communications
ELAC Nautik

NAVIGATION ECHOSOUNDER
LAZ 5100

Technical Handbook
TH 52 603 8001 E

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Declaration of Conformity

EG- Baumusterprüfbescheinigung

EG- Baumusterprüfbescheinigung

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EG- Baumusterprüfbescheinigung

Contents

1 GENERAL

1.1 FUNDAMENTAL SAFETY INSTRUCTIONS

General remark to hydroacoustic equipment LAZ 5100

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 sonar contact with the water at extremely bad weather, as a result of violent pitching.
- Hot water discharges from power plants;
- Rising cold water in several sea areas.

The list above is not complete; we will be pleased to assist with further information on request, see also chapter 5.1 Installation.

The LAZ 5100 echosounder has been built in accordance with state of the art standards and recognised safety regulations. Nevertheless, it may constitute a risk to life or limb of 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 LAZ 5100 Echosounder must only be used in a technically flawless condition in accordance with it's designated use and the instructions contained within this Technical Handbook and only by safety conscious persons who are fully aware of the risks involved in operating such a system.

The LAZ 5100 Echosounder is designed exclusively for use as a navigational echosounder. Using the system for purposes other than this is considered contrary to it's 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 entrusted with operating the system must have read the Technical Handbook, in particular the section on safety measures before and during operation. Reading these instructions after starting the system is too late. This applies especially to persons who only work with the system occasionally, e.g. during setting up or maintenance.

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

Use only spare parts authorised by the manufacturer and never replace defective fuses by those of any other rating than specified.

Switch the system OFF immediately if trouble occurs with the electrical system.

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

Observe all safety instructions and warnings for operating and maintenance 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 manufacturers 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 tighten any screwed connections, e.g. plugs, sockets and terminals, which may have been loosened during maintenance or repair work.

Always dispose of replaced parts in accordance with local environmental regulations.

Check the system regularly for defective cables, connections etc.

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

Service technicians opening the Display and Control unit for repair purposes must observe the tightening torque of the capped nut and washer, see items 17, 27 in drawing: ECHOLOT LAZ 5100-01 to 10, no. 52 590 8001 to 8010 in chapter 6 "DRAWINGS" .

Echosounding 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 display false readings over a period of time. 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.

2 GENERAL INSTALLATION INSTRUCTION FOR ECHOSOUNDERS

2.1 TRANSDUCER INSTALLATION

The performance of an echosounder is limited by the acoustical propagation of sound in water. Mainly this is influenced by the **transducer mounting place**, the **operational frequency** and the **transducer efficiency**.

The transducer mounting place is to select in such a way, that the transducer surface is free of air bubbles and turbulence. Air bubbles and turbulence will reflect the sound energy so that no echoes from the bottom will return.

That's why transducers in general have to be installed in ship's bow.

If the ship has a bow thruster, the transducer has to be mounted ahead of it. Otherwise the turbulence caused by the thruster hole will inhibit echosounding operation.

While the bow thruster is operating, no echosounding is possible because of the propeller rotation. On ships with bulbs the transducer must be mounted as far ahead as possible.

Transducers mounted in ship's aft normally are limited in function during travelling, because this area is very noisy. Due to engine noise, propeller rotation and air bubbles, the transducers are only efficient during low speed travelling.

An indication for that is the disappearing of echoes, digital reading will indicate surface reverberation (1-1.5 m) or “?”.

While sailing only the front transducer should be used.

2.1.1 CABLE LENGTH, OPERATING FREQUENCY

Both the operating frequency and the length of cable between the echosounder and the transducer influence the performance of echosounding.

General rules are:

At **lower frequencies** the influence of air bubbles and turbulence decreases, increased depth measurements are possible, energy loss at longer cable length is minimised.

Higher frequencies are less sensitive against radiated water noise caused by the ships engine and propeller rotation.

Following tables give information about echosounding performance depending on various parameters.

Table of maximum measurable water depth, depending on frequency, transducer type, cable length.

Transducer Type	Frequency	Manufacturer	Electrical Power	Maximum Cable Length	Maximum Waterdepth
LSE 132	30 kHz	Elac Nautik	450 Watt	600 m	1200 m
LSE 297	**50 kHz**	Elac Nautik	250 Watt	400 m	600 m
LSE 133	50 kHz	Elac Nautik	450 Watt	600 m	1100 m
SW 6016	100 kHz	STN Atlas	200 Watt	150 m	300 – 350 m
LSE 148	100 kHz	Elac Nautik	450 Watt	200 m	350 – 400 m
LSE 313	**200 kHz**	Elac Nautik	250 Watt	150 m	250 – 300 m
LSE 135	200 kHz	Elac Nautik	250 Watt	150 m	250 – 300 m

The depth values can only be reached with limited cable length and an undisturbed acoustic and electric receiver channel.

For cable length longer than mentioned in the table the electrical power of the echosounder has to be increased according to manufacturer's release.

Table 1 and 2 show as an example cable loss depending on frequency and cable length and the corresponding possible depth measurements for the frequencies 50 kHz and 100 kHz.

Table 1: Cable loss for 100 kHz and 50 kHz

Cable length in m	Loss in dB at 100 kHz	Loss in dB at 50 kHz
50	1.2	0.8
100	2.8	1.7
150	4.5	2.6
200	6.3	3.6
250	8.2	4.6
300	10	5.6

Table 2: Depth measuring performance, cable length- dependent for 100 kHz and 50 kHz

Cable length in m	Depth in m at 100 kHz	Depth in m at 50 kHz
50	270	600
100	250	580
150	230	560
200	200	540
250	180	515
300	170	495

2.1.2 CABLING, CABLE LOCATION, CABLE SPECIFICATION

Critical point in cabling is the correct handling of the cable screens, especially for the transducer cable.

The cable screens have to be grounded only at one point: at the echosounder.

In all connection boxes the screens are slide and not connected to ground.

Dismantling has to be as short as possible.

The transducer cable from transducer to the first connection box has to be fed through a steel protection pipe.

From the first connection box to the echosounder three kinds of cable laying are mandatory recommended:

- the cable is laid in a steel pipe
- a double-screened cable is used as transducer cable, the inner screen is one-side connected to the echosounder's ground, the outer screen is one-side connected to the ship's ground.
- the transducer cable has to be laid separately from other cables in a distance of minimum 0.5 m.

Most important is not to lay single shielded cable in the vicinity of other cable.

NOTE: in any case shielded cable has to be used over the whole distance from the transducer to the echosounder. All connection boxes must be metallic.

2.1.3 TRANSDUCER CABLE SPECIFICATION

The cable from the transducer connection box to the echosounder must be approved marine cable according DIN 89158 or similar, like MGCG 2x1.5.

At least the requirement of a resistance <13 Ω/ km and a capacity of < 150 nF/ km must be fulfilled.

2.1.4 INTERFACES

Printer interface: Standard CENTRONICS parallel interface, cable length: 5 m max.

Serial NMEA input: Input for navigational data and time synchronisation

Serial NMEA output: Water depth and additional information, see chapter 3.5.

Both serial interfaces are **RS 422**.

Only equipment with **RS 422** interfaces can be connected to the echosounder, otherwise the interface electronic gets damaged.

2.1.5 INSTALLATION REPORT; SERVICE REQUEST

After the installation and the quick check (see chapter 5.1.2) are completed, please fill in the installation report and send a copy to the ELAC Nautik service center (FAX +49 431 883 366). The original belongs into the technical handbook.

If service is needed in case of trouble with the echosounder, please complete the service request/ inspection sheet and forward it to the service company responsible with a copy to the ELAC Nautik service center (FAX + 49 883 366).

Installation – Report

Schiffsname
Ship's name _____

Installationsfirma
Installation Company _____

Installationsdatum
Date of Installation _____

LAZ 5100 ☐ ES 5000 ☐ Atlas 9205 ☐

Werk-Nr. (S/N)
Serial Number _____

1-Kanal – Gerät
1-channel unit ☐

2-Kanal – Gerät
2-channel unit ☐

Wandlertyp
Transducer Type _____ S/N _____

Digitale Tochteranzeige
Digital Display Unit

DAZ 25 ☐ S/N _____

Atlas 9205 T ☐ S/N _____

Einstellungen Settings	LAZ 5100	Kanal 1 Channel 1	Kanal 2 Channel 2
	Frequenz / Frequency	_____	_____
	Blocking Depth	_____	_____
	Draft	_____	_____
	Trim	_____	_____
	Location	_____	_____
	NMEA - Interface		
	Baudrate	_____	
	Mode	_____	
	Repetition Rate	_____	
	Protocol	_____	

Bitte eine Kopie des Installationsreports an Elac Nautik Service Center schicken.

Please forward a copy of the Installation Report to Elac Nautik Service Center.

Fax + 49 431 883 366

Service – Anforderung / Service Request

LAZ 5100 ☐ **ES 5000** ☐ **Atlas 9205** ☐ Werk – Nr.

Serial Number _____

Schiffsname: Schiffsfax:

Ship's Name: _____ Ship's Fax: _____

No.	Item	Default value	Channel 1	Channel 2
1.	**Menu „Alarm“**			
1.1	Alarm ↗	„OFF“		
1.2	Alarm depth ↗	„0000“		
1.3	Alarm ↘	„OFF“		
1.4	Alarm depth ↘	„0000“		
2.	**Menu „Parameter“**			
2.1	Sound velocity	1500 m/s		
2.2	Units	m		
2.3	Depth mode	DBK		
3.	**Menu „System Set Up“**			
3.1	Date, Time	actual date, time		
3.2	Service	select with yes		
3.2.1	Channel Settings			
3.2.1.1	Draft	0,0 m		
3.2.1.2	Trim	0,0 m		
3.2.1.4	Blocking Depth	2 - 2,5 m		
3.2.1.4	Frequency	xx kHz		
3.2.1.5	Location	BOW, AFT		
3.2.2	Interface			
3.2.2.1	External PC	38400 ; 8N1		
3.2.2.2	NMEA / DAZ 25	4800 ; 8N1		
3.2.2.3	Repetition Rate	Fast / Slow		
3.2.2.4	Protocol	DPT/DBT or ELAC		

Fehlerbeschreibung / Fault Description

3 TECHNICAL DESCRIPTION

3.1 GENERAL

The LAZ 5100 Navigation Echosounder is a compact, processor controlled, state of the art system. Presentation of the water depth is made on a Liquid Crystal COLOR Display (LCD) as.

- depth below the keel (DBK)

Logically structured MENUS assist the user when selecting the operating parameters required. Built to the highest standards, it is certified to meet all requirements laid down by the

IMO Resolution MSC 74/69: Amendments to Resolution A.224,Annex 4 . Wheelmark-tests are certified by the German authorty BSH (German Hydrographic Institute)..

Figure 3-1: LAZ 5100 Display and Control Unit

3.2 SYSTEM CONFIGURATION

NOTE: See also Figure 3-2, System Configuration with Options.

The basic system configuration is as follows:

- 1 x Display and Control Unit LAZ 5100
- 1 x Connection Box
- 1 x Transducer

3.2.1 DISPLAY AND CONTROL UNIT

The Display and Control Unit will normally be installed on the bridge, either mounted in a console or bracket mounted to the deckhead or bulkhead. It is made up of a display area and a keypad which is used to alter system parameters and settings.

The unit can be a one or two channel unit, working with different transducers on different frequencies, see Technical Data.

When used with only one transducer (see Figure 3-1), the display area shows the following:

- Water depth
- Range scale
- Time and Date
- Latitude and Longitude (if connected to a Navigation system with a standard NMEA 0183, version 2.0 interface)
- Minimum and maximum depth alarm settings (if activated)
- A trace of the sea bed
- A colour bar representing the signal strength of the echoes

With two channels, a vertical split display shows left half channel 2 information, right half channel 1 information. Instead of LAT/ LONG a second water depth indication appears.

A built-in ring memory continually stores system data, this allows the user to recall data to the screen, or print out a hard copy of any or all events occurring within the last 24 operating hours (if a printer is connected).

3.2.2 TRANSDUCER CONNECTION BOX

This will usually be installed near the transducer, to allow a defective transducer to be replaced without having to replace the complete cabling to the Display and Control Unit. The connection box must be made of metallic material.

3.2.3 TRANSDUCER

The transducer converts electrical energy to sound energy and transmits this towards the sea bed. Sound energy returning from the sea bed, in the form of echoes, is converted into electrical energy by the transducer and fed to the Display and Control Unit for evaluation and presentation.

