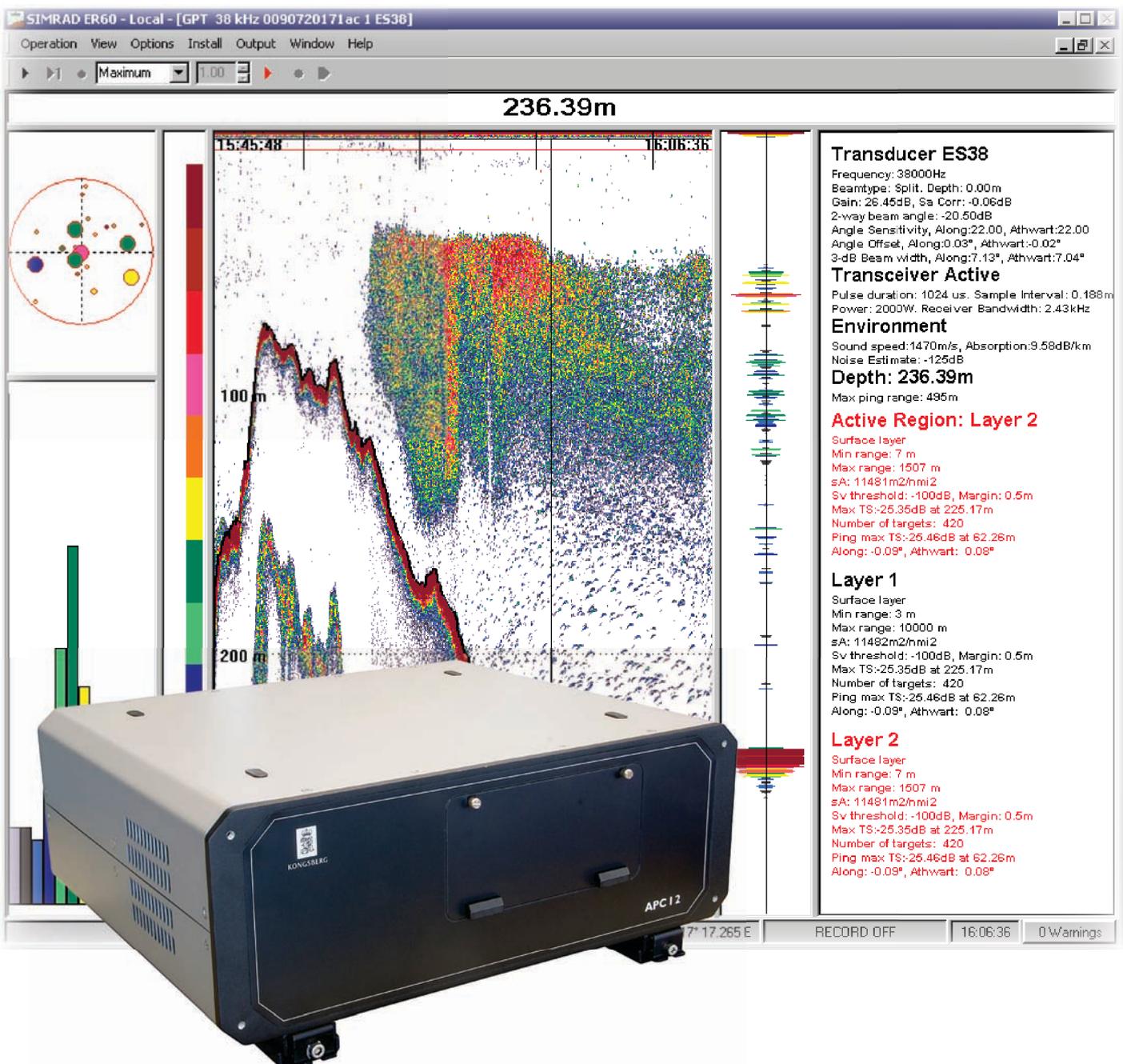


Installation manual

Simrad EK60 Scientific echo sounder APC12 Processor Unit installation





KONGSBERG

Simrad EK60 Processor Unit

Installation manual

This manual describes the installation and interface of the APC12 Processor Unit as used with the Simrad EK60 Scientific echo sounder.

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Disclaimer

Kongsberg Maritime AS endeavours to ensure that all information in this document is correct and fairly stated, but does not accept liability for any errors or omissions.

Warning

The equipment to which this manual applies must only be used for the purpose for which it was designed. Improper use or maintenance may cause damage to the equipment and/or injury to personnel. The user must be familiar with the contents of the appropriate manuals before attempting to install, operate or work on the equipment.

Kongsberg Maritime AS disclaims any responsibility for damage or injury caused by improper installation, use or maintenance of the equipment.

Support information

If you require maintenance or repair, contact your local dealer. You can also contact us using the following address: simrad.support@simrad.com. If you need information about our other products, visit <http://www.simrad.com>. On this website you will also find a list of our dealers and distributors.

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About this manual

Purpose

The purpose of this manual is to provide the information and basic drawings required for installation of the APC12 Processor Unit as used with the Simrad EK60 scientific echo sounder.

For more detailed information about the practical use of the product, refer to the *Simrad EK60 Instruction manual* and the *Simrad EK60 Reference manual*.

About the technical descriptions and the target audience

The manual is intended for technical personnel; qualified maintenance engineers and technicians. It is assumed that the personnel is conversant with the general principles of maritime electronic equipment, in particular sonar, echo sounder and catch monitoring systems. The personnel must also be familiar with computer hardware, signal processing, interface technology and traditional troubleshooting on electronic and mechanical products.

The instructions must be followed carefully to ensure optimal performance. As a guide, installation procedures are presented in the order they are to be performed.

Note

The installation instructions given in this document must be adhered to. Failure to do so may render the guarantee void.

Kongsberg Maritime AS will accept no responsibility for any damage or injury to the system, vessel or personnel caused by equipment that has been incorrectly installed or maintained, or by drawings, instructions or procedures that have not been prepared by us.

The equipment described in this manual includes the complete system with associated cabinets, but not system units provided locally by the customer, installation shipyard or local dealer. The manual also defines the equipment responsibility, and provides instructions for unpacking and storage.

After installation, this document must be stored on board the vessel for later reference when updating or servicing the equipment.

Installation drawings

Detailed vessel specific mechanical drawings for the installation must be provided by the customer, or any shipyard contracted to perform the installation.

Kongsberg Maritime AS may, on special order, provide assistance to these drawings. Drawings must be approved by the appropriate vessel certification authority prior to installation of the system.

Applicable outline dimension and production drawings are provided in the *Drawing file* chapter. Drawings may also be downloaded in PDF and/or DWG formats from <http://www.simrad.com>.

References

The following user manuals have been provided for the Simrad EK60.

All manuals may be downloaded from <http://www.simrad.com>.

- Simrad EK60 Reference manual [164692]
- Simrad BI60 Operator manual [164694]
- Simrad EK60 Installation manual [164696]

Simrad EK60

Study this chapter to familiarize yourself with the Simrad EK60.

