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Reference Manual

Simrad CS90

Fish-finding sonar

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SIMRAD
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Simrad CS90
Fish-finding sonar
Reference Manual
Release 23.9.X

The purpose of this publication is to provide the descriptions, procedures and detailed parameter explanations required to allow for safe and efficient use of the CS90 system. This publication is intended for all regular users of the CS90 system. Due to the nature of the descriptions and the level of detail provided by this publication, it is well suited for those who are - or wish to be - expert users.

Caution

You must never permit the CS90 system to transmit (ping) when the ship is in a dry dock. The transducer can be damaged if it transmits in the open air.

Additional end-user documents related to the CS90 system can be found on our website. This includes publications that are translated into other languages. Selected publications are also provided in IETM (*Interactive Electronic Technical Manual*) formats.

- www.kongsberg.com/cs90

SIMRAD
By KONGSBERG

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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. You must be familiar with the contents of the appropriate manuals before attempting to operate or work on the equipment.

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About this manual

The purpose of this publication is to provide the descriptions, procedures and detailed parameter explanations required to allow for safe and efficient use of the CS90 system. The publication also provides you with a thorough understanding of the parameters and adjustments provided by the CS90 system.

Target audience

This publication is intended for all users of the CS90 system. Due to the nature of the descriptions and the level of detail provided by this publication, it is well suited for those who are - or wish to be - expert users. This manual is a reference book, and as such it is *not* intended for sequential reading. Use the table of content, the index, the search functionality as well as the interactive links to seek out the information you need when you need it.

A good understanding of system functions and controls is essential to fully take advantage of the functionality provided. Sea conditions vary, sometimes drastically. The acoustic conditions are also changing. Temperature and salinity layers differ from one day to the next, and from one position to another. It is not possible to identify settings that will provide the best data at all times. A careful study of the information in this manual is highly recommended, preferably while exploring the functionality offered by the CS90 system.

We assume that you are familiar with the basic acoustic principles of sound in water. We also expect that you have some experience with sonar operation.

Use the Help button

Installed on your CS90 system you will find a comprehensive context-sensitive online help system. Everything you can read in this publication can also be found in the online help. To open the context sensitive on-line help, select **Help** on the top bar, or the **Help** button in one of the dialog boxes.

Software version

This publication was created for the following software version: 23.9.X.

Online information

All end-user manuals provided for operation and installation of your CS90 system can be downloaded from our website. This includes publications that are translated into other

languages. Selected publications are also provided in IETM (*Interactive Electronic Technical Manual*) formats. Our website also provides information about other products from Kongsberg Discovery.

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We want your feedback

We always want to improve our products. We also want our end-user documentation to be comprehensive and relevant. You can help. Please provide comments, suggestions or constructive criticism to any of our support offices.

Simrad CS90

Topics

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Network security, page 28
Support information, page 29

Important

The CS90 is an advanced product. It is used with other advanced products. There is important information that you need to know.

Before you turn on the CS90 system

Before you turn on the CS90 system, make sure that you have sufficient water depth to lower the transducer!

Caution

You must never turn on the CS90 system when the ship is in dry dock. The transducer can be damaged if it transmits in the open air.

When the CS90 system is not used

When you do not use the CS90 system, turn it off.

Note

You must never turn off the CS90 system by means of the on/off switch on the Processor Unit. You must ALWAYS use the Operating Panel.

When you are docking your vessel

You must never set the CS90 system to normal operation when the ship is in dry dock. The transducer can be damaged if it transmits in the open air. To prevent inadvertent use of the CS90 system, pull out the mains plug on the Processor Unit whenever your vessel is in dry dock. Additional precautionary measurers should be considered.

If something breaks down

If you believe that something has broken down, contact your local dealer. A list of all our dealers is provided on our website.

- www.kongsberg.com/cs90

If you are unable to contact a dealer, observe the support information in this publication.

When you want to turn off the CS90 system

You must never turn off the CS90 system by means of the on/off switch on the Processor Unit. When you do not use the CS90 system, turn it off with the **Power** button on the Operating Panel. If the transducer is lowered when you turn off the CS90 system, it is automatically retracted to its upper position.

Note

If you turn off the CS90 system by means of the on/off switch on the Processor Unit you can damage the software and the interface settings used to communicate with external devices.

Manual operation of the hull unit

In the event of improper operation, the powerful electric motor on the hull unit may cause serious damage to the equipment and/or injury to personnel. Therefore, before you start manual operation, read carefully through the relevant operating procedures.

Note

You must familiarize yourself with the correct handling methods and the relevant safety requirements.

Rules for transducer handling

A transducer must always be handled as a delicate instrument. Incorrect actions may damage the transducer beyond repair. A physical blow to the transducer face may easily damage one or more elements. Observe these transducer handling rules:

- **Do not** activate the transducer when it is out of the water.
- **Do not** handle the transducer roughly. Avoid impacts.
- **Do not** expose the transducer to direct sunlight or excessive heat.
- **Do not** use high-pressure water, sandblasting, metal tools or strong solvents to clean the transducer.
- **Do not** damage the outer protective skin of the transducer.
- **Do not** step on the transducer cables.
- **Do not** damage the transducer cables. Avoid exposure to sharp objects.

Related topics

Simrad CS90, page 15

System description

The Simrad CS90 is an omnidirectional high frequency fish finding sonar.

The CS90 system is designed for fishing vessels of all sizes, both purse seiners and trawlers. The centre operational frequency is 80 kHz. You can select any operational frequency from 70 to 90 kHz. The cylindrical multi-element transducer allows the omnidirectional sonar beams to be tilted electronically. This allows you to automatically

track schools of fish, and to observe the whole water volume around the vessel. A stabilizing system is included for electronic pitch and roll compensation.

The CS90 system offers a number of standard interface lines for communication with peripheral devices and sensors. Typical inputs are geographical information from a positioning system, vessel speed and current heading. By default, the CS90 system uses a built-in motion sensor. For improved operational accuracy, an external motion reference unit (MRU) can be connected.

The CS90 system offers the same user interface and operating software as our other sonars, echo sounders and catch monitoring systems. This enables easier and faster training of new users.

- The echo presentations are optimised for multiple displays. Provided that you have connected additional displays to your Processor Unit, you can use the **Docking Views** function to take any sonar view and place it on a separate display. When you move a view to another display, it will automatically be scaled for the best possible result.
- It is common for sonars to require many pings to build the various views in the echo presentation. On the CS90, all the sonar views in the presentation are built using the echoes from one single ping. This dramatically improves the update rate and provides better real-time information.
- The CS90 system permits you to record real-time sonar situations. This allows you to replay complete sequences. The playback contains the exact same echo information, and can be used for mission history, training or troubleshooting purposes.

Great emphasis has been placed on an intuitive user interface and the best possible sonar presentations on a high resolution colour display.

The CS90 system is equipped with the celebrated signal processing software developed by Kongsberg Discovery. This includes Hyperbolic FM (HFM) transmissions. This pulse type is also known as "chirp". It ensures a clutter free picture with very high resolution in range. The signal processing and beamforming is performed in a fast digital signal processing system using the full dynamic range of the signals.

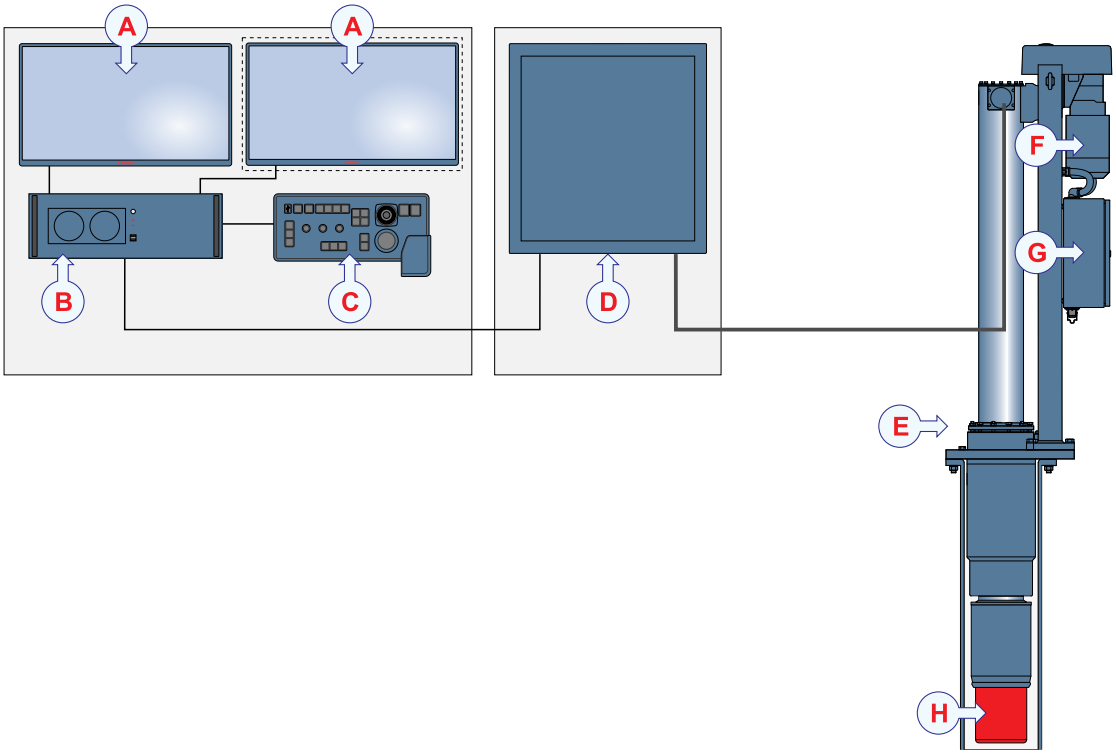
The CS90 system software operates using the Microsoft® Windows® operating system.

Related topics

Simrad CS90, page 15

System diagram

The system diagram identifies the main components of a basic CS90 system. Only the main connections between the units are shown. Detailed interface capabilities and power cables are not shown.



A *Display (The second display is optional.)*

B *Processor Unit*

C *Operating Panel*

D *Transceiver Unit*

E *Hull Unit*

F *Hoisting motor*

G *Motor Control Unit*

H *Transducer*

In this publication, the computer can also be referred to as the *Processor Unit*, and vice versa.

Unless otherwise specified in a contract, the display is not included in the standard delivery. This is a commercial item that can be purchased locally.

A choice of hull units is available for the CS90 system. The hull units offer different lowering depths and cable lengths. The same transducer is used on all hull unit types. The same installation trunk is used on all hull unit types.

Related topics

Simrad CS90, page 15

System units

Topics

Display description, page 21

Processor Unit description, page 21

Operating Panel description, page 22

Transceiver Unit description, page 22

Hull Unit description, page 23

Transducer description, page 24

Display description

A display is a required part of the CS90 system. For best readability, the display must be protected from glare and have the correct height and angle.

Any commercial display can be used with the CS90 system, provided that the chosen display meets the minimum requirements.

Tip

You may find it useful to have more than one display connected to the CS90 system. The number of displays must be chosen to fit the preferences of the crew.

Related topics

Simrad CS90, page 15
System units, page 21

Processor Unit description

A dedicated maritime computer is provided. In this publication, the computer can also be referred to as the *Processor Unit*, and vice versa.

The Processor Unit is a rugged and powerful computer. It is designed for long life in a demanding maritime environment. The Processor Unit contains the operational software, and offers the user interface that allows you to control the CS90 system. Furthermore, it offers a number of serial and Ethernet lines for communication with external devices. The Processor Unit is normally mounted on the bridge.

Related topics
Simrad CS90, page 15
System units, page 21
Installing and maintaining software, page 225

Operating Panel description

The optional Operating Panel contains all necessary control functions for normal operation of the CS90 system.

The controls provided by the Operating Panel are arranged in logical functional groups. This offers you clear and easy operation with fast access to key functionality. All the functionality provided by the CS90 system can be accessed using the trackball on the Operating Panel and the menu system shown in the display presentation.

The CS90 system supports three different operating panels. These are referred to as "Mk1", "Mk2" and "Mk3".

- The Mk1 Operating Panel is connected to the Processor Unit with three cables. The dual interface cable provides power and serial communication. The USB interface cable is used to read the trackball movements. The Processor Unit must be fitted with a custom made interface board. A small commercial power supply is used to provide power to the Operating Panel. (The Mk1 Operating Panel is no longer provided with new sonars. This information is provided for legacy reasons.)
- The Mk2 Operating Panel is connected to the Processor Unit using an Ethernet cable. The Operating Panel is provided with a built-in power supply.
- The Mk3 Operating Panel is connected to the Processor Unit with a USB cable. A dedicated power supply unit is not required.

Related topics
Simrad CS90, page 15
System units, page 21
Operating panels, page 33

Transceiver Unit description

The Transceiver Unit is provided to transmit acoustic energy through water. After each transmission, the transceiver receives the echoes from the seabed and/or the water column. These echoes are filtered, amplified and finally converted into digital format. This transmission and reception sequence is commonly referred to as a *ping*.

The transceiver controls the transmission and reception made by the transmitters and receiver channels. 16 identical transceiver boards are used. These transceiver boards provide 480 individual transmit- and receiver channels. The Transceiver Unit also holds an Ethernet switch and a large capacitor bank. An internal power supply is provided to supply the required DC voltages to the Transceiver Unit.

Note

To extend the lifetime of the Transceiver Unit, you must keep the sonar room dry and clean, and with sufficient ventilation.

The Transceiver Unit can be fitted with a commercial heat exchanger. The purpose of the heat exchanger is to provide a stable, clean and temperature controlled environment for the electronic circuitry inside the Transceiver Unit. The heat exchanger also inhibits dust and dirt particles from entering the transceiver. The heat exchanger is powered from 230 VAC using a separate outlet.

Related topics
Simrad CS90, page 15
System units, page 21

Hull Unit description

The hull unit is used to lower the transducer down below the ship's hull when the CS90 system shall be used. When the CS90 system is turned off, the transducer is hoisted for protection. The hull unit is large and crucial part of the sonar system.

Caution

When the transducer is lowered, the depth of water under the vessel must be monitored closely.

If the transducer hits larger objects or bottom, the transducer shaft may be bent, or - in worst case - it can be broken off. A broken transducer shaft will cause water leakage through the top of the shaft. If you suspect that the transducer shaft is seriously damaged do not retract the transducer to its upper position.

To prevent serious damage to the vessel or the vessel stability, you must have a water pump and a warning system in the sonar room.

If you forget to hoist the transducer before the CS90 system is turned off, the transducer is hoisted automatically before the power is disconnected. The transducer is also hoisted automatically if a serious malfunction occurs to the communication between the bridge and the hull unit.

In the event of improper operation, the powerful electric motor on the hull unit may cause serious damage to the equipment and/or injury to personnel. Therefore, before you start manual operation, read carefully through the relevant operating procedures. You must familiarize yourself with the correct handling methods and the relevant safety requirements.

The CS90 system can be provided with one of the following hull units:

Hull Unit	Lowering depth (m)	Transducer cable (m)	Maximum speed (knots)
CS90	1.0	4.6	20
		10	
CS94	2.1	4.6	19
		7	

On some vessels, additional transducer protection is required. One example is vessels working in arctic conditions. It is important for them to prevent ice from damaging the transducer. A gate valve is then added to the hull unit installation. By means of a mechanical construction it shuts off the bottom of the installation trunk when the CS90 system is not used.

For more information, refer to the end-user documentation provided by the manufacturer.

Related topics
Simrad CS90, page 15
System units, page 21
Lowering and hoisting the transducer from the sonar room, page 185

Transducer description

The cylindrical transducer allows the sonar beam to provide a full 360 degrees coverage of the water volume.

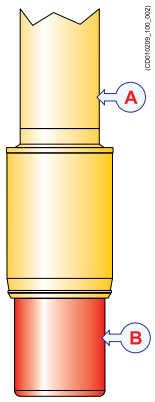
The transducer converts the electric energy generated by the transmitter circuitry to physical vibrations. These vibrations alter the water pressure, and create an acoustic pulse that is sent into the water. The acoustic signal is transmitted as a beam. The duration of the acoustic pulse, as well as its frequency and shape, are controlled by the system software. The direction and opening angle of the beam is controlled by the transmitter circuitry and the physical properties of the transducer. After the transmission, the transducer works as a "microphone". It converts the water pressure created by the acoustic echoes to electric energy. These weak echo signals are sent to the amplifiers in the receiver circuitry.

Note

The transducer is covered with a thick red or black protective coating made of a special plastic type. The protective coating is a vital part of the transducer. It is very important that neither this coating nor the internal parts of the transducer are damaged during the handling, installation or cleaning. Any holes and/or scratches in the transducer surface will allow water to penetrate the transducer. If a leak occurs, the transducer must be replaced.

A *Lower part of transducer shaft*

B *Transducer with its red protective coating*



The transducer is mounted at the bottom end of the hull unit's transducer shaft. This allows the transducer to be lowered into the water for operational use, and retracted for protection when the CS90 system is turned off. By lowering the transducer into the water, you may also be able to reduce the noise created by the laminar flow of water along the hull.

The transducer contains 480 individual elements.

Rules for transducer handling

A transducer must always be handled as a delicate instrument. Incorrect actions may damage the transducer beyond repair. A physical blow to the transducer face may easily damage one or more elements. Observe these transducer handling rules:

- **Do not** activate the transducer when it is out of the water.
- **Do not** handle the transducer roughly. Avoid impacts.
- **Do not** expose the transducer to direct sunlight or excessive heat.
- **Do not** use high-pressure water, sandblasting, metal tools or strong solvents to clean the transducer.
- **Do not** damage the outer protective skin of the transducer.
- **Do not** step on the transducer cables.
- **Do not** damage the transducer cables. Avoid exposure to sharp objects.

Related topics

Simrad CS90, page 15
System units, page 21

Order information

To order the CS90 system, or any of the optional items provided with it, contact your local dealer. If you do not have a regular dealer, a list of all our distributors and dealers can be found on our website.Your dealer will also be able to help you with a detailed quotation including price and delivery information.

Relevant order information is provided on our website.

- www.kongsberg.com/cs90

Related topics

Simrad CS90, page 15

General safety rules

Safety is important. The safety precautions must be followed at all times during installation and maintenance work.

WARNING

The CS90 system operates on 115 VAC and/or 230 VAC at 50/60 Hz. This voltage is lethal! You must never work alone on high-voltage equipment!

The hull unit is powered by a 3-phase high voltage.

This equipment must be installed, adjusted, and serviced only by qualified electrical maintenance personnel familiar with the construction and operation of the equipment and the hazards involved. Failure to observe this precaution could result in bodily injury.

Personnel requirements

All personnel must be trained in relevant installation and maintenance work.

Personal protection

Installation personnel must wear suitable work clothes. The work clothes must not contain sufficient static to ignite. Always wear a hard hat and suitable protective footwear while handling heavy objects.

Power and ground

You must always turn off all power before installation or maintenance work on the CS90 system. Use the main circuit breaker, and label the breaker with a warning sign that informs others that maintenance or installation work is in progress on the system.

For safety reasons, two persons must always be present during troubleshooting with power turned ON.

All CS90 system units must be properly grounded.

First aid

Read and understand the applicable first aid instructions related to electric shock.

Whenever installation or maintenance work is in progress, it is essential that a first aid kit is available. All personnel must be familiar with the first aid instructions for electrical shock and other personal injuries.

Weight

The various parts of the system may be heavy. Make sure that the appropriate tools and certified lifting equipment are available. Always wear a hard hat and suitable protective footwear while handling heavy objects.

Cables

Each electric cable must be handled carefully. This is important to avoid damage to the cable. This is also important to avoid electric shock in the event that the cable is unintentionally connected to a power source.

Cabinets

Do not open racks or cabinet doors while sailing in rough seas. Doors and/or cabinet parts may suddenly swing open and cause damage or injury.

Related topics
Simrad CS90, page 15

Network security

If a CS90 system is connected to a local area network, data security is important.

Equipment manufactured by Kongsberg Discovery is often connected to a local area network (LAN). When you connect a computer to a local area network you will always expose the data on that computer. All the other computers connected to the same network may be able to access your data. Several threats are imminent:

- Remote computers can read your data.
- Remote computers can change your data.
- Remote computers can change the behavior of your computer, for example by installing unwanted software.

Usually, two parameters are used to define the threat level:

1 The likelihood that any remote computer will do any of the above.

2 The damage inflicted if a remote computer succeeds doing any of the above.

Products provided by Kongsberg Discovery are always regarded as stand-alone offline systems. They are regarded as stand-alone even though they may be connected to a local area network for sensor interfaces or data distribution.

Note

No network safety applications are installed on Kongsberg Discovery computers. The computer is not protected against viruses, malware or unauthorized access by external users.

Securing the CS90 system has no meaning unless you have established a policy that secures all the computers on the network. This policy must include physical access by trained and trusted users. As an end user of the CS90 system, you are responsible for defining and implementing a security policy and providing the relevant network security applications.

Note

Kongsberg Discovery has no information about your complete system installation. We cannot estimate the threat level and your need for network security. For this reason, we cannot accept responsibility for the network security.

Kongsberg Discovery will not accept any responsibility for errors or damages caused by unauthorized use of or access to the CS90 system.

Related topics
Simrad CS90, page 15

Support information

If you need technical support for your CS90 system you must contact your local dealer, or one of our support offices. A list of all our offices and dealers is available on our website. You can also contact our main support office in Norway.

Norway (main office)

- **Company name**: Kongsberg Maritime AS / Simrad
- **Address**: Strandpromenaden 50, N3190 Horten, Norway
- **Telephone**: +47 33 03 40 00
- **Telefax**: +47 33 04 29 87
- **Website** : www.kongsberg.com/simrad
- **E-mail address**: simrad.support@simrad.com

Spain

- **Company name**: Kongsberg Maritime Spain S.L.U
- **Address**: Partida Atalayes 20, 03570 Villajoyosa, Spain
- **Telephone**: +34 966 810 149
- **Telefax**: +34 966 852 304
- **Website** : www.kongsberg.com/simrad
- **E-mail address**: simrad.spain@simrad.com

France

- **Company name**: Simrad France
- **Address**: 5 rue de Men Meur, 29730 Guilvinec, France
- **Telephone**: +33 298 582 388
- **Telefax**: +33 298 582 388

- **Website** : www.kongsberg.com/simrad
- **E-mail address**: simrad.france@simrad.com

USA

- **Company name**: Kongsberg Underwater Technology LLC (KUTL) / Simrad Fisheries
- **Address**: 19210 33rd Ave W, Suite A, Lynnwood, WA 98036, USA
- **Telephone**: +1 425 712 1136
- **Telefax**: +1 425 712 1193
- **Website** : www.kongsberg.com/simrad
- **E-mail address**: fish.usa.support@simrad.com

Canada

- **Company name**: Kongsberg Mesotech Ltd.
- **Address**: 1598 Kebet Way, Port Coquitlam, BC, V3C 5M5, Canada
- **Telephone**: +1 604 464 8144
- **Telefax**: +1 604 941 5423
- **Website** : www.kongsberg.com/simrad
- **E-mail address**: simrad.canada@simrad.com

Malaysia

- **Company name**: Kongsberg Maritime Malaysia Sdn. Bhd
- **Address**: Unit 27-5 Signature Offices, The Boulevard, Mid Valley City, Lingkaran Syed Putra, 59200 Kuala Lumpur, Malaysia
- **Telephone**: +65 6411 7488
- **Telefax**: +60 3 2201 3359
- **Website** : www.kongsberg.com/simrad
- **E-mail address**: simrad.asia@simrad.com

Korea

- **Company name**: Kongsberg Maritime Korea Ltd
- **Address**: #1101 Harbor Tower, 113-1, Nampodong 6-Ga, Jung-Gu, Busan 600-046, Korea
- **Telephone**: +82 51 242 9933
- **Telefax**: +82 51 242 9934
- **Website** : www.kongsberg.com/simrad
- **E-mail address**: simrad.korea@simrad.com

China

- **Company name**: Kongsberg Maritime China Ltd
- **Address**: 555 Chuanqiao Road, China (Shanghai) Pilot Free Trade Zone, 201206, China
- **Telephone**: +86 21 3127 9888
- **Telefax**: +86 21 3127 9555
- **Website** : www.kongsberg.com/simrad
- **E-mail address**: simrad.china@simrad.com

Related topics

Simrad CS90, page 15

Getting started

Topics

Operating panels, page 33

Starting normal operation, page 53

Basic operating procedures, page 70

Context-sensitive online help, page 76

Operating panels

The optional Operating Panel contains all necessary control functions for normal operation of the CS90 system. The Operating Panel offers all necessary control functions for normal operation.

The controls provided by the Operating Panel are arranged in logical functional groups. This offers you clear and easy operation with fast access to key functionality. All the functionality provided by the CS90 system can be accessed using the trackball on the Operating Panel and the menu system shown in the display presentation.

The CS90 system supports three different operating panels. These are referred to as "Mk1", "Mk2" and "Mk3".

- The Mk1 Operating Panel is connected to the Processor Unit with three cables. The dual interface cable provides power and serial communication. The USB interface cable is used to read the trackball movements. The Processor Unit must be fitted with a custom made interface board. A small commercial power supply is used to provide power to the Operating Panel. (The Mk1 Operating Panel is no longer provided with new sonars. This information is provided for legacy reasons.)
- The Mk2 Operating Panel is connected to the Processor Unit using an Ethernet cable. The Operating Panel is provided with a built-in power supply.
- The Mk3 Operating Panel is connected to the Processor Unit with a USB cable. A dedicated power supply unit is not required.

Topics

Operating Panel description (Mk1), page 33

Operating Panel description (Mk2), page 40

Operating Panel description (Mk3), page 45

Microsoft Xbox Controller description, page 50

Operating Panel description (Mk1)

The CS90 Operating Panel is the most important device for fast and efficient user interface. The Operating Panel offers all necessary control functions for normal operation.

The controls provided by the Operating Panel are arranged in logical functional groups. This offers you clear and easy operation with fast access to key functionality. All the functionality provided by the CS90 system can be accessed using the trackball on the Operating Panel and the menu system shown in the display presentation. The Operating Panel allows you to assign certain functions to dedicated buttons and switches.

(A) Main Switch

Power

Press this button to turn the CS90 system on and off.

Note

Before you turn on the CS90 system, make sure that you have sufficient water depth to lower the transducer!

You must never turn on the CS90 system when the ship is in dry dock. The transducer can be damaged if it transmits in the open air.

You must never turn off the CS90 system by means of the on/off switch on the Processor Unit. You must ALWAYS use the Operating Panel or select **Power Off** *on the top bar.*

Up

Press **Up** to hoist the transducer to its upper position.

While the transducer is moving the indicator lamp flashes, and an audible signal is sounded. When the requested position has been reached, the indicator lamp is lit, and the audible signal stops.

Middle

Press **Middle** to place the transducer in a predefined middle position.

If you have the large hull unit you can define two middle positions. The **Middle** button can only be used to lower or hoist the transducer to the initial middle position. If you want to place the transducer in position "Middle 2" you must use the **Hull Unit Control** dialog box. To open the **Hull Unit Control** dialog box, select **Hull Unit** on the top bar.

Down

Press **Down** to lower the transducer to its bottom position.

(B) Symbol

These buttons control the target markers functionality.

Place Marker

This is the same function as the **Place Marker** option on the shortcut menus. **Place Marker** allows you to create a marker at the current position of the cursor. One or more markers can be placed in the view to identify specific echoes. Each marker is shown as a small triangle with or without a short identifying label. It is positioned based on the two known axes in the view as well as the tilt and bearing of the current ping.

The marker is stationary. It has a specified range, bearing and depth related to your own vessel. If the echo moves in the display presentation the marker will not follow.

Own Ship Marker

This is the same function as **Place Own Ship Marker** on the shortcut menu. The own ship marker is intended as a tool in a search situation. Place the marker when your echo sounder confirms that you are passing over a school. Then, if you should loose the school from view, you will know where to start looking for it. During a search your CS90 presentation may be cluttered with multiple markers and echoes. Due to its shape the own ship markers are easy to see among the other markers.

Note

The marker is stationary. If your vessel moves in the CS90 presentation the marker will not follow.

Circle Marker

Press **Circle Marker** to place a circular marker in the active view. The circle is drawn with the same diameter as your purse. By means of the circle you can see the size of the school relative to your purse.

Tip

The **Fishing Gear** *function allows you to define the size of your trawl or purse seine. This function is opened from the* **Setup** *menu.*

Gear

Press **Gear** to place a gear symbol in the active view. The gear symbol is provided as a tool to help you plan and shoot the purse seine. The symbol is intended to be used in a structured sequence that starts when you plan to shoot the purse seine.

(C) Mode

The four buttons in the **Mode** field are dedicated for user settings or presentation modes. To choose *which* function to apply open the **Operating Panel** page. Under

User Setting Buttons, assign one predefined setting to each button on the Operating Panel. Before you can assign custom user settings to the operating panel, a selection of settings must be available from the **User Settings** dialog box. The **Operating Panel** page is located in the **Installation** dialog box.

User Settings

Press one of the **Mode** buttons to apply a predefined user setting. Any user setting selected on the Operating Panel is identified in the upper left corner of the *Horizontal* view. The identifying number refers to the **User Setting** number on the **Operating Panel** page. Click on the text to make it larger. Click one more time to restore the original font size.

Presentation Modes

All echoes offered by the CS90 system are shown in rectangular *views*. Combinations of these views are organized in *presentation modes*. Each presentation mode offered by the CS90 system provides a selection of views in a predefined pattern. You must first find the presentation mode that meets your operational requirements, then you can change the size of the individual views.

(D) Gain

The **Gain** buttons offer separate gain controls for the horizontal and vertical views.

You can compare this gain setting with the volume control on your car radio. When the gain is increased, the echoes will appear stronger. Weak echoes will be easier to see. However, since you also increase the acoustic noise in the reception, the echo presentations will also show this noise. Too much gain may therefore "distort" the presentation.

(E) Range

The **Range** buttons offer range control for the horizontal and vertical presentations.

The range setting defines from how "far" you want to detect echoes. In other words, you specify the horizontal or vertical distance from the vessel to the outer edge of the search area.

Note

Even though you can choose a large range value, that does not mean that you can detect your targets on the same range. The range value only defines the range that is shown in the views. Actual target detection will always depend on the operational environment, such as water temperature, salinity, interference and layers in the water column.

(F) Cursor

The **Cursor** buttons offer menu and cursor control.

Menu

This is an "on/off" function. Unless you need to make frequent changes to the operating parameters, you may want to hide the menu from the display presentation. This gives you more space for echo information. When the menu is hidden, it is temporarily shown on the left or right side of the display presentation if you move the cursor to that position.

Select

Press **Select** to make a selection in a menu or dialog box. This corresponds to the *left* button on a normal computer mouse.

View

The **View** button opens the shortcut menu in the active view. This corresponds to the *middle* button on a computer mouse

Object

The **Object** button opens the shortcut menu in the active view. This corresponds to the *right* button on a computer mouse

Trackball

Use the trackball to control the cursor in the user interface.

(G) Tilt

The **Tilt** buttons allow you to control the vertical angle of the sonar beams.

Manual

Press **Manual** to control the vertical angle of the sonar beams with the two arrow buttons.

Auto

This is an "on/off" function. When *Auto Tilt* mode is activated the beam will automatically change its tilt angle for each transmission ("ping").

The centre of the tilt sector is defined by the chosen tilt angle just before the *Auto Tilt* mode is started. The chosen tilt sector is shown on the tilt indicator in the *Horizontal* view using a shaded background.

Sector limits are adjusted by pressing and holding the **Auto** button and simultaneously pressing the **Tilt up** or **Tilt down** (arrow) buttons

(H) Various

Use the **Various** buttons to make screen captures and zoom in on details.

Mute

The **Mute** button on the Operating Panel enables or disables the audio output. It does not provide volume control. Use it to acknowledge audible alarms and to acknowledge messages from the message system.

Zoom

Place the cursor anywhere in the view, right-click and press **Zoom**. Only one zoom level is provided. Select **Zoom** one more time to restore the original view.

Off Centre

Place the cursor anywhere in the view, right-click and press **Off Centre**. The function moves the vessel symbol to the selected position.

Record (= Screen Capture)

Press this button to make a copy of the current display presentation. You can choose either a single screen capture or a sequence with multiple screen captures. Open the **Screen Captures** dialog box to select screen capture mode.

(I) Train

The **Train** buttons offer manual control of the horizontal angle of the sonar beams as referenced to the vessel heading. They also control the automatic search and tracking programs.

Manual

Press **Manual** to control the bearing of the sonar beams with the two arrow buttons.

Position Track

If you wish to establish a marker on a geographical position, use the standard marker. If you wish to start *position tracking*, press **Position Track** on the Operating Panel, or give a selected marker priority. When a marker is given priority it can be regarded as a *position track*.

> The phrase *position* is used to identify a fixed echo in the display presentation that you wish to act upon. The echo may for example be from a shallow, reef or rock. You must decide which echoes that shall be classified as positions, and whether you shall start position tracking.

The position track locks on a position defined by its latitude, longitude and depth. The bearing and tilt settings are automatically adjusted to compensate for the movements of your vessel. The bearing line is automatically locked on the object to reflects its bearing. The marker is stationary. If the echo moves in the display presentation the marker will not follow. If you change the tilt and bearing settings manually, the position track is disabled.

Note

The priority is identified with a "P". You can only give priority status to one object. If you create a new marker and give this priority, the position track is disabled. The same applies if you start a new target track.

Relevant information about the priority target can be found in the lower left corner of the view. If you think the text is small and hard to read, double-click on the text field. This will increase the text size.

Target Track

During normal operation, some echoes are clearly more interesting than others. In many situations specific echoes may be regarded as *targets*. To keep track of the targets you can use *target markers* and/or start *target tracking*. When target tracking is activated, bearing and tilt are automatically adjusted to follow the movements of the tracked target.

The tracked target is regarded as an *object*, and it is identified with a circle and two lines. The two lines reflect the size of the current tracking area. By default, a new manually initiated tracked object is automatically given priority status. The bearing line is automatically locked on the object to reflects its bearing.

Place the cursor over the echo you wish to track. Press **Target Track**.

Tip

On the **User Settings Setup** *page, de-select* **New Manually Initiated Track** *if you do not want new tracked targets to become priority targets. This page is located in the* **Installation** *dialog box. To open the page, select* **Installation** *on the* **Setup** *menu.*

Auto Search

Press **Auto Search** to start the automatic search function. In the *Auto Bearing* mode the CS90 system will automatically search within defined sector limits. The sector is identified in the view using two angular symbols.

The search sector is adjusted by pressing and holding the **Auto Search** button and simultaneously pressing the arrow buttons. The automatic search function is stopped when one of the arrow buttons is pressed, but will continue once the button is released. The bearing at the moment either button is released will become the centre of the search.

To exit the automatic search mode press the **Manual** button.

Before you can change the settings related to a view, you must click inside the view to activate it. The changes you make are by default only valid for the active view. Several of the functions offer **Apply to All**. If you select **Apply to All** your setting is applied to *all the views* in the current presentation mode.

Related topics

Getting started, page 32
Operating panels, page 33

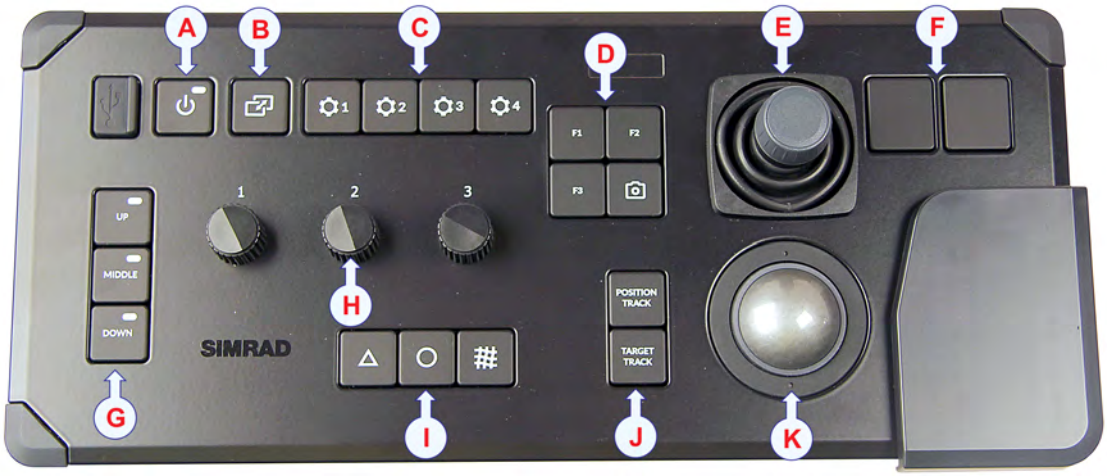
Operating Panel description (Mk2)

The CS90 Operating Panel is the most important device for fast and efficient user interface.The Operating Panel offers all necessary control functions for normal operation.

The controls provided by the Operating Panel are arranged in logical functional groups. This offers you clear and easy operation with fast access to key functionality. All the functionality provided by the CS90 system can be accessed using the trackball on the Operating Panel and the menu system shown in the display presentation. The Operating Panel allows you to assign certain functions to dedicated buttons and switches.

Tip

A USB socket is provided in the top left corner of the Operating Panel. Use this socket to connect a computer keyboard, a mouse or a USB flash drive.



(A) Power

Press this button to turn the CS90 system on and off.

Note

Before you turn on the CS90 system, make sure that you have sufficient water depth to lower the transducer!

You must never turn on the CS90 system when the ship is in dry dock. The transducer can be damaged if it transmits in the open air.

You must never turn off the CS90 system by means of the on/off switch on the Processor Unit. You must ALWAYS use the Operating Panel or select **Power Off** *on the top bar.*

(B) Sonar Select

Since the Mk2 Operating Panel uses Ethernet to communicate with the Processor Unit, you can use one single panel to control more than one sonar system. To change which sonar to control, press **Sonar Select** on the Operating Panel. If you

use your Operating Panel to control more than two sonars, press **Sonar Select** repeatedly to select.

(C) User Settings / Presentation Modes

On the Mk2 Operating Panel, the four buttons dedicated for user settings or presentation modes are located the top of the panel. To choose *which* function to apply open the **Operating Panel** page. Under **User Setting Buttons**, assign one predefined setting to each button on the Operating Panel. Before you can assign custom user settings to the operating panel, a selection of settings must be available from the **User Settings** dialog box. The **Operating Panel** page is located in the **Installation** dialog box.

User Settings

Press one of the **User Settings** buttons to apply a predefined user setting. Any user setting selected on the Operating Panel is identified in the upper left corner of the *Horizontal* view. The identifying number refers to the **User Setting** number on the **Operating Panel** page. Click on the text to make it larger. Click one more time to restore the original font size.

Presentation Modes

All echoes offered by the CS90 system are shown in rectangular *views*. Combinations of these views are organized in *presentation modes*. Each presentation mode offered by the CS90 system provides a selection of views in a predefined pattern. You must first find the presentation mode that meets your operational requirements, then you can change the size of the individual views.

(D) F1 F2 F3 / Screen Capture

F1 F2 F3

Press one of the **Fx** buttons to apply a predefined function. To choose *which* function to apply open the **Operating Panel** page. Under **Button Options**, assign one function to each **Fx** button on the Operating Panel.

Screen Capture

Press **Screen Capture** to make a copy of the current display presentation. You can choose either a single screen capture or a sequence with multiple screen captures. Open the **Screen Captures** dialog box to select screen capture mode. Use **Screen Capture File Location** to define where to save your screen captures.

(E) Joystick

Press the joystick forward to increase the tilt angle in the active view. Turn the button on the top of the joystick to change the bearing in the active view.

(F) Mouse buttons

These buttons correspond to the two most common buttons on a standard computer mouse. When an instruction tells you to "select" or "left-click", press the left button. When an instruction tells you to "right-click", press the right button.

(G) Up / Middle / Down

Use these buttons to lower and hoist the transducer.

While the transducer is moving the indicator lamp flashes, and an audible signal is sounded. When the requested position has been reached, the indicator lamp is lit, and the audible signal stops.

- **Up**: Press **Up** to hoist the transducer to its upper position.
- **Middle**: Press **Middle** to place the transducer in a predefined middle position.
- **Down**: Press **Down** to lower the transducer to its bottom position.

If you have the large hull unit you can define two middle positions. The **Middle** button can only be used to lower or hoist the transducer to the initial middle position. If you want to place the transducer in position "Middle 2" you must use the **Hull Unit Control** dialog box. To open the **Hull Unit Control** dialog box, select **Hull Unit** on the top bar.

(H) Rotary switches

Turn a rotary switch to apply a predefined function. To choose *which* function to apply open the **Operating Panel** page. Under **Rotary Switch Options**, assign one function to each rotary switch on the Operating Panel.

(I) Place Marker / Circle Marker / Gear

Use these buttons to place markers in the current active view.

Place Marker

Press **Marker** to place a generic marker in the active view. One or more markers can be placed in the view to identify specific echoes. Each marker is shown as a small triangle with or without a short identifying label. It is positioned based on the two known axes in the view as well as the tilt and bearing of the current ping.

The marker is stationary. It has a specified range, bearing and depth related to your own vessel. If the echo moves in the display presentation the marker will not follow.

Circle Marker

Press **Circle Marker** to place a circular marker in the active view. The circle is drawn with the same diameter as your purse. By means of the circle you can see the size of the school relative to your purse.

Tip

The **Fishing Gear** *function allows you to define the size of your trawl or purse seine. This function is opened from the* **Setup** *menu.*

Gear

Use the **Fishing Gear** function to define your type of fishing gear. Use the **Fishing Gear Setup** page to change the fishing gear properties to match your own equipment. Press **Gear** to place a gear symbol in the active view.

Purse seine

The gear symbol is provided as a tool to help you plan and shoot the purse seine. The symbol is intended to be used in a structured sequence that starts when you plan to shoot the purse seine. For use with a purse seine, the intended process follows:

1 To start the process:

- Press **Gear** on the Operating Panel. — **or:**
- Right-click and select **Show Gear Symbol** on the shortcut menu.