3.3 OPTIONAL EQUIPMENT

The following optional equipment is available to broaden the system capabilities:

- Digital Slave Display(s)
- Printer
- Connection Box
- Transducer(s)
- Switch box

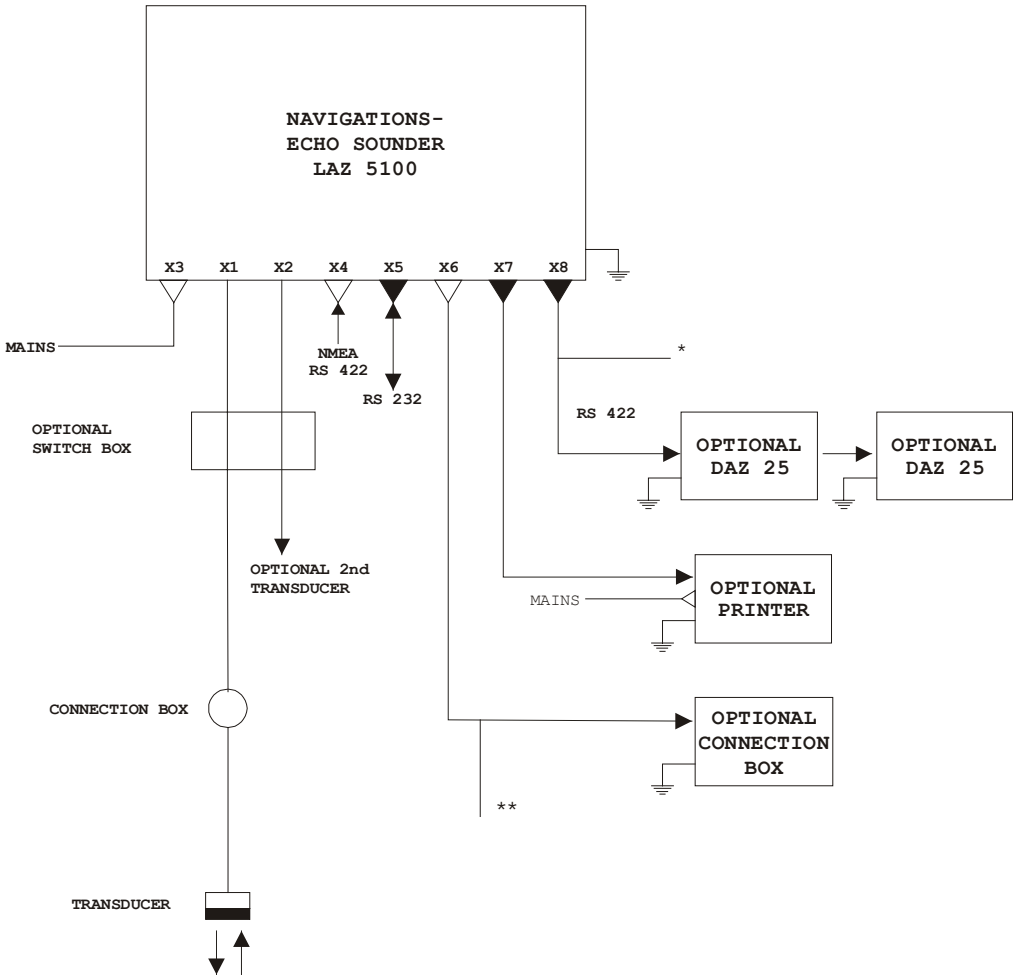


Figure 3-2 : System Block Diagram with Options

* Operator´s Fitness Check

** Mute- Control, TXD1 for Voyage Data Recorder (NMEA, RS 422)

3.3.1 DIGITAL SLAVE DISPLAY(S)

These are used to repeat water depth information at other parts of the ship where such information is needed. A total of two Digital Slave Displays can be connected directly to the system.

NOTE: Echosounding 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 regular intervals in order to guarantee the ship's safety.

IMPORTANT NOTE: While crossing steep slopes the echo evaluation might fail. A steady depth display cannot be guarantied in this case. The LAZ depth display will show the last evaluated depth value together with a question mark, longer lasting errors will be indicated by a question mark without any depth value. At the digital slave display "----" will be displayed in this case.

3.3.2 PRINTER

A Printer can be connected to give a continuous hard copy of data presented on the display area or to print out a hard copy of events from any time within a previous 24 operating hour period.

3.3.3 CONNECTION BOX

The Connection Box is connected up to the Display and Control Unit and provides the following connections:

- a 2nd Digital Slave Display
- a blanking pulse output
- depth alarm relay contacts (potential free)

3.3.4 TRANSDUCER OPTIONS

If a 2 channel module is installed, the system is capable of accommodating two transducers without further modification, e.g. one fore and one aft, one port and one starboard. Information received from either or both transducer(s) can be called up for display.

3.3.5 SWITCH BOX

If no 2 channel module is installed, a switch box can be used for the connection of two transducers of the same type (frequency). Echo-information of the transducer selected by the switch box will be shown on the display.

3.4 TECHNICAL DATA

Supply voltage, nominal	:	95 - 240 V AC, 50 - 400 Hz (min. 85 V AC, max. 264 V AC) 10 - 30 V DC (option, via power pack)
Power consumption	:	Approx. 25 W
Operating temperature range	:	-15°C - +55°C
Storage temperature	:	-20°C - +60°C
Housing	:	Cast aluminium
Protection code	:	IP 53
Transducer impedance	:	50 - 150 Ohms
Pulse length	:	0.3, 1, 3 ms, (automatically switches to suit range selected)
Measurement ranges	:	0 - 10, 20, 50, 200, 500, 2000 m (or the equivalent in feet or fathoms)
Auto range	:	depending on the water depth range scale of 200m or 50 m will be selected automatically
Digital Depth Information	:	150% of measurement range for 0 - 10m 0 - 50m 120% for other ranges
Resolution	:	1% of range selected
Measuring accuracy	:	2.5% of depth reading
Display	:	Liquid Crystal Display,
Display size	:	192 mm x 144 mm
Pixels	:	640 (hor.) x 480 (vert.)
Minimum sounding depth	:	0.5 m or equivalent (Transducer depended)
Depth corrections Starting with software version 1.82	Transducer-surface : : Transducer-keel :	up to 9.9 m up to 29,9 m up to 4.9 m
Standard frequencies (kHz)	:	28, 30, 33, 38, 50, 100, 200, 210 (selectable)
2 Channel version	:	any combination of the frequencies above
Output power	:	1000 W Max. dependent upon range selected and transducer installed
Compass Safety Distance	:	Magnetic compass : 0.5 m
	:	Steering compass : 0.3 m
Dimensions	:	Height = 288 mm Width = 336 mm Depth = 156 mm
Weight	:	Approx. 8 kg

Deadman alarm	: altering parameters of the unit causes an output to a central alarm unit (potential free relais contact)
Power alarm	: when the power supply voltages decreases 100 V a visual and audio alarm (with mute control) is activated, a potential free output for external use is available (potential free relais contact)

.

3.4.1 ELECTROMAGNETIC COMPATIBILITY

The LAZ 5100 conforms with specifications laid down in DIN* EN 60945 (IEC945+A1) Navigation equipment for Shipping; all editions up to March 1997 and also to the newest version 4 with measurements up to 2 GHz.

A declaration of conformity, in accordance with European Community guideline 89/336/EG, can be found in Figure 3-4 on page 3-17.

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

3.5 INTERFACES

The LAZ 5100 has the following interfaces:

- **RS 422**, NMEA, for Navigation data input (X4), Blanking input
- **RS 232**, Personal Computer connection for testing (X5)
- Centronics, parallel Printer connection (X7)
- **RS 422**, Digital Slave Display connection and potential free relay contacts for alarm ACTIVE (X8), relay control for Operator´s Fitness Check
- **RS 422**, Power supply for a 2nd Digital Slave Display, and blanking pulse output (X6), Mute Control input, second serial output for Voyage Data Recorder, Power Fail output.
- Interface to an external CRT monitor.

Interface connections are made at the rear of the unit. Figure 1-3 below shows which connector belongs to which interface.

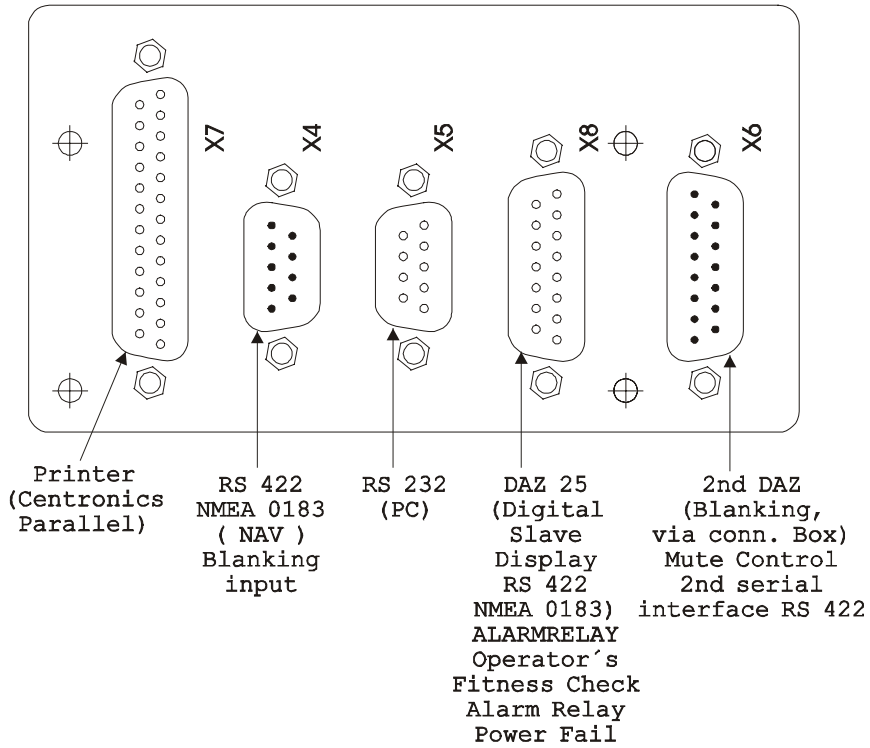


Figure 3-3 : LAZ 5100 Interface Connector Plate

NOTE: For pin connections, see Table 1 at the end of this Chapter.

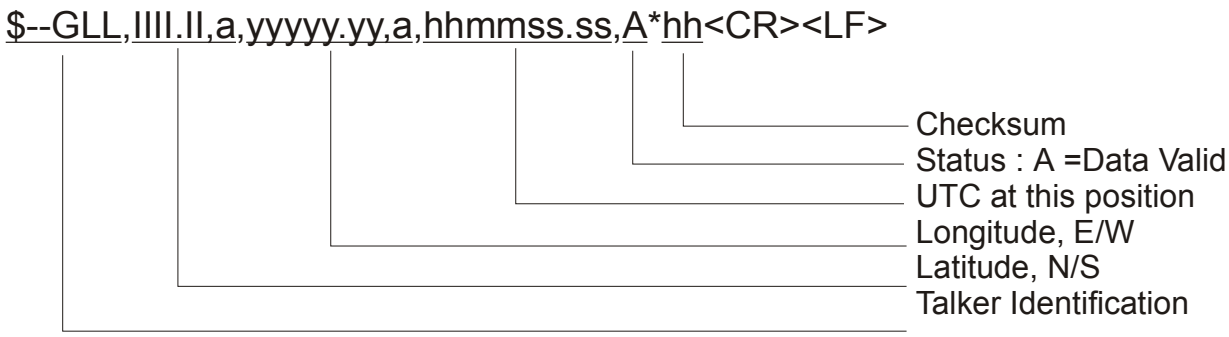
3.5.1 DESCRIPTION OF NMEA INTERFACES

All serial interfaces described in this chapter conform to EN 61162-1 (2001).

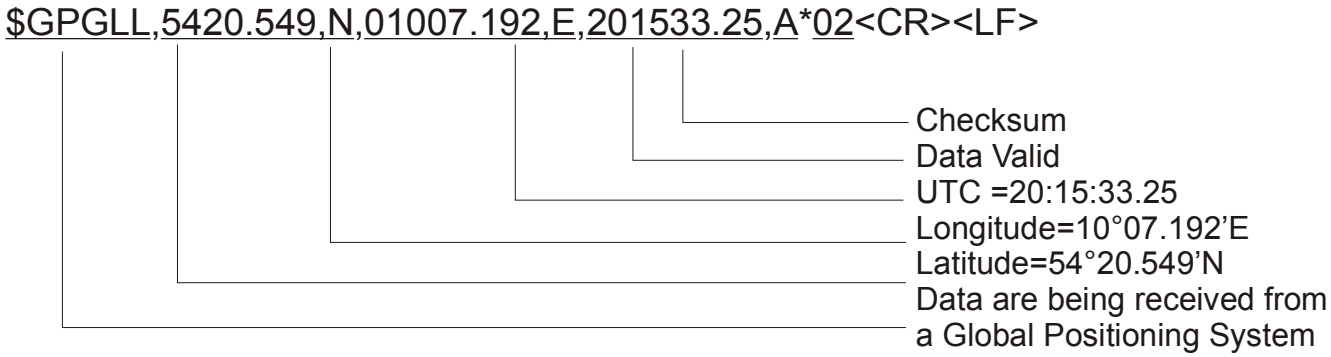
(X4)

A navigation system can be connected to this interface so that the ship's co-ordinates are displayed by the LAZ 5100. The system will accept and evaluate data sentences in NMEA 0183, Version 2.30, GLL and ZDA formats, as follows:

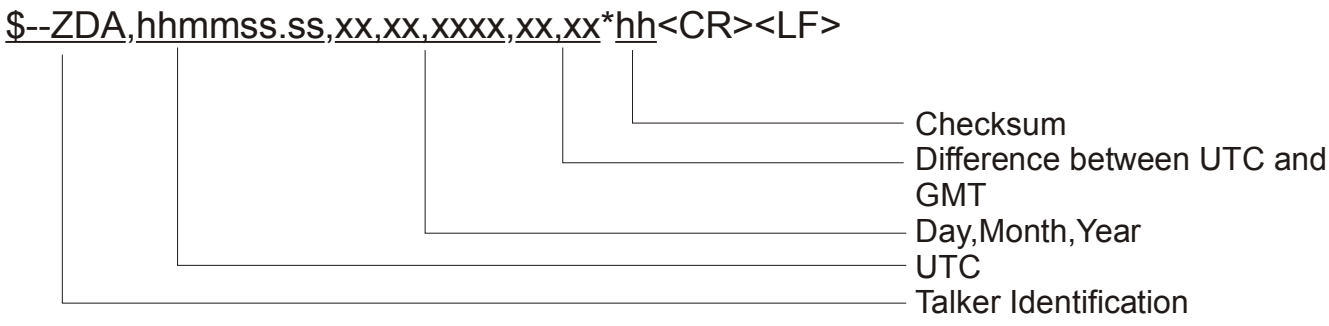
GLL Format



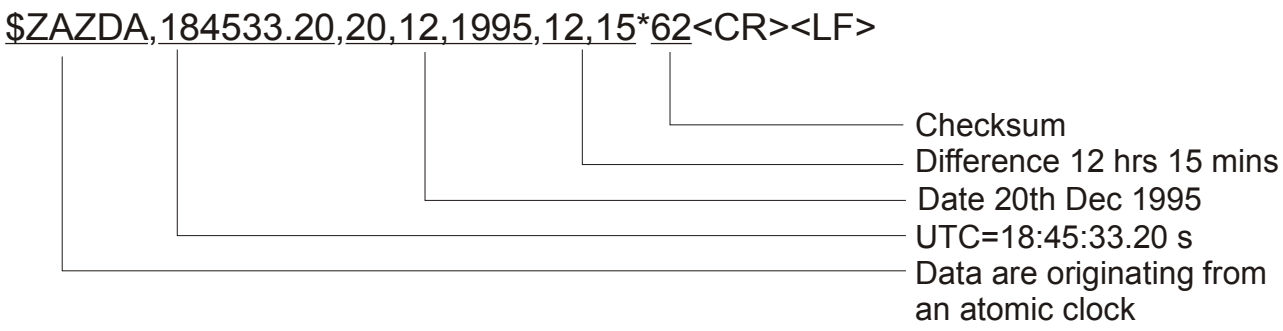
Example:



ZDA Format



Example:

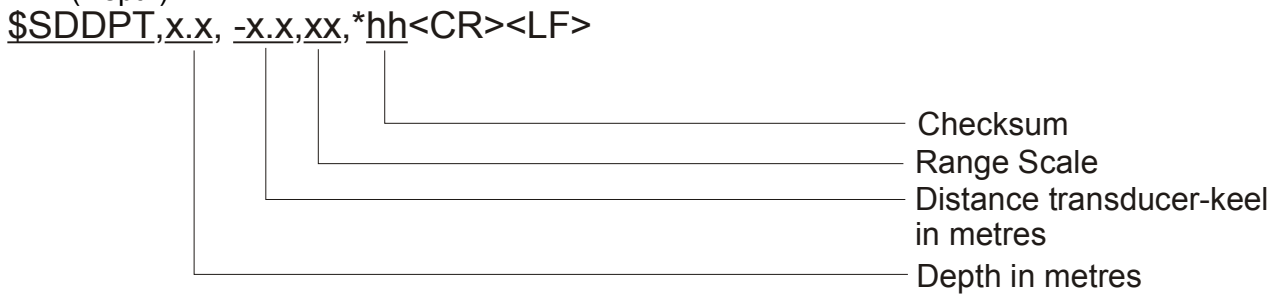


(X8)

Interface for START/ STOP - SLAVE indicator, potential free alarm relay contacts and Digital Slave Indicator.

