Maintenance Manual

EM 2000

Multibeam echo sounder

Kongsberg
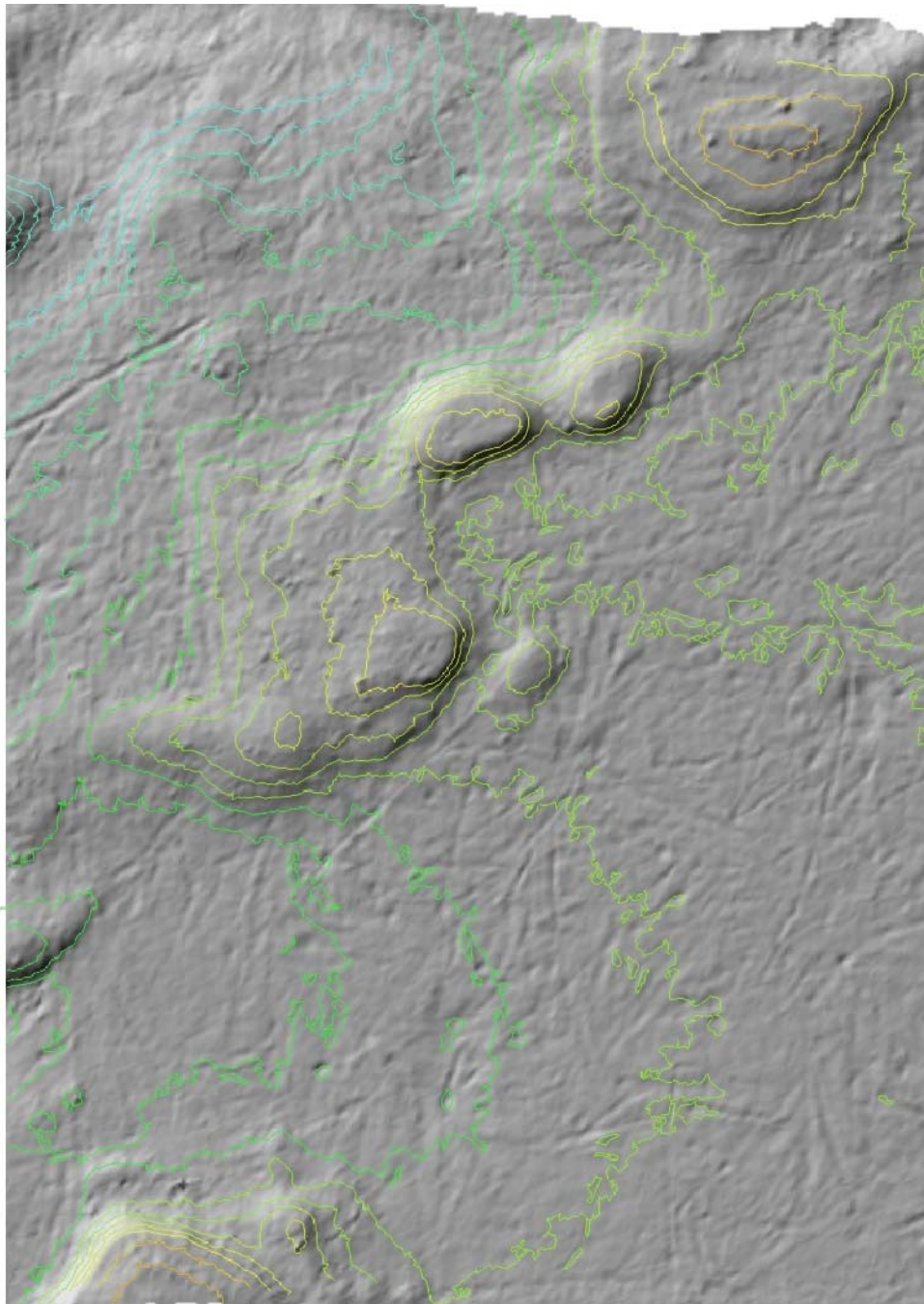
EM 2000
Multibeam echo sounder

Maintenance manual

About this document

Rev	Date	Written by	Checked by	Approved by
D	26.01.06	ASM	IHRS	GFS
	General update: Technical specifications, cable layout, Operator station and Processing unit. Datagram formats are removed, see own document.			

Remarks

References

Further information about the EM 2000 system supplied to Base version may be found in the following manuals:

- EM 2000 Operator Manual
- EM 2000 Installation Manual

The reader

This maintenance manual is intended to be used by a trained maintenance technician or engineer, with experience of electronic and digital circuitry, computers and electromechanical design. The level of information is based on the maintenance philosophy of Kongsberg Maritime: The onboard technical personnel shall, with the help of the documentation and the system's built-in test functions, be able to identify malfunctions, locate the fault, and replace major parts, modules and components on the "Line Replaceable Unit" (LRU) level. He/she will however not attempt to repair the LRUs.

High voltage safety warning

Precautionary measures

The voltages used to power this equipment are potentially lethal. Even 110 volts can kill. Whenever possible, the following precautionary measures must be taken before any work is carried out inside the equipment:

- Switch off all high-voltage power supplies.
- Check the operation of any door interlocks and any other safety devices.
- Completely discharge all high-voltage capacitors.

It should be noted that interlocks and safety devices are normally located only at regular access points, and high voltages may be exposed during dismantling.

Never work alone on high-voltage equipment!

First aid in the event of electric shock

Normally, even a high voltage electric shock will not kill instantly. The victim can still be revived even when his breathing and heart-beat have ceased.

Could YOU save someone's life?

In the event of electric shock, the correct actions, performed quickly may well save the victim's life. Make sure you know what to do!

Immediate action

While shouting for help, remove the source of power from the victim. Switch off the supply if possible, or using a dry, non-conductive material (rubber gloves, broom handle etc.) to insulate yourself, separate the victim from the source. If the voltage exceeds 1000 volts, switch off the supply and be ready to catch the victim. Take care- do not become a victim yourself.

Commence first aid on the spot. Continue to shout for assistance till someone arrives.

1 Lay the victim flat on his back and loosen any tight clothing (collar, tie, belt etc.).

2 Open his mouth and check for and remove any false teeth, chewing gum etc.

3 Check if the victim is breathing. If not, check if his heart is beating. The pulse is normally easily found in the main arteries of the neck, either side of the throat, up under the chin.

If his heart is beating but he is not breathing, commence artificial respiration. If the victim's heart is not beating, commence external cardiac massage (ECM). Continue to shout for assistance till someone arrives.

External cardiac massage

1 Kneel beside the victim. Place the heel of one hand in the centre of his chest, at a position half way between the notch between the collar-bones at the top of his chest, and the dip in the breast-bone at the base of his rib cage. Place the other hand on top of the first.

2 Keeping the arms straight and using your entire weight, press down rapidly so that the breast bone is depressed four- five cm, then release the pressure. Repeat rhythmically at a rate of one cycle per second. This will be hard work, but keep going. His life depends on YOU. Do not worry about breaking his ribs - these will heal if he survives.

Artificial respiration

1 Kneel besides the victim's head. Place one hand under his neck and lift, allowing his head to fall back. This will lift his tongue and open the air passage in his throat.

2 Place the palm of the hand on his forehead to maintain the "chin-up" position.

3 Using the index finger and thumb of the same hand, pinch the victim's nostrils closed. Open his mouth.

4 Take a deep breath and cover his mouth with yours. Blow steadily into his lungs to expand his chest. Remove your mouth from his to allow the air to escape from his chest. You should be able to see his chest deflate.

5 Repeat the "inflation-deflation" cycle at a rate of about 12 cycles per minute till the victim begins to breath normally again.

Combining EMC and artificial respiration

If you are alone, perform **one** cycle of artificial respiration for every **five** cycles of EMC. This will be hard work, but keep going. His life depends on you!

If there are other people available to help, one should perform the EMC while one performs the artificial respiration for every five cycles of EMC. It will be much more efficient with two people.

Once the victim's heart is beating and he is breathing, roll him onto his side and support him in that position. As consciousness returns he may vomit, and this will allow any liquid to drain out of his mouth.

Remove the victim to a hospital as soon as possible, but do not interrupt the artificial respiration and EMC cycles till his heart beat and breathing returns.

If started quickly and performed correctly, the resuscitation methods described will keep a sufficient volume of oxygenated blood flowing trough the victims body to allow full recovery.

Proficiency in the resuscitation methods can only be achieved trough training. All personnel concerned should attend courses on a regular basis. Remember, someone's life could depend on you.

Do you know what to do?

1 INTRODUCTION

1.1 General

This is the maintenance manual for the EM 2000 multibeam echo sounder system.

Note

This manual is common for the AUV Processing Unit and the Standard Processing Unit.

The manual contains detailed descriptions of each of the units in the system. Each circuit board and mechanical assembly is described. The manual also describes the troubleshooting process based on the Built-In Self test (BIST) software, and it includes procedures for disassembly and reassembly of the replaceable items.

This manual does not describe the maintenance of the Operator Station and the peripheral devices (printers, plotters and sensors). For information about these items, refer to the applicable manufacturer's documentation.

Topics

→   *Maintenance philosophy, page 2*

→   *System overview, page 3*

→   *System drawing, page 4 and 5*

→   *General sefety rules, page 6*

1.2   Maintenance philosophy

Kongsberg Maritime AS defines three levels for maintenance manuals:

Organizational - You will only perform limited preventive and corrective maintenance on the system. There is no need for technical education or training, and no need for any instruments. Typical tasks are exterior cleaning, or changing fuses.

Intermediate - You will perform overall preventive and corrective maintenance on the system. It is recommended that you are an educated engineer with experience from computerized design and mechanical systems. It is further expected that you can use standard electronic instruments, such as an oscilloscope. You should be trained by Kongsberg Maritime to perform maintenance on the system. Typical tasks may include troubleshooting, testing and circuit board replacement.

Depot - You will perform detailed maintenance on the system and on the circuit boards and modules. You must be an educated engineer with experience of computerized design and mechanical systems. It is further expected that you can use standard electronic instruments, such as an oscilloscope. You should be trained by Kongsberg Maritime to perform maintenance on the system. Typical tasks are circuit board repair.

Note

This maintenance manual is prepared for the intermediate level.

1.3   System overview

The EM 2000 multibeam echo sounder is a shallow water mapping and inspection system with very high accuracy and resolution.

The minimum operating depth is from less than 2.5 m below its transducers, and in typical sea water conditions the system operates to 350 to 400 m depth (less in warm water and more in fresh water). Small dimensions and low weight makes the system portable and easy to install allowing use both on survey launches and subsea vehicles to 6000 m water depth.

The EM 2000 system has a high ping rate of up to 10 Hz. It operates with 111 roll stabilised beams per ping with 1.5° beamwidth along and 1.5° acrosstrack dependent upon sonar head model. With the narrowest acrosstrack beamwidth the system has an angular coverage of more than 120 degrees, and with the widest the angular coverage is more than 150 degrees. The achievable coverage may be more than to 300 m. The beam spacing is operator adjustable to be either equiangle, equidistant or in-between. Angular coverage is also operator adjustable, always retaining the full number of beams within the defined coverage sector.

The system sonar frequency is 200 kHz, allowing small dimensions, good range capability and high tolerance to turbid waters.

Integrated seabed acoustical imaging capability (sidescan) is included as standard. A combination of phase and amplitude detection is used, resulting in a measurement accuracy of 8 cm RMS being achievable practically independent of beam pointing angle.

The EM 2000 is a complete system with all necessary sensor interfaces, real-time compensation for vessel motion and ray-bending, data displays for quality control including sensor calibration, and data logging included as standard.

Postprocessing software for the EM 2000 is available from both Kongsberg Maritime and third-party suppliers. A world-wide marketing and service organization having many years of multibeam experience is available for supporting the EM 2000.

(CD21404 / WMF / GIF)

Operator Station

Optional ethernet

Interfaces:
Sound Speed Sensor
Tide
Centre depth

Processing Unit

Serial interfaces:
Positioning systems
Attitude (roll, pitch and heave)
Heading
Clock

Special interfaces:
Trigger input/output
Clock synchronization

Supply voltage:
115 or 230 Vac 50/60 Hz

Sonar Head

Transmit transducer
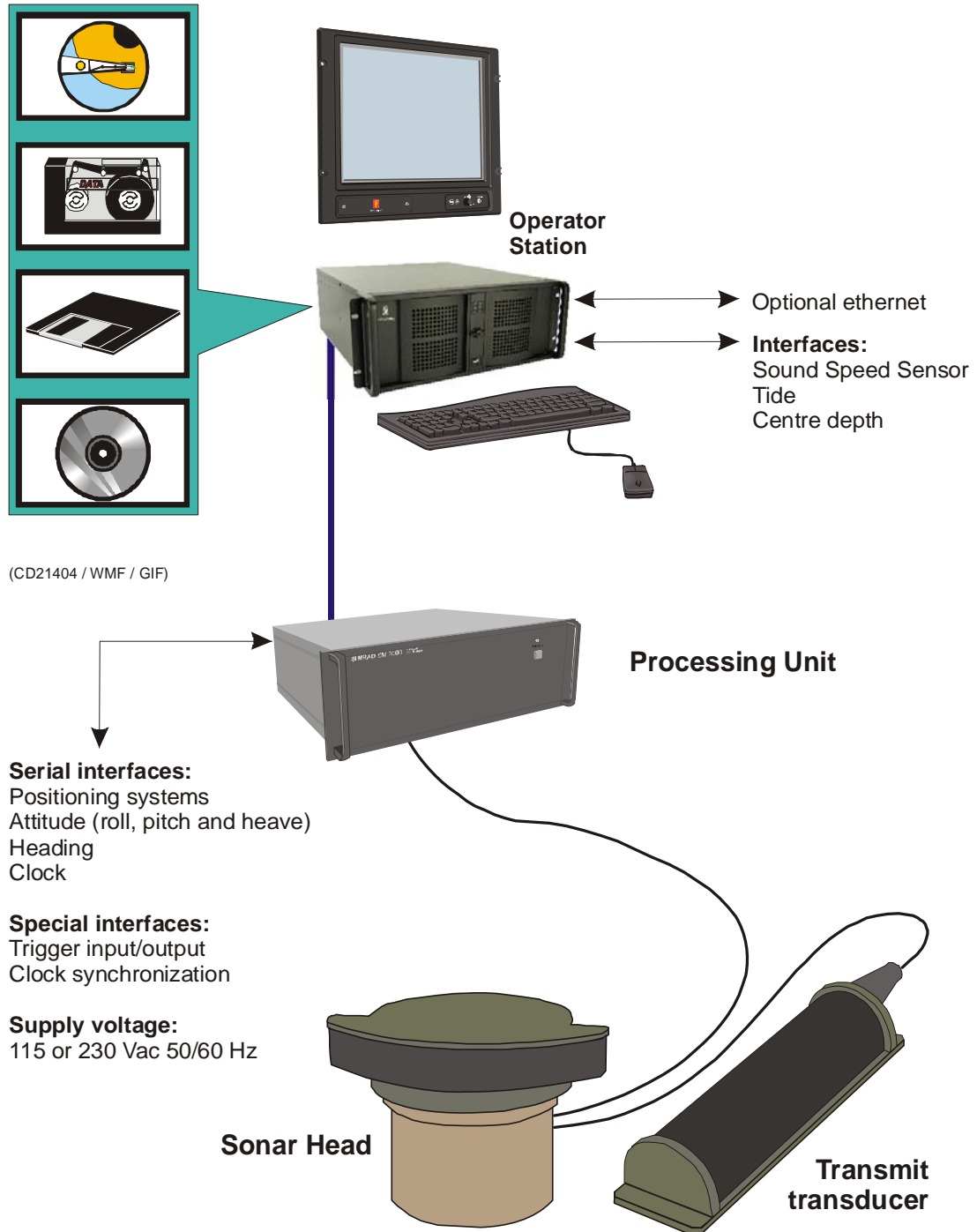
*Figure 1   EM 2000 system units and interfaces,
120 degrees sonar head*

5

(CD21404B)

Operator Station

Optional ethernet

Interfaces:
Sound Speed Sensor
Tide
Centre depth

Processing Unit

Serial interfaces:
Positioning systems
Attitude (roll, pitch and heave)
Heading
Clock

Special interfaces:
Trigger input/output
Clock synchronization

Supply voltage:
115 or 230 Vac 50/60 Hz

Transmit transducer
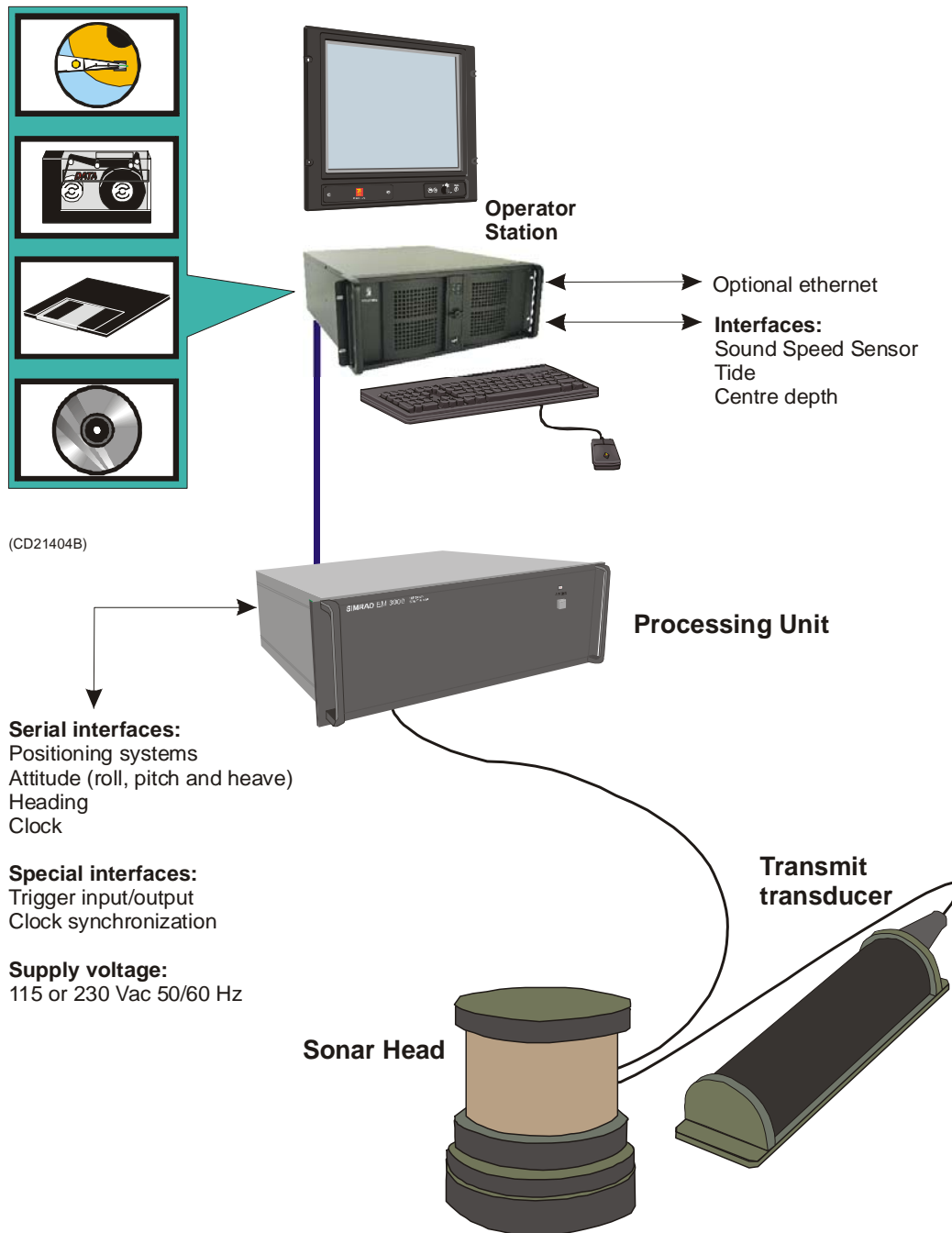
Sonar Head

*Figure 2   EM 2000 system units and interfaces,
150 degrees sonar head*

1.4   General safety rules

The system operates on 115 and/or 230 Vac, 50/60 Hz without any need for wiring changes.

Warning   ***This voltage can be lethal.***

The following safety precautions must be followed at all times during installation and maintenance work:

- Always switch off all power before installation or maintenance. Use the main circuit breaker, and label the breaker with a warning sign that informs others that maintenance or installation work is being carried out on the system.

- For safety reasons during troubleshooting on the equipment with power ON, <u>two</u> persons should <u>always</u> be present.

- Whenever maintenance is carried out, it is essential that a first aid kit is available, and that the maintenance personnel are familiar with the first aid instructions for electrical shock.

- The various parts of the system are heavy. Make sure that the appropriate tools and certified lifting equipment are available, and that the personnel are trained in installation and maintenance work.

2 TECHNICAL SPECIFICATIONS

Note

Kongsberg Maritime is engaged in continuous development of its products and reserves the right to alter specifications without prior notice.

System performance data

Frequency: 200 kHz

Maximum ping rate: 10 Hz

Number of beams per ping: 111

Alongtrack beamwidth: 1.5°

Acrosstrack beamwidth: 2.5° or 3.5°

Beam spacing: Equidistant, equiangular or in-between

Coverage sector: 120° or 150°

Roll stabilisation: Within ±15°

Depth resolution: 1 cm

Pulse length: 200 μs/600 μs

Range sampling rate: 11.1 kHz (6.75 cm)

Beamforming method: Phase shift

Transmitter (Tx)

Alongtrack beamwith: 1.5°

Number of elements in array: 2

Source level: 217 dB re 1 μPa ref 1 m

Sidelobes: < -20 dB

Receiver (Rx) and beamformer

Acrosstrack beamwidth: 2.5° or 3.5°

Beam spacing: Equidistant and in between

Range sampling rate: 11.1 kHz (6.75 cm)

Number of elements in array: 80

Bandwidth: 5.3 kHz

Max analog gain: 110 dB

TVG dynamic range: 70 dB

ADC resolution: 12 bits

Interfaces

Serial lines with operator adjustable baud rate, parity, data length and stop bit length for:

- Motion sensor (roll, pitch, heave and optionally heading) in format supported by sensors from Applanix, iXSEA, Kongsberg Seatex and VT TSS

- Heading (gyrocompass) in either NMEA 0183 HDT, SKR82/LR60 or Sperry Mk39 format

- Position in either Simrad 90, NMEA 0183 GGA or GGK format

- External clock in NMEA 0183 ZDA format

- Sound speed at transducer

- Sea level height (tide)

- Single beam echo sounder depths

- Output of depth straight down in NMEA 0183 DPT format

Interface for a 1PPS (pulse per second) clock synchronisation signal

SCSI interface intended for tape drive.

Firewire interface for external data storage device (tape or disk).

USB 2.0 interfaces for data storage, printing or plotting.

Parallel interface for PostScript colour graphics printer/plotter.

Ethernet interface for input of sound speed profile, tide and echo sounder depths, and output of all data normally logged to disk.

Physical specifications

Transmit transducer

Width/diameter: 114.3 mm

Height: 73.2 mm

Length: 419.1 mm

Weight: Approximately 5 kg

Pressure rating: 3000 m depth

Sonar Head 120° system

Diameter: 228 mm (without "ears")

Height: 238 mm

Weight: Approximately 16.6 kg

Pressure rating: 3000 m depth

Cable diameter: 17 mm

Connector: Seacon MING-10

Power: +24 Vdc, 1.5 A (available from the Processing Unit)

Sonar Head 150° system

Diameter: 238 mm

Height: 238 mm

Weight: Approx 15.5 kg

Pressure rating: 3000 m water depht

Sonar Head cable diameter: 17 mm

Connector: Seacon MING-10

Power: +24 Vdc, 1.5 A (available from the Processing Unit)

Processing Unit

Height: 178 mm (excluding rack fixing brackets)

Width: 448 mm

Depth: 370 mm (excluding handles and connectors)

Weight: 10 kg

Power: 100 to 240 Vac, <100 W, 47 to 53 Hz

Processing Unit for AUV

An optional external hard disk is not included:

Height: 182 mm (including top cover)

Width: 140 mm

Depth: 421 mm (excluding handles and connectors)

Weight: 4.5 kg

Power: +24 Vdc, 29 VA and +5 Vdc, 33 VA

Note

Note that these power measurements are for normal operations. Start-up values may be higher. The external power supply must be rated for higher, inrush current.

HWS 10 Operator Station

Height: 127 mm

Width: 427 mm (excluding rack fixing brackets)

Depth: 480 mm (excluding handles and connectors)

Weight: 20 kg

Power: 115 Vac (60 Hz) and 230 Vac (50 Hz), < 250 W

17.4'' LCD monitor

Height: 400 mm (excluding mounting bracket)

Width: 460 mm (excluding mounting bracket)

Depth: 71 mm (excluding mounting bracket)

Weight: 9.2 kg

Power: 115 Vac (60 Hz) and 230 Vac (50 Hz), < 60 W

19'' LCD monitor

Height: 444 mm (excluding mounting bracket)

Width: 483 mm (excluding mounting bracket)

Depth: 68 mm (excluding mounting bracket)

Weight: 12 kg

Power: 115 Vac (60 Hz) and 230 Vac (50 Hz), 100 W (max)

Environmental specifications

Operating temperatures:

- Processing Unit: 0 to +45°C

- Operator Station: 0 to +45°C

Storage temperatures:

- Processing Unit: -30 to +70°C

- Operator Station: -30 to +70°C

Note

Processing Unit specifications for both standard and AUV versions.

3 CABLE LAYOUT

3.1 Introduction

This chapter describes the standard cables used between the EM 2000 system units and between the units and their external devices.

Note

All electronic installations and corresponding wiring must be in accordance with the vessel's national registry and corresponding maritime authority end/or classification society.

If no such guidelines exist, Kongsberg Maritime AS recommends that Det norske Veritas (DNV) Report No. 80-P008 «Guidelines for Installation and Proposal for Test of Equipment» be used as a guide.

Contact information:

DNV
Corporate Headquarters
Veritasveien 1
1322 Høvik
Norway
http://www.dnv.com

Topics

3.2   System cabling

Cable layout

Cables are identified according to individual cable numbers (Cxx), and references are made to dedicated cable drawings (Wxxx).

Cable information includes:

- Required specifications
- Equipment they are connected to
- Corresponding terminations

System and shipyard cables

Cables fall into two categories:

- *System cables* supplied by Kongsberg Maritime with the EM 2000 system delivery.
- *Shipyard cables* provided by the shipyard performing the installation, or the shipowner. Cables to be provided by the installation shipyard are specified in the cable specifications. Note that the cable specifications provided are the *minimum acceptable*. Detailed cable information is provided for the:

  - Connection at each end (including reference to the corresponding: system unit, terminal board identification and plug/socket to be used).
  - Number of cores
  - Recommended type
  - Minimum specifications

Note

Kongsberg Maritime accepts no responsibility for damage to the system or reduced operational performance caused by improper wiring.

3.3   Cable plan

Each cable is identified with a cable identifier; Cxx. The notation Wxxx is the type/drawing reference number.

C10 (W301)
AC power

C11 (W301)
AC power

C8 (W301)
AC power

External tape (Optional)

C4
SCSI cable

C1
Display

C9 (W301)
AC power

C18 or **C19** (W501)
USB2 cable or
FireWire cable

External hard disk or tape (Optional)

C15 Serial A (W119)

C2 (W503)
Keyboard

C16 Serial B (W118)

HUB/SWICH

C6 (W400)
Ship's Ethernet to printer/plotter

C3 (W503)
Mouse

C17 (W400)
Ethernet to Processing Unit

(CD21406)
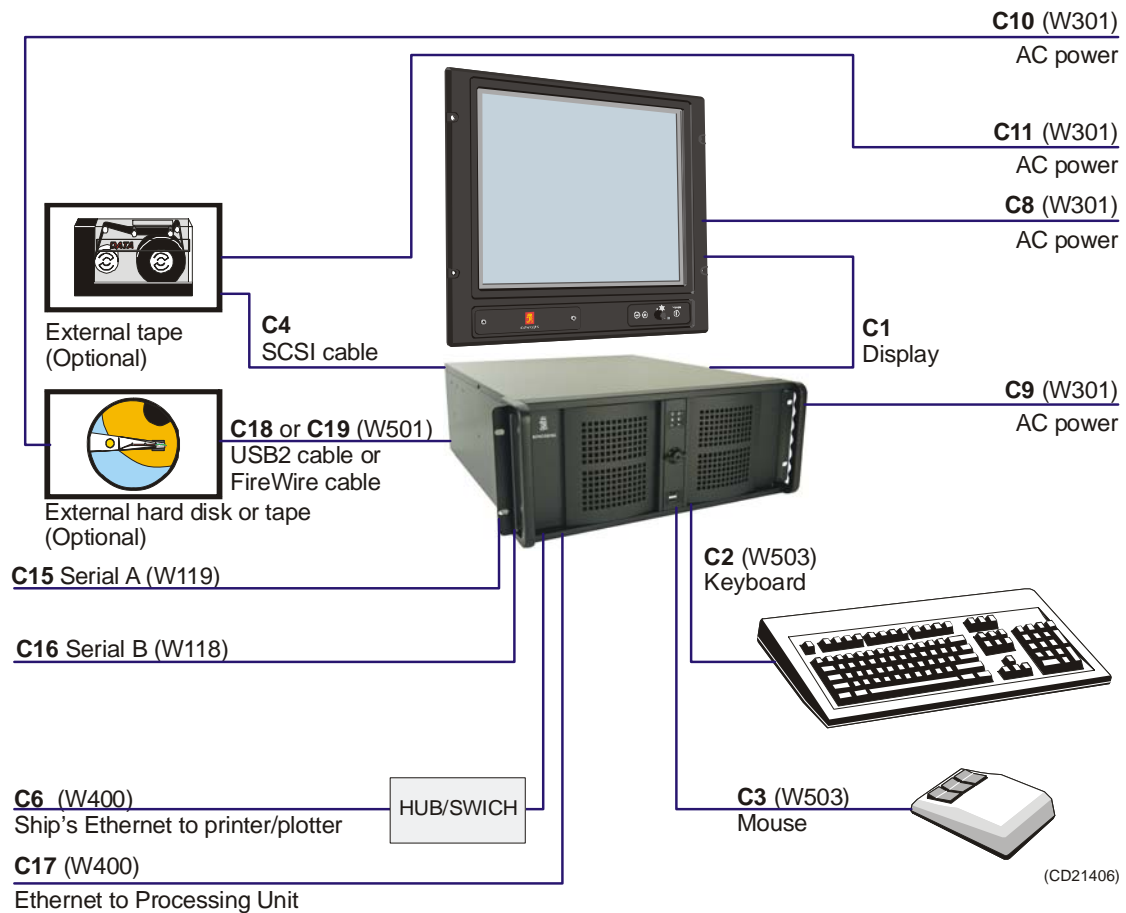
Figure 3   EM 2000 Cable plan - Operator Station.

C17 (W400)
Ethernet to Operator Station

C27 (W311)
Ground

C28 (W807)
Sonar Head

100 - 240 VAC
50 - 60 Hz
Max 6 Amp

1 PPS

Remote

EXTERNAL SENSORS

SONAR HEAD

SERIAL PORT 1

SERIAL PORT 2

SERIAL PORT 3

SERIAL PORT 4

(CD21405B)

C20 (W301)
AC power

C21 (W105)
1 PPS Clock

C22 (W600)
Remote

C23 (W118)
Serial line 1

C24 (W118)
Serial line 2

C26 (W118)
Serial line 4

C25 (W118)
Serial line 3
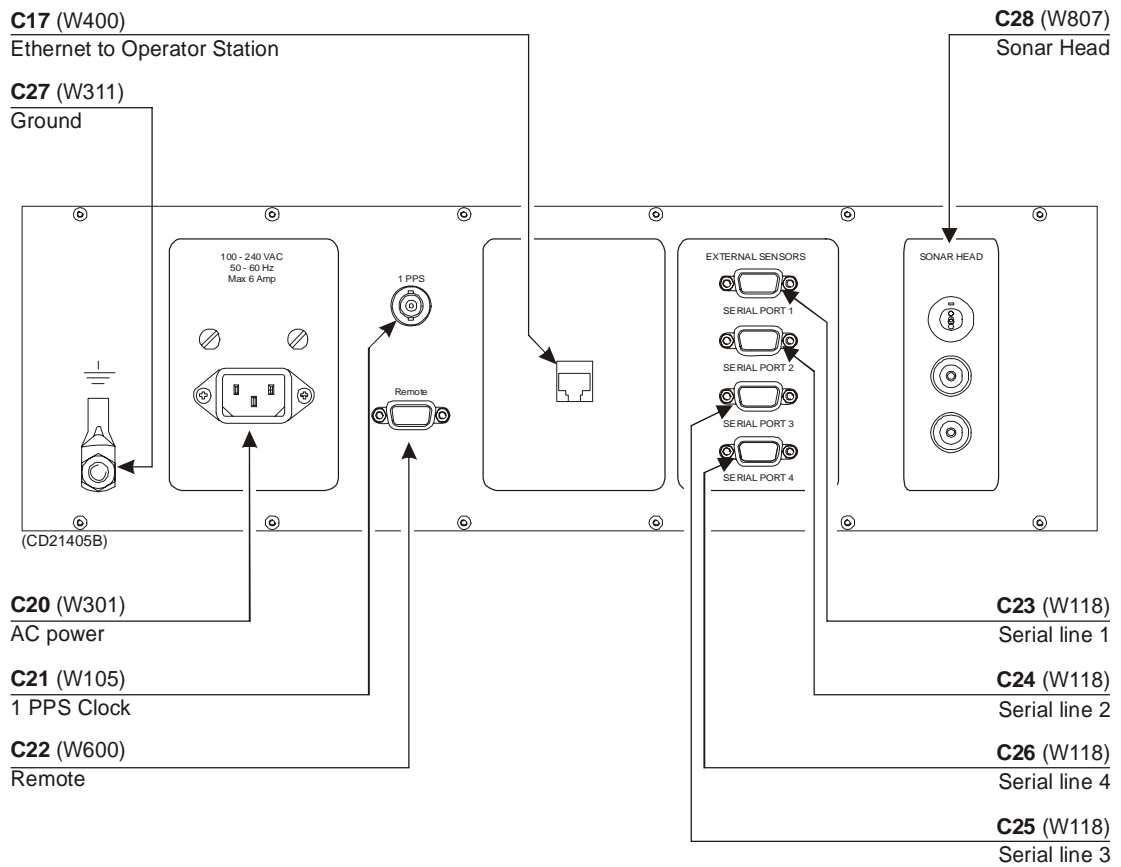
Figure 4   EM 2000 Cable plan - Processing Unit

C41 (W123)
Serial line 1

Pin 1

SERIAL PORT 1/TRIG

System:EM   / AUV PROCESSING UNIT
Part no 299-215988 Ser. no
Power:33Vac@5VDC 29VA22@24VDC
KONGSBERG SIMRAD   Made in Norway

C45 (W105)
1 PPS Clock

C43 (W103)
Serial line (optional)

C44 (W103)
Serial line

C50
Hard Disk (optional)

SERIAL PORT 2

1PPS

SERIAL PORT 3

(CD21405D)

SERIAL PORT 1/TRIG (DSUB-9)

Pin 1	Trig-Out
Pin 2	RXD-In
Pin 3	TXD-Out
4	N.A.
Pin 5	GND
Pin 6	N.A.
Pin 7	Blanking
Pin 8	Trig-In
Pin 9	N.A.

SERIAL PORT 2/3 (DSUB-9)

Pin 1	N.A.
Pin 2	RXD-In
Pin 3	TXD-Out
Pin 4	N.A.
Pin 5	GND
Pin 6	N.A.
Pin 7	N.A.
Pin 8	N.A.
Pin 9	N.A.

C48 (W400)
Ethernet

C49 (W124)
Serial line and +24 Vdc

C46 (W807)
Sonar Head

C47 (W807)
Sonar Head

Figure 5   EM 2000 Cable plan - AUV Processing Unit
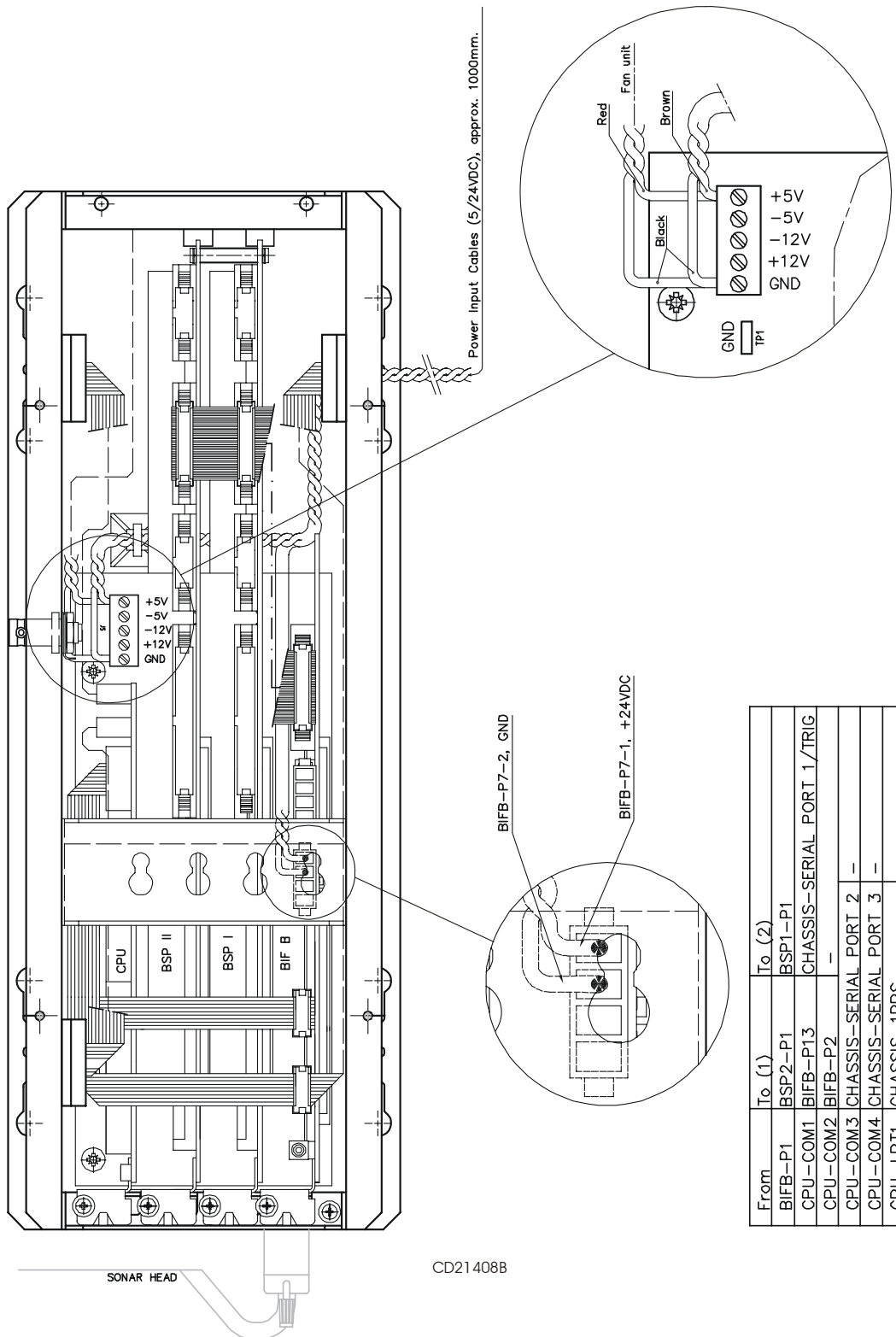
*Figure 6   EM 2000 AUV Processing Unit -
cabling details*

From	To (1)	To (2)
BIFB–P1	BSP2–P1	BSP1–P1
CPU–COM1	BIFB–P13	CHASSIS–SERIAL PORT 1/TRIG
CPU–COM2	BIFB–P2	–
CPU–COM3	CHASSIS–SERIAL PORT 2	–
CPU–COM4	CHASSIS–SERIAL PORT 3	–
CPU–LPT1	CHASSIS–1PPS	–

CD21408B

3.4   Cable specifications

Each cable is identified with a cable identifier; Cxx.