This places a circle marker in the view. The size and location of the marker is defined by the choices you have made with the **Fishing Gear** function. Until you proceed, the marker follows the movements of the vessel by keeping its relative location to the bow. This allows you to position your vessel in the best possible location before you shoot the purse seine.

2 When you shoot the net:

- Press **Gear** on the Operating Panel. — **or:**
- Right-click and select **Place Gear Symbol** on the shortcut menu.

The first timer starts when you select **Place Gear Symbol**.

A rectangular marker is placed in the view, and marks the position where the purse seine was shot. The circular marker is disconnected from the vessel movements, and acts as a guideline for your manoeuvring. The history line shows the movements of your vessel. Since the CS90 system knows the length of your net, it places a second marker on this line when half the length has been spent. When the entire net has been spent, a third rectangular marker is shown. In this phase the **Fishing Gear** function is disabled.

The first timer stops when the progress bar reads 100%. This action starts the second timer, which stops when you select **Remove Gear Symbol**.

3 When the process is finalized:

- Press **Gear** on the Operating Panel. — **or:**
- Right-click and select **Remove Gear Symbol** on the shortcut menu to delete the markers from the view.

Trawl

When the function is activated, the *Horizontal* view presents a trawl illustration. The size and location of the image reflect the measurements you added in the **Fishing Gear Setup** dialog box.

The trawl image appears aft of the vessel symbol. When your vessel turns, the trawl presentation will reflect this, but the location and movements could be more precise. If you want an accurate trawl positioning, you must equip the trawl with relevant positioning sensors and connect the data to the CS90 system.

(J) Position Track / Target Track

Press these buttons to start position or target tracking.

Position Track

A position track permits the CS90 system to automatically control the tilt and bearing based on the movements of your vessel. It locks on a position defined by its latitude, longitude and depth. The bearing and tilt settings are automatically adjusted to compensate for the movements of your vessel.

Target Track

A target track permits the CS90 system to automatically control the tilt and bearing based on the movements of the chosen target. It locks on the target defined by its position, heading and speed. The bearing and tilt settings are automatically adjusted to follow the movements of the tracked target.

By default, a new manually initiated tracked object is automatically given priority status. Relevant information about the priority target can be found in the lower left corner of the view. If you change the tilt or bearing settings manually the priority status is lost.

Tip

On the **User Settings Setup** *page, de-select* **New Manually Initiated Track** *if you do not want new tracked targets to become priority targets. This page is located in the* **Installation** *dialog box. To open the page, select* **Installation** *on the* **Setup** *menu.*

(K) Trackball

Use the trackball to control the cursor in the user interface.

Before you can change the settings related to a view, you must click inside the view to activate it. The changes you make are by default only valid for the active view. Several of the functions offer **Apply to All**. If you select **Apply to All** your setting is applied to *all the views* in the current presentation mode.

Related topics

Getting started, page 32
Operating panels, page 33

Operating Panel description (Mk3)

The CS90 Operating Panel is the most important device for fast and efficient user interface.The Operating Panel offers all necessary control functions for normal operation.

The controls provided by the Operating Panel are arranged in logical functional groups. This offers you clear and easy operation with fast access to key functionality. All the functionality provided by the CS90 system can be accessed using the trackball on the Operating Panel and the menu system shown in the display presentation. The Operating Panel allows you to assign certain functions to dedicated buttons and switches.

(A) Power Off / Up

Press and hold this button for five seconds to turn the CS90 system off. Press **Up** to hoist the transducer to its upper position.

Note

Before you turn on the CS90 system, make sure that you have sufficient water depth to lower the transducer!

You must never turn on the CS90 system when the ship is in dry dock. The transducer can be damaged if it transmits in the open air.

You must never turn off the CS90 system by means of the on/off switch on the Processor Unit. You must ALWAYS use the Operating Panel or select **Power Off** *on the top bar.*

(B) Down

Press **Down** and hold it for three seconds to lower the transducer to its bottom position.

While the transducer is moving the indicator lamp flashes, and an audible signal is sounded. When the requested position has been reached, the indicator lamp is lit, and the audible signal stops.

(C) Rotary switches

Turn a rotary switch to apply a predefined function. To choose *which* function to apply open the **Operating Panel** page. Under **Rotary Switch Options**, assign one function to each rotary switch on the Operating Panel.

(D) Panel Backlight

Adjust the background illumination to suit your preferences and the ambient light conditions.

(E) User Settings / Presentation Modes

On the Mk3 Operating Panel, the requested user setting or presentation mode is chosen with a single button. To choose *which* function to apply open the **Operating Panel** page. Select **Mode Selection** to specify what you want to use the button for.

Press the button repeatedly to cycle through the settings or modes.

User Settings

Any user setting selected on the Operating Panel is identified in the upper left corner of the *Horizontal* view. The identifying number refers to the **User Setting** number on the **Operating Panel** page. Click on the text to make it larger. Click one more time to restore the original font size.

Presentation Modes

All echoes offered by the CS90 system are shown in rectangular *views*. Combinations of these views are organized in *presentation modes*. Each presentation mode offered by the CS90 system provides a selection of views in a predefined pattern. You must first find the presentation mode that meets your operational requirements, then you can change the size of the individual views.

(F) Target Marker

During normal operation, some echoes are clearly more interesting than others. In many situations specific echoes may be regarded as *targets*. To set up the CS90 system to provide such information, you can start *target tracking*.

Place the cursor over the echo you wish to track. Press **Target Marker**. The tracked target is regarded as an *object*, and it is identified with a circle and two lines. The bearing line is automatically locked on the object to reflects its bearing. By default, a new manually initiated tracked object is automatically given priority status. If another object has this priority, the status is transferred to the new object. The priority is identified with a "P".

Tip

On the **User Settings Setup** *page, de-select* **New Manually Initiated Track** *if you do not want new tracked targets to become priority targets. This page is located in the* **Installation** *dialog box. To open the page, select* **Installation** *on the* **Setup** *menu.*

(G) Set Priority Target

You can give priority status to one marker to identify the relevant object as the most important target or position. If another object has this priority, the status is transferred to the new object. The priority is identified with a "P".

(H) Set New Ship Centre / Reset Ship Centre

Place the cursor anywhere in the view and press **Set New Ship Centre**. The function moves the vessel symbol to the selected position. Press the button one more time to move the vessel symbol back to the centre of the presentation.

(I) Marker

Press **Marker** to place a generic marker in the active view. One or more markers can be placed in the view to identify specific echoes. Each marker is shown as a small triangle with or without a short identifying label. It is positioned based on the two known axes in the view as well as the tilt and bearing of the current ping.

(J) Circle Marker

Press **Circle Marker** to place a circular marker in the active view. The circle is drawn with the same diameter as your purse. By means of the circle you can see the size of the school relative to your purse.

(K) Gear

Use the **Fishing Gear** function to define your type of fishing gear. Use the **Fishing Gear Setup** page to change the fishing gear properties to match your own equipment. Press **Gear** to place a gear symbol in the active view.

Purse seine

The gear symbol is provided as a tool to help you plan and shoot the purse seine. The symbol is intended to be used in a structured sequence that starts when you plan to shoot the purse seine. For use with a purse seine, the intended process follows:

1 To start the process:

- Press **Gear** on the Operating Panel. — **or:**
- Right-click and select **Show Gear Symbol** on the shortcut menu.

This places a circle marker in the view. The size and location of the marker is defined by the choices you have made with the **Fishing Gear** function. Until you proceed, the marker follows the movements of the vessel by keeping its relative location to the bow. This allows you to

position your vessel in the best possible location before you shoot the purse seine.

2 When you shoot the net:

- Press **Gear** on the Operating Panel. — **or:**
- Right-click and select **Place Gear Symbol** on the shortcut menu.

The first timer starts when you select **Place Gear Symbol**.

A rectangular marker is placed in the view, and marks the position where the purse seine was shot. The circular marker is disconnected from the vessel movements, and acts as a guideline for your manoeuvring. The history line shows the movements of your vessel. Since the CS90 system knows the length of your net, it places a second marker on this line when half the length has been spent. When the entire net has been spent, a third rectangular marker is shown. In this phase the **Fishing Gear** function is disabled.

The first timer stops when the progress bar reads 100%. This action starts the second timer, which stops when you select **Remove Gear Symbol**.

3 When the process is finalized:

- Press **Gear** on the Operating Panel. — **or:**
- Right-click and select **Remove Gear Symbol** on the shortcut menu to delete the markers from the view.

Trawl

When the function is activated, the *Horizontal* view presents a trawl illustration. The size and location of the image reflect the measurements you added in the **Fishing Gear Setup** dialog box.

The trawl image appears aft of the vessel symbol. When your vessel turns, the trawl presentation will reflect this, but the location and movements could be more precise. If you want an accurate trawl positioning, you must equip the trawl with relevant positioning sensors and connect the data to the CS90 system.

(L) Screen Capture

Press **Screen Capture** to make a copy of the current display presentation. You can choose either a single screen capture or a sequence with multiple screen captures. Open the **Screen Captures** dialog box to select screen capture mode. Use **Screen Capture File Location** to define where to save your screen captures.

(M) Increase / Decrease

Press these buttons to increase or decrease the value of the current setting.

(N) Mouse buttons

These buttons correspond to the two most common buttons on a standard computer mouse. When an instruction tells you to "select" or "left-click", press the left button. When an instruction tells you to "right-click", press the right button.

(O) Trackball

Use the trackball to control the cursor in the user interface.

Before you can change the settings related to a view, you must click inside the view to activate it. The changes you make are by default only valid for the active view. Several of the functions offer **Apply to All**. If you select **Apply to All** your setting is applied to *all the views* in the current presentation mode.

Related topics

Getting started, page 32
Operating panels, page 33

Microsoft Xbox Controller description

You can use a Microsoft Xbox Controller to make basic adjustments to the sonar operation.

To use the Xbox Controller, simply insert the USB receiver into a vacant USB slot on your Processor Unit. The operating system will recognize the device and automatically load the necessary drivers.

Note

The Xbox Controller is a commercial item. It is not included in the delivery from Kongsberg Discovery.

(A) Bearing

The **Bearing** function controls the horizontal direction of the *Vertical* view, the audio beam and the beam in each *Inspection* view. The current bearing applied to the *Horizontal* view is shown with a solid line pointing out from the sonar position.

(B) Power

Press this button to turn on the Xbox Controller.

(C) Screen Capture

Press **Screen Capture** to make a copy of the current display presentation. You can choose either a single screen capture or a sequence with multiple screen captures. Open the **Screen Captures** dialog box to select screen capture mode.

(D) Screen Recording

The **Screen Recording** function allows you to record and save the echo presentation as a video file.

Everything that happens in the presentation is recorded. This includes echoes, menus, dialog boxes and cursor movements. Each screen recording you make is saved in `.mp4` format on the Processor Unit hard disk. The file name reflects the current date and time.

Note

Video data files will normally become very large. If you wish to record large amounts of data, make sure that you have enough space on your hard disk. Unless your Processor Unit is equipped with a very large disk, we recommend that you save the data to an external storage device.

(E)

This button is not used.

(F) Range

The **Range** buttons offer range control for the horizontal and vertical presentations.

The range setting defines from how "far" you want to detect echoes. In other words, you specify the horizontal or vertical distance from the vessel to the outer edge of the search area.

Note

Even though you can choose a large range value, that does not mean that you can detect your targets on the same range. The range value only defines the range that is shown in the views. Actual target detection will always depend on the operational environment, such as water temperature, salinity, interference and layers in the water column.

(G)

These buttons are not used.

(H) Cursor / Place Marker

Use this controller with horizontal movements to move the cursor in the display presentation.

Press the controller down to place a marker.

One or more markers can be placed in the view to identify specific echoes. Each marker is shown as a small triangle with or without a short identifying label. It is positioned based on the two known axes in the view as well as the tilt and bearing of the current ping.

The marker is stationary. It has a specified range, bearing and depth related to your own vessel. If the echo moves in the display presentation the marker will not follow.

(I) Tilt

The **Tilt** buttons allow you to control the vertical angle of the sonar beams.

(J)

This button is not used.

(K) Circle Marker

A single circle marker can be placed in the display presentation. The circle is drawn with the same diameter as your purse. By means of the circle you can see the size of the school relative to your purse. You can only add one circle marker to the display presentation.

(L) Right mouse button

This corresponds to the *right* button on a computer mouse

(M) Left mouse button

This corresponds to the *left* button on a normal computer mouse.

Related topics

Getting started, page 32
Operating panels, page 33

Starting normal operation

Topics

Turning on the CS90 system for normal use, page 53

Getting to know the user interface, page 54

Getting to know presentation modes and views, page 57

Selecting Normal mode to start pinging, page 61

Adjusting the radius of the search area, page 62

Adjusting the gain (echo sensitivity), page 64

Changing the vertical angle of the sonar beams, page 65

Adjusting the horizontal direction of the sonar beam, page 67

Turning off the CS90 system, page 69

Turning on the CS90 system for normal use

To use the CS90 system, you must first turn it on. To turn on the CS90 system use the **Power** button on the Operating Panel. The CS90 program starts automatically when the Processor Unit is turned on.

Caution

You must never permit the CS90 system to transmit (ping) when the ship is in a dry dock. The transducer can be damaged if it transmits in the open air.

Procedure

1 Make sure that you have sufficient water depth below the keel before you lower the transducer.

2 Turn on the display(s).

If required, refer to the instructions provided by the display manufacturer.

3 On the Operating Panel, press **Power**, and keep it depressed for a few seconds.

The blue indicator light in the button flashes while the Operating Panel establishes contact with the Processor Unit. When the connection has been made, the blue indicator light is lit permanently.

Wait while the operating system and CS90 program is loaded and started. Both the Processor Unit and the Transceiver Unit are turned on automatically.

4 Observe that the **Transceiver On/Off** dialog box opens automatically.

The dialog box offers progress information. You can monitor the progress as the Transceiver Unit is turned on. A blue circle on the hull unit symbol means that the Processor Unit communicates with the hull unit control circuitry.

5 Once the program has started, observe that the display presentation fills the entire screen.

The program starts up using the same settings as the last time you used it. If these settings are acceptable, continue operation. If you wish to alter any of the settings, see the relevant procedures.

6 Make sure that you have sufficient water depth below the keel before you lower the transducer.

7 To lower the transducer, press **Down** on the Operating Panel.

While the transducer is moving the indicator lamp flashes, and an audible signal is sounded. When the requested position has been reached, the indicator lamp is lit, and the audible signal stops.

Alternatively, use the **Hull Unit** function on the top bar to lower the transducer.

8 At the bottom of the **Main** menu, observe that the **Operation** icon is flashing.

The icon is flashing to indicate that even if the CS90 system is turned on, "pinging" is disabled. The CS90 system is in *Normal* mode, but **TX Power** is set to *Off* to prevent transmissions. This is for safety reasons.

9 Set **Tx Power** to *Maximum* (or any other power rating) to start pinging.

Related topics

Getting started, page 32
Starting normal operation, page 53
Turning off the CS90 system, page 69
Tx Power function, page 434

Getting to know the user interface

The display presentation provided by the CS90 system consists of specific visual elements that work together. The visual elements provide you with the echo information you need, they help you to control the functionality needed to understand this information, and finally, they allow you to control the operational parameters. By default, the display presentation covers the entire screen.

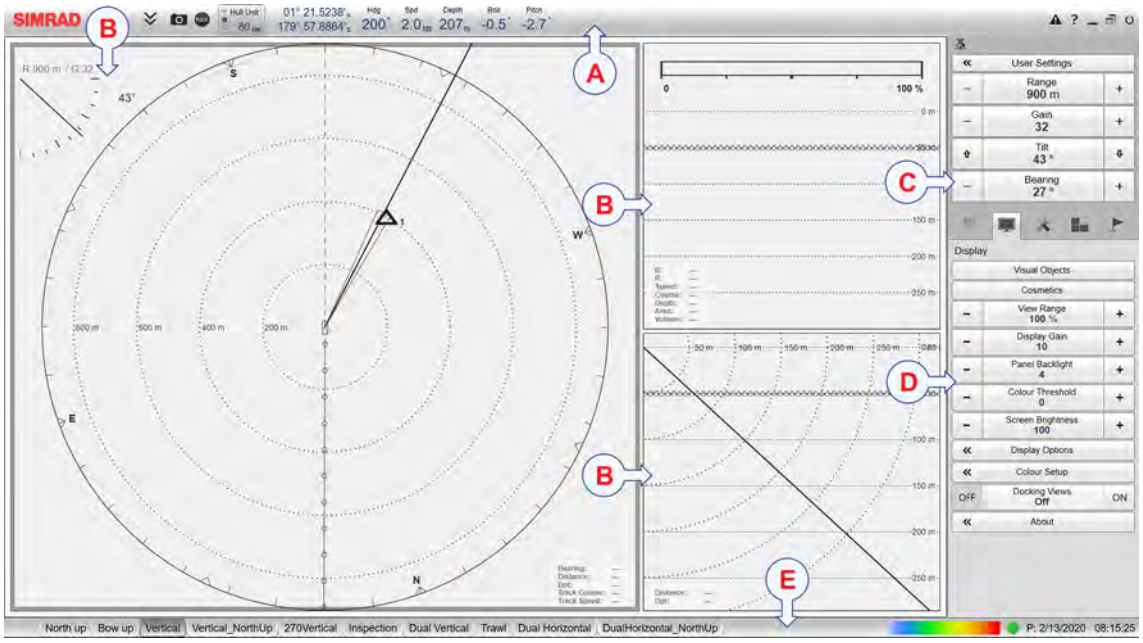
Context

All echoes offered by the CS90 system are shown in rectangular *views*. Each view has a specific purpose, and it can be set up with independent operational settings. Combinations of these views are organized in *presentation modes* selectable on the bottom bar. You can change the physical size of any view.

Tip

The **Docking Views** *function provided by the CS90 system allows you to rearrange the physical positions of the views, and to change their sizes.*

A comprehensive menu system allows access to all CS90 system functionality. The menu system is by default located on the right side of the display presentation.



A *Top bar*

B *Sonar views*

C *Menu system*

D *Secondary menus*

E *Bottom bar*

Procedure

1 Move the cursor to the top bar, and investigate the functions provided.

Observe that small tooltips open to identify the various functions you can use. The top bar is located at the top of the display presentation and stretches from the far left to the far right. The top bar gives you fast access to key functionality and navigational information. It provides buttons for hiding and showing the menu, making screen captures, opening the **Messages** dialog box, and opening context-sensitive help. The top bar allows you to open the various information panes.

2 Observe the information pane "buttons" on the top bar.

The CS90 system offers several *information panes* to provide additional and detailed data from the presentations. Each information pane is opened and closed from the top bar.

Note

Information panes are only available for Inspection views. Before you open an information pane, you must first click in an Inspection view to make it "active".

3 Move the cursor to the menu system on the right side of the presentation.

The **Main** menu is located at the top of the menu structure. It offers the most common functions for efficient use of the CS90 system. Below the **Main** menu, a set of dedicated icons are used to open the secondary menus. Select the icon one more time to close the menu.

4 Move the cursor to the bottom of the display presentation.

The bottom bar is located at the bottom of the display presentation and stretches from the left side to the right side. It allows you to choose presentation mode (view combinations). It also shows you the colour scale you are using, as well as current time and date. You can further monitor the operational status of the transceiver.

5 Move the cursor to the views in the main part of display presentation.

The various presentation modes selected on the bottom bar gives you different view configurations. By default, the views are arranged automatically in the presentation. You can change the physical size of any view. Click on the view border, hold the button depressed, then drag the border to create a smaller or larger rectangle. Note that the size of the other views are changed accordingly!

6 Click inside one of the views.

Before you can change the settings related to a view, you must click inside the view to activate it. The changes you make are by default only valid for the active view. Observe that the border lines of the active view are drawn with a thicker line.

Several of the functions offer **Apply to All**. If you select **Apply to All** your setting is applied to *all the views* in the current presentation mode.

Related topics

Getting started, page 32
Starting normal operation, page 53
Sonar views, page 307
Presentation modes, page 308

Getting to know presentation modes and views

The display presentation offered by the CS90system presents several *views*. Different combinations of views are organized in *presentation modes*.

Context

The CS90 system presents the echo data in different views. All information from each ping is shown in all the views simultaneously. Each view uses its individual transmit frequency, and you set up the different views with different operating parameters. The presentation of the echoes in each view is calculated based on your present course and speed combined with the movements of the target(s).

The following views are available:

- *Horizontal*
- *Vertical*
- *270 Vertical*
- *Catch*
- *Echogram*
- *Plane*
- *Inspection*

Tip

With the various beams provided by the CS90 system, it may be difficult to understand the concepts. How do these beams "behave" in the water? By means of a graphic presentation, the **Beam Visualization** *dialog box attempts to give you a better understanding of how the acoustic beams are transmitted into the water. Open the* **Beam Visualization** *dialog box from the* **Setup** *menu.*

Procedure

1 At the bottom of the display presentation, select a suitable presentation mode, and activate the *Horizontal* view.

The *Horizontal* view presents the 360 degrees area around your vessel from a bird's eye view. The current bearing is shown with a solid line pointing out from the vessel position. You can change the angle by means of the **Bearing** function on the **Main** menu. You can also select the bearing line and drag it sideways.

The bow marker is shown as a dotted line drawn from the bow of the vessel symbol. The line reflects your vessel's current heading. The bow marker can be enabled or disabled on the **Visual Objects** menu.

The distance from the vessel symbol in the centre of the circle to the outer ring corresponds to the currently selected range.

- The current settings for range, gain and tilt are shown in the upper left corner of the view. When you change the tilt a dotted line presents the requested tilt

while the solid line presents the actual tilt. You can change the tilt angle by means of the **Tilt** function on the **Main** menu. You can also click on the tilt line in a *Vertical* view and drag it up and down.

- The position (bearing and distance) and depth of the cursor's location is shown in the lower right corner of the view. The depth is calculated from the current tilt and the distance from the vessel.
- You can see the latest marker's course and speed in the view's lower right corner. The values are calculated based on the last two markers you created and the time between them.
- Relevant information about a priority target can be found in the lower left corner of the view.

The **Cosmetics** menu controls which "cosmetic" features that used.

2 At the bottom of the display presentation, select a suitable presentation mode, and activate the *Vertical* view.

The *Vertical* view shows you a "vertical slice" of the echo data. The direction of the vertical slice is indicated and controlled by the bearing line in the *Horizontal* view. The area covered by the vertical beam is shown as a triangle in the *Horizontal* view. You can change the bearing on the **Main** menu. You can also select the bearing line in a *Horizontal* view and drag it sideways.

The upper horizontal line in the view represents the water surface.

- Horizontal dotted lines show the depth intervals. Use **Depth Dividers** on the **Cosmetics** menu to toggle these lines *On* or *Off*.
- The selected range is divided into identical distances. These are shown as dotted circles. They are referred to as *range rings*.
- The distance and depth of the cursor's location is shown in the lower right corner of the view.

The current tilt is shown with a solid line. You can change the tilt angle by means of the **Tilt** function on the **Main** menu. You can also click on the tilt line and drag it up and down.

A line of X’es in the vertical views shows the bottom of the purse seine. The depth is defined for the fishing gear you have chosen. Under **Fishing Gear**, select **Fishing Gear Setup** to open the dialog box. For the selected purse, select a depth value. Use **Purse Depth** on the **Cosmetics** menu to toggle this line *On* or *Off*.

The **Cosmetics** menu controls which "cosmetic" features that used.

3 At the bottom of the display presentation, select a suitable presentation mode, and activate the *270 Vertical* view.

The *270 Vertical* view is designed for purse seining. The presentation combines a horizontal "bow up" presentation with a vertical slice. By default, the vertical view is shown in the lower left corner of the presentation. If you use a net on your port side, you can place the view in the bottom right corner. The area covered by the vertical beam is shown as a triangle in the *Horizontal* view.

This view makes it easy to keep contact with the school. You can determine its size distribution, and monitor the position the school relative to the bottom.

The throw side is defined for the fishing gear you have chosen. Under **Fishing Gear**, select **Fishing Gear Setup** to open the dialog box. For the selected purse, set throw side to *Port* or *Starboard*.

4 At the bottom of the display presentation, select a suitable presentation mode, and activate the *Catch* view.

Use the information in the *Catch* view to monitor the progress of the purse seine operation. The view does not offer any echo data.

- The progress bar at the top of the *Catch* view shows you the amount of net that has been spent. The sequence starts when you shoot the net.
- A line of X'es in the vertical views shows the bottom of the purse seine. The depth is defined for the fishing gear you have chosen. The depth is calculated from the sink rate you have defined for the fishing gear. Use **Purse Depth** on the **Cosmetics** menu to toggle this line *On* or *Off*.

  Tip

  Under **Fishing Gear***, select* **Fishing Gear Setup** *to open the dialog box. For the selected purse, set the sink rate. For the selected purse, select a depth value.*

- Horizontal dotted lines show the depth intervals. Use **Depth Dividers** on the **Cosmetics** menu to toggle these lines *On* or *Off*.
- Relevant information about a priority target can be found in the lower left corner of the view. The information includes the location, speed, course and depth of the target, as well as an estimate of its area and volume.
- The coverage plot for the *Plane* view is shown in the *Horizontal* view.

If you have connected a compatible catch monitoring system to your CS90 system, information from these sensors are shown in the *Catch* view.

5 At the bottom of the display presentation, select a suitable presentation mode, and activate the *Echogram* view.

The *Echogram* view provides echo data from a horizontal beam in a common echogram presentation. The echo data is taken from the current bearing and tilt. The beam used to provide data is identified in the top left corner of the view. Horizontal dotted lines show the depth intervals.

- You can change the bearing on the **Main** menu. You can also select the bearing line in a *Horizontal* view and drag it sideways.
- You can change the tilt angle by means of the **Tilt** function on the **Main** menu. You can also click on the tilt line in a *Vertical* view and drag it up and down.

Left-click in the *Echogram* view to open the tooltip. The tooltip provides the cursor location in the echogram (slant range, true range and depth) as well as the current pulse duration and time.

The **Horizontal Scroll** function controls how fast the echo presentation shall move from right towards left in the *Echogram* and *Inspection* views. The speed is controlled by adjusting the number of pixels used to present each ping. A higher speed will update the view faster, but will also reduce the resolution.

6 At the bottom of the display presentation, select a suitable presentation mode, and activate the *Plane* view.

The *Plane* view presents the echo data in a horizontal sector ("fan"). The sector direction can be changed in both vertical and horizontal directions. The tilt is drawn in the *Vertical* and *Horizontal* views as two dotted lines. The same dotted lines are shown in the *Horizontal* view as a dedicated bearing line to visualize the direction of the plane beam.

- You can change the bearing on the **Main** menu. You can also click on the dedicated dotted bearing line in a *Horizontal* view and drag it.
- You can change the tilt angle by means of the **Tilt** function on the **Main** menu.

The **Horizontal Tx Sector** function defines the opening angle of the sector.

- The selected range is divided into identical distances.
- The distance and depth of the cursor's location is shown in the lower right corner of the view.
- The current settings for range, gain and tilt are show in the lower left corner of the view.

Tip

To fully understand how the beams behave in this view, use the **Beam Visualization** *dialog box.*

7 At the bottom of the display presentation, select a suitable presentation mode, and activate the *Inspection* view.

The CS90 system offers an *inspection* beam. The inspection beam is presented using an *Inspection* view. You can train and tilt the beam independent of the beams displayed in the other views. You can use the *Inspection* view to study single fish, schools and bottom conditions in detail.

The *Inspection* view shows you echo data from a separate beam. The opening angle of the inspection beam depend on the operating frequency. Since the *Inspection* view operates with its own dedicated beam, the operating frequency can be adjusted independently of the other views. The echo data in the *Inspection* view is not subjected to AGC and RCG filtering.

The *Inspection* view can be regarded as an "echo sounder" with an adjustable direction. In the CS90 system we use the phrase *echogram* to describe the information provided by the view.

- Small labels are shown in the bottom left and right corners of the view. These labels show you the time in order to identify the scale of the horizontal axis.

- When enabled, equidistant horizontal scale lines are drawn in the view to indicate the range.
- The **Horizontal Scroll** function controls how fast the echoes shall travel across the *Inspection* views.

Tip

To fully understand how the beams behave in this view, use the **Beam Visualization** *dialog box.*

Related topics

Getting started, page 32
Starting normal operation, page 53
Sonar views, page 307
Presentation modes, page 308

Selecting Normal mode to start pinging

In order to transmit ("ping") you must set the CS90 system to *Normal* operating mode. This is the default mode when the CS90 system is turned on.

Context

The **Operation** function controls the operating mode of the CS90 system. *Normal* mode allows the CS90 system to transmit ("ping") through the water, and to receive the echoes.

Caution

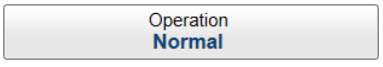
You must never permit the CS90 system to transmit (ping) when the ship is in a dry dock. The transducer can be damaged if it transmits in the open air.

Once started, the acoustic transmissions are controlled by the **Transmission Mode** and **TX Power** functions.

Procedure

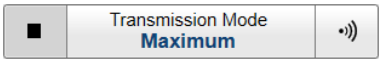
1 Open the **Operation** menu.

2 Set **Operation** to *Normal*.



The **Operation** function controls the operating mode of the CS90 system. *Normal* mode allows the CS90 system to transmit ("ping") through the water, and to receive the echoes.

3 Set **Transmission Mode** to *Maximum*.



The **Transmission Mode** function enables or disables the CS90 transmissions into the water. If you choose *Maximum*, the CS90 system will transmit (ping) continuously and as often as possible. This gives you the maximum refresh rate.

The ping rate is normally limited by the maximum range settings. It also depends on hardware limitations. This may be, for example, how fast your CS90 system can handle the information from each ping, how fast it communicates with external peripherals, or how long time it uses to save data.

4 Set **Tx Power** to *Maximum*.

Result

The CS90 system is now transmitting acoustic pulses ("pinging") into the water.

Related topics

Getting started, page 32
Starting normal operation, page 53
Operation function, page 432

Adjusting the radius of the search area

Some echoes are close, others are further away. It is often necessary to adjust the radius of the search area. On the CS90 system, this is referred to as *range*.

Context

The range setting defines from how "far" you want to detect echoes. In other words, you specify the horizontal or vertical distance from the vessel to the outer edge of the search area.

Note

The range value selected and shown is by default only used by the active view.

Even though you can choose a large range value, that does not mean that you can detect your targets on the same range. The range value only defines the range that is shown in the views. Actual target detection will always depend on the operational environment, such as water temperature, salinity, interference and layers in the water column.

The selected range is divided into identical distances. These are shown as dotted circles. They are referred to as *range rings*.

An adjustable range ring can be added to the *Horizontal* and *Vertical* views. This ring is referred to as the *variable range ring*.

Procedure

1 Click in the view you want to activate.

The active view is identified with a thicker border. Unless you use the **Apply to all** function, all changes you make will only be applied to this view.

2 Use the joystick to make the adjustment.

Tip

Optionally: Turn the relevant rotary switch to make the adjustment.

The Mk2 Operating Panel is fitted with three rotary switches. The switches are identified with numbers. Each switch can be assigned a function related to range, gain, bearing or tilt. Investigate the functionality provided on the **Operating Panel** *page. This page is located in the* **Installation** *dialog box.*

Optionally:

3 Observe the **Main** menu.

Its default location is on the right side of the display presentation.

4 Select **Range**.

5 Make the necessary adjustment.

The following methods can be used to adjust this setting:

a Select [+] or [-] to choose the requested setting.

b Place the cursor on the button. Press and hold the left mouse button. Move the cursor horizontally over the button. Release the mouse button when requested value is shown.

c Select the middle of the button to open it. If you have a keyboard connected to the CS90 system, type the requested value.

d Select the middle of the button to open it. Select a value from the options provided.

6 Open the button and select **Apply to all** if you wish to use the chosen setting in all the views in the current presentation mode.

Related topics

Getting started, page 32
Starting normal operation, page 53
Range function, page 422

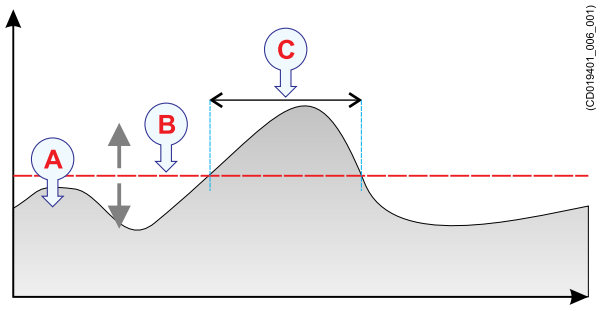
Adjusting the gain (echo sensitivity)

Some echoes are weak while others are stronger. To compensate for this it is often necessary to adjust the sensitivity of the CS90 system. This adjustment is commonly referred to as *gain*.

Context

You can compare this gain setting with the volume control on your car radio. When the gain is increased, the echoes will appear stronger. Weak echoes will be easier to see. However, since you also increase the acoustic noise in the reception, the echo presentations will also show this noise. Too much gain may therefore "distort" the presentation.

Comparing the gain function with the volume control on your car radio is not very accurate. In fact, the gain in the CS90 system is constant. The **Gain** function is used to adjust the sensitivity. This is done by controlling the minimum level of detection. When you *increase* the gain level (more positive number), you reduce the minimum level of detection, and thus *increase* the echo sensitivity.



*The echo strength (A) changes with time. The minimum level of detection (B) is adjusted up or down with the **Gain** function. Increasing the **Gain** with a more positive number reduces the minimum level, and this increases the sensitivity. Only echoes over the minimum level are shown in the echogram (C).*

Do not confuse this **Gain** setting with the **TVG** (Time Variable Gain) setting.

Tip

During normal operating conditions we recommend that you keep the gain between 15 and 30. If you need to adjust the gain "from scratch" disable AGC (Automatic Gain Control) and RCG (Reverberation Controlled Gain) to see the immediate effect of the gain adjustments. While you adjust the gain you may find it useful to have a known target (for example an island) as reference.

Procedure

1 Click in the view you want to activate.

The active view is identified with a thicker border. Unless you use the **Apply to all** function, all changes you make will only be applied to this view.

2 Use the joystick to make the adjustment.

Tip

Optionally: Turn the relevant rotary switch to make the adjustment.

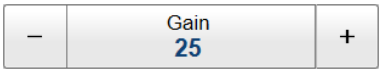
The Mk2 Operating Panel is fitted with three rotary switches. The switches are identified with numbers. Each switch can be assigned a function related to range, gain, bearing or tilt. Investigate the functionality provided on the **Operating Panel** *page. This page is located in the* **Installation** *dialog box.*

Optionally:

3 Observe the **Main** menu.

Its default location is on the right side of the display presentation.

4 Select **Gain**.



5 Make the necessary adjustment.

The following methods can be used to adjust this setting:

a Select [+] or [-] to choose the requested setting.

b Place the cursor on the button. Press and hold the left mouse button. Move the cursor horizontally over the button. Release the mouse button when requested value is shown.

c Select the middle of the button to open it. If you have a keyboard connected to the CS90 system, type the requested value.

6 Open the button and select **Apply to all** if you wish to use the chosen setting in all the views in the current presentation mode.

Related topics

Getting started, page 32
Starting normal operation, page 53
Gain function, page 423
Operating procedures, page 77
Controlling the gain and range settings, page 91

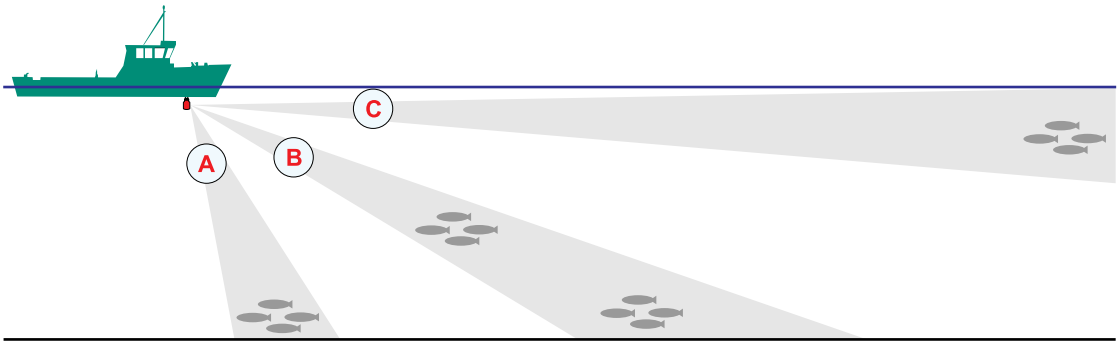
Changing the vertical angle of the sonar beams

In order to detect fish or schools in the water column you may need to change the angle of the sonar beams. The transmitted sonar beams can be tilted electronically.

Context

The current tilt is shown with a solid line in the *Vertical* view. In the *Horizontal* view, the current settings for range, gain and tilt are shown in the top left corner of the view.

With 0° tilt the sonar beam is transmitted in parallel with the sea surface. With +60 degrees tilt the beam is directed towards the bottom.



The challenge is to find a tilt that prevents the fish echoes to be "buried" in reverberation and bottom echoes.

- If you use a high tilt value (A) the fish are easily disguised by bottom echoes. A strong RCG (Reverberation Controlled Gain) setting will remove the bottom echoes. As the distance from the bottom to the fish increases, the fish echoes become clearer. However, this assumes that the fish echoes are considerably stronger than the bottom echoes.
- If you use a very small tilt (C) you are not bothered by bottom echoes. However, if the sea surface is gusty you will see echoes from the waves. These echoes are normally rather weak, and they hardly move in relation to your vessel.
- By means of a medium tilt angle (B) you are able to pick up scattered fish or schools if these are located at some distance above the bottom. The upper school in the illustration appears on the sonar picture before the bottom echo, while the lower school will easily be disguised by the bottom echoes. Once again you can activate the RCG function to improve the reading.

Tip

With the various beams provided by the CS90 system, it may be difficult to understand the concepts. How do these beams "behave" in the water? By means of a graphic presentation, the **Beam Visualization** *dialog box attempts to give you a better understanding of how the acoustic beams are transmitted into the water. Open the* **Beam Visualization** *dialog box from the* **Setup** *menu.*

Procedure

1 In a *Vertical* view, click on the tilt line, keep the mouse button depressed, and drag the line up or down.

Optionally:

2 Click in any view to make it active.

The active view is identified with a thicker border. Unless you use the **Apply to all** function, all changes you make will only be applied to this view.

3 Observe the **Main** menu.

Its default location is on the right side of the display presentation.

4 Select **Tilt**.

5 Make the necessary adjustment.

The following methods can be used to adjust this setting:

a Select [+] or [-] to choose the requested setting.

b Place the cursor on the button. Press and hold the left mouse button. Move the cursor horizontally over the button. Release the mouse button when requested value is shown.

c Select the middle of the button to open it. If you have a keyboard connected to the CS90 system, type the requested value.

6 Open the button and select **Apply to all** if you wish to use the chosen setting in all the views in the current presentation mode.

Related topics

Getting started, page 32
Starting normal operation, page 53
Tilt function, page 425

Adjusting the horizontal direction of the sonar beam

The *Horizontal* view presents the 360 degrees area around your vessel from a bird's eye view. For the other views you must define the horizontal direction of the beam. Use **Bearing** to adjust the horizontal angle referenced to the vessel heading. You can also select the bearing line and drag it sideways.

Context

The **Bearing** function controls the horizontal direction of the *Vertical* view, the audio beam and the beam in each *Inspection* view. The current bearing applied to the *Horizontal* view is shown with a solid line pointing out from the sonar position.

- The bearing for the *Vertical* view is controlled by the bearing in the *Horizontal* view.
- If you use a presentation mode with two horizontal views you can set **Bearing** to two different values. Both bearing lines are shown in the *Horizontal* view. Both bearings are shown as continuous lines pointing out from the sonar position. The bearing in *Horizontal 1* is shown with a solid line. The bearing in *Horizontal 2* is shown with a dotted line.
- If you use a presentation mode with two vertical views you can set the **Bearing** function to two different values. Both bearing lines are shown in the *Horizontal* view.

The bearing for the *Vertical* view is shown with a solid line. The bearing for the *Vertical 2* view is shown with a dotted line.

- The solid bearing line in the *Horizontal* view controls the audio beam. If you have two *Horizontal* views, the solid line in the *Horizontal 1* view controls the audio beam.
- The area covered by the vertical beam is shown as a triangle in the *Horizontal* view.

Note

The choice you make is by default only applied to the currently selected (active) view. The active view is identified with a thicker border.

By default, a new manually initiated tracked object is automatically given priority status. The priority is identified with a "P". The bearing and tilt settings are automatically adjusted to follow the movements of the tracked target. The bearing line is automatically locked on the object to reflects its bearing.

Procedure

1 Click in the view you want to activate.

The active view is identified with a thicker border. Unless you use the **Apply to all** function, all changes you make will only be applied to this view.

2 Use the joystick to make the adjustment.

Tip

Optionally: Turn the relevant rotary switch to make the adjustment.

The Mk2 Operating Panel is fitted with three rotary switches. The switches are identified with numbers. Each switch can be assigned a function related to range, gain, bearing or tilt. Investigate the functionality provided on the **Operating Panel** *page. This page is located in the* **Installation** *dialog box.*

Optionally:

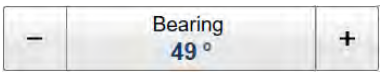
3 In a *Horizontal* view, select the bearing line and drag it sideways.

Optionally:

4 Observe the **Main** menu.

Its default location is on the right side of the display presentation.

5 Select **Bearing**.



6 Make the necessary adjustment.

The following methods can be used to adjust this setting:

a Select [+] or [-] to choose the requested setting.

b Place the cursor on the button. Press and hold the left mouse button. Move the cursor horizontally over the button. Release the mouse button when requested value is shown.

c Select the middle of the button to open it. If you have a keyboard connected to the CS90 system, type the requested value.

7 Open the button and select **Apply to all** if you wish to use the chosen setting in all the views in the current presentation mode.

