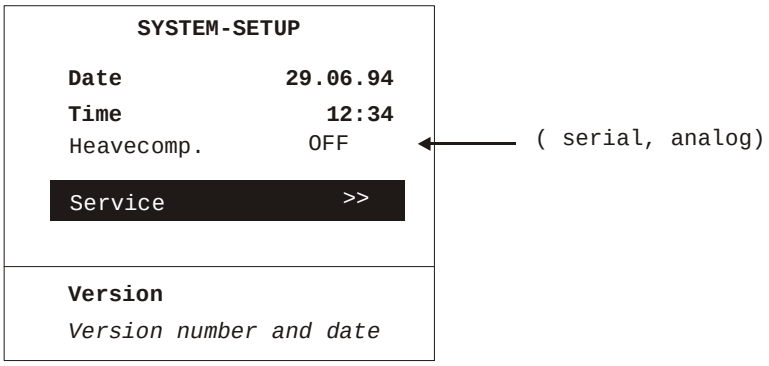
- **PRINTER:** Sets paper speed to normal, fast, slow or stop. Number of scale lines can be selected. Access to the Marker menu.

  NOTE: The printer electronic is equipped with a “paper present” sensor; no recording or motor movement is possible in the absence of paper.

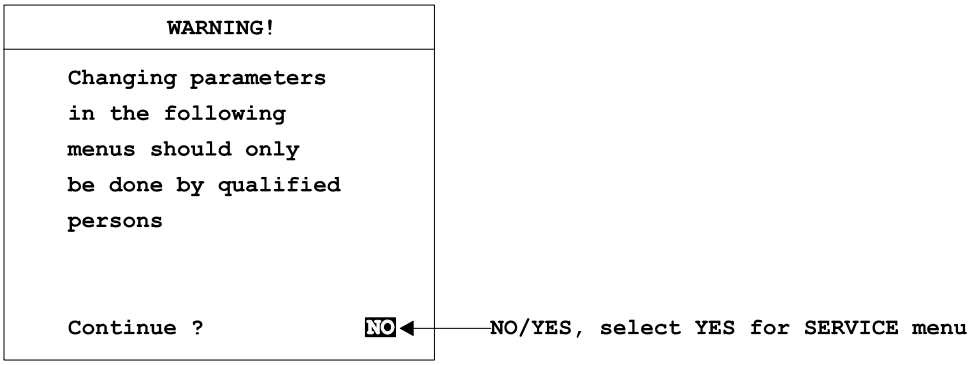
- **GATE:** Selects manual start gate or bottom tracking gate.

Initial System Set-up

Once the system has been installed, the initial set-up can be carried out. Refer to Section 3.4.7 Example to learn how to operate the menus.
Call up the **SYSTEM SET-UP MENU** by pressing the **ENTER** key four (4) times. When the **SYSTEM SET-UP MENU** appears on the display area, press the **CURSOR** ↓ key three (3) times so that the word **Service** is highlighted as shown below.



Press the **ENTER** key and the **WARNING** shown below will appear.

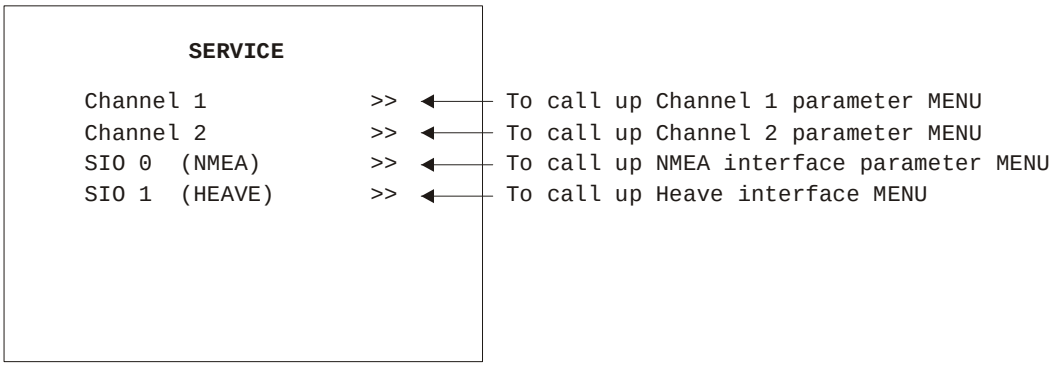


Access to the **SERVICE MENU** is gained by pressing any **CURSOR** key. The word **NO** will change to **YES**. Press the **ENTER** key and the **SERVICE MENU** will appear as shown below.

WARNING

Only qualified service technicians are allowed to alter these system settings. If you are not authorised to alter these settings, DO NOT continue. Press either the ENTER or ESCAPE key to return to the SYSTEM SET- UP menu.

IMPROPER PARAMETER CHANGES COULD RESULT IN ERRONEOUS DEPTH READINGS, POSSIBLY ENDANGERING THE VESSEL.



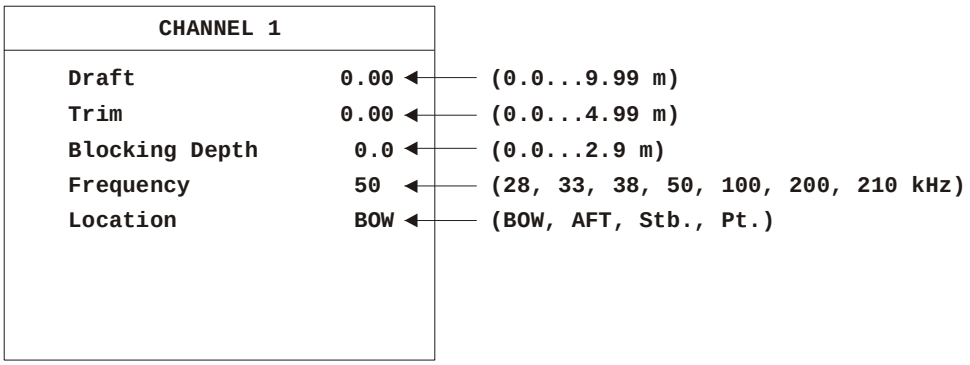
The **SERVICE MENU** allows accessing the following sub-menus:

Channel 1 -	Selection of **Draft**, **Trim**, **Blocking Depth**, **Frequency** and **Location** for **Channel 1** transducer.
Channel 2 -	Selection of **Draft**, **Trim**, **Blocking Depth**, **Frequency** and **Location** for **Channel 2** transducer, if fitted. If no 2nd Channel is fitted, this **MENU** is not available
SIO 0	Selection of parameters for data transfer.
SIO 1	Heave data input. Additionally for test purposes by ELAC Technicians.

Channel 1 menu (High frequency)

To set or change parameters for Channel 1, activate **CHANNEL1 MENU**, as follows:

- Call up the **SERVICE MENU** as described previously
- **CURSOR ↓** (1x, to mark **Channel 1**)
- **ENTER** (1x, to call up the Channel 1 parameters **MENU** as seen below)



The following parameters can be set:

- **Draft** Transducer installation depth is entered here, i.e. the depth of the transducer below the waterline, e.g. 5.61 m. This compensation allows accurate surface to sea bed soundings.

- **Trim** Distance between the transducer and the lowest part of the keel is entered here, e.g. 0.33 m. This compensation allows accurate keel to sea bed soundings.

- **Blocking depth** Prevents false digital depth readings caused by the effects of resonance of non-ELAC transducers. If the water depth is less than the depth set here, the digital display will show „?“ but the analogue depth reading will be displayed correctly on paper.

- **Frequency** Transducer frequency is entered here, e.g. 50 kHz.

- **Location** Position of the transducer is entered here, e.g. BOW**.**
  This parameter can not be altered for single channel systems.

To change **Draft** setting, press the following keys:

- Call up **CHANNEL 1 SUB MENU** as described previously
- **CURSOR** ↓ (1x, to mark the word **Draft**)
- **ENTER** (1x, to mark the 1st digit)
- **CURSOR** ↓ or ↑ (to alter the meter (1st digit) setting)
- **ENTER** (1x, to confirm selection and jump to 2nd digit)
- **CURSOR** ↓ or ↑ (to alter the 1/10th of a metre (2nd digit) setting)
- **ENTER** (1x, to confirm selection)
- **ESCAPE** (2x, to leave the **MENU**)

To change **Trim** setting, press the following keys:

- Call up the **CHANNEL 1 SUB MENU** as described previously
- **CURSOR** ↓ (2x, to mark the word **Trim**)
- **ENTER** (1x, to mark the 1st digit)
- **CURSOR** ↓ or ↑ (to alter the meter (1st digit) setting)
- **ENTER** (1x, to confirm selection and jump to 2nd digit)
- **CURSOR** ↓ or ↑ (to alter the 1/10th of a metre (2nd digit) setting)
- **ENTER** (1x, to confirm selection)
- **ESCAPE** (2x, to leave the **MENU**)

To change **Blocking Depth** setting, press the following keys:

- Call up the **CHANNEL 1 SUB MENU** as described previously
- **CURSOR** ↓ (3x, to mark the word **Blocking Depth**)
- **ENTER** (1x, to mark the 1st digit)
- **CURSOR** ↓ or ↑ (to alter the meter (1st digit) setting)
- **ENTER** (1x, to confirm selection and jump to 2nd digit)
- **CURSOR** ↓ or ↑ (to alter the 1/10th of a meter (2nd digit) setting)
- **ENTER** (1x, to confirm selection)
- **ESCAPE** (2x, to leave the **MENU**)

To change **Frequency** setting, press the following keys:

- Call up the **CHANNEL 1 SUB MENU** as described previously
- **CURSOR** ↓ (3x, to mark the word **Frequency**)
- **ENTER** (1x, to mark the frequency selected e.g. 200)
- **CURSOR** ↓ or ↑ (to alter the setting)
- **ENTER** (1x, to confirm selection)
- **ESCAPE** (2x, to leave the **MENU**)

NOTE: The new setting has to be activated by re-starting the system (i.e. switch the system OFF and ON again).