The termination of all the cables into plugs or terminal blocks are shown on the referenced pages.

Operator Station cables

C1 Display monitor (video signal)

This is a standard display cable provided with the display The physical properties of the cable is not specified in this documentation.

→   *Cable details on page 39*

C2 Keyboard

This is a standard keyboard cable provided with the keyboard. The physical properties of the cable is not specified in this documentation.

→   *Cable details on page 36*

C3 Mouse

This is a standard mouse cable provided with the mouse. The physical properties of the cable is not specified in this documentation.

→   *Cable details on page 37*

C4 SCSI external harddisk storage (optional)

This is a standard SCSI cable that can be provided with the Operator Station. The physical properties of the cable is not specified in this documentation.

C6 Printer/Plotter (optional)

This is a standard CAT-5 ethernet cable, and must be provided by the installation shipyard.

→   *Cable details on page 33*

C8 AC power display

This is a standard AC power cable. The physical properties of the cable is not specified in this documentation.

→   *Cable details on page 31*

C9 AC power operator station

This is a standard AC power cable. The physical properties of the cable is not specified in this documentation.

→ *Cable details on page 31*

C10 AC power external tape storage

This is a standard AC power cable. The physical properties of the cable is not specified in this documentation.

→ *Cable details on page 31*

C11 power external harddisk storage

This is a standard AC power cable. The physical properties of the cable is not specified in this documentation.

→ *Cable details on page 31*

C15 Sound speed sensor

Sound speed probe interface

→ *Cable details on page 27*

C16 Depth/tide

Generic RS-232 Serial line.

→ *Cable details on page 26*

C17 Ethernet to Processing Unit

This is a standard CAT-5 ethernet cable, and must be provided by the installation shipyard.

→ *Cable details on page 33*

C5, 7, 12,13,14,18 and 19 not in use.

Note   *These are standard computer cables provided with the Operator Station. The physical properties of these cables are not specified in this documentation.*

Note   *W400 is a fixed length ethernet cable supplied with the system. If required, the cable can be extended.*

Note   *A synchronization system may be used when more than one echo sounder or sonar system are used simultaneously.*

Processing Unit cables

C17 Ethernet to Operator Station

This is a standard CAT-5 ethernet cable, and must be provided by the installation shipyard.

→   *Cable details on page 33*

C20 AC power

This is a standard AC power cable. The physical properties of the cable is not specified in this dokumentation.

→   *Cable details on page 31*

C21 1 PPS Clock

Generic coax cable.

→   *Cable details on page 25*

C22 Remote

Remote synchronization.40

→   *Cable details on page 40*

C23 Serial line 1

Generic RS-232 with CTS and RTS

→   *Cable details on page 26*

C24 Serial line 2

Generic RS-232 with CTS and RTS

→   *Cable details on page 26*

C25 Serial line 3

Generic RS-232 with CTS and RTS

→   *Cable details on page 26*

C26 Serial line 4

Generic RS-232 with CTS and RTS

→   *Cable details on page 26*

C27 Ground

The physical properites of the cable is not specified in this dokumentation.

→   *Cable details on page 32*

C28 Sonar Head

→   *Cable details on page 41*

C29 … C40 not in use.

AUV Unit Cables

C41 / C43 / C44 - Serial lines

The AUV Processing Unit is equipped with three RS-232 serial lines. All connectors are 9-pin male D-connectors.

Cable C41 is a serial line with trigger input.

→   *Cable details (C41) on page 28.*

→   *Cable details (C43, C44) on page 24.*

Some sensors may require RTS and CTS.

→   *Refer to the cable description on page 26.*

The cables must be provided by the installation shipyard.

C45 - 1PPS

This is a timing signal terminated in a coax connector.

→   *Cable details on page 25.*

The cable must be provided by the installation shipyard.

C46 / C47 - Transducer cable to Sonar Head

The standard Sonar Head cable delivered by Kongsberg Maritime has three plugs for connection to the standard Processing Unit. These plugs must be substituted by one underwater plug with minimum 10 pins.

A 4 meter cable without connectors in the "Processing Unit end" is available from Kongsberg Maritime.

This can be ordered on registration number:

• 380 - 212985.

Internal wiring inside the bottle

Cabling from the underwater plug to the AUV Processing Unit BIFB board:

• Two mini coax cables must be used for the TAXI high speed up-link.

• A multi wire cable must be used to connect 24 V, RS-485 serial line.

Plug and cable specifications (not supplied by Kongsberg Maritime):

• 2 mini coax connectors to plug into the BIFB board.

- 2 mini coax cable for the TAXI link.

→ *Cable details on page 30.*

C48 - AUV Processing Unit RJ-45 interface

Refer to the Operator Station cabling.

C49 - Serial line and power

The AUV Processing Unit is equipped with one RS-485 serial line with +24 Vdc power input. The connector is a 9-pin male D-connector.:

- Plug for power and serial link for connection to the BIFB board: standard 9 pins delta plug.

  - Minimums cable dimensions: 0.5 mm^2.

→ *Cable details on page 29.*

C50 - Hard disk (optional)

This is a standard hard disk cable. The physical properties of these cables are not specified in this documentation.

Power cables

The AUV Processing Unit uses +5 Vdc and +24 Vdc for the Sonar Head. These cables are delivered without connectors.

100 cm cables are supplied by Kongsberg Maritime. They should be shortened as much as possible to minimize voltage drop.

The power cables are brown for +5 V and red for +24 V. Both use black as ground.

The 5 V ground and the 24 V ground must be connected together externally.

Power requirements: 24 Vdc, 29 VA and 5Vdc, 33 VA.

Note

The 5 V power measured at the motherboard terminals should be minimum 5.0 Vdc. The 5 V power should be rated for minimum 12 A and 24 V power should be rated for minimum 1.5 A.

3.5   Cable drawing list

Generic RS-232 Serial line

This cable comprises a multi-purpose serial line. It provides interface with any peripheral unit. One end of the cable connects to the local unit (DTE) with a 9-pin 'D' connector, while the other connects to the peripheral (DCE) as described in the peripheral unit's documentation.

Note that this cable does not support all the signals in the standard RS-232 specification.

Local (DTE) 9-pin 'D' connector

Remote unit (DCE) to be connected as described in applicable documentation

Screen

Rx	2
Tx	3
Ground	5

To plug housing

Looking into female 9-pin D-pin connector

5   1

9   6

Looking into male 9-pin D-pin connector

1   5

6   9

View

| W103 / Rev G | Standard RS-232 serial line |
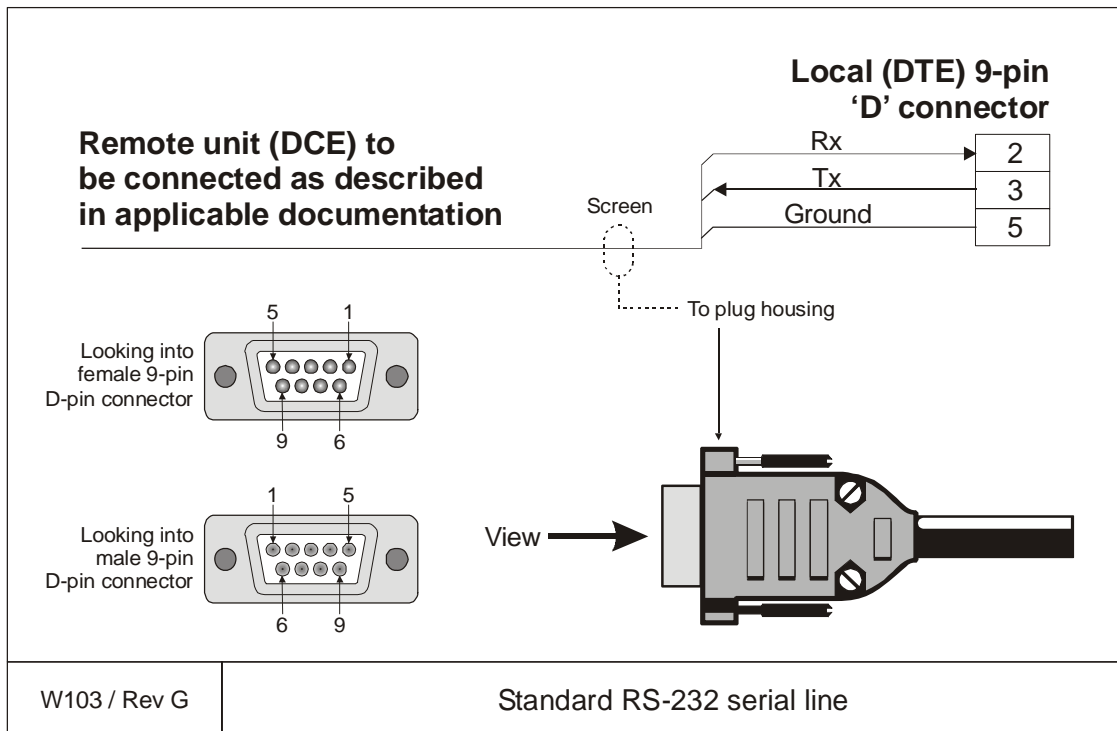
Conductors	3 x 2 x 0.5 mm2
Screen	Overall braided
Voltage	60V
Max.diameter	Set by the plugs

Generic coax cable

This cable is used for connections to peripheral units or networks.

| W105 / Rev.D | Coax connection to peripheral unit or network |
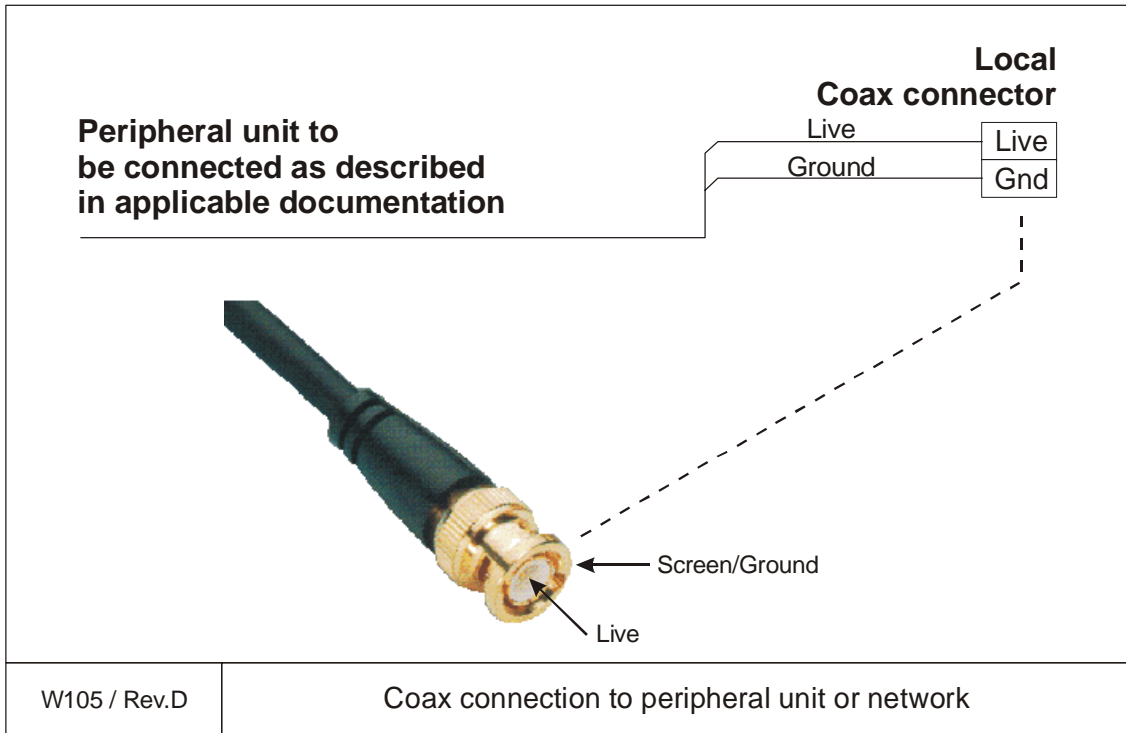
Generic RS-232 with CTS and RTS

This is a standard serial cable terminated into a 9-pin D-connector.
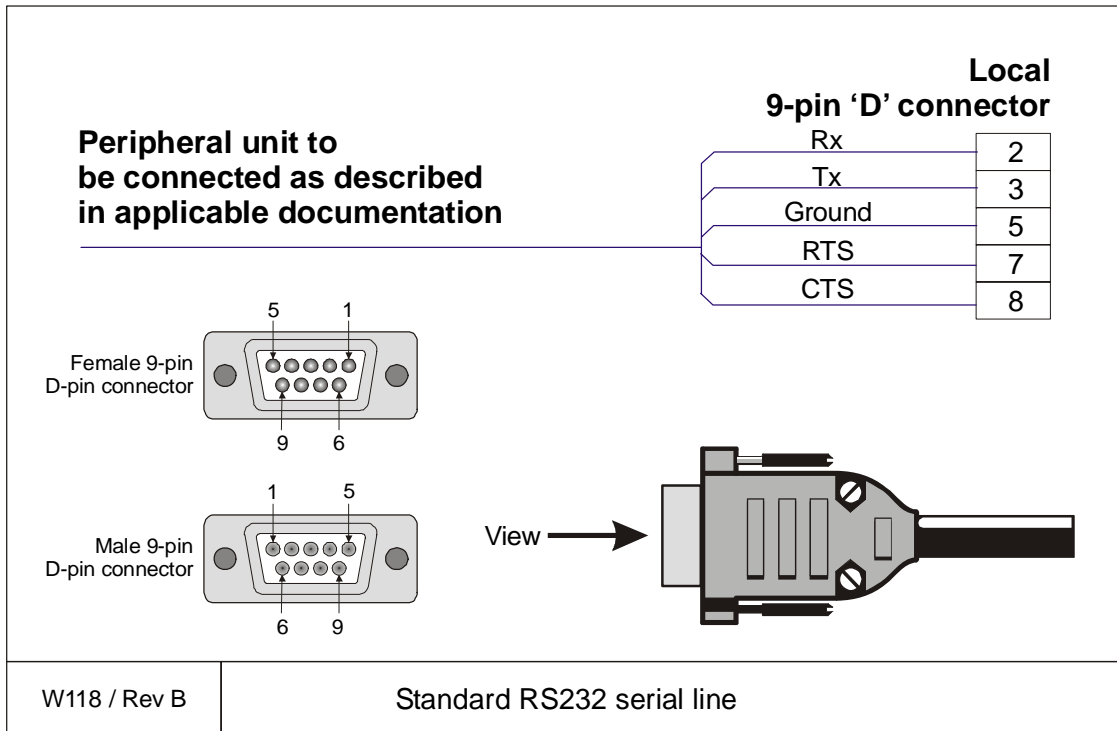
Peripheral unit to be connected as described in applicable documentation

Local 9-pin 'D' connector

	Pin
Rx	2
Tx	3
Ground	5
RTS	7
CTS	8

Female 9-pin D-pin connector

Male 9-pin D-pin connector

View

W118 / Rev B   Standard RS232 serial line

Conductors	6 x 0.5 mm2
Screen	Overall braided
Voltage	60 V
Max.diameter	Limited by the plugs

Sound speed probe interface

This cable provides the interconnection between the Processor Unit work station and the sound speed probe. This connection is normally made through a small junction box and with a power supply as indicated in the drawing.

| W119 / Rev.C | Sound speed probe interface |
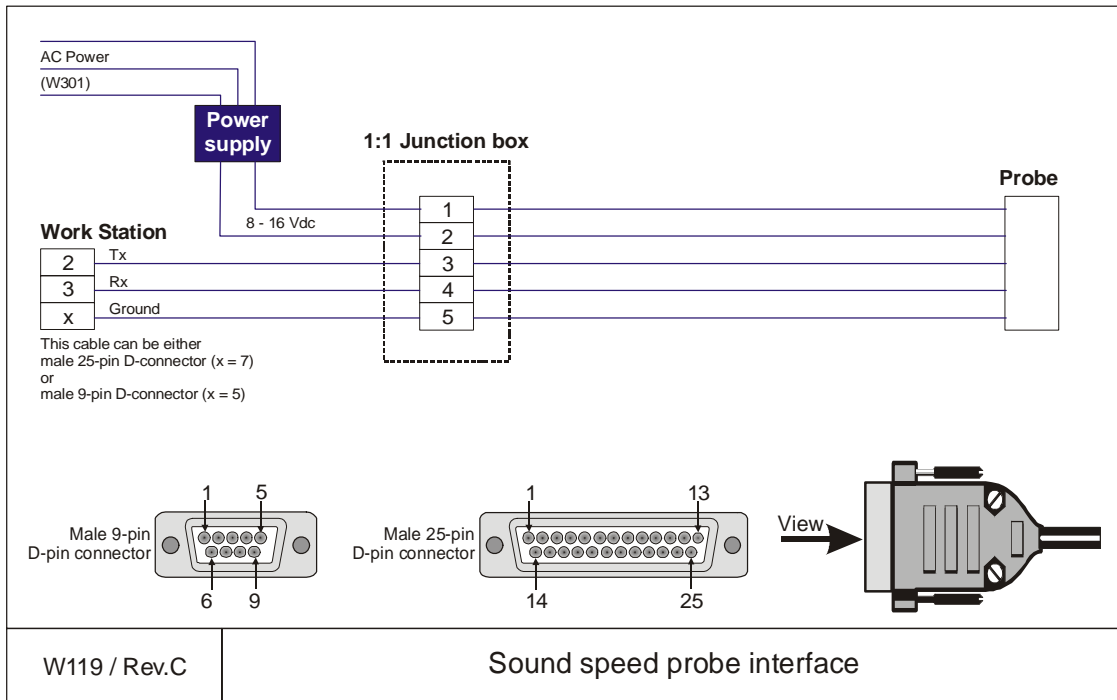
The cable between the junction box and the probe is supplied by the probe manufacturer.

Conductors	2 x 2 x 0.5 mm2
Screen	Overall braided
Voltage	60V
Max.diameter	Set by the plugs

RS-232 Serial line with Trigger signals

This cable is used by the AUV Processing Unit.

Peripheral unit to be connected as described in applicable documentation

Local 9-pin 'D' connector

Signal	Pin
Trig-Out	1
RxD-In	2
TxD-Out	3
Ground	5
Blanking (RTS)	7
Trig-In (CTS)	8

Female 9-pin D-pin connector

Male 9-pin D-pin connector

View

W123 / Rev A	AUV PU - Trigger, RS232 serial line
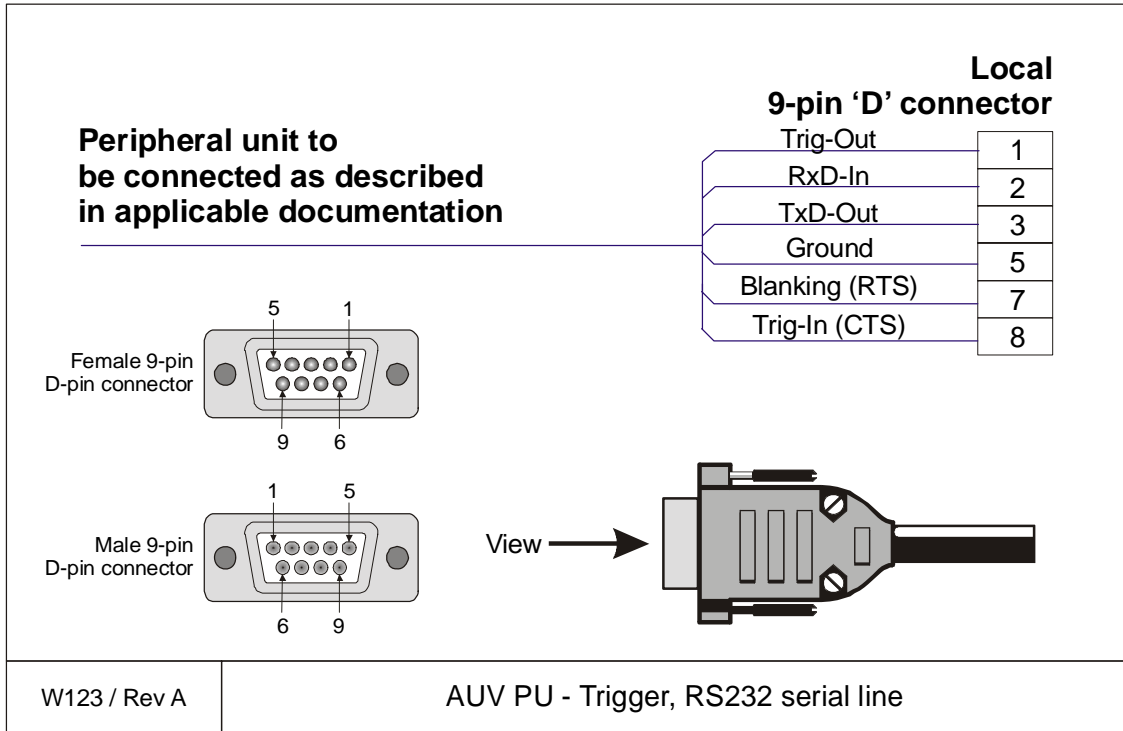
Conductors	6 x 0.5 mm2
Screen	Overall braided
Voltage	60 V
Max.diameter	Limited by the plugs

RS-485 Serial line and power

W124 / Rev.A	RS485 Serial line
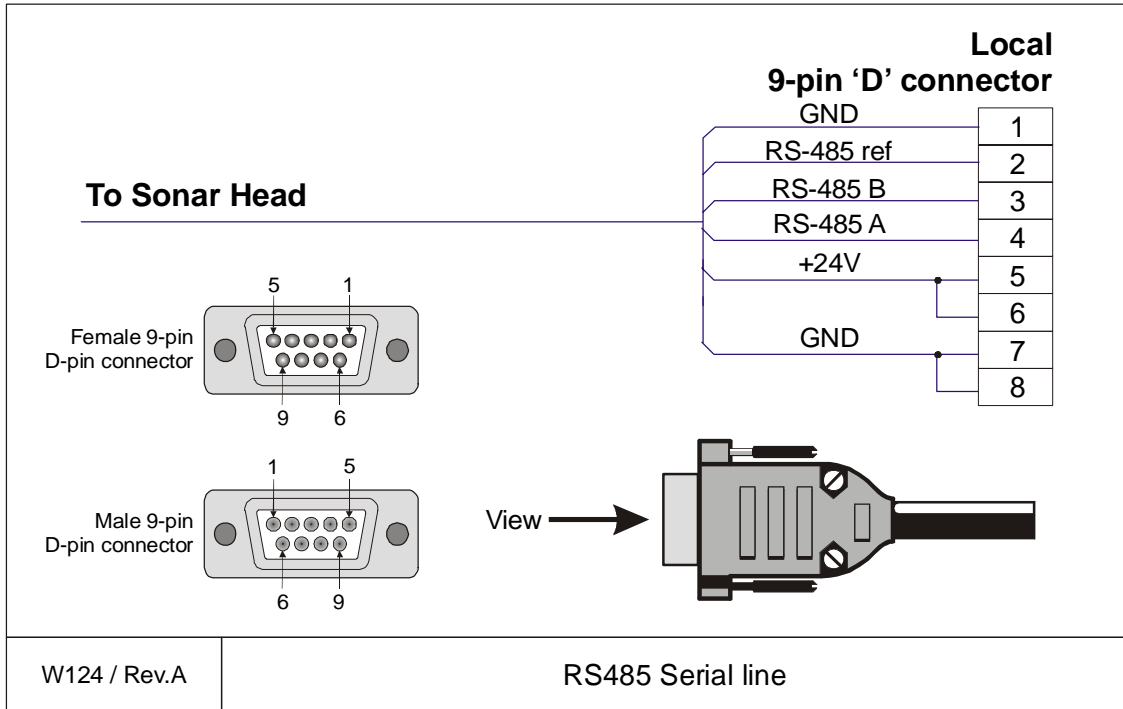
Conductors	6 x 0.5 mm2
Voltage	60 V

Mini Coax

**Peripheral unit to
be connected as described
in applicable documentation**

**Local Mini
Coax connector**

Live → Live

Ground → Gnd

| W125 / Rev.A | Mini coax connection to peripheral unit or network |
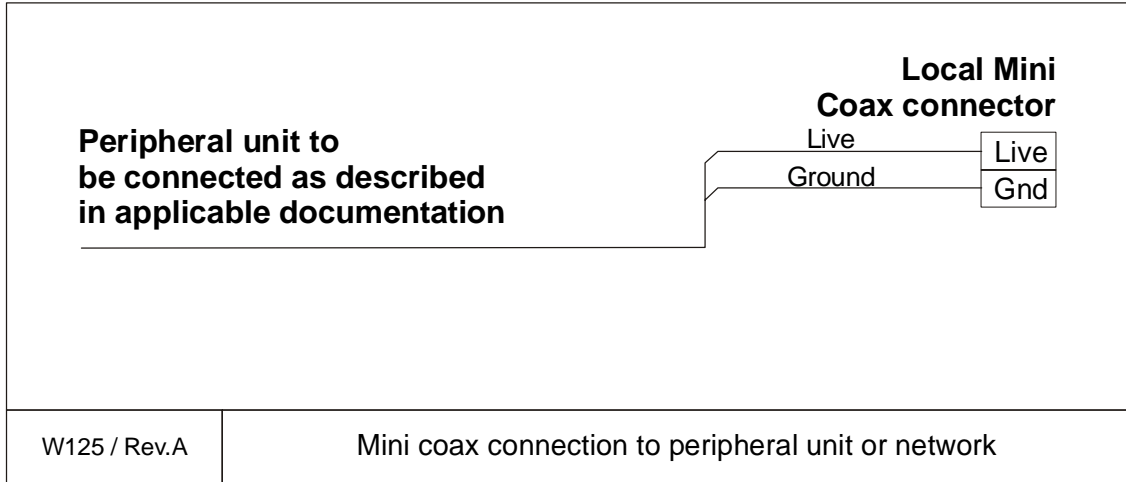
Standard AC power cable

This cable is a standard three-wire power cable. It is commercially available in standard lengths, or may be produced locally to suit the specific installation needs. The instrument end is terminated in a standard IEC female socket, while the other end is terminated in a plug suitable for the local standard.

Pin configuration

Use the applicable plug to suit local standard. EU standard plug used as example only.

IEC plug

Neutral (normally Blue)
Ground (always Yellow or Yellow/Green)
Live (normally Brown)

W301eu/Rev A	Standard power cable for 115/230 Vac 2-phase
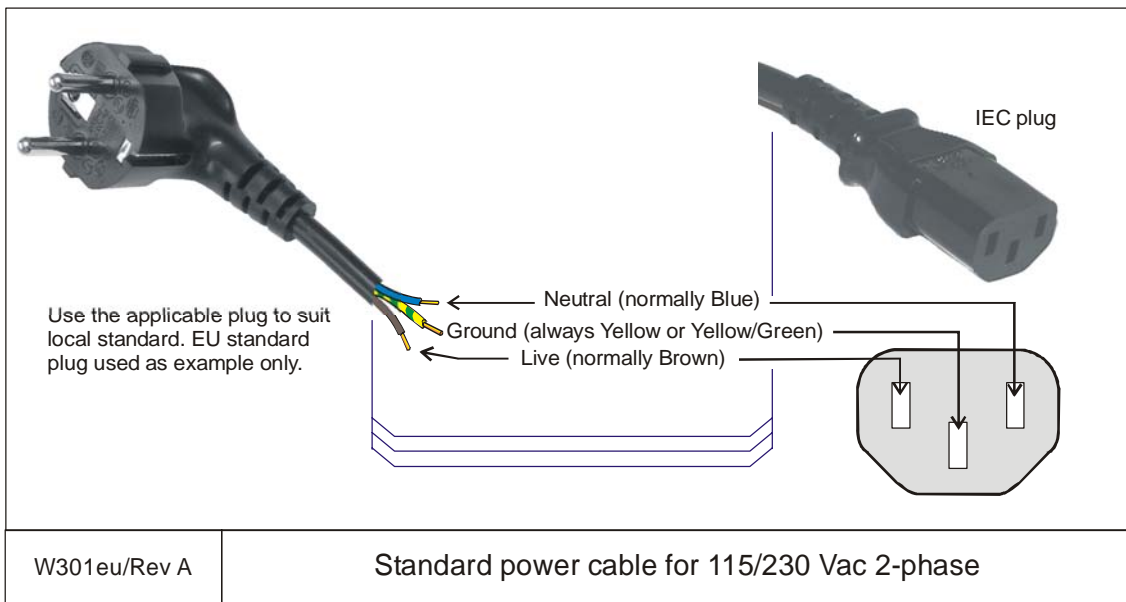
Note   *Different cable colours may be used for the "live" and "neutral" wires. Ground is however always on green/yellow.*

Specifications

Conductors	2 x 1.5 mm^2 + GND
Screen	None
Voltage	750 V
Max. diameterl	Set by the plugs

EMC ground

This cable is used to connect the system unit to the ship's ground.

Note that this cable must be as short as possible.

Units's ground tag ———————————— Ships' ground	
W311 / Rev B	Ship's ground
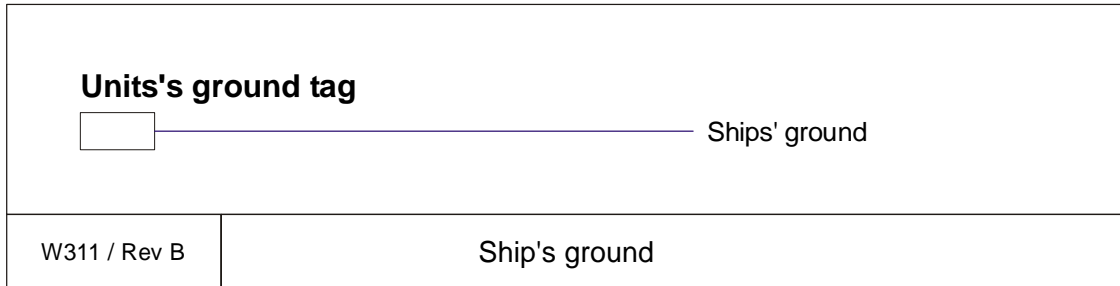
Minimum cable specifications	
Conductors	1 x 6 mm2
Screen	None
Voltage	60 V
Max.diameter	N/A

Ethernet with RJ45 plugs (screened)

This cable contains the Ethernet connection. RJ45 plugs are used to terminate the cable. Note that these plugs must be screened to comply to EC rules.

Ethernet 10Base-T with RJ45 plugs

Ethernet 10Base-T "Straight Through"

RJ45 plug — RJ45 plug

Pin	Signal
1	TX Data + (White/Orange)
2	Tx Data - (Orange)
3	Recv Data + (White/Green)
4	(Blue)
5	(White/Blue)
6	Recv Data - (Green)
7	(White/Brown)
8	(Brown)

Pairs

Ethernet 10Base-T "Crossover"

RJ45 plug — RJ45 plug

(1) TX Data + to (3) Recv Data +
(2) Tx Data - to (6) Recv Data -
(3) Recv Data + to (1) Tx Data +
(6) Recv Data - to (2) Tx Data -

Pairs

NOTE: In order to prevent noise and crosstalk, you are strongly adviced to use the cable pairs indicated above.

The "crossover" cable is used to cascade HUBs, or for connecting two ethernet stations or computers back-to-back without a HUB)

W400 / Rev E

Ethernet with IEEE 802.3

This is a standard ethernet connection. It complies to IEEE 802.3.
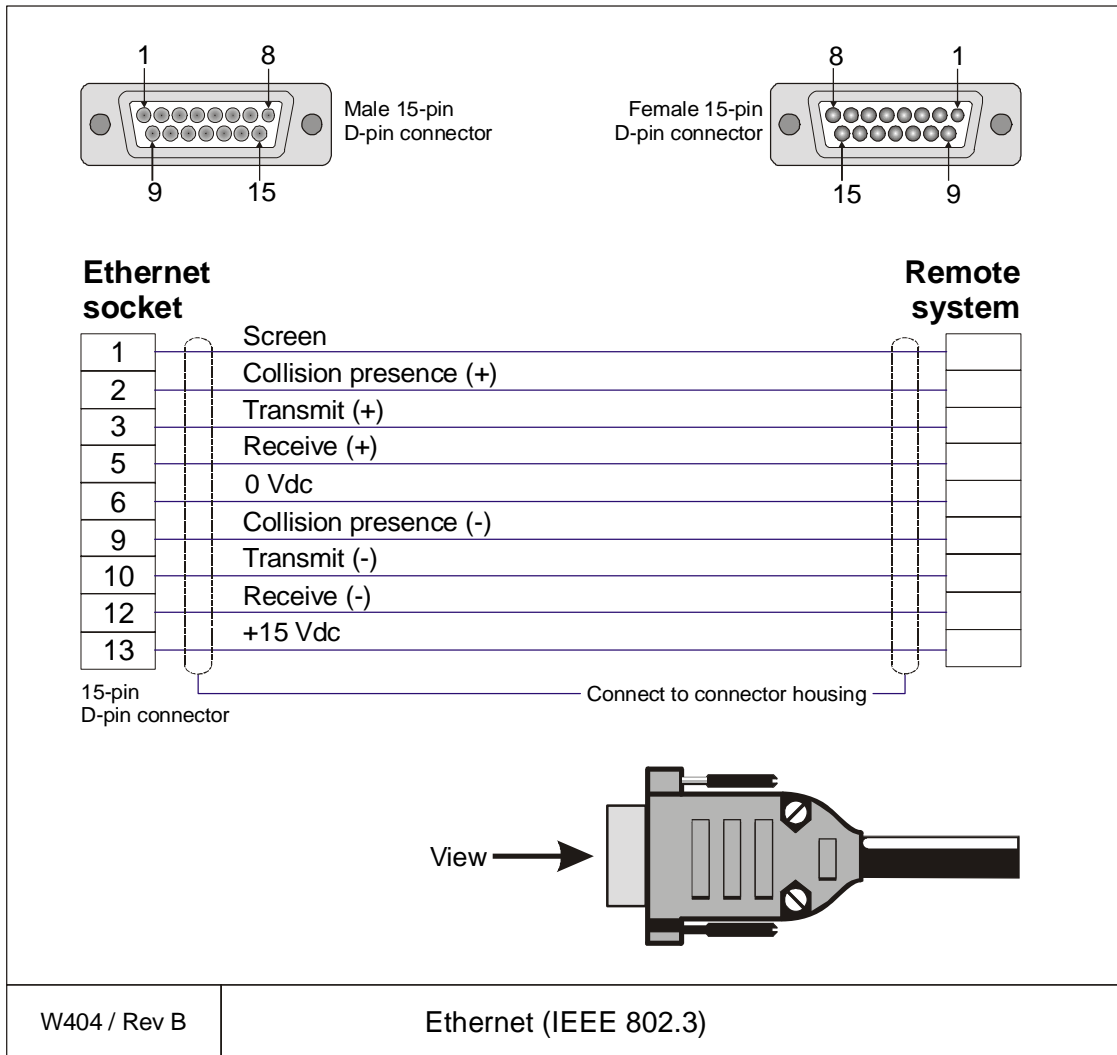
W404 / Rev B	Ethernet (IEEE 802.3)

Conductors	6 x 0.5 mm2
Screen	Overall braided
Voltage	60 V
Max.diameter	Limited by the plugs

Standard USB cable

This is a standard commercial USB cable terminated with **A** and **B** plugs in either ends. The cable can be used for a variety of external devices. The order number provided is for a 4.5 m cable.

Universal Serial Bus (USB) cable
terminated with an **A-plug** in one end
and a **B-plug** in the other.

Internal cables:

Pair 1:
28 AWG twisted pair
(data, green, white)

Pair 2:
20 AWG twisted pair
(Power, red, black)

Shield:
Foil and braid

Length: 4.5 m
Order no: 719-078524
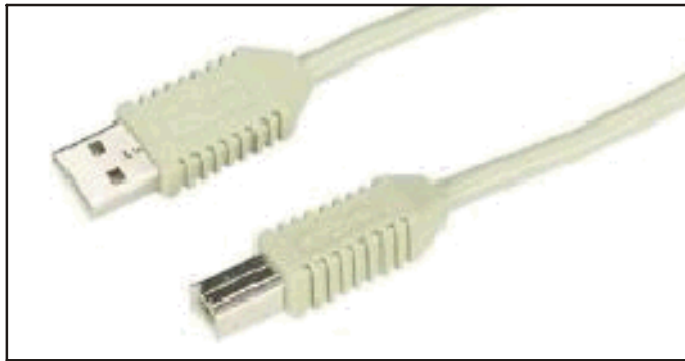
W501 / Rev.A	Commercial USB cable

Keyboard cable

This is a standard keyboard cable. In most cases, the cable is physically connected to the keyboard. It is terminated in a plug suited to fit the computer.

Several keyboard types are available for different languages and hardware platforms. Both the keyboard and the attached cable are commercial items.

Plug suited for the computer

In most cases, the keyboard cable is physically connected to the computer

Keyboard
(Different keyboard types are supplied)

W503 / Rev C	Keyboard
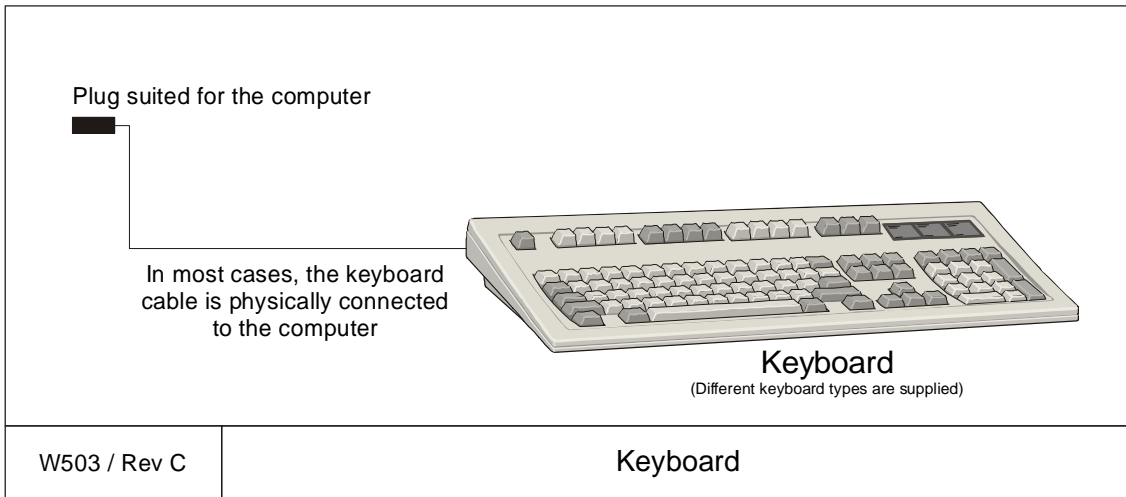
Mouse or pointing device cable

This is a standard mouse cable. It is physically connected to the mouse. It is terminated in a plug suited to fit the computer.