Related topics

Getting started, page 32
Starting normal operation, page 53
Bearing function, page 427

Turning off the CS90 system

When you do not use the CS90 system, turn it off. Select **Power Off** on the top bar to turn off the CS90 system. You can also use the **Power** button on the Operating Panel. You must never turn off the CS90 system by means of the on/off switch on the Processor Unit.

Procedure

1 Select **Power Off** on the top bar.

In the **Power Off** dialog box, select **Power off** or **Exit to Operating System**.

- **Power Off** turns off the Processor Unit and the Transceiver Unit.
- **Exit to Operation System** closes the CS90 program.
- Both functions will also retract the transducer.

or:

2 On the Operating Panel, press **Power**, and keep it depressed for a few seconds.

In the **Power Off** dialog box, select **Power off** or **Exit to Operating System**.

3 Wait while the CS90 program closes and the Transceiver Unit is turned off.

4 Turn off the display.

If required, refer to the instructions provided by the display manufacturer.

Related topics

Getting started, page 32
Starting normal operation, page 53
Turning on the CS90 system for normal use, page 53

Basic operating procedures

Topics

Selecting the language displayed in the menus and dialog boxes, page 70

Selecting operating frequency for minimum noise, page 71

Hiding the menu system when you do not need it, page 72

Saving single or sequential screen captures, page 73

Saving the current user settings, page 74

Defining the ping (transmission) modes, page 75

Selecting the language displayed in the menus and dialog boxes

You may prefer to use the CS90 system with the user interface in your own language. The **Language** function allows you to select the language to be used in the display presentations, menus and dialog boxes.

Context

With a few exceptions, the chosen language will also be used for all other texts in the user interface. The context sensitive online help may not be available for the language you choose. If your language is not supported, the English help is provided.

Procedure

1 Open the **Setup** menu.

2 Select the middle of the **Language** button to open the list of available options.

3 Select the language you wish to use.

Result

All the texts in the user interface are changed to the selected language.

The context sensitive on-line help may also be available in your language. To change the language in the on-line help, you may need to restart the CS90 system.

Related topics

Getting started, page 32
Basic operating procedures, page 70
Language function, page 459

Selecting operating frequency for minimum noise

The **Frequency** function is used to control the centre frequency of the acoustic transmissions (pings). You can select any operational frequency from 70 to 90 kHz. All types of noise matter when you wish to find the best operating frequency.

Context

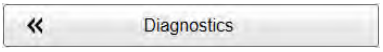
A lower frequency gives you a better detection range because the attenuation loss is smaller. A higher frequency gives you better range resolution. A higher frequency also gives you narrower beams and a "sharper" image".

Noise from internal and external sources have an impact on the choice of operating frequency. One specific frequency may perform better than the others on your vessel. To measure the noise level, observe the value presented on the **Noise** page in the **BITE** dialog box.

We recommend that you do this test twice. First, do the test with all other hydroacoustic systems (echo sounders, ADCP, sonars) turned off. Second, do the test with normal operating conditions. This allows you to see how the other hydroacoustic systems affect the operation and performance of your CS90 system.

Procedure

1 On the **Main** menu, select **User Settings**.
   a Select **CS90 Factory Defaults**.
   b Select **Activate Selected Setting**.
   c Select **OK** to apply your changes and close the **User Settings** dialog box.
2 On the **Main** menu, set **Range** to *1000 m*.
3 Open the **Operation** menu. Set **Tx Power** to *Off*.
4 Open the **Active** menu. Set **Pulse Type** to *CW Medium*.
5 Open the **Setup** menu.
6 Select **Diagnostics** to open the dialog box.



   a Select **Noise** to open the page.
   b Select **Start Noise Measurements**.
   c On the **Active** menu, change the **Frequency** setting while observing the noise value.
   d Note frequencies with high noise levels, and try to avoid using them.

Tip

The factory default settings include operating frequency. If you apply these settings remember to make the appropriate changes afterwards.

Related topics
Getting started, page 32
Basic operating procedures, page 70
Frequency function, page 478

Hiding the menu system when you do not need it

Unless you need to make frequent changes to the operating parameters, you may want to hide the menu from the display presentation. This gives you more space for echo information.

Context

The menu system is by default located on the right side of the display presentation. The menus are organized in a tree structure with a main menu, a set of secondary menus, and several menu buttons.

Tip

The **Menu on the right side** *option is provided in the* **Display Options** *dialog box. By deselecting this function, the entire menu system is placed permanently on the left side of the display presentation.*

Procedure

1 To hide the menu, select **Menu** on the top bar.

When the menu is hidden, it is temporarily shown on the left or right side of the display presentation if you move the cursor to that position.

2 To retrieve the menu, select **Menu** one more time.

Related topics
Getting started, page 32
Basic operating procedures, page 70

Saving single or sequential screen captures

While using the CS90 system you may wish to make a screen capture to save an instantaneous copy of the current presentation. Each screen capture you make is saved in `.jpg` format on the Processor Unit hard disk.

Context

You can choose either a single screen capture or a sequence with multiple screen captures. Each screen capture you make is saved in `.jpg` format on the Processor Unit hard disk. The file name reflects the current date and time.

Screen Capture on the top bar allows you to make a copy of the current display presentation. You can also use the **Screen Capture** button on the Operating Panel.

Procedure

Choosing screen capture mode:

1 Open the **Setup** menu.

2 Select **Screen Captures**.

   a Select screen capture mode.

   - Single: In *Single* mode one screen capture is taken every time you select **Screen Capture** on the top bar.
   - Sequence: In *Sequence* mode a new screen capture is created for every ping.

   b Select **Close** to save the chosen settings and close the dialog box.

Saving a single screen capture:

3 Observe **Screen Capture** on the top bar.

4 Select **Screen Capture** to make a copy of the entire display presentation.

Every time you do this a new image file is created.

You can also use the **Screen Capture** button on the Operating Panel.

Saving a sequence of screen captures:

5 Select **Screen Capture** on the top bar to start the sequence.

6 Select **Screen Capture** one more time to stop the sequence.

Related topics

Getting started, page 32
Basic operating procedures, page 70

Saving the current user settings

When you have spent some time working with the CS90 system, you are probably using specific settings that you know are efficient for your purpose. It is a good idea to save these settings.

Context

The **User Settings** dialog box is used to store your favourite settings. These settings can be related to different operations, environmental conditions or basic personal preferences. You can use different settings to create as many user profiles as you like, and give them any name. All the settings you have chosen using functions and dialog boxes in the user interface are saved.

Procedure

1 Observe the **Main** menu.

Its default location is on the right side of the display presentation.

2 Select **User Settings**.

3 Select **Save Current Setting**.

A small dialog opens to accept the name of the new setting.

4 Type a name.

Tip

If you do not have a computer keyboard connected to your CS90 system, select the **Keyboard** *button to open an on-screen keyboard.*

5 Select **OK** to save the chosen name.

6 Observe that the name you have chosen appears on the **Saved Settings** list.

7 Select **OK** to close the dialog box.

Related topics

Getting started, page 32
Basic operating procedures, page 70
User Settings dialog box, page 419

Defining the ping (transmission) modes

You can easily control how often the CS90 system shall transmit acoustic energy (a ping) into the water. You can disable the transmission altogether, set it to operate as fast as possible, or select a time interval.

Context

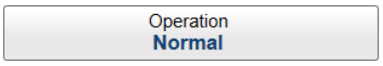
Once pinging is *On*, use **Transmission Mode** to choose *how often* the CS90 system shall transmit (ping). Use it to control the *behaviour* of the transmissions (pinging).

- *Single Ping*: The CS90 system transmits (pings) only when you click the ping symbol on the **Transmission Mode** button.
- *Interval*: The CS90 system transmits (pings) with a fixed time interval. **Ping Interval** permits you to choose the time (in milliseconds) between each transmission (ping).
- *Maximum*: The CS90 system transmits (pings) as frequent as possible.

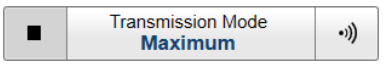
Procedure

1 Open the **Operation** menu.

2 Set **Operation** to *Normal*.



3 Set **Transmission Mode** to *Maximum*.



- Select the symbol on the right side of the button to start pinging.
- Select the symbol on the left side the button to stop pinging.
- Select the middle of the button to open it.

If you choose *Maximum*, the CS90 system will transmit (ping) continuously and as often as possible. This gives you the maximum refresh rate. The time between each ping (the *ping rate*) depends mainly on the current range. In some systems, a low performance Processor Unit and/or a slow hard disk may reduce the ping rate. How fast your Processor Unit communicates with external peripherals may also have an effect on the ping rate.

or:

4 Set **Transmission Mode** to *Interval*.

Specify the interval between each ping.

Select either side of the button to choose a value. Select the middle of the button to open it. If you have a keyboard connected to the CS90 system, type the requested value.

You can also change the value by selecting - and holding - the middle of the button, and move the cursor sideways. Drag the cursor sideways to increase or decrease the value. Release the mouse button when requested value is shown.

or:

5 Set **Transmission Mode** to *Single Ping*.

The CS90 system transmits (pings) only when you click the ping symbol on the **Transmission Mode** button.

Related topics

Getting started, page 32
Basic operating procedures, page 70
Transmission Mode function, page 433

Context-sensitive online help

Installed on your CS90 system you will find a comprehensive context-sensitive online help system. Everything you can read in this publication can also be found in the online help.

The context-sensitive online help is provided using a *WebHelp* installation using HTML format.

To open the help system, select **Help** in any dialog box. This will provide instantaneous information about the relevant dialog box. Links to related procedures and topics are provided. To navigate in the help file, use the menu system on the left side and the interactive links within the publication.

Note

To open the online help on its start page, select **Help** *on the top bar. To read about a dialog box and the options provided, select the* **[?]** *button in its top right corner.*

The context sensitive online help may not be available for the language you have chosen for the user interface. If your language is not supported, the English help is provided.

Related topics

Updating the online help system, page 228
Adding online help in a new language, page 229

Operating procedures

Topics

Getting started, page 78
Choosing operating mode and key transmit parameters, page 82
Controlling the gain and range settings, page 91
Using the markers and tracking features, page 101
Improving the recognition of fish and schools using receiver filters, page 114
Recording and replaying echo data, page 123
Recording and exporting processed echo data, page 129
Capturing the display presentation in image and video files, page 133
Setting up presentation modes and views, page 140
Defining the visual information in the sonar views, page 146
Using maps, page 150
Defining settings related to user preferences and individual customizing, page 154
Saving, retrieving and handling user settings, page 166
Defining the user-selected features on the Operating Panel, page 171
Exporting sensor data, marker positions and technical information, page 180

Getting started

Topics

Turning on the CS90 system, page 78

Lowering and hoisting the transducer from the user interface, page 80

Turning off the CS90 system, page 81

Turning on the CS90 system

To use the CS90 system, you must first turn it on. To turn on the CS90 system use the **Power** button on the Operating Panel. The CS90 program starts automatically when the Processor Unit is turned on.

Caution

You must never permit the CS90 system to transmit (ping) when the ship is in a dry dock. The transducer can be damaged if it transmits in the open air.

Procedure

1 Make sure that you have sufficient water depth below the keel before you lower the transducer.

2 Turn on the display(s).

If required, refer to the instructions provided by the display manufacturer.

3 On the Operating Panel, press **Power**, and keep it depressed for a few seconds.

The blue indicator light in the button flashes while the Operating Panel establishes contact with the Processor Unit. When the connection has been made, the blue indicator light is lit permanently.

Wait while the operating system and CS90 program is loaded and started. Both the Processor Unit and the Transceiver Unit are turned on automatically.

4 Observe that the **Transceiver On/Off** dialog box opens automatically.

The dialog box offers progress information. You can monitor the progress as the Transceiver Unit is turned on. A blue circle on the hull unit symbol means that the Processor Unit communicates with the hull unit control circuitry.

5 Once the program has started, observe that the display presentation fills the entire screen.

The program starts up using the same settings as the last time you used it. If these settings are acceptable, continue operation. If you wish to alter any of the settings, see the relevant procedures.

6 Make sure that you have sufficient water depth below the keel before you lower the transducer.

7 To lower the transducer, press **Down** on the Operating Panel.

While the transducer is moving the indicator lamp flashes, and an audible signal is sounded. When the requested position has been reached, the indicator lamp is lit, and the audible signal stops.

Alternatively, use the **Hull Unit** function on the top bar to lower the transducer.

8 At the bottom of the **Main** menu, observe that the **Operation** icon is flashing.

The icon is flashing to indicate that even if the CS90 system is turned on, "pinging" is disabled. The CS90 system is in *Normal* mode, but **TX Power** is set to *Off* to prevent transmissions. This is for safety reasons.

9 Set **Tx Power** to *Maximum* (or any other power rating) to start pinging.

Related topics

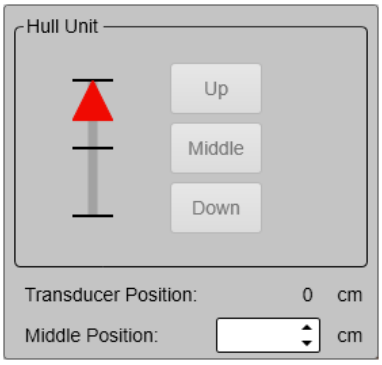
Operating panels, page 33
Operating procedures, page 77
Getting started, page 78
Lowering and hoisting the transducer from the user interface, page 80
Power Off dialog box, page 516

Lowering and hoisting the transducer from the user interface

The Operating Panel controls the lowering and hoisting of the transducer. Dedicated buttons are provided for the physical transducer locations. You can also control the transducer movements from the top bar.

Context

The **Hull Unit Control** dialog box allows you to lower and hoist the transducer. The dialog box also provides status information about the transducer position. You can monitor the current position of the transducer and make changes to the position defaults.



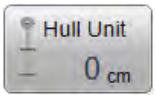
Caution

If the transducer hits larger objects or bottom, the transducer shaft may be bent, or - in worst case - it can be broken off. A broken transducer shaft will cause water leakage through the top of the shaft. If you suspect that the transducer shaft is seriously damaged do not retract the transducer to its upper position. To prevent serious damage to the vessel or the vessel stability, you must have a water pump and a warning system in the sonar room.

Procedure

1 Make sure that you have sufficient water depth below the keel before you lower the transducer.

2 Select **Hull Unit** on the top bar to open the **Hull Unit Control** dialog box.



3 To lower the transducer select **Down**.

4 To hoist the transducer select **Up**.

5 To move the transducer to its predefined middle position, select **Middle**.

If you have the large hull unit you can define two middle positions.

Retracting the transducer to a middle position may be useful if you use the CS90 system simultaneously with other sonars. A higher position will permit you to increase the vessel speed. If you operate in very shallow waters, you may also reduce the risk of hitting bottom. However, placing the transducer immediately under the hull may increase the flow noise.

Related topics

Operating panels, page 33
Operating procedures, page 77
Getting started, page 78
Hull Unit Control dialog box, page 514

Turning off the CS90 system

When you do not use the CS90 system, turn it off. Select **Power Off** on the top bar to turn off the CS90 system. You can also use the **Power** button on the Operating Panel. You must never turn off the CS90 system by means of the on/off switch on the Processor Unit.

Procedure

1 Select **Power Off** on the top bar.

In the **Power Off** dialog box, select **Power off** or **Exit to Operating System**.

- **Power Off** turns off the Processor Unit and the Transceiver Unit.
- **Exit to Operation System** closes the CS90 program.
- Both functions will also retract the transducer.

or:

2 On the Operating Panel, press **Power**, and keep it depressed for a few seconds.

In the **Power Off** dialog box, select **Power off** or **Exit to Operating System**.

3 Wait while the CS90 program closes and the Transceiver Unit is turned off.

4 Turn off the display.

If required, refer to the instructions provided by the display manufacturer.

Related topics

Operating panels, page 33
Operating procedures, page 77
Getting started, page 78
Lowering and hoisting the transducer from the user interface, page 80

Choosing operating mode and key transmit parameters

Topics

Selecting Normal mode to start pinging, page 82

Selecting Replay mode, page 83

Selecting Inactive mode, page 84

Setting up the CS90 system for maximum echo refresh rate, page 85

Transmitting single pings, page 86

Transmitting with fixed-time intervals, page 87

Adjusting the output power to match varying conditions, page 87

Selecting the best operating frequency, page 89

Selecting Normal mode to start pinging

In order to transmit ("ping") you must set the CS90 system to *Normal* operating mode. This is the default mode when the CS90 system is turned on.

Context

The **Operation** function controls the operating mode of the CS90 system. *Normal* mode allows the CS90 system to transmit ("ping") through the water, and to receive the echoes.

Caution

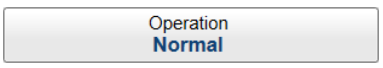
You must never permit the CS90 system to transmit (ping) when the ship is in a dry dock. The transducer can be damaged if it transmits in the open air.

Once started, the acoustic transmissions are controlled by the **Transmission Mode** and **TX Power** functions.

Procedure

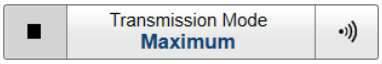
1 Open the **Operation** menu.

2 Set **Operation** to *Normal*.



The **Operation** function controls the operating mode of the CS90 system. *Normal* mode allows the CS90 system to transmit ("ping") through the water, and to receive the echoes.

3 Set **Transmission Mode** to *Maximum*.



The **Transmission Mode** function enables or disables the CS90 transmissions into the water. If you choose *Maximum*, the CS90 system will transmit (ping) continuously and as often as possible. This gives you the maximum refresh rate.

The ping rate is normally limited by the maximum range settings. It also depends on hardware limitations. This may be, for example, how fast your CS90 system can handle the information from each ping, how fast it communicates with external peripherals, or how long time it uses to save data.

4 Set **Tx Power** to *Maximum*.

Result

The CS90 system is now transmitting acoustic pulses ("pinging") into the water.

Related topics

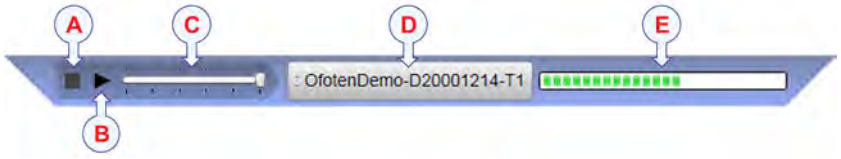
Operating procedures, page 77
Choosing operating mode and key transmit parameters, page 82
Selecting Normal mode to start pinging, page 82
Selecting Replay mode, page 83
Selecting Inactive mode, page 84
Operation function, page 432

Selecting Replay mode

Replay mode allows you to play back previously recorded raw data. The CS90 system cannot operate normally while in *Replay* mode. Neither transmission nor reception takes place.

Context

All playback is controlled by the replay bar.



A ***Stop****: Select this button to stop the playback.*

B ***Play/Pause****: Select this button to start the playback, or to pause it.*

C ***Replay Speed****: Select this slider and move it sideways to adjust the replay speed.*

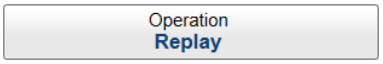
D ***Replay File****: The button shows you which file you are replaying. Select the button to open the* ***Replay File*** *dialog box.*

E ***Playback Progress****: This bar shows you the progress of the replay sequence. If you have chosen to restart the replay file(s) automatically (in a loop), the green indicator starts from left every time the file restarts.*

Procedure

1 Open the **Operation** menu.

2 Set **Operation** to *Replay*.



The replay bar opens automatically. It is positioned directly below the top bar at the top of the display presentation.

If you need to select which files to replay, select **Replay File** under the **Operation** button. You can also select the large button in the middle of the replay bar.

3 Select **Play/Pause** to start the playback.

4 To stop the replay choose any other operating mode.

Related topics

Operating procedures, page 77
Choosing operating mode and key transmit parameters, page 82
Selecting Normal mode to start pinging, page 82
Selecting Replay mode, page 83
Selecting Inactive mode, page 84
Recording and replaying echo data, page 123
Choosing which echo data file(s) to replay, page 127
Operation function, page 432
Replay File dialog box, page 497

Selecting Inactive mode

Inactive mode is provided to pause the operation temporarily. Neither transmission nor reception takes place. The current echoes are removed from the display presentation.

Context

The **Operation** function controls the operating mode of the CS90 system.

Note

Note that Inactive operating mode is not the same as Passive mode. While Inactive mode stops both transmission and reception, Passive mode will still allow the CS90 system to receive echoes. To select passive mode set **Operation** *to Normal,* **Noise Filter** *and* **Tx Power** *to Off.*

Procedure

1 Open the **Operation** menu.

2 Set **Operation** to *Inactive*.

When the CS90 system is disabled with this function, it will stop. The transmission ("pinging") stops.The current echoes are removed from the display presentation.

Related topics

Operating procedures, page 77
Choosing operating mode and key transmit parameters, page 82
Selecting Normal mode to start pinging, page 82
Selecting Replay mode, page 83
Selecting Inactive mode, page 84
Operation function, page 432

Setting up the CS90 system for maximum echo refresh rate

You can set up the CS90 system to transmit (ping) as often as possible. This gives you the maximum refresh rate.

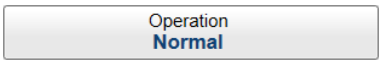
Context

Use **Transmission Mode** to control how often the CS90 system shall transmit its energy into the water. For normal use, choose *Maximum*. If you choose *Maximum*, the CS90 system will transmit (ping) continuously and as often as possible.

Procedure

1 Open the **Operation** menu.

2 Set **Operation** to *Normal*.



3 Set **Transmission Mode** to *Maximum*.

The time between each ping (the *ping rate*) depends mainly on the current range. How fast your Processor Unit communicates with external peripherals may also have an effect on the ping rate.

Related topics

Operating procedures, page 77
Choosing operating mode and key transmit parameters, page 82
Setting up the CS90 system for maximum echo refresh rate, page 85
Transmitting single pings, page 86
Transmitting with fixed-time intervals, page 87
Transmission Mode function, page 433

Transmitting single pings

You can set up the CS90 system to transmit a single ping only when you want it.

Context

Use **Transmission Mode** to control how often the CS90 system shall transmit its energy into the water. For normal use, choose *Maximum*. If you choose *Maximum*, the CS90 system will transmit (ping) continuously and as often as possible.

If you choose *Single Ping*, you can transmit single pings by selecting the ping symbol on the right side of the button.

Procedure

1 Open the **Operation** menu.

2 Set **Operation** to *Normal*.

3 Set **Transmission Mode** to *Single Ping*.

4 Select the ping symbol on the right side of the button to transmit one single ping.

Related topics

Operating procedures, page 77
Choosing operating mode and key transmit parameters, page 82
Setting up the CS90 system for maximum echo refresh rate, page 85
Transmitting single pings, page 86
Transmitting with fixed-time intervals, page 87
Transmission Mode function, page 433

Transmitting with fixed-time intervals

You can set up the CS90 system to transmit pings with a fixed time interval.

Context

Use **Transmission Mode** to control how often the CS90 system shall transmit its energy into the water. For normal use, choose *Maximum*. If you choose *Maximum*, the CS90 system will transmit (ping) continuously and as often as possible.

If you choose *Interval*, you must define the time between each ping with the **Ping Interval** function. **Ping Interval** permits you to choose the time (in milliseconds) between each transmission (ping).

Procedure

1 Open the **Operation** menu.

2 Set **Operation** to *Normal*.

3 Set **Transmission Mode** to *Interval*.

4 Specify the interval between each ping.

a Select either side of the button to choose a value.

b Select the middle of the button to open it.

If you have a keyboard connected to the CS90 system, type the requested value.

You can also change the value by selecting - and holding - the middle of the button, and move the cursor sideways. Drag the cursor sideways to increase or decrease the value. Release the mouse button when requested value is shown.

Related topics

Operating procedures, page 77
Choosing operating mode and key transmit parameters, page 82
Setting up the CS90 system for maximum echo refresh rate, page 85
Transmitting single pings, page 86
Transmitting with fixed-time intervals, page 87
Transmission Mode function, page 433

Adjusting the output power to match varying conditions

You are permitted to adjust the output power from the CS90 system. **Tx Power** is used to control the amount of power that is transmitted with each ping.

Context

Most users operate the CS90 system with **Tx Power** set to *Maximum*. This allows for maximum range, and works well in open waters with sufficient depth. Certain operating

conditions may make it appropriate to adjust the output power. Use **Tx Power** to reduce the transmitted acoustic energy compared to the maximum output.

Tip

If you work in shallow and/or confined waters you may find it useful to reduce the output power to avoid reverberation.

Some of our users claim that reducing the output may be useful if you are looking for scattered fish.

If you work in vicinity of other vessels using hydroacoustic systems in the same frequency range as your CS90 system, interference may cause problems. Reducing the output power is not a practical way to deal with interference. It is more efficient to change the operating frequency.

To investigate unknown and/or unfamiliar targets, some user prefer to "reset" the CS90 system by turning off all the receiver filters and adjust the output power.

Sea conditions vary, sometimes drastically. The acoustic conditions are also changing. Temperature and salinity layers differ from one day to the next, and from one position to another. It is not possible to identify settings that will provide the best data at all times.

Procedure

1 Open the **Operation** menu.

2 Select **Tx Power**.

3 Select the requested output power.

Select either side of the button to choose a value.

Select the middle of the button to open a small menu with the available options.

Related topics

Operating procedures, page 77
Choosing operating mode and key transmit parameters, page 82
Tx Power function, page 434

Selecting the best operating frequency

The **Frequency** function is used to control the centre frequency of the acoustic transmissions (pings). You can select any operational frequency from 70 to 90 kHz. All types of noise matter when you wish to find the best operating frequency.

Context

A lower frequency gives you a better detection range because the attenuation loss is smaller. A higher frequency gives you better range resolution. A higher frequency also gives you narrower beams and a "sharper" image".

Noise from internal and external sources have an impact on the choice of operating frequency. One specific frequency may perform better than the others on your vessel. To measure the noise level, observe the value presented on the **Noise** page in the **BITE** dialog box.

We recommend that you do this test twice. First, do the test with all other hydroacoustic systems (echo sounders, ADCP, sonars) turned off. Second, do the test with normal operating conditions. This allows you to see how the other hydroacoustic systems affect the operation and performance of your CS90 system.

Procedure

1 On the **Main** menu, select **User Settings**.

   a Select **CS90 Factory Defaults**.

   b Select **Activate Selected Setting**.

   c Select **OK** to apply your changes and close the **User Settings** dialog box.

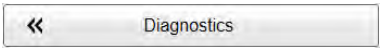
2 On the **Main** menu, set **Range** to *1000 m*.

3 Open the **Operation** menu. Set **Tx Power** to *Off*.

4 Open the **Active** menu. Set **Pulse Type** to *CW Medium*.

5 Open the **Setup** menu.

6 Select **Diagnostics** to open the dialog box.



   a Select **Noise** to open the page.

   b Select **Start Noise Measurements**.

   c On the **Active** menu, change the **Frequency** setting while observing the noise value.

   d Note frequencies with high noise levels, and try to avoid using them.

Tip

The factory default settings include operating frequency. If you apply these settings remember to make the appropriate changes afterwards.

Related topics

Operating procedures, page 77
Choosing operating mode and key transmit parameters, page 82
Frequency function, page 478

Controlling the gain and range settings

Topics

Adjusting the gain (echo sensitivity), page 91

Adjusting the TVG (Time Variable Gain) setting, page 93

Adjusting the sonar range, page 94

Expanding the range within the sonar view, page 95

Adjusting the intensity of the echo presentations, page 96

Changing the tilt, page 97

Adjusting the bearing, page 99

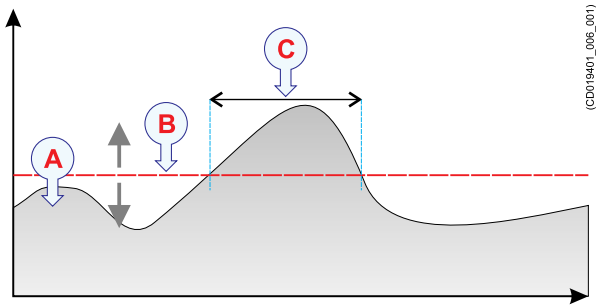
Adjusting the gain (echo sensitivity)

Some echoes are weak while others are stronger. To compensate for this it is often necessary to adjust the sensitivity of the CS90 system. This adjustment is commonly referred to as *gain*.

Context

You can compare this gain setting with the volume control on your car radio. When the gain is increased, the echoes will appear stronger. Weak echoes will be easier to see. However, since you also increase the acoustic noise in the reception, the echo presentations will also show this noise. Too much gain may therefore "distort" the presentation.

Comparing the gain function with the volume control on your car radio is not very accurate. In fact, the gain in the CS90 system is constant. The **Gain** function is used to adjust the sensitivity. This is done by controlling the minimum level of detection. When you *increase* the gain level (more positive number), you reduce the minimum level of detection, and thus *increase* the echo sensitivity.



*The echo strength (A) changes with time. The minimum level of detection (B) is adjusted up or down with the **Gain** function. Increasing the **Gain** with a more positive number*

reduces the minimum level, and this increases the sensitivity. Only echoes over the minimum level are shown in the echogram (C).

Do not confuse this **Gain** setting with the **TVG** (Time Variable Gain) setting.

Tip

During normal operating conditions we recommend that you keep the gain between 15 and 30. If you need to adjust the gain "from scratch" disable AGC (Automatic Gain Control) and RCG (Reverberation Controlled Gain) to see the immediate effect of the gain adjustments. While you adjust the gain you may find it useful to have a known target (for example an island) as reference.

Procedure

1 Click in the view you want to activate.

The active view is identified with a thicker border. Unless you use the **Apply to all** function, all changes you make will only be applied to this view.

2 Use the joystick to make the adjustment.

Tip

Optionally: Turn the relevant rotary switch to make the adjustment.

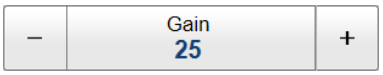
The Mk2 Operating Panel is fitted with three rotary switches. The switches are identified with numbers. Each switch can be assigned a function related to range, gain, bearing or tilt. Investigate the functionality provided on the **Operating Panel** *page. This page is located in the* **Installation** *dialog box.*

Optionally:

3 Observe the **Main** menu.

Its default location is on the right side of the display presentation.

4 Select **Gain**.



5 Make the necessary adjustment.

The following methods can be used to adjust this setting:

a Select [+] or [-] to choose the requested setting.

b Place the cursor on the button. Press and hold the left mouse button. Move the cursor horizontally over the button. Release the mouse button when requested value is shown.

c Select the middle of the button to open it. If you have a keyboard connected to the CS90 system, type the requested value.

6 Open the button and select **Apply to all** if you wish to use the chosen setting in all the views in the current presentation mode.

Related topics
Getting started, page 32
Starting normal operation, page 53
Gain function, page 423
Operating procedures, page 77
Controlling the gain and range settings, page 91

Adjusting the TVG (Time Variable Gain) setting

When an acoustic pulse is sent through the water, it will gradually lose its energy. The greater the distance between the transducer and the target(s), the greater the loss of energy. **TVG** (Time Variable Gain) compensates for the loss of acoustic energy due to geometric spreading and absorption.

Context

The TVG (Time Variable Gain) compensation is designed to counteract the natural phenomena of geometric spread and absorption loss. In the CS90 system, the TVG compensation is made using digital signal processing software. The TVG compensation is expressed as a logarithmic curve. Each curve has a different slope creating a different gain compensation. Each curve is identified with the equation *X log TVG*. The coefficient "*X*" is an integer. Typical values for "*X*" are 10 to 40.

Procedure

1 Click in the view you want to activate.

The setting you choose will only be valid for the active view. The active view is identified with a thicker border.

2 Open the **Active** menu.

3 Locate the **TVG** button.

4 Select [+] or [-] to choose the requested setting.

Related topics
Operating procedures, page 77
Controlling the gain and range settings, page 91
TVG function, page 470

Adjusting the sonar range

Some echoes are close, others are further away. It is often necessary to adjust the radius of the search area. On the CS90 system, this is referred to as *range*.

Context

The range setting defines from how "far" you want to detect echoes. In other words, you specify the horizontal or vertical distance from the vessel to the outer edge of the search area.

Note

The range value selected and shown is by default only used by the active view.

Even though you can choose a large range value, that does not mean that you can detect your targets on the same range. The range value only defines the range that is shown in the views. Actual target detection will always depend on the operational environment, such as water temperature, salinity, interference and layers in the water column.

The selected range is divided into identical distances. These are shown as dotted circles. They are referred to as *range rings*.

An adjustable range ring can be added to the *Horizontal* and *Vertical* views. This ring is referred to as the *variable range ring*.

Procedure

1 Click in the view you want to activate.

The active view is identified with a thicker border. Unless you use the **Apply to all** function, all changes you make will only be applied to this view.

2 Use the joystick to make the adjustment.

Tip

Optionally: Turn the relevant rotary switch to make the adjustment.

The Mk2 Operating Panel is fitted with three rotary switches. The switches are identified with numbers. Each switch can be assigned a function related to range, gain, bearing or tilt. Investigate the functionality provided on the **Operating Panel** *page. This page is located in the* **Installation** *dialog box.*

Optionally:

3 Observe the **Main** menu.

Its default location is on the right side of the display presentation.

4 Select **Range**.

5 Make the necessary adjustment.

The following methods can be used to adjust this setting:

a Select [+] or [-] to choose the requested setting.

b Place the cursor on the button. Press and hold the left mouse button. Move the cursor horizontally over the button. Release the mouse button when requested value is shown.

c Select the middle of the button to open it. If you have a keyboard connected to the CS90 system, type the requested value.

d Select the middle of the button to open it. Select a value from the options provided.

6 Open the button and select **Apply to all** if you wish to use the chosen setting in all the views in the current presentation mode.

Related topics

Operating procedures, page 77
Controlling the gain and range settings, page 91
Range function, page 422

Expanding the range within the sonar view

In some situations you may wish to expand the range in the sonar presentations. Use **View Range** to expand the range shown in the relevant views to any percentage of the original **Range** setting.

Context

The **Range** function allows you to specify the maximum distance from the transducer to the outer edge of the sonar beam. By default, the range shown in each relevant view is adjusted to the chosen **Range** setting. For example, if you set the range to 500 metres, the outer range of the view is also limited to 500 m. When you define a value for **View Range** the presentation will shift to the new range, while the range defined by the **Range** setting is identified with a thicker circle.

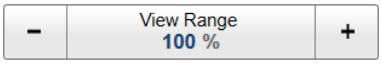
Tip

This function can be used if you wish to move your ship symbol to the bottom of the view. You can then expand the range without adding zoom.

Procedure

1 Open the **Display** menu.

2 Locate the **View Range** function.



3 Use **View Range** to expand the range shown in the relevant views to any percentage of the original **Range** setting.

The expansion is made without resizing the echoes using a "zoom" effect.

Related topics

Operating procedures, page 77
Controlling the gain and range settings, page 91
View Range function, page 445

Adjusting the intensity of the echo presentations

The effect of the **Gain** adjustment is minimized if you apply **RCG** (Reverberation Controlled Gain) and **AGC** (Automatic Gain Control). The **Display Gain** is applied at the end of the filter sequence in the CS90 system. This means that you can use **Display Gain** if you are not completely satisfied with the results of the automatic gain functionality.

Context

Display Gain controls the "amount" of echo that is displayed, in other words the "strength" or "intensity" of the echo presentation. The function thus increases or decreases the presentation of the echo colours. Use this setting together with **Gain** to adjust the sensitivity of the CS90 system.

For all practical purposes, adjusting **Display Gain** has the same effect as adjusting **Gain**. Adjust the **Display Gain** so that you can see the targets without too much noise and reverberation. The chosen setting is a matter of personal preferences.

Procedure

1 Open the **Display** menu.

2 Select **Display Gain**.

3 Adjust the setting to fit your requirements.

a To change the setting, move the cursor to either side of the button.

b Select the *left* side of the button to *decrease* the value.

c Select the *right* side of the button to *increase* the value.

d Select the middle of the button to open it.

e If you have a keyboard connected to the CS90 system, type the requested value.

Related topics
Operating procedures, page 77
Controlling the gain and range settings, page 91
Improving the recognition of fish and schools using receiver filters, page 114
Display Gain function, page 446

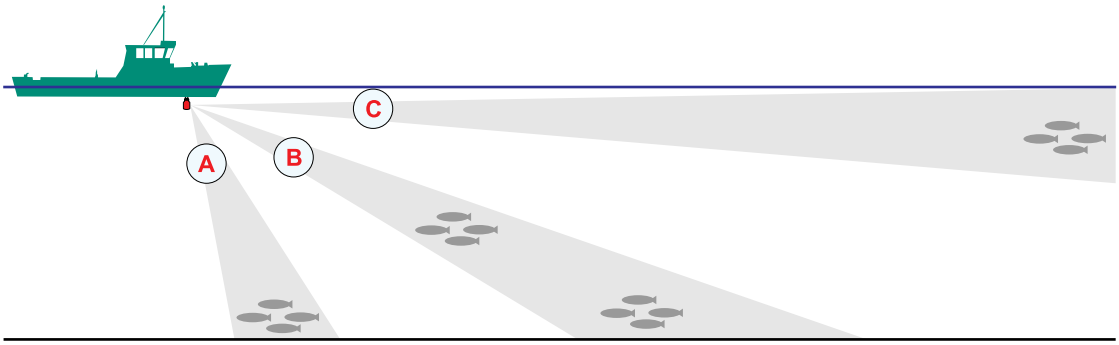
Changing the tilt

In order to detect fish or schools in the water column you may need to change the angle of the sonar beams. The transmitted sonar beams can be tilted electronically.

Context

The current tilt is shown with a solid line in the *Vertical* view. In the *Horizontal* view, the current settings for range, gain and tilt are shown in the top left corner of the view.

With 0° tilt the sonar beam is transmitted in parallel with the sea surface. With +60 degrees tilt the beam is directed towards the bottom.



The challenge is to find a tilt that prevents the fish echoes to be "buried" in reverberation and bottom echoes.

- If you use a high tilt value (A) the fish are easily disguised by bottom echoes. A strong RCG (Reverberation Controlled Gain) setting will remove the bottom echoes. As the distance from the bottom to the fish increases, the fish echoes become clearer. However, this assumes that the fish echoes are considerably stronger than the bottom echoes.
- If you use a very small tilt (C) you are not bothered by bottom echoes. However, if the sea surface is gusty you will see echoes from the waves. These echoes are normally rather weak, and they hardly move in relation to your vessel.
- By means of a medium tilt angle (B) you are able to pick up scattered fish or schools if these are located at some distance above the bottom. The upper school in the illustration appears on the sonar picture before the bottom echo, while the lower school will easily be disguised by the bottom echoes. Once again you can activate the RCG function to improve the reading.

Tip

With the various beams provided by the CS90 system, it may be difficult to understand the concepts. How do these beams "behave" in the water? By means of a graphic presentation, the **Beam Visualization** *dialog box attempts to give you a better understanding of how the acoustic beams are transmitted into the water. Open the* **Beam Visualization** *dialog box from the* **Setup** *menu.*

Procedure

1 In a *Vertical* view, click on the tilt line, keep the mouse button depressed, and drag the line up or down.

Optionally:

2 Click in any view to make it active.

The active view is identified with a thicker border. Unless you use the **Apply to all** function, all changes you make will only be applied to this view.

3 Observe the **Main** menu.

Its default location is on the right side of the display presentation.

4 Select **Tilt**.

5 Make the necessary adjustment.

The following methods can be used to adjust this setting:

a Select [+] or [-] to choose the requested setting.

b Place the cursor on the button. Press and hold the left mouse button. Move the cursor horizontally over the button. Release the mouse button when requested value is shown.

c Select the middle of the button to open it. If you have a keyboard connected to the CS90 system, type the requested value.

6 Open the button and select **Apply to all** if you wish to use the chosen setting in all the views in the current presentation mode.

Related topics

Operating procedures, page 77
Controlling the gain and range settings, page 91
Tilt function, page 425

Adjusting the bearing

The *Horizontal* view presents the 360 degrees area around your vessel from a bird's eye view. For the other views you must define the horizontal direction of the beam. Use **Bearing** to adjust the horizontal angle referenced to the vessel heading. You can also select the bearing line and drag it sideways.

Context

The **Bearing** function controls the horizontal direction of the *Vertical* view, the audio beam and the beam in each *Inspection* view. The current bearing applied to the *Horizontal* view is shown with a solid line pointing out from the sonar position.

- The bearing for the *Vertical* view is controlled by the bearing in the *Horizontal* view.
- If you use a presentation mode with two horizontal views you can set **Bearing** to two different values. Both bearing lines are shown in the *Horizontal* view. Both bearings are shown as continuous lines pointing out from the sonar position. The bearing in *Horizontal 1* is shown with a solid line. The bearing in *Horizontal 2* is shown with a dotted line.
- If you use a presentation mode with two vertical views you can set the **Bearing** function to two different values. Both bearing lines are shown in the *Horizontal* view. The bearing for the *Vertical* view is shown with a solid line. The bearing for the *Vertical 2* view is shown with a dotted line.
- The solid bearing line in the *Horizontal* view controls the audio beam. If you have two *Horizontal* views, the solid line in the *Horizontal 1* view controls the audio beam.
- The area covered by the vertical beam is shown as a triangle in the *Horizontal* view.

Note

The choice you make is by default only applied to the currently selected (active) view. The active view is identified with a thicker border.

By default, a new manually initiated tracked object is automatically given priority status. The priority is identified with a "P". The bearing and tilt settings are automatically adjusted to follow the movements of the tracked target. The bearing line is automatically locked on the object to reflects its bearing.

Procedure

1 Click in the view you want to activate.

The active view is identified with a thicker border. Unless you use the **Apply to all** function, all changes you make will only be applied to this view.

2 Use the joystick to make the adjustment.

Tip

Optionally: Turn the relevant rotary switch to make the adjustment.

The Mk2 Operating Panel is fitted with three rotary switches. The switches are identified with numbers. Each switch can be assigned a function related to range, gain, bearing or tilt. Investigate the functionality provided on the **Operating Panel** *page. This page is located in the* **Installation** *dialog box.*

Optionally:

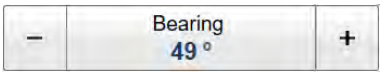
3 In a *Horizontal* view, select the bearing line and drag it sideways.