Topics

- *System description* on page 8
- *System diagram* on page 8
- *Processor Unit* on page 9
- *Scope of supply* on page 9
- *General safety rules* on page 9
- *General supply conditions* on page 10
- *General installation requirements* on page 11
- *Support information* on page 12

Related topics

- *Equipment handling* on page 29
- *Basic cable requirements* on page 40

System description

The Simrad EK60 is designed for fishery research and incorporates the following primary features:

- The Simrad EK60 is flexible and easy to configure due to its modular design.
- User menus, dialogue boxes and system functions are manipulated using a standard mouse or roller ball. User input is provided using a standard keyboard.
- Raw sample data and/or data for further processing can be stored on the system's hard disk (or other recordable media).
- The EK60 display presentation has been designed with the standard Microsoft® Windows® interface in mind and operation is to a large extent very similar. Getting started should be relatively simple for users familiar with Microsoft® Windows® programs with basic system operation being intuitive.
- The store/replay function reduces the need for echogram printout on paper. Unprocessed transducer signals are recorded directly to the system's harddisk. During replay, signals are input into the echo sounder software as if it they where received directly from a transceiver.

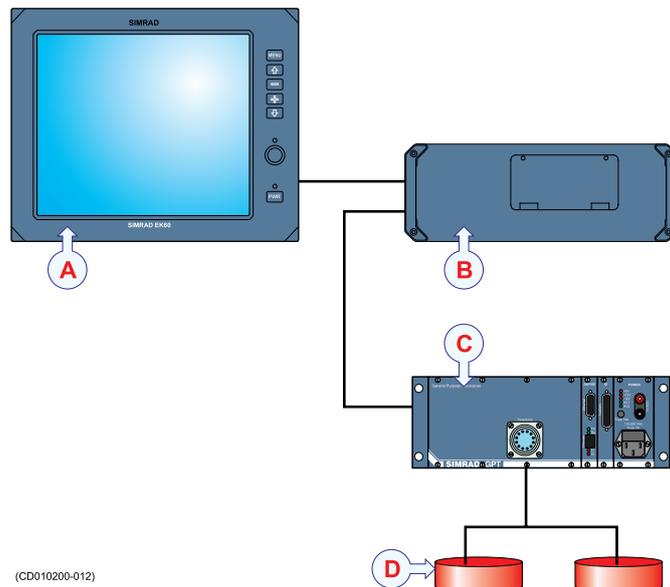
System diagram

This drawing shows the basic components of a Simrad EK60 system.

Different EK60 system configurations may include up to four transceivers.

- A *Colour display*
- B *Processor Unit*
- C *General Purpose Transceiver (GPT)*
- D *Transducer(s)*

Figure 1 Simplified system diagram



(CD010200-012)

Processor Unit

The EK60 Processor Unit is a high performance computer.

The computer software is based on the commercial Microsoft® Windows® XP® operating system.

The Processor Unit communicates with the echo sounder transceiver by means of an Ethernet cable. If more than one transceiver is used, a commercial Ethernet switch is used.

The software on the Processor Unit provides you with the following main functionality:

- Operational control of the Simrad EK60
- Communication with peripheral sensors and optional post-processing system(s)
- Menu system
- Context sensitive on-line help

Figure 2 Processor Unit



Scope of supply

The Simrad EK60 Processor Unit is by default provided with the following parts and units. Order numbers in brackets.

- [357359] EK60 Processor Unit (APC)
Includes keyboard, trackball and EK60 user documentation

General safety rules

WARNING

The Simrad EK60 operates on 230 Vac 50/60 Hz. This voltage is 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.
- Do not open the rack or cabinet doors while in rough seas. It may swing open suddenly and cause damage or injury.
- For safety reasons during troubleshooting on the equipment with power ON, two persons must always be present.
- Read and understand the applicable first aid instructions for electric shock.

- 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 may be heavy. Make sure that the appropriate tools and certified lifting equipment are available, and that the personnel are trained in installation and maintenance work.

General supply conditions

The following supply conditions are applicable to this Simrad EK60 delivery.

Equipment responsibility

The shipyard performing the installation and/or equipment dealer becomes fully responsible for the equipment upon receipt unless otherwise stated in the contract.

The duration of responsibility includes:

- The period of time the equipment is stored locally before installation.
- During the entire installation process.
- While commissioning the equipment.
- The period of time between commissioning and the final acceptance of the equipment by the end user (normally the owner of the vessel which the equipment has been installed).

Unless other arrangements have been made in the contract, the Simrad EK60 guarantee period (as specified in the contract) begins when the acceptance documents have been signed

Receipt, unpacking and storage

Upon accepting shipment of the equipment, the shipyard and/or the dealer should ensure that the delivery is complete and inspect each shipping container for evidence of physical damage. If this inspection reveals any indication of crushing, dropping, immersion in water or any other form of damage, the recipient should request that a representative from the company used to transport the equipment be present during unpacking.

All equipment should be inspected for physical damage, i.e. broken controls and indicators, dents, scratches etc. during unpacking. If any damage to the equipment is discovered, the recipient should notify both the transportation company and Kongsberg Maritime so that Kongsberg Maritime can arrange for replacement or repair of the damaged equipment.

Once unpacked, the equipment must be stored in a controlled environment with an atmosphere free of corrosive agents, excessive humidity or temperature extremes. The equipment must be covered to protect it from dust and other forms of contamination when stored.

For more information, see the appendix related to equipment handling.

→ *Equipment handling* on page 29

General installation requirements

The following installation requirements are applicable to this Kongsberg Maritime delivery.

Approval by classification society

The Simrad EK60 transducer installation must be approved by Det Norske Veritas (DNV) or another classification society.

The shipowner and shipyard performing the installation are responsible for obtaining the installation approval.

Supply power

The supply voltage to the equipment is to be kept within $\pm 10\%$ of the installation's nominal voltage. Maximum transient voltage variations on the main switchboard's bus-bars are not to exceed -15% to $+20\%$ of the nominal voltage (except under fault conditions).

Kongsberg Maritime recommends that the Simrad EK60 is powered using an Uninterrupted Power Supply (UPS) with sine wave output.

The UPS must have the capacity to independently maintain power to the system for a minimum of 10 minutes. This ensures that the system can be switched off in a controlled manner in the event of a power failure.

Compass deviation

Once the installation is complete, the vessel must be swung with the system in both the operative and inoperative modes. The shipowner and captain are responsible for updating the deviation table accordingly with regard to the vessel's national registry and corresponding maritime authority.

Noise sources

The vessel's hull, rudder(s) and propeller(s) should be thoroughly inspected in dry dock prior to installation.

Roughness below the water-line deformities in the shell plating and protruding obstacles can create underwater noise. These sources of turbulence must be smoothed or removed as best as possible. It is especially important that the propeller(s) is not pitted or damaged.

Dry docking

Make sure that ample clearance under the transducer(s) and/or protection blister is provided when dry docking the vessel.

Avoid locating supporting blocks or structures in the vicinity of this equipment.