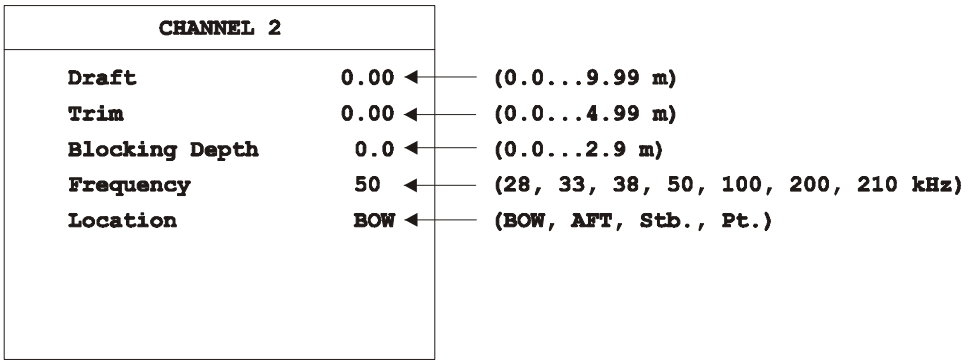
To change **Location** setting, press the following keys:

- Call up the **CHANNEL 1 SUB MENU** as described previously
- **CURSOR** ↓ (5x, to mark the word **Location**)
- **ENTER** (1x, to mark the location selected e.g. BOW)
- **CURSOR** ↓ or ↑ (to alter the setting)
- **ENTER** (1x, to confirm selection)
- **ESCAPE** (2x, to leave the **MENU**)

Channel 2 menu (Low frequency)

To set or change the parameters for Channel 2, call up the **CHANNEL 2 MENU**, as follows:

- Call up the **SERVICE MENU** as previously described
- **CURSOR ↓** (2x, to mark **Channel 2**)
- **ENTER** (1x, to call up the Channel 1 parameters **MENU** as seen below)



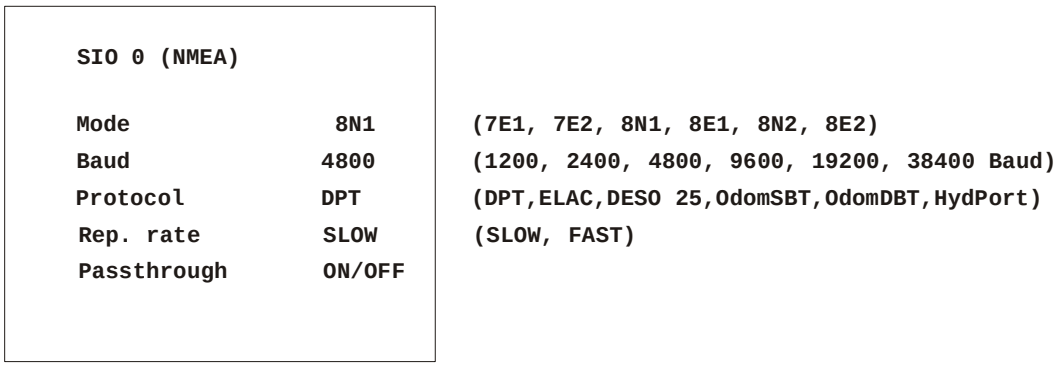
Proceed from here in exactly the same way as described for **Channel 1** settings.

SIO 0 menu

To call up the **INTERFACE MENU** (SIO 0) proceed as follows:

- Call up the **SERVICE MENU** as described previously
- **CURSOR ↓** (3 or 4x, to mark the SIO)
- **ENTER** (1x, to call up the **INTERFACES SUB-MENU**)

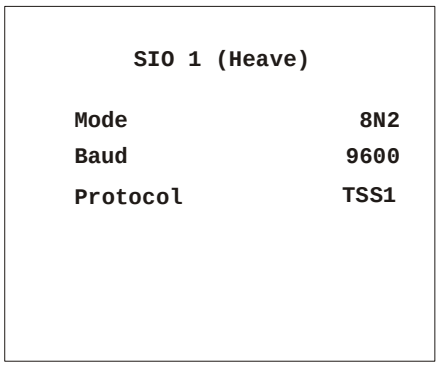
The **INTERFACE MENU** for SIO 0 is shown below.



If **Passthrough** is set to **On**, the NMEA input data from X4 are sent to Data Out X8 if the time interval is sufficiently large. The output of the depth data in any case has priority.

SIO 1 menu

The **INTERFACE MENU** for SIO 1 is shown below.



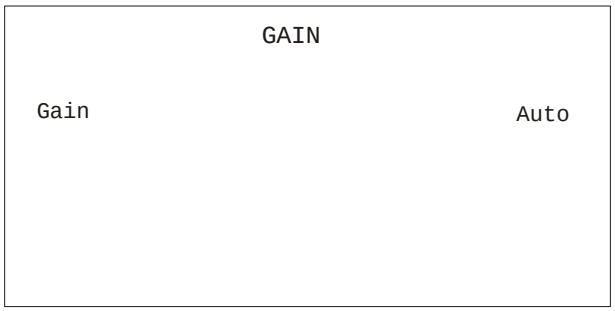
Note: The Protocol **ELAC** is only applicable for dual channel units, see also chapter "Description of Interfaces".

These system parameters need to be checked and/or changed every time the system is installed on a new ship. (E.g. with new transducer locations or when a transducer is replaced by a different type).

Selecting equipment parameters
GAIN, RANGE, GATE and PRINTER Settings

GAIN (amplification), **RANGE** (depth range), **GATE** and **PRINTER** settings are made by pressing the relevant keys. With these keys dedicated menus are opened directly any time if no other menu is in the edit status:

GAIN:



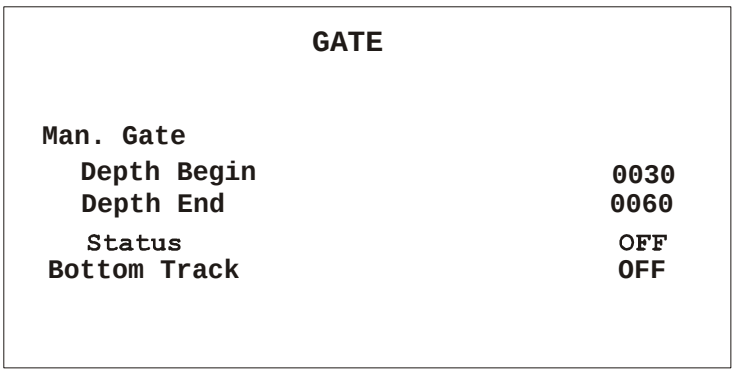
The **GAIN** menu allows the selection of **AUTO** mode or manually setting of a specific gain (amplification) level. Repeated pressing of the **GAIN** pushbutton cycles the menu between **GAIN** and **AUTO**. In **GAIN** mode, press the cursor to change the gain in 3 dB steps. When the desired level is displayed, press **ENTER** to store the value and exit from the **GAIN** menu
In **Auto** mode the gain is controlled automatically by an automatic gain control circuit. No further settings are necessary here.

RANGE:

The **RANGE** menu offers fixed depth scales, a selection of 50-meter range spans, and Autophase. In Range mode, bottom echoes down to the selected depth are processed. In Phase mode, only those echoes detected within the selected range span are processed. In Auto Phase, the bottom echo is automatically positioned within a 25-meter depth window centred at mid chart if the bottom trace starts to leave the chart recording limits. Range scales are: 5, 10, 25, 50, 100, 250, 500 and 1000 m. Phase scales can be set to: 0-50, 50-100, 100-150, 150-200, 200-250, 250-300, 300-350, 350-400, 400-450 and 450-500 m.

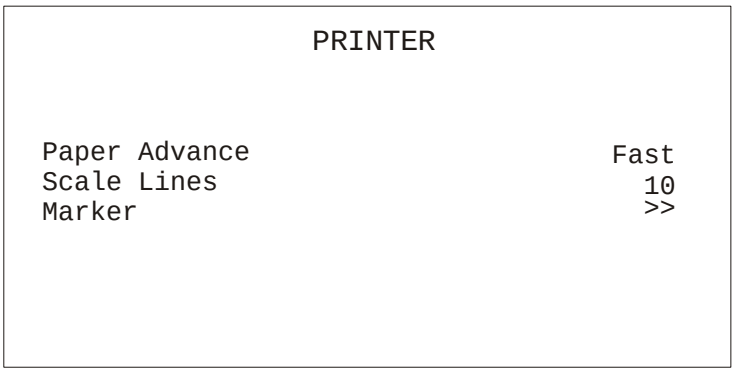
In **RANGE** mode, press the cursor keys until the desired range value is displayed. Press **ENTER** to store the value. In **PHASE** mode, press the cursor keys until the desired range scale is displayed, and press **ENTER** to store it. In **AUTO PHASE** mode, press the cursor key to select either OFF or ON, then press **ENTER** to store the selection and exit from the RANGE menu. To use this function, enter a depth value and select Status ON. Set the Bottom Track function to ON to print a mark above the digitised echo.

GATE:



The **GATE** menu offers the possibility to select a manual gate setting, which will activate digital bottom acquisition at the beginning of the gate depth. To use this function, enter an appropriate **DEPTH** value and set the **STATUS** to “ON”. With the **BOTTOM TRACK** function set to ON, the printing of a mark above the echo digitised can be activated, see Chapter 4.

PRINTER:



The **PRINTER** menu controls paper advance on/off, paper speed and the scale lines interval printed on the paper. Toggling the cursor (🡻 or 🡹) selects 5, 10, 20 or 50 meter depth interval lines. Toggling Paper Advance with the cursor key selects OFF, FAST or SLOW. (***Note:*** actual paper speed under the thermal printer head is controlled by the selected depth scale; FAST or SLOW relates to the paper speeds available for a depth scale.)

The **MARKER** submenu appears when **MARKER** (**>>**)on the **PRINTER** menu is highlighted and **ENTER** is pressed. The **MARKER** submenu has four parameters: Type, Start Index, Auto, and Interval.

- **Type** selects the type of data that is printed in the annotation line. Selection is between position or depth information.
- **Start Index** determines the start value of the annotation line index number.
- When **Auto** is set to On, the annotation line is printed starting on the next minute from the internal clock (internal clock settings are made during system installation and are not normally available to the operator). Sequential annotation lines are printed periodically as determined by Interval spacing.
- **Interval** spacing is entered in minutes and seconds. Several write cycles are needed to print a complete annotation line. If the interval is set too short, the annotation text will be illegible due to overprinting. The elapsed time between two writing cycles is determined by the soundings/second rate and thus dependent on the depth scale.

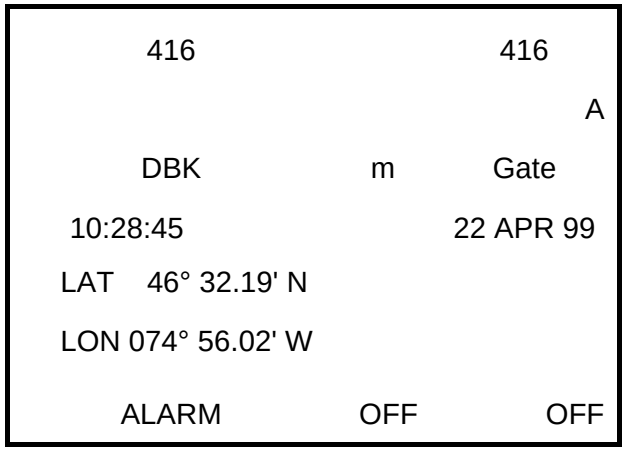
Each annotation writing event requires six ping cycles. If the paper speed is set to “Low”, only every other sounding is recorded, but 12 soundings are necessary to allow printing a complete annotation line.
However, if Interval is left at 00:00, a single annotation line is printed at the beginning of the minute. The interval value entered by the user is taken over for processing after the actual interval has expired, which means that after filling in a new value for the interval, one additional annotation will be printed in the old interval. If the interval is set to 00:00 with Auto set to On, one additional annotation line is printed before the annotation stops.