Optionally:

4 Observe the **Main** menu.

Its default location is on the right side of the display presentation.

5 Select **Bearing**.



6 Make the necessary adjustment.

The following methods can be used to adjust this setting:

a Select [+] or [-] to choose the requested setting.

b Place the cursor on the button. Press and hold the left mouse button. Move the cursor horizontally over the button. Release the mouse button when requested value is shown.

c Select the middle of the button to open it. If you have a keyboard connected to the CS90 system, type the requested value.

7 Open the button and select **Apply to all** if you wish to use the chosen setting in all the views in the current presentation mode.

Related topics

Operating procedures, page 77
Controlling the gain and range settings, page 91
Bearing function, page 427

Using the markers and tracking features

Topics

Starting a position track, page 101

Starting a target track, page 103

Placing a new marker, page 104

Deleting a marker, page 105

Measuring the size of a school relative to the purse seine, page 106

Using visual aids during the purse seine catch phase, page 107

Selecting a geographical area for accurate target tracking, page 109

Defining the physical size of the tracking area, page 110

Choosing the fishing gear in use, page 111

Changing the fishing gear properties to match your own equipment, page 112

Starting a position track

A position track permits the CS90 system to automatically control the tilt and bearing based on the movements of your vessel.

Context

The position track locks on a position defined by its latitude, longitude and depth.

> The phrase *position* is used to identify a fixed echo in the display presentation that you wish to act upon. The echo may for example be from a shallow, reef or rock. You must decide which echoes that shall be classified as positions, and whether you shall start position tracking.

The bearing and tilt settings are automatically adjusted to compensate for the movements of your vessel. The bearing line is automatically locked on the object to reflects its bearing. The marker is stationary. If the echo moves in the display presentation the marker will not follow.

Tip

By default, a new manually initiated tracked object is automatically given priority status. Relevant information about the priority target can be found in the lower left corner of the view. If you think the text is small and hard to read, double-click on the text field. This will increase the text size.

On the **User Settings Setup** *page, de-select* **New Manually Initiated Track** *if you do not want new tracked targets to become priority targets. This page is located in the* **Installation** *dialog box. To open the page, select* **Installation** *on the* **Setup** *menu.*

Procedure

1 Place the cursor over the echo you wish to track.

2 Press **Position Track** on the Operating Panel.

or:

3 Place the cursor over the echo you wish to track.

4 Right-click to open the shortcut menu.

5 Select **Initiate Track**.

Result

The marker is shown as a small triangle with or without a short identifying label. Once an echo has been provided with a marker in the display presentation it is regarded as an *object*.

Note

If you change the tilt and bearing settings manually, the position track is disabled. If you create a new marker and give this priority, the position track is disabled. The same applies if you start a new target track.

Related topics

Operating panels, page 33
Objects menu, page 403
Shortcut menus, page 413
Operating procedures, page 77
Using the markers and tracking features, page 101
Using markers in the CS90 user interface, page 350

Starting a target track

During normal operation, some echoes are clearly more interesting than others. In many situations specific echoes may be regarded as *targets*. To set up the CS90 system to provide such information, you can start *target tracking*.

Context

A target track permits the CS90 system to automatically control the tilt and bearing based on the movements of the chosen target. It locks on the target defined by its position, heading and speed. The tracked target is regarded as an *object*, and it is identified with a circle and two lines. The two lines reflect the size of the current tracking area.

> The phrase *target* is used to identify an echo in the display presentation that you wish to act upon. The echo may be from a material item, a shallow, reef or rock, or from fish, fish schools or mammals. In most cases, the target will move and continuously change its position relative to your own vessel. You must decide which echoes that shall be classified as targets, and whether you shall start manual or automatic target tracking.

The bearing and tilt settings are automatically adjusted to follow the movements of the tracked target. The bearing line is automatically locked on the object to reflects its bearing.

Note

If you change the tilt or bearing settings manually the priority status is lost. The CS90 system will still attempt to track the target, but the tilt and bearing settings are not adjusted.

By default, a new manually initiated tracked object is automatically given priority status. The priority is identified with a "P". You can only give priority status to one object. If you start tracking a *new* target the first target will loose its priority. The same applies if you give priority to another marker. The tracking of the first target will however not stop, and the target marker is still shown.

Tip

Relevant information about the tracked object can be found in the bottom left corner of the view. If you think the text is small and hard to read, double-click on the text field. This will increase the text size.

On the **User Settings Setup** *page, de-select* **New Manually Initiated Track** *if you do not want new tracked targets to become priority targets. This page is located in the* **Installation** *dialog box. To open the page, select* **Installation** *on the* **Setup** *menu.*

Procedure

1 Place the cursor over the echo you wish to track.

2 Press **Target Track** on the Operating Panel. (Mk1/Mk2)

3 Press **Place Marker** on the Operating Panel. (Mk3)

or:

4 Place the cursor over the echo you wish to track.

5 Right-click to open the shortcut menu.

6 Select **Initiate Track**.

Further requirements

Under certain circumstances the target tracking may not follow the intended echo. This may for example happen if the tracking area is too large. You can start manual tracking by placing multiple markers on a target echo that moves in the view. The physical location of the individual markers and the specific information provided for the latest marker show you the historical path of the chosen target.

Related topics

Operating panels, page 33
Objects menu, page 403
Shortcut menus, page 413
Operating procedures, page 77
Using the markers and tracking features, page 101
Using markers in the CS90 user interface, page 350

Placing a new marker

One or more markers can be placed in the view to identify specific echoes. Each marker is shown as a small triangle with or without a short identifying label.

Context

Each marker is positioned based on the two known axes in the view.

Example

When you are manoeuvring close to the coastline, or in otherwise working in confined waters, you may wish to avoid shallow waters and reefs. To keep track of potentially dangerous places, you place markers on them.

The marker is stationary. It has a specified range, bearing and depth related to your own vessel. If the echo moves in the display presentation the marker will not follow.

Procedure

1 Place the cursor over the echo in the display presentation.

2 Press **Marker** on the Operating Panel.

Result

Once an echo has been provided with a marker in the display presentation it is regarded as an *object*. The **Objects** menu provides a list of all current objects. This includes all types of objects including those classified as targets.

Related topics

Operating panels, page 33
Objects menu, page 403
Shortcut menus, page 413
Operating procedures, page 77
Using the markers and tracking features, page 101
Using markers in the CS90 user interface, page 350

Deleting a marker

There are two ways to delete a marker.You can use the shortcut menu, or select **Delete** in the **Objects** menu.

Context

You can delete a single marker, or multiple markers simultaneously, by selecting **Delete** in the **Objects** menu. If you use **Delete Marker** on the shortcut menu you can only remove one marker at a time.

Procedure

1 Open the **Objects** menu.

2 In the list of objects, check the box for the object(s) you wish to delete.

Check **Select All** to select all the markers in the list.

3 Select **Delete**.

or:

4 Place the cursor on the marker you wish to delete.

5 Right-click to open the shortcut menu.

6 Select **Delete Marker**.

Related topics

Operating panels, page 33
Objects menu, page 403
Shortcut menus, page 413
Operating procedures, page 77
Using the markers and tracking features, page 101
Using markers in the CS90 user interface, page 350

Measuring the size of a school relative to the purse seine

Estimating the size of a school can sometimes be challenging. A single circle marker can be placed in the display presentation. The circle is drawn with the same diameter as your purse. By means of the circle you can see the size of the school relative to your purse.

Prerequisites

To provide an accurate visual presentation, the CS90 system needs to know the size of your gear.

The **Fishing Gear** function allows you to define the size of your trawl or purse seine. This function is opened from the **Setup** menu.

Context

You can only add one circle marker to the display presentation.

Procedure

1 Position the cursor where you wish to place the circle marker.

2 Press **Circle Marker** on the Operating Panel.

or:

Right-click and select **Place Circle Marker** on the shortcut menu.

The size and location of the marker is defined by the choices you have made with the **Fishing Gear** function.

Further requirements

To delete the circle marker, press **Circle Marker** on the Operating Panel, or right-click to select **Remove Circle Marker** on the shortcut menu.

Related topics

Operating panels, page 33
Objects menu, page 403
Shortcut menus, page 413
Operating procedures, page 77
Using the markers and tracking features, page 101
Using markers in the CS90 user interface, page 350

Using visual aids during the purse seine catch phase

The gear symbol is provided as a tool to help you plan and shoot the purse seine. The symbol is intended to be used in a structured sequence that starts when you plan to shoot the purse seine.

Prerequisites

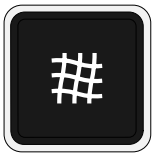
To provide an accurate visual presentation, the CS90 system needs to know the size of your gear.

The **Fishing Gear** function allows you to define the size of your trawl or purse seine. This function is opened from the **Setup** menu.

Context

Use the information in the *Catch* view to monitor the progress of the purse seine operation. If you have connected a compatible catch monitoring system to your CS90 system, information from these sensors are shown in the *Catch* view.

Procedure



1 At the bottom of the display presentation, select a suitable presentation mode, and activate the *Catch* view.

2 To start the process: Press **Gear** on the Operating Panel.

or:

Right-click and select **Show Gear Symbol** on the shortcut menu.

This places a circle marker in the view. The size and location of the marker is defined by the choices you have made with the **Fishing Gear** function. Until you proceed, the marker follows the movements of the vessel by keeping its relative location to the bow. This allows you to position your vessel in the best possible location before you shoot the purse seine.

3 When you shoot the net: Press **Gear** on the Operating Panel.

or:

Right-click and select **Show Gear Symbol** on the shortcut menu.

A rectangular marker is placed in the view, and marks the position where the purse seine was shot. The circular marker is disconnected from the vessel movements, and acts as a guideline for your manoeuvring. The history line shows the movements of your vessel. Since the CS90 system knows the length of your net, it places a second marker on this line when half the length has been spent. When the entire net has been spent, a third rectangular marker is shown.

The progress bar at the top of the *Catch* view shows you the amount of net that has been spent. The sequence starts when you shoot the net. The estimated depth of the purse seine is shown under the progress bar. The depth is calculated from the sink rate you have defined for the fishing gear.

- Horizontal dotted lines show the depth intervals.
- Relevant information about a priority target can be found in the lower left corner of the view.

A line of X'es in the vertical views shows the bottom of the purse seine. The depth is defined for the fishing gear you have chosen.

4 When the process is finalized: Press **Gear** on the Operating Panel.

or:

Right-click and select **Remove Gear Symbol** on the shortcut menu to delete the markers from the view.

Related topics

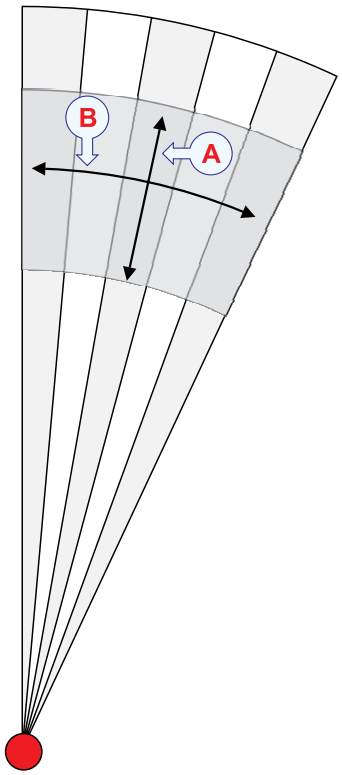
Operating panels, page 33
Objects menu, page 403
Shortcut menus, page 413
Operating procedures, page 77
Using the markers and tracking features, page 101
Using markers in the CS90 user interface, page 350
Changing the fishing gear properties to match your own equipment, page 112
Choosing the fishing gear in use, page 111

Selecting a geographical area for accurate target tracking

When you have an echo you wish to track, the tracking functionality places a geographical area around the object. An invisible area - the tracking area - is created as an acquisition area. In order for the CS90 system to find and lock on the intended target, it needs to be kept within this tracking area. If the intended target falls outside the area, the tracking can not be started.

Context

Illustration:



A *Each **Tracking Area** option controls the distance from the inner to the outer radius of the area.*

B *The width of the area is fixed, and stretches across a predefined number of beams. This means that the actual width depends on the distance from your vessel to the area.*

The **Tracking Area** function is used to select the physical size of the area. You can choose from a set of predefined sizes.

To track a target efficiently, the area should be as small as possible. For example, use a small area if you track single fish or small schools. However, if the target is large, or moves very fast, a larger area may be beneficial. This may be useful if you track a large school of fish.

Tip

Under certain circumstances the target tracking may not follow the intended echo. This may for example happen if the tracking area is too large.

Procedure

1 Open the **Setup** menu.

2 Use the **Tracking Area** function to define the size of the area that you want to detect moving objects in.

Further requirements

Use the **Tracking Area Setup** dialog box to change the size of the predefined area sizes.

Related topics

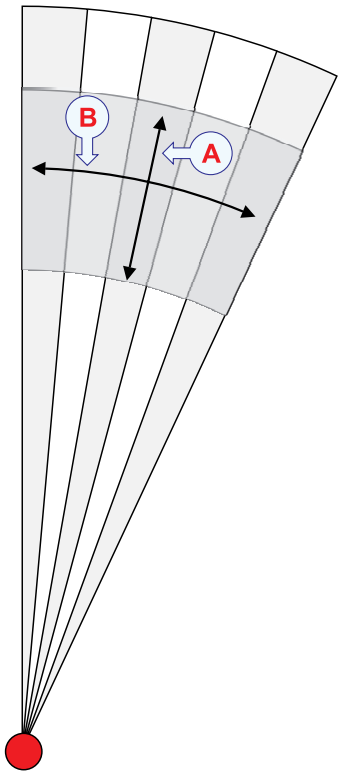
Operating procedures, page 77
Using the markers and tracking features, page 101
Using markers in the CS90 user interface, page 350
Defining the physical size of the tracking area, page 110
Tracking Area function, page 454
Tracking Area Setup dialog box, page 511

Defining the physical size of the tracking area

When you have an echo you wish to track, the tracking functionality places a geographical area around the object. An invisible area - the tracking area - is created as an acquisition area. In order for the CS90 system to find and lock on the intended target, it needs to be kept within this tracking area. If the intended target falls outside the area, the tracking can not be started. Use the **Tracking Area Setup** dialog box to define or change the physical size of the tracking area.

Context

Illustration:



A *Each **Tracking Area** option controls the distance from the inner to the outer radius of the area.*

B *The width of the area is fixed, and stretches across a predefined number of beams. This means that the actual width depends on the distance from your vessel to the area.*

The **Tracking Area** function is used to select the physical size of the area.

You can only define the area size as the distance from the inner to the outer radius of the area. The width of the area is fixed, and stretches across a predefined number of beams.

To track a target efficiently, the area should be as small as possible. For example, use a small area if you track single fish or small schools. However, if the target is large, or moves very fast, a larger area may be beneficial. This may be useful if you track a large school of fish.

Tip

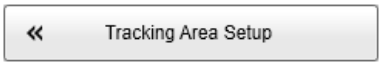
Under certain circumstances the target tracking may not follow the intended echo. This may for example happen if the tracking area is too large.

When the size of a tracking area has been changed, the new size will take effect the next time a track is manually initiated.

Procedure

1 Open the **Setup** menu.

2 Select **Tracking Area** on the **Setup** menu, open the button submenu, and select **Tracking Area Setup**.



3 Make the necessary adjustments.

4 Select **OK** to save the selected settings and close the dialog box.

Further requirements

Use the **Tracking Area Setup** dialog box to change the size of the predefined area sizes.

Related topics

Operating procedures, page 77
Using the markers and tracking features, page 101
Using markers in the CS90 user interface, page 350
Selecting a geographical area for accurate target tracking, page 109
Tracking Area function, page 454
Tracking Area Setup dialog box, page 511

Choosing the fishing gear in use

By defining the type of fishing gear you are using, the CS90 system may provide more accurate visual presentations. The **Fishing Gear** function allows you to define the size of your trawl or purse seine.

Prerequisites

Use the **Fishing Gear Setup** dialog box to change the fishing gear properties to match your own equipment.

Context

Accurate fishing gear properties are important for the following functionality:

- Circle Marker
- Gear Symbol
- Catch view

Procedure

1 Open the **Setup** menu.

2 Select **Fishing Gear**.

3 Select an option from the list provided.

Related topics

Operating procedures, page 77
Using the markers and tracking features, page 101
Using markers in the CS90 user interface, page 350
Changing the fishing gear properties to match your own equipment, page 112
Using visual aids during the purse seine catch phase, page 107
Fishing Gear function, page 456
Fishing Gear Setup page, page 610
Add Fishing Gear dialog box, page 512

Changing the fishing gear properties to match your own equipment

Use the **Fishing Gear Setup** dialog box to change the fishing gear properties to match your own equipment.

Context

Accurate fishing gear properties are important for the following functionality:

- Circle Marker
- Gear Symbol
- Catch view

Procedure

1 Open the **Setup** menu.

2 Under **Fishing Gear**, select **Fishing Gear Setup** to open the dialog box.

3 If the relevant gear is not listed, select **Add Fishing Gear**.

   a In the **Add Fishing Gear** dialog box, select gear type and gear name.

   b Select **OK** to save the selected settings and close the dialog box.

4 On the list of available fishing gears, select the gear you wish to set up.

5 For the selected gear, select a depth value.

   The depth value defines how deep the gear will sink when it is fully deployed.

6 Select the length of the fishing gear.

7 Set throw side to *Port* or *Starboard*.

8 Set the sink rate.

   The sink rate defines how fast the gear will sink.

9 Select **OK** to save the selected settings and close the dialog box.

Related topics

Operating procedures, page 77
Using the markers and tracking features, page 101
Using markers in the CS90 user interface, page 350
Choosing the fishing gear in use, page 111
Using visual aids during the purse seine catch phase, page 107
Fishing Gear function, page 456
Fishing Gear Setup page, page 610
Add Fishing Gear dialog box, page 512

Improving the recognition of fish and schools using receiver filters

Topics

About the receiver filter sequence in the CS90 system, page 114

Reducing noise and reverberation with the AGC (Automatic Gain Control) function, page 115

Reducing propeller noise and interference with the Noise Filter, page 117

Reducing bottom and surface reverberation with the RCG (Reverberation Controlled Gain) function, page 118

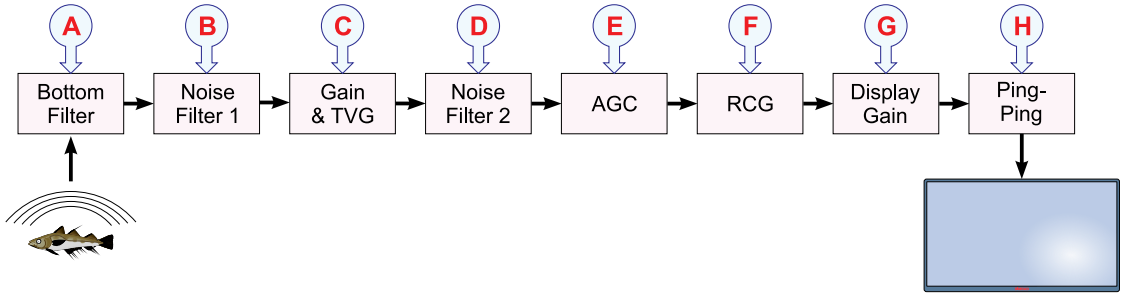
Reducing noise and false echoes with the Ping-Ping Filter, page 119

Reducing the strong bottom echo to see fish close to the seabed, page 120

Adjusting the intensity of the echo presentations, page 121

About the receiver filter sequence in the CS90 system

The filters in the CS90 system are implemented in “series”. Any changes to a filter setting may therefore have an effect on subsequent filters.



A *Bottom Filter*

B *Noise Filter (1)*

C *Gain & TVG (Time Variable Gain)*

D *Noise Filter (2)*

E *AGC (Automatic Gain Control)*

F *RCG (Reverberation Controlled Gain)*

G *Display Gain*

H *Ping-Ping Filter*

Note that **Gain**, **TVG** (Time Varied Gain) and **Display Gain** are not filters, but included only to illustrate the complete "signal path".

Related topics

Operating procedures, page 77
Improving the recognition of fish and schools using receiver filters, page 114
Reducing noise and reverberation with the AGC (Automatic Gain Control) function, page 115
Reducing propeller noise and interference with the Noise Filter, page 117
Reducing bottom and surface reverberation with the RCG (Reverberation Controlled Gain) function, page 118
Reducing noise and false echoes with the Ping-Ping Filter, page 119
Reducing the strong bottom echo to see fish close to the seabed, page 120
Adjusting the intensity of the echo presentations, page 121

Reducing noise and reverberation with the AGC (Automatic Gain Control) function

Identifying echoes from fish and schools can often be challenging when they are hidden by noise and reverberation. When sonar conditions are poor, effective tuning of the filters in the CS90 system may be necessary to achieve a satisfactory result. Automatic Gain Control (AGC) is one of the tools provided to remove noise and reverberation from the echo presentation.

Context

The **AGC** (Automatic Gain Control) function runs an automatic analysis of the echo strength. Based on this analysis the CS90 system maintains a proper dynamic range based on all the current echo values. This is done by automatically reducing the gain if you have reverberation and noise, or increasing the gain if the acoustical conditions permit it.

Tip

The most practical way to use the AGC (Automatic Gain Control) is to first switch it off. Adjust the echo presentation using the normal gain functionality until you have the best possible result, then activate the AGC.

The AGC works best with even background (homogenous noise conditions) and pronounced targets. With uniform environmental conditions you may benefit from strong compensation. However, if you are looking at scattered fish, reduce the automatic gain control, and try to add normal gain instead.

If you work close to other vessels, the noise from their propellers may be misinterpreted as echoes. This will also reduce the visibility of other echoes. The same applies if the bottom conditions place your vessel with decreasing depth on one side of the vessel and your targets on the other side. Reduce the automatic gain control.

If you have a large school located close to your vessel (typically closer than 150 meters) the school gives you a strong echo. The AGC may misinterpret the school echo for noise. Reduce or disable the automatic gain control.

The filters in the CS90 system are implemented in “series”. The gain compensations are made before the AGC. For this reason, your current gain setting will always have an effect on the automatic gain control.

Procedure

1 Click in any view to make it active.

The active view is identified with a thicker border.

2 Open the **Active** menu.

3 Select **AGC** (Automatic Gain Control).

4 Select a value from the options provided.

The choice you make is by default only applied to the currently selected (active) view.

Select the middle of the button to open a small menu with the available options. Select the *left* side of the button to select a "lower"' menu choice. Select the *right* side of the button to select a "higher"' menu choice.

Related topics

Operating procedures, page 77
Improving the recognition of fish and schools using receiver filters, page 114
AGC (Automatic Gain Control) function, page 484

Reducing propeller noise and interference with the Noise Filter

Unless you synchronize the transmissions from your other hydroacoustic systems you may have an issue with interference. Even with synchronization activated the noise from other nearby vessels may cause noise.

Context

The **Noise Filter** is used to minimize the interference from other acoustics systems (sonars and echo sounders) on your own and/or other vessels. The filter also suppresses noise from your propellers, and from other similar noise sources. The **Noise Filter** is very effective if you are bothered by strong noise or interference, especially from your own vessel, or even from other vessels operating near you.

Tip

Use weak filtering - or turn the filter off - if you have strong echoes on short ranges. The filter may then be too powerful, and distort the echo presentation.

The filters in the CS90 system are implemented in "series". The noise filtering is done early in the receiver process.

Procedure

1 Click in any view to make it active.

The active view is identified with a thicker border.

2 Open the **Active** menu.

3 Select **Noise Filter**.

4 Select a value from the options provided.

Related topics

Operating procedures, page 77
Improving the recognition of fish and schools using receiver filters, page 114
Noise Filter function, page 490

Reducing bottom and surface reverberation with the RCG (Reverberation Controlled Gain) function

When you transmit an acoustic pulse into the water to search for a target, echoes will also be returned from any other objects in the beam. The energy reflected from these "unwanted" objects is referred to as *reverberation*. Reverberation is often a limiting factor, especially if you are searching for smaller targets.

Context

Reverberation is often regarded as noise.

There are several types of reverberation.

Volume reverberation

The volume reverberation is caused by minute plankton and air-bubbles in the water. This reverberation has often daily cycles in intensity.

Surface reverberation

The surface reverberation depends on the weather condition and the waves.

Bottom reverberation

The bottom reverberation depends on the roughness and physical properties of the sea bottom.

The **RCG** (Reverberation Controlled Gain) controls the receiver processing. The algorithm handles each receiver beam individually. The filter reduces the unwanted echoes from the bottom and from the sea surface. This enhances the visibility of schools.

Note

The numerical settings do not express an increasing filter strength. They represent specific settings using different algorithms.

The algorithms in the filter may interpret scattered fish as reverberation. Use reverberation controlled gain carefully if you wish to detect scattered fish.

Tip

We recommend that the reverberation controlled gain is active all the time, but be careful in the vertical presentation.The filter works best on small schools.

This rough guide to the settings can be used as a starting point for own experiments.

- **Off**: The filter is disabled.
- **Weak**: Use for scattered fish.
- **Medium**: Use for schools.
- **Strong**: Use for schools with higher density. This setting can also be used in horizontal views to detect schools close to the bottom.

- **4**: Use for scattered fish located close to the bottom. This setting uses a slightly different algorithm than the other scattered fish settings.
- **5**: Use for scattered fish located close to the bottom. This setting uses a slightly different algorithm than the other scattered fish settings.
- **Scattered**: Use for scattered fish. This setting uses a slightly different algorithm than the other scattered fish settings.
- **7**: Use for scattered fish. This setting uses an algorithm dedicated for higher bandwidth.
- **8**: Use for schools. This setting uses an algorithm dedicated for higher bandwidth.
- **9**: Use for schools. This setting uses an algorithm dedicated for higher bandwidth.
- **Experimental**: These options are provided for software development purposes.

The filters in the CS90 system are implemented in “series”. The reverberation controlled gain adjustment is made late in the sequence, so any changes to the preceding filters may have an effect on how it works.

Procedure

1 Click in any view to make it active.

The active view is identified with a thicker border. Unless you use the **Apply to all** function, all changes you make will only be applied to this view.

2 Open the **Active** menu.

3 Select **RCG** (Reverberation Controlled Gain).

4 Select a value from the options provided.

The choice you make is by default only applied to the currently selected (active) view.

Related topics

Operating procedures, page 77
Improving the recognition of fish and schools using receiver filters, page 114
RCG (Reverberation Controlled Gain) function, page 487

Reducing noise and false echoes with the Ping-Ping Filter

The **Ping-Ping Filter** analyses the historical information from previous consecutive pings in order to remove unwanted noise and interference from the echo presentation.

Context

The following filter options are provided:

- **Off**: Select **Off** to disable the filter. The historical information from previous transmissions ("pings") is *not* used to remove noise and unwanted echoes.
- **Weak**: Select *Weak* to allow the filter to compare the echoes from the latest two pings. For the current echo to be shown, it must be present in both of these pings.
- **Medium**: Choose *Medium* to compare the echoes from the latest four pings. For the current echo to be shown, it must be present in *all* of these pings.
- **Strong**: Select *Strong* to allow the filter to compare the echoes from the latest eight pings. For the current echo to be shown, it must be present in *all* of these eight pings.

The filters in the CS90 system are implemented in “series”. The **Ping-Ping Filter** is the last filter in the sequence, so any changes to the other filters may have an effect on how it works.

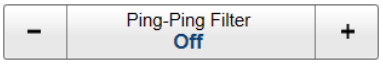
Procedure

1 Click in any view to make it active.

The active view is identified with a thicker border.

2 Open the **Active** menu.

3 Select **Ping-Ping Filter**.



4 Choose the required setting.

The choice you make is by default only applied to the currently selected (active) view.

Related topics

Operating procedures, page 77
Improving the recognition of fish and schools using receiver filters, page 114
Ping-Ping Filter function, page 472

Reducing the strong bottom echo to see fish close to the seabed

Fish close to the bottom can be hard to see because they may be hidden in the strong bottom echo.

Context

The CS90 system provides a bottom filter to reduce the sometimes powerful echo from the seabed. This filter is useful if you try to find fish close to the bottom.

Procedure

1 Click in any view to make it active.

The active view is identified with a thicker border.

2 Open the **Active** menu.

3 Select **Target Threshold**.

4 Select a value from the options provided.

Select a **Target Threshold** value to control the "strength" of the filter. A higher numerical value increases the filter efficiency and reduces the bottom echo accordingly.

The choice you make is by default only applied to the currently selected (active) view.

Select the middle of the button to open a small menu with the available options. Select the *left* side of the button to select a "lower"' menu choice. Select the *right* side of the button to select a "higher"' menu choice.

Related topics

Operating procedures, page 77
Improving the recognition of fish and schools using receiver filters, page 114
Target Threshold function, page 489

Adjusting the intensity of the echo presentations

The effect of the **Gain** adjustment is minimized if you apply **RCG** (Reverberation Controlled Gain) and **AGC** (Automatic Gain Control). The **Display Gain** is applied at the end of the filter sequence in the CS90 system. This means that you can use **Display Gain** if you are not completely satisfied with the results of the automatic gain functionality.

Context

Display Gain controls the "amount" of echo that is displayed, in other words the "strength" or "intensity" of the echo presentation. The function thus increases or decreases the presentation of the echo colours. Use this setting together with **Gain** to adjust the sensitivity of the CS90 system.

For all practical purposes, adjusting **Display Gain** has the same effect as adjusting **Gain**. Adjust the **Display Gain** so that you can see the targets without too much noise and reverberation. The chosen setting is a matter of personal preferences.

Procedure

1 Open the **Display** menu.

2 Select **Display Gain**.

3 Adjust the setting to fit your requirements.

a To change the setting, move the cursor to either side of the button.

b Select the *left* side of the button to *decrease* the value.

c Select the *right* side of the button to *increase* the value.

d Select the middle of the button to open it.

e If you have a keyboard connected to the CS90 system, type the requested value.

Related topics

Operating procedures, page 77
Controlling the gain and range settings, page 91
Improving the recognition of fish and schools using receiver filters, page 114
Display Gain function, page 446

Recording and replaying echo data

Topics

Defining the file and folder settings for data recording, page 123

Recording echo data, page 124

Locating the echo data files to delete, move or copy them, page 125

Selecting Replay mode, page 126

Choosing which echo data file(s) to replay, page 127

Defining the file and folder settings for data recording

A useful function of the CS90 system is it ability to record echo data. You can save the data to the hard disk, or onto an external storage device. To retrieve the data files you need to know where they are, and which file names that have been used. The data files can be played back on the CS90 system. The data files can later be deleted, copied or moved to another storage device. You can keep the recorded files for future reference, training purposes and calibration.

Context

Before you start recording, make sure that you have defined where you wish to store the data files. If you wish to save your recorded data on an external hard disk, make sure that it is connected to the computer.

Unless you really need to record data for playback and/or training purposes, you should use this function with care. The data files will fill you hard disk very fast!

The **File Setup** settings control how and where the recorded files are saved on the hard disk, or on an external storage device. By adding a prefix to the file names you can identify the files you have recorded during a specific trip. You can also define a maximum size of the files.

Note

The data files will normally become very large. If you wish to record large amounts of data, make sure that you have enough space on your hard disk. The CS90 system is not provided with unlimited disk capacity. We recommend that you save the data files to an external storage device.

Set up the file and folder parameters before you start the recording. If you wish to save your recorded data on an external hard disk, make sure that it is connected to the computer.

Procedure

1 Open the **Operation** menu.

2 Select **Output**.

Observe that the **Output** dialog box opens. This dialog box contains a number of pages selected from the menu on the left side.

3 Select **File Setup** to open the page.

a Choose the required settings.

b Select **Apply** to save your choice.

4 At the bottom of the **Output** dialog box, select **OK** to save the chosen parameters and close it.

Related topics

Operating procedures, page 77
Recording and replaying echo data, page 123
Recording echo data, page 124
File Setup page, page 519

Recording echo data

Use the data recording functionality provided by the CS90 system to save echo data. The data files can be copied or moved to an external storage device. You can keep the recorded files for future reference, training purposes and calibration. The recording is controlled by the **Record** function.

Prerequisites

Before you start data recording, make sure that you have defined where to store the files. To define which disks and folders to use to save the data files, select **File Setup**. If you wish to save your recorded data on an external hard disk, make sure that it is connected to the computer.

Tip

You are permitted to define the maximum file size for each recorded file.

Context

Unless you really need to record data for playback and/or training purposes, you should use this function with care. The data files will fill you hard disk very fast!

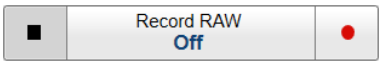
Note

The data files will normally become very large. If you wish to record large amounts of data, make sure that you have enough space on your hard disk. The CS90 system is not provided with unlimited disk capacity. We recommend that you save the data files to an external storage device.

Procedure

1 Open the **Operation** menu.

2 Start data recording by opening the **Record RAW** button, and select *On*.



or:

To start recording, select the red circle on the right side of the button.

The **Record** indicator on the top bar changes its colour to reflect that recording is active.

3 To stop recording, select *Off* or the black rectangle on the right side of the **Record RAW** button.

Related topics

Operating procedures, page 77
Recording and replaying echo data, page 123
Defining the file and folder settings for data recording, page 123
Record RAW function, page 436

Locating the echo data files to delete, move or copy them

Use the data recording functionality provided by the CS90 system to save echo data. You can save the data to the hard disk, or onto an external storage device.

Prerequisites

It is assumed that you are familiar with the Microsoft® operating system utilities for file handling.

You need a data storage device. This is typically a large capacity USB flash drive or a small portable hard disk. You can also connect the Processor Unit to a network, and copy the files to a server.

Procedure

1 Connect a suitable storage device to the Processor Unit.

2 If you have a computer keyboard connected, press ⊞ **Win+E** to open the file manager.

3 Without a keyboard:

a Select **Minimize** on the right side of the top bar.

b From the Windows® **Start** button, right-click to open File Explorer.

4 In the file manager utility, locate the folder you defined in the **File Setup** dialog box.

5 Use the functionality provided by the operating system to delete the files, or to copy or move them to the storage device.

6 Close File Explorer.

7 Disconnect the storage device.

8 Select the CS90 button on the operating system taskbar to restore the application window.

Related topics

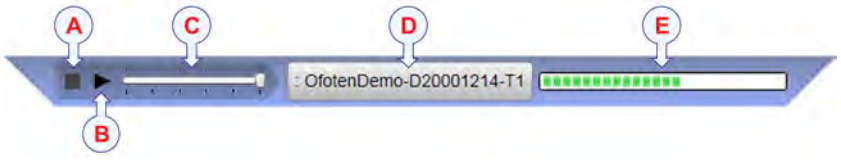
Operating procedures, page 77
Recording and replaying echo data, page 123
Record RAW function, page 436
Replay File dialog box, page 497

Selecting Replay mode

Replay mode allows you to play back previously recorded raw data. The CS90 system cannot operate normally while in *Replay* mode. Neither transmission nor reception takes place.

Context

All playback is controlled by the replay bar.



A ***Stop****: Select this button to stop the playback.*

B ***Play/Pause****: Select this button to start the playback, or to pause it.*

C ***Replay Speed****: Select this slider and move it sideways to adjust the replay speed.*

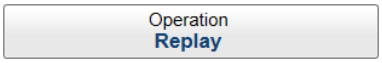
D ***Replay File****: The button shows you which file you are replaying. Select the button to open the* ***Replay File*** *dialog box.*

E ***Playback Progress****: This bar shows you the progress of the replay sequence. If you have chosen to restart the replay file(s) automatically (in a loop), the green indicator starts from left every time the file restarts.*

Procedure

1 Open the **Operation** menu.

2 Set **Operation** to *Replay*.



The replay bar opens automatically. It is positioned directly below the top bar at the top of the display presentation.

If you need to select which files to replay, select **Replay File** under the **Operation** button. You can also select the large button in the middle of the replay bar.

3 Select **Play/Pause** to start the playback.

4 To stop the replay choose any other operating mode.

Related topics

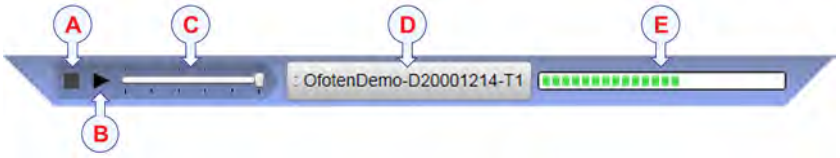
Operating procedures, page 77
Choosing operating mode and key transmit parameters, page 82
Selecting Normal mode to start pinging, page 82
Selecting Replay mode, page 126
Selecting Inactive mode, page 84
Recording and replaying echo data, page 123
Choosing which echo data file(s) to replay, page 127
Operation function, page 432
Replay File dialog box, page 497

Choosing which echo data file(s) to replay

When you record echo data the information is stored on the Processor Unit hard disk. Depending on your initial settings, the files can also be stored on an external storage device. The echo data files can be retrieved and played back on the CS90 system.

Context

All playback is controlled by the replay bar.



A ***Stop****: Select this button to stop the playback.*

B ***Play/Pause****: Select this button to start the playback, or to pause it.*

C ***Replay Speed****: Select this slider and move it sideways to adjust the replay speed.*

D ***Replay File****: The button shows you which file you are replaying. Select the button to open the* ***Replay File*** *dialog box.*

E ***Playback Progress****: This bar shows you the progress of the replay sequence. If you have chosen to restart the replay file(s) automatically (in a loop), the green indicator starts from left every time the file restarts.*

Procedure

1 Open the **Operation** menu.

2 Select **Operation** to see the available choices.

3 Select **Replay File** to open the dialog box.

The **Replay File** dialog box allows you to choose which file(s) to be used for playback. The files listed were generated automatically during recording. Each file is identified with the time and date it was made.

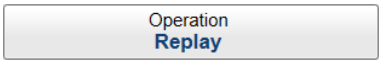
4 Select **Add** to choose a replay file.

A standard operating system dialog box is used to locate and select the files you wish to use.

5 If you wish to replay the selected files in an "endless" loop, select **Loop**.

6 Select **OK** to save the selected settings and close the dialog box.

7 Set **Operation** to *Replay*.



The replay bar opens automatically. It is positioned directly below the top bar at the top of the display presentation.

Related topics

Operating procedures, page 77
Recording and replaying echo data, page 123
Replay File dialog box, page 497

Recording and exporting processed echo data

Topics

Defining the processed data recording parameters, page 129

Recording processed data, page 130

Locating the processed data files to delete, move or copy them, page 132

Defining the processed data recording parameters

The CS90 system allows you to record processed data. The data are saved on the hard disk, or on an external data storage device, according to the preferences you have defined. You can also define the which file format to use.

Prerequisites

This is an optional function. In order to use this functionality, a dedicated software license is required. Contact you local dealer for more information.

Context

The **File Setup** settings control how and where the recorded files are saved on the hard disk, or on an external storage device. By adding a prefix to the file names you can identify the files you have recorded during a specific survey. You can also define a maximum size of the files.

Note

The data files will normally become very large. If you wish to record large amounts of data, make sure that you have enough space on your hard disk. The CS90 system is not provided with unlimited disk capacity. We recommend that you save the data files to an external storage device.

Set up the file and folder parameters before you start the recording. If you wish to save your recorded data on an external hard disk, make sure that it is connected to the computer.

Procedure

1 Open the **Operation** menu.

2 Select **Output**.

Observe that the **Output** dialog box opens. This dialog box contains a number of pages selected from the menu on the left side.

3 Select **Processed Data to File** to open the page.

a Select an output type from the list.

b Define the output directory for the recorded files.

c Select **Add** to save the output format.

d Select **Apply** to save your choices.

4 At the bottom of the **Output** dialog box, select **OK** to save the chosen parameters and close it.

Related topics

Recording and exporting processed echo data, page 129
Operating procedures, page 77
Processed Data to File page, page 525

Recording processed data

The **Record Processed** function provided by the CS90 system allows you to save processed data on a selected format. The data files can be copied or moved to an external storage device, or to another computer on the network. The recording is controlled by the **Record Processed** function.

Prerequisites

Before you start data recording, make sure that you have defined where to store the files. If you wish to save your recorded data on an external hard disk, make sure that it is connected to the computer.

Before you start recording, you must also define which output format(s) you wish to use. To choose which processed data formats to record, select **Processed Data to File**. This page is located in the **Output** dialog box.

Context

You can save and recall echo information using the following methods and formats:

Screen Captures function

Select **Screen Capture** to make a copy of the entire display presentation. Each screen capture you make is saved in `.jpg` format on the Processor Unit hard disk.

Record RAW function

Record RAW allows you to record the *unprocessed* echo data received by the transducer. To play back data, select **Operation** and then *Replay* mode. The *Replay* mode allows you to play back previously recorded data. In *Replay* mode the CS90 system is not able to transmit ("ping"). For this reason, the CS90 system is inactive during playback.

Record Processed function

Use **Record Processed** on the **Operation** menu to record processed data. This is only an export format. Processed data files can not be played back on the CS90 system.

Note

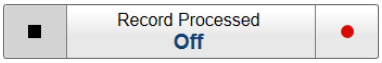
This is an optional function. In order to use this functionality, a dedicated software license is required. Contact you local dealer for more information.

Note

The data files will normally become very large. If you wish to record large amounts of data, make sure that you have enough space on your hard disk. Unless your computer is equipped with a very large disk, we recommend that you save the data to an external storage device.

Procedure

1 Make sure that the **Record Processed** function is available.



If the **Record Processed** function is unavailable, it is most likely because you have forgotten to specify an output format. Use **Processed Data to File** to define which processed data formats to save, and where to place the files. This page is located in the **Output** dialog box.

2 To start data recording, open the **Record Processed** button, and select *On*.

Alternatively, simply select the red circle on the right side of the button.

3 To stop recording, open the **Record Processed** button, and select *Off*.

Alternatively, select the black rectangle on the left side of the button to stop the recording.

Related topics

Recording and exporting processed echo data, page 129
Operating procedures, page 77
Record Processed function, page 438

Locating the processed data files to delete, move or copy them

The **Record Processed** function provided by the CS90 system allows you to save processed data on a selected format. You can save the data to the hard disk, or onto an external storage device. The data files can be copied or moved to an external storage device, or to another computer on the network.