Note

On Unix work stations, the mouse is normally connected to the keyboard.

Several mouse and pointing device types are available with two or three buttons, and with or without a scroll wheel. Both the mouse and the attached cable are commercial items.

Various mouse types support two or three buttons, and may also provide a scroll wheel.

Plug suited for the computer

The cable is physically connected to the mouse

Note that certain mouse types for Unix work stations are connected to the keyboard.

Mouse
(Different mouse types and other pointing devices are supplied)

W504 / Rev C	Mouse / Pointing device
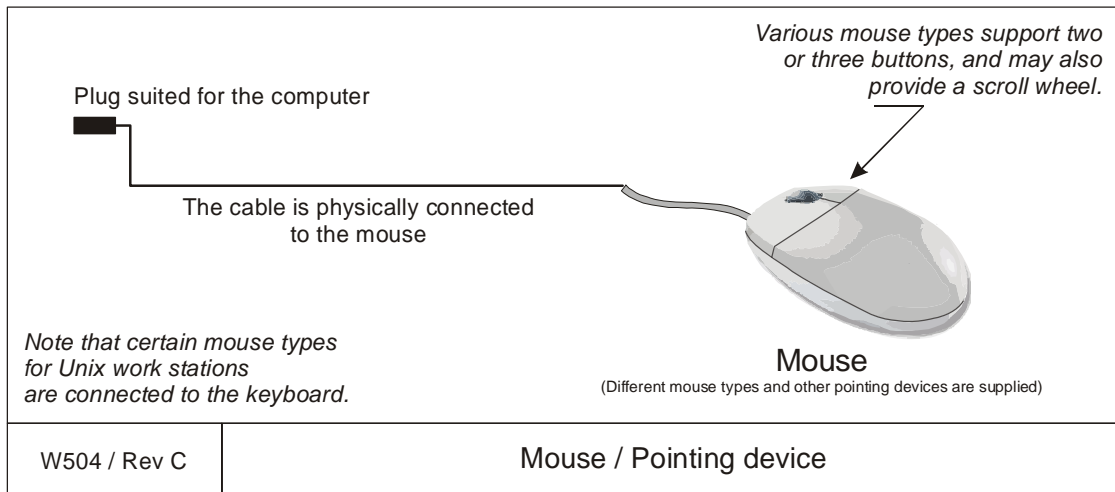
Printer cable

This is a standard printer cable. It is terminated in the computer's parallel port.

The socket on the rear side of the computer is normally a 25-pin female D-connector.

25-pin D-connector

Parallel port connector (IEEE 1284-A)

Pin	Signal
1	Strobe
2	Data 0
3	Data 1
4	Data 2
5	Data 3
6	Data 4
7	Data 5
8	Data 6
9	Data 7
10	Acknowledge
11	Busy
15	Error
18-24	Ground

W505 / Rev D	Printer cable

852-164378 / D
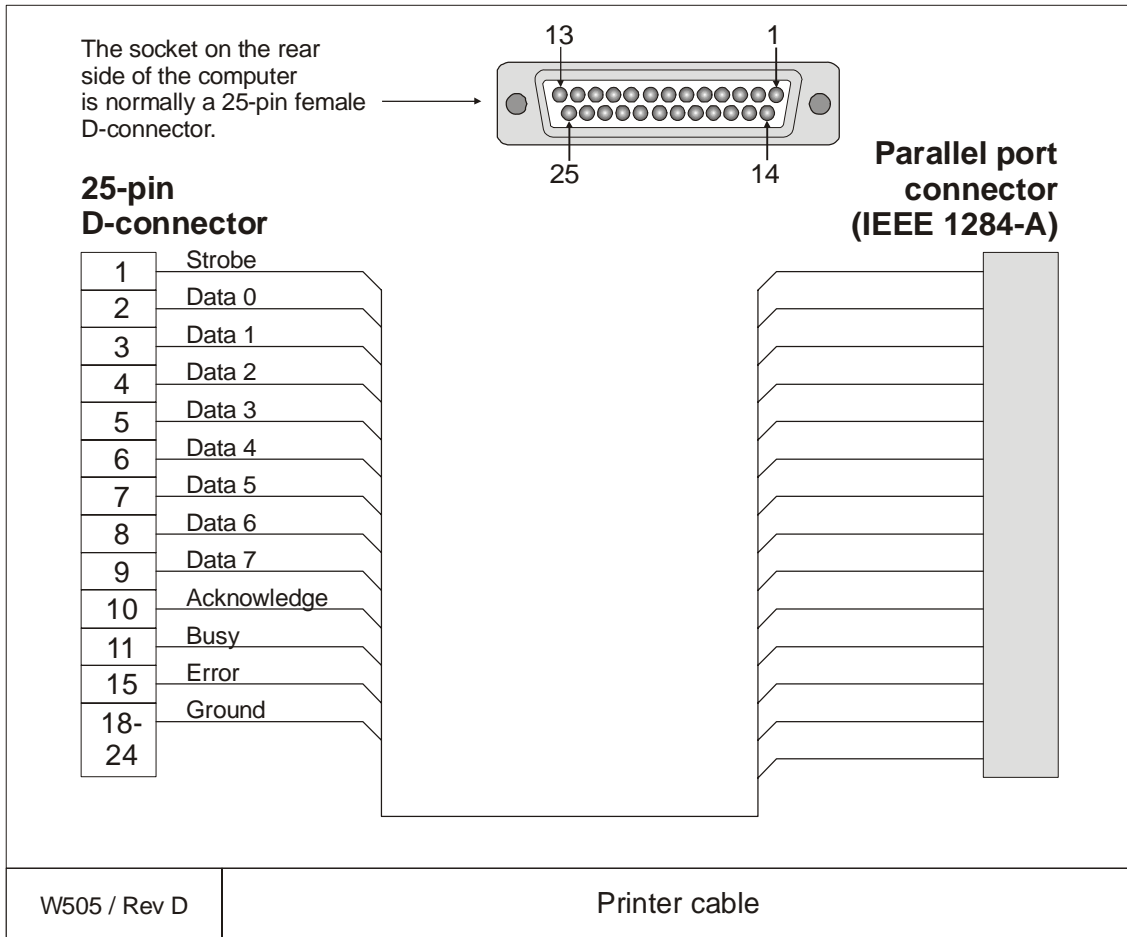
Digital Video Interface (DVI) display cable

This cable is a standard DVI-I cable. It is connected to the LCD display.

| W508 / Rev.A | DVI cable |
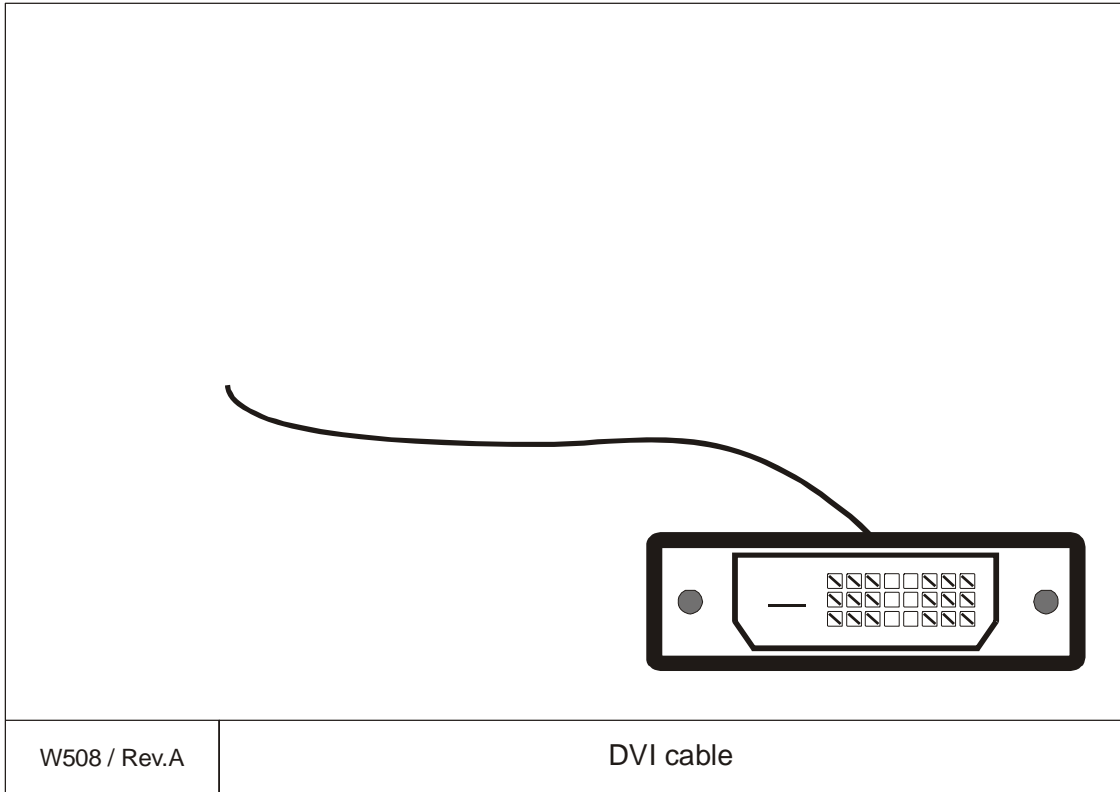
W600 - Remote synchronization

The cable is supplied by the manufacturer.

Processing Unit
9-pin 'D' connector
'Remote'

Pin	Signal
1	Trigger out
2	RX (for test)
3	TX (for test)
4	
5	GND
6	
7	RTS
8	CTS
9	

W600 / Rev A	Remote synchronization
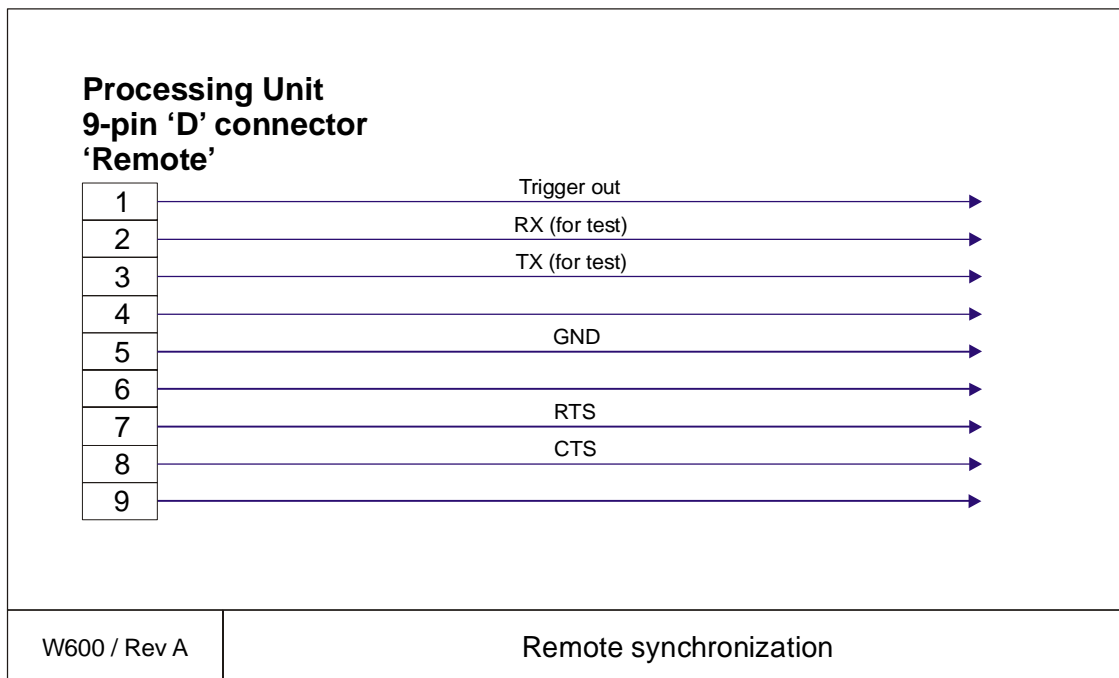
Conductors	5 x 2 x 0.5 mm2
Screen	Overall braided
Voltage	60 V
Max.diameter	Limited by the plugs

W807 - Sonar Head cable

This is the cable from the EM 2000 Processing Unit to the Sonar Head. The cable is supplied by the manufacturer.

W807 / Rev E	Sonar Head
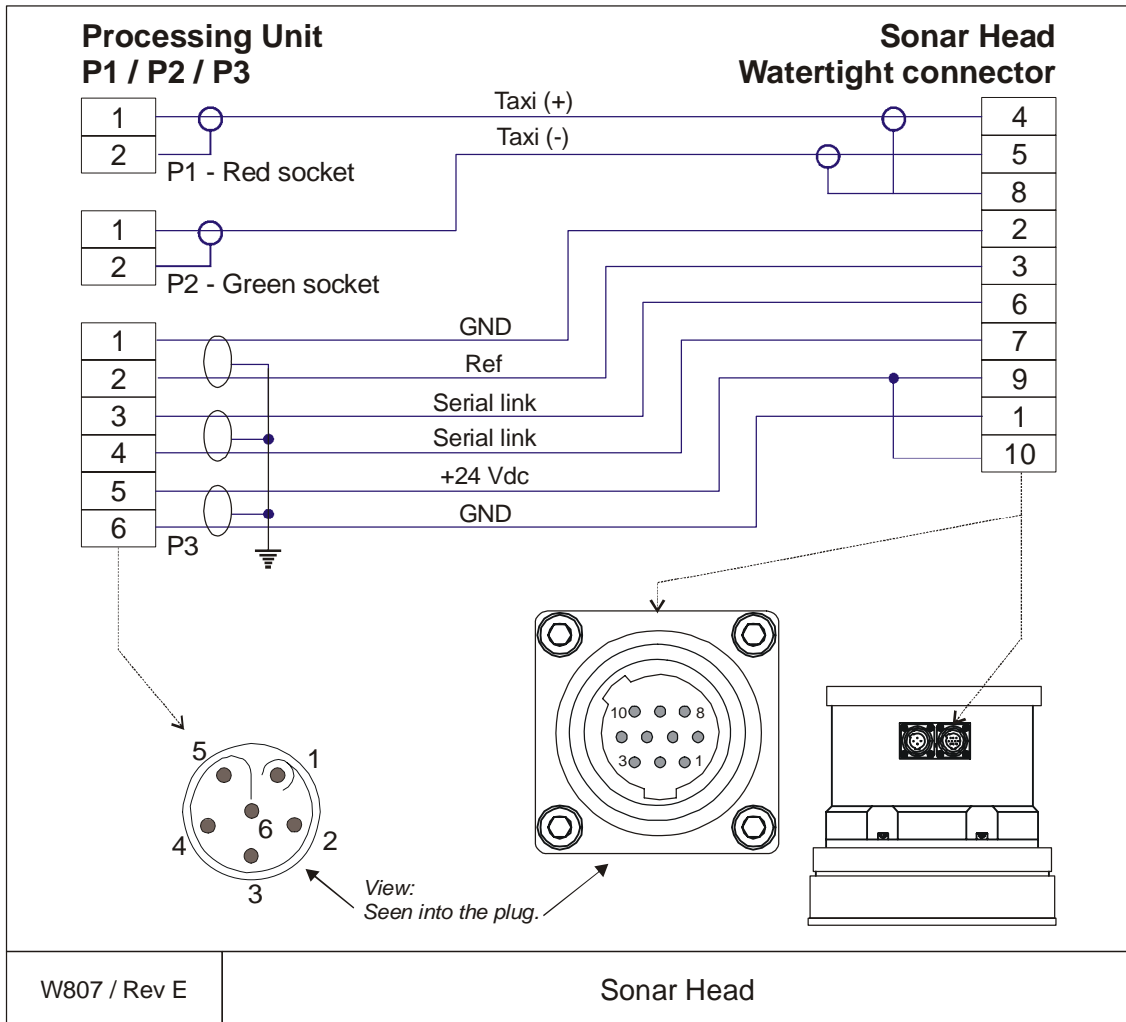
3.6 Sonar Head cable drawings

7 mm 7 mm

Dismantling the coax cables

In-line UV plug

Approx 550 mm

Approx 60 mm

Heat-shrinkable sleeve

Length
15 m

350 mm 350 mm

Protection cap
GMA.1B.045.DV
379-086961

Protection cap
GMA.1B.045.DR
379-086962

Cable
RCOP
60V
4x(2x0.5)

300 mm

UV cable
12-6621 Pur orange
(642-086803)

Plug FFA.1S.250
CTAC52Z-COMP
(370-086959)

(CD21413)

Heat-shrinkable sleeve

Plug 6-pin EGG.2B.306
CNAD99-COMP
(370-086957)

View:
Seen from solder side.

1   5

2   6   4

3

Figure 7   Sonar Head cable, assembly drawing

Standard Sonar Head cable

Note
On newer BIFB boards the TAXI interface is the same as in figure 9.
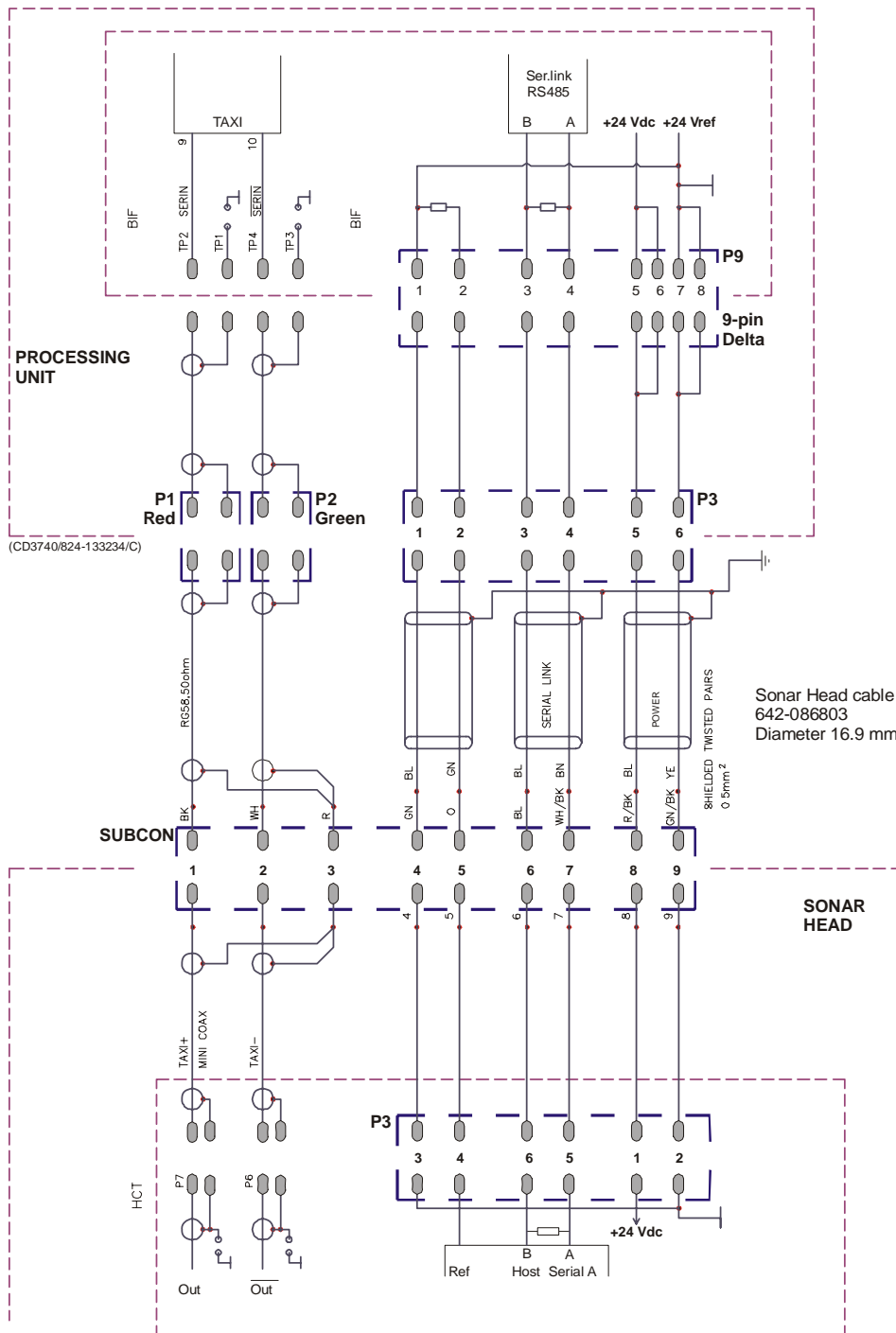
Figure 8   Sonar Head cable; connection diagram for Standard Processing Unit.

AUV Sonar Head cable
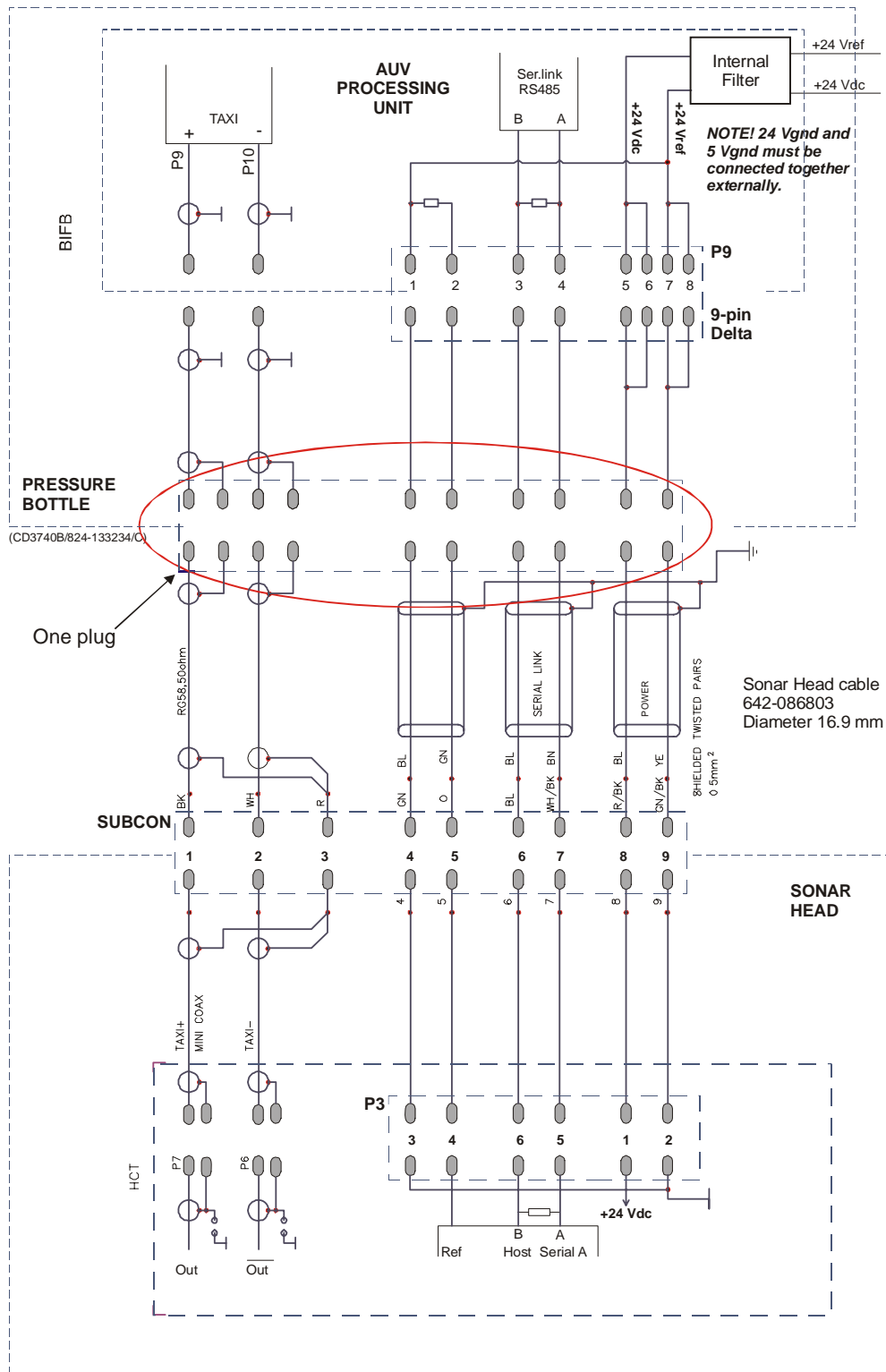
Figure 9   Sonar Head cable; connection diagram for AUV Processing Unit.

3.7 Sonar Head Connection

Sonar Head cable

The standard Sonar Head cable delivered by Kongsberg Maritime has three plugs for connection to the standard Processing Unit. These plugs must be substituted by one underwater plug with minimum 10 pins.

A 4 meter cable without connectors in the "Processing Unit end" is available from Kongsberg Maritime.

This can be ordered on registration number:

- 380-212985.

Internal wiring inside the bottle

Cabling from the underwater plug to the AUV Processing Unit BIFB board:

- Two mini coax cables must be used for the TAXI high speed up-link.

- A multi wire cable must be used to connect 24 V, RS485 serial line.

Plug and cable specifications (not supplied by Kongsberg Maritime):

- 2 mini coax connectors to plug into the BIFB board.

- 2 mini coax cable for the TAXI link.

- Plug for power and serial link for connection to the BIFB board: standard 9 pins delta plug.

    - Minimums cable dimensions: 0.5 mm2.

→   *For more details, refer to drawing on page NO TAG.*

3.8   Basic cabling requirements

Cable trays

All permanently installed cables associated with the system must be supported and protected along their entire lengths using conduits and/or cable trays. The only exception to this rule is over the final short distance (max. 0.5 metre) as the cables run into the cabinets/units to which they are connected. These short service loops are to allow the cabinets to move on their shock mounts, and to allow maintenance and repair.

- Wherever possible, cable trays must be straight, accessible and placed so as to avoid possible contamination by condensation and dripping liquids (oil, etc.). They must be installed away from sources of heat, and must be protected against physical damage. Suitable shields must be provided where cables are installed in the vicinity of heat sources.

- Unless it is absolutely unavoidable, cables should not be installed across the vessel's expansion joints. If the situation is unavoidable, a loop of cable having a length proportional to the possible expansion of the joint must be provided. The minimum internal radius of the loop must be at least twelve times the external diameter of the cable.

- Where a service requires duplicate supply lines, the cables must follow separate paths through the vessel whenever possible.

- Signal cables must not be installed in the same cable tray or conduit as high-power cables.

- Cables containing insulation materials with different maximum-rated conductor temperatures should not be bunched together (that is, in a common clip, gland, conduit or duct). When this is impractical, the cables must be carefully arranged such that the maximum temperature expected in any cable in the group is within the specifications of the lowest-rated cable.

- Cables with protective coverings which may damage other cables should not be grouped with other cables.

- Cables having a copper sheath or braiding must be installed in such a way that galvanic corrosion by contact with other metals is prevented.

- To allow for future expansion of the system, all cables should be allocated spare conductor pairs. Also, space within the vessel should be set aside for the installation of extra cables.

Radio Frequency interference

All cables that are to be permanently installed within 9 m
(30 ft) of any source of Radio Frequency (RF) interference such
as a transmitter aerial system or radio transmitters, must, unless
shielded by a metal deck or bulkhead, be adequately screened by
sheathing, braiding or other suitable material. In such a situation
flexible cables should be screened wherever possible.

It is important that cables, other than those supplying services to
the equipment installed in a radio room, are not installed
through a radio room, high power switch gear or other potential
sources of interference. Cables which must pass through a radio
room must be screened by a continuous metal conduit or
trunking which must be bonded to the screening of the radio
room at its points of entry and exit.

Physical protection

Cables exposed to the risk of physical damage must be enclosed
in a steel conduit or protected by a metal casing unless the
cable's covering (e.g. armour or sheath) is sufficient to protect it
from the damage risk.

Cables exposed to an exceptional risk of mechanical damage
(for example in holds, storage-spaces and cargo-spaces) must be
protected by a suitable casing or conduit, even when armoured,
if the cable covering does not guarantee sufficient protection for
the cables.

Metallic materials used for the physical protection of cables
must be suitably protected against corrosion.

Grounding

All metallic cable coverings (armour, metallic sheathing etc.)
must be electrically connected to the vessel's hull at both ends
except in the case of final sub-circuits where they should be
connected at the supply end only.

Grounding connections should be made using a conductor which
has a cross-sectional area appropriate for the current rating of
the cable, or with a metal clamp which grips the metallic
covering of the cable and is bonded to the hull of the vessel.
These cable coverings may also be grounded by means of glands
specially intended for this purpose and designed to ensure a
good ground connection. The glands used must be firmly
attached to, and in good electrical contact with, a metal structure
grounded in accordance with these recommendations.

Electrical continuity must be ensured along the entire length of all cable coverings, particularly at joints and splices. In no case should the shielding of cables be used as the only means of grounding cables or units.

Metallic casings, pipes and conduits must be grounded, and when fitted with joints these must be mechanically and electrically grounded locally.

Cable connections

All cable connections are shown on the applicable cable plan and interconnection diagrams.

Where the cable plan shows cable connections outside an equipment box outline, the connections are to be made to a plug or socket which matches the plug or socket on that particular item of equipment.

Where two cables are connected in series via a junction box or terminal block, the screens of both cables must be connected together but not grounded.

Cable terminations

Care must be taken to ensure that the correct terminations are used for all cable conductors, especially those that are to be connected to terminal blocks. In this case, crimped sleeve-terminations must be fitted to prevent the conductor core from fraying and making a bad connection with the terminal block. It is also of the utmost importance that where crimped terminations are used, the correct size of crimp and crimping tool are used. In addition, each cable conductor must have a minimum of 15 cm slack (service loop) left before its termination is fitted.

Cable identification

Cable identification codes corresponding to the cable number shown in the cable plan must be attached to each of the external cables. These identification codes should be positioned on the cable in such a way that they are readily visible after all panels have been fitted. In addition, each cable conductor should be marked with the terminal board number or socket to which it is connected.

4 OPERATOR STATION

4.1 Description and main functions

Introduction

The HWS 10 Hydrographic Work Station is the Operator Station normally used by the EM 2000.

Topic

Height
127 mm

Depth 480 mm
(excluding handles
and connectors)

Width 427 mm
(excluding rack fixing brackets)

Note:
All measurements are in mm.
The drawing is not in scale.

Page 1 of 1 (CD25000)	HWS 10 Operator Station Outline dimensions	**-** Rev.A
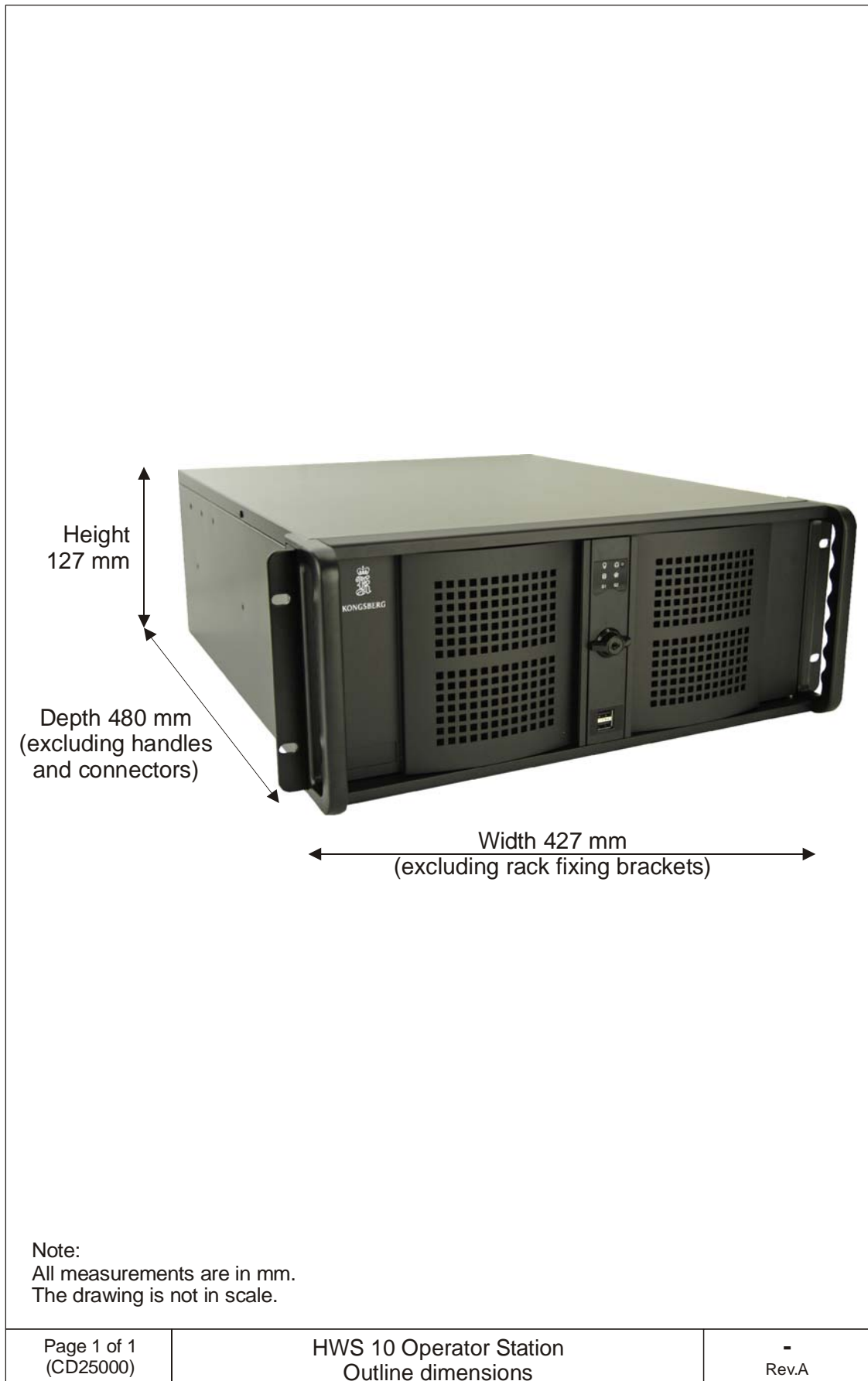
4.2 Theory

Overview

The HWS 10 is equipped to handle the heavy processing requirements and high-speed, largevolume data storage demands of today's hydrographic systems. It has been specifically designed as the optimal platform for running the Seafloor Information System (SIS) real-time operating software used on the Kongsberg EM multibeam echo sounders. Special features of SIS include real-time:

- Gridding of sounding data.

- Filtering of sounding data.

- 3-D visualization of sounding data.

- Storage and visualization of high resolution backscatter data from the seabed and the water column.

Software

The partitioned system disk is dual bootable with Linux® and Microsoft Windows XP® respectively. SIS software is factory installed and tested on both operating systems.

Data storage

The primary task of the HWS 10 is to safeguard the collected data and to visualize it for quality control. All data is initially stored on a pair of high performance SerialATA disks. These disks are run in a RAID1 configuration, thus ensuring against loss of data even if one disk should fail. They are mounted in hot swappable enclosures, so that the collected data may be transported on the disk. A DVD recorder is the standard means for permanent archiving of the collected data. For users having preferences for other storage devices or media, the HWS 10 includes USB 2.0, Firewire (IEEE 1394) and SCSI interfaces. Gigabit Ethernet is available for transfer of the data to another network computer. For temporary storage data may also be backed up to the system drive.

4.3   Installation

The HWS 10 is prepared for mounting in a 19" rack. The system's 17.4" Industrial LCD monitor is also rack mountable, and a universal bracket is supplied for tabletop, overhead or bulkhead mounting. Both the workstation and the monitor are IP22 rated. A spill-proof US keyboard and a standard optical mouse is included, but a small IP65 keyboard with integrated track stick is optionally available. A 5.25" externally accessible drive bay is available for customer use. The system supports the use of a second LCD monitor, this may be a 15" unit for use as a helmsman display.

Note

The IP22 rating requires that the two front USB ports (of a total of six) are covered. If the IP22 rating is not required, and the two front USB ports are needed, this cover may be removed.

5 PROCESSING UNIT

5.1 Introduction

The EM 2000 Processing Unit performs the data acquisition, signal processing and function control.