Note: When using the external annotation feature (see chapter 6), set "Auto" to "off", otherwise the auto marker function and the annotation function may mutually interfere.

All other parameters and settings are entered within so called **MENUS**, as described in the following Chapter 3.4.2.

ALARM, PARAMETER, CALIBRATION and SYSTEM SET-UP Menus

The primary LCD screen (Liquid Crystal Display) shows the main display with general information.



Additionally to the main display 4 other main menus are available. These can be called up by pressing the **ENTER** key.
The order in which they appear is as follows:

- Press the **ENTER** key 1x - **ALARM MENU**
- Press the **ENTER** key 2x - **PARAMETER MENU**
- Press the **ENTER** key 3x – **CALIBRATION MENU**
- Press the **ENTER** key 4x - **SYSTEM SET-UP MENU**

If the **ENTER** key is pressed 5x, the main display will re-appear.

When a menu is selected, the title will be highlighted, i.e. it will appear as inverse text. When highlighted, the menu can be left by pressing the **ESCAPE** key 1x, or to change to another menu by pressing the **ENTER** key 1x or more often until the desired menu appears. If parameters or settings have been altered within a menu, the **ESCAPE** key may have to be pressed more than 1x in order to either return to the title line or to leave the menu completely. The **ESCAPE** key can also be used to abort parameter selections.

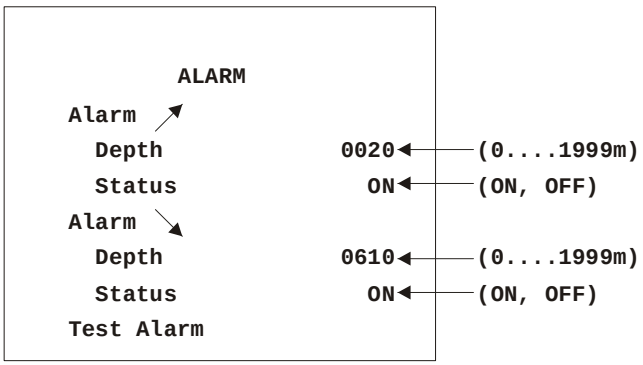
A detailed example of altering system settings and parameters within a menu can be seen in Chapter 3.4.7 "Example: Changing Parameters Within a Menu". It is recommended that the operator becomes thoroughly familiar with the procedures for selecting menus and making entries.

WARNING: The SYSTEM SET-UP menu should be activated only by qualified installation and maintenance personnel.

The ALARM Menu

The system can be set so that an audible alarm sounds if the water becomes shallower than a set minimum value or deeper than a set maximum value. This depth is always measured from the ship's keel.

To call up the **ALARM MENU**, press the **ENTER** key once.



This **MENU** is used to set, select or test the following:

- Set Minimum Depth Alarm
- Set Maximum Depth Alarm
- Test the Alarm system

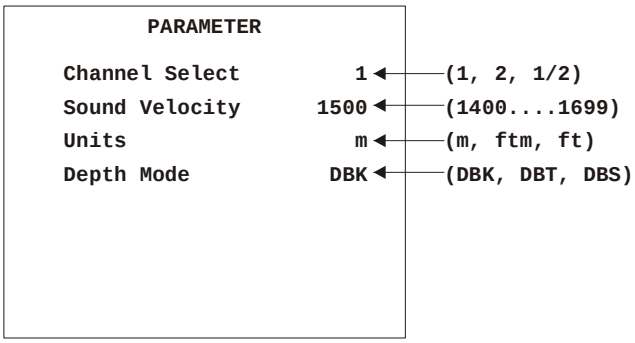
Maximum and Minimum Depth Alarms

The system can be set so that an audible alarm sounds if the water becomes shallower than a set minimum or deeper than a set maximum. This depth is always measured from the ship's keel. An Alarm Test facility is available to allow a test of the alarm function from time to time.

Note: All inputs have to be made in "Meter", regardless which "Unit" has been selected for data display.

The PARAMETER Menu

The **PARAMETER** menu is used to select and change system parameters including channel (transducer) selection, sound velocity setting, depth units, and depth mode which vary from those laid down by the IMO. To call up the PARAMETER menu, press ENTER twice.



The following settings can be made within this **MENU**:

- Channel selection
- Sound velocity setting
- Unit of measurement selection
- Depth mode selection

- **Channel Select** The Channel Select function is available only if two transducers are installed. When the system is switched on, Channel 1 is the default channel. This function is used to select the channel to be presented on the display area. Presentation of either Channel 1, Channel 2, or both is possible. If both channels are selected they will be shown superimposed. Call up the **PARAMETER** MENU and press the following keys to make a selection:
  - **CURSOR** ↓ (1x, to mark **Channel Select**)
  - **ENTER** (1x, to mark Channel number)
  - **CURSOR** ↑ or ↓ (to make selection)
  - **ENTER** (1x, to confirm selection)
  - **ESCAPE** (2x, to leave the **MENU**)

- **Sound Velocity** Sound travels at varying speeds in water, depending upon the salinity, temperature and density. The standard default setting for sound velocity is 1500 m/s. If a sound velocity measuring system is available and the user wishes to adjust the sound velocity of the depth sounder, call up the **PARAMETER** MENU and press the following keys:

- **CURSOR** ↓ (2x, to mark **Sound Velocity**)
- **ENTER** (1x, to mark 2nd digit)
- **CURSOR** ↑ or ↓ (to alter 2nd digit)
- **ENTER** (1x, to confirm selection and jump to 3rd digit)
- **CURSOR** ↑ or ↓ (to alter 3rd digit)
- **ENTER** (1x, to confirm selection and jump to 4th digit)
- **CURSOR** ↑ or ↓ (to alter 4th digit)
- **ENTER** (1x, to confirm selection)
- **ESCAPE** (2x, to leave the **MENU**)

- **Units** The standard default unit of measurement is meters. It is, however, possible to choose either fathoms or feet. In order to change the units, call up the **PARAMETER** MENU and press the following keys:
  - **CURSOR** ↓ (3x, to mark the word **Units**)
  - **ENTER** (1x to mark units selected)
  - **CURSOR** ↑ or ↓ (to make selection)
  - **ENTER** (1x, to confirm selection)
  - **ESCAPE** (2x, to leave the **MENU**)

- **Depth mode** The default depth measurement mode is **DBK** (depth below the keel). It is however possible to change this mode to either **DBT** (depth below the transducer) or **DBS** (depth below the surface). In order to change the mode, call up the **PARAMETER** MENU and press the following keys:
  - **CURSOR** ↓ (4x, to mark **Depth Mode**)
  - **ENTER** (1x, to mark the mode selected)
  - **CURSOR** ↑ or ↓ (to make selection)
  - **ENTER** (1x, to confirm selection)
  - **ESCAPE** (2x, to leave the **MENU**)

The Calibration Menu

INTRODUCTION

The principle of echo sounding is based on measuring the time of arrival of an acoustic return (echo) referenced to the time of transmission. The time required for sound to travel from a source (the transducer) to the seafloor or bottom and back can be measured and multiplied by the velocity of sound in water in order to arrive at the distance the pulse has travelled. Since the transmitted pulse has travelled from the transducer to the bottom and back again, the distance must be halved in order to obtain the water depth. As shown in the general depth formula below, other factors enter into the equation as well.

$$d = \frac{v * t}{2} + k + dr$$

Where:

d - Depth from referenced water surface.
v - Average velocity of sound in the water column.
t - Measured elapsed time from the transducer to the bottom and back to the transducer.
k - System index constant.
dr - Distance from reference water surface to the transducer (draft)

Since depth measurement accuracy is dependent on the value used for the velocity of sound in water (along with the other factors shown above) it is important that a realistic value for sound velocity be determined. In water, velocity is a function of temperature, salinity and pressure. Therefore the local sound velocity may vary widely, thereby resulting in the need to calibrate any type of echo sounder, in order to provide the most accurate depth data at a given location.

Bar-check:

The most common calibration technique is the bar check method. This method, when employed properly, has the advantage of correcting for velocity variations, draft variations, and system index errors (all of the constants in the above formula). When calibrating using the bar check method, acoustic returns are generated by a suspended target which is lowered to a known depth between the transducer and the bottom.

Traditionally a bar-check was necessary to calibrate the (analogue) echo sounders for variations in the instrument itself, such as stylus wear and variations in motor speed control as well as for differences in salinity and temperature. With digital echo sounders there are no mechanical instrument variants, so you only need to make sure that the draft and speed of sound (velocity) are set up correctly.

A bar-check is called a bar-check, because on bigger boats with an inboard transducer, it was necessary to suspend a metal 'bar' from two wires either side of the hull to ensure that the bar could be positioned under the transducer. For an outboard transducer a single metal plate with a single support line is more convenient. The plate needs to be big enough to give a good echo return, normally a 50cm diameter or square plate is the minimum size required. Use wire or

nylon rope to suspend the plate, and (stainless) steel wire for the measured wire. Mark the suspending line every two metres, try strips of insulating tape, one for 2 metres, 2 strips for 4 metres and so on.

BAR-check procedure:

Measure the depth of the transducer to the water line (draft setting), and mark the pipe at the water line.

Lower the plate underneath the transducer at a shallow setting (i.e. say 2-5 metres below the water surface), the echo sounder should then indicate the correct depth, confirming that the draft setting is correct, adjust the draft setting if necessary. The velocity can be approximate at this stage because the velocity is far less critical at shallow depth readings.

Lower the plate as deep as you can whilst retaining the plate echo (say 10 or 15 metres), and then adjust the velocity in the echo sounder to obtain the correct water depth reading. Increasing velocity will give a greater depth reading.

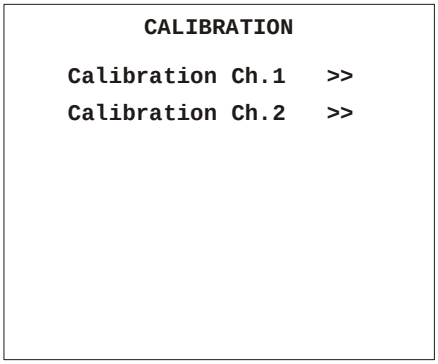
Bring the plate up in steps of say 2 metres checking against markings to verify that the echo sounder is indicating the same depths and therefore that the velocity setting is correct.