Prerequisites

It is assumed that you are familiar with the Microsoft® operating system utilities for file handling.

You need a data storage device. This is typically a large capacity USB flash drive or a small portable hard disk. You can also connect the Processor Unit to a network, and copy the files to a server.

Note

Recording processed data is an optional function. In order to use this functionality, a dedicated software license is required. Contact you local dealer for more information.

Context

Processed data files can not be played back on the CS90 system.

Procedure

1 Connect a suitable storage device to the Processor Unit.

2 If you have a computer keyboard connected, press ⊞ **Win+E** to open the file manager.

3 Without a keyboard:

   a Select **Minimize** on the right side of the top bar.

   b From the Windows® **Start** button, right-click to open File Explorer.

4 In the file manager utility, locate the folder you defined on the **Processed Data to File** page.

5 Use the functionality provided by the operating system to delete the files, or to copy or move them to the storage device.

6 Close File Explorer.

7 Disconnect the storage device.

8 Select the CS90 button on the operating system taskbar to restore the application window.

Related topics

Recording and exporting processed echo data, page 129
Operating procedures, page 77
Record Processed function, page 438

Capturing the display presentation in image and video files

Topics

Capturing the display presentation in an image, page 133

Capturing the display presentation using one image for each ping, page 134

Choosing screen capture mode, page 135

Selecting where to save the screen captures, page 136

Accessing the screen capture images to delete, move or copy them, page 137

Capturing the display presentation in a video file, page 138

Selecting where to save the video files, page 138

Capturing the display presentation in an image

While using the CS90 system you may wish to make a screen capture to save an instantaneous copy of the current presentation.

Context

You can choose either a single screen capture or a sequence with multiple screen captures. Each screen capture you make is saved in `.jpg` format on the Processor Unit hard disk. The file name reflects the current date and time.

Procedure

1 Make sure that the screen capture mode is set to *Single*.

You can choose either a single screen capture or a sequence with multiple screen captures. Open the **Screen Captures** dialog box to select screen capture mode.

2 Observe **Screen Capture** on the top bar.

3 Select **Screen Capture** to make a copy of the entire display presentation.

Every time you do this a new image file is created. Each capture includes the entire display presentation. This includes all the current views as well as the menu system.

You can also use the **Screen Capture** button on the Operating Panel.

Note

Operating Panel (Mk1): Press **Record** *to make a screen capture.*

Result

Each screen capture you make is saved in `.jpg` format on the Processor Unit hard disk. Alternatively, you can use a USB flash drive or hard drive to save the screen captures. Use **Screen Capture File Location** to define where to save your screen captures.

Default folder:

`C:\Users\Public\Documents\Simrad\CS90\ScreenDumps`

Related topics

Operating procedures, page 77
Capturing the display presentation in image and video files, page 133
Screen Capture, page 293
Screen Captures dialog box, page 462

Capturing the display presentation using one image for each ping

During normal operation it can be useful to capture a sequence of display presentations.

Context

Each screen capture you make is saved in `.jpg` format on the Processor Unit hard disk. The file name reflects the current date and time.

Procedure

1 Make sure that the screen capture mode is set to *Sequence*.

You can choose either a single screen capture or a sequence with multiple screen captures. Open the **Screen Captures** dialog box to select screen capture mode.

2 Observe **Screen Capture** on the top bar.

3 Select **Screen Capture** on the top bar to start the sequence.

You can also use the **Screen Capture** button on the Operating Panel.

Note

Operating Panel (Mk1): Press **Record** *to make a screen capture.*

4 Select **Screen Capture** one more time to stop the sequence.

Result

In *Sequence* mode a new screen capture is created for every ping.

Each screen capture you make is saved in `.jpg` format on the Processor Unit hard disk. Alternatively, you can use a USB flash drive or hard drive to save the screen captures. Use **Screen Capture File Location** to define where to save your screen captures.

Default folder:

`C:\Users\Public\Documents\Simrad\CS90\ScreenDumps`

Related topics

Operating procedures, page 77
Capturing the display presentation in image and video files, page 133
Screen Capture, page 293
Screen Captures dialog box, page 462

Choosing screen capture mode

While using the CS90 system you may wish to make a screen capture to save an instantaneous copy of the current presentation. You can choose either a single screen capture or a sequence with multiple screen captures.

Context

Screen Capture on the top bar allows you to make a copy of the current display presentation. You can also use the **Screen Capture** button on the Operating Panel.

Note

Operating Panel (Mk1): Press **Record** *to make a screen capture.*

Procedure

1 Open the **Setup** menu.

2 Select **Screen Captures**.

3 Select screen capture mode.

In *Single* mode one screen capture is taken every time you select **Screen Capture** on the top bar.

In *Sequence* mode a new screen capture is created for every ping.

4 Select **Close** to save the chosen settings and close the dialog box.

Related topics

Operating procedures, page 77
Capturing the display presentation in image and video files, page 133
Screen Captures dialog box, page 462

Selecting where to save the screen captures

While using the CS90 system you may wish to make a screen capture to save an instantaneous copy of the current presentation. Use **Screen Capture File Location** to define where to save your screen captures.

Context

Each screen capture you make is saved in `.jpg` format on the Processor Unit hard disk. Alternatively, you can use a USB flash drive or hard drive to save the screen captures. The file name reflects the current date and time.

Default folder:

`C:\Users\Public\Documents\Simrad\CS90\ScreenDumps`

Procedure

1 Open the **Operation** menu.

2 Select **Output**.

Observe that the **Output** dialog box opens. This dialog box contains a number of pages selected from the menu on the left side.

3 Select **Screen Capture File Location**.

4 Select **Browse** to locate or create the desired folder.

5 Select **Close** to save the chosen settings and close the dialog box.

Related topics

Operating procedures, page 77
Capturing the display presentation in image and video files, page 133
Screen Capture, page 293
Screen Captures dialog box, page 462

Accessing the screen capture images to delete, move or copy them

When the screen capture images have been saved, you may wish to delete them, copy them, or move them to a separate storage device.

Prerequisites

It is assumed that you are familiar with the Microsoft® operating system utilities for file handling.

You need a data storage device. This is typically a large capacity USB flash drive or a small portable hard disk. You can also connect the computer to a network, and copy the files to a server.

Procedure

1 Prepare a data storage device.

2 Select **Minimize** on the right side of the top bar.

3 Open a file manager utility.

   a On the computer keyboard, press ⊞ **Win+E** to open the file manager.

   or:

   b From the Windows® **Start** button, right-click to open File Explorer.

4 Navigate to the folder you chose to use for the screen captures.

   or:

   Navigate to the default folder.

   `C:\Users\Public\Documents\Simrad\CS90\ScreenDumps`

5 Use the functionality provided by the operating system to delete the files, or to copy or move them to the storage device.

6 Close the file manager utility.

7 Select the CS90 button on the operating system taskbar to restore the display presentation.

Related topics

Operating procedures, page 77
Capturing the display presentation in image and video files, page 133
Screen Captures dialog box, page 462

Capturing the display presentation in a video file

The **Screen Recording** function allows you to record and save the echo presentation as a video file.

Prerequisites

Before you start video recording you must specify where to save the files. Use the **Screen Recording** page to define where the video files are saved. This page is located in the **Output** dialog box. This dialog box is opened from the **Operation** menu.

Context

Everything that happens in the presentation is recorded. This includes echoes, menus, dialog boxes and cursor movements. Each screen recording you make is saved in `.mp4` format on the Processor Unit hard disk. The file name reflects the current date and time.

Note

Video data files will normally become very large. If you wish to record large amounts of data, make sure that you have enough space on your hard disk. Unless your Processor Unit is equipped with a very large disk, we recommend that you save the data to an external storage device.

Procedure

1 Observe **Screen Recording** on the top bar.

2 Select **Screen Recording** on the top bar to start the recording.

3 Select **Screen Recording** on the top bar one more time to stop the recording.

Related topics

Operating procedures, page 77
Capturing the display presentation in image and video files, page 133
Screen Recording, page 292
Screen Recording page, page 532

Selecting where to save the video files

The **Screen Recording** function allows you to record and save the echo presentation as a video file. Use the **Screen Recording** page to define where the video files are saved.

Prerequisites

You can use a USB flash drive to save the video files. This must be a high quality device with very fast data access.

Context

Each screen recording you make is saved in `.mp4` format on the Processor Unit hard disk. The file name reflects the current date and time.

Note

Video data files will normally become very large. If you wish to record large amounts of data, make sure that you have enough space on your hard disk. Unless your Processor Unit is equipped with a very large disk, we recommend that you save the data to an external storage device.

Procedure

1 If relevant: Insert the USB flash drive.

2 Open the **Operation** menu.

3 Select **Output**.

Observe that the **Output** dialog box opens. This dialog box contains a number of pages selected from the menu on the left side.

4 Select **Screen Recording** to open the page.

5 Select **Browse** to locate the desired folder.

This function uses a standard operating system dialog box.

6 Select **OK** to save the selected setting and close the dialog box.

Related topics

Operating procedures, page 77
Capturing the display presentation in image and video files, page 133
Screen Recording page, page 532

Setting up presentation modes and views

Topics

Selecting which presentation modes to choose from at the bottom of the display presentation, page 140

Selecting which cursor and marker information to be shown in a view, page 141

Moving a view to another display, page 143

Rearranging the layout of the echo presentations, page 143

Restoring the locations and sizes of the views, page 144

Selecting which presentation modes to choose from at the bottom of the display presentation

All echoes offered by the CS90 system are shown in rectangular *views*. Combinations of these views are organized in *presentation modes*.To open a presentation mode use the relevant tab on the bottom bar.Use the functionality offered by the **Presentation Mode** page to choose which presentation modes to choose from.

Context

The views are organized in *presentation modes*. Which presentation mode to use is selected with the tabs at the bottom of the CS90 presentation.

> The phrase *presentation mode* is used to describe the combination of views that are shown when the mode is selected at the bottom of the display presentation.

If you have many presentation modes on a small display, two small arrows appear on the left side of the bottom bar. You can use these arrows to scroll the bottom bar sideways. Use the functionality offered by the **Presentation Mode** page to choose which presentation modes to choose from. This can be useful for several reasons:

- A small display monitor may not be able to show you all the presentation mode tabs.
- You don't need to scroll.
- You can hide the presentation modes that you hardly or never use.

Procedure

1 Open the **Display** menu.

2 Select **Display Options** to open the dialog box.

3 Select **Presentation Modes** to open the page.

All the presentation modes are listed. Each of these appears as a tab on the bottom bar.

4 Select which presentation modes to choose from.

5 Select **OK** to save the selected setting and close the dialog box.

Related topics

Operating procedures, page 77
Setting up presentation modes and views, page 140
Presentation Modes page, page 551

Selecting which cursor and marker information to be shown in a view

It is often helpful to see information about the cursor and the active markers in the view.Use the **Cursor Readout** functionality to add information to the readout fields in the bottom corners of the view.

Context

All the presentation modes are listed. Open a presentation mode to find a list of all the views it supports. Open a view to select which information to see in the readout fields.

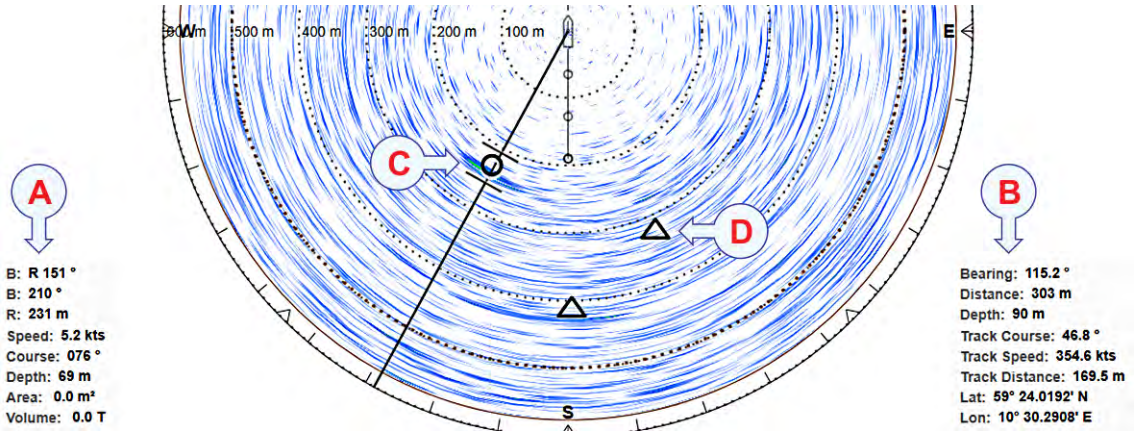
The following information can be provided:

Left side

- Information about the priority marker
- Information about the tracked target

Right side

- Information about the cursor
- Information about the markers



A *Tracked target information / Priority marker information*

B *Cursor information / Manual track information*

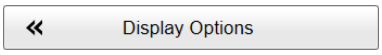
C *The tracked target is regarded as an object, and it is identified with a circle and two lines. The two lines reflect the size of the current tracking area.*

D *Marker*

Procedure

1 Open the **Display** menu.

2 Select **Display Options**.



Observe that the **Display Options** dialog box opens. This dialog box contains a number of pages selected from the menu on the left side.

3 Select **Cursor Readout** to open the page.

All the presentation modes are listed.

4 Open a presentation mode to find a list of all the views it supports.

5 Open a view to select information.

6 Select **OK** to save the selected setting and close the dialog box.

Further requirements

If you think the text is small and hard to read, double-click on the text field. This will increase the text size.

Related topics

Operating procedures, page 77
Setting up presentation modes and views, page 140
Cursor Readout page, page 548

Moving a view to another display

Each operating mode is presented with a set of views. These are placed at different positions with different sizes. If you have several displays connected to your Processor Unit you can even move selected views to another display. With the **Docking Views** function you can move and re-size the views in the display presentation.

Context

The physical location and size of each view can be changed individually. The content in a view that changes size will automatically be adjusted to take full advantage of the space available.

Procedure

1 Open the **Display** menu.

2 Set **Docking Views** to *On*.

3 Click in the title bar of the view that you want to move.

The frame of the selected view will change colour to indicate that it has been selected.

4 Press the mouse button, and keep it depressed to drag the selected view to another display.

Further requirements

To move a view back onto the main display, select it, and drag it over. Place the view among the other views as indicated by the docking positions.

Related topics

Operating procedures, page 77
Setting up presentation modes and views, page 140
Moving a view to another display, page 143
Rearranging the layout of the echo presentations, page 143
Restoring the locations and sizes of the views, page 144
Docking Views function, page 452

Rearranging the layout of the echo presentations

Each operating mode is presented with a set of views. These are placed at different positions with different sizes. With the **Docking Views** function you can move and re-size the views in the display presentation.

Context

The physical location and size of each view can be changed individually. The content in a view that changes size will automatically be adjusted to take full advantage of the space available.

Procedure

1 We recommend that you first save your current user settings.

When a complete reorganisation of the view positions and sizes have been completed, you may wish to restore the presentation to what it was *before* you changed it. You must use the **User Settings** dialog box to do this. We suggest that you save your current user settings before you activate the **Docking Views** function.

a Observe the **Main** menu.

b Select **User Settings**.

c Select **Save Current Setting**.

d Type a name.

e Select **OK** to save the chosen name.

f Select **OK** to close the dialog box.

2 Open the **Display** menu.

3 Set **Docking Views** to *On*.

4 Click in the title bar of the view that you want to move.

The frame of the selected view will change colour to indicate that it has been selected.

5 Press the mouse button, and keep it depressed to drag the selected view to another position in the CS90 presentation.

The docking positions show you where to drag and drop the selected view. Any view can be selected, and then repositioned as indicated by the docking positions.

Related topics

Operating procedures, page 77
Setting up presentation modes and views, page 140
Moving a view to another display, page 143
Rearranging the layout of the echo presentations, page 143
Restoring the locations and sizes of the views, page 144
Docking Views function, page 452

Restoring the locations and sizes of the views

If you have used **Docking Views** to rearrange the position and size of your views, you must use **User Settings** to restore all the views to their default positions.

Context

With the **Docking Views** function you can move and re-size the views in the display presentation. When a complete reorganisation of the view positions and sizes have been completed, you may wish to restore the presentation to what it was *before* you changed it.

Procedure

1 On the **Main** menu, select **User Settings**.

2 Select the default settings.

Note

These factory settings contain all the default values. They are provided with the CS90 system. All current settings are lost when the default factory settings are applied. There is no "undo".

3 Select **Activate Selected Setting**.

Result

All views are placed back to their original positions and sizes.

Related topics

Operating procedures, page 77
Setting up presentation modes and views, page 140
Moving a view to another display, page 143
Rearranging the layout of the echo presentations, page 143
Restoring the locations and sizes of the views, page 144
Docking Views function, page 452

Defining the visual information in the sonar views

Topics

Selecting true or relative motion behaviour in the views, page 146

Placing data from a sea current sensor in the sonar view, page 147

Adding markers for external objects to the echo presentation, page 148

Creating a visual presentation of your vessel's previous movements, page 149

Selecting true or relative motion behaviour in the views

In selected views you can control how the vessel symbol shall "behave" in the presentation. The way the vessel moves in the presentation can be chosen either *true* or *relative*.

Context

This function is not available in all the views.

Procedure

1 Open the **Display** menu.

2 Locate the **Motion** function.

3 Select [+] or [-] to choose the requested setting.

True Motion

In *True Motion* mode, the view is kept geographically motionless. The vessel symbols moves around in the view to reflect its true movements. If the symbol attempts to leave the view, the presentation is automatically adjusted.

Relative

In *Relative* mode, the view is continuously updating its geographical position and orientation based on the vessel movements. The vessel symbols is kept motionless at the centre of the view.

Select the middle of the button to open a small menu with the available options.

Related topics
Operating procedures, page 77
Defining the visual information in the sonar views, page 146
Motion function, page 444

Placing data from a sea current sensor in the sonar view

A current sensor can be connected to the CS90 system. This can for example be an acoustic Doppler current profiler (ADCP). The information from this sensor is presented in the applicable views.

Prerequisites

For this functionality to work, a current sensor must be connected to the CS90 system.

Context

The data from the current sensor are presented in the relevant views using text and arrows. Multiple arrows are used if the sensor presents information from more than one layer.

Procedure

1 Click once in the view that you wish to change.

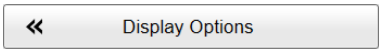
2 Open the **Display** menu.

3 Select **Visual Objects** to open the menu.

4 Set **Current Vector** to *On*.

If you select **Apply to All** your setting is applied to *all the views* that support the functionality.

5 Select **Display Options**.



Observe that the **Display Options** dialog box opens. This dialog box contains a number of pages selected from the menu on the left side.

6 Select **Current Flow** to open the page.

The **Current Flow** page allows you how to present the direction of the sea current.

7 Choose the required setting.

- **To**: Use this setting to present the direction in which the ocean current is flowing.
- **From**: Use this setting to present the direction from which the ocean current is coming. Observe the inverted arrows.

8 Select **OK** to save the selected setting and close the dialog box.

Related topics

Operating procedures, page 77
Defining the visual information in the sonar views, page 146
Visual Objects function, page 443
Current Flow page, page 547

Adding markers for external objects to the echo presentation

Position information from external objects such as buoys, fish aggregating devices and other similar items can be imported into the CS90 system. The external objects are shown as hexagonal markers in the echo presentation.

Prerequisites

A suitable receiver system must be connected to the Processor Unit.

Procedure

1 Set up the communication with the external device.
   a Open the **Setup** menu.
   b On the **Setup** menu, select **Installation**.
   c On the left side of the **Installation** dialog box, select **Sensor Installation**.
   d For **Type**, select *External Objects* to import information from relevant devices.
   e Select which port you want to import the sensor information on.
   f Type a custom name to identify the interface in other dialog boxes.
   g Select which datagram(s) you want to import from the sensor.
   h If relevant, specify a dedicated talker ID.
2 Open the **Display** menu.
3 Select **Visual Objects** to open the menu.
4 Set **Markers** to *On*.

Related topics

Operating procedures, page 77
Defining the visual information in the sonar views, page 146
Sensor Installation page, page 576

Creating a visual presentation of your vessel's previous movements

In order to maintain a visual presentation of your vessel's previous movements, you can draw these with a line. This line is drawn after the vessel symbol in the sonar views, and visualizes your past movements. We refer to this line as the *History Line*.

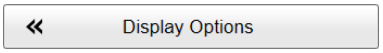
Context

The history line shows you the historic movements of your own ship. The line is drawn after the vessel symbol. When the history line is active, the length (in minutes) of the line can be defined.

Procedure

1 Open the **Display** menu.

2 Select **Display Options**.



Observe that the **Display Options** dialog box opens. This dialog box contains a number of pages selected from the menu on the left side.

3 Select **Own Ship** to open the page.

4 Set **History Line Length** to a value that meets your preferences.

Other options are:

- Select **Clear History Line** to delete the current line.
- Set **History Line Length** to 0 (zero) to disable the history line.

The **Minute Markers** function adds markers to the history line. These markers indicate how far you have sailed in the last few minutes. The minute markers are shown as small circles on the history line.

5 Open the **Display** menu.

6 Select **Visual Objects** to open the menu.

7 Set **Minute Markers** to *On*.

Related topics

Operating procedures, page 77
Defining the visual information in the sonar views, page 146
Own Ship page, page 544

Using maps

Topics

Enabling and disabling the map presentation, page 150

Selecting which map elements to include in the display presentation, page 151

Setting up the presentation of the depth lines in the map, page 152

Choosing a map provider, page 152

Enabling and disabling the map presentation

The CS90 system allows you to place a geographical map on top of the echo presentation. The purpose of the map is to make it easier to understand the echo data from the CS90 system. The map must *not* be used for navigation.

Context

The map is only shown in *Horizontal* views when **Range Projection** is set to *True*.

Procedure

1 At the bottom of the display presentation, select a suitable presentation mode, and activate the *Horizontal* view.

2 Open the **Active** menu.

3 Set **Range Projection** to *True*.

The distance to a target located anywhere in the water column can be measured in two ways. This can either be the horizontal distance to the target (*True*), or along the tilt angle (*Slant*).

4 Open the **Display** menu.

5 Select **Cosmetics** to open the menu.

6 Set **Map** to *On*.

This is an "on/off" switch. Use **Map** to enable or disable the geographical map layer.

Note

The map must not be used for navigation.

Related topics

Operating procedures, page 77
Using maps, page 150
Selecting which map elements to include in the display presentation, page 151
Setting up the presentation of the depth lines in the map, page 152
Cosmetics menu, page 411

Selecting which map elements to include in the display presentation

Once a map service has been chosen, use **Map Display** to choose which map elements to include in the map presentation.

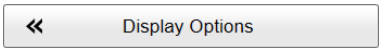
Context

The map is only shown in *Horizontal* views when **Range Projection** is set to *True*.

Procedure

1 Open the **Display** menu.

2 Select **Display Options**.



Observe that the **Display Options** dialog box opens. This dialog box contains a number of pages selected from the menu on the left side.

3 Select **Map Display** on the menu to open the page.

4 Select which map elements you want to include.

Note

These map settings are only valid for WMS (Web Map Service) maps from a KONGSBERG navigation system.

5 Select **OK** to save the selected settings and close the dialog box.

Related topics

Operating procedures, page 77
Using maps, page 150
Map Display page, page 540

Setting up the presentation of the depth lines in the map

Once a map service has been chosen, use **Map Display** to choose which map elements to include in the map presentation. The **Safety Depth** page allows you to change the safety depth settings, and thus the presentation of the various water depths.

Context

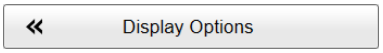
The map is only shown in *Horizontal* views when **Range Projection** is set to *True*.

Once a map is projected on top of the echo data, the depth contour lines are drawn with specific colours.

Procedure

1 Open the **Display** menu.

2 Select **Display Options**.



Observe that the **Display Options** dialog box opens. This dialog box contains a number of pages selected from the menu on the left side.

3 Select **Safety Depth** to open the page.

4 Select the settings you want to use.

Note

These map settings are only valid for WMS (Web Map Service) maps from a KONGSBERG navigation system.

5 Select **OK** to save the selected settings and close the dialog box.

Related topics

Operating procedures, page 77
Using maps, page 150
Safety Depth page, page 541

Choosing a map provider

If you want to add a map to the display presentation you must first select a *map provider*.

Context

The map is only shown in *Horizontal* views when **Range Projection** is set to *True*.

Procedure

1 Open the **Setup** menu.

2 On the **Setup** menu, select **Installation**.

3 Select **Map Setup** to open the page.

4 Choose map provider, then insert relevant information to make the connection.

Only WMS (World Map Service) maps from a KONGSBERG navigation system are supported.

5 Type the correct URL to make contact with the map server.

6 Select **OK** to save the selected settings and close the dialog box.

Related topics

Operating procedures, page 77
Using maps, page 150
Map Setup page, page 613

Defining settings related to user preferences and individual customizing

Topics

Selecting menu language, page 154
Hiding the menu system, page 155
Placing the menu on the left side of the display presentation, page 156
Selecting the information to appear on the top bar, page 156
Enabling Coordinated Universal Time (UTC) on the bottom bar, page 157
Selecting which tooltips to appear in the user interface, page 158
Adjusting the backlight intensity on the Operating Panel, page 158
Reducing the light emitted from the display presentation, page 159
Increasing the visibility of the information panes, page 160
Changing the colour palette ("skin") used in the display presentations, page 161
Choosing the colours used to present the echoes, page 161
Selecting measurement units, page 162
Configuring the environmental parameters, page 163
Setting up the alarm limits for system protection, page 164

Selecting menu language

You may prefer to use the CS90 system with the user interface in your own language. The **Language** function allows you to select the language to be used in the display presentations, menus and dialog boxes.

Context

With a few exceptions, the chosen language will also be used for all other texts in the user interface. The context sensitive online help may not be available for the language you choose. If your language is not supported, the English help is provided.

Procedure

1 Open the **Setup** menu.

2 Select the middle of the **Language** button to open the list of available options.

3 Select the language you wish to use.

Result

All the texts in the user interface are changed to the selected language.

The context sensitive on-line help may also be available in your language. To change the language in the on-line help, you may need to restart the CS90 system.

Related topics

Operating procedures, page 77
Defining settings related to user preferences and individual customizing, page 154
Language function, page 459

Hiding the menu system

Unless you need to make frequent changes to the operating parameters, you may want to hide the menu from the display presentation. This gives you more space for echo information.

Context

The menu system is by default located on the right side of the display presentation. The menus are organized in a tree structure with a main menu, a set of secondary menus, and several menu buttons.

Tip

The **Menu on the right side** *option is provided in the* **Display Options** *dialog box. By deselecting this function, the entire menu system is placed permanently on the left side of the display presentation.*

Procedure

1 To hide the menu, select **Menu** on the top bar.

When the menu is hidden, it is temporarily shown on the left or right side of the display presentation if you move the cursor to that position.

2 To retrieve the menu, select **Menu** one more time.

Related topics

Operating procedures, page 77
Defining settings related to user preferences and individual customizing, page 154
Menu, page 291

Placing the menu on the left side of the display presentation

The menu system is by default located on the right side of the display presentation. You can move the menu system to the left side of the presentation.The **General** page in the **Display Options** dialog box controls the location of the menu.

Context

The **General** page offers a range of "on/off switches". You use them to enable or disable the relevant functions.

Procedure

1 Open the **Display** menu.

2 Select **Display Options** to open the dialog box.

3 Select **General** to open the page.

4 Deselect **Menu on the right side**.

5 Select **OK** to save the selected setting and close the dialog box.

Related topics

Operating procedures, page 77
Defining settings related to user preferences and individual customizing, page 154
General page, page 537

Selecting the information to appear on the top bar

The top bar can contain various information. You can choose which information elements to appear at the top of the display presentation.

Context

The **General** page offers a range of "on/off switches". Some of these "on/off switches" are used to enable or disable the information shown on the top bar.

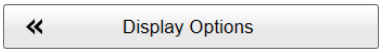
Note

The information shown on the top bar must not be used for vessel navigation.

Procedure

1 Open the **Display** menu.

2 Select **Display Options**.



Observe that the **Display Options** dialog box opens.

3 Select **General** to open the page.

4 In the **Top Bar** list, select the information you want to see on the top bar.

5 Select **OK** to save the selected settings and close the dialog box.

Related topics

Operating procedures, page 77
Defining settings related to user preferences and individual customizing, page 154
General page, page 537

Enabling Coordinated Universal Time (UTC) on the bottom bar

You can set up the CS90 system to show Coordinated Universal Time (UTC). When disabled, the CS90 system uses local time.

Prerequisites

To enable UTC time, your CS90 system must be set up to accept the NMEA ZDA datagram. The NMEA ZDA datagram contains the universal time code (UTC), day, month, year and local time zone.

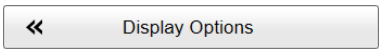
Context

This is an "on/off" switch. The time is shown on the bottom bar at the bottom of the display presentation.

Procedure

1 Open the **Display** menu.

2 Select **Display Options**.



Observe that the **Display Options** dialog box opens.

3 Select **General** to open the page.

4 Select **UTC Time** to enable Coordinated Universal Time (UTC).

5 Select **OK** to save the selected settings and close the dialog box.

Related topics

Operating procedures, page 77
Defining settings related to user preferences and individual customizing, page 154
General page, page 537

Selecting which tooltips to appear in the user interface

When you move the cursor over the echoes in the display presentation, small "tooltips" are shown to provide additional information. The **Tooltip** page controls which tooltips that are shown.

Context

Several tooltips can be shown in the echo presentation. When a tooltip is enabled, the cursor location is detected and a small information box is shown. By default, the information is related to the exact position of the cursor. Each tooltip represents a specific piece of information, and they are listed separately.

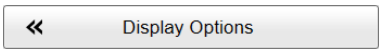
The **Tooltip** page offers a range of "on/off switches". Each tooltip is presented in the list, and you can enable or disable each of them independently.

Procedure

1 Open the **Display** menu.

2 Select **Display Options**.

3 Select **Display Options**.



Observe that the **Display Options** dialog box opens. This dialog box contains a number of pages selected from the menu on the left side.

4 Select **Tooltip** to open the page.

5 In the list of tooltips, select the tooltips you want to see.

6 Select **OK** to save the selected settings and close the dialog box.

Related topics

Operating procedures, page 77
Defining settings related to user preferences and individual customizing, page 154
General page, page 537

Adjusting the backlight intensity on the Operating Panel

The buttons on the Operating Panel have a built-in backlight to improve visibility on a dark bridge.

Context

Use **Panel Backlight** to control the intensity of the lights.

Procedure

1 Open the **Display** menu.

2 Select **Panel Backlight**.

3 Adjust the background illumination to suit your preferences and the ambient light conditions.

a To change the setting, move the cursor to either side of the button.

b Select the *left* side of the button to *decrease* the value.

c Select the *right* side of the button to *increase* the value.

d Select the middle of the button to open it.

e If you have a keyboard connected to the CS90 system, type the requested value.

Related topics

Operating procedures, page 77
Defining settings related to user preferences and individual customizing, page 154
Panel Backlight function, page 447

Reducing the light emitted from the display presentation

When the bridge is dark, the light emitted by the display presentation can affect your night vision. In order to compensate for this, you can reduce the intensity.

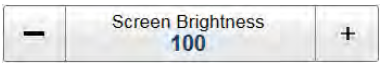
Context

The intensity of the light given off by the display presentation can be adjusted. You can use this function to increase or decrease the light from the screen to match the ambient light. The intensity of light emitted by the display can be reduced from 100% to 0% in steps of 1.

Procedure

1 Open the **Display** menu.

2 Select a **Screen Brightness** setting that fits your requirements.



a To change the setting, move the cursor to either side of the button.

b Select the *left* side of the button to *decrease* the value.

c Select the *right* side of the button to *increase* the value.

d Select the middle of the button to open it.

e If you have a keyboard connected to the CS90 system, type the requested value.

Related topics

Operating procedures, page 77
Defining settings related to user preferences and individual customizing, page 154
Screen Brightness function, page 449

Increasing the visibility of the information panes

When you open an information pane, you will see that it is transparent. This transparency allows you to see the echoes behind the pane, but it may also reduce the visibility of the information in it.

Context

The information panes provided by the CS90 system can be placed anywhere on top of the *Inspection* views in the presentation.

In order not to loose information, the panes have been designed so you can see through them. The degree of transparency can be controlled with this **Transparency** function. You can adjust the setting from 0% (no transparency) to 90% (almost full transparency) in steps of 1%.

Procedure

1 Open the **Display** menu.

2 Select a **Transparency** setting that fits your requirements.

The chosen transparency percentage is used on all open information panes.

a To change the setting, move the cursor to either side of the button.

b Select the *left* side of the button to *decrease* the value.

c Select the *right* side of the button to *increase* the value.

d Select the middle of the button to open it.

e If you have a keyboard connected to the CS90 system, type the requested value.

Related topics

Operating procedures, page 77
Defining settings related to user preferences and individual customizing, page 154
Transparency function, page 445

Changing the colour palette ("skin") used in the display presentations

Depending on the ambient light, it is possible to change the colours the CS90 system uses in its display presentation. This can help you see the information better. The **Palette** function allows you to choose which colour theme ("skin") to be used by the CS90 system.

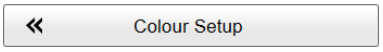
Context

Select a palette to suit the ambient light conditions and your personal preferences. The choice you make has no effect on the overall performance of the CS90 system.

Procedure

1 Open the **Display** menu.

2 Select **Colour Setup**.



Observe that the **Colour Setup** dialog box opens.

3 Select the colour palette ("skin") you want to use.

4 At the bottom of the dialog box, select **Apply** to preview your choice.

5 Select **OK** to save the selected setting and close the dialog box.

Related topics

Operating procedures, page 77
Defining settings related to user preferences and individual customizing, page 154
Colour Setup dialog box, page 450

Choosing the colours used to present the echoes

Several different colour scales are predefined and available for the presentation of the echoes. You can easily choose which colours to use. The presentation colours have no effect on the operational performance of the CS90 system.

Context

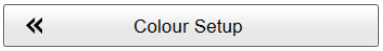
Which colour scale to use is mainly a personal preference based on ambient light conditions, the nature of the echoes and your own experience. Keep in mind that in the basic scale with 12 colours, each discrete colour represents a 3 dB range of echo signal strength. This implies that the next colour is selected every time the echo strength is doubled. If you choose to use many colours, the resolution of the display presentation is greatly improved. It is then easier to distinguish the difference between the various echoes of different size and/or target strength.

The **Smooth Echosounder** scale is based on the standard 12-colour scale. Additional colours have been added between them to make smoother colour transitions.

Procedure

1 Open the **Display** menu.

2 Select **Colour Setup**.



Observe that the **Colour Setup** dialog box opens.

3 Under **Echo Colours**, choose the colour scale you want to use.

4 Under **Colour Brightness**, choose how intense you want these colours to appear.

5 At the bottom of the dialog box, select **Apply** to preview your choice(s).

6 Select **OK** to save the selected setting and close the dialog box.

Related topics

Operating procedures, page 77
Defining settings related to user preferences and individual customizing, page 154
Colour Setup dialog box, page 450

Selecting measurement units

The CS90 system is prepared to work with several international standards for units of measurements. From the **Units** page you control which units of measurements are used.

Context

The user interface presents many measurements. These measurements are for example related to depth, range and distance. Use the **Units** options to select the units of measurements you want to work with. The CS90 system uses them in all presentations. You only need to define them once.

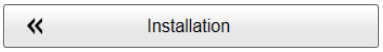
Note

When you work in the **Installation** *dialog box, you must always select* **Apply** *to save the changes made on a page. You must do this before you continue working on a different page.*

Procedure

1 Open the **Setup** menu.

2 On the **Setup** menu, select **Installation**.



Observe that the **Installation** dialog box opens. This dialog box contains a number of pages selected from the menu on the left side.

3 On the left side of the **Installation** dialog box, select **Units**.

4 Adjust the settings to fit your requirements.

5 At the bottom of the page, select **Apply** to save your settings.

6 Continue your work in the **Installation** dialog box, or select **OK** to close it.

Related topics

Operating procedures, page 77
Defining settings related to user preferences and individual customizing, page 154
Units page, page 594

Configuring the environmental parameters

Environmental parameters such as salinity, and sound speed play an important part to present accurate echo data. Use the **Environment** parameters to define these values. Depending on the current sea and weather conditions, you may need to change these values frequently.

Context

You must correctly set the sound speed through the water to obtain accurate echoes. Several parameters are required to calculate the correct sound speed value. If these parameters are unknown, use the default value of 1494 m/s. This is a typical mean value for sound speed in salt water.

Procedure

1 Open the **Setup** menu.

2 Select **Environment**.

Observe that the **Environment** dialog box opens.

3 Open the **Water Column** page.

4 Specify if you work in fresh or salt water.

5 Specify the sound speed.

6 Select **OK** to save the selected settings and close the dialog box.

Related topics

Operating procedures, page 77
Defining settings related to user preferences and individual customizing, page 154
Environment dialog box, page 458
Water Column page, page 553

Setting up the alarm limits for system protection

Safe operation of the CS90 system is made possible using multiple sensors that monitor the operation and the performance. Whenever a suspicious event takes place, a relevant message, warning or alarm is provided. Selected alarm limits may be adjusted to fit your operational requirements.

Context

The **System Protection** page allows you to specify alarm limits for the hull unit and the transducer. Additional system protection features are also listed. These function are automatically monitored by the software in the CS90 system. You are not permitted to change the alarm limits.

If an alarm limit is exceeded a relevant message is issued by the CS90 system. At the same time, the relevant descriptive text is provided with a dark background.

Procedure

1 Open the **Setup** menu.

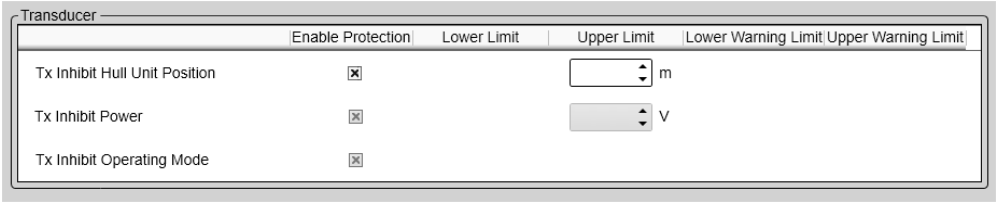
2 On the **Setup** menu, select **Installation**.

Observe that the **Installation** dialog box opens. This dialog box contains a number of pages selected from the menu on the left side.

3 On the left side of the **Installation** dialog box, select **System Protection** to open the page.

4 Define the relevant parameters.

Transducer



Tx Inhibit Hull Unit Position

If the transducer is activated when out of the water it may be damaged beyond repair. With the transducer fully retracted, no transmissions ("pings") take place. When you lower the transducer into the water, you can specify a vertical position for when the transmissions start. When the transducer is retracted, transmissions will stop when the transducer reaches the same position.

Tx Inhibit Power

The high voltage supplied to the transceiver boards is monitored. You are not permitted to change the alarm limits. If this voltage differs

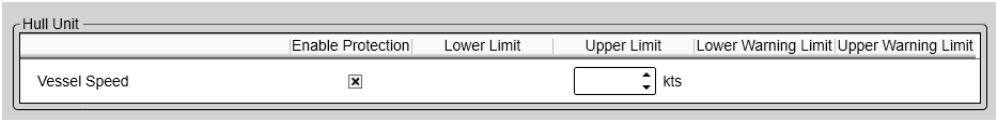
from the defined tolerances, alarm message AKH11 will be initiated: `Transmission is inhibited due to a high voltage in the power supply.`

Tx Inhibit Operation Mode

This feature activates the system protection to make sure that the CS90 system does not transmit ("ping") when you have chosen *Replay* or *Inactive* mode.

Hull Unit

You must specify a maximum speed for the vessel. This speed can match the hull unit specification, or you can choose a lower speed for increased safety.



Note

We strongly recommend that you do not specify a higher speed than the hull unit is designed for.

If the speed limit is exceeded a message is issued by the CS90 system.

The CS90 system can be provided with one of the following hull units:

Hull Unit	Lowering depth (m)	Transducer cable (m)	Maximum speed (knots)
CS90	1.0	4.6	20
		10	
CS94	2.1	4.6	19
		7	

Screen Recording

We recommend that you do not make any changes to these settings.

Recording

We recommend that you do not make any changes to these settings.

5 At the bottom of the page, select **Apply** to save your settings.

6 Continue your work in the **Installation** dialog box, or select **OK** to close it.

Related topics

Operating procedures, page 77
Defining settings related to user preferences and individual customizing, page 154
System Protection page, page 607

Saving, retrieving and handling user settings

Topics

Saving the current user settings, page 166

Choosing previously saved user settings, page 167

Renaming existing user settings, page 168

Deleting user settings that are no longer used, page 169

Choosing factory default settings, page 170

Saving the current user settings

When you have spent some time working with the CS90 system, you are probably using specific settings that you know are efficient for your purpose. It is a good idea to save these settings.

Context

The **User Settings** dialog box is used to store your favourite settings. These settings can be related to different operations, environmental conditions or basic personal preferences. You can use different settings to create as many user profiles as you like, and give them any name. All the settings you have chosen using functions and dialog boxes in the user interface are saved.

Procedure

1 Observe the **Main** menu.

Its default location is on the right side of the display presentation.

2 Select **User Settings**.

3 Select **Save Current Setting**.

A small dialog opens to accept the name of the new setting.

4 Type a name.

Tip

If you do not have a computer keyboard connected to your CS90 system, select the **Keyboard** *button to open an on-screen keyboard.*

5 Select **OK** to save the chosen name.

6 Observe that the name you have chosen appears on the **Saved Settings** list.

7 Select **OK** to close the dialog box.

Related topics

Saving, retrieving and handling user settings, page 166

Choosing previously saved user settings

User settings that either you or any of your colleagues have saved can easily be retrieved and put to use. This shortens down the time it takes to get started with the CS90 system.