Note

The location of the transducer(s) and/or protection blister(s) must be noted on the vessel's docking plan for future reference.

Prior to dry docking, power down all hydroacoustic systems, and label each system accordingly to prevent accidental power on.

Remove circuit breakers if necessary.

Wiring

All cables running between system cabinets located in different rooms and/or on different decks must be supported and protected along their entire lengths using conduits and/or cable trays. Note that the cables must not be installed in the vicinity of high-power supplies and cables, antenna cables or other possible sources of interference.

Note

Whenever possible, transducer cables must be run in steel conduits.

For more detailed information about cables and wiring, refer to the basic cable requirements.

→ *Basic cable requirements* on page 40

Support information

If you need additional technical support for your Simrad EK60 you must contact your local dealer, or one of our support departments. A list of all our dealers is provided on <http://www.simrad.com>.

Norway (Main office)

- **Address:** Strandpromenaden 50, 3190 Horten, Norway
- **Telephone:** +47 33 03 40 00
- **Telefax:** +47 33 04 29 87
- **E-mail address:** simrad.support@simrad.com
- **Website:** <http://www.simrad.no>

Spain

- **Address:** Poligono Partida Torres 38, 03570 Villajoyosa, Spain
- **Telephone:** +34 966 810 149
- **Telefax:** +34 966 852 304
- **E-mail address:** simrad.spain@simrad.com
- **Website:** <http://www.simrad.es>

USA

- **Address:** 19210 33rd Ave W, Lynnwood, WA 98036, USA
- **Telephone:** +1 425 712 1136
- **Telefax:** +1 425 712 1193
- **E-mail address:** simrad.usa@simrad.com
- **Website:** <http://www.simrad.com>

Installation

This chapter describes the installation of the Simrad EK60 Processor Unit.

Topics

- *Installation requirements* on page 15
- *Computer installation* on page 15
- *Display monitor installation* on page 16

Related topics

- *Processor Unit (341305)* on page 28

Installation requirements

Installation of the EK60 Processor Unit must be performed by qualified and trained personnel. Observe the following general guidelines for installation.

- The safe navigation of the vessel.
- The “Compass safe distance” for each individual unit.
- Ergonomically correct operating and viewing heights.
- Maximum allowable cable distances between the various units.
- The installation areas are dry, well ventilated and free of excessive dust and vibration.
- Easy access to the cable connections on the back of the equipment is provided.
- Enough extra cable is allowed to facilitate maintenance and service by not having to disconnect the cables.

Computer installation

This section describes the installation of the EK60 Processor Unit computer.

Preparations

Provide ample space around the computer. This is necessary to reach and use the front and rear mounted USB connectors, and the CD/DVD player. It is also important to allow for easy access to all the cables, and to provide for inspection, maintenance and parts replacement.

Make sure that the computer can be fully opened for unobstructed access to its internal parts.

- The computer can be installed inside a console, in a cabinet or 19” rack, or on a desk.
- Make sure that adequate ventilation is available to avoid overheating.
- The compass safe distance must be allowed for when planning the location of the unit.
- Ensure that the installation allows for the physical movements and forces normally experienced on a vessel.
- Ensure that enough space is provided for maintenance work.

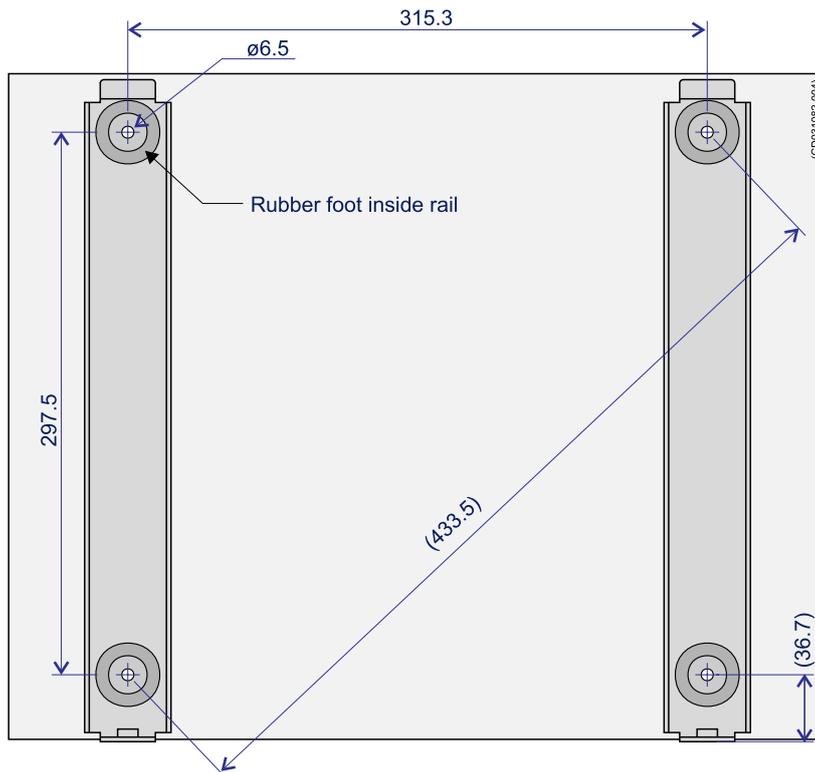
Installation procedure

- 1 Prepare the mounting location.
→ *Processor Unit (341305)* on page 28
- 2 Locate the footprint drawing (357424) provided with the computer.
Use the footprint drawing to position the base rails.
- 3 Disassemble the base rails from the computer by removing the two front base rail screws.
- 4 Attach the base rails as shown in the figure.

Note

Note that the four rubber bushings must be mounted on top of the base rails. These are required to provide vibration and shock absorption between the base rails, and the rails mounted on the computer.

Figure 3 Installation of the Processor Unit



- 5 Mount the computer onto the base rails.
 - a Hook the unit onto the rails at the rear end.
 - b Press it down.
 - c Secure the computer with the two front base rail screws

Display monitor installation

This section describes the installation of the EK60 Processor Unit display. The make and model of this display is determined by the customer. For this reason, the information provided here is only for guidance. For a detailed specific installation procedure, refer to the applicable documentation provided with the display.

- The display must be located so that it is best protected from glare which reduces readability.
- The display may be mounted in a panel, on the desktop or bulkhead, or overhead.

- Make sure that adequate ventilation is available to avoid overheating.
- The compass safe distance must be allowed for when planning the unit's location.
- Make sure that the installation allows for the physical movements and forces normally experienced on a vessel.
- Make sure that enough space is provided for maintenance work.

Cable layout

Note

For a full description of the cable layout, see the Simrad EK60 Instruction manual.