It is possible to do the bar-check in deep water. Then the plate needs to be lowered straight underneath the transducer. Be aware that if there is some current, the plate may swing outside the echo sounder 'cone' and echo will be lost.

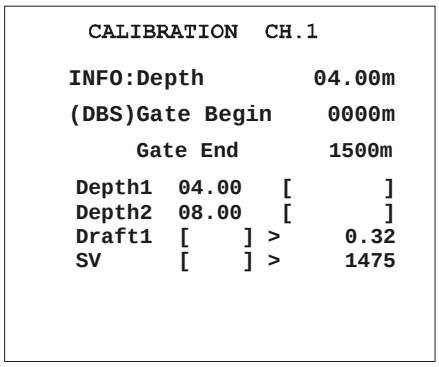
Use the echo sounder "**Gate**" function if necessary. Bear in mind that the echo sounder is designed as a bottom tracking instrument, it is not a 'fish finder'.

It is not always easy to pick up the bar check plate, in particular when the seabed is flat sand or when the plate is close to the bottom. If the seabed echo is much stronger than the plate, the instrument will lock onto the bottom and reject the plate echo's as 'fish' or suspended matter. In this case the gate settings will help.

Press **ENTER** three times to call up the **CALIBRATION MENU**.



Select the channel to calibrate.
A new **MENU** shows up:



The first lines contain general information about depth and parameters in use. The Gate information is taken from the **GATE** MENU**,** use the **GATE** MENU to alter these values.
Draft and sound velocity are the actual values in use.
There are two ways to calibrate:

1.) Enter the actual Bar depth in **Depth 1**. After entering the **Hydrostar 4300** calculates a corrected draft.

Lower the bar to depth 2, enter this depth in **Depth 2**. **Hydrostar 4300** now calculates a corrected sound velocity.

The new parameters are shown in the **Draft 1** and **SV**-brackets.

Use **ENTER** to accept these parameters digit by digit, or change the highlighted digit manually.

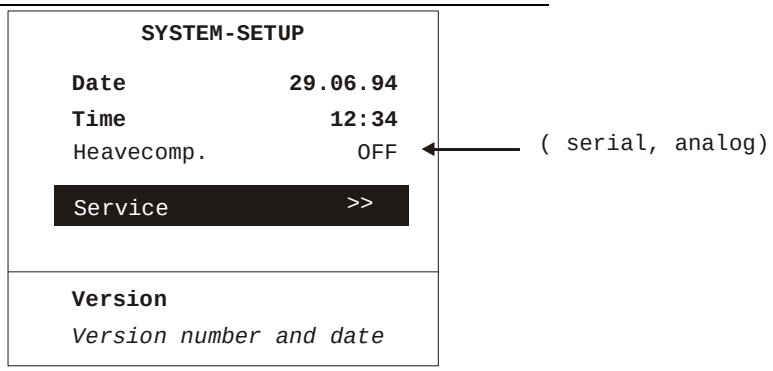
2.) You can also choose the traditional way: Enter **Depth 1** and then alter the **Draft 1** value until the depth reading is correct, than enter **Depth 2** and alter sound velocity **SV** to correct depth reading, using the **ENTER** and **CURSOR** up/down keys.

Repeat the procedure above for the second channel.

The SYSTEM SET-UP Menu

WARNING: With the exception of time and date, no other parameters should be altered unless the installation is modified, for example, changing the installation depth of the transducer, replacing the transducer by one of a different frequency. A change of such parameters should only be made by an experienced service technician. Improper parameter changes could result in erroneous depth readings, possibly endangering the vessel and personnel.

To call up the **SYSTEM SET- UP** MENU, press the **ENTER** key four times. The **MENU** as shown below will appear.



The **SYSTEM SET-UP MENU** is used to set the time and date, to activate heave compensation and to gain access to the **SERVICE, CHANNEL** and **INTERFACE SUB MENUS** to allow the service technician to change installation and interface parameters **(see above warning**).

Date and Time

To change the system **DATE**, press the following keys:

- **CURSOR** ↓ (1x, to mark the word **Date**)
- **ENTER** (1x, to mark the day setting)
- **CURSOR** ↑ or ↓ (to alter the day setting)
- **ENTER** (1x, to confirm selection and jump to the month setting)
- **CURSOR** ↑ or ↓ (to alter the month setting)
- **ENTER** (1x, to confirm selection and jump to the year setting)
- **CURSOR** ↑ or ↓ (to alter the year setting)
- **ENTER** (1x, to confirm selection)
- **ESCAPE** (2x, to leave the **MENU**)

To change the system **TIME**, press the following keys:

- **CURSOR** ↓ (2x, to mark the word **Time**)
- **ENTER** (1x, to mark the hour setting)
- **CURSOR** ↓ or ↑ (to alter the hour setting)
- **ENTER** (to confirm selection and jump to the minutes setting)
- **CURSOR** ↓ or ↑ (to alter the minutes setting)
- **ENTER** (1x, to confirm selection)
- **ESCAPE** (2x, to leave the **MENU**)

To activate the **HEAVE COMPENSATION**, press the following keys:

- **CURSOR** ↓ (3x, to mark the word **Heavecomp.**)
- **ENTER**
- **CURSOR** ↓ or ↑ (to select between off, analogue or serial)
- **ENTER**

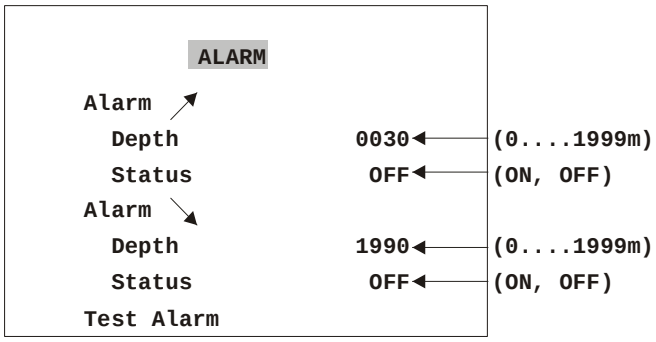
- **ESCAPE** (2x, to leave the **MENU**)

Installation settings are made within the **SERVICE, CHANNEL** and **INTERFACE SUB-MENUS** which are described in Chapter 3.3 of this manual.

Example: Changing Parameters within a Menu

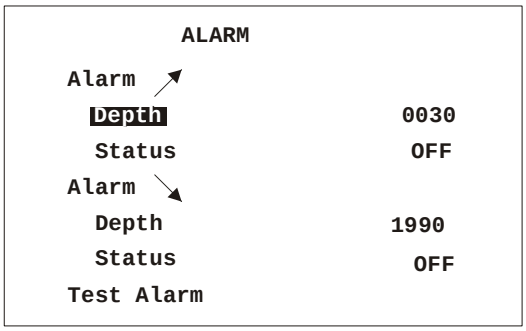
Example: The user wishes to change the MINIMUM DEPTH ALARM from 30 m to 20 m and activate it (Status = ON) and to change the MAXIMUM DEPTH ALARM to 610 m and activate it.

Press the **ENTER** key once to call up the **ALARM MENU**. The **ALARM MENU** as shown below appears. Example:

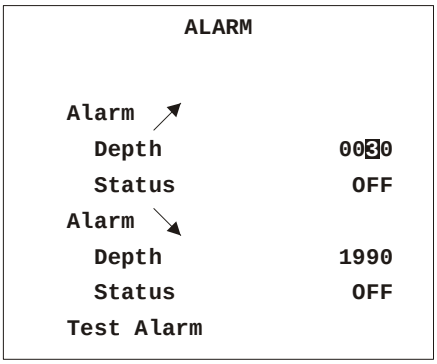


The word **ALARM** is marked by the cursor and appears inverse, i.e. dark background, light text. In order to change the **MINIMUM DEPTH ALARM** setting within this **MENU**, the value to be changed must be marked by the cursor. This is done by using the **CURSOR** keys. The **CURSOR** key with the arrow pointing downwards (🡻) is used to move the cursor down and the **CURSOR** key with the arrow pointing upwards (🡹) is used to move the cursor up. Press the **CURSOR** 🡻 key once to mark the word "**Depth**".

The **MENU** below shows that the cursor has been moved down to mark the word "Depth" which now appears inverse.

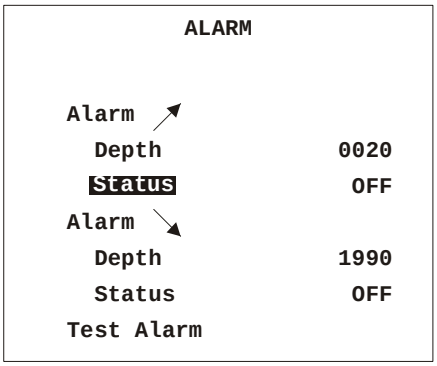


Now press the **ENTER** key. The cursor will jump from the word "**Depth**" to the first digit of the alarm setting, in this case a zero. Press the **ENTER** key twice more and the cursor will move to the right and mark the number 3, as shown in the **MENU** below.

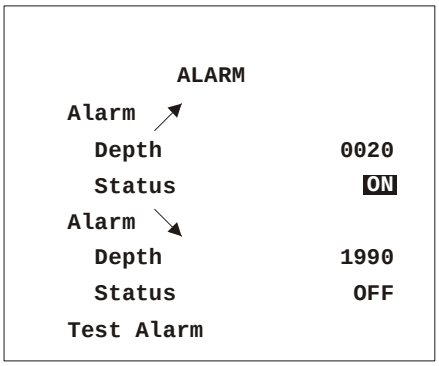


Press the **CURSOR** ↓ key once. The number 3 will change to a 2.

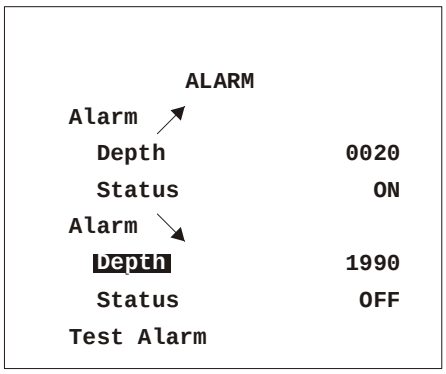
Press the **ENTER** key to confirm the new setting. The cursor will jump one digit to the right. Press the **ENTER** key once more and the cursor will move to mark the word "**Status**" as shown in the picture below.