Context

The **User Settings** dialog box is used to store your favourite settings. These settings can be related to different operations, environmental conditions or basic personal preferences. You can use different settings to create as many user profiles as you like, and give them any name. All the settings you have chosen using functions and dialog boxes in the user interface are saved. To activate either a factory setting or a saved setting, select the relevant name in one of the lists, then select **Activate Selected Setting**.

Tip

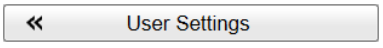
The Operating Panel allows you to assign certain functions to dedicated buttons and switches. This includes user settings. Once the requested functionality has been defined, simply press the button to make your choice. The **Operating Panel** *page is used to assign functionality to the programmable buttons. This page is located in the* **Installation** *dialog box.*

Procedure

1 Observe the **Main** menu.

Its default location is on the right side of the display presentation.

2 Select **User Settings**.



3 Observe the list of previously saved settings in the **Saved Settings** list.

4 Select the setting you want to use.

5 Select **Activate Selected Setting**.

6 Select **OK** to apply your changes and close the **User Settings** dialog box.

Related topics

Saving, retrieving and handling user settings, page 166

Renaming existing user settings

An existing user setting can easily be renamed.

Context

The **User Settings** dialog box is used to store your favourite settings. These settings can be related to different operations, environmental conditions or basic personal preferences. You can use different settings to create as many user profiles as you like, and give them any name. All the settings you have chosen using functions and dialog boxes in the user interface are saved. To rename a user setting, select its name in the list, and then select **Rename**. The factory settings cannot be renamed.

Procedure

1 Observe the **Main** menu.

Its default location is on the right side of the display presentation.

2 Select **User Settings**.

Observe that the **User Settings** dialog box opens.

3 Observe the list of previously saved settings in the **Saved Settings** list.

4 Select the setting you want to rename.

5 Select **Rename**.

A small dialog box opens to accept the new name.

6 Type a name.

Tip

If you do not have a computer keyboard connected to your CS90 system, select the **Keyboard** *button to open an on-screen keyboard.*

7 Select **OK** to save the chosen name.

8 Observe that the name you have chosen appears on the **Saved Settings** list.

9 Select **OK** to apply your changes and close the **User Settings** dialog box.

Related topics

Saving, retrieving and handling user settings, page 166

Deleting user settings that are no longer used

When you save the user settings, the files you have created are shown on the **Saved Settings** list. The list may be too long. User settings that you do not need can be deleted.

Context

The **User Settings** dialog box is used to store your favourite settings. These settings can be related to different operations, environmental conditions or basic personal preferences. You can use different settings to create as many user profiles as you like, and give them any name. All the settings you have chosen using functions and dialog boxes in the user interface are saved. To delete a user setting, select its name in the list, and then select **Delete**. The factory settings cannot be deleted.

Note

There is no "undo".

Procedure

1 Observe the **Main** menu.

Its default location is on the right side of the display presentation.

2 Select **User Settings**.

Observe that the **User Settings** dialog box opens.

3 Observe the list of previously saved settings in the **Saved Settings** list.

4 Select the setting you want to delete.

5 Select **Delete**.

A small dialog box opens so that you can verify your choice. There is no "undo".

6 Observe that the name you have chosen is removed from the **Saved Settings** list.

7 Select **OK** to apply your changes and close the **User Settings** dialog box.

Related topics

Saving, retrieving and handling user settings, page 166

Choosing factory default settings

Sometimes it may be useful to reset the CS90 system to work with a set of known user settings. A set of "factory settings" is provided for this purpose. The factory settings may be put to use if you are uncertain of which values to use. They offer the "best practice" settings for typical use.

Context

The **User Settings** dialog box is used to store your favourite settings. These settings can be related to different operations, environmental conditions or basic personal preferences. You can use different settings to create as many user profiles as you like, and give them any name. All the settings you have chosen using functions and dialog boxes in the user interface are saved. To activate either a factory setting or a saved setting, select the relevant name in one of the lists, then select **Activate Selected Setting**. The factory settings cannot be changed.

When you want to apply the factory settings a small dialog box opens to request your confirmation.

Note

Unless they are saved, all your current settings are lost when the factory settings are applied. There is no "undo".

Procedure

1 Observe the **Main** menu.

Its default location is on the right side of the display presentation.

2 Select **User Settings**.

Observe that the **User Settings** dialog box opens.

3 Observe the **Factory Settings** list.

4 Select the setting you want to use.

5 Select **Activate Selected Setting**.

6 Select **OK** to apply your changes and close the **User Settings** dialog box.

Related topics

Saving, retrieving and handling user settings, page 166

Defining the user-selected features on the Operating Panel

Topics

Selecting which Operating Panel to use, page 171

Assigning user settings or presentation modes to the Operating Panel, page 172

Assigning functions to the rotary switches on the Operating Panel, page 174

Assigning functions to F1, F2 and F3 on the Operating Panel (Mk2), page 177

Selecting which Operating Panel to use

The Operating Panel offers all necessary control functions for normal operation.

Context

The controls provided by the Operating Panel are arranged in logical functional groups. This offers you clear and easy operation with fast access to key functionality. All the functionality provided by the CS90 system can be accessed using the trackball on the Operating Panel and the menu system shown in the display presentation.

The CS90 system supports three different operating panels. These are referred to as "Mk1", "Mk2" and "Mk3".

- The Mk1 Operating Panel is connected to the Processor Unit with three cables. The dual interface cable provides power and serial communication. The USB interface cable is used to read the trackball movements. The Processor Unit must be fitted with a custom made interface board. A small commercial power supply is used to provide power to the Operating Panel. (The Mk1 Operating Panel is no longer provided with new sonars. This information is provided for legacy reasons.)
- The Mk2 Operating Panel is connected to the Processor Unit using an Ethernet cable. The Operating Panel is provided with a built-in power supply.
- The Mk3 Operating Panel is connected to the Processor Unit with a USB cable. A dedicated power supply unit is not required.

To select which operating panel to use, open the **Operating Panel** page in the **Installation** dialog box. The **Installation** dialog box is located on the **Setup** menu.

Tip

When you work in the **Installation** *dialog box, you must always select* **Apply** *to save the changes made on a page. You must do this before you continue working on a different page.*

Procedure

1 Open the **Setup** menu.

2 On the **Setup** menu, select **Installation**.

Observe that the **Installation** dialog box opens. This dialog box contains a number of pages selected from the menu on the left side.

3 On the left side of the **Installation** dialog box, select **Operating Panel**.

4 Select which operating panel to use.

5 At the bottom of the page, select **Apply** to save your settings.

6 Continue your work in the **Installation** dialog box, or select **OK** to close it.

Related topics

Operating procedures, page 77
Defining the user-selected features on the Operating Panel, page 171
Operating Panel page, page 596

Assigning user settings or presentation modes to the Operating Panel

The **User Settings** dialog box is used to store your favourite settings. These settings can be related to different operations, environmental conditions or basic personal preferences. You can use different settings to create as many user profiles as you like, and give them any name. The Operating Panel allows you to assign certain functions to dedicated buttons and switches. This includes user settings and presentation modes.

Prerequisites

Before you can assign custom user settings to the operating panel, a selection of settings must be available from the **User Settings** dialog box. The **User Settings** dialog box is located on the **Main** menu.

Context

The **Operating Panel** page is used to select which physical hardware panel you use, and to assign functionality to the programmable buttons. This page is located in the **Installation** dialog box. The **Installation** dialog box is located on the **Setup** menu.

- On the Mk2 Operating Panel, the four buttons dedicated for user settings or presentation modes are located the top of the panel.

- On the Mk3 Operating Panel, the requested user setting or presentation mode is chosen with a single button. Press the button repeatedly to cycle through the settings or modes.

Tip

Any user setting selected on the Operating Panel is identified in the upper left corner of the Horizontal view. The identifying number refers to the **User Setting** *number on the* **Operating Panel** *page. Click on the text to make it larger. Click one more time to restore the original font size.*

Procedure

1 Open the **Setup** menu.

2 On the **Setup** menu, select **Installation**.

Observe that the **Installation** menu opens. This dialog box contains a number of pages selected from the menu on the left side.

3 On the left side of the **Installation** dialog box, select **Operating Panel**.

4 Select the relevant operating panel.

5 Select **Mode Selection** to specify what you want to use the buttons for.

6 Assign one predefined user setting *or* presentation mode to each button on the Operating Panel.

7 At the bottom of the page, select **Apply** to save your settings.

8 Continue your work in the **Installation** dialog box, or select **OK** to close it.

Related topics

Operating procedures, page 77
Defining the user-selected features on the Operating Panel, page 171
Operating Panel page, page 596

Assigning functions to the rotary switches on the Operating Panel

The Mk2 Operating Panel is fitted with three rotary switches. The Mk3 Operating Panel is fitted with two rotary switches. The switches are identified with numbers. Each switch can be assigned a function related to range, gain, bearing or tilt. The Mk1 Operating Panel does not support this functionality.

Context

The **Operating Panel** page is used to select which physical hardware panel you use, and to assign functionality to the programmable buttons. This page is located in the **Installation** dialog box. The **Installation** dialog box is located on the **Setup** menu.

The following functions can be assigned:

Horizontal Range

This is the range setting in the *Horizontal* view.

Vertical Range

This is the range setting in the *Vertical* view.

Inspection Range

This is the range setting in the *Inspection* view.

Horizontal Range 2

This is the range setting in the *second Horizontal* view when a "dual" presentation mode is used.

Vertical Range 2

This is the range setting in the *second Vertical* view when a "dual" presentation mode is used.

Plane Range

This is the range setting in the *Plane* view.

Active Ping Range

This is the range setting in the currently active view.

Active Ping Gain

This is the gain setting in the currently active view

Active Ping Bearing

This is the bearing setting in the currently active view.

Active Ping Tilt

This is the tilt setting in the currently active view

Procedure

1 Open the **Setup** menu.

2 On the **Setup** menu, select **Installation**.

Observe that the **Installation** menu opens. This dialog box contains a number of pages selected from the menu on the left side.

3 On the left side of the **Installation** dialog box, select **Operating Panel**.

4 Select Operating Panel Mk2.

a Under **Rotary Switch Options**, assign one function to each rotary switch on the Operating Panel.

5 Select Operating Panel Mk3.

a Under **Rotary Switch Options**, assign one **Rotate** function to each rotary switch on the Operating Panel.

The assigned function is activated when you *turn* the rotary switch.

b Assign one **Push** function to each rotary switch.

The assigned function is activated when you *press* the rotary switch.

The following functions can be assigned:

None

No specific functionality is assigned.

Auto Tilt

This is an "on/off" function. When *Auto Tilt* mode is activated the beam will automatically change its tilt angle for each transmission ("ping"). The centre of the tilt sector is defined by the chosen tilt angle just before the *Auto Tilt* mode is started. The chosen tilt sector is shown on the tilt indicator in the *Horizontal* view using a shaded background. The sector and step settings are made using the **Tilt** function on the **Main** menu.

Zoom

Place the cursor anywhere in the view, right-click and select **Zoom**. Only one zoom level is provided. Select **Zoom** one more time to restore the original view.

Menu Off

This is an "on/off" function. Unless you need to make frequent changes to the operating parameters, you may want to hide the menu from the display presentation. This gives you more space for echo information.

Audio

Select **Audio** to turn the audio output on or off.

Own Ship

This is the same function as **Place Own Ship Marker** on the shortcut menu. Select this function to add a square symbol to the vessel's current

position in the echo presentation. The own ship marker is now regarded as an *object*. All information about the object is shown in the **Objects** menu listed as "OSM". Use **Delete Own Ship Marker** on the shortcut menu to delete the marker from the current view.

Auto Bearing

This is an "on/off" function. Set this function to *On* to start the automatic search function. In the *Auto Bearing* mode the CS90 system will automatically search within defined sector limits. The sector is identified in the view using two angular symbols. The sector and step settings are made using the **Bearing** function on the **Main** menu.

Screen Recording

This is an "on/off" function. The **Screen Recording** function allows you to record and save the echo presentation as a video file. Each screen recording you make is saved in `.mp4` format on the Processor Unit hard disk. The file name reflects the current date and time.

Select **Screen Recording** to start and stop the recording from the Operating Panel.

Use the **Screen Recording** page to define where the video files are saved. This page is located in the **Output** dialog box.

Delete Oldest Marker

The CS90 offers several different marker types. You can add as many markers as you like. The most common markers can be added using dedicated buttons on the Operating Panel. Other markers are added using the shortcut menu in each view. Each marker is identified with its geographical location.

Select **Delete Oldest Marker** to use the Operating Panel to remove the oldest marker from the sonar view.

6 At the bottom of the page, select **Apply** to save your settings.

7 Continue your work in the **Installation** dialog box, or select **OK** to close it.

Related topics

Operating procedures, page 77
Defining the user-selected features on the Operating Panel, page 171
Operating Panel page, page 596

Assigning functions to F1, F2 and F3 on the Operating Panel (Mk2)

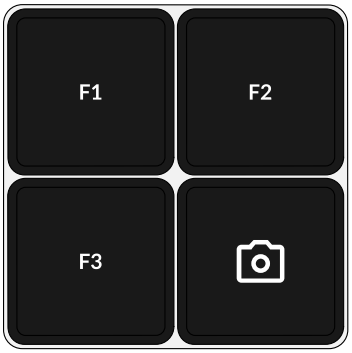
The Mk2 Operating Panel is fitted with three function buttons. The buttons are identified as **F1**, **F2** and **F3**. Each button can be assigned a dedicated function.

Context

The **Operating Panel** page is used to select which physical hardware panel you use, and to assign functionality to the programmable buttons. This page is located in the **Installation** dialog box. The **Installation** dialog box is located on the **Setup** menu.

The three function buttons are grouped with the **Screen Capture** button.

The following functions can be assigned:



Auto Tilt

This is an "on/off" function. When *Auto Tilt* mode is activated the beam will automatically change its tilt angle for each transmission ("ping"). The centre of the tilt sector is defined by the chosen tilt angle just before the *Auto Tilt* mode is started. The chosen tilt sector is shown on the tilt indicator in the *Horizontal* view using a shaded background. The sector and step settings are made using the **Tilt** function on the **Main** menu.

Off Centre

This is the same function as **Set New Ship Centre** on the shortcut menu. Place the cursor anywhere in the view and press the button. The function moves the vessel symbol to the selected position.

Zoom

Place the cursor anywhere in the view, right-click and select **Zoom**. Only one zoom level is provided. Select **Zoom** one more time to restore the original view.

Menu Off

This is an "on/off" function. Unless you need to make frequent changes to the operating parameters, you may want to hide the menu from the display presentation. This gives you more space for echo information.

Audio

Select **Audio** to turn the audio output on or off.

Own Ship

This is the same function as **Place Own Ship Marker** on the shortcut menu. Select this function to add a square symbol to the vessel's current position in the echo presentation. The own ship marker is now regarded as an *object*. All information about the object is shown in the **Objects** menu listed as "OSM". Use **Delete Own Ship Marker** on the shortcut menu to delete the marker from the current view.

Auto Bearing

This is an "on/off" function. Set this function to *On* to start the automatic search function. In the *Auto Bearing* mode the CS90 system will automatically search within defined sector limits. The sector is identified in the view using two angular symbols. The sector and step settings are made using the **Bearing** function on the **Main** menu.

Screen Recording

This is an "on/off" function. The **Screen Recording** function allows you to record and save the echo presentation as a video file. Each screen recording you make is saved in `.mp4` format on the Processor Unit hard disk. The file name reflects the current date and time.

Select **Screen Recording** to start and stop the recording from the Operating Panel.

Use the **Screen Recording** page to define where the video files are saved. This page is located in the **Output** dialog box.

Delete Oldest Marker

The CS90 offers several different marker types. You can add as many markers as you like. The most common markers can be added using dedicated buttons on the Operating Panel. Other markers are added using the shortcut menu in each view. Each marker is identified with its geographical location.

Select **Delete Oldest Marker** to use the Operating Panel to remove the oldest marker from the sonar view.

Procedure

1 Open the **Setup** menu.

2 On the **Setup** menu, select **Installation**.

Observe that the **Installation** menu opens. This dialog box contains a number of pages selected from the menu on the left side.

3 On the left side of the **Installation** dialog box, select **Operating Panel**.

4 Select Operating Panel Mk2.

5 Under **Button Options**, assign one function to each **Fx** button on the Operating Panel.

6 At the bottom of the page, select **Apply** to save your settings.

7 Continue your work in the **Installation** dialog box, or select **OK** to close it.

Related topics

Operating procedures, page 77
Defining the user-selected features on the Operating Panel, page 171
Operating Panel page, page 596

Exporting sensor data, marker positions and technical information

Topics

Exporting target markers, page 180

Exporting sensor data to a peripheral system, page 181

Exporting technical information, page 183

Exporting target markers

Under normal use, the CS90 system presents several different echoes simultaneously. Some of these are clearly more interesting than others. It can be a challenging task to tell these echoes apart. It can also be hard to keep track of the different echoes as both echoes and your own vessel move. To ease the identification of these echoes you can use *markers*. Each marker is identified with its geographical location. This marker location can be very useful for other instruments For example, you can export this information to a chartplotter.

Prerequisites

A compatible instrument is connected to the CS90 system. You have a vacant interface port on your Processor Unit. The interface port is set up with the correct communication parameters.

Context

In this context, the phrase *marker* is used to identify a visual symbol placed in the display presentation. Placing a marker on an echo identifies the echo as "interesting". It is regarded as an *object* that you can act upon.

Procedure

1 Open the **Operation** menu.

2 Select **Output**.

Observe that the **Output** dialog box opens. This dialog box contains a number of pages selected from the menu on the left side.

3 Select **Marker Output** to open the page.

a Select an output type from the list.

b Select the communication port you want to use.

c Select which marker type to export.

d Select **Add** to save the output format.

e Select **Apply** to save your choices.

4 If you want to check the communication parameters, select **Inspect Port**.

Note

*You cannot make any changes here. To change the communication parameters, use the **I/O Setup** page. The* **I/O Setup** *page is located in the* **Installation** *and* **Output** *dialog boxes.*

5 If you want to check the data flow on the selected port, select **Monitor**.

In order to see this data traffic, your CS90 system must be active and transmitting information to the peripheral system.

The **Port Monitor** dialog box provides one text box for incoming messages (**Rx Data**), and one for outgoing messages (**Tx Data**). Use these boxes and your knowledge of the data communication to investigate the datagrams. The **Port Monitor** dialog box is a tool for debugging purposes. It is neither required nor intended for normal operation of the CS90 system.

6 At the bottom of the **Output** dialog box, select **OK** to save the chosen parameters and close it.

Related topics

Operating procedures, page 77
Exporting sensor data, marker positions and technical information, page 180
Marker Output page, page 528

Exporting sensor data to a peripheral system

The information provided to the CS90 system from various sensors can also be useful for other systems on board. The CS90 system allows you to export the same sensor data that was originally imported. This can "reuse" the same information on other systems. The **Relay Output** page is used to set up and control this export functionality.

Prerequisites

A compatible instrument is connected to the CS90 system. You have a vacant interface port on your Processor Unit. The interface port is set up with the correct communication parameters.

Context

The information imported to the CS90 system from various sensors can also be useful for other systems on board your vessel. The CS90 system allows you to "re-export" this

sensor information. When activated, the selected sensor information is sent out on the chosen communication port (serial or LAN).

The following sensor data can be exported:

- Navigation
- Motion sensor

Procedure

1 Open the **Setup** menu.

2 Select **Output**.

Observe that the **Output** dialog box opens. This dialog box contains a number of pages selected from the menu on the left side.

3 On the left side of the **Output** dialog box, select **Relay Output**.

4 On the **Relay Output** page, set up the data export parameters.

a Select which information to export.

b Select the communication port you want to use.

c Select **Add** to start export of the chosen data format.

5 If you want to check the communication parameters, select **Inspect Port**.

Note

*You cannot make any changes here. To change the communication parameters, use the **I/O Setup** page. The* **I/O Setup** *page is located in the* **Installation** *and* **Output** *dialog boxes.*

6 If you want to check the data flow on the selected port, select **Monitor**.

In order to see this data traffic, your CS90 system must be active and transmitting information to the peripheral system.

The **Port Monitor** dialog box provides one text box for incoming messages (**Rx Data**), and one for outgoing messages (**Tx Data**). Use these boxes and your knowledge of the data communication to investigate the datagrams. The **Port Monitor** dialog box is a tool for debugging purposes. It is neither required nor intended for normal operation of the CS90 system.

7 Select **Apply** and then **Close** to save all the parameters and close the **Output** dialog box.

Related topics

Operating procedures, page 77
Exporting sensor data, marker positions and technical information, page 180
Relay Output page, page 530

Exporting technical information

Exporting technical information from the CS90 system to a hard disk or USB flash drive is often useful. Both during normal use, and perhaps preferably during software and hardware troubleshooting, it can be helpful to share information.

Prerequisites

It is assumed that you are familiar with the Microsoft® operating system utilities for file handling.

You need a data storage device. This is typically a large capacity USB flash drive or a small portable hard disk. You can also connect the computer to a network, and copy the files to a server.

Context

The **Export** dialog box allows you to export user settings, configuration files, message logs and information mainly related to hardware and software troubleshooting. You are provided with a list of file types to export. You must specify *where* these files shall be saved.

Procedure

1 Insert the USB flash drive.

2 Open the **Setup** menu.

3 Select **Export** to open the dialog box.

4 Select the information you wish to export.

The total size of the selected files is shown below the list.

5 Select **Browse** to locate the desired folder.

You can also type the folder name. If you do not have a computer keyboard connected to your CS90 system, select the **Keyboard** button to open an on-screen keyboard.

6 Select **Save** to start the data export.

Result

Related topics

Operating procedures, page 77
Exporting sensor data, marker positions and technical information, page 180
Export dialog box, page 465

Maintenance procedures

Topics

Lowering and hoisting the transducer from the sonar room, page 185

Setting up the interfaces to peripheral devices, page 192

Inserting the installation parameters, page 210

Installing and maintaining software, page 225

Testing the noise conditions and the sonar functionality, page 247

Preventive maintenance, page 263

Lowering and hoisting the transducer from the sonar room

Topics

Lowering and hoisting the transducer using the Hoist/Lower Switch, page 186

Lowering and hoisting the transducer using the hand crank, page 188

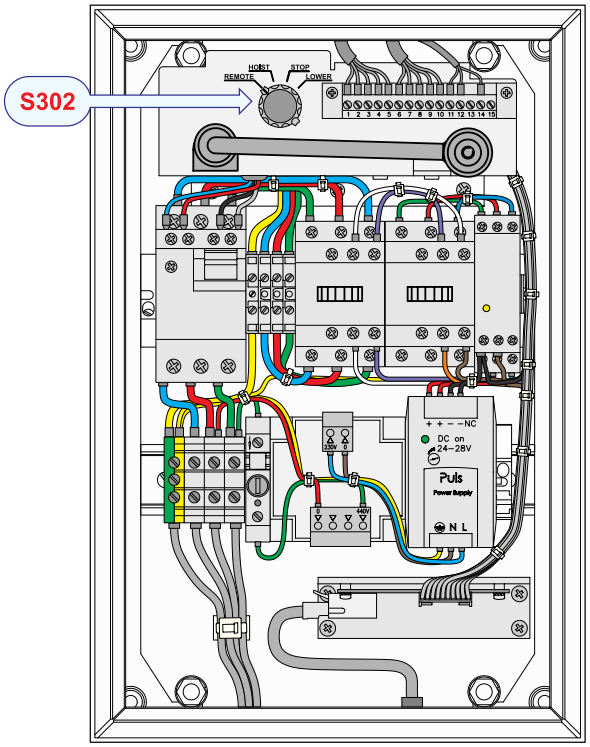
Emergency lowering and hoisting using the two contactors, page 190

Lowering and hoisting the transducer using the Hoist/Lower Switch

The Operating Panel controls the lowering and hoisting of the transducer. Dedicated buttons are provided for the physical transducer locations. You can also do this from the Motor Control Unit. Local control is useful for maintenance purposes.

Prerequisites

You need a suitable screwdriver or a large coin to open the Motor Control Unit cabinet. 3-phase voltage for the hoisting motor and +24 VDC from the internal power supply are available. Both indicator LEDs inside the Motor Control Unit are lit.



Context

Use **Hoist/Lower Switch** (S302) in the upper part of the cabinet to control lowering and hoisting. For normal operation from the Operating Panel, the switch must be set to *REMOTE*.

Procedure

1 Make sure that you have sufficient water depth below the keel before you lower the transducer.

If your vessel is in dry dock, make sure that you have sufficient height between the hull and the dry dock floor. The space under the hull must be free from tools, scaffolding, personnel and other obstacles.

2 Open the cabinet door.

WARNING

High voltages are used. This equipment must be serviced only by qualified personnel familiar with high-voltage equipment and the potential hazards involved. Failure to observe this precaution could result in bodily injury. You may be exposed to electric shock. Read and understand the applicable first aid instructions related to electric shock.

3 Locate the **Hoist/Lower Switch** (S302).

4 Lowering the transducer:

a Set the switch to position *LOWER*.

Lowering is automatically stopped when the **Lower Limit Switch** is activated. If necessary, the transducer can be stopped in any position by setting the **Hoist/Lower Switch** to *STOP*.

b Set the switch to position *STOP*.

5 Hoisting the transducer:

a Set the switch to position *HOIST*.

Hoisting is automatically stopped when the **Upper Limit Switch** is activated. If necessary, the transducer can be stopped in any position by setting the **Hoist/Lower Switch** to *STOP*.

b Set the switch to position *STOP*.

6 Locate the **Hoist/Lower Switch** (S302). Set the switch to position *REMOTE*.

Note

For normal operation from the Operating Panel, the switch must be set to REMOTE.

7 Close the cabinet door.

Lowering and hoisting the transducer using the hand crank

The Operating Panel controls the lowering and hoisting of the transducer. In case of a power failure the transducer can be hoisted or lowered manually by means of a hand crank.

Prerequisites

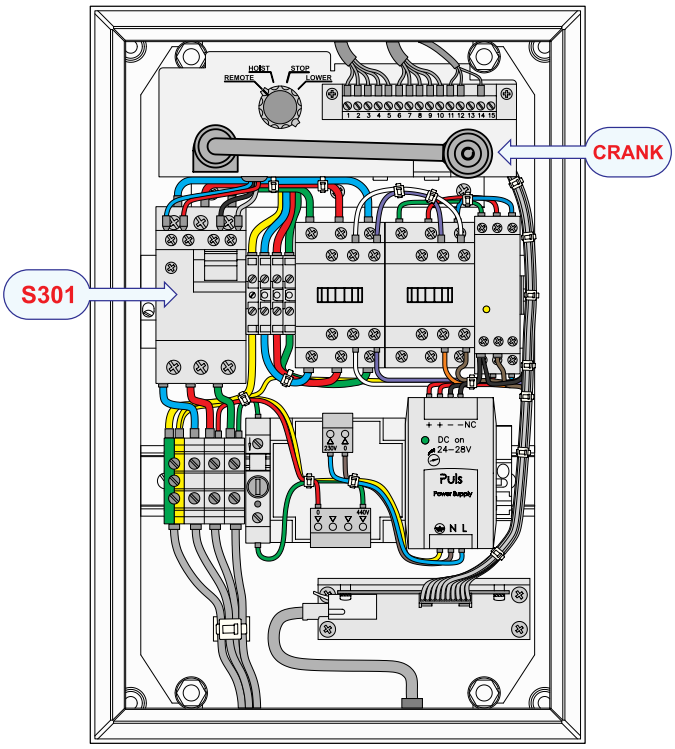
You need a suitable screwdriver or a large coin to open the Motor Control Unit cabinet. You also need a 4 mm Allen key.

Context

On larger hull units, the hoist motor is provided with a motor brake. The motor brake must be released before the transducer is manually lowered or hoisted.

Note

When not in use, the hand crank must always be placed inside the Motor Control Unit. When removed from its storage position the hand crank releases a safety switch which disables hull unit operation.



Procedure

1 Make sure that you have sufficient water depth below the keel before you lower the transducer.

If your vessel is in dry dock, make sure that you have sufficient height between the hull and the dry dock floor. The space under the hull must be free from tools, scaffolding, personnel and other obstacles.

2 Remove the mains fuses for the hull unit.

3 Lowering the transducer

a Use a spanner to open the door on the Motor Control Unit.

WARNING

High voltages are used. This equipment must be serviced only by qualified personnel familiar with high-voltage equipment and the potential hazards involved. Failure to observe this precaution could result in bodily injury. You may be exposed to electric shock. Read and understand the applicable first aid instructions related to electric shock.

b Locate the **Motor Protecting Switch** (S301).

c Deactivate the **Motor Protecting Switch** (S301) by pressing the operating handle to *OFF*.

d Locate the hand crank inside the Motor Control Unit.

e Remove the hand crank from its storage position.

f Remove the plastic plug on the top cover of the hull unit.

g Mount the hand crank onto the stub shaft through the hole in the top cover.

h Locate the brake release screw on the motor.

i Use an 4 mm Allen key to rotate the screw clockwise until the motor brake is released.

j Turn the crank until the transducer is fully lowered.

4 Hoisting the transducer

a Turn the crank until the transducer is fully retracted.

b Loosen the brake release screw to engage the motor brake.

c Check with the hand crank to ensure that the motor brake is engaged.

d Remove the hand crank from the stub shaft, and mount it in its storage position in the Motor Control Unit.

e Activate the **Motor Protecting Switch** (S301) by pressing the operating handle to *ON*.

f Make sure that the **Hoist/Lower Switch** is set to *REMOTE*.

Note

For normal operation from the Operating Panel, the switch must be set to REMOTE.

g Close the door on the Motor Control Unit.

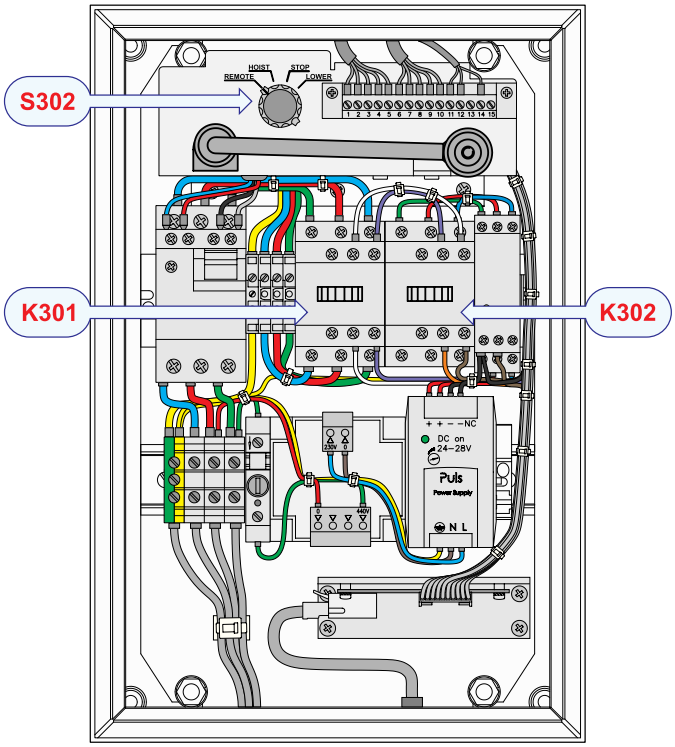
5 Insert the mains fuses for the hull unit.

Emergency lowering and hoisting using the two contactors

In case of emergency it is possible to bypass the control logic in the Motor Control Unit. You can control the hoisting motor directly using the two designated contactors.

Prerequisites

You need a suitable screwdriver or a large coin to open the Motor Control Unit cabinet. You also need a small screwdriver. 3-phase voltage for the hoisting motor is available.



Context

The two contactors are identified as K301 and K302. The **Hoisting Contactor** (K301) and the **Lowering Contactor** (K302) are located on the upper DIN rail in the Motor Control Unit.

- **Left side**: When activated, the **Hoisting Contactor** (K301) starts the motor in order to hoist the transducer.
- **Right side**: The **Lowering Contactor** (K302) starts the motor to lower the transducer.

WARNING

This operation overrides the upper and lower limit switches. The contactors must be released before the transducer reaches upper or lower position. Failure to do so may result in serious mechanical damage to the hull unit.

Procedure

1 Make sure that you have sufficient water depth below the keel before you lower the transducer.

If your vessel is in dry dock, make sure that you have sufficient height between the hull and the dry dock floor. The space under the hull must be free from tools, scaffolding, personnel and other obstacles.

2 Open the cabinet door.

WARNING

High voltages are used. This equipment must be serviced only by qualified personnel familiar with high-voltage equipment and the potential hazards involved. Failure to observe this precaution could result in bodily injury. You may be exposed to electric shock. Read and understand the applicable first aid instructions related to electric shock.

3 Locate the **Hoist/Lower Switch** (S302). Set the switch to position *STOP*.

This is for safety reasons.

4 Lowering the transducer:

a Locate the **Lowering Contactor** (K302) on the right side.

b Open the transparent plastic cover on the front of the contactor.

c Use a small screw driver, and press the spring return actuator to apply voltage to the motor.

d Lower the transducer and STOP before you reach the bottom position.

5 Hoisting the transducer:

a Locate the **Hoisting Contactor** (K301) on the left side.

b Open the transparent plastic cover on the front of the contactor.

c Use a small screw driver, and press the spring return actuator to apply voltage to the motor.

d Hoist the transducer and STOP before you reach the upper position.

6 Locate the **Hoist/Lower Switch** (S302). Set the switch to position *REMOTE*.

Note

For normal operation from the Operating Panel, the switch must be set to REMOTE.

7 Close the cabinet door.

Setting up the interfaces to peripheral devices

Topics

Installing navigation sensors and other sensors, page 192

Setting up the serial and Ethernet (LAN) port parameters, page 193

Setting up the input from a navigation system (GPS), page 195

Setting up the interface for speed log input, page 197

Setting up the interface for course gyro input, page 199

Configuring the sensor priority, page 202

Setting up the input from a motion reference unit (MRU), page 203

Setting up the CS90 system for synchronized operation, page 205

Setting up input from buoys, fish aggregating devices and other external objects, page 208

Installing navigation sensors and other sensors

For the CS90 system to use and offer correct navigational information, one or more external sensors must be connected. Typical sensors are those providing navigational information (heading, speed or geographical position). To set up the communication parameters on the serial and LAN ports, use the **I/O Setup** page. To select which sensors to install, use the **Sensor Installation** page. The **Sensor Configuration** page allows you to define a datagram priority, so that the information from the "most reliable" sensor is used by the CS90 system. You can also define manual values in case a sensor is unserviceable, or not installed.

Prerequisites

The new sensor is physically connected to the CS90 system using a serial or network cable.

Context

The **Sensor Installation** page allows your CS90 system to communicate with external sensors and systems. However, in order to communicate with each sensor, you must first set up the relevant communication parameters. Once the communication has been established and the sensor is connected, you must define the datagram priority and finalize the configuration.

Note

Just making changes and selecting **OK** *at the bottom of the page will not install anything. Select what to install, define the relevant parameters, and then select* **Add**.

Procedure

1 Open the **Setup** menu.

2 On the **Setup** menu, select **Installation**.

Observe that the **Installation** dialog box opens. This dialog box contains a number of pages selected from the menu on the left side.

3 Set up the interfaces to the navigation sensors.

a On the left side of the **Installation** dialog box, select **I/O Setup**.

b Set up the relevant serial or Ethernet (LAN) communication parameters.

c At the bottom of the page, select **Apply** to save your settings.

d On the left side of the **Installation** dialog box, select **Sensor Installation**.

e Select the type of sensor you want to interface, and define the relevant parameters.

f Select **Add** to save the new sensor interface you have defined.

g On the left side of the **Installation** dialog box, select **Sensor Configuration**.

h Define the priority of the datagrams, and set up relevant configuration parameters.

i At the bottom of the page, select **Apply** to save your settings.

4 Repeat for each sensor interface that you need to set up.

5 Continue your work in the **Installation** dialog box, or select **OK** to close it.

Setting up the serial and Ethernet (LAN) port parameters

For any sensor interface to work, the communication parameters must be set up correctly. The CS90 software automatically scans the Processor Unit to locate and identify the available communication ports. Once the software has established a list of valid interfaces, you can set up and control the communication parameters.

Prerequisites

This procedure assumes that:

- You have a vacant interface port on your Processor Unit.
- You are familiar with NMEA and other relevant datagram formats.

- You know how to set up the parameters for serial and local area network (LAN) communication.
- The relevant communication parameters required for the sensor interface are known.

Context

The **I/O Setup** page provides two lists; one for serial ports and one for Ethernet (LAN) ports. Each list is supported with a set of functions to set up and monitor the communication ports. Select the port you want to work with and then select one of the buttons below the list.

Tip

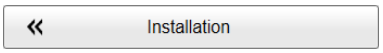
The **Sensors** *page in the* **Diagnostics** *dialog box provides an overview of all the communication lines and sensors in use. All relevant status information is provided. Open the* **Diagnostics** *dialog box from the* **Setup** *menu.*

When you work in the **Installation** dialog box, you must always select **Apply** to save the changes made on a page. You must do this before you continue working on a different page.

Procedure

1 Open the **Setup** menu.

2 On the **Setup** menu, select **Installation**.



Observe that the **Installation** dialog box opens. This dialog box contains a number of pages selected from the menu on the left side.

3 On the left side of the **Installation** dialog box, select **I/O Setup**.

4 Observe that the available serial interface ports on the Processor Unit are listed.

5 Set up the relevant serial or Ethernet (LAN) communication parameters.

a Select the interface port you want to set up.

b Select **Setup** to open the **Serial Port Setup** or **LAN Port Setup** dialog box.

c Set up the relevant serial or Ethernet (LAN) communication parameters.

The communication parameters defined for NMEA 0183 are:

- **Baud rate**: 4800 bit/s
- **Data bits**: 8
- **Parity**: Even
- **Stop bits**: 1

Some instruments may provide other parameters and/or options. You must always check the relevant technical documentation supplied by the manufacturer.

d Select **OK** to save the selected settings and close the dialog box.

6 At the bottom of the page, select **Apply** to save your settings.

7 Repeat for any other communication ports that you need to set up.

8 Continue your work in the **Installation** dialog box, or select **OK** to close it.

Setting up the input from a navigation system (GPS)

For the CS90 system to use and offer correct navigational information, one or more external sensors must be connected. Typical sensors are those providing navigational information (heading, speed or geographical position). To select which sensors to install, use the **Sensor Installation** page. Your current position is shown on the top bar if you have enabled this in the **Display Options** dialog box.

Prerequisites

This procedure assumes that:

- You have a vacant interface port on your Processor Unit.
- You are familiar with NMEA and other relevant datagram formats.
- You know how to set up the parameters for serial and local area network (LAN) communication.
- The interface port is set up with the correct communication parameters.
- The CS90 system is turned on and operates normally.
- The new sensor is physically connected to the CS90 system using a serial or network cable. The sensor is turned on and in normal operation.

Neither tools nor instruments are required.

Context

The **Sensor Installation** page allows your CS90 system to communicate with external sensors and systems. You must specify which communication port to use (LAN (Local Area Network) or serial port). You can type a custom name to identify the sensor import. In the list of valid datagram formats, select the format(s) to be accepted by the CS90 system. For each relevant sensor you must insert the offset values that define the its physical location relative to the vessel's coordinate system.

Note

Just making changes and selecting **OK** *at the bottom of the page will not install anything. Select what to install, define the relevant parameters, and then select* **Add**.

Procedure

1 Connect the navigation system to an available communication port on your computer.

This is described in the *Installation Manual*.

2 Open the **Setup** menu.

3 On the **Setup** menu, select **Installation**.

Observe that the **Installation** dialog box opens. This dialog box contains a number of pages selected from the menu on the left side.

4 On the left side of the **Installation** dialog box, select **Sensor Installation**.

5 For **Type**, select the *GPS* sensor to import information from a global positioning system.

6 Select which port you want to import the sensor information on.

7 If you want to check the communication parameters, select **Inspect Port**.

Note

*You cannot make any changes here. To change the communication parameters, use the **I/O Setup** page.*

8 If you want to check that the peripheral system is transmitting data to the CS90 system, select **Monitor**.

The **Port Monitor** dialog box provides one text box for incoming messages (**Rx Data**), and one for outgoing messages (**Tx Data**). Use these boxes and your knowledge of the data communication to investigate the datagrams. The **Port Monitor** dialog box is a tool for debugging purposes. It is neither required nor intended for normal operation of the CS90 system.

9 Type a custom name to identify the interface in other dialog boxes.

10 Select which datagram(s) you want to import from the sensor.

11 If relevant, specify a dedicated talker ID.

12 Provide the accurate physical location of the sensor (or its antenna) with reference to the vessel's coordinate system.

The position of certain sensors must be defined as an *offset* to the *Ship Origin* in the coordinate system to maximize performance. These offset values are all required to allow the CS90 system to give you as accurate information as possible. The degree of accuracy offered by the CS90 system is directly related to the accuracy of the information you enter on the **Sensor Installation** page.

a Select the offset value on the X axis (fore-and-aft direction) from the *Ship Origin*. Adjust with a positive value for X if the sensor is located ahead of the ship origin.

b Select the offset value on the Y axis (athwartship) from the *Ship Origin*. Adjust with a positive value for Y if the sensor is located on the starboard side of the ship origin.

c Select the offset value on the Z axis (vertical) from the *Ship Origin*. Adjust with a positive value for Z if the sensor is located under the ship origin.

13 Select **Add** to save the new sensor interface you have defined.

The sensor interface is added to the **Installed Sensors** list on the **Sensor Installation** page.

14 At the bottom of the dialog box, select **Apply** to save your settings.

15 Repeat for each sensor interface that you need to set up.

16 Continue your work in the **Installation** dialog box, or select **OK** to close it.

Further requirements

On the left side of the **Installation** dialog box, select **Sensor Configuration**. Define the priority of the datagrams, and set up relevant configuration parameters.