Topics

→ *Standard Processing Unit drawing, page 54.*

→ *AUV Processing Unit drawing, page 55.*

→ *Circuit boards and modules, page 56.*

→ *AUV Processing Unit Circuit boards and modules, page 57.*

→ *Theory of operation, page 59.*

→ *Standard Processing Unit details, page 63.*

→ *AUV Processing Units details, page 64.*

→ *Circuit board descriptions, page 65.*

→ *Serial Line board (CI-104JS), page 66.*

→ *4-Ports Serial Line Board (C114P), page 68.*

→ *Cool Monster C/400 Control Processor Board, page 71.*

→ *VIPer 629 Control Processor Board, page 70.*

→ *Beamformer and Signal Processor (BSP), page 73.*

→ *Beamformer Interface Board (BIFB), page 76.*

→ *Passive Backplane BP-10S, page 78.*

→ *Processing Unit Power Supply, page 80.*

→ *Assambly backplane, page 81.*

5.2   Standard Processing Unit drawing

Unit body width
448 mm

Front panel width
482,6 mm

Unit body
depth
370 mm

POWER

EM 2000

Front panel height
178 mm (4U)
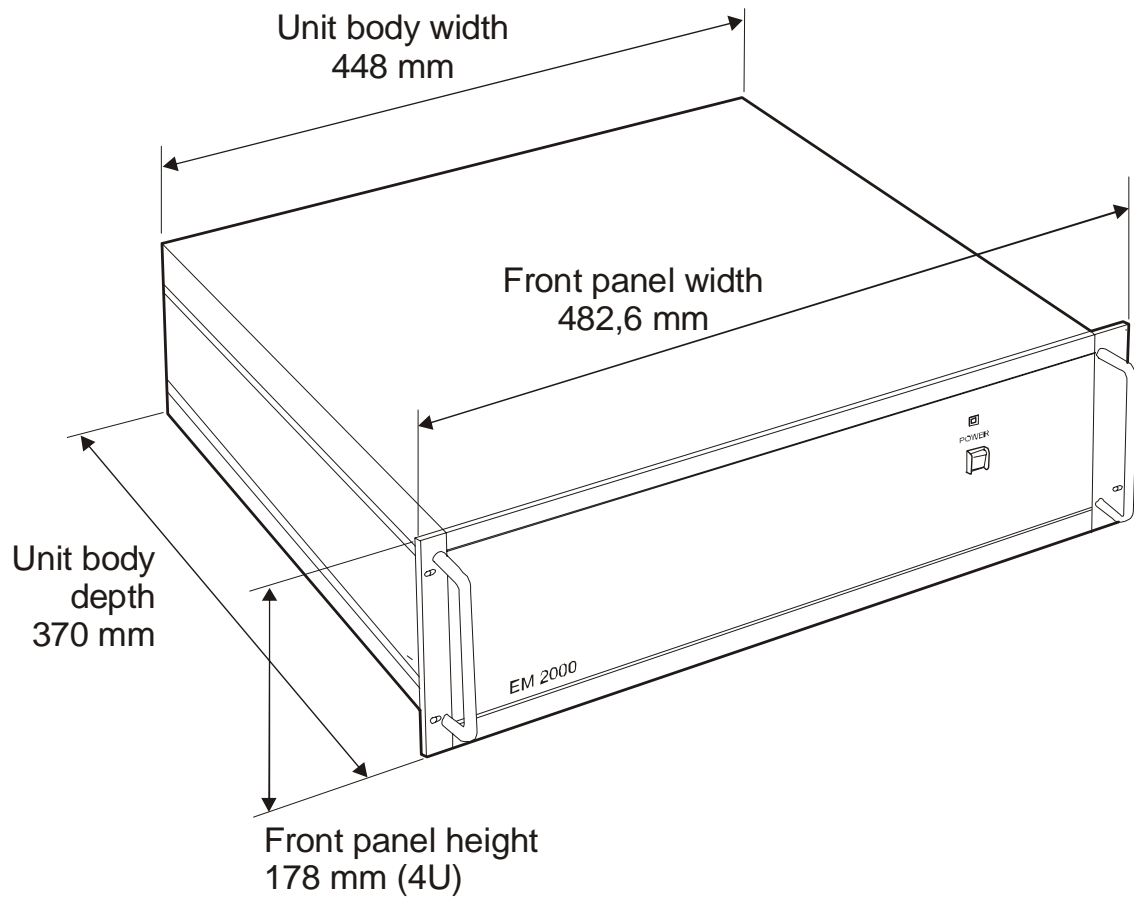
Figure 10   Standard Processing Unit - Outline dimensions

5.3 AUV Processing Unit drawing

Chassis shown with top cover, mounted in tube.
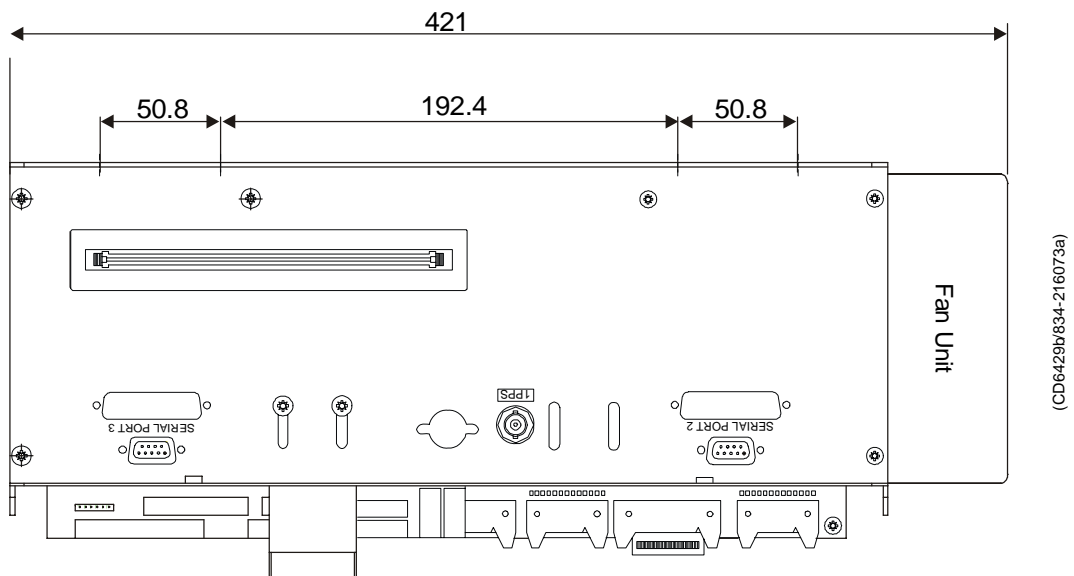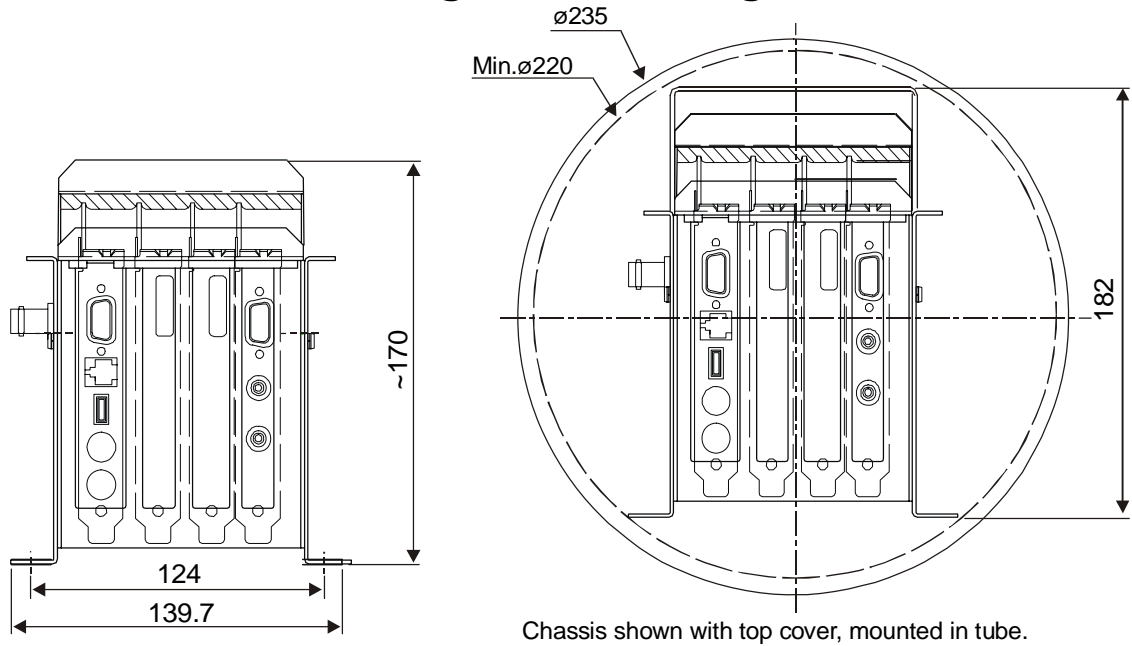
*Figure 11 AUV Processing Unit - Outline dimensions
(shown with Fan Unit and cover).*

Circuit boards and modules

The Standard Processing Unit holds several circuit boards, fans and a power supply. All connections are made on the rear panel.

(CD6113B /860-213901)
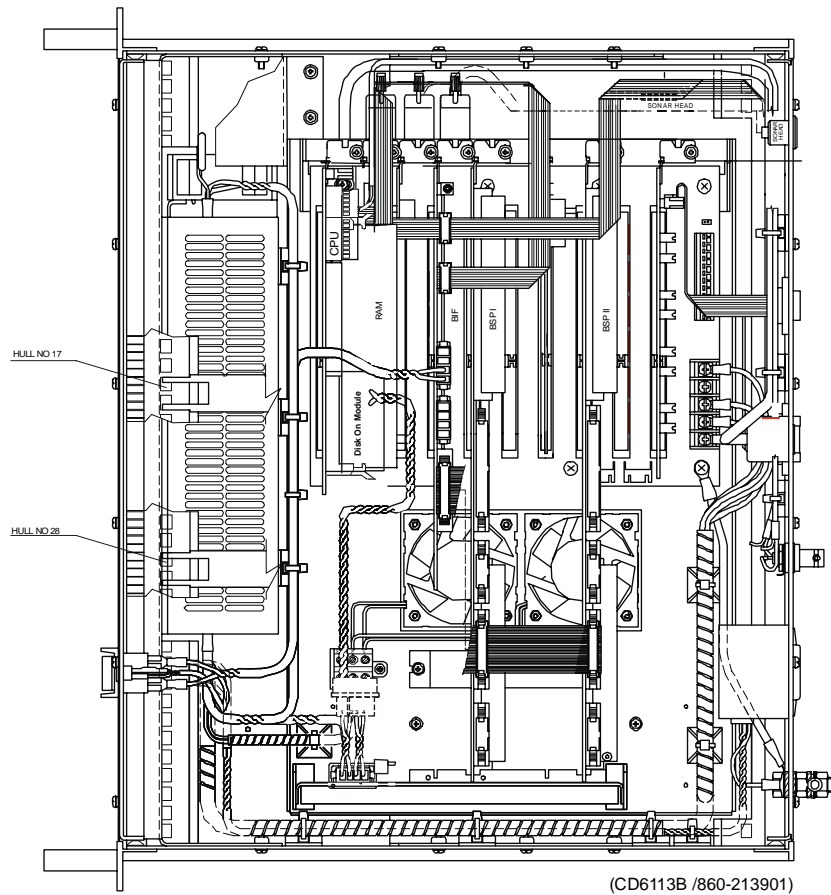
Figure 12   Processing Unit, wired

The unit holds the following circuit boards and modules:

- 4-Ports Serial Line board

- Beamformer & Signal Processor (BSP1 and BSP2)

- Beamformer Interface (BIFB)

- Passive Backplane

- Control Processing Unit board

- Power supply

- Fan

→   *A more detailed description of all the circuit boards and modules is found on page 63.*

AUV Processing Unit
Circuit boards and modules

The Processing Unit holds several circuit boards and a fan. The power must be supplied by the customer. Refer to Technical specifications, page 7.
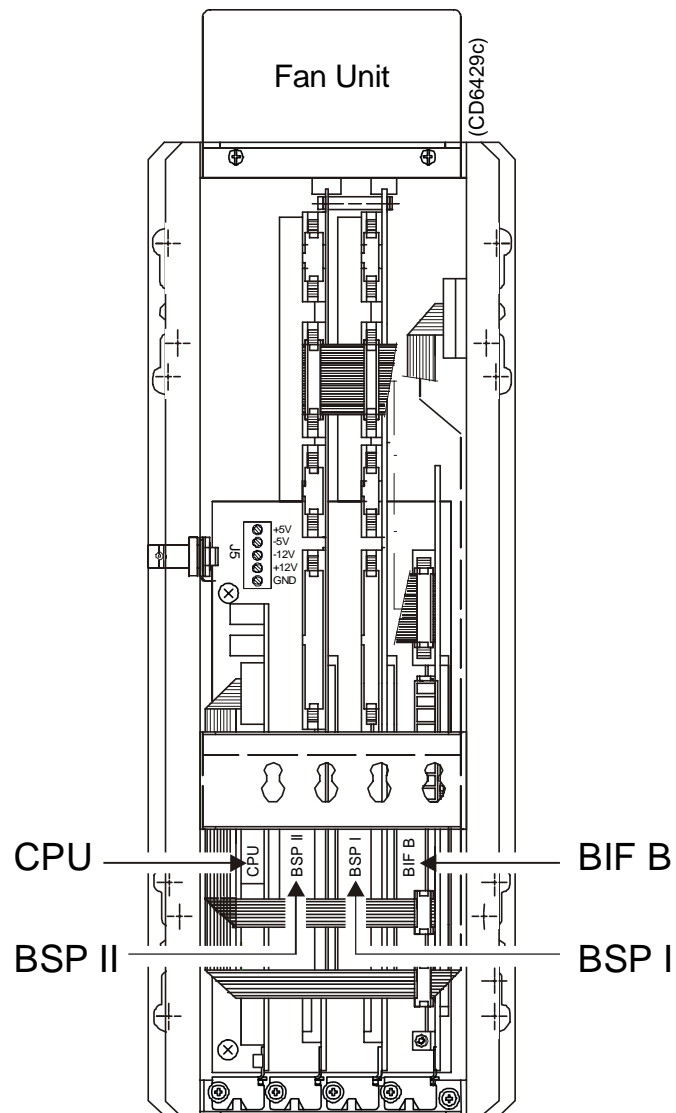
The unit holds the following circuit boards and modules:

- Beamformer & Signal Processor (BSP1 and BSP2)

- Beamformer Interface (BIFB)

- Passive Backplane (made by Kongsberg Maritime.)

- Control Processing Unit board

Optional:

- External harddisk

Power for external hard disk must be supplied by the customer.

The fan is supplied internally by 5 Vdc.The fan is supplied internally by 5Vdc.

5.4 Theory of operation

Overview

This chapter presents a functional description of the Processing Unit.
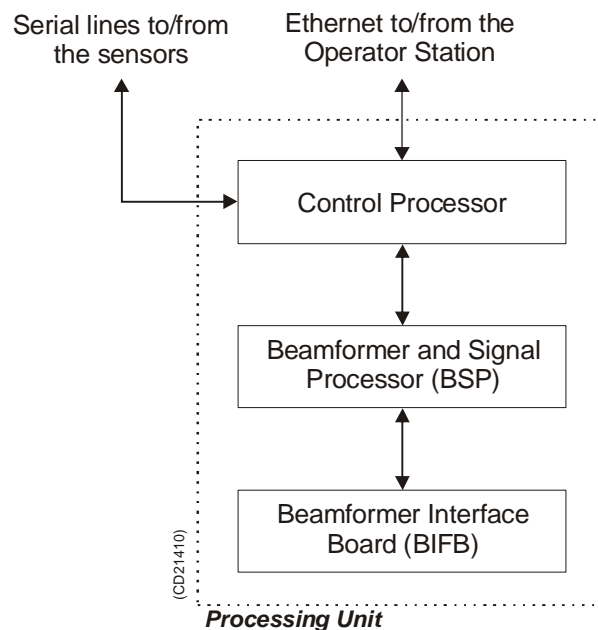
Figure 13   EM 2000 simplified block diagram

Simplified block diagram

The simplified block diagram for the Processing Unit presents the following main functions:

- Transmission
- Reception
- Processing

→   *Refer to figure 13.*

The various parameter settings made on the Operator Station are sent to the Control Processor in the Processing Unit. The information is interpreted, and passed on to the Head Control board. After the transmission, the Head Control board read data from 80 Rx channels, and pass these to the two Signal Processors (BSPs) in the Processing Unit.

Control functions

The control functions in the Processing Unit are mainly handled by the control processor board, but additional boards are also used.

The Control Processor in the standard Processing Unit is not equipped with all interface capabilities, and may thus requires external board to handle serial lines interface.

The AUV Processing Unit has ethernet and serial line interfaces locally on the Control Processor Unit board.

It also relies on a memory disk for the software contained in the DOM (DiskOnModule) device. This is located on the Control Processing Unit Board.

All the peripheral boards used here are commercial.
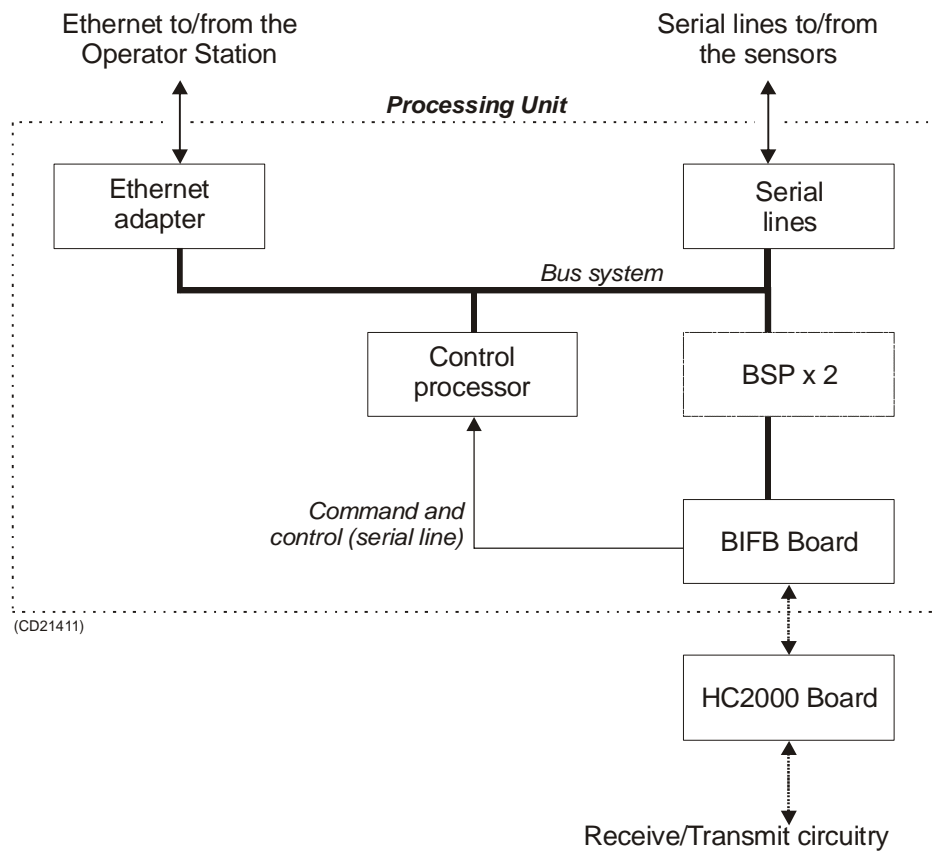
Figure 14   The control functions

One serial line, on the Control Processor board, is used to interface the command and control signals to and from the Sonar Head. The RS-232 line is converted to RS-485 on the BIFB-board.

External synchronization

The serial lines RTS (Request To Send) and CTS (Cleared To Send) signals are used for external syncronization. In addition a Trig out signal is issued by the BIFB (Beamformer Interface) board.

Levels	
RTS, CTS = high	+3 to +15 V
RTS, CTS = low	−3 to −15 V
Trig out	TTL level

Outputs from PU	
Trig out = 1	TX is off (high TTL level)
Trig out = 0	TX is active (low TTL level)
RTS = high	PU is ready for a new ping
RTS = low	PU is not ready
RTS is pin 7	

Inputs to PU	
CTS = high	Ping command
CTS = low	Wait
CTS is pin 8	The CTS pulse length must be minimum 30 milliseconds
GND (ground) is pin 5	
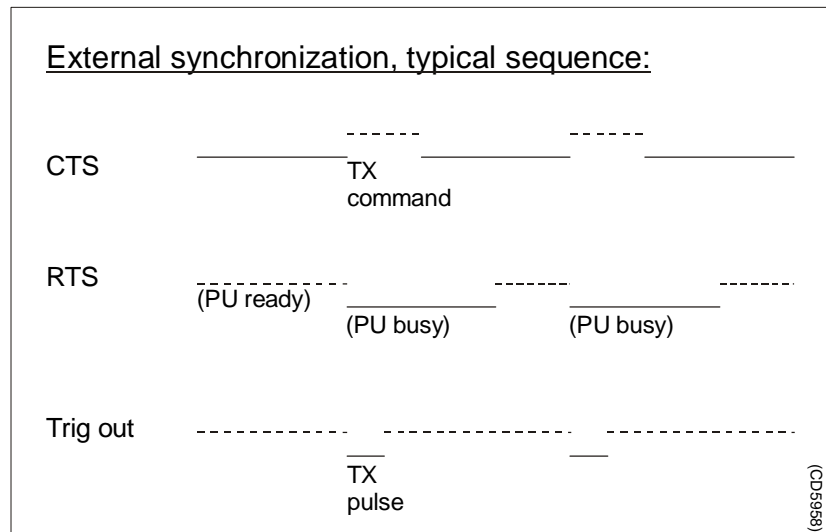
When the Processing Unit is ready for a new ping, RTS is set to high. When the external device is ready for a new ping, CTS is changed into high. The Processing Unit will then start a ping, change RTS to low (busy), and the Trig out will be low for 10 - 30 μS, when the transmit pulse starts. After the Trig out is received, the external device should turn CTS to low, or at least keep it high for 30 milliseconds.

When the received period is finished and the Processing Unit is ready for a new ping, the RTS will be changed to high, and the Processing Unit will wait for a new trigger (a high level on CTS).

If CTS is high at all times, or if external synchronization in the installation menu is switched off, the Processing Unit will ping at its maximum rate.

1PPS

The 1PPS input signal is normally "resting" at a high level. Each second, a pulse (100µS-1000µS) adjusts the second counter in the Processing Unit. Since 1PPS is a TTL-signal, a high level at the input connector must be higher than 2,7 Vdc (margin is 0.3 Vdc) and a low level (during the pulse) must not exeed 0.6 Vdc (margin is 0.2 Vdc).

5.5 Standard Processing Unit details

The Processing Unit holds several circuit boards, fans and a power supply.

Circuit boards and modules

4-ports Serial Line Board

This is a commercial circuit board. It provides the Processing Unit with four serial lines.

→ *The interface board, CI-104JS, is explained on page 66.*

→ *The interface board, C114P, is explained on page 68.*

Note   *Some of the systems delivered use the board C114P, while others use the board CI-104JS.*

Beamformer & Signal Processor 1,2 (BSP1 and BSP2)

These are the main processing boards in the Processing Unit.

→ *The circuit board is explained on page 73.*

Beamformer Interface (BIFB)

This is a Kongsberg Maritime made circuit board. It contains interfaces for the sonar head. It is a single slot half-length ISA board.

→ *The circuit board is explained on page 76.*

Control Processor Unit Board (CPU), Viper

This processor board acts as a function controller. It holds a DiskOnModule flash disk and a ethernet adapter.

→ *The circuit board is explained on page 70.*

Passive Backplane

This is a commercial backplane. It has a 10-slot ISA bus.

→ *The circuit board is explained on page 78*

Power supply

The Processing Unit contains a commercial switch-mode power supply located behind the circuit board.

→ *Refer to page 80*

Fans

Two of the fans are located at the bottom of the Processing Unit. One is located next to the power supply.

5.6   AUV Processing Unit details

Control Processor Unit Board (CPU), CoolMonster

This processor board acts as a function controller. It holds a DiskOnModule flash disk and a ethernet adapter and serial lines.

Beamformer & Signal Processor 1,2 (BSP1 and BSP2)

These are the main processing boards in the Processing Unit.

Beamformer Interface (BIFB)

This is a Kongsberg Maritime made circuit board. It contains interfaces for the sonar head. It is a single slot half-length ISA board.

Passive Backplane

This is manufactured by Kongsberg Maritime. It has a 4-slot PISA bus.

Fans

The fan is located at the end of the Processing Unit.

Power

5Vdc and 24Vdc, must be supplied by the customer.

5.7 Circuit board descriptions

Overview

This chapter describes all the circuit boards and modules in the EM 2000 Processing Unit. A functional description with a block diagram is provided, as well as the facilities provided for maintenance.

Serial Line Board (CI-104JS)

Purpose and description

This is a commercial circuit board designed and produced by Moxa Technologies. It is located in the Processing Unit.

The board is a cabling space saver that features a built-in RJ45 bracket to save cable layout space and reduce cost.

It has surge protection and ISA bus.

Note

A software setup has been done at Kongsberg Maritime to configure the board.
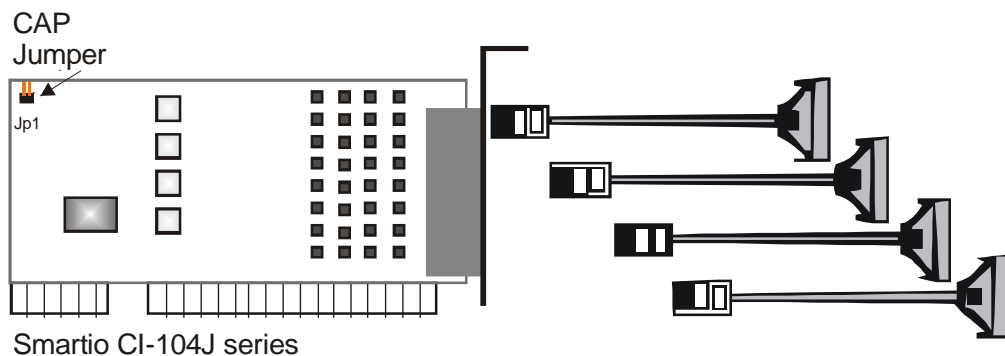
Figure 15   Illustration of the Serial Line Board.

How it works

The Smartio CI-104JS Series provides 4 RJ-45 sockets for connection, which save a lot of cable space.

Surge Protection

To prevent the board from damage caused by lighting or high potential voltage, TVSS (Transient Voltage Surge Suppressor) technology is introduced in Smartio CI-104JS to protect the board. This is critical to harsh environment such as factory.

Specifications

Connector type	RJ–45
Bus	ISA (16 bit)
Serial	RS–232
Ports (interface)	4
Power requirements	83 mA max. (–12V), 57 mA max. (+12V), 100 mA max. (+5V)

Operating temperature	0° – 55°C
Dimensions	157 x 83 mm (width x depth)
Surge protection	25 KV ESD, 2 KV EFT

Facilities

No switches.

References

For more information, refer to webpage *www.moxa.com*.

4-Ports Serial Line Board (C114P)

Purpose and description

This is a commercial circuit board designed and produced by Moxa Technologies. This is identified as C114P, and is located in the Processing Unit.
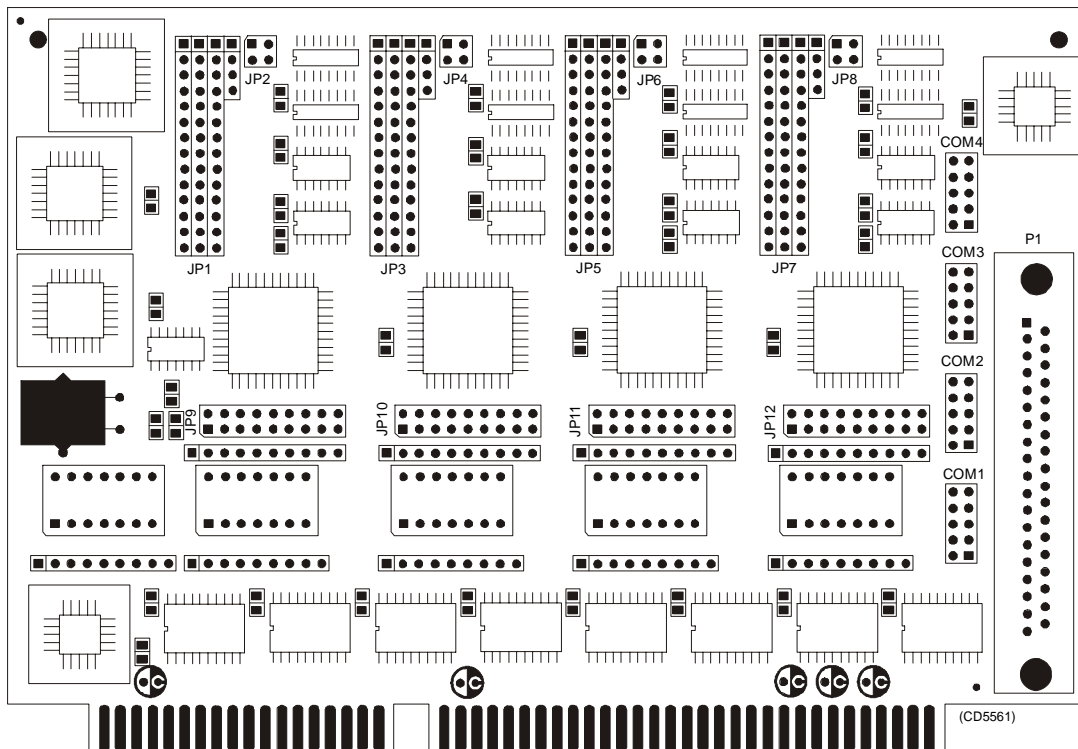
Figure 16   The C114P layout

How it works

Each of the 4 ports can be configured to RS-232, RS-422, or RS-485 interface individually, but only RS-232 will work on the EM 2000 system.

Facilities

<u>LEDs</u>

None.

<u>Jumpers</u>

The C114 is set up with IRQ 11 on the jumpers JP9, JP10, JP11 and JP12.

<u>Links</u>

Note   *The following settings are only valid for new boards (version 2). For elder boards (version 1) the settings will be inverted. In the table below, the settings that are OFF will be ON and vice versa.*

Note

Tthis does NOT apply for SW 5, bit 7, which must <u>always</u> be ON.

The settings of the C114P DIP switches for use in the EM 2000 are listed in the table below:

Switch	1	2	3	4	5	6	7
SW 5	ON	ON	OFF	OFF	OFF	ON	ON
SW 1	ON	ON	ON	ON	OFF	OFF	ON
SW 2	OFF	ON	ON	ON	OFF	OFF	ON
SW 3	ON	OFF	ON	ON	OFF	OFF	ON
SW 4	OFF	OFF	ON	ON	OFF	OFF	ON

Connections

The C114P contains one DB-37 female connector on the rear side of the circuit board. It comes with a cable; one terminal is a 37-pin male D-type and the other terminal is a four 9-pin male D-type connectors. This is not used.

→   *Refer to figure 18 and 19 for pin assignments.*

→   *Refer to figure 17 for pin assignments.*

In addition, four 10-pin pin-head connectors corresponds to the DB-37 connector on the board of C114P. These four connectors are called COM1, COM2, COM3 and COM4, and are connected directly to the Processing Unit bottom plate.

Figure 17   10-pin header connector pin assignment
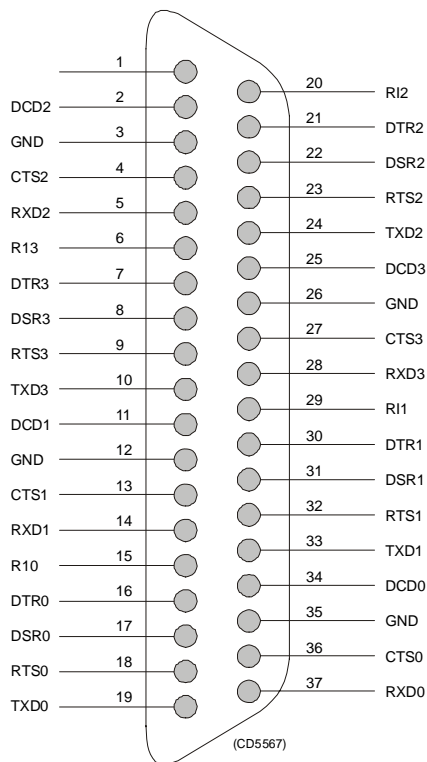
Figure 18   DB-37 pin assignment
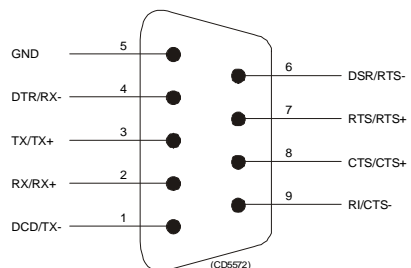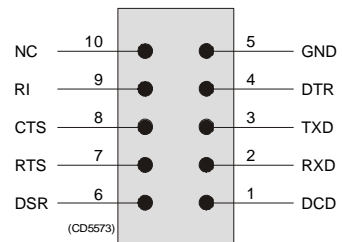
Figure 19   DB-9 pin assignment

References

For more information, refer to webpage *www.moxa.com*.

VIPer 629 Control Processor Board

Purpose and description

This is a commercial circuit board designed and produced by Kontron.

The board is located in the Standard Processing Unit.

A DiskOnModule (DOM) or a DiskOnFlash (DOF) module is mounted on this board. This module contains the software needed for this CPU board, and for the BSP boards. It can be upgraded from the release CD.

The LAN / Ethernet to and from the Operator Station is connected here.

(BM614)

Figure 20   VIPer 629

References

For more information, refer to webpage *www.kontron.com*.

Cool Monster C3/400 Control Processor Board for AUV

Purpose and description

This is a commercial circuit board designed and produced by JUMPtec Industrielle Computertechnik AG.

The board is located in the AUV Processing Unit.

A DiskOnModule is mounted on this board. This module contains the software needed for this CPU board, and for the BSP boards. It can be upgraded from the release CD.

Cable Position No.	From	To (1)	To (2)
# 7	BIFB–P1	BSP2–P1	BSP1–P1
# 8	CPU–COM1	BIFB–P13	CHASSIS–serial port 1/trig
# 9	CPU–COM2	BIFB–P2	–
# 10 (1)	CPU–COM3	CHASSIS–serial port 2	–
# 10 (2)	CPU–COM4	CHASSIS–serial port 3	–
# 11	CPU–LPT1	CHASSIS–1PPS	–

References

For more information, refer to webpage *www.jumptec.de*.
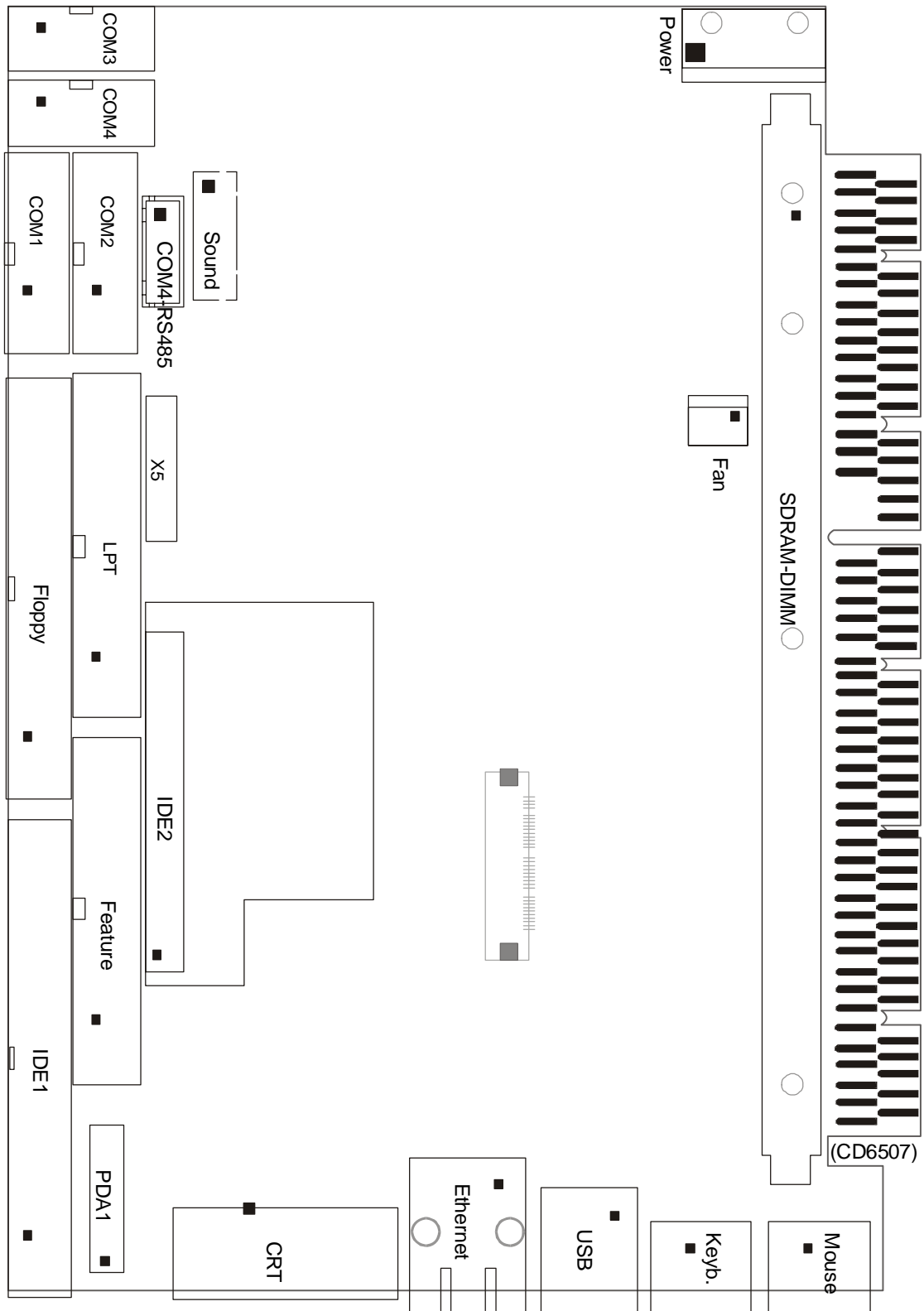
Figure 21   CoolMonster board details

Beamformer & Signal Processor (BSP)

Purpose and description

The Beamforming & Signal Processing (BSP) board is a multi digital signal processor (DSP) board. It is designed to perform the beamforming and signal processing in sonars and multibeam echo sounders. It is controlled from a host processor.

The processing power in the Beamforming & Signal Processing (BSP) board is based on eight Texas TMS320C50 fixed point digital signal processors working in parallel while beamforming the data. Next, there are four Texas TMS320C44 floating point digital signal processors interconnected to use both parallel and sequential processing of the beamformed data from the fixed point processors.

The Beamforming & Signal Processing (BSP) board is a single slot full length standard ISA format circuit board made to fit into a personal computer.

How it works

The Beamforming & Signal Processing (BSP) board contains four main sections:

- Sonar Input Data
- Beamforming
- Signal Processing
- Host Interface

The **Sonar Input Data** interfaces an 18-bit wide and 1k deep Input FIFO (First-In-First-Out) register. This input FIFO holds the data received from the transducer array through the receiver processing circuitry. A dedicated digital signal processor reads the input FIFO.

There are two identical **Beamforming** digital signal processing branches. Each consists of four digital signal processors and a 16-bit wide and 8k deep dual port memory (DPRAM). The two branches are exchanging data by means of this DPRAM.

The **Signal Processing** section comprises three digital signal processors dedicated to do further processing of the beamformed data.

The **Host Interface** function is maintained by the master processor on the Beamforming & Signal Processing (BSP) board. It exchanges data with the host processor via a 16-bit wide and 8k deep dual port memory (DPRAM) on the ISA bus.

Facilities

<u>LEDs</u>

D1 (LED): C44 D

<u>Test points</u>

There is one test point for each C50 digital signal processor (eight total). These testpoints are all connected to the XF/ signal which is active while that particular C50 access the shared DPRAM.

There is also one test point for each C44 digital signal processor (four total). These test points are connected to the IIOF2/ signal, which is a general purpose I/O port bit that can be controlled by the software.

The C44-D testpoint is also connected to a light emitting diode (D1) for visual observation. The LED will be activated during each ping.

TP1	C50 E0
TP2	C50 E1
TP3	C50 E2
TP4	C50 E3
TP5	C50 F0
TP6	C50 F1
TP7	C50 F2
TP8	C50 F3
TP11	C44 A
TP12	C44 B
TP13	C44 C
TP14 (& D1)	C44 D

The testpoints will be active when the corresponding processor is working.

<u>Links</u>

A number of links are implemented on the board to allow for several different applications. Links LK1, LK2 and LK3 are used to identify the board as one out of maximum eight boards in one system.

LK3	LK2	LK1	BSP ID
0	0	0	BSP 0
0	0	1	BSP 1
0	1	0	BSP 2
0	1	1	BSP 3
1	0	0	BSP 4
1	0	1	BSP 5
1	1	0	BSP 6
1	1	1	BSP 7

Link applications

The following links are ON (closed) in this application:

- BSP0 is the master processor (no links).

- BSP1 is the slave processor (link LK1).

Switches

There are no switches on the board.

Connections

The Beamforming & Signal Processing (BSP) holds the following plugs and sockets:

P1	Sonar input data
P2	ISA bus component
P3	Emulator
P4	Direct memory access
P5	External communication port
P6	Test access port
P7	External communication port

The P1, sonar input data, is connected to BIFB via a flat cable plug.

Beamformer Interface Board (BIFB)

Purpose and description

The Beamformer Interface Board (BIFB) is an interface board between the BSP (Beamformer and Signal Processing) board in the Processing Unit (a PC), and a EM 2000 transducer head with high-speed serial data sent on TAXI line. The BIFB board receives data, decode and write them into a FIFO (First In, First Out), located on the BSP board. A converter between the RS232, from the Processing Unit, and RS485, to the transducer head, is implemented. RS232 data is received through a 10-pin connector (P2). The direction on RS485 (P9) is controlled by RS232 signal RTS.

The BIFB board is a single slot half-length ISA board made to fit into a personal computer.

How it works

The BIFB board contains 4 main sections:

- *Serial to parallel conversion*

    BIFB board receives data on high-speed serial line (Taxi line) and write it into a FIFO located on the BSP board. All data and all commands other than SYNC are written to the BSP board.

- *Power to transducer head*

    24Vdc is sent down to the transducer head, on connector P9 from the Processing Unit internal power supply

- *Commands to transducer head*

    All commands to the transducer head are sent on a standard RS485, half duplex on connector P9. RS232 signals from the CPU (in the Processing Unit) are converted to RS485 and the direction is controlled by the RS232 signal RTS (Request To Send).