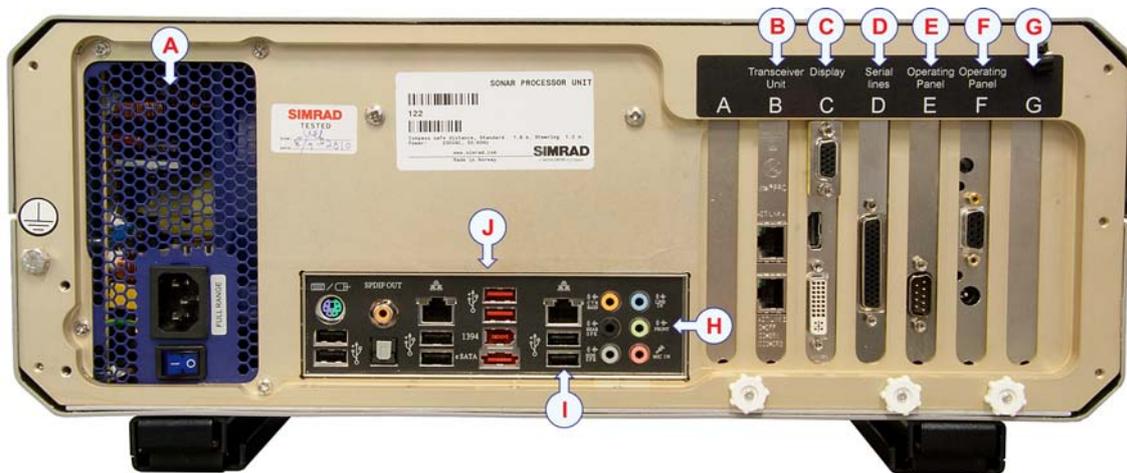
Topics

- *Connections* on page 19
- *Moxa CP134U-I Serial adapter setup* on page 19

Connections

Observe the following connections made to the Simrad EK60 Processor Unit.

Figure 4 Rear side of Processor Unit



- A Power supply with AC mains input
 - B Ethernet adapter with two connectors for cables to the transceiver. You will only need to use one of these connectors.
 - C Graphic adapter
 - D Serial interface board
 - E Serial interface connector, not used
 - F PC Power-On board, not used
 - G Empty slot, not used
 - H Audio output, not used
 - I USB connectors for keyboard and mouse
 - J Interface panel with various connectors
- Use one of the Ethernet connectors on this panel for communication with the ship's network.

Moxa CP134U-I Serial adapter setup

This section describes the **Moxa CP134U-I** 4-port optical isolated serial interface board.

This board is used on the Processor Unit to provide multiple serial line connections. The other serial ports on the computer (slots E and F) are not supported.

Serial line support

The 4-port serial board supports the following serial line interface formats:

- **Port 1:** RS-232/422/485
- **Port 2:** RS-232/422/485
- **Port 3:** RS-422/485
- **Port 4:** RS-422/485

Note

*By manufacturer default, all these serial connections are set to **RS-422** format. In order to change this to RS-232 or RS-485 format, dedicated jumpers or DIP switches must be changed.*

Note that only ports 1 and 2 support RS-232 format.

Jumper and DIP switch settings

Use the 10-pin jumper arrays and the two DIP switches to set ports 1 and 2 to RS-232, RS-422, or RS-485. Use the two DIP switches to set ports 3 and 4 to RS-422 or RS-485.

- **RS-232:** In order to use Port 1 (COM2) or Port 2 (COM3) as RS-232 interfaces, the relevant jumper arrays for Port 1 or Port 2 must be moved. Note that ports 3 and 4 do not support RS-232 format.
- **RS-422:** All four ports can be set to RS-422 using the two jumpers and the right-hand DIP switch S2.
- **RS-485:** All four ports can be set to RS-485 using the two jumpers and the right-hand DIP switch S2. Additionally, each port can be selected for a 2-wire or 4-wire connection type using the left-hand DIP switch S1.

Figure 5 Location of the jumpers and DIP switches

- A Jumper for Port 1 interface setup
- B Jumper for Port 2 interface setup
- C DIP-switch S1 for 2-wire or 4-wire setup (all ports)
- D DIP-switch S2 for RS-422 or RS-485 selection (all ports)

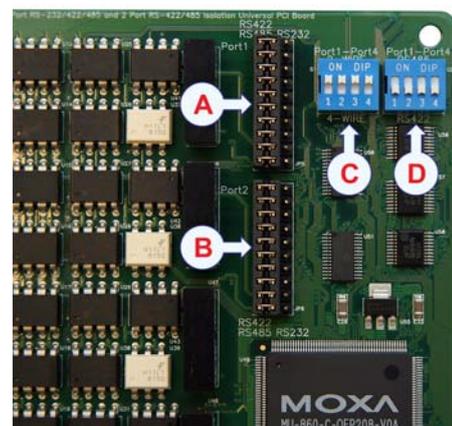


Table 1 Serial lines jumper and DIP switch settings

Port	Interface	Jumper	S1	S2
Port 1	RS-232	Port 1 to right		
	RS-422	Port 1 to left		1 to OFF
	2-wire RS-485	Port 1 to left	1 to ON	1 to ON
	4-wire RS-485	Port 1 to left	1 to OFF	1 to ON
Port 2	RS-232	Port 2 to right		
	RS-422	Port 2 to left		2 to OFF
	2-wire RS-485	Port 2 to left	2 to ON	2 to ON
	4-wire RS-485	Port 2 to left	2 to OFF	2 to ON
Port 3	RS-422			3 to OFF
	2-wire RS-485		3 to ON	3 to ON
	4-wire RS-485		3 to OFF	3 to ON
Port 4	RS-422			4 to OFF
	2-wire RS-485		4 to ON	4 to ON
	4-wire RS-485		4 to OFF	4 to ON

Note: [Blank] = Not active or not used. Ports 3 and 4 do not support RS-232.

Table 2 Serial lines DIP switch settings, examples

DIP switch	Setting
	Port 1 set for RS-422 transmission.
	Port 1 set for 2-wire RS-485 transmission.

Table 2 Serial lines DIP switch settings, examples (cont'd.)

DIP switch	Setting
	Port 1 set for 4-wire RS-485 transmission.

Adapter cable

An adapter cable is included in the delivery. This allows for connection of four individual 9-pin D-sub connectors to the serial interface board.

Table 3 Moxa CP134U-I 9-pin D-connector converter

Pin	RS-232	RS-422	RS485 (4-wire)	RS485 (2-wire)
1	DCD	TXD-(A)	TXD-(A)	—
2	RxD	TXD+(B)	TXD+(B)	—
3	TxD	RXD+(B)	RXD+(B)	Data-(B)
4	DTR	RXD-(A)	RXD-(A)	Data-(A)
5	GND	GND	GND	GND
6	DSR	—	—	—
7	RTS	—	—	—
8	CTS	—	—	—
9	—	—	—	—

Software backup and restore

When the EK60 has installation has been finalized, all the settings have been made, and all the tests have been run, you must create a software backup with all the software on the Processor Unit.

Note

The procedures provided here assume that you have a keyboard and a mouse available, and that you are familiar with computers and the Windows operating system.

Topics

- *About EK60 backup and restore on page 23*
- *How to create a backup image on page 24*
- *How to restore from a backup image on page 24*
- *How to create a bootable USB memory stick on page 25*

About EK60 backup and restore

Software backup is provided using dedicated software and storage devices.