Setting up the interface for speed log input

In order to operate correctly, the CS90 system requires input from a speed log. In most cases a suitable sensor is already installed on the vessel. A global positioning system (GPS) with a compatible output format can also be used. To select which sensors to install, use the **Sensor Installation** page. The vessel speed is shown on the top bar if you have enabled this in the **Display Options** dialog box.

Prerequisites

This procedure assumes that:

- You have a vacant interface port on your Processor Unit.
- You are familiar with NMEA and other relevant datagram formats.
- You know how to set up the parameters for serial and local area network (LAN) communication.
- The interface port is set up with the correct communication parameters.
- The CS90 system is turned on and operates normally.
- The new sensor is physically connected to the CS90 system using a serial or network cable. The sensor is turned on and in normal operation.

Neither tools nor instruments are required.

Context

Note

The input from a speed log is essential for operation. Without speed information, the CS90 system will neither be able to present correct navigational information, nor compensate for vessel movements. This lack of compensation will prevent the system from providing correct echo information.

The **Sensor Installation** page allows your CS90 system to communicate with external sensors and systems. You must specify which communication port to use (LAN (Local Area Network) or serial port). You can type a custom name to identify the sensor import. In the list of valid datagram formats, select the format(s) to be accepted by the CS90 system.

Note

Just making changes and selecting **OK** *at the bottom of the page will not install anything. Select what to install, define the relevant parameters, and then select* **Add**.

Procedure

1 Connect the speed log to an available communication port on your computer.

This is described in the *Installation Manual*.

2 Open the **Setup** menu.

3 On the **Setup** menu, select **Installation**.

Observe that the **Installation** dialog box opens. This dialog box contains a number of pages selected from the menu on the left side.

4 On the left side of the **Installation** dialog box, select **Sensor Installation**.

5 For **Sensor Type**, select *Speed Log* to import information from a global positioning system.

6 Select which port you want to import the sensor information on.

7 If you want to check the communication parameters, select **Inspect Port**.

Note

You cannot make any changes here. To change the communication parameters, use the ***I/O Setup*** *page.*

8 If you want to check that the peripheral system is transmitting data to the CS90 system, select **Monitor**.

The **Port Monitor** dialog box provides one text box for incoming messages (**Rx Data**), and one for outgoing messages (**Tx Data**). Use these boxes and your

knowledge of the data communication to investigate the datagrams. The **Port Monitor** dialog box is a tool for debugging purposes. It is neither required nor intended for normal operation of the CS90 system.

9 Type a custom name to identify the interface in other dialog boxes.

10 Select which datagram(s) you want to import from the sensor.

11 If relevant, specify a dedicated talker ID.

12 Select **Add** to save the new sensor interface you have defined.

The sensor interface is added to the **Installed Sensors** list on the **Sensor Installation** page.

13 At the bottom of the dialog box, select **Apply** to save your settings.

14 Continue your work in the **Installation** dialog box, or select **OK** to close it.

Further requirements

On the left side of the **Installation** dialog box, select **Sensor Configuration**. Define the priority of the datagrams, and set up relevant configuration parameters.

Setting up the interface for course gyro input

In order to operate correctly, the CS90 system requires input from a course gyro. In most cases a suitable course gyro is already installed on the vessel. A global positioning system (GPS) with a compatible output format can also be used. To select which sensors to install, use the **Sensor Installation** page. The current heading is shown on the top bar if you have enabled this in the **Display Options** dialog box.

Prerequisites

This procedure assumes that:

- You have a vacant interface port on your Processor Unit.
- You are familiar with NMEA and other relevant datagram formats.
- You know how to set up the parameters for serial and local area network (LAN) communication.
- The interface port is set up with the correct communication parameters.
- The CS90 system is turned on and operates normally.
- The new sensor is physically connected to the CS90 system using a serial or network cable. The sensor is turned on and in normal operation.

Neither tools nor instruments are required.

Context

Note

The input from a course gyro is essential for operation. Without the input from a course gyro, the CS90 system will not be able to present correct navigational information. This lack of compensation will prevent the system from providing correct echo information.

The **Sensor Installation** page allows your CS90 system to communicate with external sensors and systems. You must specify which communication port to use (LAN (Local Area Network) or serial port). You can type a custom name to identify the sensor import. In the list of valid datagram formats, select the format(s) to be accepted by the CS90 system. For each relevant sensor you must insert the offset values that define the its physical location relative to the vessel's coordinate system.

Note

Just making changes and selecting **OK** *at the bottom of the page will not install anything. Select what to install, define the relevant parameters, and then select* **Add**.

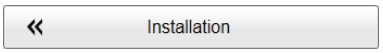
Procedure

1 Connect the gyro (or other heading sensor) to an available communication port on your computer.

This is described in the *Installation Manual*.

2 Open the **Setup** menu.

3 On the **Setup** menu, select **Installation**.



Observe that the **Installation** dialog box opens. This dialog box contains a number of pages selected from the menu on the left side.

4 On the left side of the **Installation** dialog box, select **Sensor Installation**.

5 For **Sensor Type**, select *Gyro* to import information from a global positioning system.

6 Select which port you want to import the sensor information on.

7 If you want to check the communication parameters, select **Inspect Port**.

Note

You cannot make any changes here. To change the communication parameters, use the ***I/O Setup*** *page.*

8 If you want to check that the peripheral system is transmitting data to the CS90 system, select **Monitor**.

The **Port Monitor** dialog box provides one text box for incoming messages (**Rx Data**), and one for outgoing messages (**Tx Data**). Use these boxes and your knowledge of the data communication to investigate the datagrams. The **Port Monitor** dialog box is a tool for debugging purposes. It is neither required nor intended for normal operation of the CS90 system.

9 Type a custom name to identify the interface in other dialog boxes.

10 Select which datagram(s) you want to import from the sensor.

11 If relevant, specify a dedicated talker ID.

12 Provide the accurate physical location of the sensor (or its antenna) with reference to the vessel's coordinate system.

The position of certain sensors must be defined as an *offset* to the *Ship Origin* in the coordinate system to maximize performance. These offset values are all required to allow the CS90 system to give you as accurate information as possible. The degree of accuracy offered by the CS90 system is directly related to the accuracy of the information you enter on the **Sensor Installation** page.

a Select the offset value on the X axis (fore-and-aft direction) from the *Ship Origin*. Adjust with a positive value for X if the sensor is located ahead of the ship origin.

b Select the offset value on the Y axis (athwartship) from the *Ship Origin*. Adjust with a positive value for Y if the sensor is located on the starboard side of the ship origin.

c Select the offset value on the Z axis (vertical) from the *Ship Origin*. Adjust with a positive value for Z if the sensor is located under the ship origin.

13 Select **Add** to save the new sensor interface you have defined.

The sensor interface is added to the **Installed Sensors** list on the **Sensor Installation** page.

14 At the bottom of the dialog box, select **Apply** to save your settings.

15 Continue your work in the **Installation** dialog box, or select **OK** to close it.

Further requirements

On the left side of the **Installation** dialog box, select **Sensor Configuration**. Define the priority of the datagrams, and set up relevant configuration parameters.

Configuring the sensor priority

With multiple sensors connected to the CS90 system, many of them will provide the same datagrams. We cannot expect that these datagrams provide the same information. The **Sensor Configuration** page allows you to define a datagram priority, so that the information from the "most reliable" sensor is used by the CS90 system. You can also define manual values in case a sensor is unserviceable, or not installed.

Prerequisites

This procedure assumes that:

- The new sensor is physically connected to the CS90 system using a serial or network cable.
- The interface port is set up with the correct communication parameters.
- The input from the navigation sensor is defined in the user interface. The relevant interface parameters and physical location properties for the sensor are defined.

Context

Any information in a datagram, for example, the vessel speed, may be provided in different datagrams from several sensors. Due to several reasons (environmental conditions, installation, configuration, accuracy, etc.), the numerical values provided can be different from one sensor to another. The term *datagram* has been defined as follows:

> A self-contained, independent entity of data carrying sufficient information to be routed from the source to the destination computer without reliance on earlier exchanges between this source and destination computer and the transporting network.
>
> *https://tools.ietf.org/html/rfc1594, April 2016*

Several sensor are provided on the **Sensor Configuration** page, one for each type of information. Select the sensor you wish to configure in the **Sensor** list. For each type, you can define a priority sensor by rearranging the datagrams in a list. You can also define manual values in case a sensor is unserviceable, or not installed.

Tip

The CS90 system can communicate with several different sensor types. Use the **Sensor Installation** *page to define which external sensors your CS90 system will import information from. You must also specify which datagram formats to use. Open the* **Sensor Installation** *page in the* **Installation** *dialog box.*

When you work in the **Installation** dialog box, you must always select **Apply** to save the changes made on a page. You must do this before you continue working on a different page.

Procedure

1 Open the **Setup** menu.

2 On the **Setup** menu, select **Installation**.

Observe that the **Installation** dialog box opens. This dialog box contains a number of pages selected from the menu on the left side.

3 On the left side of the **Installation** dialog box, select **Sensor Configuration**.

Observe that the **Sensor Configuration** page opens.

4 Select the sensor you wish to configure in the **Sensor** list.

5 If you wish to use the built-in datagram priority, select **Auto**.

- With **Auto** *enabled*, the priority list is used. Information is imported from the sensor at the top of the list. If the sensor fails to provide information for more than 20 seconds, data from the next sensor is used.
- With **Auto** *disabled*, the priority list is not used. Information is imported from the sensor at the top of the list. All other sensors are ignored.

Note

If you wish to control the datagram priority manually, do not select **Auto**.

6 Use the two large arrows to move the selected datagram up or down the priority list.

7 If relevant, add a manual value for the sensor input.

8 At the bottom of the dialog box, select **Apply** to save your settings.

9 Repeat for each sensor interface that you need to set up.

10 Continue your work in the **Installation** dialog box, or select **OK** to close it.

Setting up the input from a motion reference unit (MRU)

The information from a motion reference unit (MRU) (normally heave, roll and pitch information) is imported into the CS90 system to increase the accuracy of the echo data. The CS90 system is provided with a built-in motion sensor to provide electronic stabilization of the sonar beams. It is placed inside the Motor Control Unit. For improved operational accuracy, an external motion reference unit (MRU) can be used.

Prerequisites

This procedure assumes that:

- You have a vacant interface port on your Processor Unit.
- You are familiar with NMEA and other relevant datagram formats.
- You know how to set up the parameters for serial and local area network (LAN) communication.
- The interface port is set up with the correct communication parameters.

- The CS90 system is turned on and operates normally.
- The new sensor is physically connected to the CS90 system using a serial or network cable. The sensor is turned on and in normal operation.

Neither tools nor instruments are required.

Context

The motion reference unit (MRU) measures the roll and pitch movements of the vessel. Some sensor models also measure heave. The information provided by the motion sensor is used by the CS90 system to stabilize the beams.

Note

This task is only applicable is you are using an external motion reference unit on your CS90 system.

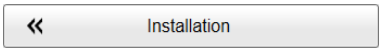
Procedure

1 Connect the motion sensor system to an available communication port on your computer.

This is described in the *Installation Manual*.

2 Open the **Setup** menu.

3 On the **Setup** menu, select **Installation**.



Observe that the **Installation** dialog box opens. This dialog box contains a number of pages selected from the menu on the left side.

Note

If you want to use a serial line to interface the motion sensor, and no COM ports are available, you must first release a port on the **I/O Setup** *page. If you choose a serial COM port to interface the motion sensor, make sure that you do not put the same COM port to other use on the* **I/O Setup** *page.*

4 Release an unused serial port (COM) port.

a On the left side of the **Installation** dialog box, select **I/O Setup**.

b Observe that the available serial interface ports on the Processor Unit are listed.

c If you have a vacant COM port, select it, then select **Remove** to delete it from the list.

d At the bottom of the page, select **Apply** to save your settings.

e Close the **Installation** dialog box.

f Restart the CS90 system.

A restart allows the Processor Unit to make the communication port available for other use.

g When the CS90 system has started, proceed to the **Motion Reference Unit** page to put the communication port to use.

5 On the left side of the **Installation** dialog box, select **Motion Reference Unit**.

6 Set up the interface.
If you select to use the LAN port, the CS90 system will automatically use the built-in motion sensor. Select **COMx** to connect to the external motion sensor. "COMx" is the serial port to which the motion sensor is connected. Select **None** to disconnect the CS90 system from both external and internal motion sensors.

a Select the Ethernet port or serial port you want to use.

b Select which protocol (datagram sentence) you want to use.

c If you are using a serial line, define the baud rate.

7 At the bottom of the dialog box, select **Apply** to save your settings.

8 Continue your work in the **Installation** dialog box, or select **OK** to close it.

Further requirements

If you choose a serial COM port to interface the motion sensor, make sure that you do not put the same COM port to other use on the **I/O Setup** page.

Note

To align an external motion sensor to the internal sensor, you may need to adjust the stabilization offset values.

Setting up the CS90 system for synchronized operation

If you want to use the CS90 system as a master or slave in a synchronized system, you must set it up for such operation. To do this, you must select which communication port to use for the synchronization interface, and you must select the requested synchronization mode.

Prerequisites

This procedure assumes that:

- The vessel is berthed or at sea.
- You have an RS2-232 interface port on your computer that allows you to use the CTS/RTS connections.

For "slave" operation, a remote system (for example *K-Sync* or *Simrad TU40*) must be available to provide trigger pulses. For "master" operation, a remote hydroacoustic

system (sonar, echo sounder) is connected. This remote system must be set up in "slave" mode.

Context

Whenever more than one hydroacoustic system is installed on a vessel, interference may occur. To avoid interference, you have these options:

- The systems are all connected to a common synchronization system.
- One of the acoustic systems is set up as "master", and controls the transmissions on the other systems.

The CS90 system offers functionality for remote transmit synchronization. It can be set up to operate in either *Master* or *Slave* mode.

Note

When you work in the **Installation** *dialog box, you must always select* **Apply** *to save the changes made on a page. You must do this before you continue working on a different page.*

Procedure

1 Connect the synchronization cable from the remote system to an available communication port on your computer.

This is described in the *Installation Manual*.

2 Turn on the CS90 system and set it to normal use.

3 Open the **Setup** menu.

4 On the **Setup** menu, select **Installation**.

Observe that the **Installation** dialog box opens. This dialog box contains a number of pages selected from the menu on the left side.

5 On the left side of the **Installation** dialog box, select **Synchronization**.

6 Select **Synchronization Mode**.

- *Stand-alone*

  This synchronization mode is used when the CS90 system is working by itself. Synchronization is turned off. It is the default setting. The CS90 system operates using the current settings for ping interval. The operation is independent of any trigger signals arriving at the synchronization port.

  The **Synchronization Delay** setting is not applicable when synchronization is switched off.

- *Master*

Master mode is used if the CS90 system shall operate as the controlling unit in a synchronized system. Any peripheral hydroacoustic system(s) are only permitted to transmit when enabled by the CS90 system. The CS90 system operates using the current settings for ping interval. It also sends trigger signals to the peripheral system(s).

This mode is unavailable if you set **Synchronization Port** to *Transceiver Auxiliary Port*.

- *Slave*

  The *Slave* mode is used if the CS90 system shall transmit only when permitted by a peripheral system. When the *Slave* mode is selected, the CS90 system will not transmit ("ping") unless an external trigger appears on the chosen synchronization port. The peripheral system may be any other hydroacoustic product (for example an echo sounder or sonar), or even a dedicated synchronization system.

7 Select **Synchronization Delay**.

This delay parameter is used differently depending on the chosen synchronization mode.

- *Stand-alone*

  The **Synchronization Delay** setting is not applicable when synchronization is switched off.

- *Master*

  In *Master* mode, the CS90 system waits for the delay time after the external trigger signal has been sent to the slaves before transmitting the ping. This is often referred to as a *pre-trigger*.

  Note

  This delay will only work when the synchronization is set up using a serial port.

- *Slave*

  In *Slave* mode, the CS90 system waits for the delay time after the external trigger signal has arrived before transmitting the ping. This is often referred to as a *post-trigger*.

8 From the list of ports available, select **Synchronization Port**.

This is the interface port currently used to transmit or receive synchronization signals. It must be an RS-232 serial port. Since the synchronization function only uses the *Request To Send (RTS)* and *Clear To Send (CTS)* signals on a serial port, you may be able to use a port that is already assigned other interface purposes. For the same reason, you do not need to define any baud rate.

9 At the bottom of the page, select **Apply** to save your settings.

10 Continue your work in the **Installation** dialog box, or select **OK** to close it.

Setting up input from buoys, fish aggregating devices and other external objects

Position information from external objects such as buoys, fish aggregating devices and other similar items can be imported into the CS90 system.

Prerequisites

This procedure assumes that:

- You have a vacant interface port on your Processor Unit.
- A suitable receiver system must be available.
- You are familiar with NMEA and other relevant datagram formats.
- You know how to set up the parameters for serial and local area network (LAN) communication.
- The interface port is set up with the correct communication parameters.
- The CS90 system is turned on and operates normally.

Context

The **Sensor Installation** page allows your CS90 system to communicate with external sensors and systems. You must specify which communication port to use (LAN (Local Area Network) or serial port). You can type a custom name to identify the sensor import. In the list of valid datagram formats, select the format(s) to be accepted by the CS90 system. For each relevant sensor you must insert the offset values that define the its physical location relative to the vessel's coordinate system.

Note

Just making changes and selecting **OK** *at the bottom of the page will not install anything. Select what to install, define the relevant parameters, and then select* **Add**.

Procedure

1 Connect the receiver to an available communication port on the Processor Unit.

This is described in the *Installation Manual*.

2 Open the **Setup** menu.

3 On the **Setup** menu, select **Installation**.

Observe that the **Installation** dialog box opens. This dialog box contains a number of pages selected from the menu on the left side.

4 On the left side of the **Installation** dialog box, select **Sensor Installation**.

5 For **Type**, select *External Objects* to import information from relevant devices.

6 Select which port you want to import the sensor information on.

7 If you want to check the communication parameters, select **Inspect Port**.

Note

*You cannot make any changes here. To change the communication parameters, use the **I/O Setup** page.*

8 If you want to check that the peripheral system is transmitting data to the CS90 system, select **Monitor**.

The **Port Monitor** dialog box provides one text box for incoming messages (**Rx Data**), and one for outgoing messages (**Tx Data**). Use these boxes and your knowledge of the data communication to investigate the datagrams. The **Port Monitor** dialog box is a tool for debugging purposes. It is neither required nor intended for normal operation of the CS90 system.

9 Type a custom name to identify the interface in other dialog boxes.

10 Select which datagram(s) you want to import from the sensor.

11 If relevant, specify a dedicated talker ID.

12 Select **Add** to save the new sensor interface you have defined.

The sensor interface is added to the **Installed Sensors** list on the **Sensor Installation** page.

13 At the bottom of the dialog box, select **Apply** to save your settings.

14 Continue your work in the **Installation** dialog box, or select **OK** to close it.

Further requirements

On the left side of the **Installation** dialog box, select **Sensor Configuration**. Define the priority of the datagrams, and set up relevant configuration parameters.

Inserting the installation parameters

Topics

Correct installation parameters are crucial for sonar operation, page 210

Inserting the ship origin and dimensions, page 211

Inserting the installation parameters for the transducer, page 213

Inserting the installation parameters for the motion reference unit (MRU), page 216

Adjusting the built-in motion sensor offset, page 219

Adjusting the stabilization offsets for the external motion sensor, page 222

Correct installation parameters are crucial for sonar operation

The quality and accuracy of the CS90 presentations depend on the hull unit being correctly installed, and that all necessary parameters related to this installation have been entered into the software

Ship origin / Ship dimensions

When you have several different sensors and transducers on your vessel, and you wish each of them to provide accurate data, you need to know their relative physical positions. To do this, you must establish one or more common reference points. This reference point is also used to position the sonar echoes relative to the ship symbol on the display presentation.

Use the **Ship** page to define a specific reference point (*Ship Origin* or *origo*) for the various sensors connected to the CS90 system. Do this as accurately as possible. This information is used to create a new origin in the vessel coordinate system.

Transducer

When the installation trunk is mounted, it may not be positioned with the mounting holes perfectly aligned to the centre line of the vessel. When the hull unit is placed on the trunk, the "forward" mark on the transducer shaft sleeve - and thus also "forward" on the transducer - may not point forward at all, but several degrees off the centre line. To obtain accurate echo presentations, this misalignment must be adjusted by changing the installation parameters.

Note

Providing the correct value for this rotation is crucial for the sonar performance. An inaccurate or incorrect value will cause the sonar echoes to be presented at the wrong bearing.

Use the **Transducer** page to define the physical location of the transducer in the vessel coordinate system, as well as the installation angles (rotation). Do this as accurately as possible.

Motion sensor

The physical rotation of the motion reference unit (MRU) relative to the transducer is required to allow the CS90 system to adjust for roll and pitch as accurately as possible.

Note

Correct values for motion sensor rotation are critical for the sonar performance.

Use the **MRU** (Motion Reference Unit) page to insert the physical location and rotation of the motion reference sensor (MRU) with reference to the vessel coordinate system.

The **Installation Parameters** pages allow you to define the relationship between the physical locations of the various sensors and the transducer. All relevant system units and sensors must be defined with their physical offset values in relation to the defined *Ship Origin* in the vessel's coordinate system. You will only need to define these installation parameters once. These pages are located in the **Installation** dialog box.

Inserting the ship origin and dimensions

When you have several different sensors and transducers on your vessel, and you wish each of them to provide accurate data, you need to know their relative physical positions. To do this, you must establish one or more common reference points. This reference point is also used to position the sonar echoes relative to the ship symbol on the display presentation.

Prerequisites

The CS90 system has been set up with its hardware units connected as specified in the *Installation Manual*.

- The CS90 system is turned on and operates normally.
- The CS90 system is in *Normal* mode, but **TX Power** is set to *Off* to prevent transmissions.
- The vessel is berthed or at sea.
- Neither tools nor instruments are required.

For accurate ship dimensions you need the detailed vessel drawings.

Context

Use the **Ship** page with the ship's physical dimensions to create a virtual reference point (the *Ship Origin*) in a dedicated coordinate system for the CS90 system. The *Ship Origin* is normally located in the following position:

- **X position**: Half the ship's length
- **Y position**: Half the ship's width
- **Z position**: On the waterline

If you want to change the location of the *Ship Origin*, you can do this by providing offset values in the X, Y and/or Z directions. To do this you will need the ship drawings.

Tip

It is common practice to place the Ship Origin at the same position as the motion reference unit (MRU). This will minimize the vectors when your vessel is moving. Use the vessel drawings to establish the offset values between the basic position of the Ship Origin and the MRU location.

If you do not have a motion sensor you can place the Ship Origin at any location on the vessel. We suggest that you place the origin under the captain's seat on the bridge. All sensors will then be referenced to this position. Whenever a sonar is used with short ranges, this will provide a more precise presentation.

Procedure

1 Open the **Setup** menu.

2 On the **Setup** menu, select **Installation**.

Observe that the **Installation** dialog box opens. This dialog box contains a number of pages selected from the menu on the left side.

3 On the left side of the **Installation** dialog box, select the small white triangle next to **Installation Parameters**.

Observe that a menu opens with access to all the individual pages.

4 Open the **Ship** page.

5 Insert the physical dimensions of your vessel (length and width).

Do this as accurately as possible. This information is used to create a new origin in the vessel coordinate system.

6 Offset:

a If you want to keep the default reference point (*origin*), leave all offset values to 0 (zero).

b If you want to move the reference point to another location, use the necessary offset values.

To find these offset values, consult the vessel drawings. Do this as accurately as possible.

7 At the bottom of the page, select **Apply** to save your settings.

8 Continue your work in the **Installation** dialog box, or select **OK** to close it.

Result

A common reference point for the sensors and transducer has now been established.

Further requirements

You must proceed by defining the locations of the navigation system antenna, the motion reference sensor, and the transducer. These locations are all referenced to the same reference point.

Inserting the installation parameters for the transducer

When the installation trunk is mounted, it may not be positioned with the mounting holes perfectly aligned to the centre line of the vessel. When the hull unit is placed on the trunk, the "forward" mark on the transducer shaft sleeve - and thus also "forward" on the transducer - may not point forward at all, but several degrees off the centre line. To obtain accurate echo presentations, this misalignment must be adjusted by changing the installation parameters. Providing the correct value for this rotation is crucial for the sonar performance. An inaccurate or incorrect value will cause the sonar echoes to be presented at the wrong bearing.

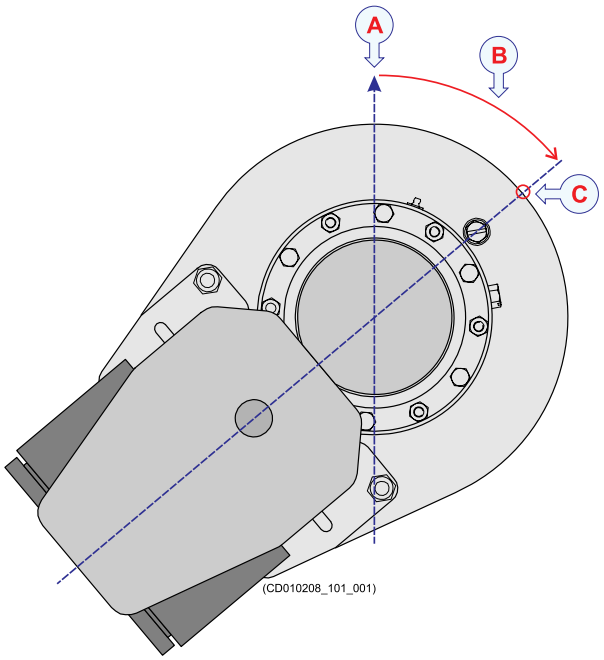
Prerequisites

*Illustration **CS90**:*

A *Bow*

B *This is the alignment angle (±180°)*

C *0° transducer mark*



The CS90 system has been set up with its hardware units connected as specified in the *Installation Manual*.

- The CS90 system is turned on and operates normally.
- The CS90 system is in *Normal* mode, but **TX Power** is set to *Off* to prevent transmissions.
- The vessel is berthed or at sea.
- Neither tools nor instruments are required.

For accurate location of the transducer, you need the detailed vessel drawings. You also need the installation angles that were recorded when the transducer was installed.

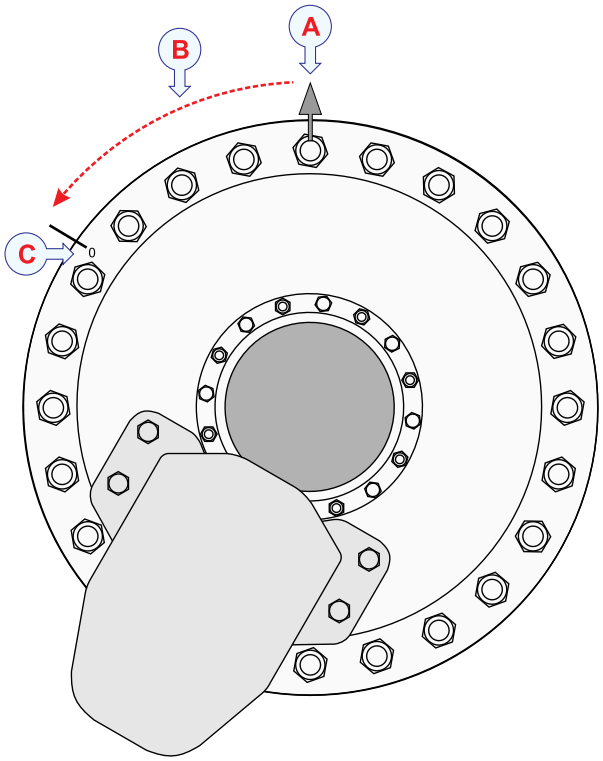
Context

*Illustrations **CS94**:*

A *Bow*

B *This is the alignment angle (±180°)*

C *0° transducer mark*



As a general recommendation, the hull unit shall be oriented with the hoisting motor pointing aft. If this orientation makes it difficult to access electrical connections, the hull unit may be rotated during its installation to the most suitable direction. Independent of the hull unit orientation, the alignment is always defined as:

The angle measured from the bow to the 0° transducer mark.

The 0° transducer mark is located outermost on the mounting flange, and it is marked as a red "0". Depending on the transducer mounting, it can be located at any angle on the mounting flange, not necessarily as shown in the illustration.

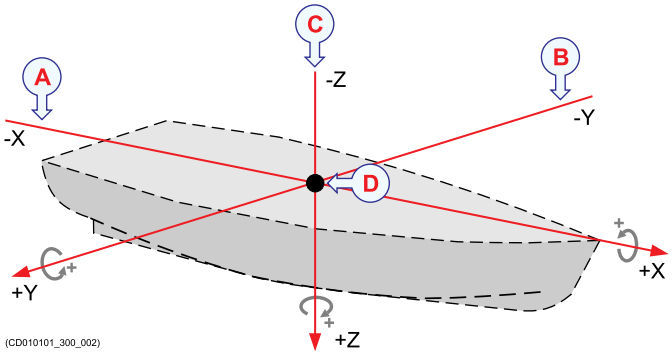
On the **Transducer** page, define this angle as rotation around **Z**.

- If the 0° transducer mark points to the starboard (right) side of the vessel's centre line, insert the alignment as a number between 0 and +180 degrees.
- If the 0° transducer mark points to the port (left) side of the vessel's centre line (as shown in the illustration), insert the alignment as a number between 0 and –180 degrees.

Illustration:

A *Rotation around the x-axis: In the positive horizontal direction (forward), a positive rotation is clockwise.*

B *Rotation around the y-axis: In the positive horizontal direction (starboard), a positive rotation is clockwise.*



C *Rotation around the z-axis: In the positive vertical direction (down), a positive rotation is clockwise.*

D *Reference point (Ship Origin)*

Procedure

1 Open the **Setup** menu.

2 On the **Setup** menu, select **Installation**.

Observe that the **Installation** dialog box opens. This dialog box contains a number of pages selected from the menu on the left side.

3 On the left side of the **Installation** dialog box, select the small white triangle next to **Installation Parameters**.

Observe that a menu opens with access to all the individual pages.

4 Select **Transducer** to open the page.

5 Insert the relevant offset values.

Do this as accurately as possible.

a **X Offset**: Insert the horizontal distance on the x-axis (fore-and-aft direction) between the transducer and the *Ship Origin*.

b **Y Offset**: Insert the horizontal distance on the y-axis (athwartship direction) between the transducer and the *Ship Origin*.

c **Z Offset**: Insert the vertical distance on the Z axis between the transducer and the *Ship Origin*.

6 Obtain the rotation (angle) information from the personnel that installed the hull unit.

Insert the values. Do this as accurately as possible.

a **Rotation Around X**: Specify an angle (in degrees) to compensate for any deviation from the X axis (fore-and-aft direction) in the vessel coordinate system. If the transducer is properly installed without unintentional skew, this angle can be set to 0 degrees.

b **Rotation Around Y**: Specify an angle (in degrees) to compensate for any deviation from the Y axis (athwartship direction) in the vessel coordinate system. If the transducer is properly installed without unintentional skew, this angle can be set to 0 degrees.

c **Rotation Around Z**: Specify an angle (in degrees) to compensate for any deviation from the Z axis (vertical direction) in the vessel coordinate system. This is the alignment angle.

- If the 0° transducer mark points to the starboard (right) side of the vessel's centre line, insert the alignment as a number between 0 and +180 degrees.
- If the 0° transducer mark points to the port (left) side of the vessel's centre line (as shown in the illustration), insert the alignment as a number between 0 and –180 degrees.

Examples:

- If the alignment angle is 295 degrees, insert -65 degrees.
- If the alignment angle is 15 degrees, insert 15 degrees.

7 At the bottom of the page, select **Apply** to save your settings.

8 Continue your work in the **Installation** dialog box, or select **OK** to close it.

Inserting the installation parameters for the motion reference unit (MRU)

The physical rotation of the motion reference unit (MRU) relative to the transducer is required to allow the CS90 system to adjust for roll and pitch as accurately as possible. This task is only applicable is you are using an external motion reference unit on your CS90 system. Correct values for motion sensor rotation are critical for the sonar performance.

Prerequisites

The CS90 system has been set up with its hardware units connected as specified in the *Installation Manual*.

- The CS90 system is turned on and operates normally.
- The CS90 system is in *Normal* mode, but **TX Power** is set to *Off* to prevent transmissions.
- The vessel is berthed or at sea.
- Neither tools nor instruments are required.

The relevant offset values can normally be taken from the vessel drawings.

Context

The CS90 system is provided with a built-in motion sensor to provide electronic stabilization of the sonar beams. It is placed inside the Motor Control Unit. The motion sensor measures the roll and pitch movements of the vessel.

Note

If you want to use the built-in motion sensor, you do not need to enter any offset values.

If the hull unit has been installed with the Motor Control Unit pointing straight aft, you do not need to enter any rotation values. If the unit faces in any other direction you must compensate for this by typing the relevant value for **Rotation Around Z***.*

For improved operational accuracy, an external motion reference unit (MRU) can be used.

Offsets

The offset values specify the physical location of the motion reference unit relative to the reference point (origin). The relevant offset values can normally be taken from the vessel drawings.

Rotation

The values for rotation around the X, Y and Z axis are used to compensate for any misalignments made during the physical installation of the motion reference unit. Such misalignments occur if the sensor is not placed in parallel with the vessel's horizontal and/or vertical planes. We strongly recommend that you install your motion reference unit so that all rotation angles can be set to 0 (zero).

The required accuracy of the offset and rotation angles depends on the accuracy requirements for the echo data.

Note

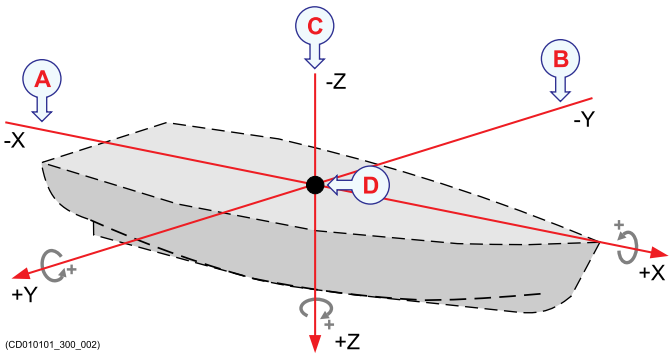
Correct values for motion sensor rotation are critical for the sonar performance.

The motion sensor offset values (its physical location relative to the vessels' coordinate system) are not important for sonar operation.

The Kongsberg Seapath® - and other GPS systems - allow you to define the MRU location in the positioning system. If this is done, the MRU offset values in the CS90 system must be set to 0 (zero) to avoid "dual compensation". The rotation angles are normally not recorded by the positioning system. These can either be inserted into the MRU control application, or into the CS90 system. Make sure that you do not insert them both places.

A *Rotation around the x-axis: In the positive horizontal direction (forward), a positive rotation is clockwise.*

B *Rotation around the y-axis: In the positive horizontal direction (starboard), a positive rotation is clockwise.*



C *Rotation around the z-axis: In the positive vertical direction (down), a positive rotation is clockwise.*

D *Reference point (Ship Origin)*

Procedure

1 Open the **Setup** menu.

2 On the **Setup** menu, select **Installation**.

Observe that the **Installation** dialog box opens. This dialog box contains a number of pages selected from the menu on the left side.

3 On the left side of the **Installation** dialog box, select the small white triangle next to **Installation Parameters**.

Observe that a menu opens with access to all the individual pages.

4 Select **MRU** to open the page.

5 From the vessel drawings, extract the relevant offset information, and insert those values.

Do this as accurately as possible.

Note

The Kongsberg Seapath® - and other GPS systems - allow you to define the MRU location in the positioning system. If this is done, the MRU offset values in the CS90 system must be set to 0 (zero) to avoid "dual compensation". The rotation angles are normally not recorded by the positioning system. These can either be inserted into the MRU control application, or into the CS90 system. Make sure that you do not insert them both places.

6 From the information provided by the personnel installing the motion sensor, obtain the relevant rotation information. Insert the values.

Do this as accurately as possible.

7 At the bottom of the page, select **Apply** to save your settings.

8 Continue your work in the **Installation** dialog box, or select **OK** to close it.

Adjusting the built-in motion sensor offset

The information from a motion reference unit (MRU) (normally heave, roll and pitch information) is imported into the CS90 system to increase the accuracy of the echo data. The CS90 system is provided with a built-in motion sensor to provide electronic stabilization of the sonar beams. It is placed inside the Motor Control Unit.

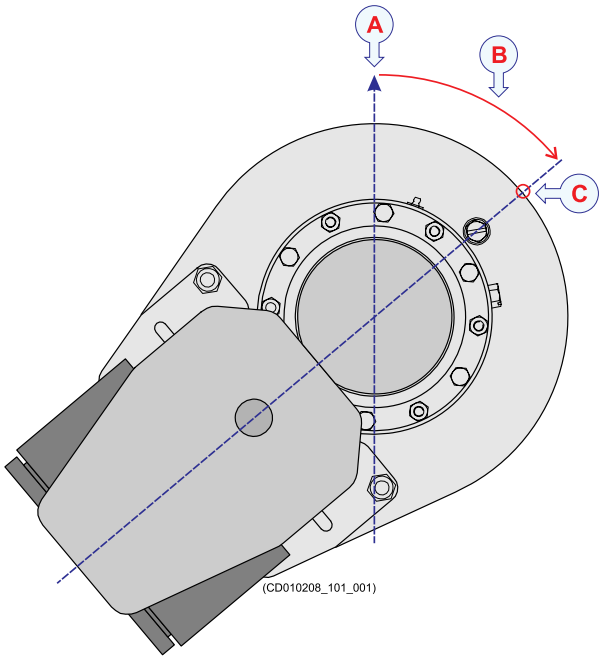
Prerequisites

***CS90**:*

A *Bow*

B *This is the alignment angle (±180°)*

C *0° transducer mark*



The CS90 system has been set up with its hardware units connected as specified in the *Installation Manual*.

- The CS90 system is turned on and operates normally.
- The CS90 system is in *Normal* mode, but **TX Power** is set to *Off* to prevent transmissions.
- The vessel is berthed or at sea.
- Neither tools nor instruments are required.

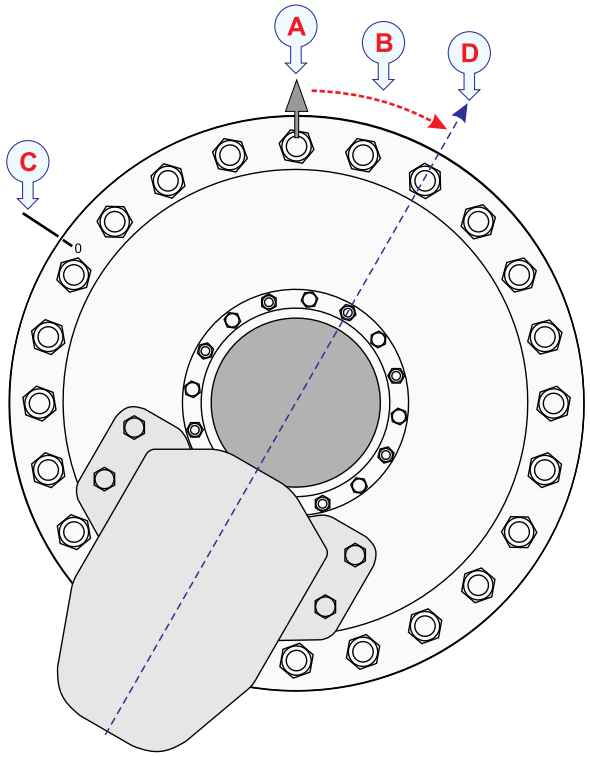
CS94:

A *Bow*

B *This is the alignment angle: (±180°)*

C *0° transducer mark*

D *0° motion sensor reference*



Context

As a general recommendation, the hull unit shall be oriented with the hoisting motor pointing aft. If this orientation makes it difficult to access electrical connections, the hull unit may be rotated during its installation to the most suitable direction. The 0° reference for the built-in sensor is always related to the gantry. If the hoist/lower motor *does not* point aft (on or parallel to the vessel's centre line) the built-in motion sensor offset must be defined. Independent of the hull unit orientation, the offset of the built-in motion sensor is always defined as:

The angle measured from the bow to the motion sensor's 0° reference.

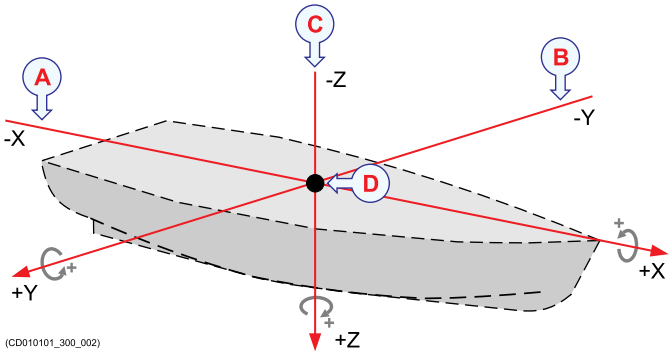
On the **MRU** page, define the offset as rotation around **Z**.

- If the 0° reference mark for the built-in motion sensor points to the starboard (right) side of the vessel's centre line (as shown in the illustration), insert the offset as a number between 0 and +180 degrees.
- If the 0° reference mark points to the port (left) side of the vessel's centre line, insert the offset as a number between 0 and –180 degrees.

Illustration:

A *Rotation around the x-axis: In the positive horizontal direction (forward), a positive rotation is clockwise.*

B *Rotation around the y-axis: In the positive horizontal direction (starboard), a positive rotation is clockwise.*



C *Rotation around the z-axis: In the positive vertical direction (down), a positive rotation is clockwise.*

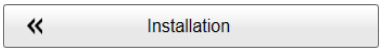
D *Reference point (Ship Origin)*

Procedure

1 Estimate the alignment angle from the bow (vessel's centre line) to the 0° reference mark for the built-in motion sensor.

Do this as accurately as possible.

2 On the **Setup** menu, select **Installation**.



Observe that the **Installation** dialog box opens. This dialog box contains a number of pages selected from the menu on the left side.

3 On the left side of the **Installation** dialog box, select the small white triangle next to **Installation Parameters**.

Observe that a menu opens with access to all the individual pages.