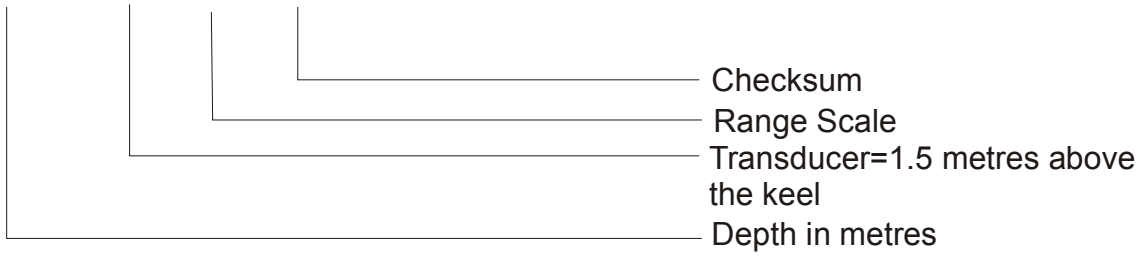
After each sounding the LAZ 5100 transmits depth information to the Digital Slave Display interface (15 to 60 times per minute, depending upon the measuring range selected) in NMEA, Version 2.00 format. The DPT (Depth) and DBT (Depth Below Transducer) sentences are as follows:

DPT (Depth)



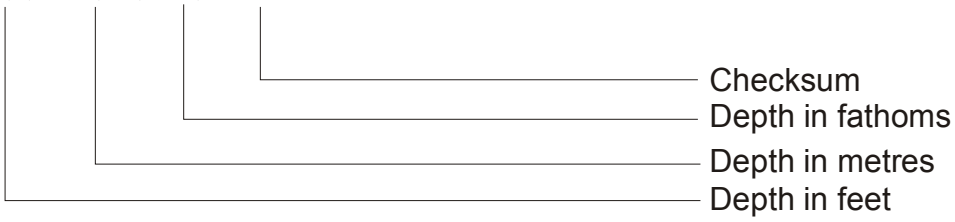
Example:

$SDDPT,0337.0, -1.5,0500,*4D<CR><LF>



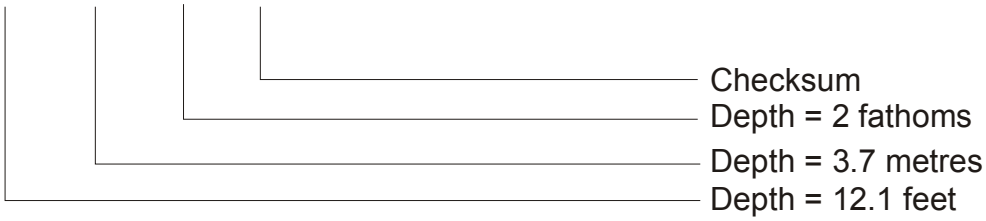
Depth Below Transducer (DBT)

$SDDBT,x.x,f, x.x,M,x.x,F*hh<CR><LF>



Example:

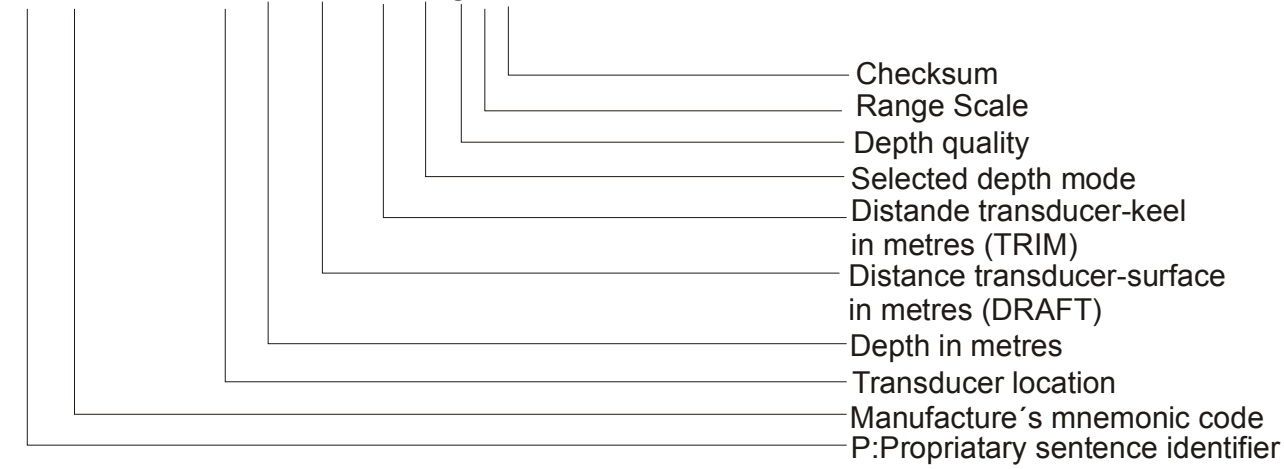
$SDDBT,0012.1,f, 0003.7,M,0002.0,F*32<CR><LF>



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,g,r,*hh<CR><LF>



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

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

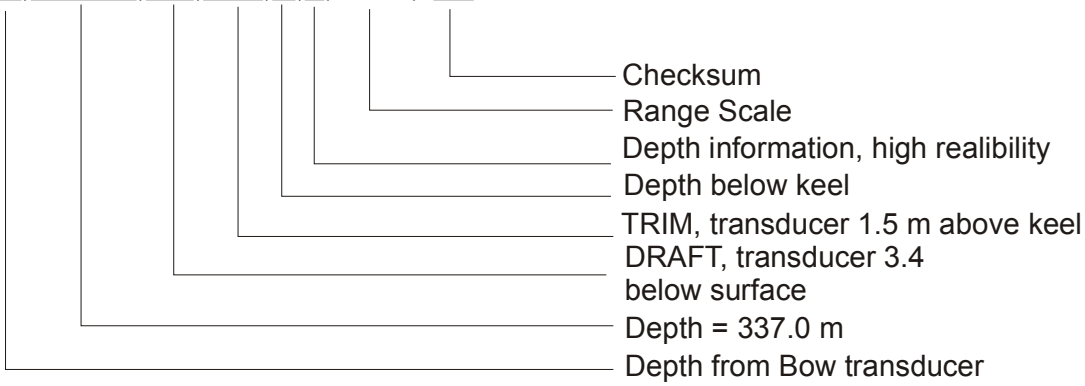
r: Range Scale

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,2,0500,*3F<CR><LF>



To activate the Protocol ELAC see chapter 5.1.2 Initial System Set-up.

3.5.2 OTHER INTERFACES

(X5)

Reserved for service technicians for testing purposes and transferring data to a PC (special software required).

(X6)

This interface provides a power supply and serial Data output for a second Digital Slave Display and a blanking pulse output.

(X7)

This Centronics interface allows an EPSON LX 300 (or compatible) printer to be connected to the system. Max. length of printer cable 5 m !

(X38)

This is an output to connect a standard CRT monitor to the echosounder.

	NMEA IN	**PC**	**2nd DAZ**	**Printer**	**DAZ 25**	**Monitor**
Pin	**X4**	**X5**	**X6**	**X7**	**X8**	**X38**
1	CANL***	BSL	SioB1Tx-	Strobe	OFC 1**	red
2	SioBRxD+	Sio0RxD	SioB1Tx+	Data 0	OFC 2**	green
3	n.c.	Sio0TxD	SioB0Tx+	Data 1	SioB0Tx+	blue
4	Blanking in -	n.c.	Mute in b	Data 2	n.c.	n.c.
5	Blanking in +	Ground	Mute in a	Data 3	Alarm A **	Ground
6	CANH***	n.c.	SioATxD+	Data 4	START	Ground
7	SioBRxD-	n.c.	SioARxD+	Data 5	STOP	Ground
8	n.c.	n.c.	SioB0Tx-	Data 6	SioB0Tx-	Ground
9	n.c.	Vcc	Blanking out -*	Data 7	Alarm B **	n.c.
10	---	---	Blanking out +*	ACK	Alarm C **	Ground
11	---	---	Aux. Voltage +	BUSY	Aux. Voltage +	n.c.
12	---	---	RSRemote	PAPER END	Power Fail 1**	n.c.
13	---	---	SioATxD-	SELECT	Power Fail 2**	hsync
14	---	---	SioARxD-	n.c.	LSE2+2	vsync
15	---	---	Aux. Voltage -	ERROR	Aux. Voltage -	n.c.
16	---	---	---	RESET	---	---
17	---	---	---	n.c.	---	---
18	---	---	---	Ground	---	---
19	---	---	---	Ground	---	---
20	---	---	---	Ground	---	---
21	---	---	---	Ground	---	---
22	---	---	---	Ground	---	---
23	---	---	---	Ground	---	---
24	---	---	---	Ground	---	---
25	---	---	---	Ground	---	---

Pin Connections

LEGEND: nc = not connected OFC: Operator Fitness Check

--- = not available

* Blanking + : open Collector (Potentialfree Transistor output)

Blanking - : open Emitter

** Relays; Contact rating : Umax 28 VDC, Imax 1 A

Max. switching Power: 5W

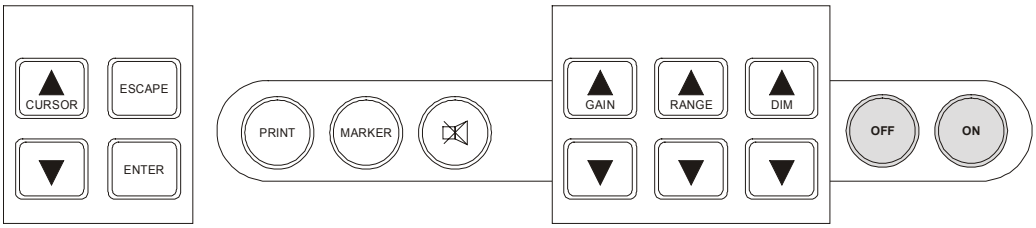
*** Not in use

EC- Approval

Figure 3-4 : Copy of the Original Declaration of Conformity

4 OPERATING INSTRUCTIONS

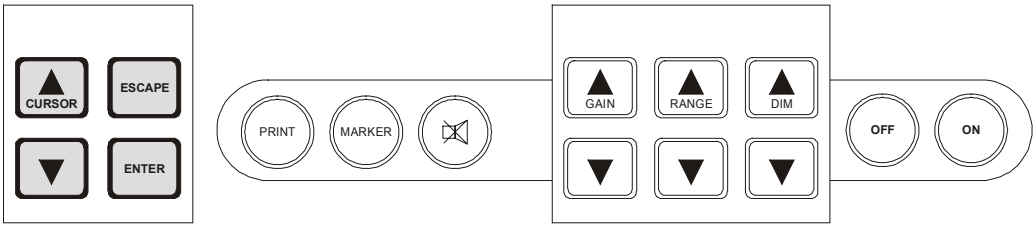
4.1 SWITCHING THE SYSTEM ON/OFF



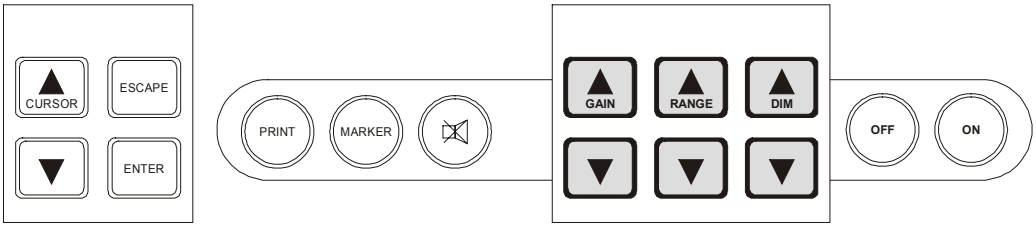
To switch the System **ON**, press the far right-hand key marked "**ON**". The system will switch **ON** and assume the parameter settings which were selected when the system was last switched **OFF**.