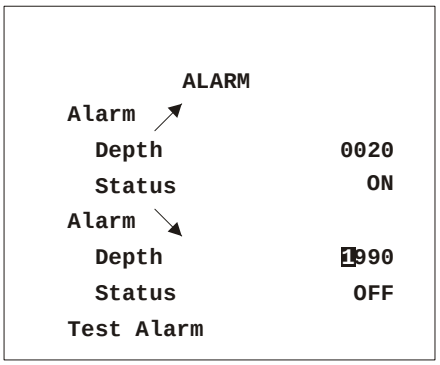
Press the **ENTER** key and the cursor will jump to the word "**OFF**". Press a **CURSOR** key (↑ or ↓) to toggle from **OFF** to **ON**. The menu will appear as shown below.



Press the **ENTER** key to confirm the setting. The cursor will jump to the word "**Depth**" as shown in the menu below.

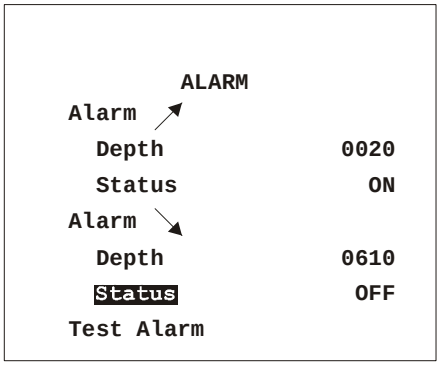


Press the **ENTER** key and the cursor will jump to the first digit of the alarm setting, in this case a 1, as shown in the picture below.

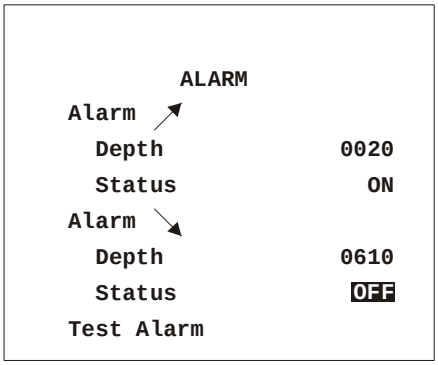


Change the 1 to a 0 by pressing the **CURSOR** ↓ key. Press the **ENTER** key to confirm. The cursor will jump to the next digit, a 9. Repeatedly press the **CURSOR** ↑ key until the desired value is reached, in this case a 6. Press the **ENTER** key to confirm. The cursor will jump to the next digit, again a 9. Set this to 1 using the **CURSOR** ↓ key. Press the **ENTER** key to confirm, the cursor jumps to the 0 which need not be altered.

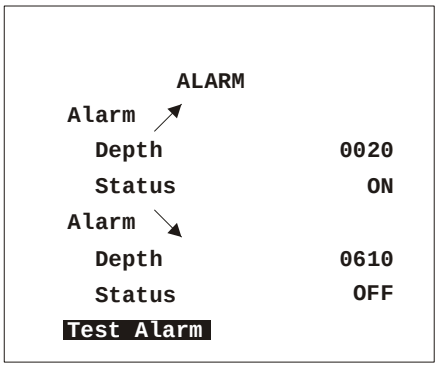
Now that the desired value, 610 m, has been set, press the **ENTER** key to confirm. The cursor will jump to the word "Status" as shown in the picture below.



Press the **ENTER** key and the cursor will jump to the word "**OFF**" as shown in the picture below.



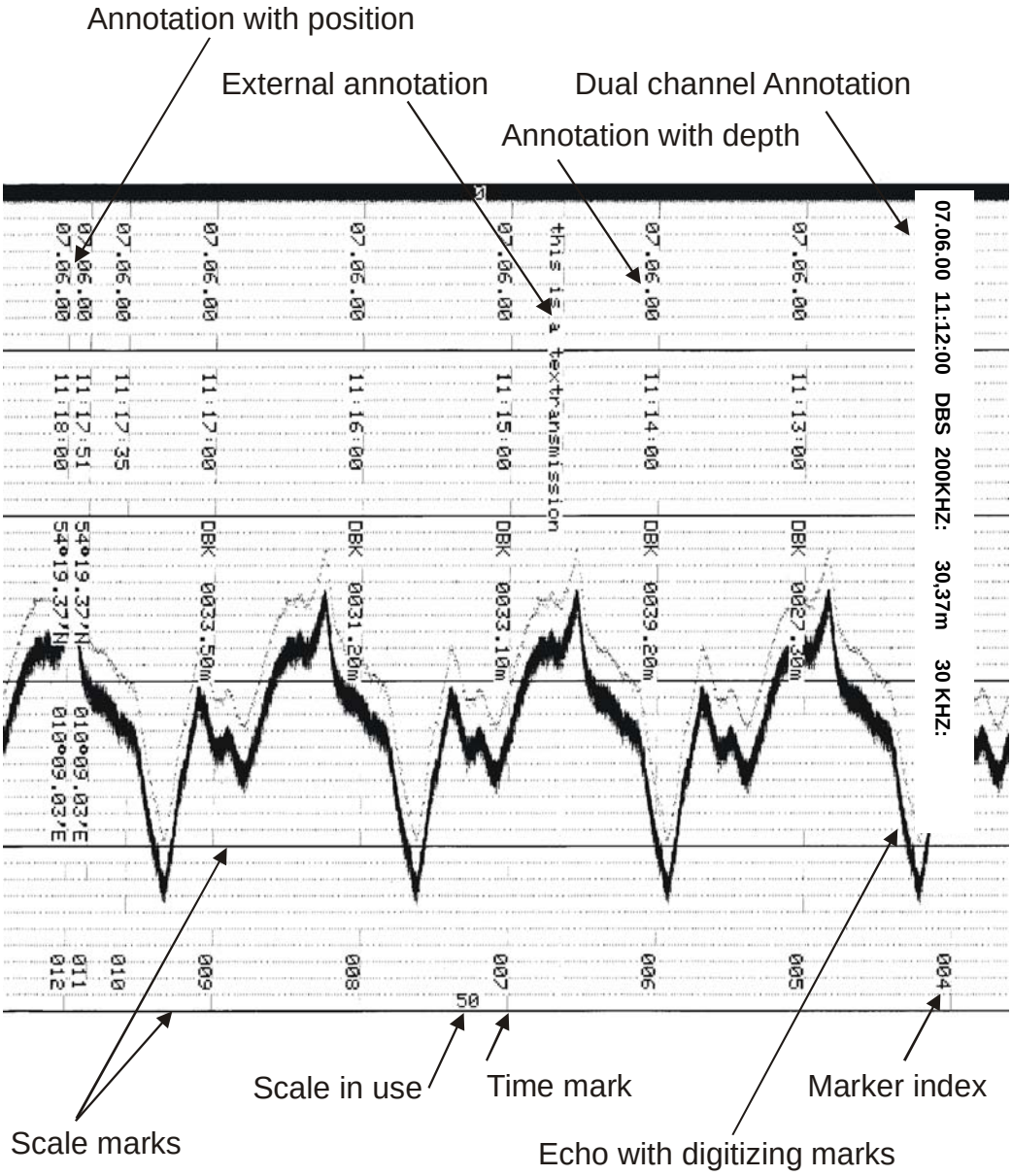
Change the Status to **ON** as described for the minimum depth alarm. Press the **ENTER** key to confirm. The cursor will jump to the words "**Test Alarm**", as shown in the picture below.



A functional test of the audio alarm can now be carried out by pressing the **ENTER** key. When the alarm sounds, press ENTER twice to exit the menu. The LCD returns to the primary screen.

4. Echo presentation on recording paper

The echo sounder uses thermally sensitive paper to record soundings and other markings used for interpreting the sounding data. The picture below shows typical markings written to the chart paper.



- The **scale line** is a horizontal line continuously printed across the paper. The number of lines and their spacing is determined by the depth scale in use and the number of scale lines selected for that depth scale.
- The **time mark** is a short vertical line at the bottom of the chart printed every three minutes.
- The **depth scale** in use is denoted by a number printed at the bottom of the chart.
- The **marker field** is a vertical row of numbers containing either position information (latitude and longitude) or date and time. Data is selected in the MARKER submenu.

The marker is printed either on demand by pressing the MARKER button, or may be printed periodically at operator-selected intervals using the AUTOMARKER option. A marker may also be initiated remotely if an input signal is received through the connector marked HEAVE IN/MARKER IN.

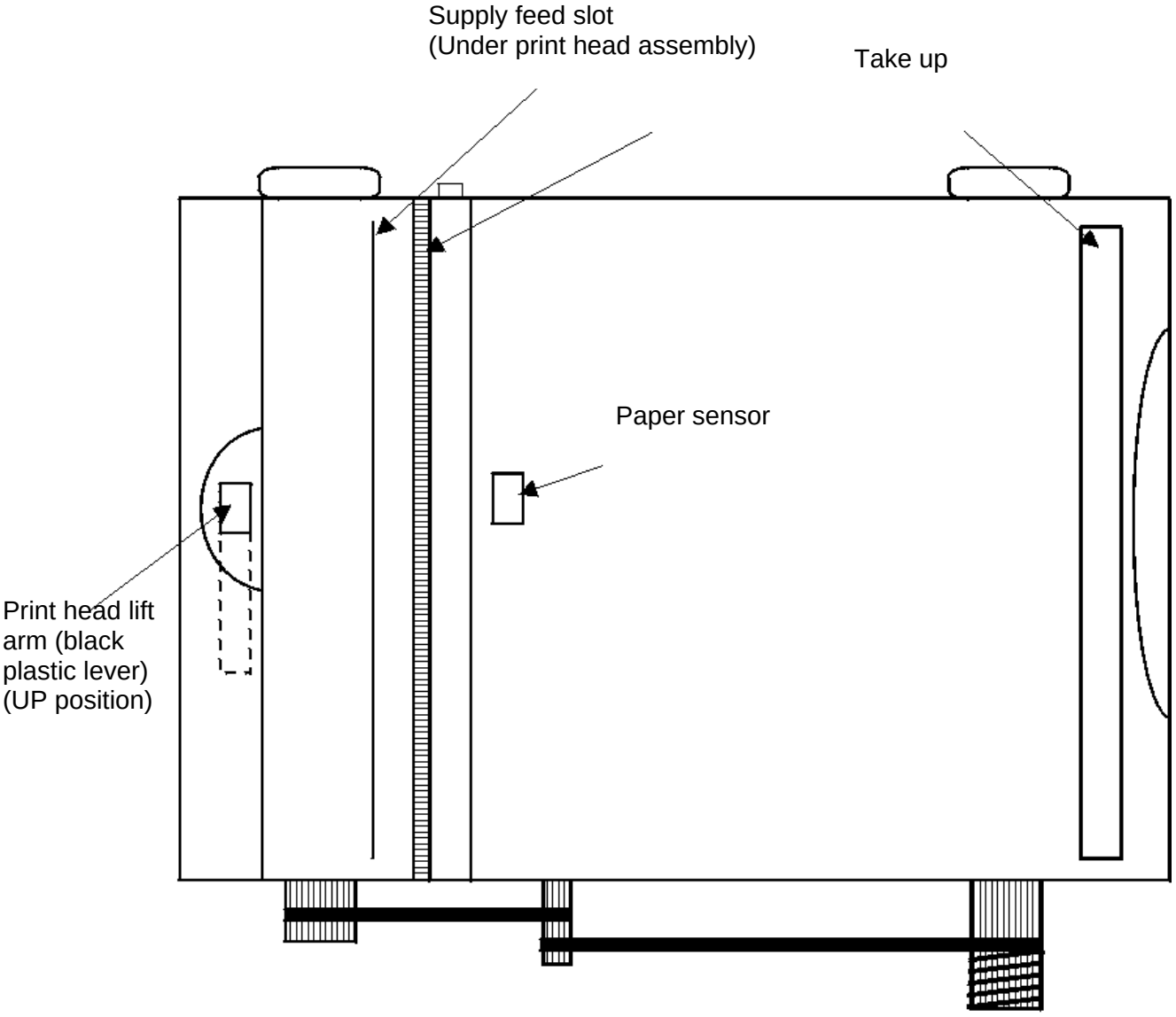
- A **validation mark** is printed above the bottom echo whenever the bottom detection algorithm determines that the returned echo is from the bottom. The validation mark is printed only when BOTTOMTRACK mode is selected.