- *Trig out during transmit*

    During transmit time, a Trig out is sent out on the minicoax connector P14 and a signal on the connector P13. This is to synchronise other systems.

Facilities

LEDs

There are two LEDs used on the BIFB board. LED1 is used as the "MASTER", programmed by the CPU. LED4 is the "ping activity" LED.

Jumpers

One jumper, ST1, is implemented on the BIFB board.

This jumper should be connected.
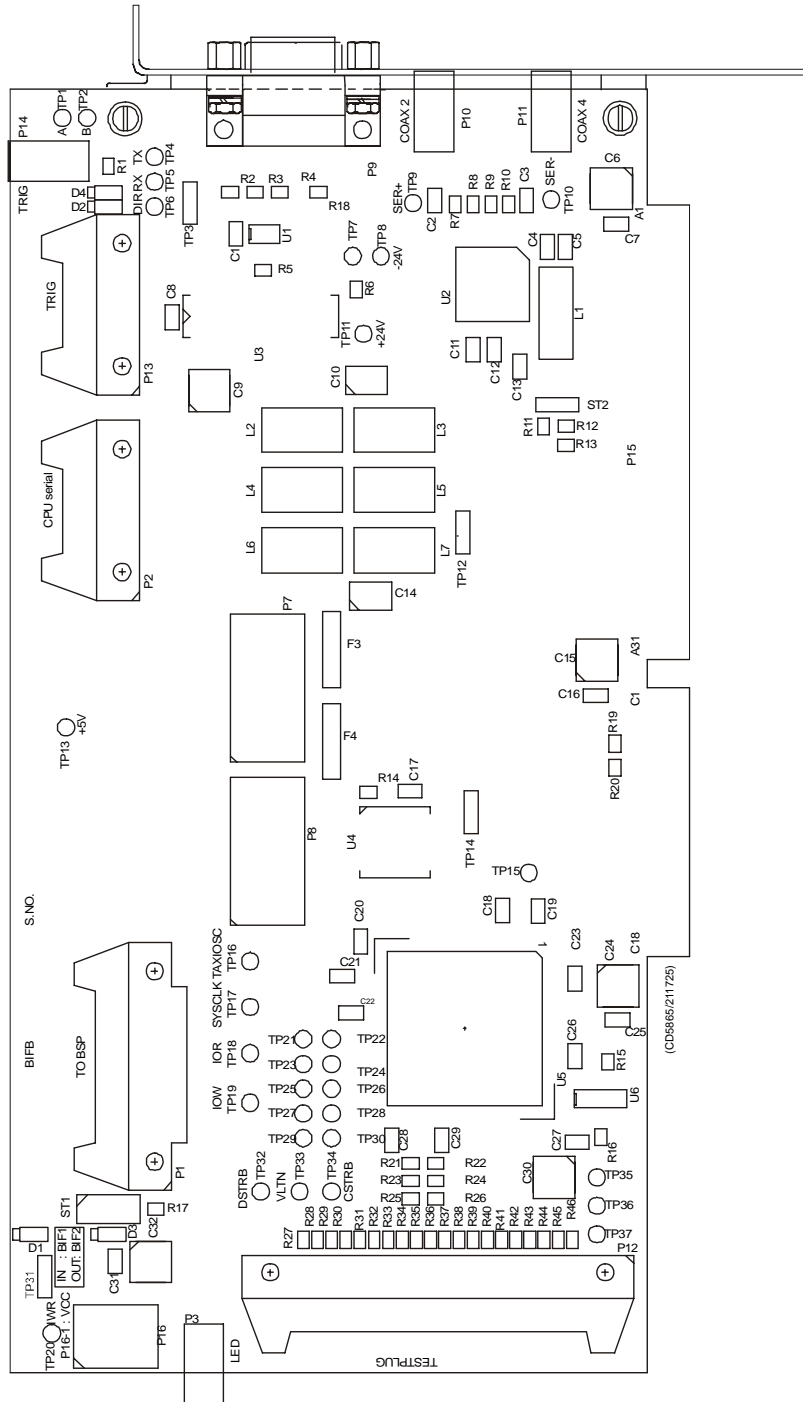
Figure 22   BIFB board

Passive Backplane BP-10S

Purpose and description

This is a passive backplane. It has ten ISA-bus slots.

The board is located in the Standard Processing Unit.

Note   *The AUV Processing Unit has a special 4 slot backplane.*

(CD5869)
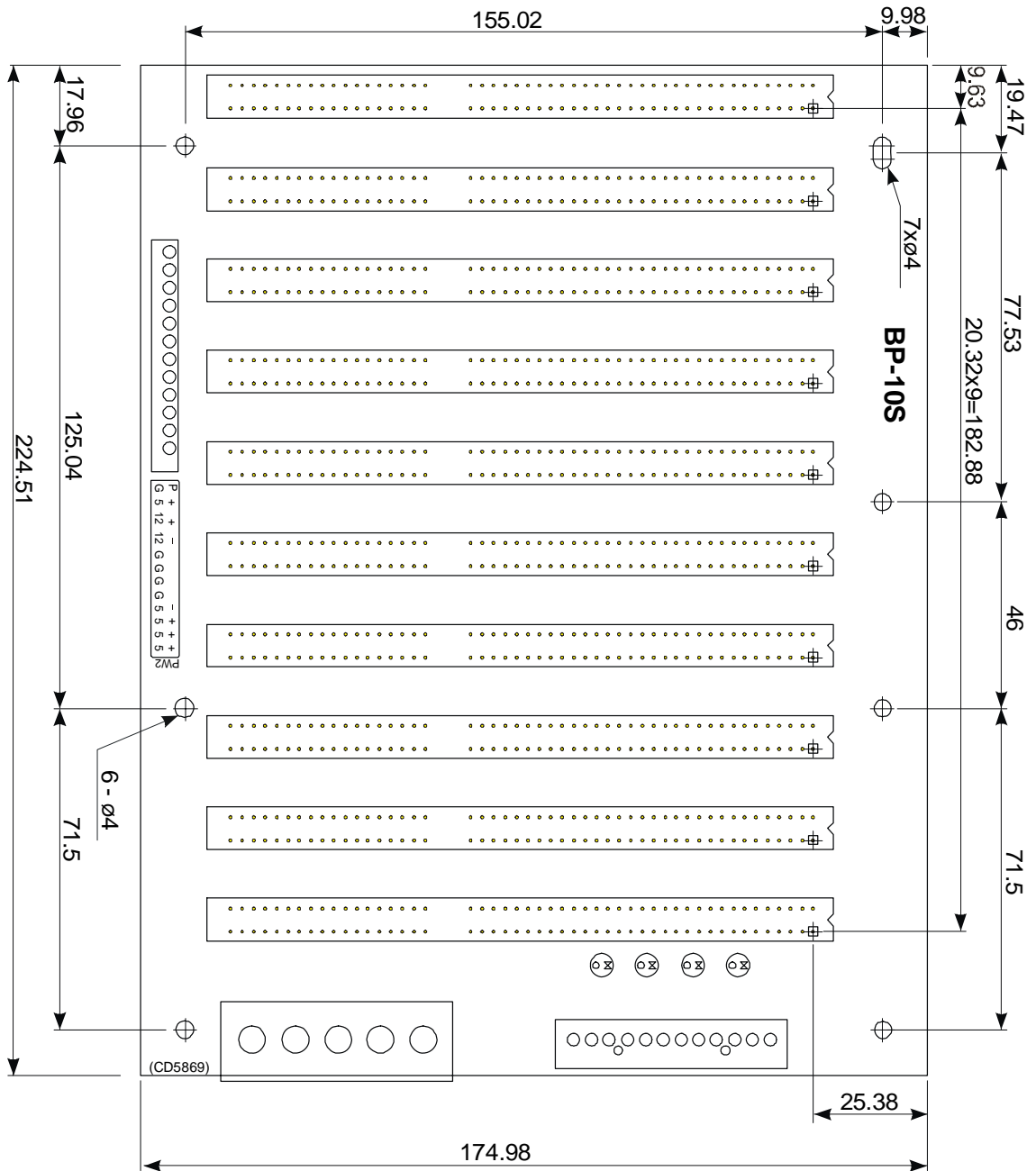
How it works

There are no active components on this backplane.

Facilities

LEDs

The LEDs are used as power supply indicators. There are five LEDs on the backplane:

- + 5V

- - 5V

- + 12V

- - 12V

- 5V is not used and therefore not lit. The three other LEDs should be lit at all times.

Test points

None

Links

None

Connections

+ 5V, + 12V and - 12Vdc.

Processing Unit Power Supply

Purpose and description

The purpose of the power supply is to feed +5 Vdc, -12 Vdc and +12 Vdc to the Processing Unit. It also supplies 24 Vdc to the Sonar Head. It is located on the front side of the Standard Processing Unit.

How it works

This is a commercial switch mode power supply.
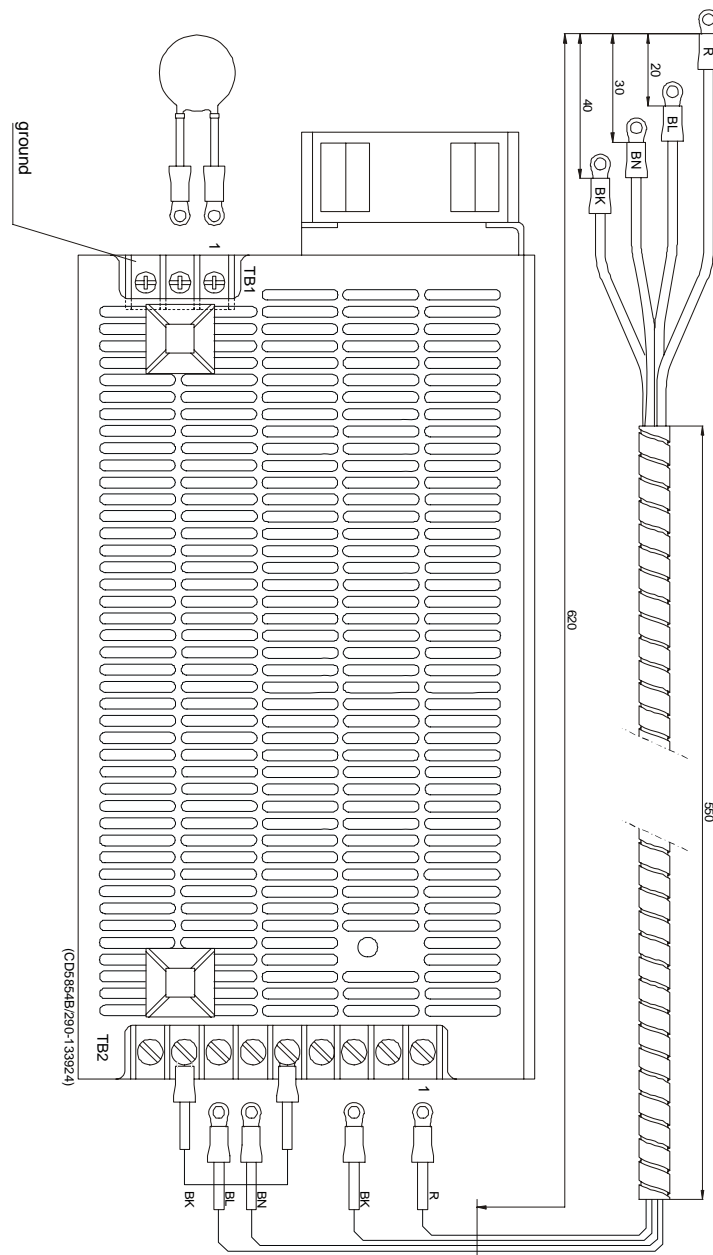
Figure 23   Power supply, wired

Assembly backplane

This is a passive backplane, specially designed for AUV Processing Unit.
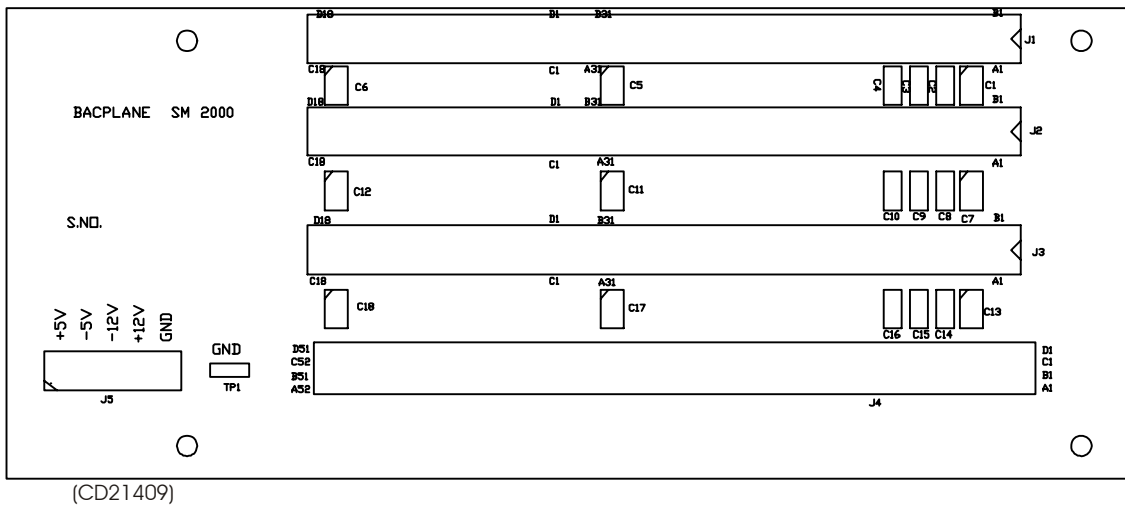
Figure 24   Assembly drawing backplane

6 SONAR HEAD

6.1 Description and main functions

Overview

The EM 2000 Sonar Head consist of:

- **Transducer array**

- **Transformer / preamplifier PCB's** which incorporates the transducer matching band pass filter.s, and low noise gain amplifiers for 80 channels.

- Two **PDH/MVX/ADC/Tx PCB's**. Each consist of 40 channels and a transmitter driver.

- The **HC2000 PCB**, that includes a TMS32eC51processor, a serial line and a TAXI link interface.

- A **power supply PCB**, that includes DC/DC converters and a capacitor bank.

A single cable with an underwater plug, connects the Sonar Head to the EM 2000 Processing Unit.

Topics

210

238

238

Receiver array

150°

3/8—16 UNC(6 Holes)
Equally spaced
on ⌀188

Weight of Receiver is
approx. 15.5 Kg (air).

60°

Page 1 of 1 (CD21412C)	EM 2000 Rx Transducer, 150 degrees system Outline dimensions	834-215553 Rev.C

238

ø210

(CD6400 / 834-216175aa)

3/8-16 UNC(6 holes)
Equally spaced
on ø188

~R209

Receiver array

314

60°

228

Page 1 of 1 (CD6400)	EM 2000 Rx Transducer, 120 degrees system Outline dimensions	**834-216175** Rev.A
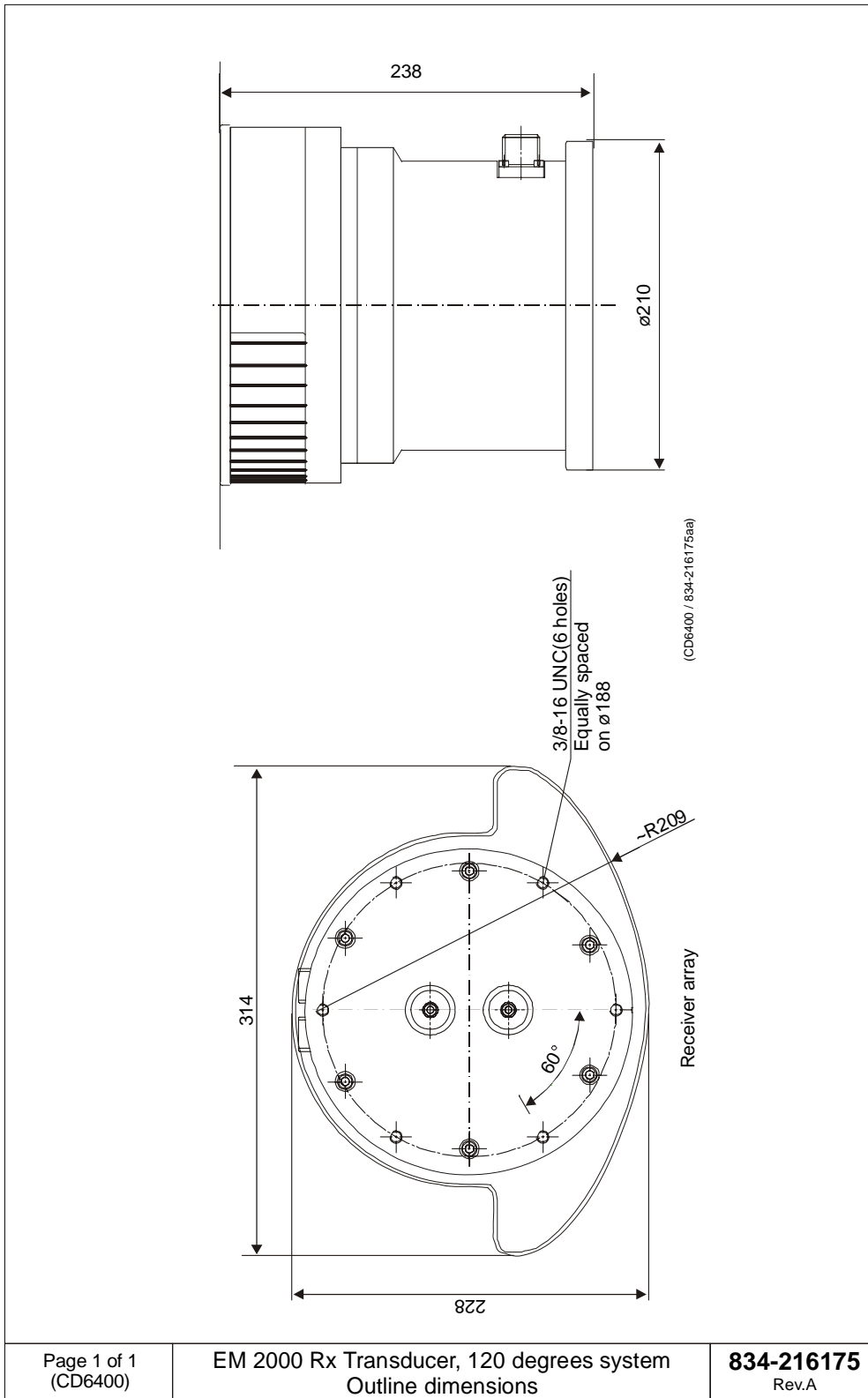
Circuit boards descriptions

The Sonar Head is a watertight unit containing five circuit boards and a receive transducer with 80 staves.

→ *The Sonar Head - as seen from above - is shown in figure 25.*
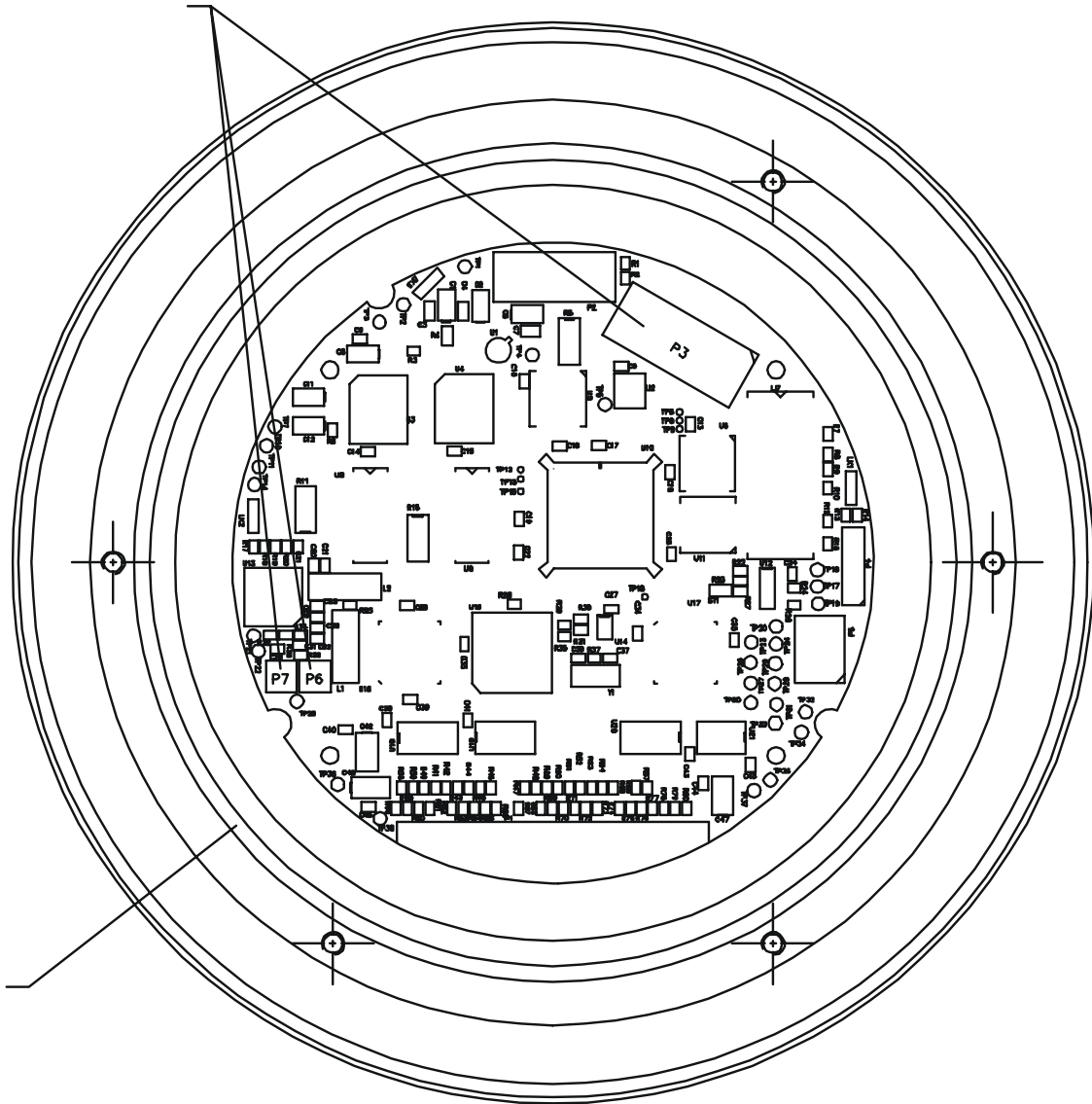
Figure 25   The Sonar Head seen from above

6.2   Theory of operation

Overview

This chapter presents a functional description of the Sonar Head.
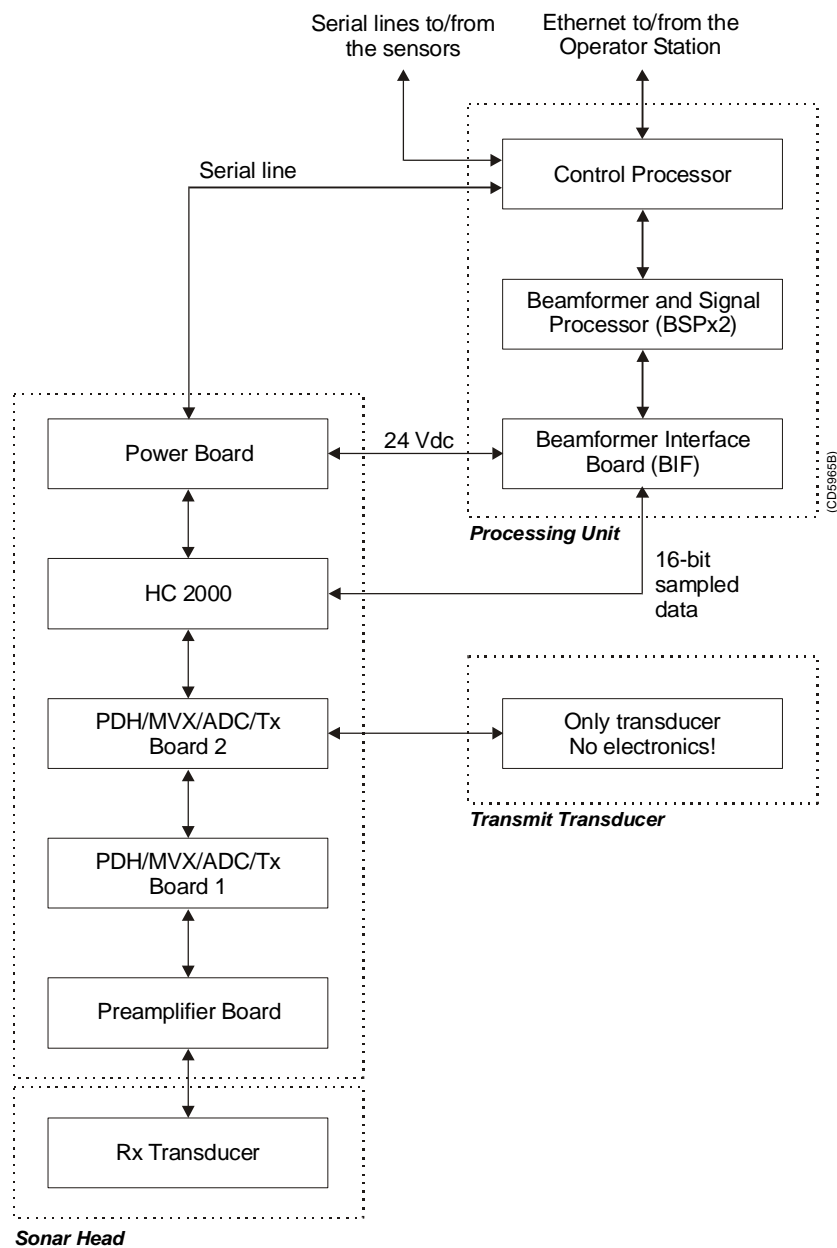
Figure 26   EM 2000, simplified block diagram

Simplified block diagram

The simplified block diagram for the Sonar Head presents the following main functions:

- Reception

- Processing

→   *Refer to figure 86.*

Control functions

The control functions in the Sonar Head are handled by the HC2000 board.

6.3   Sonar Head details

Circuit boards and modules

PDH Receiver Board (PDH / MVX / ADC / Tx)

Each PDH board has a 40 channel receiver.

→   *The board is described on page 89.*

HC 2000 Board

The HC 2000 receive commands from the host computer.

→   *The board is described on page 90.*

PDH/MVX/ADC/Tx Board

Purpose and description

Each PDH board has 40 receiver channels and has the following functions:

- ten 4 channel TVG amplifier and demodulator hybrids (DPH)

- five 16 channel MVXs

- five 12 bit A/D converters (real and imaginary samples)

- bus interface circuits

- one transmit driver (one half of Tx transducer)

All digital control signals and the TVG control voltage are supplied by the HC2000 board.

How it works

The signals from the preamlifier board are amplified in the VCA (Voltage Controlled Amplifier). This is located on the PDH hybrid. The signals are then filtered in a low-Q bandpass filter, and fed through a second amplifer before being applied to the quadrature demodulator.

The quadrature demodulator consist of two parallel channels. Each channel has a mixer, a programmable amplifer (0-30 dB in 6 dB steps), a switched capacitor lowpass filter and simultaneous sample/hold amplifiers.

HC 2000 Board

Purpose and description

The Head Control (HC 2000) Board receives commands from the host computer, on a half duplex RS-485 serial line. It sends sampled data out on a high speed serial line (TAXI link).

Its purpose is to read data from 40 channels on PDH/MVX/ADC/Tx boards. The HC 2000 also controls the transmitters.

The HC 2000 board is connected to the PDH boards, power board and the Processing Unit through separate connectors.

7 TRANSMIT TRANSDUCER

7.1 Description and main functions

Overview

The EM 2000 Transmit transducer contains no electronics. It is controlled by the Sonar Head. It needs to be submerged in water and it is usually mounted close to the Sonar Head.

A single cable with an underwater plug connects the Transmit transducer to the EM 2000 Sonar Head.

Topics

→ *Transmit transducer outline, page 92.*

→ *Modules, page 93*

7.2   Transmit Transducer outline
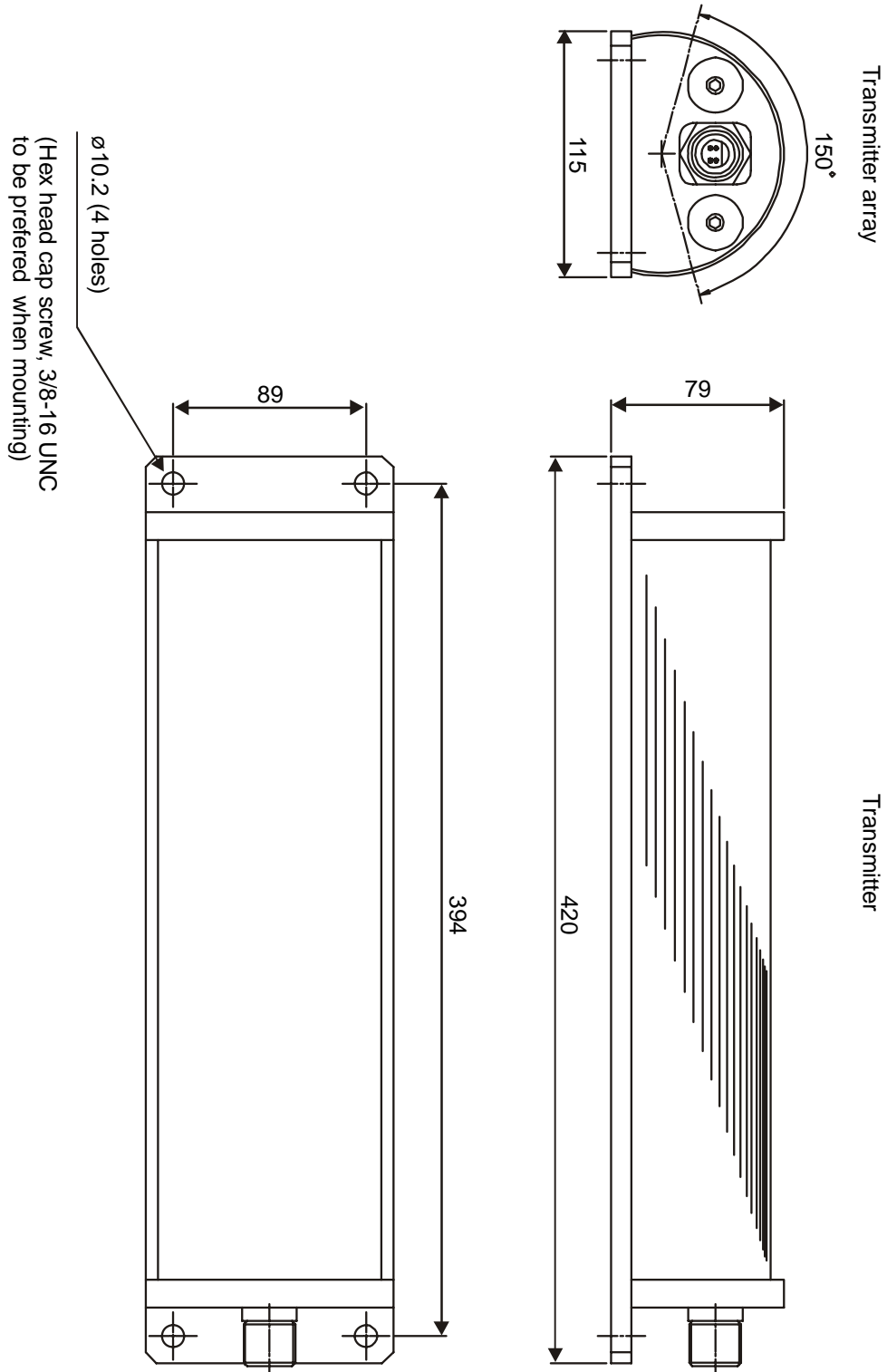
Figure 27   Transmit Transceiver, outline dimensions

Modules

The Transmit transducer is a watertight unit containing a transmit transducer with 2 elements.

8 TROUBLESHOOTING

8.1 Messages (for UNIX only)

Introduction

The EM 2000 provides numerous messages to inform you of major and minor hardware and software errors.

The messages, if they occur, will be displayed in the Status Display in the Message field.

The different utilities operating on the EM 2000 Operator Station each issue several messages. These messages can be sorted in four categories:

- Display warnings
- Display errors
- Warnings
- Errors

The messages presented as **display warnings** and **warnings** merely point out small inaccuracies, and must be regarded as guidelines to the normal operation of the system.

The **display errors** and operational **errors** reflect major and minor hardware and software errors, some of which must be acted upon to ensure the normal operational capability.

The following chapters present all the possible messages, and briefly explain the proper action to be taken.

The information is provided as follows:

<Nxxx>: – <Message text>

      Necessary action with applicable references.

<Nxxx> is the message identifier. The number will allow you to find the message easier in this document, and it tells you which utility issued it.

N - *module/utility identifier.*

xxx - *message identifier*

In the list below you will find one letter representing each module. Each module is described in its own chapter. The number **xxx** is only an identifier.

      S: setup messages

      W: ESO/workstation messages

L: launchpad messages

E: sound speed profile editor messages

P: Ping Display messages

The **Hardware** and **CPU CMOS setup** messages are presented with the exact same layout. The Hardware messages also start with a message identifier <Nxxx>, and have a following message text.

The message text contains an error code which has to be decoded to get the exact error condition.

Most display errors are equipped with a help-textfunction, giving additional help on the errors. This text will, in most cases, be identical to the action text found in this manual.

Topics

Setup messages

The following messages are presented by the **Setup** utility.

<u>Display Warning</u>

S10: – Remember to set correct Gain parameters when using Manual bottom detection!
Normal mode should be Range And Gain, which uses Automatic bottom detection!

> This mode should only be used when automatic bottom detection doesn't work. Make sure that the Depth To Normal Incidence depth indicator has a sensible value - it should have a value fairly close to the expected depth.

<u>Display Error</u>

S15: – Unable to write BIST output buffer to printfile <filename>.

> An attempt was made to open the printfile in the system defaults directory for writing, but the operation failed. You should have full read and write access to the directory and all files in the directory.

<u>Display Error</u>

S17: – Unable to write BIST output buffer to file <filename>.

> An attempt was made to open the savefile in the system defaults directory for writing, but the operation failed. You should have full read and write access to the directory and all files in the directory.

<u>Display Error</u>

S18: – No reply to the current BIST test!

> Each of the Built In Self Test (BIST) commands is required to give a response within a fixed period of time. The length of this period varies with the type of test. The Processing Units has sub-units that may not respond in time, but this should be reported back to the operator as part of the reply to the current BIST test.
> If the Processing Unit does not respond within the allocated time period, you should try one of the other tests to see if this is a general problem. If this is the case, or if the problem persists, you should try rebooting the Processing Unit.

<u>Display Warning</u>

S21: – The profile is not deep enough, and should be extended. When you select the OK button, the profile will be sent to the profile editor for automatic extension.

> All profiles used by the system require a maximum depth of 12000 meters. Profiles less deep will be extended by the system, starting from the original maximum depth. The extension is based on standard table values, with two points interpolated between last value pair in profile and first table value pair.

Error

S25: – The Profile contains errors and will not be used. Errors detected:

The same message is used for several types of warnings:

1. Out-of-bounds depth values. Legal interval is 0 - 12000m.
2. Out-of-bounds sound speed values. Legal interval is 1400 - 1700 m/s.
3. Fewer actual samples than stated in profile header, using actual no. of samples in profile.
4. Gradient anolomies checking two neighbouring value pairs.

Even though you are given the choice to use the profile, it is recommended that you use the profile editor to verify and correct it. Otherwise, the echo sounder soundings may suffer quality degradation.

Error

S28: – Too steep gradients...

If one or more of the samples are spike values, they should be removed from the profile.

Display Warning

S32: – The sound velocity profile <name> contains too few samples.

The profile header says that the profile contains less than two entries. At least two entries are required, and for any real life sounding that is really too few entries.

Display Warning

S33: – The sound velocity profile <name> contains more than 1000 samples!

The system is not designed to handle profiles exceeding 1000 depth/speed pairs. You should use the profile, or download again, using 1000 depth/speed pairs as a maximum.

Display Error

S37: – Sound Velocity Profile <name> was not found!

The specified profile was not located in the directory containing the sound speed profiles ($SHAREDHOME). You could have misspelt the profile name, or the profile has been removed from this directory after it was selected. Try selecting the profile from the pull-down menu. This menu is updated every time it is opened, and should give you the exact list of available profiles.

Display Error

S50: – The file <filename> is not found in the $HOME/<directory>, or in the $NEPTUNEHOME/defaults directory.

Error

S61: – The following entries in the set–up–file are missing or contain an error in value specification:

> All set-up parameters are checked when a set-up file is opened. Any parameters that are not within legal range or missing from the file will be listed in this message. By following the instructions, it is possible to get around the problem and recreate the set-up file. You may instead check if you have a backup version of the installation file in the system directory by selecting the 'File->Read...' option. You will probably find some older version of the file, because any modification of the installation parameters followed by a 'File-Save' creates a backup version of the file to be modified.

Display Error

S64: – Profile <name> has an error in line 1. The line should contain a space after the opening parenthesis and one space before the closing parenthesis. Correct the profile before reselecting...

> According to the Simrad ASCII profile format, this space is required. You can fix the problem using a text editor. If you have downloaded the profile from an external source, please verify that your profile source or download programs adheres to the file syntax.

Display Error

S65: – Profile <name> has an error in line 1.
It seems that the header does not contain the correct no. of elements. Create the profile before retrying.

> The profile header should start with "(" and close with ")". One or both of these elements could not be located in the header line. You can fix the problem using a text editor. If you have downloaded the profiles from an external source, please verify that your profile source or download programs adheres to the file syntax.

Display Error

S66: – Sound Velocity Profile directory <name> not found!

> The missing directory ($SHAREDHOME) is created during installation, and should always be present. If not, it means that someone has modified the file system. You should reinstall the system to recreate the proper operating environment.

Display Warning

S69: – Profiles in Simrad Survey Format cannot be downloaded...

The system cannot use this format for sound speed profiles. These profiles are produced when logging data, based on a Simrad ASCII format profile selected by the user. If this ASCII profile is no longer available, and you would like to use it again, you could use the Profile Editor to convert the profile into the Simrad ASCII profile format.

Display Error

S70: – The BIST for SW version returned an empty string!

Each of the Built In Self Test commands will return with the result being displayed in the BIST output area. This message informs you that a reply arrived, but that the reply contained no text to be displayed. This is clearly an error. Please repeat BIST command to check if the problem is repeatable. Errors like this should not occur, and if the problem persists, you are advised to reboot the Processing Unit and restart the operation station software.

Error

S71: – The Set–up–file is empty. Do you want to reinstall the default Simrad file?

The file containing installation parameter set-up values was empty. When this happens, the system can automatically install the default version of the file. The file may have been corrupted during a program crash. Confirming installation of default file allows you to continue. Otherwise, the system cannot be operated...

Display Error

S73: – Format error in BIST return for SW version request!

Each of the Built In Self Test commands will return with the result being displayed in the BIST output area. This message informs you that a reply arrived, but that the reply did not match the expected format. This is clearly an error. Please repeat BIST command to check if the problem is repeatable. Errors like this should not occur, and if the problem persists, you are advised to reboot the Processing Unit and restart the operation station software.