To switch the system **OFF**, press and **hold** the second key from the right, marked "**OFF**", the system will switch **OFF** after about 3 to 5 seconds. This is a built-in safety feature to prevent accidental switching **OFF**.

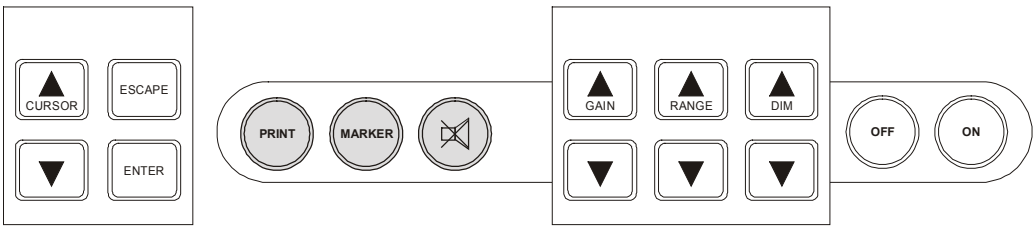
4.2 BRIEF EXPLANATION OF CONTROLS



- **CURSOR** : The **CURSOR** keys allow the user to move the cursor within a **MENU** and alter parameters. The position of the cursor can easily be seen, the word, letter or digit marked by the cursor appears inverse (dark background, light text). Parameters to be altered must first be "marked" by the cursor.
- **ESCAPE** : The **ESCAPE** key is used to leave a **MENU** or to abort parameter alterations.
- **ENTER** : The **ENTER** key is used to call up **MENUS** and confirm parameter alterations within **MENUS**.



- **GAIN** : The **GAIN** keys are used to alter the system gain, otherwise known as amplification, to achieve a clearer presentation. The system can be operated with either automatic or manual gain control. See chapter 4.4.1.
- **RANGE** : The **RANGE** keys are used to set the depth range of the system.
- **DIM** : The **DIM** keys are used to set the display backlighting level to suit the user.

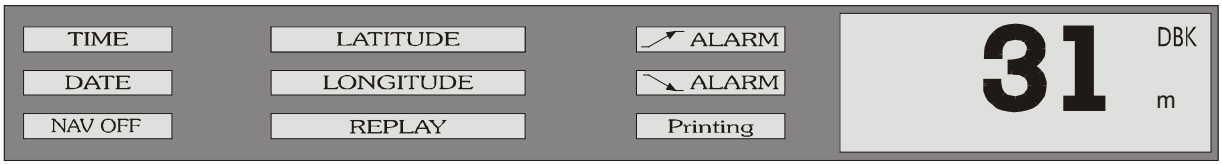


- **PRINT** : The PRINT key is used when the user wishes to make a simultaneous hard copy of the echogram. This is only possible if a printer is connected to the system.
- **MARKER** : When the MARKER key is pressed, a vertical dotted line appears on the screen and moves with the presentation from right to left. At the same time all relevant information is stored in the system's 24 hour memory. This memory stores data from the previous 24 system operating hours.
- **SYMBOL** : The key marked with a loudspeaker symbol is used to acknowledge acoustic depth alarms.

4.3 DISPLAY AREA

4.3.1 SINGLE CHANNEL DISPLAY

The Display Area is used to present the user with all relevant information. The screen is divided into two areas. The lower, main area is used to present an echogram of the scenario beneath the ship. It is provided with a scale and time markings. The range in use is displayed beside the scale markings, at the bottom right of the screen. The time markings appear at 3 minute intervals at the bottom edge of the screen. As explained previously, when MENUS are called up, they will appear at the bottom left-hand side of this area. The smaller strip across the top of the screen provides the user with various system and depth information (see illustration below).



Explanation of information contained in the illustration above (from left to right):

TIME : Shows the actual time

DATE : Shows the actual date

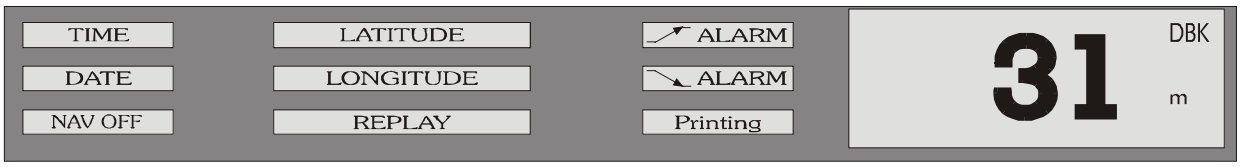
NAV OFF : Flashes to indicate that the Navigation mode is **not** in use i.e. the user has selected other units, sound velocity or depth mode. When the user returns to the Navigation mode,
by selecting NAV Defaults, this window will disappear (see also chapter 4.5.1, NAV-Defaults). If the echosounder is in the two channel mode (only if the second channel and a second transducer is fitted), NAV - OFF is activated without flashing.

LONGITUDE : These windows will display the actual Lat. and
LATITUDE : Lon. **only if the system is connected up to the ship's navigation system**.

Printing : This window is usually blank. If the user chooses to make a hard copy of the echogram, by pressing the **PRINTER** key (a printer must be connected) the word "Printing" will appear here.

ALARM : These windows show the depth alarm settings. The upper window shows the minimum depth alarm, the lower window shows the maximum depth alarm. If the alarms are not activated, e.g. Status = OFF, the relevant window(s) will remain blank. If an alarm condition is present, the relevant window will flash

REPLAY : When the user chooses to display information stored over the previous 24 operating hours (using the LOG DATA MENU), the word "REPLAY" will appear here.



The large window at the right-hand side of the information area is used to display the actual water depth, the measurement mode, units of measurement. The measurement mode can be either:

- Depth Below the Keel = DBK (as shown)
- Depth Below the Surface = DBS
- Depth Below the Transducer = DBT

The units of measurement can be either:

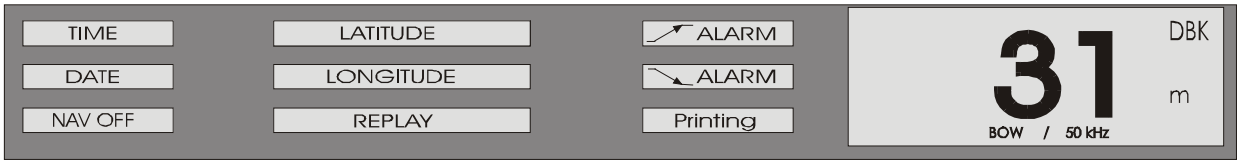
- Metres = m (as shown)
- Feet = ft
- Fathoms = ftm

If instead of the depth value a ? appears, make sure, that the echo signal will be in the range selected.

IMPORTANT NOTE: While crossing steep slopes the echo evaluation might fail. A steady depth display cannot be guarantied in this case. The LAZ depth display will show the last evaluated depth value together with a question mark, longer lasting errors will be indicated by a question mark without any depth value. At the digital slave display "----" will be displayed in this case.

4.3.2 2 CHANNEL DISPLAY

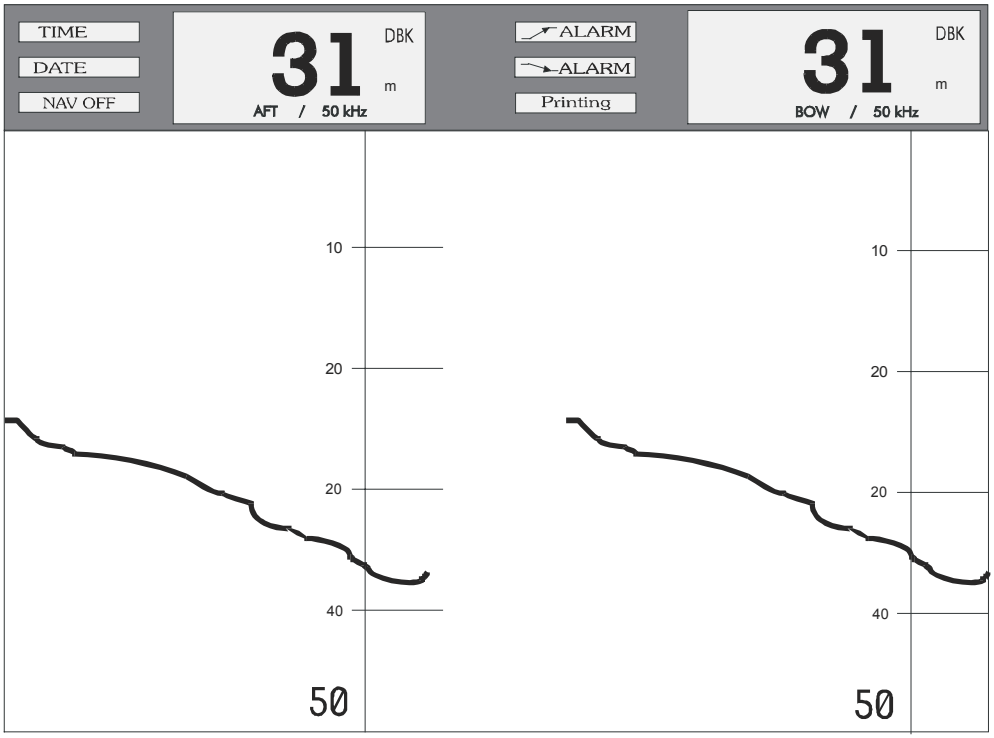
In the 2 channel mode information of the transducer location and frequency of the transducer in use is added.



If the presentation channel 1/2 is selected, Information of both channels are shown in a vertical split display.

The indication NAV OFF is activated without flashing to indicate, that all parameters are mode of presentation is non standard. For each transducer depth location and frequency is shown.

For transducer location and frequency see chapter 5.1.2 Initial System Set - up.



4.3.3 WARNING FIELDS

Three warning fields are provided on the display:

- NAV OFF flashing indicates that one or more parameters do not correspond to the navigational mode, i.e. the user has selected other units, sound velocity or depth mode.
- NAV OFF whithout flashing appears in the 2 channel mode. It is a hint, that in this display mode the user has to observe, that for instances dedicated digital slave repeaters are in use.
- POWER ERROR occurs when the supply voltage of the echosounder unit undergoes a value of 100 V AC. This is an internal alarm, the POWER ERROR field flashes and an acoustic alarm (with mute control) is activated.

4.4 ALTERING SYSTEM PARAMETERS AND SETTINGS

When the system is switched OFF, parameters selected are stored in the system's memory. When the system is switched ON again, these parameters will be retrieved and used (see NOTE below).

NOTE: The "DIM" setting is not stored, a pre-set default setting is used when the system is switched ON. With two channel systems, channel 1 is the default channel at start-up.

4.4.1 GAIN, RANGE AND DIM SETTINGS

GAIN (amplification), **RANGE** (depth range) and **DIM** (display area backlighting and keypad illumination) settings are made by pressing the relevant keys. There are two keys for each setting, one marked with an arrow pointing upwards and one marked with an arrow pointing downwards. Pressing these keys as described below will alter the present setting. The new setting will appear briefly on the display area directly above the key which was pressed and the effects of a change can be observed directly on the display area. Pressing the key a second time will alter the setting by a further unit.

GAIN:

The unit is fitted with an automatic gain control circuit for the data processing which is always activated when the unit is switched on. The **GAIN** setting only influences the displayed echo information. The **GAIN** value can be altered between 1 and 10, whereby 1 is the lowest and 10 the highest gain (amplification) factor.

If the sea bed trace appears too weak, the **GAIN** level must be increased to give a clear presentation. If there is a lot of "noise" to be seen on the display area, the **GAIN** level must be decreased. To **increase** the GAIN level, press the **GAIN key ▲** To **decrease** the **GAIN** level, press the **GAIN key ▼**. The value set will appear on the display area above the key (between 1 and 10). Pressing the same key a second time will cause the value to increase or decrease by one further unit. Repeat the procedure until a satisfactory sea bed trace is achieved.

In some cases it can be useful to work with manual instead of automatic gain. Manual gain setting is explained in chapter 4.5.2.

RANGE:

The **RANGE** can be set to suit the circumstances e.g. if a water depth of 35 m is indicated, the 50m range will give a better resolution and accuracy than the 200 m range. The range can be altered in the same way as the gain, except that here, pressing the **RANGE key ▲** will **decrease** the range and pressing the **RANGE key ▼** will **increase** the range. There are 6 ranges to choose from, 10, 20, 50, 200, 500 and 2000 m (or the equivalent in fathoms or feet). Selecting the unit of measurement is described in chapter 4.5.2.

Increasing the range to more than 2000 m scale an "A" will appear together with the 200 m scale. "A" indicates the selection of the automaticc mode. When the water depth decreases the range will at depth less than 50 m switch automatically in the 50 m range scale, if the depth increases, the 200 m range will be selected. Pressing in the automatic mode the range keys, manual control is activated.

NOTE: When DBS is used, the ranges 0-10 m; 0-20 m are not available, only 0-50 m.

DIM:

The display backlighting can be set in 10 steps to suit the ambient light. To **increase** the display backlighting, press the **DIM key ▲**. To decrease the display backlighting, press the **DIM key ▼** (see NOTE below).

All other parameters and settings are altered within so called **MENUS**, as described in chapters 4.4.2 and 4.5.

4.4.2 GENERAL INFORMATION REGARDING MENUS

The **ENTER** key is used to call up the various **MENUS** in sequence. 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 - **LOG DATA MENU**
- Press the **ENTER** key 4x - **SYSTEM SET-UP MENU**

If the **ENTER** key is pressed 5x, the **ALARM MENU** will re-appear.
When a **MENU** is called up, the title will be highlighted i.e. it will appear in inverse text, this means light text on a dark background or vice versa, depending upon the **DIM** setting. During daylight use, the text will be light on a dark background and during darkness, when the screen is dimmed, the text will be dark on a light background.

When the title line of a **MENU** is highlighted, it is possible to leave that **MENU** by pressing the **ESCAPE** key 1x, or to change to another **MENU** by pressing the **ENTER** key 1x or more 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 4.4.3. It is advisable that the user reads this Section thoroughly and practices making the alterations described in order to become more familiar with the system.