A USB memory device is included with the EK60 system. This device is bootable, and it contains the following folders:

- **WIN XP image with license**

This folder contains the backup file that was created during the computer setup. It contains the complete and licensed operating system. It does not include the EK60 software.

- **Root**

The root folder contains the DOS boot files and the Ghost utility.

We strongly advice you to create your own backup once the installation has been completed. Your backup will then include the operating system, the system software, as well as all the interface parameters that you have defined.

→ *How to create a backup image on page 24*

How to create a backup image

This procedure is used when you wish to create a backup containing all the software files on the EK60 computer. The application used to do the backup is **Norton Ghost 8**. This application is provided on a bootable USB memory device.

To create the backup image, you need the bootable USB memory device provided with the EK60.

- 1 Boot the computer from the USB memory device.

This procedure describes how to start up the EK60 computer from a bootable USB memory device, and how the **Norton Ghost 8** utility starts automatically.

- a Insert the bootable memory device (USB memory stick).
- b Power up the with the front mounted on/off button (behind the lid).
- c As soon as the BIOS starts to load, press **F8** to choose boot device.
- d When the boot device selection dialog opens, choose the USB memory stick.
It is normally identified as USB: [name of memory stick]
- e Allow the computer to boot.
- f Observe that the **Norton Ghost 8** utility starts automatically.
- g Click **Ok** in the **Norton Ghost 8** start-up dialog.

- 2 Click **Local** → **Disk** → **To image**.

- 3 Choose the local source drive. This is the disk partition to be copied to the backup disk.

Click **2** to select the largest partition. The small partition is the USB memory device.

- 4 Click **Ok**.

- 5 Choose which folder on the USB memory stick to hold the data.

If you use the factory USB memory device, folder **Backup** has been prepared for this use.

- 6 Enter preferred name for the image file.

- 7 Click **Save**.

- 8 In the next dialog, click **High** to use maximum file compression.

- 9 In the next dialog, click **Yes** to proceed with the image file creation.

- 10 Wait for the backup process to finish. Once completed, remove the USB memory stick, and restart the computer.

How to restore from a backup image

This procedure is used when you wish to restore the EK60 software from a pre-made backup file containing your entire installation. The backup file may either be generic, or it may be custom made to fit your system. The application used to restore from the backup is **Norton Ghost 8**.

If you restore your system from a generic image file, you must both change the Windows license, and activate it, before you can use the EK60. You must also reinstall the EK60 software.

- 1 Boot the computer from the USB memory device.

This procedure describes how to start up the EK60 computer from a bootable USB memory device, and how the **Norton Ghost 8** utility starts automatically.

- a Insert the bootable memory device (USB memory stick).
 - b Power up the with the front mounted on/off button (behind the lid).
 - c As soon as the BIOS starts to load, press **F8** to choose boot device.
 - d When the boot device selection dialog opens, choose the USB memory stick.
It is normally identified as `USB: [name of memory stick]`
 - e Allow the computer to boot.
 - f Observe that the **Norton Ghost 8** utility starts automatically.
 - g Click **Ok** in the **Norton Ghost 8** start-up dialog.
- 2 Click **Local** → **Disk** → **From image**.
 - 3 Choose from which folder on the USB memory stick to restore the data.
If you use the factory USB memory device, folder **Backup** has been prepared for this use.
 - 4 Choose the backup file to restore.
 - 5 Choose to which drive you wish to restore the data.
Use **Drive 2**. This is the largest drive.
 - 6 Click **Ok** to verify the drive details.
 - 7 Click **Yes** to proceed with the restore.
 - 8 Wait for the restore process to finish. This will take some time depending on the size of the data.
 - 9 Click **Reset computer** when the restore has finished.
 - 10 Allow Windows to boot.
 - 11 Click **Yes** when the computer wishes to restart.
 - 12 When the computer has restarted, proceed with normal operation.

How to create a bootable USB memory stick

This procedure explains how to create a bootable USB memory device to use for backup purposes.

The following software is required:

- Microsoft DOS7
- Hewlett Packard USB Memory stick utility
- Norton Ghost 8

These software utilities are all available on the USB memory device that is provided with the sonar. Registered users can also download the utilities from the [Simrad Dealer Club](#).

- 1 Make sure that you have all the necessary software on your computer.

The files comprising DOS7 must be placed in a separate folder.

- 2 Insert the USB memory device you wish to format.
- 3 Start the Windows version of the HP utility (hpusbfw.exe)

- 4 Observe that the USB memory device is recognized by the utility.

- 5 Set “File system” to FAT or FAT32.

- 6 Enter a “Volume label”.

- 7 Click to “Create a DOS startup disk”

- 8 Identify the folder on your harddisk that contains the DOS7 files

- 9 Click **Start**.

- 10 Wait for the formatting process to finish. This will take some time depending on the size of the USB memory device.

- 11 Copy all the DOS 7 files from the folder on your hard disk to the root directory on the USB memory device.

- 12 Verify that the “autoexec.bat” file is present in the root folder of the USB memory device.

- 13 Modify the “autoexec.bat” file as required.

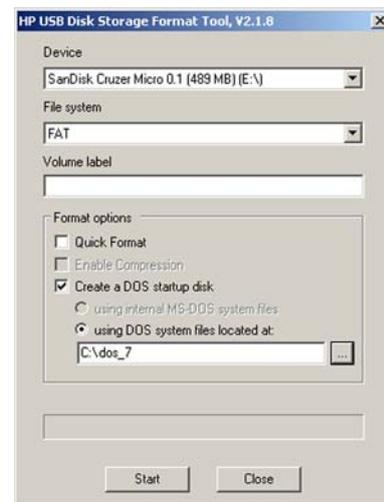
Use “Notepad” or a similar ASCII editor. The last line in the batchfile must contain the line “ghost.exe”.

- 14 Copy over the **Norton Ghost 8** application (ghost.exe) to the root folder of the USB memory device.

- 15 The USB device is now formatted as a boot drive, and it is prepared to be used for backup purposes.

- 16 Close down all the utilities you have used.

- 17 Remove the USB memory device from the computer using the “Safely remove hardware” feature in the operating system.



Drawing file

This chapter contains relevant drawings related to the installation and maintenance of the Simrad EK60.