Display Error

S74: – 'BSP Test' failed – do you want to reboot the BSP unit?

The BSP sub-unit may occasionally lock up, with no pings being produced from the echo sounder. When that happens, the BSP BIST command will fail with this message. It is, however, possible to restart the BSP without rebooting the Processing Unit. This will happen when you confirm that a reboot is wanted. When the boot is completed, you should run the BSP BIST command again to verify that the unit responds correctly.

Display Error

S96: – Environment 'MODULE_ADDRESSES' undefined!

The program cannot operate without the specified environment. Please verify that the correct start-up procedure is used.

Display Error

S97: – Network Configuration File not found! File: <filename>

The program cannot operate without the specified file. Please verify that the file specified by the environment 'MODULE_ADDRESSES' with hostname as extension is present in your home directory, and that you at least have 'Read' permission.

Error

S98: – Error in connecting to input socket for program <program name>.

The set-up program tries to open an input socket, but the operation failed. The most likely explanation, is that the port no. specified for the set-up program already is in use. Check if any of the programs started from a previous session of the system are still running. If so, terminate these programs. If you do not know how to do this, it will in most cases be sufficient to log out and then back in. This will terminate any running programs and free up resources. Then restart the operator station software...

Display Error

S147: – Error sending datagrams to Ping Display!

Communication with the Ping Display uses IP socket communication, where the Ping Display has opened a specific port for data input. This error occurs when the set-up program tries to send to that port. The most likely explanation is that the port no. specified for the Ping Display is in use by another program.

Display Error

S148: – No profile name entered!

You have not specified a profile name - the input field is empty. Enter a profile name to proceed...

Display Warning

S150: – The file <filename> was empty, and factory defaults was read. Please verify all settings and save all settings using the 'File–>Save' menu option.

> The specified file containing set-up parameters (runtime or installation) was empty. When this happens, the system automatically installs the default version of the file. The file may have been corrupted during a program crash.

Display Error

S151: – The file <filename> is not found in the $HOME directory, or in the $NEPTUNEHOME/defaults directory. After verifying the settings, you may create the file by using the 'File–>Save' menu option. The program terminates when you select the OK button.

> The specified file containing set-up parameters (runtime or installation) is missing from the system directory, and was not located in any of the predefined locations for the file. The error indicates that the system somehow has been corrupted, possible due to manual operations in the file system. It is advisable to reinstall the system to re-establish system integrity.

Display Error

S152: – Not able to copy the file <filename> to $HOME/<filename>. The program terminates when you select the OK button.

> The specified file containing set-up parameters (runtime or installation) was missing from the system directory, and could not be copied to this directory. Due to problems with the directory access. The error indicates that the system somehow has been corrupted, possible due to manual operations in the file system. It is advisable to reinstall the system to re-establish system integrity.

Display Error

S206: – Min. Depth must be less than Max. Depth!

> It should be fairly easy to fix - just enter a minimum value less than the maximum value...

Display Error

S207: – Max. Depth must be greater than Min. Depth!

> It should be fairly easy to fix - just enter a maximum value greater than the minimum value...

Display Error

S208: – Legal interval: [<value>, <value>]

> The input value is outside the specified interval - re-enter value to proceed...

Display Error

S211: – Couldn't locate Workspace of Main Program!

If this error occurs, it means that certain workspace functions will be disabled, but that the overall functionality will be present. It has been observed that restarting the Operator Station software may remove the problem.

Display Error

S212: – Couldn't connect to SMS Server!

Occurs when the program is started independent of the rest of the system, or when the operating environment is insufficiently defined. It means that none of the functionality based on running an integrated system will be present, thereby rendering the system inoperable. If restarting the system does not remove the problem, it is likely, that the easiest way to fix it is to reinstall the software.

Display Error

S213: – Illegal Window Configuration Command received: <command>

An unknown workspace or window command was received. Should not affect the main functionality of the program.

Display Error

S214: – Couldn't send status to SMS Server!

This is a serious error, which should not occur. It reflects internal corruption in the communication link with the rest of the system. It means that none of the functionality based on running an integrated system will be present, thereby rendering the system inoperable. If restarting the system does not remove the problem, it is likely, that the easiest way to fix it is to reinstall the software.

Display Error

S215: – Server Connection Broken!

This is a serious error, which should not occur. It reflects internal corruption in the communication link with the rest of the system. It means that none of the functionality based on running an integrated system will be present, thereby rendering the system inoperable. If restarting the system does not remove the problem, it is likely, that the easiest way to fix it is to reinstall the software.

Display Warning

S237: – No profile downloaded...

The system has not received any download profiles. When downloading takes place, the set-up program is notified of the profile name. So far, it seems that nothing has arrived.

Display Warning

S238: – Profile not located in profile directory!

When downloading takes place, the set-up program is notified of the profile name. The system has received a download profile, but it could not be located in the directory used for sound speed profiles.

Display Error

S239: – Sensor Offset + current sound speed exceeds maximum speed of 1700.0 m/s.

The system does not recognise sound speeds in water exceeding 1700 m/s. To correct, enter an offset value, which keeps the sum of sound speed and offset value below or equal to 1700 m/s.

ESO messages

The following messages are presented by the **ESO** utility.

<u>Display error</u>

W5: – Serial Set–up–file <filename> missing. Install Default file?

> The specified file is either removed or renamed. However, the default file provided will enable all functions on a system not extended with a serial port expansion card.

<u>Display error</u>

W9: – No Serial input device is open! Select the 'Smart Probe Profile Inputs' as the current serial I/O function in the 'Workstation I/O Interfaces' menu.

> The serial port specified for this function could not be opened as expected probably due to error in read/write permission, or that a non-existing device is specified in the set-up-file.

<u>Display error</u>

W12: – Unable to open temporary file <filename>!

> The error occurs because of inaccurate read/write permissions to the system directory. This is either an installation error, or an error introduced after installation.

<u>Display error</u>

W17: – Input Error. To enable new input, you must reselect the current input function.

> The input format was not recognised. Reading from the serial port was disabled to avoid further input, and must be reactivated by reselecting the input function.

<u>Display warning</u>

W22: – No probe samples logged!

> The sampling of probe values was terminated, but no values were actually received. Check probe connections and serial port set-up.

<u>Display warning</u>

W26: – The file <name> was empty. Factory Defaults was used instead. Please verify settings and use the 'File –> Save' command to make settings permanent.

This means that the set-up-file somehow has been corrupted. (E.g. system crash, text editor). A workaround is to set all parameters in the menus as required, and recreate the set-up-file using the 'File->Save' command. If this is followed by the 'File->Read' command, full functionality should be restored. Alternatively, you could exit the program - remove the empty file - and then restart the program. This will enable you to install the default set-up-file delivered with the system.

Display error

W27: – The file <filename> is not found in the $HOME directory, or on $NEPTUNEHOME/defaults directory.

The set-up-file should be present in both the indicated locations. If you at any point have done a system upgrade, you should check for backup copies in any of the system directory backups in the login directory. Backup file syntax: ".eso_system<date_time>/ .esoSetup.serial". If no such files are found, search for the file on the CD-ROM containing the installation.

Display error

W28: – Not able to copy the file <filename> to $HOME/.eso_system. Program terminates when you select the OK button.

The error occurs because of inaccurate read/write permissions to the system directory. This is either an installation error, or an error introduced after installation.

Display error

W29: – Not able to remove the file <filename>. Check access and owner of the file. Program terminates when you select the OK button.

The error occurs because of inaccurate read/write permissions to the system directory. This is either an installation error, or an error introduced after installation.

Display error

W30: – Unable to open device <device-name>! You may have a permission problem.

The error occurs because of inaccurate read/write permissions to the specified serial port device. This is either an installation error, or an error introduced after installation.

Display error

W40: – The set-up file is incomplete. Verify all parameters. Then save your configuration using the 'File->Save Set-up' menu option. Then read the set-up using the 'File->Read Set-up' to reinitiate the system!

The file could be corrupted (system crash), or modified outside the program (text editor), accidentally removing parts of the file.

Display error

W41: – Incomplete SVP CALC profile received on the network...

When receiving from the network, AML CALC files are supposed to be received in one go, i.e. complete with both profile identifier and termination sequence. In this case, no termination sequence was found in input.

Warning

W43: – The device associated with this function is in active use by the following function:
<function>.
To use the selected function:
1. Switch OFF the other function
    or
2. Change device associated with one of the two functions.

Warning

W44: – You must terminate any active functions before reading set–up file!

Warning

W45: – Could not open tide output file: <filename>. You may have a permission problem...

An attempt was made to open the tide file in the current survey directory, but the operation failed. You should have full read & write access to the directory and all files in the directory.
Correct the directory & file access and activate the tide input function again.

Warning

W46: – The <name> function cannot share device with the <name> function. Per definition, only the following functions may share device:

<list of functions>

These functions may all be active at the same time.

Warning

W53: – Serial Port input not recognised! To enable new input, you must reselect the last selected input function

The input received was not recognized. This could be due to errors in the format used for transmitted data, or, if a serial line is used, errors in setting up serial line characteristics.

Warning

W54: – Input buffer overrun – function disabled! To enable new input, you must reselect the currently disabled input function.

Error

W60: – The last command sequence to the probe failed. Repeat your latest action to retransmit sequence. If this message was issued when bringing up this window, select the 'Apply Settings' button in the 'Sampling Parameters' section to repeat sequence.

> The probe did not recognize the last command issued. This could be caused by garbled serial line transfer. Verify your serial line settings and retry the command once again.

Error

W61: – No reply to last SV Plus command! Probe may be disconnected or without power...

Error

W62: Format Error in SV Plus Input!

> The input from the probe was not recognized.This could be caused by garbled serial line transfer. Verify your serial line settings and retry the command once again.

Launchpad messages

The following messages are presented by the **Launchpad** utility.

<u>Display Error</u>

L12: – The following Program(s) should always run, but is still NOT running:

> The Operator Station software is an integrated system, and is based on having a predefined set of programs running. If not, the echo sounder cannot be operated.
> You may look for any messages related to the offending program in the 'Messages' area of the 'Status Display', or use the 'File->Print / View' menu item to bring up the 'Message Viewer'.
> Select the icon for the offending program(s) to check for any messages that could help you locate and fix the problem.

<u>Display Error</u>

L13: – Echo Sounder Not Ready!
The Initial 'Power Up' Built In Self Test (BIST) has failed. Details may be found in the ESO Set–up BIST Self Test (Show–>Testing) menu.

> The Echo Sounder has a range of Built In Self Test (BIST) commands, testing various parts of the Sounder.
> Every time the Operator Station software is started, a link to the Processing Unit is established and the Initial Power-Up-Test is performed. If this fails, the Echo Sounder is inoperable, and the operator should examine the error messages in the BIST test window in the Set-up-program.
> Additional status information may be obtained using the other BIST tests available.

<u>Display Error</u>

L15: – Error in Runtime or Installation set–up values!
Must be corrected before activating!

> All parameters go through verification checks. First while reading from the Set-up-file, and second while entering parameters manually. The reported error is detected while reading from a Set-up-file, and will block Echo Sounder operation until corrected.
> Set the correct value for the offending parameter(s) in the set-up program, and use the 'File' menu 'Read' command to read the set-up back in.
> This will automatically verify the new set-up.

<u>Display Warning</u>

L16: – No reply from PU on 'Time Request'. Logging NOT started!

When activating logging of data, the system timestamps some of the datagrams used in the process.
The time to use was requested from the Processing Unit, but the reply did not arrive within a fixed period of time. This may be due to a Processing Unit running at full capacity, or - if the situation continues, while having a normal load on the system - that you may have network problems.

Display Warning

L39: – The <program name> program has not yet registered.
Do you still want to wait for the program to come up?

When starting one of the programs used by the system, it will try to hook up to enable the necessary communication and supervision. If a program does not succeed with this initial registration or hook up, it may have problems in the initial phase of starting up.
Please refer to the 'Status Display, Messages Section' for possible error messages that may help sorting out the problems.

Display Error

L40: – The following Program(s) has not yet registered:

All programs started and supervised by the Launchpad establishes a communication link with the system when they are launched. The listed program(s) did not succeed in establishing this link. It could be that the program (s) crashed before the linkup was attempted. If so, the program(s) has no possibility to communicate with the rest of the system. You may try a manual start of the system in a window, to see if you can find any useful messages written in the window.

Warning

L45: – Error reading input datagram...

Reading from the communication input socket failed. This is a low-level error, and should not occur if the system managed to start properly. If the error persist, try terminating the system and restart the software again.

Display Error

L47: – The Initial Power Up Self Test failed.
Do you want to repeat the test?

Please refer to the test menus in the Echo Sounder Set-up program for details.

Warning

L52: – Sound Speed At Transducer deviates more than X m/s from the corresponding value defined by the current Sound Speed Profile!

The sound speed at transducer depth received from the probe exceeded the selected alarm offset 5 times in a row. You should verify that you are using the correct sound speed profile, and also verify the size of the alarm offset.

Warning

L54: – Current Center Depth exceeds original maximum depth from the current Sound Speed Profile!

Center Beam Depth = <depth>
Profile Max. Depth = <depth>.

The original profile had a maximum depth before the automatic profile extension extended the profile down to 12000 m. The depth you now are registering exceeds this depth. This could mean that your original profile isn't deep enough for this area.

Display Error

L59: – Echo Sounder Not Ready!
Error in Sound Speed Profile!

There are no samples in the current Sound Speed Profile! Verify & correct current profile, or select a new one! After doing this, you should run the Power Up Built In Self Test (BIST) to enable the system.

Display Error

L60: – Echo Sounder Not Ready!
Error in echo sounder set–up parameters!

All parameters go through verification checks. First while reading from set-up-file and second when entering parameters manually. The reported error is detected while reading from the set-up-file, and must be corrected before continuing! After doing this, you should run the Power Up Built In Self Test (BIST) to enable the system.

Display Error

L62: – No Processing Unit has been detected while scanning the Network.
Do you want to terminate the Launchpad?

The Operator Station is not receiving broadcast datagrams from the Processing Unit. The continuing flow of broadcast datagrams tells the rest of the system that the PU is still alive. To prevent gaps in the line and possible data corruption, logging was stopped. Possible reasons for loss of contact:
. Processing Unit is not Powered On
. Network Cable Problems
. Configuration Errors
. Processing Unit Hardware / Software malfunction

Error

L64: – Connection timeout – Logging switched Off!

The Operator Station stopped receiving broadcast datagrams from the Processing Unit. The continuing flow of broadcasts datagrams tells the rest of the system that the PU is still alive. To prevent gaps in the line and possible data corruption, logging was stopped. Possible reasons for loss of contact:

.Processing Unit is not Powered On
.Network Cable Problems
.Configuration Errors
.Processing Unit Hardware / Software malfunction

Error

L65: – Connection timeout – Pinging switched Off!

The Operator Station stopped receiving broadcast datagrams from the Processing Unit. The continuing flow of broadcast datagrams tells the rest of the system that the PU is still alive. The system status was set to No Pinging. Possible reasons for loss of contact:

.Processing Unit is not Powered On
.Network Cable Problems
.Configuration Errors
.Processing Unit Hardware / Software malfunction

Error

L66: – Timeout in Processing Unit <-> Launchpad Connection!

The Operator Station stopped receiving broadcasts from the Processing Unit. The continuing flow of broadcasts tells the rest of the system that the PU is still alive. Possible reasons for loss of contact:

.Processing Unit is not Powered On
.Network Cable Problems
.Configuration Errors
.Processing Unit Hardware / Software malfunction

Display Error

L67: – Format Error in Processing Unit Broadcast!

The Processing Units broadcast their presence on the Network. Such a broadcast message was received, but did not meet the format specification.

Display Error

L76: – No reply to the Initial Power–Up BIST.
Do you want to Retry?

The network connection is OK, but the Processing Unit is not responding. Cancel the current attempt. Power the Processing Unit 'Off' and then 'On' again. Then try restarting the operating software.

Display Error

L83: – Could not create Config–file!

An attempt was made to store the current layout configuration onto the system defaults directory, but the operation failed. You should have full read & write access to this directory.

Display Error

L84: – Error in retrieving 'All Workspaces' info!

This is an internal error in the Launchpad, and should never happen. If it does occur, it will be during saving of the layout configuration to file. You should then restart the Operator Station software, and try the same command once again. This error may indicate internal problems for the Launchpad program, and should be reported.

Display Error

L85: – Program <name> contains an error in the configuration–file start–string!

This is a serious error. An attempt was made to update the main configuration file from data in memory. The attempt failed because the internal information did not adhere to the syntax for this type of information. You should exit and restart the system to avoid loss of operational control.

Display Error

L89: – Could not create Log–file Backup!

An attempt was made to open the log-file in the system defaults directory, but the operation failed. You should have full read & write access to this directory.

Display Error

L99: – Not able to change to Raw Data Directory <name> when generating Survey Parameters file.

An attempt was made to change the internal working directory to the one used for raw data ($RAWDATAHOME), but the operation failed. Please verify that you have full read, write & execute access to this directory.

Display Warning

L111: – Tape Operation Aborted!
Reason:

The reason for an aborted tape operation may vary. With the exception of a user-triggered abort, the reason stated in the message body originates from the operating system, but should be fairly easy to understand. Examples of this could be a message stating that the tape drive is offline or that no data cartridge is loaded.

Display Warning

L112: – You cannot delete the current survey!

The current survey could be active, meaning that the associated directories and files are in use for data storage and processing. Removal of the current survey is therefore prohibited.

Display Warning

L113: – The Log–file is quite large: size X Mb – reset recommended!

The messages in the log-file may be viewed using the 'File->Print / View' command. If the file contains too many messages, it may be prove too 'crowded' for practical purposes. It is recommended that you pay heed to the suggestions of reset offered by the system. Use the 'File->Reset Log-file' option. If you are afraid of loosing useful information, please note that any errors reported while logging data, is logged in a separate log-file along with the survey data. Also remember, that you are offered the option of backing up your log-file before resetting.

Display Warning

L114: – You cannot alter logging set–up while logging is Active!

Due to the programmed functionality of the system, some parameters (logging set-up & installation parameters) may not be modified, because that would disrupt proper functionality and data integrity.

Display Warning

L117: – The root partition of this system now has less than 2Mb space left...

If the disk space on the root partition falls to zero, you may experience various types of problems while operating the system. It is advisable to increase this space to a minimum of 10 - 20 Mb.

Display Error

L120: – The main configuration file <filename> was not found. Since this is a vital file for the system, the Launchpad will terminate when you select the OK button...

This file contains the overall configuration of the operator station software. The system can't operate without this file. The file was copied to the system directory during installation, and may have been accidentally removed.

Display Error

L121: – Error(s) found in the Launchpad Configuration File!
When you select the 'OK' button, the file will be deleted and this program will terminate.
When restarting the system, the Factory Default Configuration File will be installed.

> The Launchpad program uses a text-file to define which programs are included in the system. Quite a few bits of information are stored here, using a fixed syntax. This error occurs because the line for this program does not adhere to the syntax. An erroneous modification may have been done using a text editor. A new default version of the file will automatically be installed when restarting the system.

Error

L122: – There are too many entries in setup–file! Max = 18.

> The configuration file contains all programs included in the integrated system, but may also contain programs added by the user. These programs may be started from the Launchpad, but are not supervised as the other programs.
> The total number of entries has exceeded the maximum limit, probably due to manual modifications of this configuration file.
> To restore the default file supplied by the system, remove the $HOME/.eso_system/esoEmX_config file, and restart the system.

Error

L123: – Not able to obtain the icon for <this utility>!

> Each of the programs integrated into the system has a button in the rightmost part of the Launchpad, and each of these buttons should have a symbol / icon for identification purposes.
> The symbol name specified in the external configuration file was not found, indicating an error in the file, or a mismatch between the configuration file and the file containing the icon descriptions.
> If this error occurs, a capital 'X' is drawn instead of the proper icon.

Error

L124: – Not able to obtain default icon!

Each of the programs integrated into the system has a button in the rightmost part of the Launchpad, and each of these buttons should have a symbol / icon for identification purposes.

The symbol name specified in the external configuration file was not found, indicating an error in the file, or a mismatch between the configuration file and the file containing the icon descriptions.

If this error occurs, a capital 'X' is drawn instead of the proper icon. This message indicates that the 'X' icon was not found.

Display Error

L137: – A survey name must be provided before this program can start!

Fill in or select a survey name to continue!

Display Error

L140: – Illegal character(s) in the Survey Name!

The characters ('>' or '<') are illegal as part of all file-names, survey-names and operator names. Space (' ') will be substituted with '_'.

Display Error

L141: – Illegal character(s) in the Operator Name!

The characters ('>' or '<') are illegal as part of all file-names, survey-names and operator names. Space (' ') will be substituted with '_'.

Error

L142: – Environment 'MODULES_ICON_FILE' not found, or empty! Fix and restart!

The file containing the icon descriptions used by the system cannot be located, because the environment variable, giving the name of this file, was undefined. All environment variables used by the system are defined when installing the system, so this message indicates a system installation error.

Error

L143: – Unable to open module icon description file <name> specified in environment 'MODULES_ICON_FILE. Fix and restart!

The file containing the icon descriptions could not be opened. The file may be missing, or you do not have the proper file access.

Display Error

L144: – Program <name> (possibly specified by the environment symbol <symbol name> in the start–up script) was not found in the Network Configuration File.

File: DPC.addresses.<hostname>

The system cannot work until the problem is fixed, and will terminate when you select the 'OK' button.

> The specified file contains network addresses and port no.'s for all programs attached to the system. The error occurs when the program listed in the error message does not have an appropriate entry in the file.

Display Error

L145: – Error opening Network Configuration File!

File: DPC.addresses.<hostname>

The system cannot work until the problem is fixed, and will terminate when you select the 'OK' button.

> The specified file contains network addresses and port no.'s for all programs attached to the system. The error occurs when your program tries to access this file, but is denied access. Several possible reasons:
> 1. The file does not exist. Removed? Wrong Name?
> 2. You have no file system access.

Display Error

L146: – Error in connecting to socket given by <entry name> in the file: DPC.addresses.<hostname>.
The system cannot work until the problem is fixed, and will terminate when you select the 'OK' button.

> All programs in this system have an entry in the specified file. The most likely reason for this problem is that this entry is in use by a process (program) running on the system now. If you cannot find and terminate such a process, then try logging out and logging on before restarting the system.

Display Error

L147: – The following environment variables are undefined:
<variable list>

> Part of the system uses external definition of various elements used within the programs. One such type of external definition is Environment Variables. One or more of these are undefined, leaving the system without all information needed to function properly. The environment variables should be defined as part of the installation process, and these error points to either an error in the installation, or manual interference in the files defining these variables.

Display Error

L149: – Active Pos. Sys.: No Input...

The system does not receive any input from the positioning system defined as Active. This could be due to the wrong system being selected as Active. You should also check input port parameters in the set-up program, and finally, check that the cabling is OK and that the positioning system unit generates the correct datagrams.

Display Error

L150: – Heading Sensor: No Input...

The system does not receive any input from the system generating the Heading. This could be due to the wrong system being selected for Active Heading. You should also check input port parameters in the set-up program, and finally, check that the cabling is OK and that the unit from which heading is used, generates the correct datagrams.

Display Error

L151: – Attitude Sensor: No Input...

The system does not receive any input from the attitude sensor. You should check input port parameters in the set-up program, and that the cabling is OK. Also check that the attitude sensor generates the correct datagrams.

Error

L152: – Clock: No Input...

The system does not receive any clock input from the positioning system. You should check input port parameters in the set-up program, and that the cabling is OK. Also check that the positioning system generates the correct datagram.

Error

L154: – Logging of Survey Data to Disk was switched Off due to an error in the <name> program!

Refer to messages in the Status Display for further details.

Error

L155: – Logging of Raw Data to Disk was switched Off due to an error in the <name> program!

Refer to messages in the Status Display for further details.

Display Error

L163: – Quit Signal Received! System will shut down when you select the 'OK' button!

The system uses built-in mechanisms to handle signals (interrupts) originating both internally and externally. The type of signal is described in the message. All, except the external Terminate Signal, is caused by errors in the program.

Display Error

L164: – Floating Point Exeption! System will shut down when you select the 'OK' button!

The system uses built-in mechanisms to handle signals (interrupts) originating both internally and externally. The type of signal is described in the message. All, except the external Terminate Signal, is caused by errors in the program.

Display Error

L165: – Bus Error! System will shut down when you select the 'OK' button!

The system uses built-in mechanisms to handle signals (interrupts) originating both internally and externally. The type of signal is described in the message. All, except the external Terminate Signal, is caused by errors in the program.

Display Error

L166: – Segmentation Violation! System will shut down when you select the 'OK' button!

The system uses built-in mechanisms to handle signals (interrupts) originating both internally and externally. The type of signal is described in the message. All, except the external Terminate Signal, is caused by errors in the program.

Display Error

L167: – Terminate Signal Received! System will shut down when you select the 'OK' button!

The system uses built-in mechanisms to handle signals (interrupts) originating both internally and externally. The type of signal is described in the message. All except the external Terminate Signal, is caused by errors in the program.

Display Error

L168: – Illegal Instruction Signal Received! System will shut down when you select the 'OK' button!

The system uses built-in mechanisms to handle signals (interrupts) originating both internally and externally. The type of signal is described in the message. All, except the external Terminate Signal is caused by errors in the program.

<u>Display Error</u>

L169: – SIGNAL <signal no.> received! System will shut down when you select the 'OK' button!

> The system uses built-in mechanisms to handle signals (interrupts) originating both internally and externally. The type of signal is described in the message. All, except the external Terminate Signal, is caused by errors in the program.

<u>Error</u>

L170: – Unable to create Process List!

> An attempt was made to open the process id log-file in the system directory for writing, but the operation failed. You should have full read & write access to the specified file and directory.

<u>Error</u>

L171: – Unable to open Process List!

> An attempt was made to open the process id log-file in the system directory for reading, but the operation failed. You should have full read & write access to the specified file and directory.

<u>Display Error</u>

L172: – The following Programs are still running, and must be terminated before continuing:

> The operating software uses several programs in an integrated system. Each running program is represented internally as a process. It has been observed, mostly after a crash, that these processes may continue to be active when they should not have been. The system detects these processes when it is restarted, and will, on users confirmation, issue termination commands before the system continues initialisation. But on rare occasions, the termination signal sent to these processes fails, and manual intervention is required as instructed in the error message.

<u>Display Error</u>

L173: – The following Programs could not be terminated:

> The operating software uses several programs in an integrated system. Each running program is represented internally as a process. It has been observed, mostly after a crash, that these processes continue to be active when they should not have been. The system detects these processes when it is restarted, and will, on user confirmation, issue termination commands before the system continues initialisation. But on rare occasions, the termination signal sent to these processes fails, and manual intervention is required as instructed in the error message.

Display Error

L176: – The following Program(s) should always run, but is still NOT running:

> All programs started and supervised by the Launchpad establishes a communication link with the system when they are launched. The listed program(s) did not succeed in establishing this link. It could be that the program (s) crashed before the linkup was attempted. In that case, the program(s) has no possibility to communicate with the rest of the system. You may try to start the system manually in a window, to see if you can find any useful messages written in the window. These programs are so called system programs, and it will be impossible to run the system when they are not running as intended.

Display Error

L177: – Could not read Raw Data directory for survey <name>.

> You do not have the correct access to the specified directory. Correct ownership of directories and files are defined when the system is installed, so this problem could be the result of a manual operation in the file system. Please verify that you have read, write & execute access to the storage directories for raw data ($RAWDATAHOME).

Display Error

L178: – Not able to change to Survey Directory <name> when fetching Line Statistics file!

> The system could not perform an internal change of directory to the specified directory due to error in directory access. You should have read, write & execute access to all directories and files in the data storage locations. Please verify and correct.

Display Error

L179: – Not able to change to Home Directory when fetching Line Statistics file!

> The system could not perform an internal change of directory back to your login directory due to error in directory access. You should have read, write & execute access to all directories and files in the data storage locations. Please verify and correct.

<u>Display Error</u>

L181: – Not able to copy the file <filename> to $HOME/<filename>.
Program terminates when you select the OK button!

> This is the file setting up the configuration of the status filed in the Launchpad. An attempt was made to copy this file from the system defaults directory, but failed. You should have read & write access to all files in the system directory and to the directory itself. Please verify and correct.

<u>Display Error</u>

L182: – Could not open Operators File!

> Open a terminal window, and go to the $HOME/.eso_system directory. Verify that you have both Read and Write access to the file 'esoSetup.operators'.

<u>Display Error</u>

L183: – Not able to copy the Status Config file to <directory name>.
Using default values...

> This is the file setting up the configuration of the status fields in the Launchpad. An attempt was made to copy the file from the system defaults directory, but failed. You should have read & write access to all files in the system directory and to the directory itself. Please verify and correct.

<u>Display Error</u>

L184: – Status Config file not found.
Using default values...

> This is the file setting up the configuration of the status fields in the Launchpad. It was not located in any of the predefined locations. This is an error by itself - but the system uses a default set-up, and will be operable. If you define a new status set-up, remember to save the set-up for later use.

<u>Display Error</u>

L186: – Could not init log–file!

> It was not possible to create the file due to error in permissions. You should have read & write access to all files in the system directory and to the directory itself. Please verify and correct.

<u>Display Error</u>

L187: – Could not open log–file for append!

> It was not possible to open the file for append due to error in file access. You should have read & write access to all files in the system directory. Please verify and correct.

<u>Display Error</u>

L189: – Line Statistics File could not be opened!

Survey: <survey name>
File: <line name>.linestat

> The line statistics file for the specified line exists, but it could not be opened due to error in file access. You should have read, write & execute access to all files in the data storage directories. Please verify and correct.

<u>Display Error</u>

L190: – Statistics File for Survey <survey name>, line <line name> is empty!

> The line statistics file for the specified line exists, but it was empty. It is difficult to state the reason for this, because all lines, no matter how small, should have something in this type of file. The file should be removed.

<u>Display Error</u>

L193: – Raw Data Parameters File for Survey <survey name> could not be opened!

> The line parameters file for the specified line exists, but it could not be opened due to error in file access. You should have read, write and execute access to all data storage files and directories. Please verify and correct.

<u>Display Error</u>

L194: – Survey Parameters File for Survey <survey name>, line <line name> is empty!

> The line parameters file for the specified line exists, but it was empty. It is difficult to state the reason for this, because all lines, no matter how small, should have something in this type of file. The file should be removed.

<u>Display Error</u>

L198: – Not able to change to Survey Directory <directory name> when fetching Line Statistics file!

> There can be several reasons for this error, the most probable is that you don't have the correct access to the specified survey directory. Please verify that you have read, write & execute access to all directories in the $PROCHOME location. '$PROCHOME' is an environment variable defining the top location of your storage area for processed data (not raw data).

<u>Display Error</u>

L209: – You do not have WRITE access to file <name>.

You do not have the correct access to the specified file. Correct ownership of directories and files are defined when the system is installed, so this problem could be the result of a manual operation in the file system. Please verify that you have read, write & execute access to the shared system directory ($SHAREDHOME) and all files and subdirectories.

Display Error

L212: – Operation cancelled!
Echo Sounder not ready!

The system was interrupted while performing a Power Up test. One of the main criteria for initiating the system is that the Power Up test is completed without error. When this test is cancelled, the system is defined to be inoperable. It will remain so until the test is completed successfully.

Display Error

L222: – Line Statistics File not found.

Survey: <survey name>
File: <line name>.linestat

The specified Line Statistics File does not exist. When terminating logging to a line, such a file is produced automatically. This error indicates that the file system has been manually modified.

Display Error

L228: – The file <filename> is not found on $HOME/<name> directory, or on $NEPTUNEHOME/defaults directory.
Since this is a vital file for the system, the Launchpad will terminate when you select the OK button...

The main configuration file is not located in any of the predefined locations. The system cannot be operated without this file. You should check if you have any backups of the system directory - one is made during every upgrade / reinstall of the system. If that fails, reinstall the system.

Display Error

L229: – The file <filename> is not found on $HOME/<name> directory, or on $NEPTUNEHOME/defaults directory.
Using default set–up...

The main configuration file is not located in any of the predefined locations. The system cannot be operated without this file. You should check if you have any backups of the system directory - one is made during every upgrade / reinstall of the system. If that fails, reinstall the system.

Display Warning

L230: – Operator <name> has no Config–file...

Use the 'Update Operator's 'Config-file' popup menu option on the 'All Programs' icon in the 'Programs' section of the Launchpad. This will generate a default file for the current operator.

Display Error

L231: – The file <filename> is not found on $HOME/<name> directory, or on $NEPTUNEHOME/defaults directory.

The specified file is not located in any of the predefined locations. The system cannot be operated without this file. You should check if you have any backups of the system directory - there is made one during every upgrade / reinstall of the system. If that fails, reinstall the system.

Display Error

L232: – Not able to remove the file <file name>.

Check access and owner of the file. Program terminates when you select the OK button.

You do not have the correct access to the specified file. Correct ownership of directories and files are defined when the system is installed, so this problem could be the result of a manual operation in the file system. Please verify that you have read, write & execute access to the system directory and all files in this directory ($HOME/.eso_system).

Display Error

L233: – Unable to open Table Of Contents!

You do not have the correct access to the selected file. Correct ownership of directories and files are defined when the system is installed, so this problem could be the result of a manual operation in the file system. Please verify that you have read, write & execute access to the system directory and all files in this directory ($HOME/.eso_system).

Display Error

L234: – Unable to open temporary copy of the log–file!

It was not possible to open the file, due to an error in file access. You should have read & write access to all files in the system directory ($HOME/.eso_system). Please verify and correct.

Display Error

L235: – Cannot allocate enough memory for viewing the log–file. You should reset the file using the 'File–>Reset Log-file' option.

The log-file was too big for the available memory resources. If it is important to view the log-file, you could try terminating as many of the programs as possible before retrying. If the problem persists, you should reset the log-file. When resetting, it is possible to take a backup copy of the log-file.

Display Error

L297: – Raw Data Parameters File for
Survey <survey name>
Line <line name>
could not be opened!

The parameter file for the specified survey exists, but it could not be opened due to error in file access. You should have read, write and execute access to all data storage files and directories. Please verify and correct. Due to the sequence of events producing this file, this error is not likely to occur.

Display Error

L298: – Survey Parameters File for Survey <name> does not exist!

The survey parameter file is based on the parameters for each line, and presents information regarding changes in line parameter set-up. For some reason, this file could not be produced. It may be, that there are no lines in the survey, or that the logged lines are corrupted.

Display Error

L299: – Raw Data Parameters File for
Survey <survey name>
Line <line name>
does not exist!

The file contains the parameter set-up being used when logging the line. For some reason, this file could not be produced. It may be that the logged line is corrupted.

Display Error

L300: – Environment variable for Network Configuration File not defined!

Some of the information required to have the system running properly, is set outside of the actual programs, using environment variables. The specified variable is not defined, and probably means an installation error, or manual modification in the definition of variables.

Display Error

L301: – Could not open Network Configuration File!
File: <filename>

It was not possible to open the file due to error in file access. You should have read & write access to all files in the system directory. Please verify and correct.

Display Error

L302: – Unable to open Serial Datagram Set–up–file

It was not possible to open the file due to error in file access. You should have read & write access to all files in the system directory. Please verify and correct.

Display Error

L303: – Unable to open Datagram Set–up–file!
File: <filename>

This file contains the datagrams available for subscription. It will not be possible to use the subscription facility without this file. You should have read & write access to all files in the system directory. Please verify and correct.

Display Error

L304: – Format error on input from Datagram Set–up–file!
File: <filename>

Datagrams available for user-defined distribution are defined using a fixed format. One or more of the entries in this file does not fit this format. The safest way to fix the problem is to remove the file, and restart the system. The file will then be copied to the system directory, using the default version supplied with the installation.

Display Error

L318: – Illegal format on IP address!

Format: ddd.ddd.ddd.ddd, where 'd' is a digit.
Leading zeros may be omitted.

The networking addresses used by the system must follow the specified syntax. Normally, if you have subscribers running on the same computer as the operating software, you should use the IP address of this computer.

Display Warning

L321: –This is the system's broadcast IP address, and cannot be deleted. If you were thinking of defining a new broadcast address, this one will be automatically adjusted whenever the system's IP address is modified.

When removing an IP address, all programs having the selected address will be modified. Since the selected address is of vital importance for the system, deletion or modification is not allowed. The address is used to establish and maintain the connection with the echo sounder.

Display Warning

L325: – You cannot change the datagram set-up of the system's reserved programs!

Currently, only user-defined datagram subscriptions may be modified. Allowing the user to modify the flow of datagrams needed for proper operation of the system could result in operational problems.

Display Warning

L326: – You cannot modify the IP address of the system's reserved programs!

Currently, only user-defined datagram subscription set-up may be modified. Allowing the user to modify the networking set-up, needed for proper operation of the system, could result in operational problems.

Display Warning

L327: – The specified IP Port no. is outside bounds!
Legal interval: [2000, 6000]

The interval is limited to avoid interfering with the internal port no. usage of the system. Using port no.'s already in use will give operational problems, both for the system programs and for user programs.

Display Warning

L328: – IP Port no. <port no.> is already in use by the <subscriber name> subscriber!
Legal IP Port interval: [2000, 6000]

Opening and using the same port no. for reading is not allowed. You may send datagrams to the same port no. from several programs, but since you are defining datagram distribution, you cannot use the same port as another program.

Display Warning

L333: – Logging cannot be started when Edit Mode is enabled in the Set–up menu!

The reason for this restriction is that when logging to a line is started, all current values of the installation parameters are logged with the data. And since only one such representation is possible per line, editing of these parameters is prohibited when already logging.

Display Error

L334: – PPS not received!

The system does not receive any input from the system generating the 1PPS. This could be due to the wrong system being selected for 1PPS. You should also check input port parameters in the set-up program, and finally, check that the cabling is OK and that the unit from which heading is used, generates the correct datagrams.

Display Warning

L335: – Initial Power–Up Test was interrupted!
Echo Sounder Not Ready!

> The initial power-up test was interrupted by the user. And since it is an absolute requirement that this test is successfully completed, this test should be performed (with no errors reported).

Display Warning

L336: – No Sound Speed Probe values received!

> The system is supposed to receive Sound Speed Probe values, bot does not receive any. Verify probe connections, set-up and power.

Display Error

L337: – Depth/Height Sensor: No Input...

> The system is supposed to receive sensor input, but does not receive any. Verify sensor connections, set-up and power.

Warning

L355: – Unknown NMEA Telegram received...

> The datagram received were not uniquely recognised. It seems to be a NMEA datagram, but one not supported by the system. The datagram may also contain format errors. Please refer to separate documentation on datagram definitions.

Error

L356: – Format Error in Remote Control Telegram!

> The datagram received was recognised as a Remote Control datagram, but the content does not adhere to the datagram syntax. Please refer to separate documentation on datagram definitions.

Display Warning

L357: – Datagram subscriber 'remoteLogging' not defined!
Use 'Options–>DatagramSubscriptions...'to enter 'remoteLogging' as a subscriber. Remember to supply IP address and port.no. to receive datagrams on!

> The system has received a Remote Control datagram, but vital information is missing from the datagram distribution set-up. Without this, none of the remote control functionality will be available. The rest of the sounder will operate as normal.

Display Warning

L358: – No datagrams are selected for the 'remoteLogging' subscriber! Use 'Options−>DatagramSubscriptions...' and select datagrams for subscription for the 'remoteLogging' subscriber.

> When using the Remote Control functionality, you must define a selection of datagrams that you want distributed to the 'remoteLogging' subscriber. Otherwise, nothing will flow to this subscriber, even though it is properly defined with an IP address and port number.