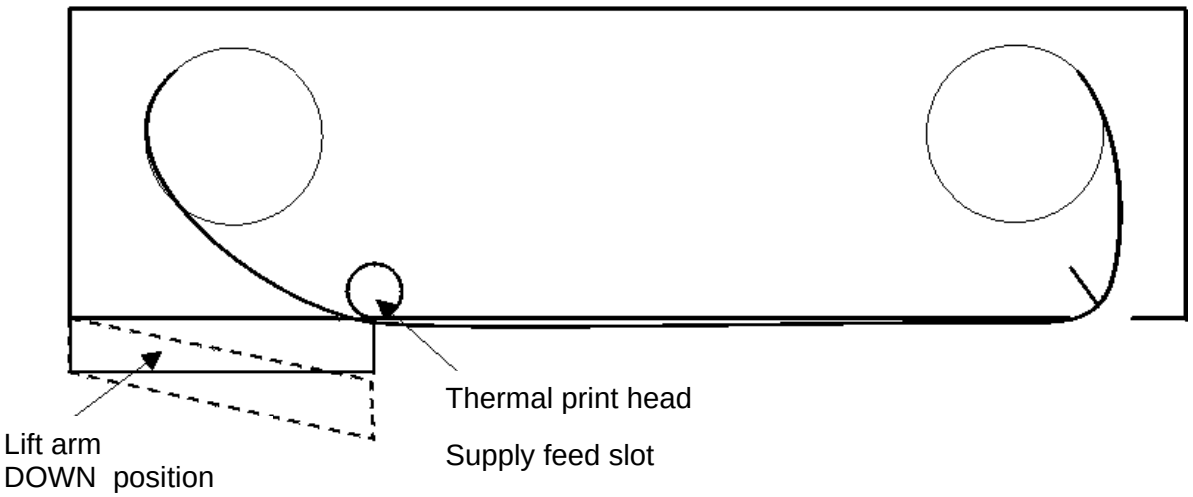
Paper installation

WARNING

Switch off the echo sounder before conducting preventive or corrective maintenance or changing paper.

1. Undo the two latches at the top of the case and lower the front panel as far as it will go. Be careful that the LCD display screen and pushbuttons do not strike any sharp objects.
2. At the left side of the recorder assembly, raise the black plastic lever to lift the print head from the paper.
3. At the right side of the recorder assembly, depress the latch by pressing in while pulling the paper transport out and to the left.
4. Remove the used chart paper from the take-up side; remove the empty spool from the supply side and install on the take-up side.
5. Install a fresh roll of chart paper on the supply side. Pass the paper through the feed slot under the thermal print head across to the take-up slot on the right side.
6. Insert the paper through the take-up slot into the take-up spool and take up slack by turning the take-up drive hub.
7. Swing the paper transport back to the right and push in firmly until latched.
8. Lower the black plastic lever to place the print head in contact with the paper.


Supply feed slot
(Under print head assembly)
Take up
Paper sensor
Print head lift
arm (black
plastic lever)
(UP position)


Thermal print head
Supply feed slot
Lift arm
DOWN position

5. Maintenance

The **HYDROSTAR 4300** Navigation Echo Sounder is largely maintenance free.

Routine maintenance

The echo sounder case can be cleaned using a mild non-abrasive household cleaning agent. Use window glass cleaner to clean the chart window and LCD screen. Be very careful not to apply excessive pressure to the screen surface.

Corrective maintenance

Onboard corrective maintenance is limited to replacing blown fuses and exchanging defective printed circuit boards. If the echo sounder does operate with proper DC power applied, check fuse F1 located on the chart paper transport chassis lower right corner. Replace a blown fuse with a good fuse rated at: T 6.3 amps. If the fuse blows repeatedly, do not attempt to operate the equipment but return it for diagnosis and repair.

Sometimes the quality of the recording could degrade if paper residue is sticking to the **THERMOHEAD** heat element area. Paper blackness decreases and some areas of the paper show poor recording quality.

In this case switch off the unit, raise the thermo-head and clean the heat element area using a cotton swab with some alcohol.

The transducer(s) should be cleaned whenever an opportunity arises, e.g. when the ship is in dock. The transducer(s) can be cleaned using a plastic scraper or scrubbing brush.

NOTE: **Never use metal scrapers or wire brushes to clean the transducer(s). Never paint the radiating surface of the transducer(s).**

If the system cables are exposed, i.e. are not run in ducts or tubes, check them at monthly intervals for insulation damage.

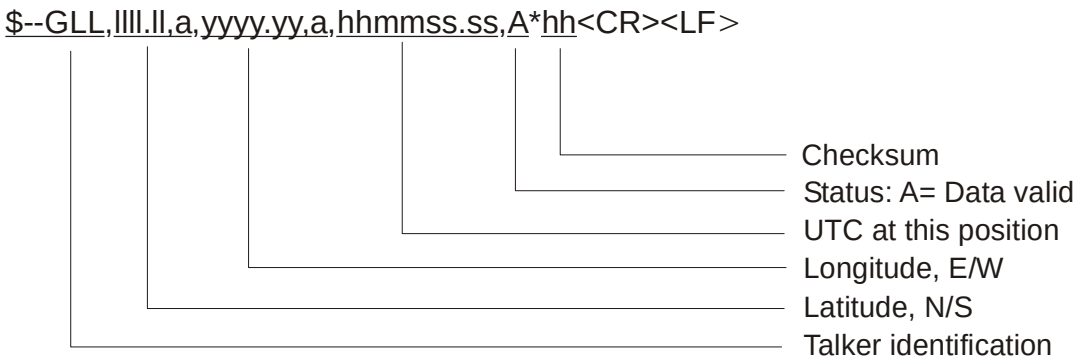
Do not attempt to troubleshoot and repair printed circuit boards due to the sensitivity of electronic components. Replacement circuit boards and spares may be obtained by ordering form the table of spare part numbers listed below. Parts orders may be sent by e-mail, fax or telephone to:

L-3 Communications ELAC Nautik GmbH
Neufeldtstrasse
24118 Kiel
Germany
Tel. +49 431 883-0
Fax: +49 431 883 496
E-mail elac.support@l-3com.com

6. Description of Interfaces

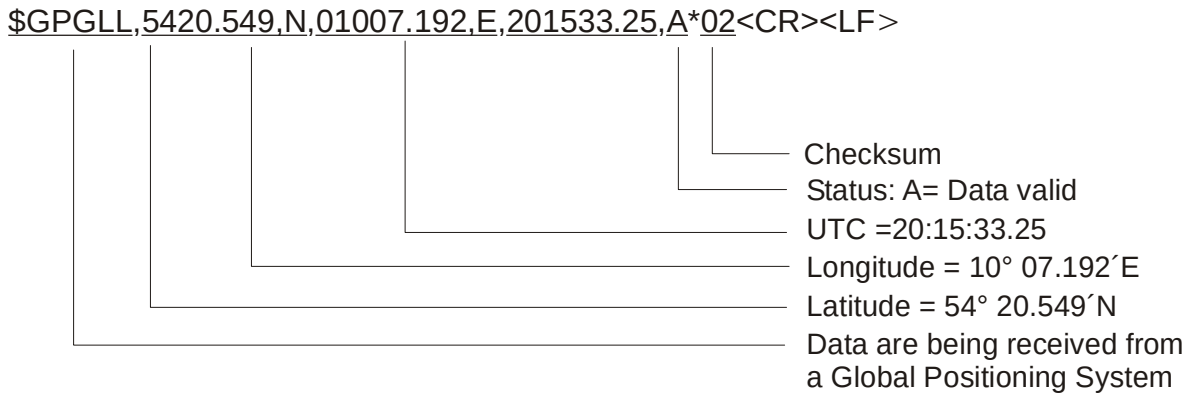
Connector X4

A navigation system can be connected to this interface so that the ship's co-ordinates are displayed by the HYDROSTAR 4300. The system will accept and evaluate data sentences in NMEA 0183, Version 2.00, GLL, GGA and ZDA formats, as follows:

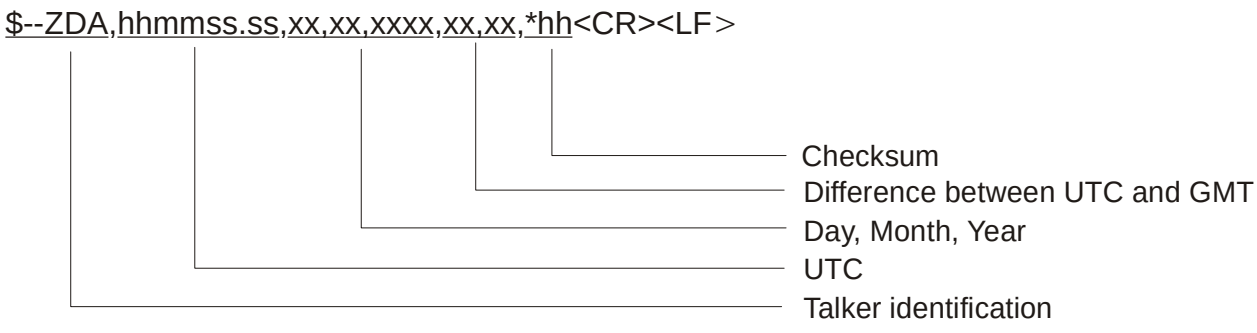


GLL Format

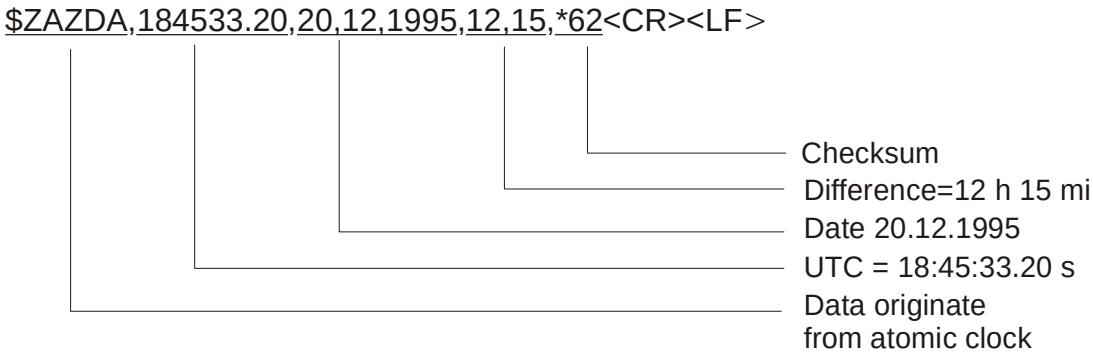
Example:



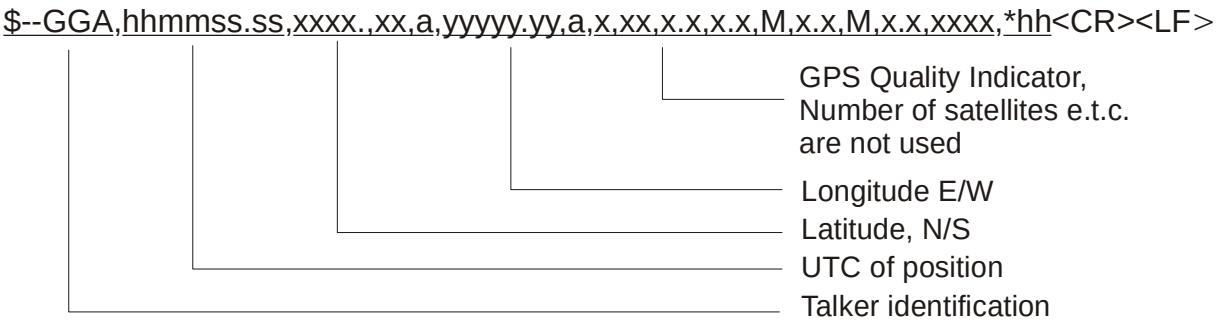
ZDA Format



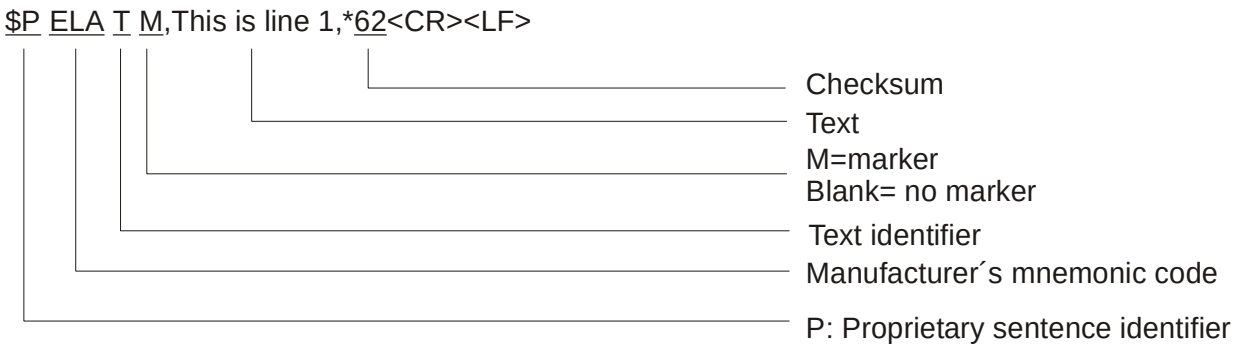
Example:



GGA Format



Private Protocol (Annotation Text)



The maximum length of the text string including blanks is limited by the width of the print head to 66 characters. Within the text no control codes, umlauts, commas and no "*" characters are allowed. A text buffer holds up to two lines which are printed sequentially.

After receiving this protocol a marker line is printed (if demanded) and the printing sequence for the received text is initiated. The printing takes 32 soundings to be completed (8 dots character height, 4 soundings per dot). Due to the choice of suppressing marker lines it is possible to print out additional coherent text lines.

With the following command the actual printing sequence is aborted and the text buffer is cleared.

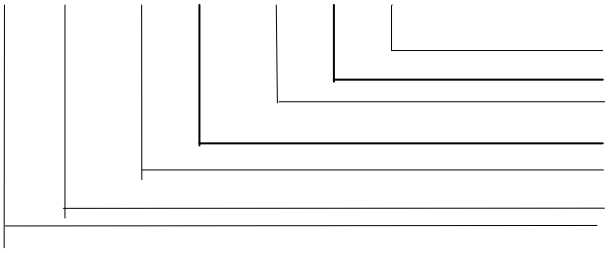
$PELATC<CR><LF>

Note : When using the external annotation feature, switch off the auto marker function (see chapter 0), otherwise the auto marker function and the annotation function may mutually interfere.

Connector X5

A heave sensor can be connected to this interface so that the ship's heave movements are corrected by the HYDROSTAR 4300. The system will accept and evaluate analogue heave signals ± 5 V for ± 5 m heave and serial data sentences in the following format:

:XXAAAA MHHHHQMRRRR MPPPP<CR><LF>



pitch in 0.01°
Space
Roll in 0.01°
Q = Status
Heave in cm
Space
XX: horizontal, not used
AAAA: vertical acceleration, not used

" : " start of sentence
M: " space"= if positive
" – " if negative

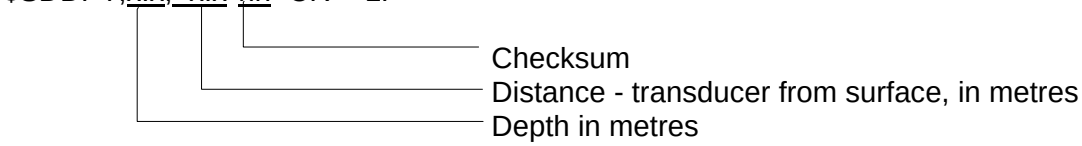
Connector X8

Interface for external equipment:
Output for potential free alarm relay contacts, Digital Slave Indicator, PC.
After each sounding (in mode "fast") or every second (in mode "slow") the HYDROSTAR 4300 transmits depth information to the interface in selectable sentences:
The sentences are:
DPT: NMEA, Version 2.00 format. The DPT (Depth) and sentences are as follows:
ELAC: NMEA, Version 2.00 format.
DESO 25:
ODOM SBT:
ODOM DBT:
HYDROPORT:

To activate the protocols see chapter 3.3 Initial System Set-up.

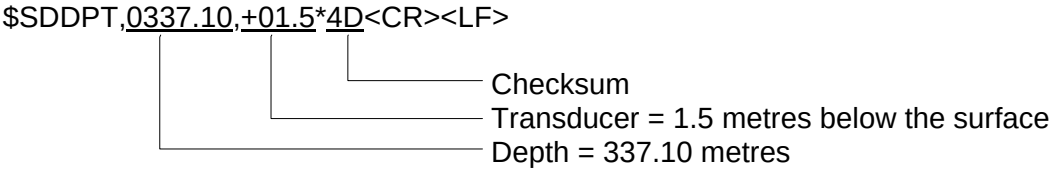
DPT (Depth)

$SDDPT,x.x,+x.x*hh<CR><LF>



Example:

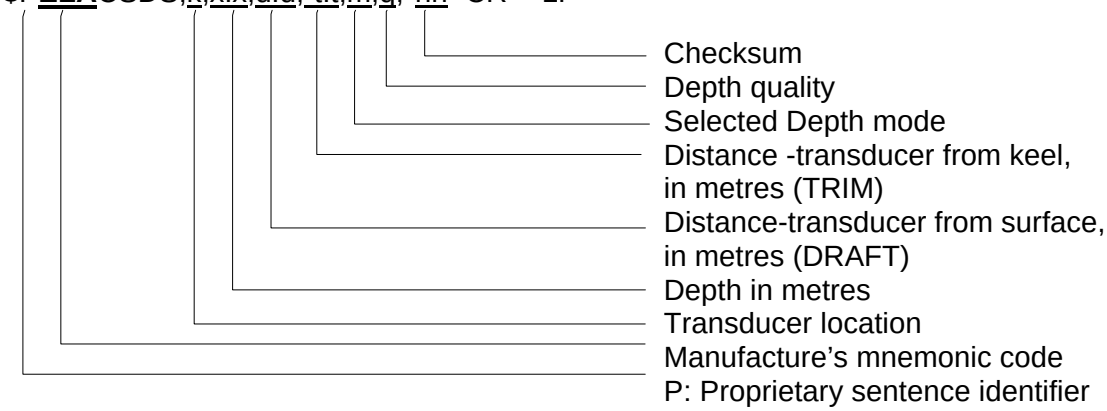
$SDDPT,0337.10,+01.5*4D<CR><LF>



A NMEA proprietary sentence ELAC is available to allow the transfer of dual channel depth information, including transducer mounting position.