Note

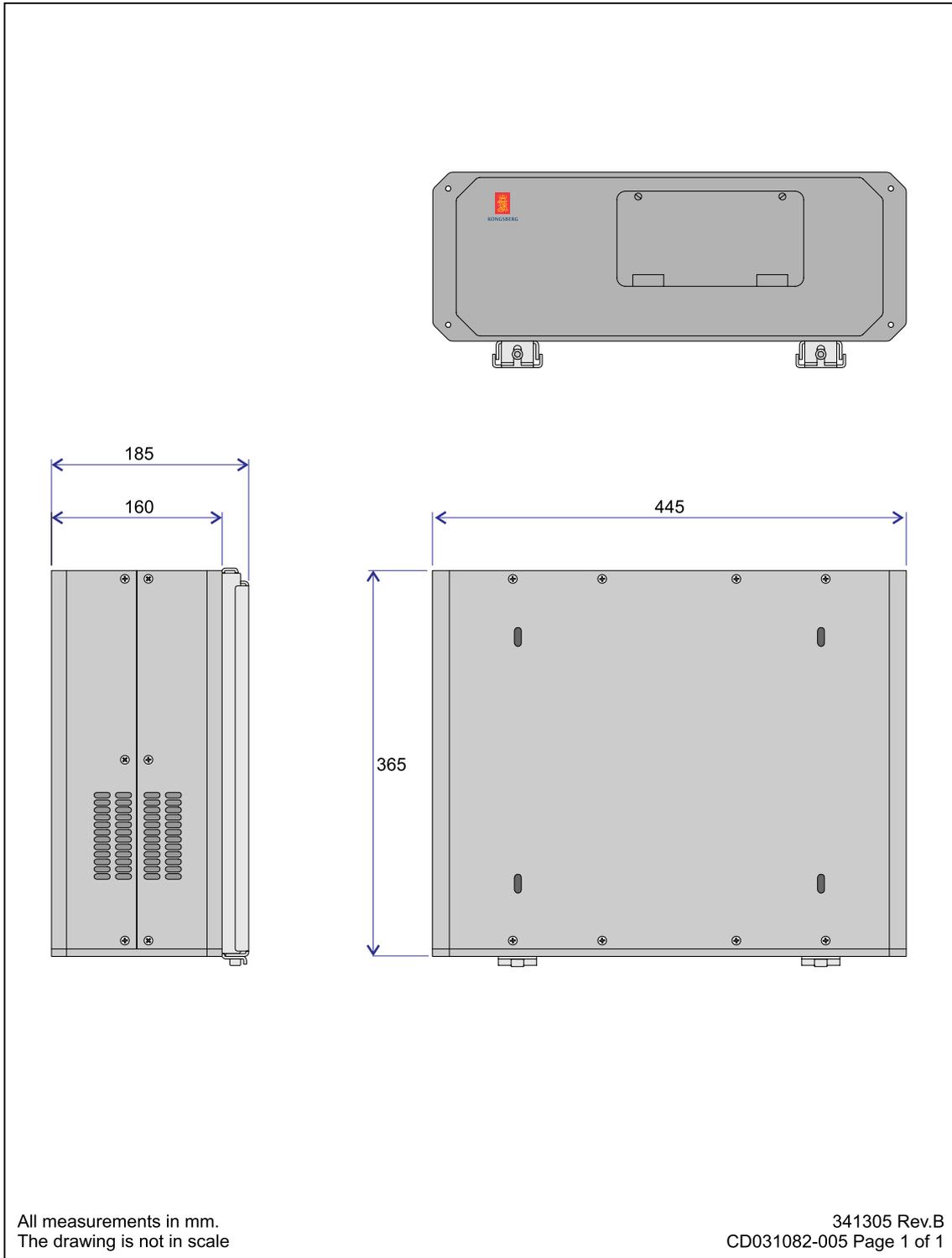
The mechanical drawings are for information and guidance only. They are not in scale. All dimensions are in mm unless otherwise is noted. The original installation drawings are available on PDF and/or AutoCad's DWG format.

Visit www.simrad.com to download.

Topics

- *Processor Unit (341305)* on page 28

Processor Unit (341305)



Appendix A Equipment handling

This section provides the basic rules for transportation, storage and handling of units. In this context, a unit may be any large or small part of the system. It can be supplied as part of the initial delivery, or as a spare part.

Topics

- *Transportation* on page 30
- *Lifting* on page 30
- *Storage prior to installation or use* on page 31
- *Inspection* on page 32
- *Unpacking* on page 32
- *Storage after unpacking* on page 34
- *Storage after use* on page 34
- *Re-packaging* on page 36
- *Temperature protection* on page 36
- *Circuit board handling and packaging* on page 37
- *Electro-Static Discharge (ESD)* on page 38
- *Disposal* on page 38

Transportation

Unless otherwise stated in the accompanying documentation, electronic, electro-mechanical and mechanical units supplied by Kongsberg Maritime can be transported using all methods approved for delicate equipment; (by road, rail, air or sea). The units are to be transported in accordance with general or specific instructions for the appropriate unit(s), using pallets, transport cases, or carton boxes as appropriate.

Note

Special local restrictions concerning air transportation may be applied to units containing certain types of batteries. These units must be checked properly, and the regulations must be investigated by the packer/shipper before the unit is dispatched.

All local transportation must be carried out according to the same specifications as for the initial delivery. In general, all units must be handled with care.

The carton or case containing the unit must be kept dry at all times, and must be sheltered from the weather. It must not be subjected to shocks, excessive vibration or other rough handling. The carton or case will normally be marked with text or symbols indicating which way it is to be placed. Follow any instructions given, and ensure the case is always placed with its “top” uppermost.

The carton or case must not be used for any purpose for which it was not intended (step, table, etc.), and in the absence of other information, no other cartons or cases must be stacked on top of it.

Lifting

A heavy crate will normally be marked with its weight, and the weights of other cartons or crates will normally be entered on the packing list.

- You must always check the weight of a crate before you attempt to lift it.
- You must always use lifting apparatus that is approved and certified for the load.

Heavy units may be equipped with lifting lugs for transportation by crane within the workshop or installation area. Before you use a crane:

- You must check the applicable weight certificate for the crane.
- You must check the security of the lifting lugs.

Ensure that all available lifting lugs are used. Ensure the unit remains under control during the operation to avoid damage to the unit, equipment or personnel.

Heavy units may be transported using a forklift truck. Special attention must then be paid to the position of the unit's centre of gravity. The units must be properly secured to the truck.

Storage prior to installation or use

When a system, a unit or a spare part has been delivered to the customer, it may be subject to long time storage prior to installation and use. During this storage period, certain specifications must be met. The equipment must be preserved and stored in such a way that it does not constitute any danger to health, environment or personal injury.

- 1 The equipment must be stored in its original transportation crate.
- 2 Ensure that the units are clearly separated in the shelves and that each unit is easily identifiable.
- 3 The crate must not be used for any purpose for which it was not intended (eg. work platform etc.).
- 4 The crates must not be placed on top of each other, unless specific markings permit this.
- 5 The crates must not be placed directly on a dirt-floor.
- 6 Do not open the crate for inspection unless special circumstances permit so.
 - “Special circumstances” may be suspected damage to the crate and its content, or inspections by civil authorities.
 - If any units are damaged, prepare an inspection report stating the condition of the unit and actions taken. Describe the damage and collect photographic evidence if possible. Re-preserve the equipment.
 - If the units are not damaged, check the humidity absorbing material. If required, dry or replace the bags, then re-pack the unit(s) according to the packing instructions.
- 7 If the crate has been opened, make sure that it is closed and sealed after the inspection. Use the original packing material as far as possible.
- 8 The storage room/area must be dry, with a non-condensing atmosphere. It must be free from corrosive agents.
- 9 The storage area’s mean temperature must not be lower than -30°C , and not warmer than $+70^{\circ}\text{C}$. If other limitations apply, the crates will be marked accordingly.
- 10 The crate must not be exposed to moisture from fluid leakages.
- 11 The crate must not be exposed to direct sunlight or excessive warmth from heaters.
- 12 The crate must not be subjected to excessive shock and vibration.
- 13 If the unit contains normal batteries, these may have been disconnected/isolated before the unit was packed. These must only be reconnected before the installation starts. Units containing batteries are marked.