Display Error

L364: – The system is currently configured NOT to launch the Survey Display automatically. Changing this mode requires changing the configuration file...

> Some installations have their own Survey Control software. The message indicates that the current configuration of the system has disabled this particular feature. Please refer to the documentation for information on how to enable this software.

Display Warning

L372: – Could not verify incoming profile!

> The Profile Editor is already running, and profile verification is currently suspended. Terminating the current editor session will automatically bring up the received profile for verification.

Display Error

L400: – Could not open print tmp−file.

> You do not have the correct access to a work-file in your own home directory. Correct ownership of directories and files are defined when the system is installed, so this problem could be the result of a manual operation in the file system. Please verify that you have read, write & execute access to your login directory and the files in this directory.

Display Error

L401: – Error in Launchpad Message Server Initialize!

> Some system resources could not be allocated, because some other program is holding these resources. Check if any of the programs started from a previous session of the system are still running. If so, terminate these programs. If you do not know how to do this, it will in most cases be sufficient to log out and then back in. This will terminate any running programs and free up resources. Then restart the operator station software...

Sound Speed Profile Editor messages

The following messages are presented by the **SSP Editor** utility.

Warning

E10: – Profile contains fewer points than specified in Profile Header. Using number of points read from file!

> The profile may have been edited manually, creating a mismatch between header no. of entries and actual no. of entries. The profile was automatically corrected.

Warning

E11: – Profile contains more points than specified in Profile Header. Using number of points read from file!

> The profile may have been edited manually, creating a mismatch between header no. of entries and actual no. of entries. The profile was automatically corrected.

Warning

E13: – You have no WRITE access to profile directory <directory name>.

> The profile directory is created with full Read and Write access when installing the system. This problem may be caused by manual modifications of the file system. Set the correct directory access before retransmitting.

Warning

E33: – The file <filename> containing the selected Sound Profile was not found.

> Someone has deleted the selected Sound Velocity Profile from the disk after the list was created! The list was produced using only actual and existing profiles. If you have no idea how this could have happened, get in touch with the System Administrator.

Warning

E38: – You have no WRITE access to the selected Sound Velocity Profile directory!

> The File Selection Box enables traversal of the file system directory structure, which means that you may select any directory as a storage area for the SV Profile - even those you do not have WRITE access to. If you are denied access to a directory that you would like to have access to, check the System Manager to see if this is permissible.

Warning

E42: – You have no DELETE access to the selected Sound Velocity Profile!

> The profile directory is created with full Read and Write access when installing the system. This problem may be caused by manual modification of the file system. Set the correct directory & file access before retrying.

<u>Error</u>

E46: –
Environment 'SVP_EDITOR_MODULE_NO' not defined or empty!
Environment 'SVP_EDITOR_MODULE_NAME' not defined or empty!
These errors results in a program that does not work properly. Fix and restart!

> Most of the variable elements of the system configuration can be configured outside the programs. This is done by quite a few 'environment variables', which is set to an initial value when installing the system, and then fetched by the programs when needed. The environment variables listed in the error message must be set to match the initial values.

<u>Warning</u>

E54: – Please use the 'Save As...' command to give the profile a name.

<u>Warning</u>

E56: – No points in Profile...

> The editable buffer is empty. Create a profile using the New Profile command in the File menu. You may also use the Copy SV Profile or the Combine SV Profiles in the Edit menu.

<u>Warning</u>

E60: – Illegal Survey Format File Name: <filename>

> The survey format profile name does not match the syntax, which is as follows:
>
> <line_no_yyyymmdd_hhmmss_sensor_version>.sfsvp
>
> The only way to correct this is to do a manual profile rename. Since the survey profiles are named autmatically, this is an error that should not have occurered.

<u>Warning</u>

E61: – Empty file: <filename>

> The file does not contain any samples, and cannot be used. It is not possible to state any reasons for this. The file should be removed from the profiles directory.

<u>Warning</u>

E62: – Currently no editable profiles in work area to save!

Ping Display messages

The following messages are presented by the **Ping Display** utility.

P32: – No information received from the ESO! Ignore this message if used in stand–alone mode.

> When starting up, the program tries to get some information from the ESO system. But when running in a standalone mode, it does not receive any answer. The requested information is not important in the standalone mode.

If you get this message when running as part of the complete system, try restarting the operator software.

8.2   CMOS SETUP - standard Processing Unit

Setup for VIPer

Standard CMOS Setup

Date

Time

HARD DISKS	type	Mode
Primary Master	Auto	Auto
Primary Slave	Auto	Auto
Secondary Master	Auto	Auto
Secondary Master	Auto	Auto

Drive A: 1.44M, 3.5 in.

Drive B: None

Video: EGA/VGA

Halt On: All, But Disk/Key

BIOS Feature Setup

Note   *While setting up the DiskOnModule or DiskOnFlash module, the CPU has to boot on the floppy drive!*

Boot Sequence: **A,C,SCSI**

Note   *Remember to put back before booting from DiskOnModule!*

Boot Sequence: **C,A,SCSI**

Virus Warning: Disabled

CPU Internal Cache: Enabled

External Cache: Enabled

CPU L2 Cache ECC Checking: Enabled

Processor Number Feature: Enabled

Quick Power On Self Test: Enabled

Boot Sequence: C,A,SCSI

Swap Floppy Drive: Disabled

Boot Up Floppy Seek: Disabled

Boot Up NumLock: On

Gate A20 Option: Fast

Typematic Rate Setting: Disabled

Typematic Rate (Char/Sec):   6

Typematic Delay (Msec):   250

Security Option: Setup

PCI/VGA Palette Snoop: Disabled

OS Select For DRAM > 64MB: Non-OS2

Report No FDD Fpr WIN 95:   Yes

Video BIOS Shadow: Disabled

C8000-CBFFF Shadow: Disabled

CC000-CFFFF Shadow: Disabled

D0000-D3FFF Shadow: Disabled

D4000-D7FFF Shadow: Disabled

D8000-DBFFF Shadow: Disabled

DC000-DFFFF Shadow: Disabled

Chipset Features Setup

SDRAM RAS-to-CAS Delay: 3

SDRAM RAS Precharge Time: 3

SDRAM CAS latency Time: 3

SDRAM Precharge Control: Disabled

DRAM Data Integrity Mode: Non-ECC

System BIOS Chacheable: Disabled

Video BIOS Chacheable: Disabled

Video RAM Chacheable: Disabled

8 Bit I/O Recovery Time: 3

16 Bit I/O Recovery Time: 2

Memory Hole at 15M-16M: Enabled

Passive Release: Enabled

Delayed Transaction: Disabled

AGP Aperture Size (MB):   64

CPU Warning Temperature: 66°C/151°F

Current System Temp:

Current CPU Temperature

CPU FAN Speed

VCCP: VTT:

VCC3:   + 5 V:

+12 V: -12 V:

- 5 V:

Shutdown Temperature: 70°C/158°F

Power Management Setup

ACPI function: Disabled

Power Management: User Define

PM Control by APM: No

Video Off Method: V/H SYNC+Blank

Video Off After: NA

MODEM Use IRQ: NA

Doze Mode: Disable

Standby Mode: Disable

Suspend Mode: Disable

HDD Power Down: Disable

Throttle Duty Cycle: 62.5%

PCI/VGA Act-Monitor: Disabled

Soft-Off by PWR-BTTN: Instant-Off

PowerOn by Ring: Enabled

Resume by Alarm: Disabled

IRQ 8 Break Suspend: Disabled

** Reload Global Timer Events **

IRQ[3-7,9-15],NMI: Disabled

Primary IDE 0:   Disabled

Primary IDE 1:   Disabled

Secondary IDE 0:   Disabled

Secondary IDE 1:   Disabled

Floppy Disk: Disabled

Serial Port: Enabled

Parallel Port: Disabled

PNP/PCI Configuration

PNP OS Installed: No

Resource Controlled By: Manual

Reset Configuration: Disabled

IRQ-3 assigned to: Legacy ISA

IRQ-4 assigned to: Legacy ISA

IRQ-5 assigned to: PCI/ISA PnP

IRQ-7 assigned to: Legacy ISA

IRQ-9 assigned to: Legacy ISA

IRQ-10 assigned to: Legacy ISA

IRQ-11 assigned to: Legacy ISA

IRQ-12 assigned to: Legacy ISA

IRQ-14 assigned to: PCI/ISA PnP

IRQ-15 assigned to: PCI/ISA PnP

DMA-0 assigned to: PCI/ISA PnP

DMA-1 assigned to: PCI/ISA PnP

DMA-3 assigned to: PCI/ISA PnP

DMA-5 assigned to: PCI/ISA PnP

DMA-6 assigned to: PCI/ISA PnP

DMA-7 assigned to: PCI/ISA PnP

Used MEM base addr: N/A

Load BIOS Defaults

NO

Load Setup Defaults

NO

Integrated peripherals

IDE HDD Block Mode:	Enabled
IDE Primary Master PIO:	Auto
IDE Primary Slave PIO:	Auto
IDE Secondary Master PIO:	Auto
IDE Secondary Slave PIO:	Auto
IDE Primary Master UDMA:	Auto
IDE Primary Slave UDMA:	Auto
IDE Secondary Master UDMA:	Auto
IDE Secondary Slave UDMA:	Auto
On-Chip Primary PCI IDE:	Enabled
On-Chip Secondary PCI IDE:	Enabled
USB Keyboard Support:	Disabled
Init Display first:	PCI Slot
KBC input clock:	8 MHz
Onboard FDC Controller:	Enabled
Onboard Serial Port 1:	3F8/IRQ4
Onboard Serial Port 2:	2F8/IRQ3
UART Mode Select:	Normal
Onboard Parallel Port:	378/IRQ7
Parallel Port Mode:	SPP

Supervisor password

PASSWORD DISABLED

User password

PASSWORD DISABLED

IDE HDD Auto detection

Do not choose Disk On Module here, it should be set to auto:

Primary Master: No

Primary Slave: No

Secondary Master: No

Secondary Slave: No

Save and Exit Setup

YES

8.3 CMOS SETUP - AUV Processing Unit

Setup for Cool Monster (C3/400)

To change the setup you must mount a standard VGA card and connect a VGA monitor and a keyboard.

Main

System Time
System Date

Legacy Diskette A: [1.44/1.25 MB 31/2]
Legacy Diskette B: [Disabled]

Primary Master:

- Type: [Auto]
- 32 Bit I/O   [Disabled]

Primary Slave:

- Type: [Auto]
- 32 Bit I/O   [Disabled]

Secondary Master:

- Type: [Auto]
- 32 Bit I/O   [Disabled]

Secondary Slave:

- Type: [Auto]
- 32 Bit I/O   [Disabled]

Memory Shadow:

- CC00 - CFFF [Disabled]
- D000 - D3FF [Disabled]
- D400 - D7FF [Disabled]
- D800 - DBFF [Disabled]
- DC00 - DFFF [Disabled]

Memory Cache:

- Memory Chache: [Enabled]
- Chache System BIOS Area: [Write Protect]
- Chache Video BIOS Area: [Write Protect]
- Chache Extended Memory Area: [Write Back]
- Chache CC00 - CFFF: [Disabled]
- Chache D000 - D3FF: [Disabled]
- Chache D400 - D7FF: [Disabled]
- Chache D800 - DBFF: [Disabled]
- Chache DC00 - DFFF: [Disabled]

System Memory: 640 KB
Extended Memory: 62 MB

Advanced

Note

Setup Warning: Setting items on this menu to incorrect values
may cause your system to malfunction.

Advanced Chipset Control:

- Graphics Aperture: [64 Mb]
- Enable memory gap: [Extended]
- EEC Config: [Disabled]
- SERR signal condition: [Multiple bit]

- 8-bit I/O Recovery: [4.5]
- 6 bit I/O Recovery: [4.5]

PNP OS Installed: [No]
Reset Configuration Data: [No]
Secured Setup Configurations: [Yes]

PCI Configuration:

- PCI Device, Slot #1
  - Option ROM Scan: [Enabled]
  - Enable Master: [Enabled]
  - Latency Timer: [0040h]
- PCI Device, Slot #2
  - Option ROM Scan: [Enabled]
  - Enable Master: [Enabled]
  - Latency Timer: [0040h]
- PCI Device, Slot #3
  - Option ROM Scan: [Enabled]
  - Enable Master: [Enabled]
  - Latency Timer: [0040h]
- PCI Device, Slot #4
  - Option ROM Scan: [Enabled]
  - Enable Master: [Enabled]
  - Latency Timer: [0040h]

PCI IRQ line 1:   [Auto Select]
PCI IRQ line 2:   [Auto Select]
PCI IRQ line 3:   [Auto Select]
PCI IRQ line 4:   [Auto Select]

PCI/PNP ISA UMB Exclusion:

- CC00 - CFFFF: [Available]
- D000 - D3FFF: [Available]
- D400 - D7FFF: [Available]
- D800 - DBFFF: [Available]
- C00 - DFFFF: [Available]

PCI/PNP ISA IRQ Resource Exclusion

- IRQ 3:   [Available]
- IRQ 4:   [Available]
- IRQ 5:   [Available]
- IRQ 7:   [Available]
- IRQ 9:   [Reserved]
- IRQ 10: [Reserved]
- IRQ 11: [Available]
- IRQ 12: [Reserved]

Default Primary Video Adapter:[AGP]
ISA graphics device installed: [No]
Assign IRQ to PCI VGA   [No]

PS/2 Mouse: [Disabled]

Keyboard Features:

- NumLock: [Auto]
- Key Click: [Disabled]
- Keyboard auto-repeat rate: [30/sec]
- Keyboard auto-repeat delay: [1/2 sec]

I/O Device Configuration:

- Local Bus IDE adapter: [Both]
- Floppy disk controller: [Enabled]
    - Base I/O address: [Primary]
    - Floppy Drive Swap:[Disabled]

- Serial port A: [Enabled]
    - Base I/O address: [3F8]
    - Interrupt: [IRQ 4]
- Serial port B: [Enabled]
    - Mode: [Normal]
    - Base I/O address: [2F8]
    - Interrupt: [IRQ 3]

- Serial port C: [Enabled]
    - Base I/O address: [3E8]
    - Interrupt: [IRQ 11]
- Serial port D: [Enabled]
    - Base I/O address: [2E8]
    - Interrupt: [IRQ 11]
    - Interface: [RS232]
- Parallel port: [Enabled]
    - Mode: [EPC]
    - Base I/O address: [378]
    - Interrupt: [IRQ 7]
    - DMA channel: [DMA 3]

Legacy USB Support: [Disabled]

Watchdog Setting:

   - Mode: [Disabled]

Large Disk Access Mode: [DOS]

Halt On Error: [Yes]

Security

Supervisor Password Is: Clear
User Password Is: Clear

Set Supervisor Password: [Enter]
Set User Password: [Enter]

Password on boot: [Disabled]
Fixed disk boot sector: [Normal]
Diskette access: [Supervisor]

Virus check reminder: [Disabled]
System backup reminder: [Disabled]

Power

Power Savings: [Disabled]

Standby Timeout: [Off]
Auto Suspend Timeout: [Off]

IDE Drive 0 Monitoring: [Disabled]
IDE Drive 1 Monitoring: [Disabled]
IDE Drive 2 Monitoring: [Disabled]
IDE Drive 3 Monitoring: [Disabled]

PCI Bus Monitoring: [Disabled]

Boot

Floppy check: [Disabled]
Summary screen: [Disabled]
QuickBoot Mode: [Disabled]
Dark Boot: [Disabled]

Boot Device Priority

Hard Drive:

- SanDisk

- Primary Master

- Bootable Add-in Cards

Removable Devices

- Legacy Floppy Drives

ATAPI CD-ROM Drive

Network Boot

Onboard LAN RPL ROM   [Disabled]

Format the Boot drive for SM 2000

- Format the Boot drive for SM 2000 to be a system drive. The flash disk is mounted as D:

  - format D: /s

- Copy the DOS boot files and VXWorks boot files for this SM 2000 system

  - The DOS files:

  - copy AUTOEXEC.BAT   D:

  - copy COMMAND.COM   D:

  - copy CONFIG.SYS   D:

  - The VXWorks files

  - copy VXLOAD.COM   D:

  - copy VXWORKS.ST   D:

- Make the directory for DOS commands.

  - mkdir c:\dos

- Copy the DOS files that are needed.
  - copy COUNTRY.SYS
  - copy DISPLAY.SYS
  - copy EDIT.COM
  - copy EGA.CPI
  - copy FDISK.EXE
  - copy FORMAT.COM
  - copy HIMEM.SYS
  - copy KEYB.COM
  - copy KEYBOARD.SYS
  - copy MODE.COM
  - copy QBASIC.EXE
  - copy SETVER.EXE
  - copy XCOPY.EXE
- Make the directory for BSP programs
  - mkdir c:\BSP_2000
- Copy the files for the BSP cards.
  - copy BBOT.OUT
  - copy C44A.OUT
  - copy C44D.OUT
  - copy C44X.OUT
  - copy C50.OUT
  - copy HC.OUT
  - copy HCT_MON.OUT
  - copy CALIB.TXT

9   REPLACEMENT PROCEDURES

9.1   Introduction

Overview

This chapter presents the basic procedures for disassembly and reassembly of the replaceable parts in the EM 2000 system.

Caution

The Sonar Head should not be opened by unauthorized personnel. We recommend that you contact your nearest Kongsberg Maritime office. When you open the Sonar Head, your insurance will no longer be regarded as valid!

Tools required

A standard tool set is required to perform the removal and replacement of the modules. This tool set should contain the following tools:

- Cabinet key

- Standard screwdrivers in different widths and lengths

- Standard cross-slot screwdrivers in different widths and lengths

- Allen keys in metric sizes

- Philips screwdrivers in different sizes

- Pozidrive screwdrivers in different sizes

- Flat nosed pliers

- Lap jointed pliers

- Wire cutters

- Soldering iron

- Open ended and ring spanners in metric sizes

- Adjustable spanners

- Socket set

The following expendables are recommended:

- Solder

- Wire straps in different sizes

9.2 Processing Unit procedures

Overview

The Line Replaceable Units (LRUs) in the EM 2000 Processing Unit are:

- 4-Ports Serial Line board
- Control Processor board (CPU)
- Beamformer & Signal Processor (BSP)
- Beamformer Interface (BIF)
- Fan
- Motherboard

Other devices:

- AC mains fuse and filters
- Fuses
- Fan drawers

The replacement procedures for these parts are described in the following disassembly and reassembly procedures.

The modules that are accessible, are described in this chapter.

Circuit boards and modules

Introduction

The system must be switched off prior to disassembly. Access is gained by opening the top and/or side panel(s) of the Processing Unit. How to open the Processing Unit is described under the Disassembly procedure.

Disassembly procedure

1   Remove the mounted cables from the applicable circuit boards.

2   Release the thumb-screws if required.

3   Pull the board/unit carefully out.

Reassembly procedure

1   Check links and switches on the new board and compare to the old board.

2   Insert new circuit boards and modules in reverse order. Mount the removed cables and the front covers.

3   Check that the circuit boards and modules have been installed in their correct locations! (Refer to the applicable pictures and drawings).

Fans

Introduction

Two of the fans are mounted on the bottom plate in the Processing Unit. One is mounted next to the Power Supply. Remember to switch off the system.

The system must be switched off prior to disassembly. Access is gained to the wired rack by opening the top panel of the Processing Unit. How to open the Processing Unit is described under Disassembly procedures of the Circuit boards and modules.

Disassembly procedure

1   When you have reached access to the fan, unscrew it, and remove the cable connected.

2   Replace the fan with a new one.

Reassembly procedure

1   Mount the screws, and put the cables back to their original place.

Power Supply

Introduction

How to open the Processing Unit is described under the Disassembly procedures of the Circuit boards and modules.

Disassembly procedure

1   Switch off the circuit breaker.

2   Unbolt the unit. It is mounted with four captive-bolts so they cannot fall out. The nuts and spring washers are accessible.

Reassembly procedure

The new power supply is replaced by reversing the above procedure.

10 EM DATAGRAM FORMATS

For information on this topic see own document (160962 EM Series Datagrams).

11 SYSTEM ADMINISTRATION (UNIX)

Note

If you have a SIS operator station please refer to the SIS Operator Manual.

11.1 Introduction

This chapter provides basic reference information useful for the EM 2000 system supervisor. In order to make the most of the information provided, you may need some basic knowledge of the Unix operating system.

11.2 Passwords

EM 2000 Installation setup

In order to change the installation parameters on the EM 2000 system, you need to enter a password. This password is common for all the operators of the EM 2000 system. You will automatically be prompted to enter the password once you select **Edit enable** in the **Edit** menu.

If a password has not been identified, the first attempt to modify the installation parameters will prompt you to enter a new password.

If the password is lost, the current password can be deleted by deleting the following file:

`$HOME/.eso_system/.esoEM 2000_protection`

No special privileges are required to delete this file. Once it is gone, the system will prompt you for a new password next time you choose **Edit enable**.

11.3 EM 2000 File system

Introduction

The EM 2000 requires a large number of individual files. Some are used for data storage, others for system setup, while some are used to store operator and system configurations. This chapter lists the various file types and provides brief explanations.

The notation $<name> is an "environment variable", usually specifying a filsystem directory.

Survey files

During a survey, the EM 2000 system will record and store the following file types:

- Raw data

- Survey data

The information is stored on the Operator Station harddisk on dedicated data formats defined by Kongsberg Maritime..

Survey data

These are the data files generated by the system. Note that files will only be stored if the **Survey Format To Disk** option is checked in the window opened by **Options** -> **Logging**.

These files are used by the post-processing software, and by the Survey Display program.

Note   *Unless this data is stored, the Survey Display application will not work.*

Raw data

These are the files containing the raw data retrieved during the survey. These files are the most important files collected during a survey. If you accidentally loose your survey data format files (required by the post-processing software), you can recreate these files based on the raw data files. Care should be taken to backup raw data files on a regular basis, using the backup facilities supplied as an integral part of the system.

Sound speed profiles

All the sound speed profiles are stored as separate files in directory specified by the environment variable.

$SHAREDHOME

The files have extension ***.asvp**

Absorption coefficient file

The absorption coefficient file contains number pairs of absorption coefficients and corresponding depths. The coefficients are integrated during loading to the echo sounder and the integrated value is used.   The file is named **absorption.coef** and is stored in directory:

$SHAREDHOME

Workstation I/O

When you define the use of the Operator Station's serial lines, the setup information is stored in the following file:

$HOME/.eso_system/esoSetup.serial

Echo sounder parameters

These are the files determining how the current echo sounder system is set up. The system uses separate files for runtime and installation parameters.

Installation setup

The installation setup information is saved in the following file:

Every time you save this file, a backup file is generated automatically. This file is named:

where:

    yyyy=year

    mm=month

    dd=day

    hh=hour

    mm=minute.

You can also save the setup files with other names you choose yourself. You can then pick any name, but you must keep the extension as ".installation". The extension is added automatically if you only specify the file name.

Runtime setup

The runtime setup information is saved in the following file:

esoEM2000Setup.runtime

Every time you save this file, a backup file is generated automatically. This file is named:

where:

yyyy=year

mm=month

dd=day

hh=hour

mm=minute.

You can also save the runtime files with other names you choose yourself. You can then pick any name, but you must keep the extension as ".runtime". The extension is added automatically if you only specify the file name.

Echo sounder status

The information in the Status Field in the Launchpad is stored in the following file:

$HOME/.eso_system/esoSetup.status

IP addresses, ports and datagrams

The IP addresses for the various items in the system, the ports used for the various applications, and the datagram distribution are collected in the following file:

$HOME/DPC.addresses.<host>

where <host> is the name of the Operator Station.

You may modify the contents of this file by using the **Options -> Datagram subscriptions** choices on the Launchpad.

The datagrams available are listed in the following file:

$HOME/.eso_system/esoSetup.datagrams

This is a static file, and will only be used by the system.

NMEA 0183

The information for the NMEA 0183 depth serial line is stored in the following file:

$HOME/.eso_system/esoSetup.serial

BIST files

When you run the built-in test applications, the results displayed in the output area in the BIST window may be saved to disk. The file is created with the following location and file name:

$HOME/.eso_system/BISToutput

Every time you save the information, the old file will be replaced. The information is stored in ASCII format.

Logfiles

Each application in the EM 2000 system issues report and error messages when required. These messages are collected in logfiles.

The size of the current logfile is monitored by the system. If it exceeds 8Mb, a warning dialogue pops up recommending a reset of the file. The actual reset is done using the **File**->**Reset Logfile** option, as instructed in the popup dialogue.

When you reset the logfile using the **File -> Reset logfile** command on the Launchpad, you may create a backup copy of the logfile. The backup is named:

$HOME/.eso_system/esoLogfile.yyyy_mmdd_hhmm

where:

yyyy=year

mm=month

dd=day

hh=hour

mm=minute.

In most cases you do not need to create backup copies of the logfile, since errors and warnings are logged to the survey logfiles during active surveying.

In addition to this logfile, the errors and warnings issued during a survey are saved on a separate file for the active survey. This file is only created while logging takes place. The file is:

$PROCHOM/<survey>/esoLogfile

where <survey> is the chosen name for the active survey.

Operator configuration files

These are the individual files containing the operator specified window layouts and desktop workspaces for the programs supervised by the EM 2000 Launchpad.

Default window layout

Each operator can define a preferred window and workspace layout, and then use the **Window Layout** -> **Save Operator's Layout** command on the launchpad's main menu to save this information. The name of the file will be:

$HOME/.eso_system/esoEmX_config.<operator>

where <operator> is the current operator of the system, as defined in the Launchpad's Survey field (below the program icons).

The default window layout is:

$HOME/.eso_system/esoEmX_config

<u>List of known operators</u>

The list of the operators known to the system is stored in the following file:

$HOME/.eso_system/esoSetup.operators

<u>User preferences</u>

All the preferences you define during the survey are stored in a separate file.

$HOME/.eso_system/esoSetup.launchpad

This file is created using the **Options -> User preferences** command on the Launchpad's main menu.

Survey jobs

These are the files generated by the Survey Display's Planning module. All these plans are located in the following directory:

$SHAREDHOME/<job name>.asciiplan

TOC files

The TOC (Table of Contents) files are created automatically when you select the Generate Tape TOC operation in the File Admin window.

Each TOC file contains a list of oll the files on the tape. This is normally all the files used for a specific survey, but in general it can be any file types recognized by the File Admin utility.

The TOC files can be named manually, or they can be assigned a name automatically. This name is then defined based on the curernt date and time with extension *.TOC.

The files are stored in the following directory:

$HOME/.eso_system/

11.4 File formats

Introduction

The main files are described in this chapter, but the header files that follow the system are only referred to and must be inspected by listing the header file of current interest or by checking the computer display.

Survey format and I/O library

The **Survey Format (SF)** files are the key files of the Kongsberg Maritime workstation systems. The files are located in the **$PROCHOME** directory. An I/O library from Kongsberg Maritime is supplied to the users who wish to access the data themselves. You can then install the I/O library whereever it fits for your development. Header files and libraries are available.

The **SF** is a Kongsberg Maritime defined format that fits for all Kongsberg multibeam echo sounder data, and for the EA 500 and EK 500 single beam echo sounders. The data is converted directly to this format if a Kongsberg Maritime logging system is used. As the lines are run, the raw data is fed into the **handleMessage** or **handleEmX** filter and stored correctly on the **$PROCHOME/<SurveyName>** directory, while the **survey.lines** file on the same directory is updated with information about the same line.

The survey format

Introduction

This is the Kongsberg Maritime workstation processing format that applies to all multibeam echo sounders and also to some single beam echo sounders. The format is used in other workstation products in addition to *Neptune*, such as *Merlin*, *Poseidon* and *Triton*.

The format is based on indexed files. For each line there is an index file which holds some common index data for each ping. The files handled by the index file are:

1   Depth file

2   Sonar Image file

3   Classification file

The following files have been defined as system administration files:

4   Parameter file

5   sound speed file

These files contain parameter settings and information about the sound speed that has been used during the data collection. The information about the used sound speed is vital for reprocessing old data with new sound speed profiles.

The position files (there might be several due to more than one positioning system) are treated separately. After position processing, a new valid position file is generated and will be used for further processing (Sensor 00), version 02.

A representation of the file structure is described by the following:

Index file	**Depth file**	**Position file**
FileHeadrec	FileHeadRec	FileHeadrec
PingHeadRed	DepthFileRec 1	PosHeadRec
IndexFileRec 1 1	DepthFileRec 2	PositionFileRec
IndexFileRec 2 2	....	PositionFileRec
....	....	....
....	DepthFileRec i	....
IndexFileRec i	....	PositionFileRec i
....	DepthFileRec n	....
IndexFileRec n	....	PositionFileRec n

Raw sidescan file	**Parameter file**	**sound speed file**
FileHeadRec	FileHeadRec	FileheadRec
SideHeadRec	ParameterRec 1	SndVelFileRec 1
SideRawFileRec 1	ParameterRec 2	SndVelFileRec 2
SideRawFileRec 2	....	....
....	....	....
....	ParameterRec i	SndVelFileRec i
SideRawFileRec i	....	....
....	ParameterRec n	SndVelFileRec n
SideRawFileRec n		

Survey format I/O library

The I/O sub-routine library can be used by a company or institution who have bought a license for a Kongsberg Maritime workstation product. It can also be distributed by the Kongsberg Maritime customer to others after agreement between Kongsberg Maritime and the institution or company. Maintenance and help with the library and files are given to those who have maintenance contract with Kongsberg Maritime.

The Survey format coordinate system

The coordinate system of the vessel has an x-axis along the ships keel pointing forwards from the origin of the ship. The y-axis points to starboard, and the z-axis points straight down giving the depths as positive values increasing with depth.

This generates the *right-hand coordinate system* on board the ship. Positive rotation around the axis is defined by the right-hand rule, giving a positive rotation of angles in the horizontal plane in the same way as the gyro rotates positively (Clockwise as seen from above the ship).

The data that is logged on files is in latitude/longitude coordinates. The data is represented by a 4-byte integer that has the following resolutions:

Latitude   :

2*10E7 decimal degrees per number unit (+90 to -90 degrees).

Longitude:

1*10E7 decimal degrees per number unit (+180 to -180 degrees).

Depths are treated with centimetre resolution in the EM 2000 system, and represented in this resolution on the XYZ files.

Use of the Kongsberg Maritime I/O library

Introduction

The Kongsberg Maritime I/O library consists of two different parts. One part is intended to be used by those who want to fit their own data into Kongsberg Maritime's *Survey Format* (SF) file format. The modules supported for this use are *msgSim* and *handleMessage*. The handleMessage takes its input data from the logging program (Mermaid/Merlin) or from msgSim. The other part is intended to be used by those who want to use Survey Format data. This part of the library is called RWlib (Read and Write library). All routines in the library return an integer as return parameter. This parameter is negative if something went wrong or the data returned are not valid.

Message simulator

The message simulator (**msgSim**) simulates messages from the logging system by reading one or more raw data files, putting the message length in front of each message and writing it to *stdout*. If the messages are separated on different data files, the files containing the depth data message must end with **.dpt**, position data with **.pos**, sidescan data with **.rss** and start/stop/parameter data with **.inf**. The module also handles the situation when all messages are collected in one file. All of these data files must only contain valid, complete messages and nothing else.

Message handling

Messages from Mermaid/Merlin or msgSim may be 'piped' into **handleMessage**. This module reads the messages from **stdin**, decodes them into survey format and writes them to file. The files written are:

- position files (.pos)
- depth files (.depth)
- sidescan files (.sidescan)
- parameter files (.para)
- sound speed files (.svel)
- index files (.ind).

The name of the new file starts with the line number, an underscore, the date of the start telegram, an underscore, the time, an underscore, sensor number, an underscore, version number and the extension.

Example:

0183_19921031_155630_00_01.depth

The module starts decoding and writing when a start telegram arrives and stops when a stop telegram arrives. If sidescan data is to be handled, depth data must be present, and if the data is to be used with "near real time" visualization (i.e. Merlin), position data must also be present. For information on how to run handleMessage, see the section "Command references".

Library calls

Introduction

The library is written in the ANSI "C" programming language. The definition and prototyping is done in the ***.h** files:

- readWriteFile.h

- SurveyLines.h

- newFormat.h

The return structures that you need to know about are found in the **newFormat.h** file. This file is documented internally in the file, while the other ***.h** files not are intended to be read, just included to supply you with the structures required for some of the calls. These calls are described here, and the prototyping is found in the above listed header files.

Writing new files

For writing new files in SF the library **libRW** is supported. With this library you can open, write and close new files in SF. Before a file (of any type) can be written, it must be opened by the appropriate open routine for this file type. The input parameters for these routines are:

- file directory,

- generic file name,

- sensor number (set to 0->zero)

- type specific header,

- a comment and a description of the process which created the file.

In addition file handler **newFilePnt** must be supported for each file (except for opening the index file) and one common write handler. E.g. this write handler is used for writing indices to files. To write new records to file, a set of writing routines are supported. All those writing routines have their specific record format, their file handler (except for writing pings) and the common write handler as parameters. When depth data or sidescan data is written, it must be specified which sounder (port or starboard for dual system or single for single system) the data comes from. To close the file (except the index file which is closed with a specific routine) the routine *closeNewFile* is called with the file handler as input.

All data are written to file in the native format (little or big Endian) in which the program is running. The index file (with ping data) is written every time the ping number changes. This is done automatically in **writeDepth** or **writePing**, which means that these routines must be called in order to let the index and ping records be written (ping number must be supplied and properly changed if not present in the raw datagram). Date and time must also be supplied for each record (ping and position) so that it will be possible to index a ping from position through data and time. When the index file is written, all indices are written including those for sidescan and position. As sidescan data only are accessible through the index file, all calls to either **writeDepth** or *writePing* must be made. Position data, on the other hand, may either be accessed via index (for "near real time") or via time. But in order to make indices for the position data correct, all data must be written in time sequence. The positions are also filtered for coarse jumps (i.e. more than one degree) and flagged accordingly before they are written. Available routines are described in the following paragraphs.

Open files

newIndexFile: Open and init index file

(IN: writeHandler, directory, fileName, sensor, pingHeader, comment, process)

newPosFile: Open and init position file

(IN: fileHandler, writeHandler, directory, fileName, sensor, posHeader, comment, process)

newDepthFile: Open and init depth file

(IN: fileHandler, writeHandler, directory, fileName, sensor, comment, process)

newSideFile: Open and init sidescan file

(IN: fileHandler, writeHandler, directory, fileName, sensor, sideHeader, comment, process)

newSvelFile: Open sound speed file

(IN: fileHandler, writeHandler, directory, fileName, sensor, comment, process)

newParaFile: Open parameter (start/stop/parameter) file

(IN: fileHandler, writeHandler, directory, fileName, sensor, comment, process)

Write files

writePos:– Write position data to file

(IN: fileHandler, writeHandler, positionRecord)

writeDepth: Write depth data to file (and possible also index and ping)

> (IN: fileHandler, writeHandler, sounder, depthRecord)

writeSidescan: Write sidescan data to file

> (IN: fileHandler, writeHandler, sounder, sidescanRecord)

writePing: Set current ping data, write ping and index data to file

> (IN: writeHandler, sounder, pingRecord)

writeSvel: Write sound speed data to file

> (IN: fileHandler, writeHandler, soundVelRecord)

writePara: Write parameter data to file

> (IN: fileHandler, writeHandler, parameterRecord)

Close files

closeNewFile: Close a file

> (IN: fileHandler)

closeIndexFile: Write last index/ping to file (if necessary), close index file

> (IN: writeHandler)

Reading and updating survey data

For those who only want to read or update data on SF, the library *libRW* is supplied. With this library you can open, read, copy, update and close the files containing SF data.

Before anything can be done with a file, it must be opened by the appropriate opening routine. These routines have the parameters:

1   file mode (r or r+)

2   directory

3   file name

4   sensor number (set to 0)

5   file version number as input

In addition a file handler must be supported for each file. For the index file an index handler must also be supported. It is through this index handler that depth, sidescan and (for "near real time") position data are accessible. The different opening routines then return some type specific data (e.g. a file header and number of record). To open a file for reading, set file mode to **r** and for updating set file mode to **r+**.

If the data is written on a machine with little Endian and read on a machine with big Endian format (or vice versa), it is automatically swapped when read, or updated. If the file is copied, then it is always copied to the native format of the machine the program is running on.

Note   *Compressed data can not be transferred between little Endian
        and big Endian machines.*

        Compressed data can not be transferred between little Endian
        and big Endian machines.

        The data can be accessed in several different ways. Ping data,
        position data, sound speed data and parameter data are accessed
        via an index number which starts at 0 (zero) and goes up to the
        number of records (minus one) for each file. Depth data and
        sidescan data are accessed via the file index. This index is set
        with the **setFileIndexno** routine. If the depth and sidescan data
        were produced by a dual echo sounder system, the port and
        starboard can be accessed via the *port* and *stb* parameters; for
        single echo sounder system, the *sing* parameter is used.

        To get an interpolated position for a ping, one must first call the
        routine **initPosInter**. This routine incudes an index to the first
        position and number of positions as input parameters. This is
        because all indexing on a file within a region is based on the
        indices from the position file. The routine uses a handler
        posSearchPnt and returns the first valid ping index and number
        of indices within the positions. These parameters should then be
        used in the loop to access the ping, depth and sidescan data.

        To get a ping with its position the routine **getPingPos** is used.
        This uses the parameter **indexHandler** set by **setFileIndexno**.
        You may also specify the maximum legal difference in time and
        in distance from the ping to the two nearest positions. If you
        only want ping data at a specific delta distance, this may also be
        set. If the routine returns with a negative number, no valid
        position exists for this ping. When finished, **freePosInter** is
        called.

        To update a file, the file must be opened with file mode = r+.
        Then all the update routines can be used. Access through the
        index handler to depth and sidescan files must still be used.
        When the updating is finished, **updateHeader** must be called to
        set the right time and process for file updated. If you want to
        change other data in the files than flags, the file should be
        copied (with copyFile) before it is updated. The routine
        copyFile has as input parameter the file handler and the new
        directory, and it returns the new file version number.

        To make a new position file from several position files
        (combine), the general file header must be copied with
        copyHeader. Then the copied file (header) must be opened
        with **openPosFileAppend** and position can be written (in
        sequence) with **updatePostion**.

There are also some convenience routines to update flags for position, ping and depth data. These routines read the data, check if some flags are changed and if so, write the changed data back. Modules that keep original survey data structures in memory, should use the ordinary update routines instead. It is however strongly recommended that you keep track of what flags (e.g. one variable that tells whether some of the depth flags for a ping are changed) that are changed, in order to minimize input/output. When depth flags are updated only those flags which are not equal NaN (Not a Number) are updated.

The module does also (for the time being) contain some routines to transform across- and along-data for each beam to either latitude and longitude or to UTM and to calculate the distance between two positions. Supplied routines are described in the following paragraphs.