ELA (Manufacture's Mnemonic Code)

$P**ELA**CSDS,k,x.x,d.d,-t.t,m,q,*hh<CR><LF>



k: S=Starboard, P=Port, B=Bow, A=Aft, 0=not selected

m: Selected depth mode: K=DBK (Depth below Keel), S=DBS (Depth below Surface), T=DBT (Depth below Transducer)

Note: The depth mode has no effect on the data output! The depth will always be DBT.

q: Quality of digital depth reading:

0 = no depth information available

1 = no depth information available, poor quality

2 = depth information available, high reliability

Example:

$P**ELA**CSDS,B,0337.0,3.4,-1.5,K,2,*3F<CR><LF>

- Checksum
- Depth information, high reliability
- Depth below keel
- TRIM, Transducer 1.5 m above keel
- DRAFT, Transducer 3.4 m below surface
- Depth=337.0 m
- Depth from transducer installed Bow

DESO 25:

DADDDDD.DD <sp>m<CR><LF>

- "m" if meters, "t" if feet
- "space or f", "space" if m, "f" if feet
- Depth Data
- "A" for high, "B" for low frequency
- always D

ODOM SBT

<sp>et<sp><sp>DDDDD<CR>

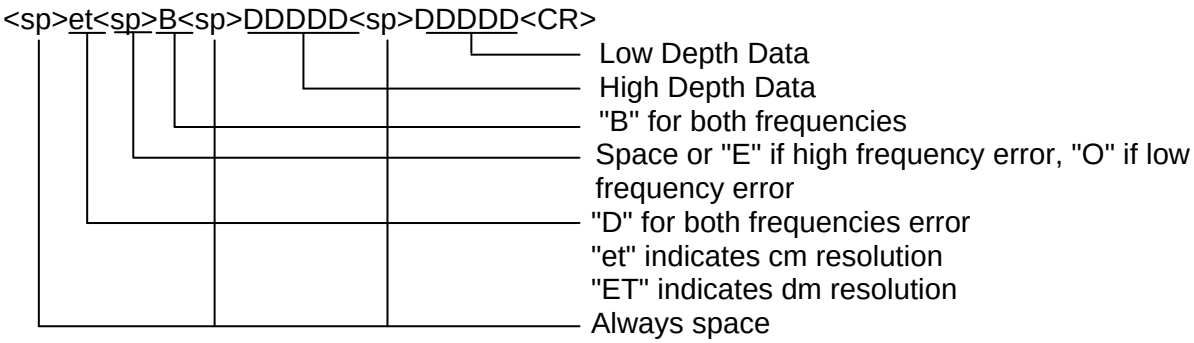
- Depth Data
- Normally space, "E" indicates error
- "et" indicates cm resolution
- "ET" indicates dm resolution
- always space

ODOM DBT, only one frequency active

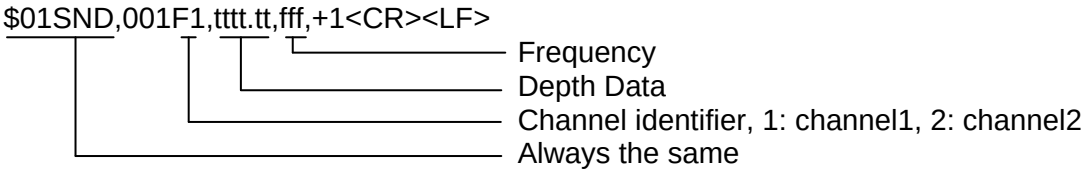
<sp>et<sp>H<sp>DDDDD<CR>

- Depth Data
- High/Low indicator, „H“ for High: „L“ for Low
- space or "E" if high frequency error, "O" if low frequency error
- "et" indicates cm resolution
- "ET" indicates dm resolution

ODOM DBT, both frequencies active



HYDROPORT



7. Troubleshooting

Trouble Shooting Table

Fault	Possible Reason	Corrective measures
LAZ 4300 cannot be switched on	DC – Power Supply Voltage missing	check DC – Mains Supply Voltage check external DC – Power Supply Unit check Battery check Supply Connection Cable
	DC – Power Supply Voltage too low	check external DC – Power Supply Unit, adjust correctly check, charge or replace Battery
	Fuse defective	check for Short Cuts replace Fuse
	Power Supply PCB 52 596 1802 defective	replace PCB 52 596 1802
LAZ 4300 switch off after short time	external Power Supply is not stable	check external DC – Power Supply Unit replace check, charge or replace Battery
	Power Supply provides too low current (peak current)	replace external DC – Power Supply Unit against stronger version (peak current 10 A) replace Battery
Key Panel not operable	Key Panel defective	replace Key Panel
	Ribbon Cable	check Ribbon Cable connection
	Multiplexing IC D1 on PCB 52 596 1802 defective	replace PCB 52 596 1802
	Grounding Problems caused by external devices	check Ground Connections for Ground Loops

Fault	Possible Reason	Corrective measures
Disturbed display on LC - Display	LC – Display defective	replace LC – Display
	Ribbon Cable	check Ribbon Cable connection
	Power Supply for LC - Display	check, replace Power Supply
	Grounding Problems caused by external devices	check Ground Connections for Ground Loops
Disturbed Paper Recording	Printer Device defective	replace Printer Device
	Printer Device Adjustment	adjust Printer Device
	Paperrolling/transport	feed in Paper correctly
	Printer Control defective	check, replace PCB 57 299 1852 check, replace PCB 52 596 1801
	Ribbon Cable	check Ribbon Cable connection
	wrong Paper type	use correct Paper type
Transmitting Pulse (Zero Sound) and Bottom Echo missing	Main Board PSE 33 PCB 57 299 8002/4/6	Measure Transmitting Voltage with connected Dummy Load resistor Check unit with Echo simulator replace PSE 33
Transmitting Pulse (Zero Sound) existing Bottom Echo missing	Main Board PSE 33 PCB 57 299 8002/4/6	Measure Transmitting Voltage with connected Dummy Load resistor Check unit with Echo simulator replace PSE 33
	wrong Echo sounding Frequency	set Echo sounding Frequency correctly
	Transducer defective	check Transducer for Impedance and Insulation replace Transducer

Fault	Possible Reason	Corrective measures
Serial NMEA Output (X8) do not work	wrong setting of Serial Interface	set parameter correctly Baudrate, Format
	wrong connection of Serial Interface	check connection
	Interface IC on PSE 33 defective	replace PSE 33
	wrong Data Format	set correct Data Format DPT, Elac, Deso ...
	Input of connected device is no RS 422	use RS 422 input use RS 422 / RS 232 - converter
	Serial Interface of connected device wrong settings	set parameter of connected device correctly
	connected device defective	replace device
Serial NMEA Input (X4) do not work	wrong setting of Serial Interface	set parameter correctly Baudrate, Format
	wrong connection of Serial Interface	check connection
	Interface IC on PSE 33 defective	replace PSE 33
	Serial Interface of connected device wrong settings	set parameter of connected device correctly
	connected device defective	replace device
Serial RS 232 Interface (X5) (Heave) do not work	wrong setting of Serial Interface	set parameter correctly Baudrate, Format
	wrong connection of Serial Interface	check connection
	Interface IC on PSE 33 defective	replace PSE 33
	Serial Interface of connected device wrong settings	set parameter of connected device correctly
	connected device defective	replace device

Power Supply

AC – Power Supply

Connecting the Hydrostar LAZ 4300 to the AC – main supply voltage (220 / 115 V AC), a power supply unit with an output voltage of 24 V DC and an output peak current of min. 6 A has to be used.
Recommended are power supply units with 24 V DC / 10 A.

DC – Power Supply / Battery

Connecting the Hydrostar LAZ 4300 to a DC – supply voltage or a battery, the supply voltage should be 24 V DC (possible DC – Voltage range 12 V DC to 24 V DC).
When batteries are used, connect two batteries serial.
The min. output peak current of the DC – Power Supply or the Battery should be 6 A, at 12 V DC 10 A.

Transmitting Voltage / Pulse Length

The Transmitting Voltage an Pulse Length of the Hydrostar LAZ 4300 will be measured with connected dummy load resistor of 70 Ohms and then with connected transducers.

Transmitting Voltage		
Range	Channel 1	Channel 2
50 m	40 – 80 Vpp	40 – 80 Vpp
500 m	200 – 350 Vpp	200 – 350 Vpp

Pulse Length		
Range	Channel 1	Channel 2
10 m	0,3. ms	0,3 ms
50 m	1,0 ms	1,0 ms
500 m	3,0 ms	3,0 ms

Transducer Test

Insulation

The transducer insulation shall be tested with an insulation meter at 500 V DC
The insulation value from transducer cable to ground has to be > 1 M ohm

Impedance

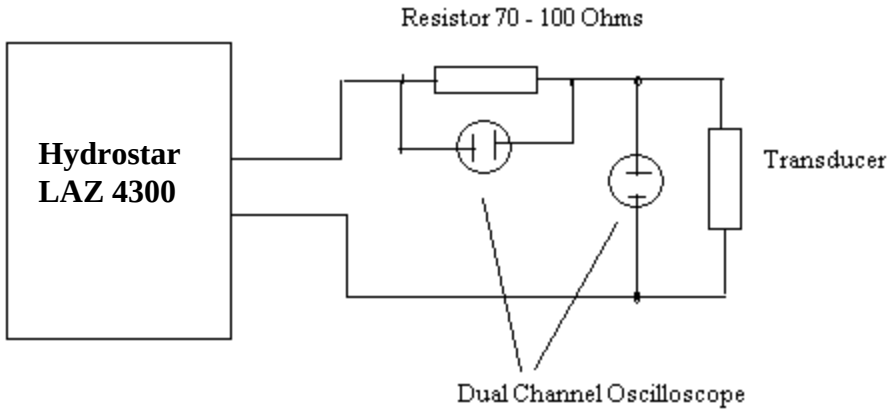
The transducer impedance shall be measured at the working frequency of the transducer with an impedance meter like the EDI TT – 2D

Impedance of the dual frequency transducer LSE 218

30 kHz	70 Ohms +/- 30 Ohms
200 kHz	250 Ohms +/- 100 Ohms

If no impedance meter is available, the impedance could be checked with the echo sounder.

Connect resistor (70 – 100 Ohms / 5 Watt) between echo sounder and transducer. Connect dual channel oscilloscope and measure the voltages over resistor and transducer at selected 50 m range.



Calculating transducer impedance

$$z \text{ (impedance)} = \frac{U_{transducer} \times Resistor}{U_{resistor}}$$

Serial Interface

NMEA – serial RS 422 output X8 / Pins 3 and 8

Only RS 422 interfaces should be connected on Pins 3 and 8, never RS 232. Connecting a RS 232 interface will damage the serial RS 422 interface.
To connect a RS 232 interface, use a RS 422 / RS 232 - converter

8. Relevant Drawings

Dimensional Drawing: MB 52 596 8001
HYDROSTAR LAZ 4300 Circuit Diagram: .....SP 52 596 8001

9. Spare Parts List

Spare Part	Ident. No.
Power supply unit.....	.....52 596 1802
Printed circuit board Printer.....	.....52 596 1801
Fuses (line) F1, T6,3 A.....	.....06 710 1630
Main board PSE 33.....	.....57 299 8002
Thermal Printhead.....	..... 06 968 0110
Stepper Motor.....	.....52 596 1012
Cold Fluorescent Lamp.....	..... 52 596 1011
Thermal Recording Paper.....	.....05 990 0063