Caution

Units containing lithium or alkaline batteries must be handled separately and with care. Such units are marked accordingly. Do not attempt to recharge such batteries, open them or dispose of them by incineration. Refer to the applicable product data sheets.

Inspection

An inspection must be carried out immediately after the unit(s) have arrived at their destination.

- 1 Check all wooden or cardboard boxes, plastic bags and pallets for physical damage. Look for signs of dropping, immersion in water or other mishandling.
- 2 If damage is detected externally, you will have to open the packaging to check the contents. Request a representative of the carrier to be present while the carton is opened, so any transportation damage can be identified.
- 3 If any units are damaged, prepare an inspection report stating the condition of the unit and actions taken. Describe the damage and collect photographic evidence if possible. Send the inspection report to Kongsberg Maritime as soon as possible.
- 4 If the units are not damaged, check the humidity absorbing material. If required, dry or replace the bags, then re-pack the unit(s) according to the packing instructions.

Unpacking

General unpacking procedure

Normal precautions for the handling, transportation and storage of fragile electronic equipment must be undertaken.

Note

If the unit is not to be prepared for immediate use, you may consider storing it unopened in its original packing material. However, it may be useful to open the case to check its contents for damage and retrieve any accompanying documentation.

Do not use a knife to open cardboard cartons - the contents may lie close to the surface, and may be damaged by the blade.

- 1 Check the carton before opening it to ensure it shows no signs of dropping, immersion in water or other mishandling. If the carton shows signs of such damage, refer to the paragraph covering Inspection on receipt.
- 2 Place the carton on a stable work bench or on the floor with the top of the carton uppermost.
- 3 In the absence of other instructions, always open the top of the carton first. The contents will normally have been lowered into the carton from above, so this will usually be the easiest route to follow. Care must be used when opening the carton to ensure the contents are not damaged. Do not use a knife to open cardboard cartons
- 4 If the carton has been closed using staples, remove the staples from the carton as you open it. This will reduce the possibilities of scratch injury to yourself and damage to the contents.
- 5 If a wooden crate has been closed using screws, always remove them using a screwdriver. Do not attempt to prise the lid off with a crowbar or similar.

- 6 Once the carton is open, carefully remove all loose packing and insulation material. Check for manuals and other documents that may have been added to the carton during packing, and put these to one side. Check also for special tools, door keys etc.

Unpacking electronic and electromechanical units

Electronic and electromechanical units will normally be wrapped in a clear plastic bag. Lift the unit, in its bag, out of the carton and place it in a stable position on the floor/work bench.

Inspect the unit for damage before opening the plastic bag.

Note

Beware of the dangers of Electro-Static Discharge (ESD) both to yourself and to the equipment, when handling electronic units and components.

*Cables must **never** be used as carrying handles or lifting points.*

Do not break the seal to open a circuit board package before the board is to be used. If the board package is returned to the manufacturer with the seal broken, the contents will be assumed to have been used and the customer will be billed accordingly.

Assuming all is well, open the bag and remove the unit.

Open the unit and check inside. Remove any packing and desiccant material that may be inside.

Unpacking mechanical units

Mechanical units may be heavy. Using a suitably certified lifting apparatus, lift the unit out of the crate and place it in a stable position on the floor/work bench.

Inspect the unit for damage and remove any packing material that may be inside the unit.

Unpacking transducers

Transducers may be supplied mounted to a hull unit (if any), or packed separately. Crates are normally identified by the order number and the serial number.

The transducer face must be protected by a rigid, padded cover (e.g. a wooden box lined with foam rubber) all the time it is exposed to the risk of physical damage.

Caution

Once transducer is unpacked, great care must be taken to ensure that transducer body and cabling is not exposed to any mechanical stress.

Storage after unpacking

The unit must whenever possible be stored in its original transportation crate until ready for installation. The crate must not be used for any purpose for which it was not intended (eg. work platform etc.).

Once unpacked, the equipment must be kept in a dry, non condensing atmosphere, free from corrosive agents and isolated from sources of vibration.

Note

Do not break the seal to open a circuit board package before the board is to be used. If the board package is returned to the manufacturers with the seal broken, the contents will be assumed to have been used and the customer will be billed accordingly.

The unit must be installed in its intended operating position as soon as possible after unpacking. If the unit contains normal batteries, these may have been disconnected/isolated before the unit was packed. These must then be reconnected during the installation procedure. Units containing batteries are marked.

Note

Units containing lithium or alkaline batteries must be handled separately and with care. Such units are marked accordingly. Do not attempt to recharge such batteries, open them or dispose of them by incineration. Refer to the applicable product data sheets.

Storage after use

If a unit is removed from its operating location and placed into storage, it must be properly cleaned and prepared before packing.

Cleaning cabinets

If a cabinet has been exposed to salt atmosphere while it was in use, it must be thoroughly cleaned both internally and externally to prevent corrosion.

- 1 Wipe the cabinet externally using a damp cloth and a little detergent. Do not use excessive amounts of water as the unit may not be water tight. On completion, dry the unit thoroughly.
- 2 All surfaces must be inspected for signs of corrosion, flaking/bubbling paint, stains etc. Damaged or suspect areas must be cleaned, prepared and preserved using the correct preservation mediums for the unit. The mediums to be used will usually be defined in the units' maintenance manual.
- 3 Open the unit, and using a vacuum cleaner, remove all dust etc. from the unit. Great care must be taken to ensure the circuit boards and modules are not damaged in the process.

Mechanical units

If a mechanical unit may have been exposed to a salt atmosphere while it was in use, it must be thoroughly cleaned both internally and externally to prevent corrosion.

- 1 If the construction materials and type of unit permits, wash the unit using a high-pressure hose and copious amounts of fresh water. Examples are the lower parts of hull units (outside the hull) or subsea units
- 2 Ensure that all traces of mud and marine growth are removed. Use a wooden or plastic scraper to remove persistent growth, barnacles etc. On completion, dry the unit thoroughly.

Caution

Do not use a high pressure hose in the vicinity of cables or transducers. Do not use sharp or metal tools on a transducer face.

- 3 If the materials or type of unit prevents the use of a high-pressure hose, wipe the unit using a cloth dampened with water containing a little detergent. Examples are the upper parts of hull units (inside the hull) and hydraulic systems
- 4 Do not use excessive amounts of water as some components on the unit may not be water tight. Wipe off the detergent with a damp cloth, then dry the unit thoroughly.
- 5 All surfaces must be inspected for signs of corrosion, flaking/bubbling paint, stains etc. Damaged or suspect areas must be cleaned, prepared and preserved using the correct preservation mediums. The mediums to be used will normally be defined in the unit's maintenance manual.