<u>Open files</u>

openIndexFile   Open index file

     IN: fileHandler, indexHandler, fileMode, directory, fileName, sensor, versionNumber,

     OUT: pingHeader, sounderSystem, numbOfPing

openPosFile   Open position file

     IN: fileHandler, fileMode, directory, fileName, sensor, versionNumber,

     OUT**:** posHeader, numbOfPos

openDepthFile   Open depth file

     IN: fileHandler, fileMode, directory, fileName, sensor, versionNumber

openSideFile   Open sidescan file

     IN: fileHandler, fileMode, directory, fileName, sensor, versionNumber,

     OUT**:** sideHeader

openSvelFile   Open sound speed file

     IN: fileHandler, fileMode, directory, fileName, sensor, versionNumber,

     OUT**:** numbOfSvel

openParaFile   Open parameter file

     IN: fileHandler, fileMode, directory, fileName, sensor, versionNumber,

     OUT**:** numbOfPara

openPosFileAppend   Open position file for append

> IN: fileHandler, directory, fileName, sensor, versionNumber, posHeader)

Reading data

setFileIndexno   Set index and get ping data

> IN: fileHandler, indexHandler, pingIndex,

> OUT: pingRecord

getDepth   Get depth data

> IN: fileHandler, indexHandler,

> OUT: singDepthRecord, stbDepthRecord, portDepthRecord

getSidescan   Get sidescan data

> IN: fileHandler, indexHandler,

> OUT: singSidescanRecord, stbSidescanRecord, portSide-scanRecord

getPosition   Get position data

> IN: fileHandler, posIndex,

> OUT: positionRecord

getManyPos   Convenience routine to get many positions

> IN: fileHandler, fromPosIndex, numbOfPos,

> OUT: positionRecords

getSvel   Get sound speed data

> IN: fileHandler, svelIndex,

> OUT: soundVelRecord

getPara   Get parameter data

> IN: fileHandler, paraIndex,

> OUT: parameterRecord

getPosIndDateTime   Get position indexes from date and time

> IN: fileHandler, totNumbOfPos, fromDate, fromTime, toDate, toTime

> OUT: fromPosIndex, numbOfPos

initPosInter   Initiate for accessing interpolated positions for ping

> IN: positionFileHandler, indexFileHandler, posSearchPnt, posHeader, fromPosIndex, numbOfPos, totalNumbofPing,

OUT: fromPingIndex, numbOfPing

getPingPos Get ping with interpolated position

IN: indexFileHandler, indexHandler, posSearchPnt, pingIndex, deltaDistance, maximumDistance, maximumT imeDifference,

OUT: pingRecord, positionRecord

freePosInter Free data for position interpolation

IN: posSearchPnt

getManyIndex- Get noPing pings from fromPing

IN: indexFileHandler, fromPing, noPing,

OUT: indexes

getNoPing- Get number of ping in file

IN: indexFileHandler,

OUT: noPing

getInterPos Interpolate position from time and date

IN: positionFileHandler, indexFileHandler, posHead, maxDist, maxTimeDiff,

OUT: newPos

getPosList Get position data into position list

IN: positionFileHandler, posHead, fromPos, noPos, deltaDist, maxDist,

OUT: pingPosList

getPingList Get position data into ping list

IN: pingHead, posSearch, fromPing, noPing, deltaDist, maxDist, maxTimeDiff,

OUT: pingPosList

getFromNoOfPing Get fromping and no of pings for pings that are between two valid positions

IN: positionFileHandler, indexFileHandler, fromPos, noPos, totPing,

OUT: fromPing, noPing

flagPosJump Mark all position with pos_jump_flag which are outside a given range from the median of the surrounding positions

IN: posHead, noPos, pos, medianFilterType, maxDist

Copy file

copyFile Copy file

IN: fileHandler, directory,

OUT**:** versionNumber

copyHeader   Copy general file header

    IN: fileHandler, directory,

    OUT**:** versionNumber

<u>Update file</u>

updatePing   Update ping data and set index

    IN: fileHandler, indexhandler, pingIndex, pingRecord

updateDepth   Update depth data

    IN: fileHandler, indexHandler, singDepthRecord, stbDepthRecord, portDepthRecord

updateSidescan   Update sidescan data

    IN: fileHandler, indexHandler, singSidescanRecord, stbSidescanRecord, portSidescanRecord

updatePosition   Update position

    IN: fileHandler, posIndex, positionRecord

updateHeader   Update file header after updating file

    IN: fileHandler, process, comment

<u>Update flags</u>

updatePosFlag   Update position flag

    IN: fileHandler, posIndex, positionFlag

updatePingFlag   Update ping flag and set index

    IN: fileHandler, indexHandler, pingIndex, pingFlag

updateDepthFlag   Update depth flag for current index

    IN: fileHandler, indexHandler, singDepthFlagList, stbDepthFlagList, portDepthFlagList

<u>Close file</u>

closeFile   Close a file

    IN: fileHandler

Convenience routines

Some routines has been developed to make life easier for the programmers. These functions are listed below.

<u>Transform</u>

toLL   Transform each beam to latitude and longitude

    IN: positionRecord, posHeader, gyroHeading, depthRecord,

    OUT**:** latLongPositions

toUTM   Transform each beam to UTM

    IN: utmSone, positionRecord, posHeader, gyroHeading, depthRecord,

    OUT**:** utmPositions

getDiffDist   Calculate distance between to positions (in centimetres)

    IN: fromPositionRecord, toPositionRecord, posHeader

    OUT**:** distance

calcDirection   Calculate the direction from one position to another (in milli-degrees)

    IN: fromPositionRecord, toPositionRecord, posHeader

    OUT**:** direction

Header files

For each file there is a description on what it contains. The documentation is on the header file itself, and the user should consult this file. It is found in the IO library distribution.

For each file there is a description on what it contains. The documentation is on the header file itself, and the user should consult this file. It is found in the IO library distribution.

readWriteFile.h	Handlers and prototypes for readWriteFile.c
newFormat.h	Definition of survey format.
process.h	Process id. description
datum.h	List of datums
cdefine.h	Definitions of some C programming definitions used in the programs.
general.h	Definition of some general structures that are used several places in the code.

SurveyLines library

This file is important for all the processing. It includes all the lines of the survey, and identifies which versions are the most recent. The file is binary and is located on the $PROCHOME/<SurveyName> directory.

The file **survey.lines** is an index of all existing SF data files on current directory. The file **current.line** identifies the line currently being processed. These two files must be updated by the modules writing or updating SF files. All modules reading SF files get a list of existing survey format files by reading the **survey.lines** file. The sensors that exists for the different lines are also listed on a specific file. This is the **line.sensors** file. In addition a file called **adm.data** contains the sensors of the survey with their name and their id numbers.

Writing and updating

The following routines are supplied:

---

int SlAdd (

s110FileType ioFileType   /* **IN**: SL_SURVEY_L or SL_CURRENT_L */

  char *dir,   /* **IN**: Directory name */

  char *prefix,   /* **IN**: File name prefix */

  SlsurveyFileType survFileType /* **IN**: SL_POS, SL_INDEX, SL_DEPTH,or
                                          SL_SIDESCAN */

  int version,   /* **IN**: File version */

  ProDescType lastProc   /* **IN**: Process identification */

)

This function adds a new record to the **survey.lines** file. If a record for the directory/file name prefix combination of current interest already exists, this record is updated and no new record is added. For **current.line** SlAdd has the same functionality as for **survey.lines**, except that when a new record is added, the previous record is deleted.

---

int SlUpdate (

  SlIoFileType ioFileType,   /* **IN**: SL_SURVEY_L or SL_CURRENT_L */

  char *dir,   /* **IN**: Directory name */

  char *prefix,   /* **IN**: File name prefix */

  SlSurveyFileType survFileType /* **IN**: SL_POS, SL_INDEX, SL_DEPTH,or
                                          SL_SIDESCAN */

  int version,   /* **IN**: File version */

  ProDescType lastProc   /* **IN**: Process identification */

)

This function is equal to the SlAdd function, except that the current directory/file name prefix combination must exist. If the new version number is lower than the version number on the **survey.lines** file, then the datafiles (.pos, .ind, .depth, or .sidescan) with version number higher than the new version number will be deleted.

---

int SlDelete(

SlIoFileType ioFileType,   /* **IN**:   SL_SURVEY_L or SL_CURRENT_L */

char *dir,   /* **IN**:   Directory name */

char *prefix,   /* **IN**:   File name prefix */

SlSurveyFileType survFileType,   /* **IN**:   SL_POS,SL_INDEX,SL_DEPTH, or
                                              SL_SIDESCAN */

ProDescType lastPro   /* **IN**:   Process identification */

)

Delete a survey format file by setting the version equal to 0. The record is deleted in the **survey.lines** file. The datafile (.pos, .ind, .depth, or .sidescan) will be deleted.

int SlDeleteLine(

SlIoFileType ioFileType,   /* **IN**:   SL_SURVEY_L or SL_CURRENT_L */

char *dir,   /* **IN**:   Directory name */

char *prefix,   /* **IN**:   File name prefix */

ProDescType lastPro   /* **IN**:   Process identification */

)

Deletes all survey format files for a line by setting the versions equal to 0. The datafiles (.pos, .ind, .depth, and .sidescan) will be deleted and the file [<dir>/]<prefix>_00_01.para will be deleted

Reading

The following functions return information in a SlList structure (See the SurveyLines.h file for information about the structure). The following routines are supplied:

SlList *SlCreateList (

SlIoFileType ioFileType,   /* **IN**:   SL_SURVEY_L or SL_CURRENT_L */

)

Function for reading **survey.lines** and **current.line**. SlCreateList returns a SlList structure.

int SlUpdateList (

   SlIoFileType ioFileType,   /* **IN**:   SL_SURVEY_L or SL_CURRENT_L */

   SlList *ioList   /* **IN**:   Pointer to structure from the
                                        SlCreateList function */

)

SlUpdateList updates an existing SlList structure. Use SlCreateList once to create the list. Then call SlUpdateList repeatedly to get information on changes made to the survey.lines or current.line.

<u>Header files</u>

This is where the programmers can find the definitions of the structures of this library. The actual header files are:

SurveyLines.h   Survey line and current line structures.

lineSensors.h   Structures and routines for the **line.sensors** file.

Administration file I/O

<u>File format</u>

The **adm.data** file contains the names of the different sensors. The file is an ASCII file named where for each sensor the following data are written:

sensor <sensorType1> <N1> <name1>

sensor <sensorType2> <N2> <name2>

sensor <sensorType1> <N3> <name3>

where **Nx** is the sensor number on the Survey Format files, and **namex** is the name of the sensor. The **sensorTypex** is position or depth. This is when more than the usual EM sensor exists. The Merlin logging system will build this file and the **survey.lines** file automatically, and the default EM sensor is given by:

sensor position 0 undefined

<u>Reading</u>

To read the file, the following routine is called:

AdReadAdm (EvHandler *evHand)

And to fetch the sensors read:

AdGetSensors (int *noSensors, SensorPnt *snrPnt)

Structures and files

The structures are defined in the **adm.h** file.

11.5 Survey Predefined Files

Introduction

When you define and run a survey, you will always need information describing basic data or set-up, such as:

- projection data
- user defined colours
- user defined show/hide settings
- coastline contours
- course deviation

The **Survey Predefined Files** function allows you to build a set of templates to hold this kind of information.

File locations

The Survey Predefined Files are located in the $SHAREDHOME directory. In this directory, you can create subdirectories defining specific survey types, where the type can be defined by your own choice. You can for example create sets of files to match specific bottom conditions or geographical locations.

The result may be (for example):

$SHAREDHOME/Oslofjord/*.*

$SHAREDHOME/Mercator_30_degrees/*.*

In order to create the file structure, and to copy in the files you wish to use, you need to open a terminal window on your Operator Station and use the standard Unix commands.

→   *Refer to the applicable instruction manual(s) for a description of the terminal window and the Unix commands.*

Using the Survey Predefined Files

When you define a new survey using the options on the EM 2000 launchpad, you are asked which of the Survey Predefined Files you will use. When you select any of the templates on the list, the files in that directory are copied over to the survey directory on $PROCHOME.

Scope and purpose

This document defines the interfaces and use of the component **Projection**. The purpose with the document is to describe how the component interfaces with other components, and how the component is to be used.

Projection overview

Each and every survey should have a well defined projection. The Kongsberg Maritime Software will use the defined projection in all geographic displays and in many other programs where a projection is needed.

There are three major different ways to define a projection in the Kongsberg Maritime Software:

1   You have full access to the library PROJ.4 from USGS.

2   You can give Kongsberg Maritime the source code (in "C") to his preferred projection, and make that projection a permanent part of all Kongsberg Maritime Software.

3   You can program your own projections into the shared library (libsharedProj.so) which is used in all Kongsberg Maritime Software. A template of the source code is supplied by Kongsberg Maritime.

It should be noted that Kongsberg Maritime knows nothing about what goes on inside your projection routines. Some of these routines may contain datum transformations which should be known to the system operator.

Projection protocol

You should for each and every survey define your preferred projection. The projection used in a survey is defined in the file

$PROCHOME/<survey>/projection.data

The first word in the first line defines which projection to use. The file may look like this:

1   If the first word is "RijksDriehoksnet", the preferred projection for the Netherlands is used.

2   If the first word is "utm", a UTM-projection is used. Setting the UTM zone is however a little tricky:

utm
0 3
0 3

If the file looks like the above, UTM zone 31 is selected. The number 3 is the longitude.

3   If the first word is "sharedlib", the projection from the shared library libsharedProj.so is used

4   If the first word is "user_defined", a user defined projection from the USGS PROJ.4 library is used.

The file $PROCHOME/<survey>/projection.data may then look like this:

user_defined   defaultProjections:proj1

This means that the user defined projection using PROJ.4 is found in the file $PROJ_LIB/defaultsProjections and that the setup for the projection is taken from <proj1>.

The file $PROJ_LIB/defaultsProjections may look like this:

(which is standard PROJ.4, ref. [1], [2] and [3]):

```
<proj1>
proj=stere
x_0=155000
y_0=463000
k=0.9996
lat_0=52.156160556
lon_o=5.387638889
<proj2>
proj=utm
zone=31
```

5   If the first word is "GK_AUSTRIA", the preferred projection for Austria is selected. There are 16 parameters which controls this projection and they are all kept in the same file. These 16 parameters must be in the specified order in the file, the rest of the file is comments. As we can see this projection performs a datum transformation from WGS 84 to Bessel (Europe) prior to the projection. The projection itself is a Gauss-Krüger.

$PROCHOME/<survey>/projection.data may look like this:

```
GK_AUSTRIA
-563.9
-82.3
-463.4
4.47
4.85
1.88
4.46
6377397.155
299.15281285
```

16.333333333333
6378137.0
298.257223563
0
-5000000
500
!   Line1: GK_AUSTRIA tells Simrad Software
!   to use Gauss-Kruger for Austria.
!   Transformationsparameter
!   für die Umwandlung von WGS84-Koordinaten
!   nach Gauss-Krüger-Koordinaten bezogen
!   auf das Datum MGI
!   Zeile 1: Translation in x [m]
!   Zeile 2: Translation in y [m]
!   Zeile 3: Translation in z [m]
!   Zeile 4: Maßstab
!   Zeile 5: Rotation in x ["]
!   Zeile 6: Rotation in y ["]
!   Zeile 7: Rotation in z ["]
!   Zeile 8: große Halbachse [m]
!   Nutzersystem (z.B. Bessel)
!   Zeile 9: Abplattung Nutzersystem
!   (z.B. Bessel)
!   Zeile 10: Zentralmeridian Nutzersystem
!   (z.B. Bessel)
!   Zeile 11: große Halbachse [m] WGS84
!   Zeile 12:   Abplattung   WGS84
!   Zeile 13: Zuschlag Rechtswert
!   Zeile 14: Zuschlag Hochwert
!   Last line: Fixed height used in
!   projections.

Notes

The setup of the projection is quite important to do right which means that this should be done by qualified persons only. In the Neptune/Survey Display system it is possible to set up default surveys that you can use as templates for new surveys. These default surveys can then be set up with the correct projections and given names which makes it easy for the operator to choose a default survey of the correct type.

There is already a file $PROJ_LIB/defaultsProjections which is in use if some of the standard default surveys are used.

11.6 Dynamic Projection Library

Introduction

The purpose is to describe how the component interfaces with other components and how the component is to be used.

Overview

There need to be defined a shared library where the customer can implement his own projection routines to use with Kongsberg Maritime's Graphic System. This shared library will then be a permanent part of all graphic windows.

Dynamic projection library definitions

In the graphic system today you can set projection and some projection parameters in the file

$PROCHOME/<survey>/projection.data.

This file will also be used when you specify that projections shall be taken from the shared library **libsharedProj.so**. The shared library for customer defined projections, **libsharedProj.so**, must be put somewhere where the loader will find it at startup, **/usr/lib/libsharedProj.so**.

Dynamic projection library protocol

When you wish to use a projection defined in the shared library, the first line in the file
$PROCHOME/<survey>/projection.data must look like this:

sharedlib 5

The number (here: 5) is defined by you.

When the program (i.e. Survey, Merlin, GridDisplay) starts, it will look for the file
$PROCHOME/<survey>/projection.data. When it finds the word **sharedlib** as the first word in the file, the next word is read as an integer which identifies which projection will be used.

The **initUserProjection** routine is then called with this number as a parameter. This enables you to do additional initialisation to the projection. Since only the first line in $PROCHOME/ <survey>/projection.data is used by the system, you can freely use the rest of this file for additional parameters to be read at startup time.

Each and every projection should be associated with a name. This name will appear when you wish to plot something on a plotter. For Kongsberg Maritime's Graphic System to get this name, you must supply a routine **getUserProjectionName** which also has the number as an input parameter and returns a string with the name to be used for the projection.

When Kongsberg Maritime's Graphic System is set up to use projection routines from the shared **library libsharedProj.so**, it will do so by calling two routines. The routine used for projection is **userProjectionLatLongToNorthEast**, and the routine used for the reverse projection is **userProjectionNorthEastToLatLong**.

Example

This is an example of how the codes for

- initUserProjection

- getUserProjectionName

- userProjectionLatLongToNorthEast

- userProjectionNorthEastToLatLong

should look like:

```
/* **FILEHEADER**
** $Id: dummyRoutines.c,v 1.1.1.1
** 1997/01/23 08:45:44 tp Exp $
**
** Filename: dummyRoutines.c
** Date of creation: 23 Jan 1997
** Creator: Terje Pedersen
** Purpose: Dummy-routines for the shared
**    library libsharedProj.so
**    which can be changed by the customer.
** Copyright: Kongsberg Simrad AS
** **_FILEHEADER */
#include <stdlib.h> /*calloc-function*/
#include <string.h> /*memcpy-function*/
/* **S*************************************
* Routine:
*     initUserProjection
* Purpose:
*     Initialize the user's preferred
```

```
*     projection. The programmer has access to
*     the file projection.data in current
*     directory which the user controls.
* Parameters:
*     int userProjectionNumber (input)
*     This is the number found in
*     projection.data
*     where the first line looks like this:
*     sharedlib 4
*     In this case userProjectionNumber will be
*     4.
* Return values:
*     0 on success, -1 on error.
* References:
*     The Component Interface
*     Doucument: Neptune/UserProjections.
* Changes:
* **_S** *******************************/
int initUserProjection(int
userProjectionNumber)
{
  switch (userProjectionNumber){
  case 1:
    break;
  default:
    return -1;
  }/*switch*/
  return 0;
}/*initUserProjection*/
/* **S*************************************
* Routine:
*     getUserProjectionName
* Purpose:
*     Get the name to display in the
*     menus for this user projection.
* Parameters:
* int userProjectionNumber (input):
*     This is the number found  in
*     projection.data
*     where the first line looks like this:
*     sharedlib 4
*     In this case userProjectionNumber will
```

```
*      be 4.
* Return values:
*      A dynamically allocated character array
*      containing the name of the projection to
*      use. On error NULL is returned.
* References:
*      The Component Interface Doucument:
*      Neptune/UserProjections.
* Changes:
* **_S** *********************************/
char *getUserProjectionName(int
userProjectionNumber)
{
  char *p;
  if ((p = calloc(20,sizeof(char)))==NULL)
return NULL;
  switch (userProjectionNumber){
  case 1:
    memcpy(p,"User Projection 1",18);
    break;
  default:
    free(p);
    return NULL;
  }/*switch*/
  return p;
}/*getUserProjectionName*/
/* **S** *********************************
* Routine:
*      userProjectionLatLongToNorthEast
* Purpose:
*      This routine is called to get the
*      projection coordinates from the
*      geographic coordinates.
* Parameters:
* int userProjectionNumber (input):
*      See initUserProjection.
* double latitude, double longitude (input):
*      latitude and longitude in decimal
*      degrees.
* double *north, double *east (input/output):
*      pointers to doubles where to store the
*      projection coordinates north and east
```

```
*      (in meters).
* Return values:
*    0 on success, -1 on error.
* References:
*    The Component Interface Doucument:
*    Neptune/UserProjections.
* Changes:
* **_S** *********************************/
int userProjectionLatLongToNorthEast(int
userProjectionNumber,
     double latitude, double longitude,
     double *north, double *east)
{
  if (north == NULL || east == NULL) return
-1;
  switch (userProjectionNumber){
  case 1:
    break;
  default:
    return -1;
  }/*switch*/
  return 0;
}/*userProjectionLatLongToNorthEast*/
/* **S** *********************************
* Routine:
*    userProjectionNorthEastToLatLong
* Purpose:
*    This routine is called to get the
*    geographic coordinates from the
*    projection coordinates.
* Parameters:
* int userProjectionNumber (input):
*    See initUserProjection.
* double north, double east (input):
*    Projection coordinates (meters)
* double *latitude, double *longitude
* (input/output):
*   Pointers to doubles where to store the
*   geographic coordinates latitude and
*   longitude (desimal degrees).
* Return values:
*    0 on success, -1 on error.
```

```
* References:
*   The Component Interface Doucument:
*   Neptune/UserProjections.
* Changes:
* **_S** *********************************/
int userProjectionNorthEastToLatLong(int
userProjectionNumber,
     double north, double east,
     double *latitude, double *longitude)
{
  if (latitude == NULL || longitude == NULL)
return -1;
  switch (userProjectionNumber){
  case 1:
    break;
  default:
    return -1;
  }/*switch*/
    return 0;
}/*userProjectionNorthEastToLatLong*/
```

The makefile on a DEC OSF1 UNIX workstation looks like
this:

```
# $Id: Makefile,v 1.1 1997/01/23 11:12:07 tp
Exp $
# Makefile to create libsharedProj.so.
#
# 23 Jan 1997, Terje Pedersen
#
# Copyright: Kongsberg Simrad AS
#
#
.PHONY:install lib clean
CC=cc
LD=ld
LDFLAGS=-shared -no_archive
INSTALL=/usr/local/lib
dummyRoutines.o: dummyRoutines.c
@$(CC) -c $<
lib: dummyRoutines.o
```

```
@$(LD) $(LDFLAGS) -o libsharedProj.so
dummyRoutines.o -lc

install: lib
@cp libsharedProj.so
$(INSTALL)/libsharedProj.so
@cp dummyRoutines.h
$(NEPTUNEHOME)/include/simrad/.
@ls -l $(INSTALL)/libsharedProj.so
@ls -l
$(NEPTUNEHOME)/include/simrad/dummyRoutines.h

clean:
@rm dummyRoutines.o libsharedProj.so
```

The makefile is probably very similar on other platforms.

Notes

There are some restrictions on shared libraries on every platform. You should be aware of this. When upgrading Kongsberg Maritime Software the customer's shared library should be reinstalled to make sure it is the one being used. You are encouraged to use the initialisation routine to test that the projection is working.

Heights are not used in Kongsberg Maritime's Graphic system. It is not necessary in the projections since the height varies very little within one survey that a fixed height will suffice. This can be a parameter in $PROCHOME/<survey>/projection.data that you can read at startup time and use in the projections internally.

12 SPARE PARTS

12.1 Overview

This chapter contains an illustrated presentation of the spare parts available for the EM 2000 multibeam echo sounder. All the parts are not listed her, only those defined as Line Replaceable Units (LRU) to be changed by the on-board maintenance personnel.

12.2 Spares data presentation

Spares table

The parts are presented in a table format ("**5008**") specified by the Royal Norwegian Navy.

An example is shown below.

10 SNo	11 Drawing ref	13 Prod.p.no	15 Article name	18 Price	21 Unit	22 Quantity
	12 Other ref.	14 TM part.no	16 Technical data	19 TM code	26 User-spares	27 Base spares
	24 Date	17 NATO No		23 Status	20 Comp	25 Ser.no.
1	Fig.1 – 05.03.97	290–085827 – –	Powec Power Supply PMP 4M.02	– – –	EA 0 C	1 0 N/A
2	Fig.1 05.03.97	299–049179 – –	Fan Drawer Assembly	– – –	EA 0 C	3 0 N/A

The parts information in this table also conforms to the civilian standard **NS 5820** specified by the Norwegian Standardisation Society (Norges Standardiserings Forbund).

Parts list codes

These are the code descriptions for the information in the table.

No	Caption	Description
	Key codes to the parts list	
10	Serial no.	Row number in list.
11	Drawing no. & item no.	The number of the drawing, and the position on that drawing, of the part.
12	Other references	Any other applicable references are included here.
13	Producer's part no.	The part number to be used when ordering spares from Kongsberg Maritime AS.
14	True manufacturer's part no.	Part number designated by manufacturer of part. Will be same as (13) if part is manufactured or assembled by Kongsberg Maritime AS.
15	Article name	The name of the unit or part.
16	Technical data	Any additional technical information which may be relevant.
17	NATO catalogue no.	The NATO stock number will be added where appropriate.
18	Currency/unit price	Price of the part, and the applicable currency
19	True manufacturer's code	This is a code number to identify the suppliers of the parts to enableyou to order directly from the suppliers in an emergency.
20	Component	Component definition. **C** = a component which cannot be broken down into smaller units. **P** = a part which may contain separately replaceable components. **S** = a set of parts.
21	Unit	The SI units applicable to the component. E.G. m = metric units for bolts etc.
22	Quantity	The total number of that particular part included in the system.
23	Status	Code for use by the Navy. Will be completed by the Navy
24	Date	This is the date the row was last updated.
25	Serial number	The component serial number where applicable.
26	User spares	The suggested number of spares to be held by the user.
27	Spares at base	The suggested number of spares to be held at the user's home base.

12.3 Operator Station (HWS 10) spare parts

The line replaceable units in the HWS10 Operator Station are circuit boards, fans and power supply

Commercial items can be replaced by other manufactureres than the ones listed here. Ensure compability!

SNo	Drawing ref	Prod.p.no	Article name	Price	Unit	Quantity
	Other ref.	TM part.no	Technical data	TM code	User- spares	Base spares
	Date	NATO No	Other information	Status	Comp	Ser.no.
1	Fig.– – 01.04.04	719–099078 PC–DL DELUXE –	Motherboard – Commercial item (ASUS)	– – –	EA 0 C	1 0 N/A
2	Fig.– 01.04.04	719–099080 CT6472Z335 –	Memory PC2700, 512 MB DDR DIMM, Unbuffered, ECC Commercial item (Crucial)	– – –	EA 0 C	4 0 N/A
3	Fig.– 01.04.04	719–099079 BX80532KE2800B –	Processor Intel 2.8 GHz Xeon (PC533) (mounted on the motherboard)	– – –	EA 0 C	1 (or 2) 0 N/A
4	Fig.– 01.04.04	719–099081 V9560XT –	Graphics card Nvidia FX5600XT 128 MB Commercial item (ASUS)	– – –	EA 0 C	1 0 N/A
5	Fig.– 01.04.04	719–099093 WD1200JD –	Hard disk IDE, Caviar 120 GB, S–ATA Comm. item (Western Digital)	– – –	EA 0 C	1 0 N/A
6	Fig.– 01.04.04	719–099082 WD360GD –	Hard disk Raptor 36.7 GB S–ATA Comm. item (Western Digital)	– – –	EA 0 C	2 0 N/A
7	Fig.– 01.04.04	719–099085 SuperSwap 1100 –	Hot–Swap drive enclosure Disk enclosure for S–ATA disk Commercial item (Promise)	– – –	EA 0 C	2 0 N/A
8	Fig.– 01.04.04	719–099083 PX–708A/T3B –	DVD recorder 8 x DVD+R Commercial item (Plextor)	– – –	EA 0 C	1 0 N/A
9	Fig.– 01.04.04	719–099090 MPF–920–Z/121 –	3.5" floppy disk – Commercial item (Sony)	– – –	EA 0 C	1 0 N/A
10	Fig.– 01.04.04	719–099133 PILA8460BN –	Ethernet card 10/100 Mbs Commercial item (Intel)	– – –	EA 0 C	1 0 N/A
11	Fig.– 01.04.04	719–099084 DC–315U Ultra –	SCSI card Ultra narrow Commercial item (Tekram)	– – –	EA 0 C	1 0 N/A
12	Fig.– 01.04.04	719–099086 EG465AX–VE(W) FM 24P –	Power supply ATX 460W PFC Commercial item (Enermax)	– – –	EA 0 C	1 0 N/A
13	Fig.– 01.04.04	– FD121225HB –	Fan 80mm, 12Vdc Commercial item	– – –	EA 0 C	1 0 N/A
14	Fig.– 01.04.04	– KM128025HB –	Fan 120mm, 12Vdc Commercial item	– – –	EA 0 C	1 0 N/A

12.4 Processing Unit spare parts

The line replaceable units in the EM 2000 Processing Unit are:

- Circuit boards
- Fans
- Power supply

Note

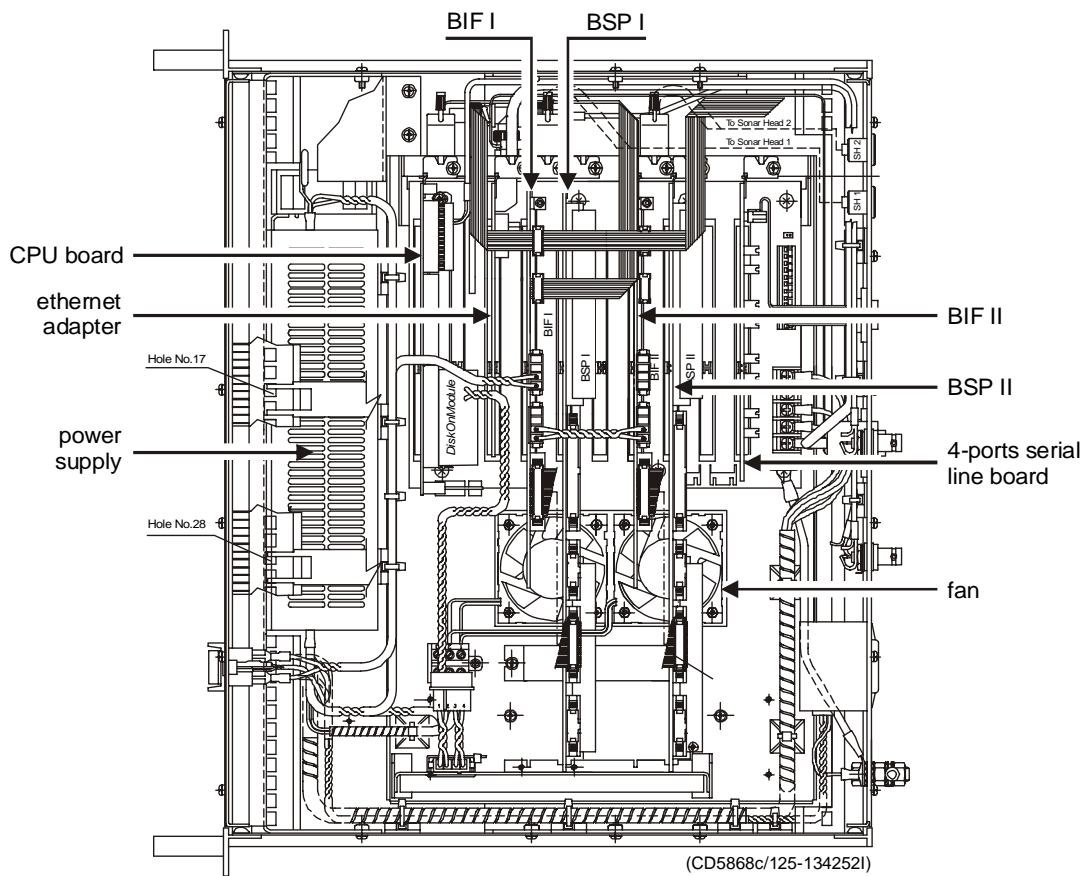*The AUV Processing Unit does not contain a power supply and serial board.*

Figure 28   The Processing Unit, spare parts

The spare parts in The Processing Unit are those circuit boards used in the chassis.

Standard Processing Unit spare parts

SNo	Drawing ref	Prod.p.no	Article name	Price	Unit	Quan-tity
	Other ref.	TM part.no	Technical data	TM code	User-spares	Base spares
	Date	NATO No	Other information	Status	Comp	Ser.no.
3	Fig.28	719–098382	4–ports Serial Line Board	–	EA	1
		–	CI–104JS	–	1	0
	21.06.02	–	Commercial item	–	C	N/A
3	Fig.28	719–087002	4–ports Serial Line Board	–	EA	1
		–	C114P	–	1	0
	21.06.02	–	Commercial item	–	C	N/A
3	Fig.28	382–214580	Beamformer & Signal Processor	–	EA	2
		–	(BSP, Old PU)	–	0	1
	21.06.02	–		–	C	N/A
3	Fig.28	382–218016	Beamformer & Signal Processor	–	EA	2
		–	(BSP, New PU)	–	0	1
	21.06.02	–		–	C	N/A
3	Fig.28	382–211722	Beamformer Interface (BIF B)	–	EA	2
		–		–	0	1
	21.06.02	–		–	C	N/A
5	Fig.28		Ethernet Adapter	–	EA	1
				–	0	1
	21.06.02		Commercial item	–	C	N/A
3	Fig.28	719–097597	Disk On Module	–	EA	2
		–	(mounted on the Processor board)	–	0	1
	21.06.02	–		–	C	N/A
2	Fig.28	719–087004	Passive Backplane	–	EA	1
		–		–	0	0
	21.06.02	–	Commercial item	–	C	N/A
2	Fig.28	719–098108	Processor Board VIPer	–	EA	1
		–		–	0	0
	21.06.02	–	Commercial item	–	C	N/A
2	Fig.28	719–097239	Processor Board SSC	–	EA	1
		–		–	0	0
	21.06.02	–	Commercial item	–	C	N/A
2	Fig.28	290–133924	Power Supply	–	EA	1
		–		–	0	0
	21.06.02	–		–	C	N/A
6	Fig.28	129–096870	Fan, axial, 12 Vdc	–	EA	2
		–		–	0	1
	21.06.02	–	Commercial item	–	C	N/A
6	Fig.28	129–096790	Fan, axial, 24 Vdc	–	EA	2
		–		–	0	1
	21.06.02	–	Commercial item	–	C	N/A

AUV Processing Unit spare parts
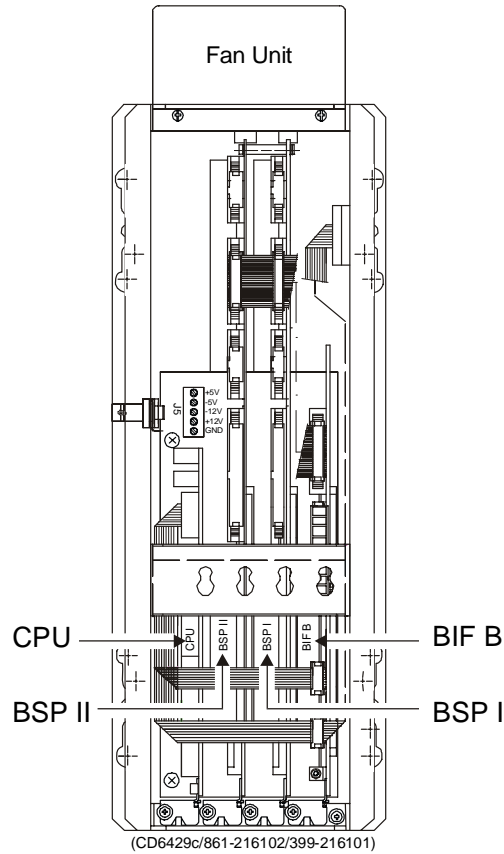
Figure 29   The AUV Processing Unit, spare parts

SNo	Drawing ref	Prod.p.no	Article name	Price	Unit	Quan-tity
	Other ref.	TM part.no	Technical data	TM code	User-spares	Base spares
	Date	NATO No	Other information	Status	Comp	Ser.no.
1	Fig.29	719–097988	Processor Board	–	EA	1
		–		–	0	0
	12.03.02	–	Commercial item	–	C	N/A
1	Fig.30	719–097988	Processor Board	–	EA	1
		–		–	0	0
	12.03.02	–	Commercial item	–	C	N/A
2	Fig.29	382–211722	Beamformer Interface (BIF B)	–	EA	1
		–		–	0	1
	12.03.02	–	Commercial item	–	C	N/A
2	Fig.30	382–211722	Beamformer Interface (BIF B)	–	EA	1
		–		–	0	1
	12.03.02	–	Commercial item	–	C	N/A
3	Fig.29	382–218016	Beamformer & Signal Processor (BSP)	–	EA	1
		–		–	0	1
	12.03.02	–	Commercial item	–	C	N/A
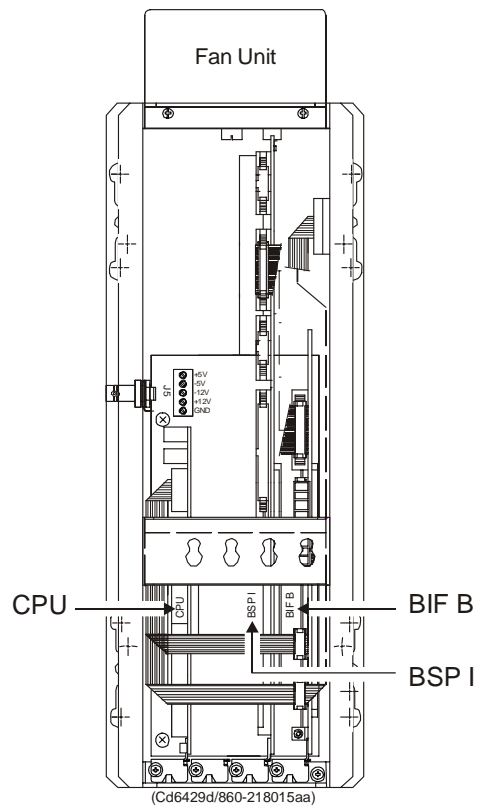
Figure 30   The AUV Processing Unit, spare parts

3	Fig.30	382–218016	Beamformer & Signal Processor	–	EA	1
		–	(BSP)	–	0	1
	12.03.02	–	Commercial item	–	C	N/A
4	Fig.29	382–215857	Passive Backplane	–	EA	1
		–		–	0	0
	12.03.02	–		–	C	N/A
4	Fig.30	382–215857	Passive Backplane	–	EA	1
		–		–	0	0
	12.03.02	–		–	C	N/A
5	Fig.29	719–097987	Disk On Module	–	EA	
		–	(mounted on the Processor board)	–	0	1
	12.03.02	–		–	C	N/A
5	Fig.30	719–097987	Disk On Module	–	EA	
		–	(mounted on the Processor board)	–	0	1
	12.03.02	–		–	C	N/A
6	Fig.29	129–098158	Fan, axial, 5 Vdc	–	EA	
		–		–	0	1
	21.06.02	–	Commercial item	–	C	N/A
6	Fig.30	129–098158	Fan, axial, 5 Vdc	–	EA	
		–		–	0	1
	21.06.02	–	Commercial item	–	C	N/A

12.5 Sonar Head spare parts

The line replaceable units in the EM 2000 Sonar Head are:

- Circuit boards

SNo	Drawing ref	Prod.p.no	Article name	Price	Unit	Quantity
	Other ref.	TM part.no	Technical data	TM code	User-spares	Base spares
	Date	NATO No	Other information	Status	Comp	Ser.no.
		382–213261	PCB HC2000 FP EM 2000			
	20.12.05					

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