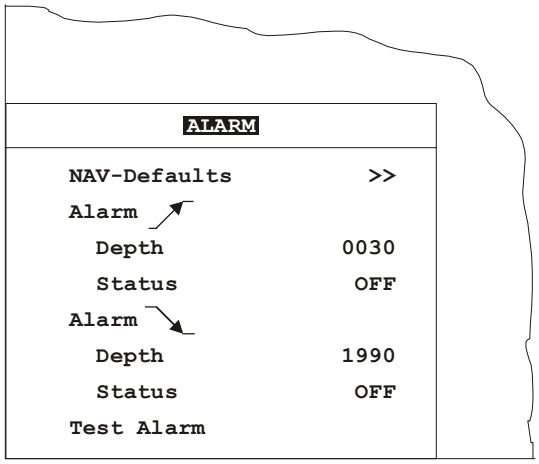
WARNING: Do not alter parameters within the SERVICE SUB-MENU unless authorised to do so. See also WARNING given in chapter 4.5.4, "The SYSTEM SET-UP MENU".

4.4.3 ALTERING SYSTEM SETTINGS/PARAMETERS WITHIN A MENU

When a **MENU** is called up, it will appear at the bottom left-hand side of the display area. There are 4 main **MENUS** available. These can be called up by pressing the **ENTER** key.

Example: The user wishes to change the MINIMUM DEPTH ALARM from 30m to 20m and activate it (Status = ON) and to change the MAXIMUM DEPTH ALARM to 410m and activate it.

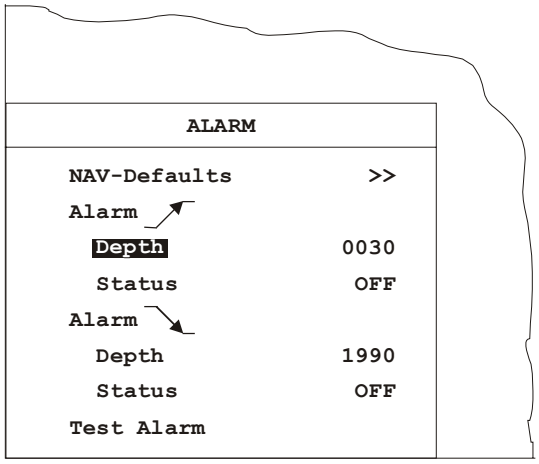
Press the **ENTER** key once to call up the **ALARM MENU**. The **ALARM MENU** as shown below, appears at the bottom left-hand side of the display area.



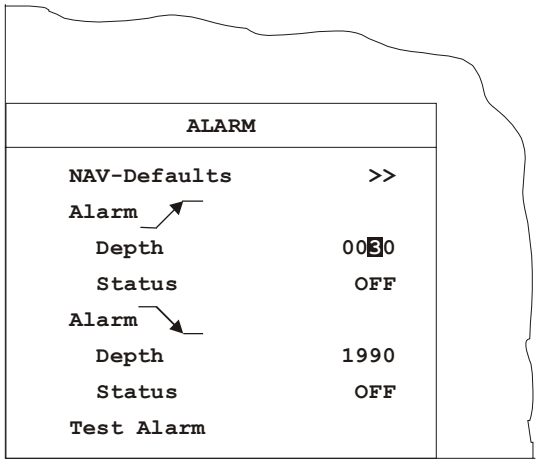
The word **ALARM** is marked by the so called cursor and appears inverse, i.e. dark background, light text.

In order to alter the **MINIMUM DEPTH ALARM** setting within this **MENU**, the value to be altered 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 twice 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.

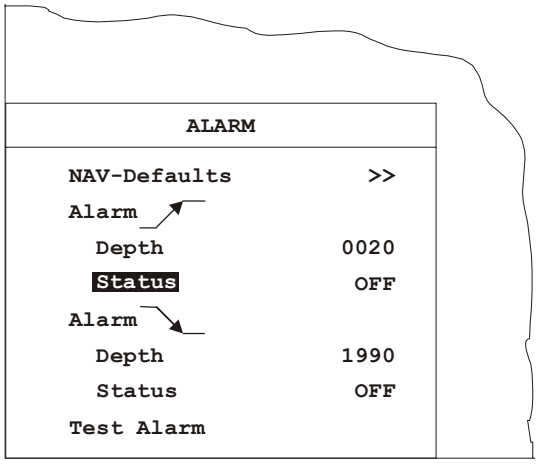


Now press the **ENTER** key. The cursor will jump from the word "Depth" to the first digit of the alarm setting, in this case a zero. Press the **ENTER** key twice more and the cursor will move to the right and mark the figure 3, as shown in the **MENU** below.

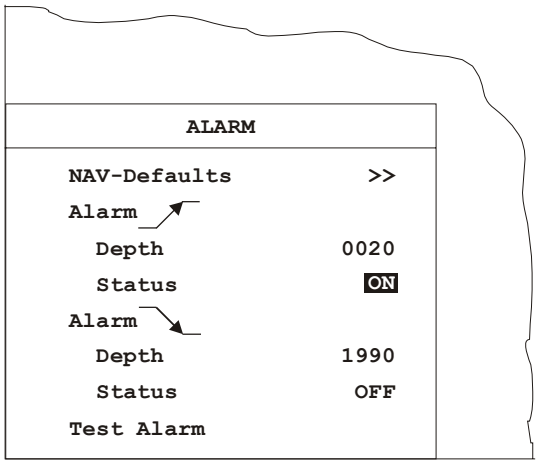


Press the **CURSOR ▼** key once. The figure 3 will change to a 2.

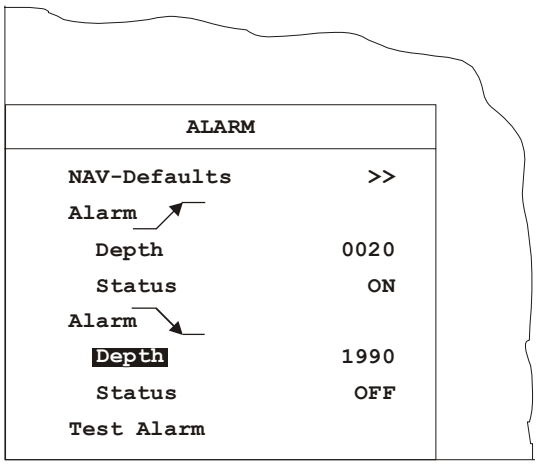
Press the **ENTER** key to confirm the new setting. The cursor will jump one digit to the right. Press the **ENTER** key once more and the cursor will move to mark the word "Status" as shown in the **MENU** overleaf.



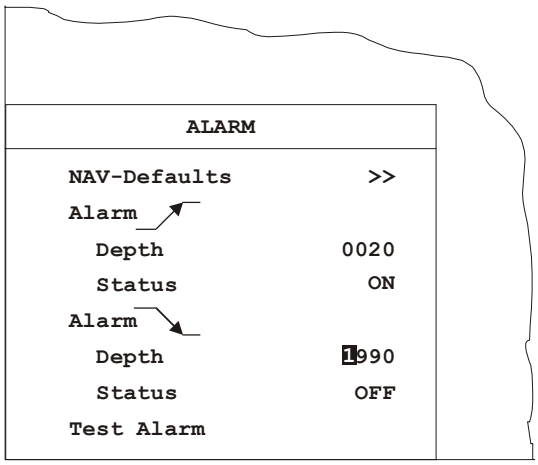
Press the **ENTER** key and the cursor will jump to the word "**OFF**". Press a **CURSOR** key (▲ or ▼) to toggle from **OFF** to **ON**. The **MENU** will appear as below.



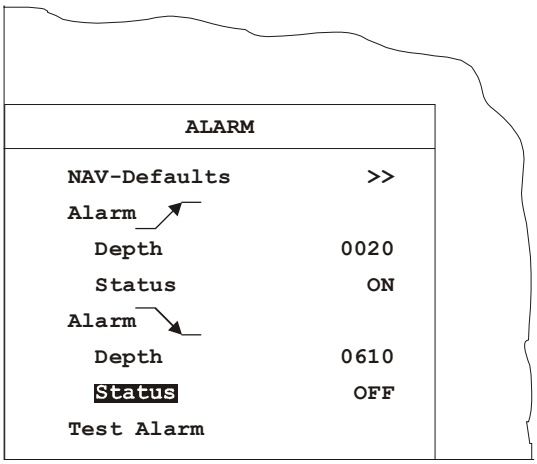
Press the **ENTER** key to confirm the setting. The cursor will jump to the word "Depth" as shown in the **MENU** below.



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 **MENU** below.

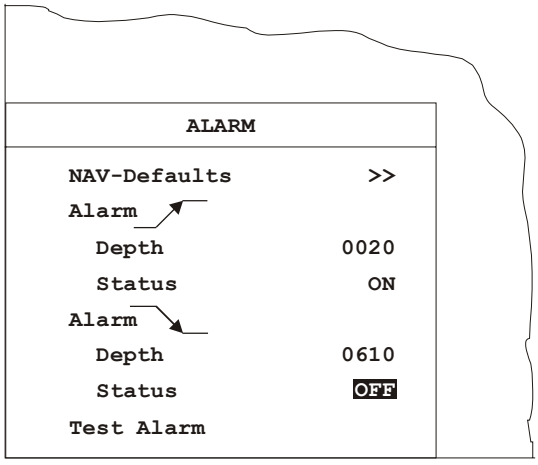


Change the 1 to a 0 by pressing the **CURSOR ▼** key. Press the **ENTER** key to confirm. The cursor will jump to the next digit, a 9. Repeatedly press the **CURSOR ▼** key until the desired value is reached, in this case a 6. Press the **ENTER** key to confirm. The cursor will jump to the next digit, 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, 410m, has been set, press the **ENTER** key to confirm. The cursor will jump to the word "Status" as shown in the **MENU** below.

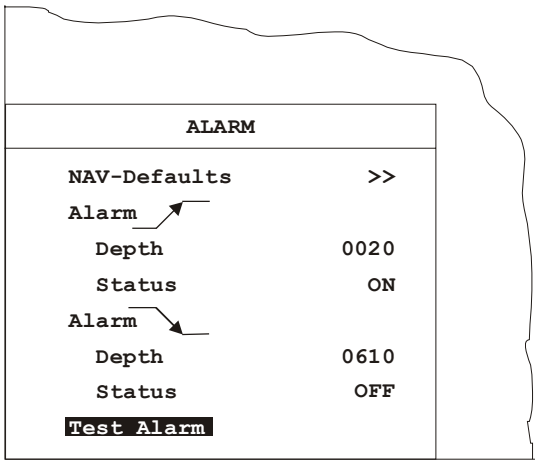


Press the **ENTER** key and the cursor will jump to the word "**OFF**".

The **MENU** will appear as shown overleaf.



Alter 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 **MENU** below.



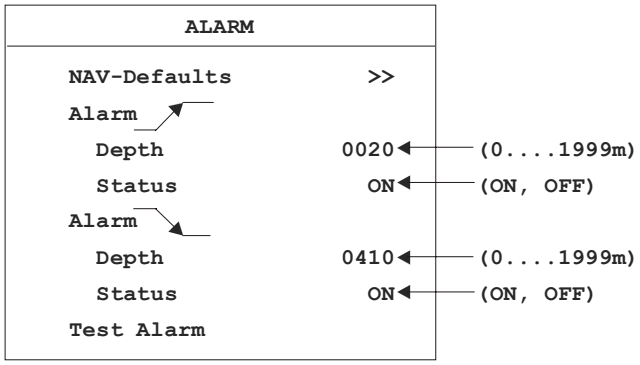
A functional test of the audio/visual alarm can now be carried out by pressing the **ENTER** key. The audio alarm must sound and the field(s) showing the alarm setting(s) on the display area must blink.

Now that the settings have been altered and the alarm tested by pressing the **ENTER** key, leave the **MENU** by pressing the **ESCAPE** key twice.

4.5 MENU DESCRIPTION

4.5.1 THE ALARM MENU

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



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

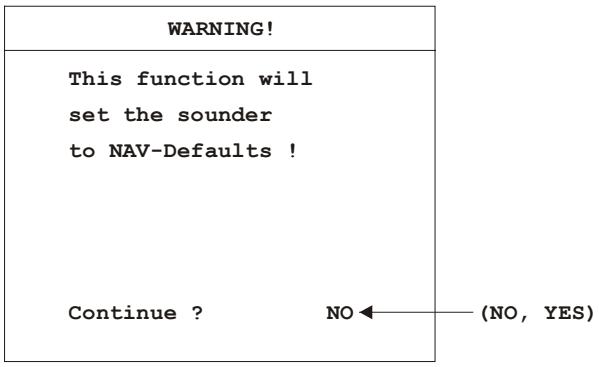
- Select NAV-Defaults
- Set Minimum Depth Alarm
- Set Maximum Depth Alarm
- Test the Alarm system

NAV-Defaults

NAV(Navigation)-**Defaults** are basic compulsory settings which must be used when operating the system for navigational purposes. These are laid down by the International Maritime Organisation (IMO) and state that:

- The system must operate with one channel only
- The sound velocity must be set to 1500 m/s
- The unit of measurement must be metric (metres)
- Water depth must be measured below the keel (DBK)

If the system is being operated in any other mode, e.g. units selected are feet, water depth from the surface is selected etc. the user can return to the **NAV** mode by calling up this **MENU** and selecting **NAV-Defaults**. A sub menu will appear in which the user can choose between selecting **NAV-Defaults**, or returning to the **ALARM MENU**. The sub menu can be seen overleaf.