Cables

Wipe clean all exposed cables, and check for damage. If a cable shows signs of wear or ageing, contact Kongsberg Maritime for advice.

Internal batteries

If the unit contains batteries, these may discharge slowly during storage. If the unit is to be stored for an extended period, disconnect or remove all internal batteries.

A suitable piece of insulating material can be placed between the battery and the electrical contacts to prevent electrical discharge. The battery can then remain in the unit, reducing the risk of it being misplaced during the storage period.

Caution

Units containing lithium or alkaline batteries must be handled separately and with care. Such units are marked accordingly. Do not attempt to recharge such batteries, open them or dispose of them by incineration. Refer to the applicable product data sheets.

Dehumidifier

Place a suitably sized bag of desiccant material (silica gel or similar) into the unit to keep the electronic components as dry as possible.

Coatings

Spray the unit externally with a corrosion inhibitor (e.g. a light oil) before packing.

Re-packaging

Whenever possible, the unit must be stored and transported in its original packing material and/or crate. In the event that this material is not available, proceed as follows:

- Small units must be protected from damp by being placed within a plastic bag at least 0.15 mm thick. An appropriate quantity of desiccant material should be placed inside this bag, and the bag sealed. The sealed unit must then be placed in an appropriate carton or crate, and supported in the container by appropriate shock-absorbing insulation (polystyrene foam chips etc.).
- Large units must be placed in a suitable cardboard box or wooden crate. The unit must be protected against physical damage by means of shock-absorbing insulation mats. The box must be clearly marked with its contents, and must be stored in a dry and dust-free area.

Temperature protection

If the unit must be protected against extremes of temperature, the carton/crate must be lined on all walls, base and lid with 5 cm thick polyurethane or polystyrene foam. These units will be identified as delicate in the applicable documentation.

The package must then be clearly marked:

Must not be transported or stored in temperatures below -5 degrees Celsius.

Other units can normally be stored in temperatures between -30° C and +70° C, refer to the system's technical specifications for details.

Note

Unless otherwise specified, transducers must not be stored in temperatures below -20° C and above +55° C.

Circuit board handling and packaging

Circuit boards are delicate items. They may work year after year in an advanced product, but then fail due to a small spark of static electricity. For this reason, it is very important that they are properly handled and protected during shipping.

Beware of ESD!

When you handle electronic circuit boards, you must beware of the dangers of electrostatic discharge (ESD), both to yourself and to the equipment. In order to ensure safe transport and storage, circuit boards and other electronic units will always be wrapped in a clear plastic protective bag, and the bag will be sealed. See also section *Electro-Static Discharge (ESD)* on page 38.

Unpacking and handling circuit boards

Observe the following steps to unpack a circuit board.

- 1 Wherever possible, prepare a suitable workbench. It must have an approved conductive service mat, and it must be connected directly to a reliable earth point via its earthing cord. You must wear a wristband in direct contact with the skin, and the wristband must be connected to the service mat.
- 2 Lift the circuit board, in its protective bag, out of the carton and place it in a stable position on the a floor/work bench.
- 3 Inspect the unit for damage before you open the plastic bag.
- 4 Do not break the seal to open a circuit board package before the board shall to be used. If the board package is returned with the seal broken, we will assume that the content has been used, and we will bill you accordingly.
- 5 Assuming all is well, open the bag and remove the unit.
- 6 Take out and keep the documentation. You will need it if the circuit board shall be returned to us. Also, remove any packing and desiccant material that may be inside.
- 7 Keep the protective plastic bag for future use.

Unpacking on board the vessel

When you are working on board a vessel, an “approved conductive service mat” is often far away. As you still need to unpack circuit boards, make sure that you do it in the instrument room, or at another location where you have a steel deck. Keep far away from the bridge or any other rooms with wall-to-wall carpets! If possible, bring a wristband and ground yourself.

Returning a circuit board

If you wish to return a circuit board to us, observe the following rules.

Note

Failure to follow these rules may result in unserviceable circuit boards.

- 1 Place the circuit board to be returned in the same protective plastic bag as you originally received it in - or a protective bag of similar ESD protection quality.

- 2 DO NOT use standard plastic bags, such as commercial bubble wrap.
- 3 Fill in all the necessary information on the applicable documentation and place it inside the bag.
- 4 Seal the bag.
- 5 Place the circuit board in a suitable carton, and secure it for shipping.

Electro-Static Discharge (ESD)

What is ESD?

Electro-Static Discharge (ESD) is the transfer of an electrostatic charge between two bodies at different electrostatic levels, caused either by direct contact or induction by an electrostatic field. The passing of a charge through an electronic device can cause localised overheating, and it can also “puncture” insulating layers within the structure of the device. This may deposit a conductive residue of the vaporised metal on the device, and thus create a short circuit. This may result in a catastrophic failure, or degraded performance of the device.

ESD protection

Sensitive electronic circuit boards must be transported and stored in protective packing bags. The circuit boards must not be transported or stored close to strong electrostatic, electro-magnetic or radioactive fields.

If it is necessary to open and touch the circuit board inside the protective bag, then the following precautions must be taken:

- 1 The working area must be covered by an approved conductive service mat that has a resistance of between 50 k Ω and 2 M Ω , and is connected directly to a reliable earth point via its earthing cord.
- 2 The service personnel involved must wear a wristband in direct contact with the skin, connected to the service mat.
- 3 Printed circuit boards must be placed on the conductive service mat during installation, maintenance etc.
- 4 If, for any reason, it is necessary to move the circuit board from the conductive service mat, it must be placed in an approved antistatic transportation container (e.g. static shielding bag) before transportation.
- 5 During installation and servicing, all electrical equipment (soldering irons, test equipment etc.) must be earthed.

Disposal

At the end of the product lifetime, all Kongsberg Maritime products must be disposed in an environmental friendly way.

All electrical and electronic components must be disposed of separately from the municipal waste stream via designated collection facilities appointed by the government or local authorities. The correct disposal and separate collection of your old appliance will help prevent potential negative consequences for the environment and human health. This is a precondition for reuse and recycling of used electrical and electronic equipment. For more detailed information about disposal of your old appliance, please contact your local authorities or waste disposal service.

All disposal of mechanical, electromechanical, electronic and chemical waste – including all types of batteries – must thus be disposed of according to national and international rules and regulations. Observe the relevant Waste Electrical and Electronic Equipment (WEEE) regulations.

Kongsberg Maritime offers a product recycling service. This is described on <http://www.km.kongsberg.com> →**Products** →**Services** →**Product recycling**.

Appendix B

Basic cable requirements

This chapter provides general information related to the installation of system cables.

Topics

- *Cable trays* on page 41
- *Radio Frequency interference* on page 41
- *Physical protection* on page 42
- *Grounding* on page 42
- *Cable connections* on page 43
- *Cable terminations* on page 43
- *Cable identification* on page 43

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 (maximum. 0,5 meters) 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.

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