To set the system back to **NAV defaults**, call up the **ALARM MENU** and press the following keys:

- **CURSOR ▼** (1x, to mark **NAV-Defaults**)
- **ENTER** (1x, to call up **SUB-MENU**)
- **CURSOR ▼** or **▲** (to select **YES**)
- **ENTER** (to confirm selection and exit **SUB-MENU**)
- **ESCAPE** (1x, to leave the **MENU**)

Maximum and Minimum Depth Alarms

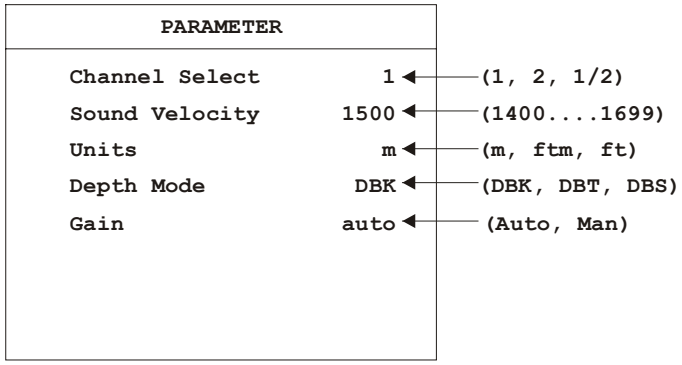
The user can set the system alarm so that an audio/visual alarm occurs if the water becomes shallower than a set minimum or if the water becomes deeper than a set maximum. This depth is always measured from the ship's keel. An Alarm Test facility is available so that the alarm function can be periodically tested. These settings are made as described in chapter 4.4.3.

Mute- Control

The audio alarm can be muted externally by connected Mute Control.

4.5.2 THE PARAMETER MENU

To call up the **PARAMETER MENU**, press the **ENTER** key twice.



The **PARAMETER MENU** is used to select system parameters which vary from those laid down by the IMO. The following and 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 only operative if the system is fitted with two transducers. When the system is switched on, channel 1 is the default setting. 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 appear side by side on the display area, Channel 1 to the right and Channel 2 to the left. Call up the **PARAMETERS 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 NAV(Navigation) 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 **PARAMETERS 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 metres. It is however possible, if the user wishes, to choose either fathoms or feet. In order to alter the unit of measurement, call up the **PARAMETERS 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 standard 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 alter the mode of depth measurement, call up the **PARAMETERS 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**)

NOTE: When the NAV-Defaults are selected within the ALARM MENU, the system returns to the navigation mode, using the default values , i.e.:

- **Channel Select = 1**
- **Sound Velocity = 1500 (m/s)**
- **Units = m**
- **Depth Mode = DBK**

Manual Gain setting

In a noisy environment or if the bottom depth changes very rapidly it is useful to work with **manual gain** instead of **automatic gain**.

The manual mode is selected as follows:
Select second menu (PARAMETER) by pressing **ENTER, ENTER**
Select in the PARAMETER menu **Gain** using the cursor, **ENTER**
With the cursor change **Auto** to **Man**., **ENTER**
With the **GAIN** keys now gain is adjustable.
With **GAIN UP** or **DOWN** gain can be set between 1 (minimum) and 15 (maximum)

Vary the gain value until the bottom is clearly indicated on the display. For differentiation the gain value selected is shown inverse on the display during the use of the gain keys:

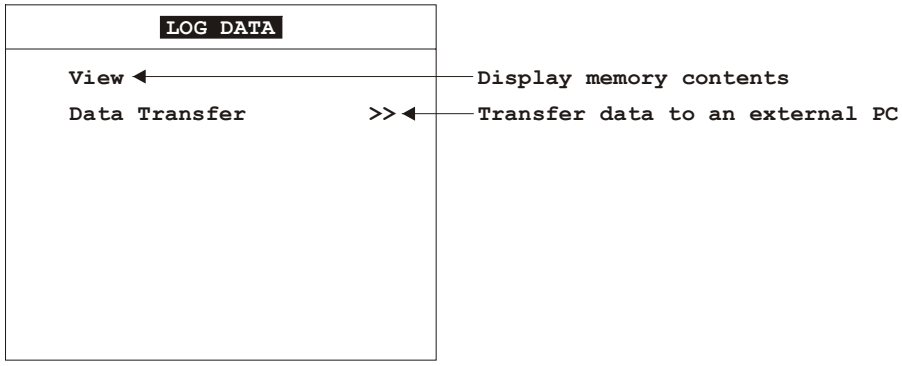
Indication with Auto: 9

Indication with Man.: 12

NOTE : During switch off the last gain value in use is stored. If the unit is switched on again, Auto mode is selected. If Man. becomes selected as described, the stored last gain value will be recalled.

4.5.3 THE LOG DATA MENU

To call up the **LOG DATA MENU**, press the **ENTER** key three times. The **MENU** as shown below will appear.

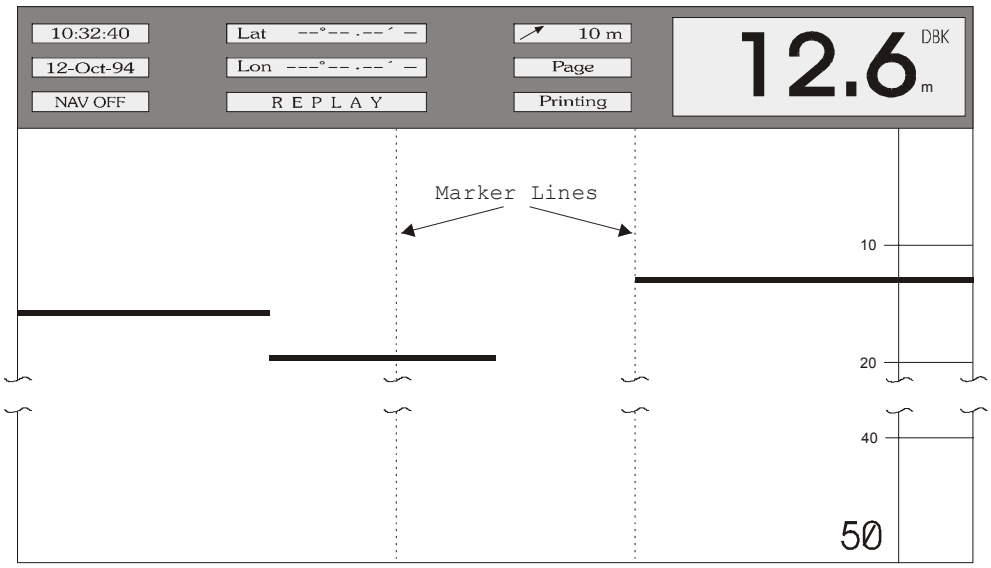


The **LOG DATA MENU** is used to gain access to data stored in the system's built-in 24 hour ring memory. This data can then be viewed on the display area and printed out in full or in part (if an external printer is connected). The contents of the memory can also be transferred to a personal computer for further analysis (special software is required in order to transfer and analyse data).

WARNING: During this mode, the echo sounder is not in operation and no actual depth data will be given. ALARM functions will not be in effect. No data will be stored.

To view stored data

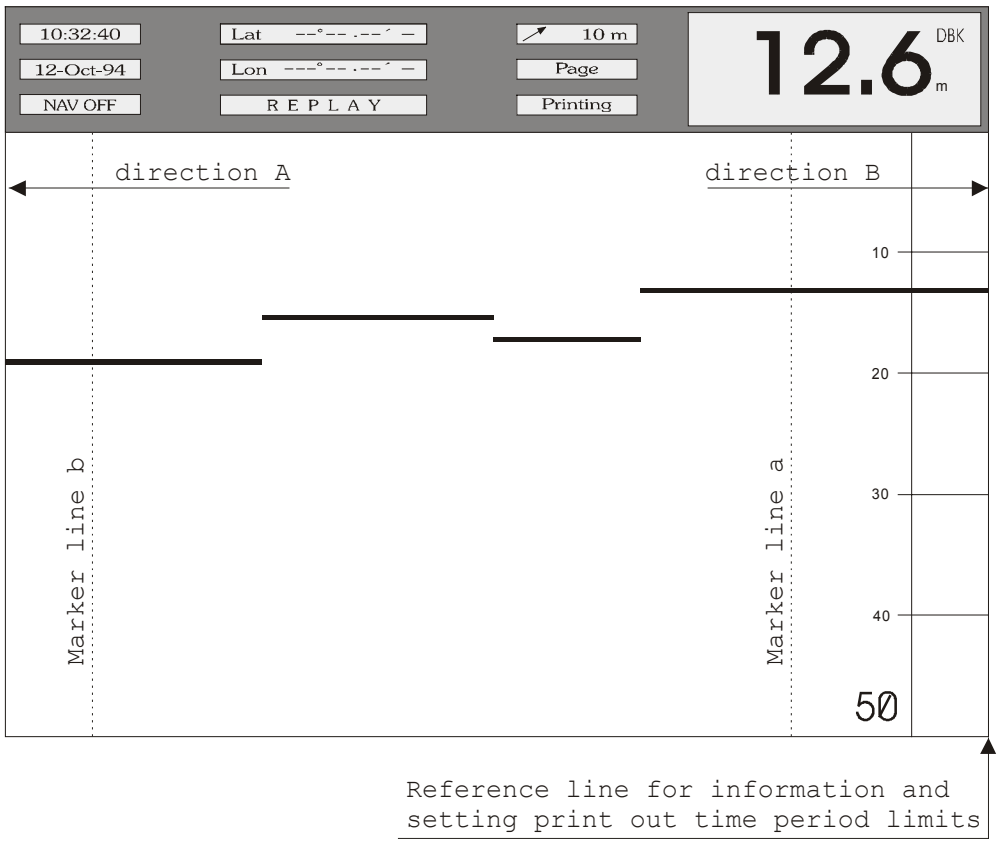
Call up the **LOG DATA MENU** as described previously. Press the **CURSOR ▼** key once to mark the word "**VIEW**", followed by the **ENTER** key. The **MENU** will disappear from the screen and stored data will appear. A typical Viewed Data display area can be seen below.



The upper part of the display area contains the following information which is always related to the 1st data block on the extreme right of the display area:

- Time (10:32:40) and date (12-Oct.-94) of stored data
- NAV Mode ON or OFF (if the NAV mode was ON when data was stored, this window will not be present)
- Latitude and Longitude (only if the system was connected to an external navigation system)
- The window showing REPLAY indicates that stored data is being viewed
- Depth setting of the shallow water alarm (10m) (if this function was selected)
- Depth, unit (m) and mode (DBK) of measurement
- Depth range (50m)
- the "Page" and "Printing" windows will be explained later

Explanation of controls for viewing data



Key	Function
CURSOR ▲	Scrolls forwards in time (direction A)
CURSOR ▼	Scrolls backwards in time (direction B)
ENTER	Toggles page scroll option (for faster scrolling)
MARKER	Marks one limit of the time period to be printed out (start or finish)
PRINT	Marks the other limit of the time period to be printed out and simultaneously activates the printer (if connected)
ESCAPE	Exit, return to the echosounding mode

Controls for Viewing Data

NOTE: With the exception of the DIM and OFF keys, all other keys are inoperative.

Scrolling through memory data

To scroll the display to a certain time in the memory at which events that occurred earlier (relative to time shown in "time" window) wish to be viewed, press and hold the **CURSOR ▼** key until nearing the desired time (shown in the "time" window). Finely adjust the desired time by pressing the **CURSOR ▲** or **▼** key momentarily, each time a key is pressed, the time will advance by a 5 second period. If the event to be viewed occurred a lot earlier, scrolling can be accelerated by using the "Page scroll" option. Press the **ENTER** key and the word "Page" will appear in the window beneath the "Depth Alarm" window. When the **CURSOR ▲** or **▼** keys are now pressed momentarily, the display will be shifted by approx. three quarters of a page backwards or forwards (pressing and holding these keys scrolls continuously).

EXAMPLE:

To view data at the time "Marker line a" was set, press and hold the **CURSOR ▼** key until the marker line is almost at the right-hand side of the display area. Finely adjust by pressing the **CURSOR ▼** repeatedly until the marker is at the extreme right-hand side of the display area. The data will now be presented in the upper part of the display area. To move "Marker line b", press the ENTER key. The word "Page" will appear in the window below the alarm window showing that the "Page scroll" option is activated. When the **CURSOR ▼** is now pressed once, the marker line will jump to the right. Press the **ENTER** key to return to the "slow scroll" option and finely adjust as previously described for "Marker line a".

NOTE: Depth, scale and position information will not be updated during scrolling (only time and echograms) except when a marker line passes the right-hand border of the display area.

The following information can be read off the display area for any given time during the previous 24 system operating hours:

- Water depth at that time
- Units and mode of measurement at that time
- Range in use at that time
- Time and date at which the information was stored
- Whether the NAVIGATION mode was in use at that time
- Latitude and Longitude at which the information was stored (if connected to a nav. system)
- Whether a shallow water alarm was activated at that time

Printing data from the memory

In order to make a print-out of all or part of the data stored in the memory, so called "limit markers" must be set. Only data within these limit markers will be printed out. To set these limit markers and print the data within them, proceed as follows:

- Scroll the display area until one limit is reached (the time can be seen in the "time window").
- Press the **MARKER** key (the time of the right hand side of the display appears in a window below the depth alarm window)
- Scroll the display area until the other limit is reached (the time can be seen in the "time window").
- Press the **PRINT** key, the time in the window below the depth alarm window will be replaced by the word "Wait", followed after a short time by the word "Printing".

During printing, the user may scroll further within the memory. The print-out can be stopped at any point by pressing the **PRINT** key for a second time.

Fault conditions

When the **PRINT** key is pressed, a fault condition may exist. If so, one of the 3 fault conditions shown below will be indicated in the window beneath the depth alarm window:

- **PERIOD**? : This indicates that the user has set the both limit markers to the same time. The limit markers must be set to different times.
- **PAPER OUT** : The printer has run out of paper
- **ERROR** : The printer is not connected, not switched ON, or otherwise defective

Making a hard copy of the screen

In order to make a hard copy of data displayed on the screen, scroll to the desired position and press the **PRINT** key. A window will appear containing the word "Hardcopy". The print-out will be an exact reproduction of the screen at the time the **PRINT** key was pressed.

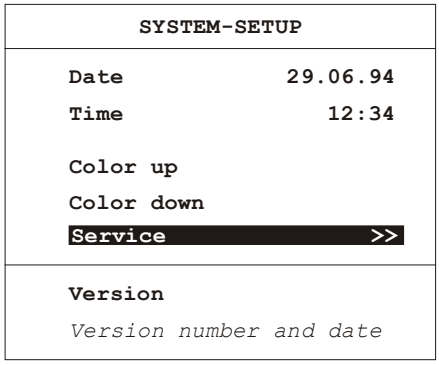
NOTE: With the exception of the PRINT and ESCAPE push-buttons, all other controls are "dead" during the time it takes to print out a hard copy of the screen. The PRINT push-button will stop the printing process and the ESCAPE push-button will exit the LOG-DATA feature and return the system to Echo-sounding operation.

4.5.4 THE SYSTEM SET-UP MENU

WARNING: With the exception of the time, date and contrast, no other parameters must be altered unless modifications are made to the system, e.g. altering the installation depth of the transducer, replacing the transducer for one of a different frequency. Alteration of such parameters must only be made by an experienced service technician.

PARAMETER ALTERATIONS MADE BY NON-QUALIFIED PERSONS MAY LEAD TO INCORRECT DEPTH READINGS WHICH IN TURN CAN LEAD TO MATERIAL DAMAGE AND TO THE LOSS OF LIFE AND LIMB

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 and to gain access to the **SERVICE** and **INTERFACE SUB MENUS** to allow the service technician to alter installation and interface parameters **(see above warning**).

Changing the Date and Time

To change the system **DATE**, call up the **SYSTEM SET-UP MENU** and 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**, call up the **SYSTEM SET-UP MENU** and 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**)

COLOR BAR MENU allows user settings according to ambient conditions. Several combinations of echo indication and the overlay of general information are possible according the following table.

Example: CC B>R means

CC: **C**olored overlay, **C**olored echotrace

B>R: **B**lue are week echoes, **R**ed are strong echoes

CODE						
LETTERS 1+2	OVERLAY		LETTERS 3+4	ECHOLEVEL		COLORS
	Text	**Background**		**High**	**Low**	
CC	Black	Colored	**B>W**	White	Black	8 blue to white on black
GC	Grey	Dark grey	**B>W**	White	Black	8 blue to white on black
GG	Grey	Dark grey	**B>W**	White	Black	16 grey level on black
GG	Grey	Dark grey	**W>B**	Black	White	16 grey level on white
CC	Black	Colored	**B>R**	Red	Black	16 blue to red on black
GC2	Grey	Dark grey	**B>R**	Red	Black	16 blue to red on black
CC	Black	Colored	**B>W**	White	Black	8 blue to white on black
GC	Black	Dark grey	**B>W**	White	Black	8 blue to white on black
GG	Black	Dark grey	**B>W**	White	Black	16 grey level on black
GG	Black	Dark grey	**W>B**	Black	White	16 grey level on white
CC	Black	Colored	**B>R**	red	black	16 blue to red on black
GC	Grey	Dark grey	**B>R**	Red	Black	16 blue to red on black

Installation settings are made within the **SERVICE** and **INTERFACE SUB-MENUS** which are described in Chapter 5.

5 INSTALLATION, CARE AND MAINTENANCE

5.1 INSTALLATION

The display and control unit can be panel, bulkhead, deckhead or console mounted. The system is delivered with mounting brackets as specified by the user. Install the display and control unit in accordance with the relevant section of the Installation Drawing Number EZ 52 590 8001 to 8010 which can be found in chapter 6 "DRAWINGS" of this handbook.

The mounting place should assure, that no direct sun light influences the visibility of the display and for clear display readings a viewing angle of ± 50° perpendicular to the display is recommended.

The echosounder performance is limited by the acoustic in-water characteristics. These are mainly influenced by the transducer mounting position, the operating frequency and the efficiency of electrical-acoustical conversion.

The transducer position must be selected in a way that the radiating surface is mounted in an area virtually free of turbulence and air bubbles. The sound waves are reflected by any layers of air bubbles or turbulence that strong, that the sound can not pass the layers and thus echosounding is prevented.

Because of this fact the transducers should be mounted within the ship's bow area. In case of an existing bow thruster, the transducer must be mounted ahead or below the thruster outlet. If mounted behind the bow thruster, the performance of the echosounder will be degraded by turbulence and air bubbles. Even a total echosounding break down is possible.

During bow thruster operation echosounding is not possible because a wide area around the thruster´s outlet is saturated with turbulence and air bubbles.

On ships equipped with a bulb bow the transducer must be mounted ahead as far as possible, because the bulb generates a layer of air bubbles that heavily reduces the transducer / echosounder performance.

A transducer mounted in the vicinity of the ship's stern can be operated only while drifting, at the pier or at very low speed. The reason is that the stern area is generally disturbed by turbulence and air bubbles, dependent on ship's speed. Additionally vibrations and engine noise may be a source of disturbances. The sound signal cannot penetrate this layer, the bottom echo fades away and the digital display shows the zero echo (1 - 1.5 m) or "?". For this reason only the front transducer must be used while sailing.

Once the transducer has been installed, the system must be set up to take certain factors into consideration. These are:

- Never paint the radiating surface of the transducer.
- Transducer installation depth beneath the surface.
- Transducer installation height relative to the lowest part of the ship's keel.
- Blocking depth, a setting to prevent false digital depth readings caused by resonance of non-ELAC transducers**. This setting need not be altered from ZERO if using ELAC transducers.**
- Frequency of the transducer.
- Installation position of the transducer, e.g. BOW, AFT, Pt., Stb, (if 2 transducers are installed).

When a transducer is installed, i.e. before the ship is launched, measure the height difference between the radiating surface of the transducer and the lowest part of the keel and the distance between the waterline and the radiating surface of the transducer. These measurements are needed to compensate the differences when the system is initially set up. The transducer frequency can be found in the shipping documents.

Connect the system up in accordance with the connection diagram which can be found in chap. 6.

When cabling the system, take especial care that all signal lines are screened properly. The cable from the transducer to the connection box must be laid in an iron tube. From the connection box to the echo sounder there are three choices for a proper cable laying:

- the transducer cable is laid within an iron tube
- a double-screened cable is used as transducer cable, the inner screen is one-side connected to the echosounder's ground, the outer screen is one-side connected to the ship's ground.(see Figure 5- 1)
- the transducer cable is laid apart at least 500 mm from all other cables.

By no means a single screened cable must be laid together with any other cable.

5.1.1 DISTORTION LEVEL TEST

After routing and connecting the transducer cable a distortion level test has to be carried out, to ensure the correct routing and screening of the transducer cables.

Test procedure:

1. Switch on the echosounder LAZ 5100
2. Select 500 m range
3. Select Display Gain 10 (max.)
4. Select Display Mode 1/2 for Dual Channel Unit
5. Select Item Gain, man. in the Parameter Menu
6. Select Gain 15 (max.)
7. Check the recording on the LCD – Screen. Below the transmitting pulse and echo signals no or only light distortion shall appear on the screen.
8. If strong distortion appear, check and correct transducer cable routing and screening according to the Installation Instruction.
9. Repeat test procedure until the display is free of distortion.
10. Return to normal mode

Connect up peripheral equipment, i.e. external PC, printer, remote display unit etc. in accordance with the above mentioned connection diagram and referring to Figure 3-3 in chapter 3.5.

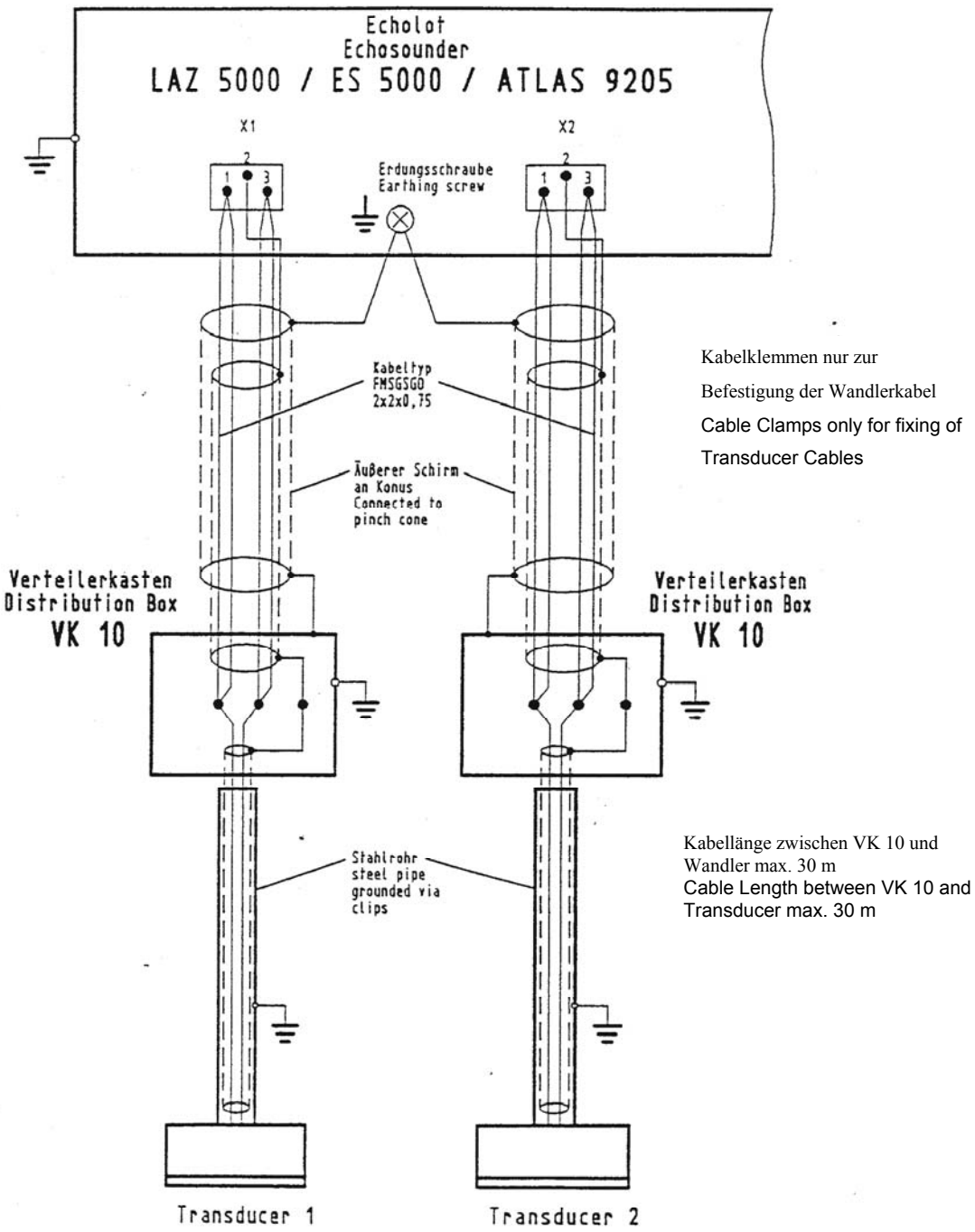


Figure 5-1 Instruction for transducer- cable connection

Transducer Type	Frequency	Manufacturer	Electrical Power	Maximum Cable Length	Maximum Waterdepth
LSE 131	30 kHz	Elac Nautik	1000 Watt	600 m ($2x1,5mm^2$)	2200 m
LSE 132	30 kHz	Elac Nautik	450 Watt	600 m ($2x1,5mm^2$)	1200 m
LSE 297	**50 kHz**	Elac Nautik	250 Watt	400 m ($2x1,5mm^2$)	600 m
LSE 133	50 kHz	Elac Nautik	450 Watt	600 m ($2x1,5mm^2$)	1100 m
SW 6016	100 kHz	STN Atlas	200 Watt	150 m ($2x1,5mm^2$) 250 m ($2x2,5mm^2$)	300 – 350 m
LSE 148	100 kHz	Elac Nautik	450 Watt	200 m ($2x1,5mm^2$) 300 m ($2x2,5mm^2$)	350 – 400 m
LSE 313	**200 kHz**	Elac Nautik	250 Watt	150 m ($2x1,5mm^2$) 250 m ($2x2,5mm^2$)	250 – 300 m
LSE 135	200 kHz	Elac Nautik	250 Watt	150 m ($2x1,5mm^2$) 250 m ($2x2,5mm^2$)	250 – 300 m

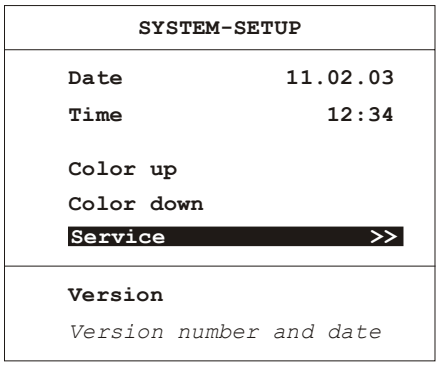
Table 5-1 Transducer type

5.1.2 INITIAL SYSTEM SET-UP

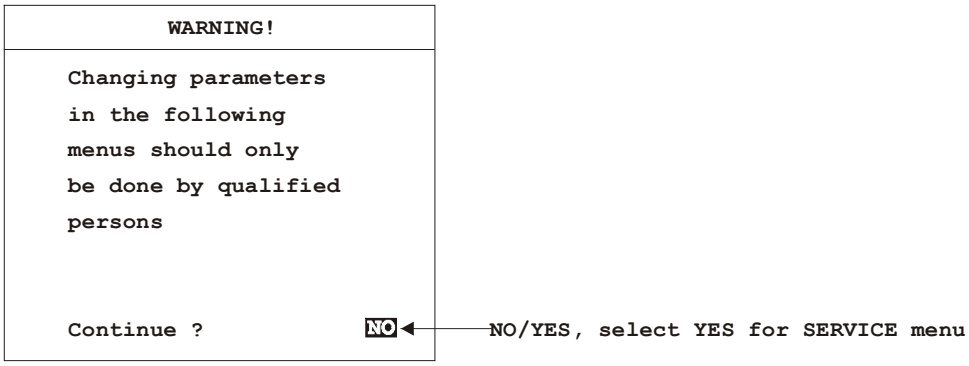
After installation of the LAZ 5100 please follow this procedure for setting into operation the first time.

No.	Item	Result
1.	**Installation check**	
1.1	Main supply (X3)	
1.2	Transducer (X1, X2) – cable screening, cable laying	
1.3	Printer (X7) – max. cable length 5 m	
1.4	NMEA – Output (X8) – RS 422	
1.5	NMEA – Input (X4) – RS 422	
1.6	Start / Stop – Output (X8)	
1.7	NMEA – Output (X6) – RS 422	
2.	**Setting into operation**	
2.1	Disconnect Printer, NMEA - Input and Output	
2.2	Only Main Supply and Transducer connected	
2.3	Switch „ON“ the unit	
2.4	Check and do basically settings	
	- frequency	
	- sound velocity (1.500 m/s)	
	- blocking depth (2 - 2.9 m)	
	- draft, trim	
	- NMEA - Interface (4.800 baud, 8N1)	
	- date and time	
2.5	Check the function of the unit	
	- depth recording	
	- LC - Display	
2.6	Check distortion level	
	- select 500 m range	
	- select item Manual Gain	
	- select gain Vmax (15)	
	- no or light distortion shall appear on the LCD – screen	
	- reduce gain, until the screen is free of distortion	
	- notice gain level	
	- return to normal mode	
2.7	Connect NMEA - Output (if requested)	
	- check data at receiving unit	
2.8	Connect NMEA - Input (if requested)	
	- check data on LC- Display	
2.9	Connect Printer (if available)	
	- check recording on printer	
2.10	Connect Start/Stop - Output (i.e. DAZ 13) (if requested)	
3.	**Sea Trial**	
3.1	Check the performance of the transducer	
	- distortion (airbubbles, turbulence) under the	
	- recording free of electrical noise?	
	- depth indication, analogue and digital	

Once the system has been correctly installed, the initial set-up can be carried out. 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.

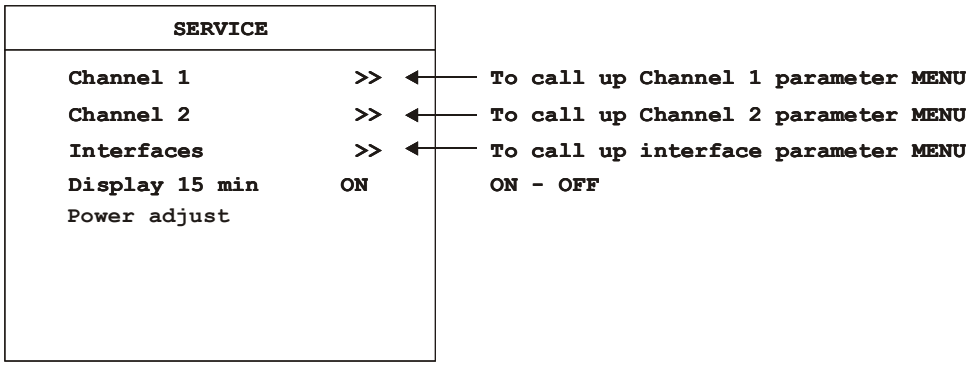


WARNING: Only qualified service technicians are allowed to alter these system settings. If you are not authorised to alter these settings, DO NOT continue. Press either the ENTER or ESCAPE key to return to the SYSTEM SET-UP menu.

UNAUTHORISED ALTERATION OF THESE SETTINGS CAN ENDANGER THE SAFETY OF THE SHIP AND LEAD TO LOSS OF LIFE AND LIMB.

If not authorised to make alterations, press the ESCAPE or ENTER key to return to the SYSTEM SET-UP menu.

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**, shown below, will appear.

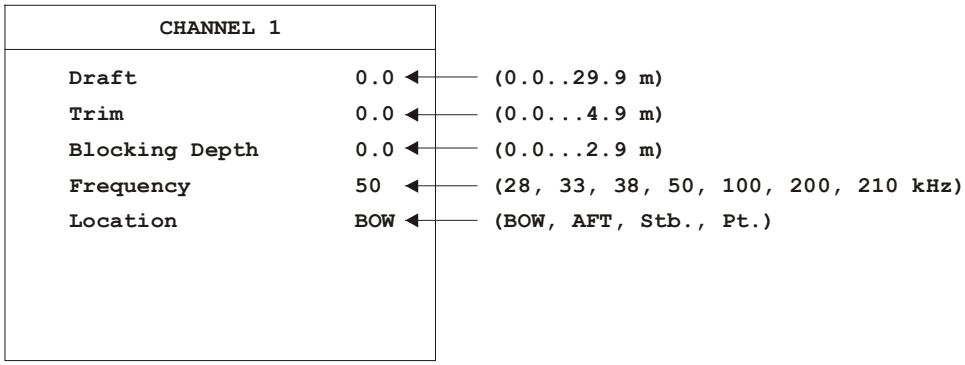


The **SERVICE MENU** allows the service technician to access the following sub-MENUS:

- **Channel 1** - allows selection of **Draft**, **Trim**, **Blocking Depth**, **Frequency** and **Location** for the **Channel 1** transducer.
- **Channel 2** - allows selection of **Draft**, **Trim**, **Blocking Depth**, **Frequency** and **Location** for the **Channel 2** transducer, if fitted. If no 2nd Channel is fitted, this **MENU** is not available
- **Interfaces** - allows selection of parameters for data transfer.
- **Display 15 min** altering the selection of the recording display time.

<u>In order to set or alter the parameters for Channel 1, call up the CHANNEL 1 MENU, as follows:</u>

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



The **CHANNEL 1 MENU** allows the service technician to set the following parameters:

- **Draft** the transducer installation depth is entered here, i.e. the depth of the transducer below the waterline, e.g. 5.6 m. This compensation allows accurate surface to sea bed measurements..
- **Trim** the distance between the transducer and the lowest part of the keel is entered here, e.g. 0.3 m. This compensation allows accurate keel to sea bed measurements.
- **Blocking depth** this setting is to prevent 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 a „?“ but the analogue depth reading will be displayed correctly.
- **Frequency** the transducers working frequency is entered here, e.g. 50 kHz.
- **Location** the position where the transducer is installed is entered here, e.g. BOW**. This parameter can not be altered for single channel systems**.

To alter the Draft setting, press the following keys:

- Call up the **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 metre (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 alter the 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 metre (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 alter the 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 metre (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 alter the 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**)

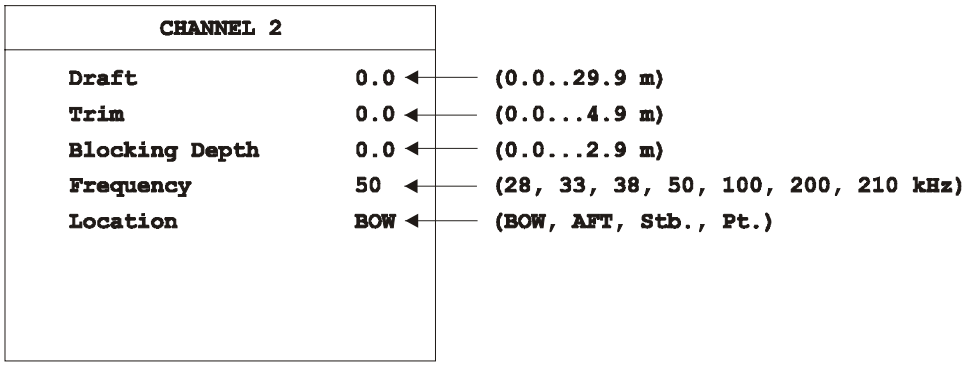
IMPORTANT NOTE: The new setting can only be activated by re-starting the system (i.e. switch the system OFF and then ON again).

To alter the 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**)

In order to set or alter 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)

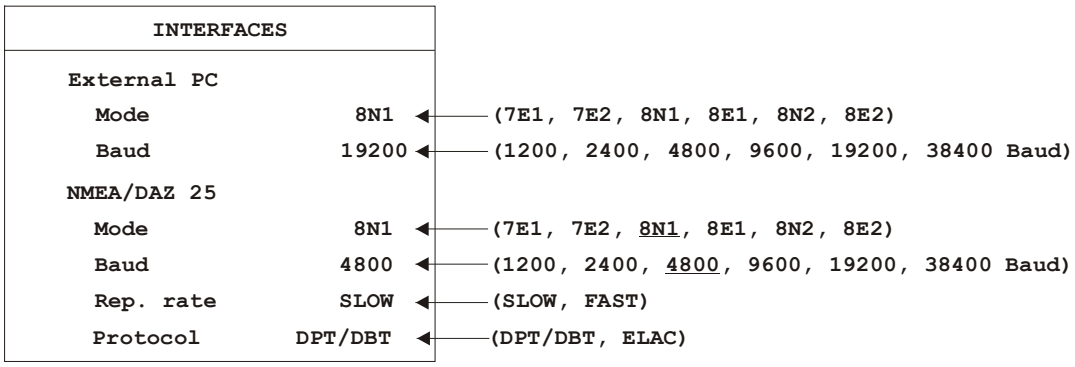


Proceed from here in exactly the same way as described for **Channel 1** settings.

To call up the INTERFACE MENU. proceed as follows:

- Call up the **SERVICE MENU** as described previously
- **CURSOR ▼** (3x, to mark the word Interfaces)
- **ENTER** (1x, to call up the **INTERFACES SUB-MENU**)

The **INTERFACE MENU** shown below will appear.



This menu allows the service technician to assign the interfaces to fit to other peripheral equipment, e.g. a personal computer or digital slave indicators.

To alter the External PC Mode, press the following keys:

- Call up the **INTERFACES SUB-MENU** as described previously
- **CURSOR ▼** (1x, to mark the word **Mode**)
- **ENTER** (1x, to mark the selected mode)
- **CURSOR ▼** or **▲** (to alter the mode)
- **ENTER** (1x, to confirm selection)
- **ESCAPE** (2x, to leave the **MENU**)

To alter the External PC Baud rate, press the following keys:

- Call up the **INTERFACES SUB-MENU** as described previously
- **CURSOR ▼** (2x, to mark the word **Baud**)
- **ENTER** (1x, to mark the selected Baud rate)
- **CURSOR ▼** or **▲** (to alter the Baud rate)
- **ENTER** (1x, to confirm selection)
- **ESCAPE** (2x, to leave the **MENU**)

To alter the NMEA/DAZ 25 Mode, press the following keys:

WARNING: The NMEA/DAZ 25 interface Mode and Baud rate are laid down by the National Marine Electronics Association. If these are altered, the interface will no longer be to this NMEA standard.

- Call up the **INTERFACES SUB-MENU** as described previously
- **CURSOR ▼** (3x, to mark the word **Mode**)
- **ENTER** (1x, to mark the selected mode)
- **CURSOR ▼** or **▲** (1x, to alter the mode)
- **ENTER** (1x, to confirm selection)
- **ESCAPE** (2x, to leave the **MENU**)

To alter the NMEA/DAZ 25 Baud rate, press the following keys:

- Call up the **INTERFACES SUB-MENU** as described previously
- **CURSOR ▼** (5x, to mark the word **Baud**)
- **ENTER** (1x, to mark the selected Baud rate)
- **CURSOR ▼** or **▲** (to alter the Baud rate)
- **ENTER** (1x, to confirm selection)
- **ESCAPE** (2x, to leave the **MENU**)

To alter the Protocol, press the following keys:

- Call up the **INTERFACES SUB-MENU** as described previously
- **CURSOR ▼** (6x, to mark the word **Protocol**)
- **ENTER** (1x, to mark the selected Protocol)
- **CURSOR ▼** or **▲** (to alter the Protocol)
- **ENTER** (1x, to confirm selection)
- **ESCAPE** (2x, to leave the **MENU**)

Note, that the Protocol ELAC is only applicable for dual channel units, see also chapter 3.5.1 Description of Interfaces.

To alter the recording display time on the LCD – Screen, press the following keys

Call up the **Display 15 min Sub Menu** as described previously

- **Enter** (1x), to mark “ON” or “OFF”
- **Cursor** to alter the setting
- **Enter** (1x), to confirm the selection
- **Escape**(2x), to leave the **Menu**

Once the initial system settings have been made they need only be altered if for example a 2nd transducer is added or the original transducer is replaced for one of a different frequency.

If a 2nd transducer is added at a later date, parameters must be entered in the channel 2 sub-menu. The parameters for channel 1 must not be altered. (See installation instruction UN 52 590 4001 for the integration of the second channel).

If the original transducer is replaced and the replacement is fitted at a different location, the parameters must be altered accordingly.

5.1.3 POWER ADJUST

This adjust feature allows the authorised service person to alter the transmit power according to cable length on bord.

5.2 CARE AND MAINTENANCE

The LAZ 5100 Navigation Echo Sounder is largely maintenance free. 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, see note below.

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

The housing of the control and display unit can be cleaned using a non-abrasive household cleaning agent. Use window/glass cleaning fluid to clean the display area screen. **Do not apply unnecessary pressure to the screen area when cleaning**.

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

If the system is defective and requires repair, onboard service is normally not possible because of the high density electronics. Onboard service is done by exchanging PCB´s (Printed Circuit Boards), a list of spare parts available can be seen overleaf. Order spares from the address below stating part(s) required and ident. number(s).

L-3 Communications ELAC Nautik GmbH

Neufeldtstrasse

24118 Kiel

Germany

5.3 SPARE PARTS LIST

Spare Part	Ident. No.
Power supply unit.....	.....06 990 0274
Printed circuit board A3.....	.....52 603 181801
Fuses (line) F1, F2, T2A.....	.....06 710 1200
Main board PSE 33.....	.....57 319 8001
Frontpanel complete.....	.....52 603 1002

6 DRAWINGS

Dimensional drawing	: MB 52 603 8001
	: MB 54 555 1101
	: MB 54 555 8002 to 8004
	: MB 54 568 1101
	: MB 54 568 8001
Installation drawing	: EZ 52 603 8001
	: EZ 54 555 8002 to 8004
	: EA 54 555 8002
	: EZ 54 568 8001
	: EA 54 568 8001
Circuit diagram:	: SP 52 590 8001
Connection Diagram	: VE 44 390 8001
Cable Joining List	: KA 44 390 8001