4 Select **MRU** to open the page.

5 Insert the alignment offset angle as a rotation around **Z**.

- If the 0° reference mark for the built-in motion sensor points to the starboard (right) side of the vessel's centre line (as shown in the illustration), insert the offset as a number between 0 and +180 degrees.
- If the 0° reference mark points to the port (left) side of the vessel's centre line, insert the offset as a number between 0 and –180 degrees.

6 At the bottom of the page, select **Apply** to save your settings.

7 Continue your work in the **Installation** dialog box, or select **OK** to close it.

Adjusting the stabilization offsets for the external motion sensor

The CS90 system is provided with a built-in motion sensor to provide electronic stabilization of the sonar beams. It is placed inside the Motor Control Unit. For improved operational accuracy, an external motion reference unit (MRU) can be used. It is very important that the motion sensor is set correctly with stabilization offset values that are adapted to the physical installation angles of the hull unit. To align an external motion sensor to the internal sensor, you may need to adjust the stabilization offset values. This task is only applicable is you are using an external motion reference unit on your CS90 system.

Prerequisites

Note

Before you do this task, you must adjust the installation offset of the motion sensor.

The CS90 system has been set up with its hardware units connected as specified in the *Installation Manual*.

- The external motion sensor is connected to the CS90 system.
- The CS90 system is turned on and operates normally.
- The vessel is berthed.

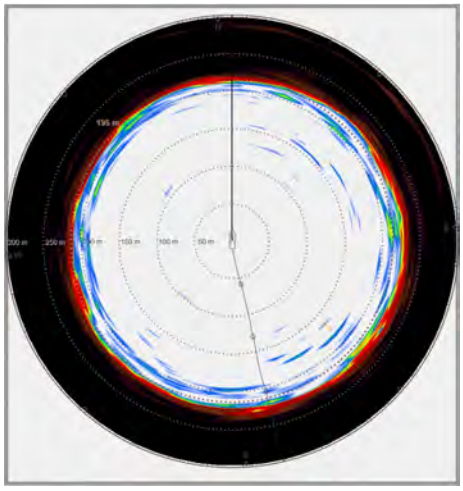
Note

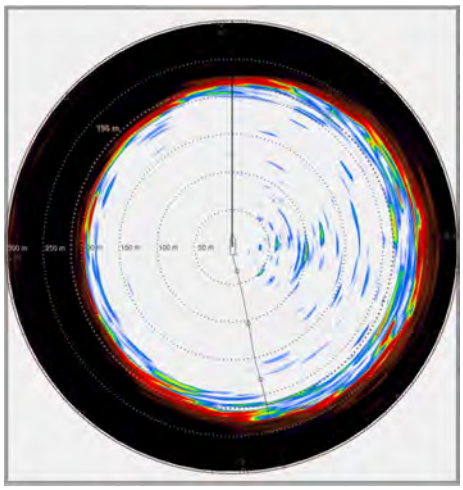
We recommend that you do this task in calm sea without any vessel movements.

Context

It is very important that the motion sensor is set correctly with stabilization offset values that are adapted to the physical installation angles of the hull unit. Even a small offset error can give you very inccurate readings. In many cases a suitable motion sensor is already installed. This sensor may be mounted anywhere on the vessel. Because of this, the risk of stabilization offset misalignment is present.

The two screen captures below illustrate how the CS90 system can provide inaccurate data if the stabilization offset is misaligned. In both examples, the tilt is set to approximately 24 degrees, and you are looking at the echoes from a flat bottom at a very short range. The first example is made without any offset errors, and the echoes from the bottom are evenly distributed in the circle. On the second screen capture, a 3 degrees roll offset error causes the echoes to be "distorted". This error will of course be more visible on longer ranges.





Note

Do not confuse stabilization offset with installation offset. The installation offset values describe the physical location and orientation of an item, and how this location is related to the vessel's coordinate system. The stabilization offset values describe any misalignments related to the measurements a sensor make.

Procedure

1 Select a very short range.

2 Disable the input from the external motion sensor.

   a On the **Setup** menu, select **Installation**.

   b On the left side of the **Installation** dialog box, select **Motion Reference Unit**.

   c Set **Port** to *LAN* to use the internal motion sensor.

   d Set **Protocol** to *EM3000* to match the data format provided by the internal motion sensor.

e Select **Apply** and then **OK** to save all the parameters and close the **Installation** dialog box.

3 Open the **Display** menu.

a Select **Display Options**.

b Select **General** to open the page.

c In the **Top Bar** list, enable **Roll** and **Pitch**.

d On the top bar, read the roll and pitch values.

e Write down the values.

f Select **OK** to save the selected settings and close the dialog box.

4 Enable the input from the external motion sensor.

a On the **Setup** menu, select **Installation**.

b On the left side of the **Installation** dialog box, select **Motion Reference Unit**.

c Select the serial port you want to use.

d Select which protocol (datagram sentence) you want to use.

e Select the baud rate.

f Select **Apply** and then **OK** to save all the parameters and close the **Installation** dialog box.

5 Compare the information from the external motion sensor with the information from the internal sensor.

6 If necessary: Adjust the stabilization offsets.

a Open the **Setup** menu.

b Open the **Stabilization** function.

c Adjust the **Roll Offset** and **Pitch Offset** settings.

Select [—] on the left side to decrease the value, or select [+] on the right side to increase.

Installing and maintaining software

Topics

Installing a new version of the operating software, page 225
Removing the operating software, page 226
Updating the online help system, page 228
Adding online help in a new language, page 229
Obtaining and installing a software license for additional functionality, page 231
Setting up the Operating Panel (Mk2), page 232
Using more than one Operating Panel to control the sonar (Mk2), page 235
Using a single Operating Panel to control more than one sonar (Mk2), page 239
Updating the Operating Panel support applications (Mk2), page 243
Updating the firmware on the Operating Panel (Mk2), page 244

Installing a new version of the operating software

A dedicated wizard is used to install the software. The operating software for the CS90 system must be downloaded on a separate computer.

Prerequisites

The following specific items are required for this task:

- Personal computer
- USB flash drive
- Computer mouse (Optional)
- Computer keyboard (Optional)

Neither tools nor instruments are required. This procedure is made for the Microsoft® Windows® 10 operating system. It is assumed that you are familiar with this operating system.

Note

The software release note may contain additional details related to the software installation.

Procedure

1 On the personal computer:

a Download the new software version.

b Unpack the ZIP file to access the executable application file.

c Copy the application file to a USB flash drive.

2 Turn on the Processor Unit.

3 Make the following preparations.

a If applicable: Connect the keyboard and the mouse to USB sockets on the Processor Unit.

b Insert the USB flash drive.

4 Install the new version of the application.

a From the Windows® **Start** button, right-click to open File Explorer.

b Locate the executable setup file (`.exe`).

c Copy the file to a temporary folder on the "D" drive.

d Double-click the setup executable file to start the installation.

e Select the check box to accept the license terms and conditions.

f Select **Install**.

g Follow the instructions provided by the wizard.

We recommend that you install the software in the default folder suggested by the wizard.

h Close File Explorer.

i Remove the USB flash drive.

5 On the Processor Unit desktop, double-click the CS90 icon to start the program.

6 If applicable: Disconnect the keyboard and the mouse from the Processor Unit.

Removing the operating software

If you wish to replace your Processor Unit with a new model, or simply do not wish to use the CS90 system any longer, you can remove the software. Software removal may also be required during an upgrade.

Prerequisites

The following items may be useful:

- Computer mouse
- Computer keyboard

Neither tools nor instruments are required. This procedure is made for the Microsoft® Windows® 10 operating system. It is assumed that you are familiar with this operating system.

Note

The software release note may contain additional details related to the software removal.

Context

Removal of the software is done using functionality provided by the operating system.

Procedure

1 Turn on the Processor Unit.

2 Select **Power off** to turn off the system.

3 In the **Power Off** dialog box, select **Exit to Operating System** to close the CS90 program.

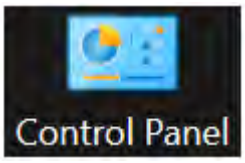
4 If applicable: Connect the keyboard and the mouse to USB sockets on the Processor Unit.

5 Uninstall the application.

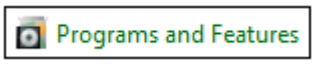
   a If applicable: Open the on-screen keyboard.

   b In the bottom left corner of your desktop, select the looking glass to start a search.

   c Type `Control Panel` to locate the application, then open it.



   d Select **Programs and Features**.



   e On the list provided, locate the software you shall uninstall.

   f Select it, then select **Uninstall**.

   g Observe the **Remove existing settings** dialog box.

   h Do not select any check boxes!

   i Select **Uninstall** in the dialog box to remove the software.

   j Follow the instructions provided by the wizard.

6 Click the [**X**] in the top right corner to close the Control Panel.

7 If applicable: Disconnect the keyboard and the mouse from the Processor Unit.

Updating the online help system

Installed on your CS90 system you will find a comprehensive context-sensitive online help system. The help system is updated periodically. You can then update your CS90 system with the new online help.

Prerequisites

In order to update the online help system, you need a USB flash drive. Your computer must have a suitable utility to unpack ZIP files. We recommend that you connect a computer keyboard to your Processor Unit.

It is assumed that you are familiar with the Microsoft® operating system utilities for file handling.

Context

The context-sensitive online help is provided using a *WebHelp* installation using HTML format. It uses the default web browser on the computer. The help system comprises a large number of files.

Language codes = Folder names		
da = Danish	is = Icelandic	sv = Swedish
de = German	it = Italian	tr = Turkish
el = Greek	ja = Japanese	vi = Vietnamese
en = English	ko = Korean	zh-CHT = Chinese
es = Spanish	no = Norwegian	zh-CN = Chinese (Simplified)
fr = French	pl = Polish	
id = Indonesian	ru = Russian	

Procedure

1 Obtain the new help file.

   a Download the help file from our website to a local computer.

      • www.kongsberg.com/cs90

   b Unpack the ZIP file, and place all the files in a folder named `HTML`.

   c Copy the `HTML` folder to a USB flash drive.

2 Turn on the CS90 system.

3 Open a file manager utility.

   a On the computer keyboard, press ⊞ **Win+E** to open the file manager.

   or:

   a Select **Power Off** on the top bar.

b In the **Power Off** dialog box, select **Exit to Operating System** to close the CS90 program.

c From the Windows® **Start** button, right-click to open File Explorer.

4 Navigate to the folder with the on-line help files.

`c:\ProgramData\Simrad\CS90\Help`

Observe that the folder contains one sub-folder for each language. Examples are "en" for English, "es" for Spanish and "de" for German. Language folders may be missing.

5 Update the existing help file.

a Open the relevant language folder.

b Rename the existing `HTML` folder to `HTML_Old`.

c Copy the entire `HTML` folder from the USB flash drive to the language folder.

6 Close File Explorer.

7 Restart the CS90 system.

Adding online help in a new language

Installed on your CS90 system you will find a comprehensive context-sensitive online help system. The help system may be provided in a new language. You can then update your CS90 system with the new online help.

Prerequisites

The following items are required:

- USB flash drive
- Computer mouse
- Computer keyboard

In order to update the online help system, you need a USB flash drive. Your computer must have a suitable utility to unpack ZIP files. We recommend that you connect a computer keyboard to your Processor Unit.

It is assumed that you are familiar with the Microsoft® operating system utilities for file handling.

Context

The context-sensitive online help is provided using a *WebHelp* installation using HTML format. The help system comprises a large number of files.

Language codes = Folder names		
da = Danish	is = Icelandic	sv = Swedish
de = German	it = Italian	tr = Turkish

Language codes = Folder names		
el = Greek	ja = Japanese	vi = Vietnamese
en = English	ko = Korean	zh-CHT = Chinese
es = Spanish	no = Norwegian	zh-CN = Chinese (Simplified)
fr = French	pl = Polish	
id = Indonesian	ru = Russian	

Procedure

1 Obtain the new help file.

   a Download the help file from our website to a local computer.

      • www.kongsberg.com/cs90

   b Unpack the ZIP file, and place all the files in a folder named `HTML`.

   c Copy the `HTML` folder to a USB flash drive.

2 Turn on the CS90 system.

3 Close the CS90 program.

4 Open a file manager utility.

   a On the computer keyboard, press ⊞ **Win+E** to open the file manager.

   or:

   b From the Windows® **Start** button, right-click to open File Explorer.

5 Navigate to the folder with the on-line help files.

   `c:\ProgramData\Simrad\CS90\Help`

   Observe that the folder contains one sub-folder for each language. Examples are "en" for English, "es" for Spanish and "de" for German. Language folders may be missing. In such cases, the on-line help is provided in English.

6 Add the new help file.

   a Create a folder for the new language.

      Make sure that you use the correct folder name. We use the language codes defined by ISO 639-1.

   b Copy the entire `HTML` folder from the USB flash drive to the language folder.

7 Close the file manager utility.

8 Restart the CS90 system.

Obtaining and installing a software license for additional functionality

The CS90 system does not need any software licenses to operate. However, specific software license codes "unlocks" additional functionality.

Context

The software license is a 32 character hexadecimal string based on the hardware identifier (**Hardware ID**). This unique identifier is generated using information from key components in the Processor Unit. The software license is linked to the physical Processor Unit. You cannot move the CS90 system software from one Processor Unit to another unless you also request and install a new license.

In order to obtain a software license you must contact one of our dealers or distributors. You can also use the request form on our website, or contact our support department directly.

Note

Once you receive your software license string(s), do not lose them. We suggest that you copy the information into a text file (for example Notepad), and add relevant information. Place the text file on the computer desktop, and make sure that backup copies are made.

When you work in the **Installation** dialog box, you must always select **Apply** to save the changes made on a page. You must do this before you continue working on a different page.

The following licensing option is available for the CS90 system:

NetCDF

The CS90 system supports netCDF4, where the number refers to the version of the format. SONAR-NetCDF4 is a data and metadata convention for storage of data from active sonars in NetCDF4 formatted files, defined by The International Council for the Exploration of the Sea (ICES). Sonar-NetCDF4 consists primarily of a naming convention and a data structure within the NetDCF4 data model.

Procedure

1 On the **Setup** menu, select **Installation**.

Observe that the **Installation** dialog box opens. This dialog box contains a number of pages selected from the menu on the left side.

2 On the left side of the **Installation** dialog box, select **Software License**.

Observe that the **Software License** page opens.

3 Obtain the necessary information about your CS90 system:

- Hardware ID

4 Send the information to one of our dealers or distributors.

You can also use the request form on our website, or contact our support department directly. You can use the following e-mail address:

- purchase.order@simrad.com

Once the software license string(s) have been returned to you (most likely by e-mail), you can install the licenses into the software.

5 Open the **Software License** page.

6 Select **Type License String**, and type the license string into the dialog box.

If you do not have a computer keyboard connected to your CS90 system, select the **Keyboard** button to open an on-screen keyboard. If you have received the license string on an electronic format (e-mail or text file), you can copy the string from the source document and paste it into the **Type License String** dialog box.

7 Select **OK** to save the license string and close the **Type License String** dialog box.

8 Verify that the license string is placed in the **Currently active licenses** list.

If necessary, select the license string on the left side, and click the arrow button [>] to move it to the **Currently active licenses** list.

9 Select **Apply** and then **Close** to save all the parameters and close the **Installation** dialog box.

Setting up the Operating Panel (Mk2)

The Operating Panel offers all necessary control functions for normal operation. Before it can be put to use, the Mk2 Operating Panel must be configured to permit Ethernet communication between the panel and the Processor Unit.

Prerequisites

The Operating Panel is installed as specified in the *Installation manual*. The Processor Unit is turned on. The following specific items are required for this task:

- Computer mouse
- Computer keyboard

Neither tools nor instruments are required.

Context

When supplied, the Operating Panel is set up with the following communication parameters:

- IP Address: 157.237.60.20
- Subnet mask: 255.255.255.0
- Gateway: 157.237.60.1

To set up the Ethernet communication, you must define the IP address for the panel, and identify the Processor Unit in the panel software. These settings allow you to use more than one Operating Panel on the Processor Unit. You can also control more than one Processor Unit from a single Operating Panel.

The IP and MAC addresses for your Processor Unit are contained in a text file named `IPandMACaddress.txt`. The file contains the product name, IP address and MAC address in the following format (example):

```
CS90
157.237.60.14
AC:1F:6B:1D:42:E6
```

If the text file is missing you must find the information manually. We suggest that you do this, and create the necessary folder and txt file before you start the setup process. See step 1 in the procedure.

Note

If the Operating Panel fails to establish contact with the Processor Unit it will time out and switch itself off after two minutes. When this happens the blue indicator light stops flashing.

Procedure

If required, locate the IP and MAC addresses on the ETH1 Ethernet adapter in the Processor Unit.

1 Obtain the IP address.
The IP and MAC addresses for your Processor Unit are contained in a text file named `IPandMACaddress.txt`. If the text file is missing you must find the information manually.

   a In the bottom-left corner of your desktop, select the Windows® **Start** button.

   b On the menu, select **Settings**.

   c Observe that the **Windows Settings** dialog box opens.

   d Select **Network & Internet**.

   e Select **Change adapter options**.

   f Select the relevant network adapter, then right-click and select **Properties** on the short-cut menu.

   g On the list of connections, select **Internet Protocol 4 (TCP/IPv4)**, and then **Properties**.

   h Observe the IP address for the Ethernet adapter.

   i Write down the information.

   j Close all the dialog boxes.

   Obtain the MAC address.

a In the bottom left corner of your desktop, select the looking glass to start a search.

b Type "Command", do the search, and open the **Command Prompt** window.

c Type **ipconfig /all** and press the **Enter** key.

d Observe the "Physical Address" (MAC address) for the relevant Ethernet adapter.

e Write down the information.

f Close the **Command Prompt** window.

Select the adapter that the Operating Panel is connected to. On the CS90 system, the Ethernet adapter is named Simrad Connect.

Prepare the Operating Panel for use.

2 Make the following preparations.

a Connect the power cable from the Operating Panel to the power outlet on the uninterruptible power supply (UPS).

b Connect the Ethernet cable from the Processor Unit to the Operating Panel. Make sure that you use the correct Ethernet socket on the rear side of the Processor Unit: ETH1

c Connect the keyboard and the mouse to USB sockets on the Processor Unit.

d On the Processor Unit, close any programs that are running, and return to the desktop.

e On the Operating Panel, press **Power**, and keep it depressed for a few seconds. The blue indicator light in the button flashes while the Operating Panel establishes contact with the Processor Unit. When you start the panel for the first time the interface must be configured to establish this connection. When the connection has been made, the blue indicator light is lit permanently.

f On the Processor Unit desktop, open folder `SIMRAD-Shortcut`.

g Double-click file `IPandMACaddress.txt` to open it in a text editor.

h Double-click the URL shortcut to open the Operating Panel configuration page in the default web browser.

i Observe that the Operating Panel configuration page opens on page 157.237.60.20:5000.

3 Define the configuration parameters.

a Select **SOP Configuration** on the top menu to open the page.

b Observe the default values.
If you wish to keep these default values, do nothing. The default values are well suited if you have one single panel communicating with one single Processor Unit. For other configurations, see the relevant procedures.

4 Add a single Processor Unit to the Operating Panel configuration.

a Select **Sonar PCs Configuration** on the top menu to open the page.

b Type or copy the IP address into the relevant box.

c Type or copy the MAC address into the relevant box.

d Select **ADD Sonar PC**.

e Observe that your Processor Unit is added to the list.

f Close the web browser.

5 Make sure that the Operating Panel is functional.

a Make sure that the blue indicator is lit, and check that you can move the cursor on the screen.

b On the Processor Unit desktop, double-click the CS90 icon to start the program. Wait until the CS90 system operates normally.

c Press and hold **Power** depressed four minimum four seconds to turn off the Operating Panel.
Observe that the **Transceiver On/Off** dialog box opens automatically.

Make sure that the CS90 system is turned off.

d Turn on the CS90 system with the **Power** button on the Operating Panel.

e Make sure that you can control the cursor, and that you can make selections in the menu system.

f Press and/or turn selected buttons, and make sure that the corresponding function is activated in the user interface.

Using more than one Operating Panel to control the sonar (Mk2)

A secondary Operating Panel may be connected to the Processor Unit. This may be useful in conjunction with a second display if you wish to control the CS90 system from two different locations on your vessel.

Prerequisites

The Operating Panel is installed as specified in the *Installation manual*. The Processor Unit is turned on. The following specific items are required for this task:

- Computer mouse
- Computer keyboard
- Ethernet switch

  Make sure that your selected Ethernet switch has a large bandwidth capacity. Minimum 1 Gb (1000BASE-T) is required.
- Ethernet cables

  It is very important that high-quality Ethernet cables are used. You must use Cat 5e STP (Shielded Twisted Pair) quality or better.

Neither tools nor instruments are required.

Context

When supplied, the Operating Panel is set up with the following communication parameters:

- IP Address: 157.237.60.20
- Subnet mask: 255.255.255.0
- Gateway: 157.237.60.1

The IP and MAC addresses for your Processor Unit are contained in a text file named `IPandMACaddress.txt`. The file contains the product name, IP address and MAC address in the following format (example):

```
CS90
157.237.60.14
AC:1F:6B:1D:42:E6
```

Tip

If the distance between the Processor Unit and your second display is considerable, we suggest that you use KVM (Keyboard Video Mouse) technology to preserve the video quality.

Procedure

1 Make the following preparations.

   a On the Processor Unit, close any programs that are running, and return to the desktop.

   b Insert the Ethernet switch between the Operating Panel and the Processor Unit.

   Make sure that you use the correct Ethernet socket on the rear side of the computer: ETH1

   c Install the secondary Operating Panel.

   d Connect the Operating Panel to AC mains.

   e Connect the power cable from the Ethernet switch to the AC power outlet.

   f Do not connect the Operating Panel to the Ethernet switch.

Ethernet cables

Tip

An Ethernet switch connected to ETH1 on the rear side of the Processor Unit can also be used to interface other peripheral systems such as echo sounders and positioning systems. You can also connect the Olex system to the CS90 system using this Ethernet switch.

2 Change the IP Address on the primary Operating Panel.

Note

Each Operating Panel must have a different IP Address. None of the panels must use the default IP Address. If you have previously changed the IP Address on the Operating Panel, you can proceed to the next step.

a On the Operating Panel, press **Power**, and keep it depressed for a few seconds.

The blue indicator light in the button flashes while the Operating Panel establishes contact with the Processor Unit. When the connection has been made, the blue indicator light is lit permanently.

b On the Processor Unit desktop, open folder `SIMRAD-Shortcut`.

c Double-click the URL shortcut to open the Operating Panel configuration page in the default web browser.

d Select **SOP Configuration** on the top menu to open the page.

e In the **SOP IP** field, change the IP Address from the default value to: `157.237.60.xx`

The last digit "xx" in the IP Address can be any number between 21 and 29.

Note

Each Operating Panel must have a different IP Address. None of the panels must use the default IP Address.

f Select **Apply IP Configuration**.

When the new IP Address has been set in the Operating Panel, you will loose contact with the configuration page.

g To re-establish contact, use the following URL in your browser: `157.237.60.xx:5000`

h Select **Sonar PCs Configuration** on the top menu to open the page.

i Make sure that the IP and MAC Addresses to the Processor Unit are correct, and that the Processor Unit is present on the list.

j Close the web browser.

3 Connect and set up the secondary Operating Panel.

a Connect the Operating Panel to the Ethernet switch.

b On the Operating Panel, press **Power**, and keep it depressed for a few seconds.

The blue indicator light in the button flashes while the Operating Panel establishes contact with the Processor Unit. When you start the panel for the first time the interface must be configured to establish this connection. When the connection has been made, the blue indicator light is lit permanently.

c On the Processor Unit desktop, open folder `SIMRAD-Shortcut`.

d Double-click the URL shortcut to open the Operating Panel configuration page in the default web browser.

e Select **SOP Configuration** on the top menu to open the page.

f In the **SOP IP** field, change the IP Address from the default value to: `157.237.60.xx`

The last digit "xx" in the IP Address can be any number between 21 and 29.

Note

Each Operating Panel must have a different IP Address. None of the panels must use the default IP Address.

g Select **Apply IP Configuration**.

When the new IP Address has been set in the Operating Panel, you will loose contact with the configuration page.

h To re-establish contact, use the following URL in your browser: `157.237.60.xx:5000`

i Select **Sonar PCs Configuration** on the top menu to open the page.

j Obtain the IP address.

k Type or copy the IP address into the relevant box.

l Obtain the MAC address.

m Type or copy the MAC address into the relevant box.

n Select **ADD Sonar PC**.

o Observe that your Processor Unit is added to the list.

p Close the web browser.

4 Make sure that each Operating Panel is functional.

a Make sure that the blue indicator is lit, and check that you can move the cursor on the screen.

b On the Processor Unit desktop, double-click the CS90 icon to start the program.

Wait until the CS90 system operates normally.

c Make sure that you can control the cursor, and that you can make selections in the menu system.

d Press and/or turn selected buttons, and make sure that the corresponding function is activated in the user interface.

Using a single Operating Panel to control more than one sonar (Mk2)

Since the Mk2 Operating Panel uses Ethernet to communicate with the Processor Unit, you can use one single panel to control more than one sonar system.

Prerequisites

The Operating Panel is installed as specified in the *Installation manual*. The Processor Unit is turned on. The following specific items are required for this task:

- Computer mouse
- Computer keyboard
- Ethernet switch

  Make sure that your selected Ethernet switch has a large bandwidth capacity. Minimum 1 Gb (1000BASE-T) is required.
- Ethernet cables

  It is very important that high-quality Ethernet cables are used. You must use Cat 5e STP (Shielded Twisted Pair) quality or better.

Neither tools nor instruments are required.

Context

When supplied, the Operating Panel is set up with the following communication parameters:

- IP Address: 157.237.60.20
- Subnet mask: 255.255.255.0
- Gateway: 157.237.60.1

The IP and MAC addresses for your Processor Unit are contained in a text file named `IPandMACaddress.txt`. The file contains the product name, IP address and MAC address in the following format (example):

```
CS90
157.237.60.14
AC:1F:6B:1D:42:E6
```

Tip

To change which sonar to control, press **Sonar Select** *on the Operating Panel. If you use your Operating Panel to control more than two sonars, press* **Sonar Select** *repeatedly to select.*

Procedure

1 Make the following preparations.

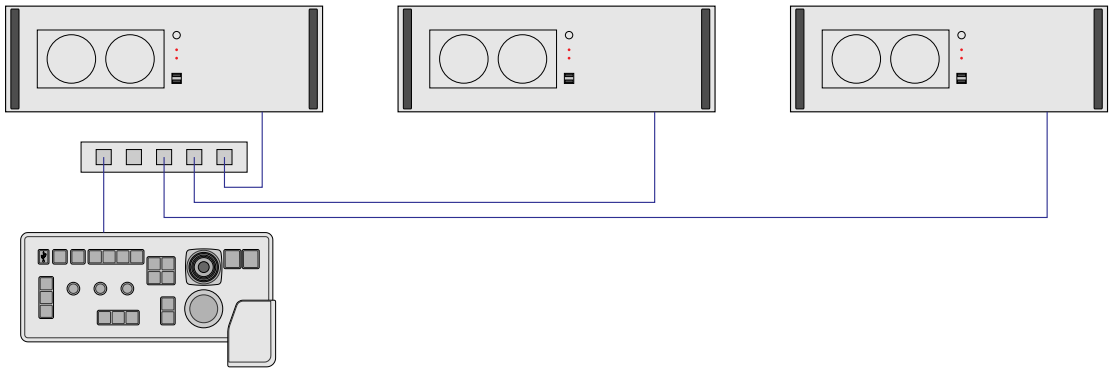
a Insert the Ethernet switch between the Operating Panel and the Processor Unit.

Make sure that you use the correct Ethernet socket on the rear side of the computer: ETH1

b Connect each Processor Unit to the same Ethernet switch.

Make sure that you use the correct Ethernet socket on the rear side of the computer: ETH1

c Connect the power cable from the Ethernet switch to the AC power outlet.



Ethernet cables

Tip

An Ethernet switch connected to ETH1 on the rear side of the Processor Unit can also be used to interface other peripheral systems such as echo sounders and positioning systems. You can also connect the Olex system to the CS90 system using this Ethernet switch.

2 Open the Operating Panel configuration page.

a On the Operating Panel, press **Power**, and keep it depressed for a few seconds.

The blue indicator light in the button flashes while the Operating Panel establishes contact with the Processor Unit. When the connection has been made, the blue indicator light is lit permanently.

b On the Processor Unit, close any programs that are running, and return to the desktop.

c On the Processor Unit desktop, open folder `SIMRAD-Shortcut`.

d Double-click the URL shortcut to open the Operating Panel configuration page in the default web browser.

Note

If you have previously changed the IP Address on the Operating Panel, you must use this address to open the configuration page.

For each Processor Unit that is added:

3 Locate the IP and MAC addresses on the ETH1 Ethernet adapter in the Processor Unit.

The IP and MAC addresses for your Processor Unit are contained in a text file named `IPandMACaddress.txt`. If the text file is missing you must find the information manually.

Obtain the IP address.

a In the bottom-left corner of your desktop, select the Windows® **Start** button.

b On the menu, select **Settings**.

c Observe that the **Windows Settings** dialog box opens.

d Select **Network & Internet**.

e Select **Change adapter options**.

f Select the relevant network adapter, then right-click and select **Properties** on the short-cut menu.

g On the list of connections, select **Internet Protocol 4 (TCP/IPv4)**, and then **Properties**.

h Observe the IP address for the Ethernet adapter.

i Write down the information.

j Close all the dialog boxes.

Obtain the MAC address.

a In the bottom left corner of your desktop, select the looking glass to start a search.

b Type "Command", do the search, and open the **Command Prompt** window.

c Type **ipconfig /all** and press the **Enter** key.

d Observe the "Physical Address" (MAC address) for the relevant Ethernet adapter.

e Write down the information.

f Close the **Command Prompt** window.

Select the adapter that the Operating Panel is connected to. On the CS90 system, the Ethernet adapter is named Simrad Connect.

4 Add a single Processor Unit to the Operating Panel configuration.

a Select **Sonar PCs Configuration** on the top menu to open the page.

b Type or copy the IP address into the relevant box.

c Type or copy the MAC address into the relevant box.

d Select **ADD Sonar PC**.

e Observe that your Processor Unit is added to the list.

f Close the web browser.

5 Make sure that the Operating Panel is functional.

a Make sure that the blue indicator is lit, and check that you can move the cursor on the screen.

b On the computer desktop, double-click the CS90 icon to start the program.

c Press **Sonar Select** on the Operating Panel.

d Make sure that you can control the cursor, and that you can make selections in the menu system.

e Press and/or turn selected buttons, and make sure that the corresponding function is activated in the user interface.

Updating the Operating Panel support applications (Mk2)

For the Operating Panel to communicate with the Processor Unit, certain interface applications are required.

Prerequisites

The Operating Panel is installed as specified in the *Installation manual*. The Processor Unit is turned on. The following specific items are required for this task:

- Personal computer
- USB flash drive
- Computer mouse (Optional)
- Computer keyboard (Optional)

Neither tools nor instruments are required. This procedure is made for the Microsoft® Windows® 10 operating system. It is assumed that you are familiar with this operating system.

Context

The following applications are used:

- HIDS
- MSS
- SPS
- vJoy Device Driver

Refer to the *Software changes* chapter in the software release note to see *which* applications that needs to be updated.

Procedure

1 On the personal computer:
   a Download the new software version.
   b Unpack the ZIP file to access the executable application file.
   c Copy the application file to a USB flash drive.
2 Make the following preparations.
   a If applicable: Connect the keyboard and the mouse to USB sockets on the Processor Unit.
   b Insert the USB flash drive.
3 Select **Power Off** on the top bar.
4 In the **Power Off** dialog box, select **Exit to Operating System** to close the CS90 program.

5 Uninstall the application.

a From the **Start** button in the lower left corner, open the Control Panel.

b In the Control Panel, select **App**.

c Select **Programs and Features**.

d On the list provided, locate the software you shall uninstall.

Refer to the *Software changes* chapter in the software release note to see *which* applications that needs to be updated.

e Select it, then select **Uninstall**.

f Click the [**X**] in the top right corner to close the Control Panel.

6 Install the new version of the application.

a From the Windows® **Start** button, right-click to open File Explorer.

b Locate the executable setup file (`.exe`).

Refer to the *Software changes* chapter in the software release note to see *which* applications that needs to be updated.

c Copy the file to a temporary folder on the "C" drive.

d Double-click on the file to install the new version of thew application.

e Close File Explorer.

f Remove the USB flash drive.

7 On the Processor Unit desktop, double-click the CS90 icon to start the program.

8 If applicable: Disconnect the keyboard and the mouse from the Processor Unit.

Updating the firmware on the Operating Panel (Mk2)

Whenever required the firmware in the Operating Panel can be updated to include new functionality or to correct software errors.

Prerequisites

The Operating Panel is installed as specified in the *Installation manual*. The Processor Unit is turned on. The following specific items are required for this task:

- USB flash drive
- Personal computer (Optional)
- Computer mouse (Optional)
- Computer keyboard (Optional)
- Ethernet cable (Optional)
- Chrome web browser

A firmware update for the Operating Panel was distributed with sonar software version 3.1.8. If this update has not been implemented you will need to use the

Chrome web browser. If you want to use the Processor Unit you must first connect it to the Internet, then download and install Chrome.

If the update with 3.1.8 was implemented you can do the firmware update on the Processor Unit using the default browser.

Neither tools nor instruments are required. This procedure is made for the Microsoft® Windows® 10 operating system. It is assumed that you are familiar with this operating system.

Note

The software release note may contain additional details related to the firmware update.

Procedure

1 Locate the firmware update file: `SOPupdate.zip`.

2 If you use a separate computer:

- a Copy the file to a folder on your computer, but *do not* unpack it.
- b Disconnect the Operating Panel from the Processor Unit. (Ethernet cable)
- c Connect the Operating Panel to the computer.
- d Open the web browser.

  A firmware update for the Operating Panel was distributed with sonar software version 3.1.8. If this update has not been implemented you will need to use the Chrome web browser.
- e In the browser address field, type: http://157.237.60.20:5000

  Note

  If you have previously changed the IP Address on the Operating Panel, you must use this address to open the configuration page.

3 If you use the Processor Unit:

- a Select **Power off** to turn off the system.
- b In the **Power Off** dialog box, select **Exit to Operating System** to close the CS90 program.

- c If applicable: Connect the keyboard and the mouse to USB sockets on the Processor Unit.
- d From the Windows® **Start** button, right-click to open File Explorer.
- e Insert the USB flash drive.
- f Copy the file to a folder on the Processor Unit, but *do not* unpack it.
- g Remove the USB flash drive.
- h On the Processor Unit desktop, open folder `SIMRAD-Shortcut`.

i Double-click the URL shortcut to open the Operating Panel configuration page in the default web browser.

Note

If you have previously changed the IP Address on the Operating Panel, you must use this address to open the configuration page.

4 Do the firmware update.

a In the browser window, select **Update**.

b Select **Perform update**.

c Locate the firmware update file and select **Open**.

d Select **OK** when prompted to update.

The firmware update will now take place. The web browser will reload. You may need to refresh the web browser after some time.

e Make sure that the correct versions have been installed:

Refer to the software release note.

5 If you use a separate computer:

a Disconnect the Operating Panel from the computer.

b Connect the Operating Panel to the Processor Unit. (Ethernet cable)

6 On the Processor Unit desktop, double-click the CS90 icon to start the program.

7 Restore normal operation.

Testing the noise conditions and the sonar functionality

Topics

Checking the status of the transceiver boards, page 247

Checking the transducer by means of the Diagnostics functionality, page 249

Measuring the noise in passive mode, page 252

Making a noise/speed curve to determine vessel noise, page 254

Measuring flow noise, page 258

Checking the status of the transceiver boards

The purpose of the **Diagnostics** dialog box is to allow on-line testing and verification of the hardware components in the CS90 system. The **Transceiver** page offers key information about each transceiver board in the Transceiver Unit.

Prerequisites

Neither tools nor instruments are required.

- The CS90 system is turned on and operates normally.
- The CS90 system is in *Normal* mode, but **TX Power** is set to *Off* to prevent transmissions.
- The transducer is retracted to its upper position.
- The vessel is berthed or at sea. We recommend that the test is done with the vessel at sea.

Caution

You must never set the CS90 system to ping unless the transducer is submerged in water. The transducer can be damaged if it transmits in the open air.

Context

By means of the **Diagnostics** functionality, you can easily determine if the hardware components in the CS90 system are operational. And most important, you can make sure that all the transceivers channels and transducer elements are functional. Each button provides a small colour coded indicator.

- **No indicator**: Status is OK. No actions are necessary.
- **Yellow**: This is a warning. A closer investigation is recommended.

- **Red**: This is an alarm. A closer investigation is required.
- **Blue**: A device monitored by the diagnostic system is disabled.
- **Grey**: No information is available.

The **Diagnostics** dialog box and functionality is only provided for performance monitoring. The functionality offered by the dialog box is not required for normal use of the CS90 system. The dialog box does not permit you to change any operational settings.

Procedure

1 Make sure that you have sufficient water depth below the keel before you lower the transducer.

2 Lower the transducer to its bottom position.

3 Select the default settings.

   a On the **Main** menu, select **User Settings**.

   b Observe the **Factory Settings** list.

   c Select the setting you want to use.

   d Select **Activate Selected Setting**.

   e Select **OK** to apply your changes and close the **User Settings** dialog box.

4 Make the following preparations.

   a On the **Main** menu: Set **Range** to *1500 m*.

   b On the **Operation** menu: Set **Tx Power** to *Maximum* (or any other power rating) to start pinging.

   c On the **Setup** menu: Select **Diagnostics** to open the dialog box.

5 Select **Transceiver** to open the page.

The **Transceiver** page provides a graphic presentation of the transceiver boards. The visual presentation reflects the physical location of the boards in the Transceiver Unit. Only static information is provided. The **Board Information** parameters offer key information about the supply power to the selected transceiver board, as well as the environmental conditions.

To select a transceiver board, click the "button". Relevant information about the selected transceiver board is provided under **Board Information**.

To disable or enable a transceiver board, right-click the "button" and use the short-cut menu.

Each button provides a small colour coded indicator.

- **No indicator**: Status is OK. No actions are necessary.
- **Yellow**: This is a warning. A closer investigation is recommended.
- **Red**: This is an alarm. A closer investigation is required.
- **Blue**: A device monitored by the diagnostic system is disabled.
- **Grey**: No information is available.

6 Make sure that all the transceiver boards are fully functional.

7 Finish the test.

a Close the **Diagnostics** dialog box.

b Set **Tx Power** to *Off*.

c Hoist the transducer back up to its upper position.

Checking the transducer by means of the Diagnostics functionality

The purpose of the **Diagnostics** dialog box is to allow on-line testing and verification of the hardware components in the CS90 system. Use the **Transducer** page to do a reception test to check the individual transducer elements. Any errors are then easily detected.

Prerequisites

Neither tools nor instruments are required.

- The CS90 system is turned on and operates normally.
- The CS90 system is in *Normal* mode, but **TX Power** is set to *Off* to prevent transmissions.
- The transducer is retracted to its upper position.
- The vessel is berthed or at sea. We recommend that the test is done with the vessel at sea.

Caution

You must never set the CS90 system to ping unless the transducer is submerged in water. The transducer can be damaged if it transmits in the open air.

For the best possible conditions, the ship must be "silent".

- The water must be as deep as possible. Recommended minimum depth is 100 metres.
- There must be no other vessels in the vicinity.
- The vessel must lie still in the water.
- As much machinery as possible must be turned off. It is particularly important to turn off electrical motors, as well as cooling systems and hydraulic pumps that may cause electric noise.
- To prevent interference, all other hydroacoustic instruments must be turned off.

Context

By means of the **Diagnostics** functionality, you can easily determine if the hardware components in the CS90 system are operational. And most important, you can make sure that all the transceivers channels and transducer elements are functional. Each button provides a small colour coded indicator.

- **No indicator**: Status is OK. No actions are necessary.
- **Yellow**: This is a warning. A closer investigation is recommended.
- **Red**: This is an alarm. A closer investigation is required.
- **Blue**: A device monitored by the diagnostic system is disabled.
- **Grey**: No information is available.

The **Diagnostics** dialog box and functionality is only provided for performance monitoring. The functionality offered by the dialog box is not required for normal use of the CS90 system. The dialog box does not permit you to change any operational settings.

Procedure

1 Make sure that you have sufficient water depth below the keel before you lower the transducer.

2 Lower the transducer to its bottom position.

3 Select the default settings.

   a On the **Main** menu, select **User Settings**.

   b Observe the **Factory Settings** list.

   c Select the setting you want to use.

   d Select **Activate Selected Setting**.

   e Select **OK** to apply your changes and close the **User Settings** dialog box.

4 Make the following preparations.

a On the **Main** menu: Set **Range** to *1500 m*.

b On the **Operation** menu: Set **Tx Power** to *Maximum* (or any other power rating) to start pinging.

c On the **Setup** menu: Select **Diagnostics** to open the dialog box.

5 Select **Transducer** to open the page.

The **Transducer** page presents all the elements that are used in the transducer. The presentation attempts to organize the elements in the same manner as in the physical transducer. The transceiver boards are shown as "buttons". Select a transceiver board to highlight the elements that are physically connected to the board.

6 Select **Reception Test** to start an automatic test of the individual transducer elements.

The reception test validates each single element in the transducer, and returns the status using a simple colour code.

- **Green**: The transducer element is fully operational.
- **Red**: The transducer element offers reduced performance.
- **Black**: The transducer element is not working ("dead").

For more information, observe the tooltip provided for each element rectangle.

7 Make sure that the number of unserviceable ("dead") elements does not degrade the performance of the CS90 system.

A small number of unserviceable transducer elements are accepted, even for operational use. This is regarded as "graceful degradation".

The CS90 system offers a large number of transceiver channels. 16 identical transceiver boards are used. If a single channel fails during normal operation, you are not likely to detect it. Even if several channels fail, you may not see it.

The detection of a faulty channel depends on the physical location of the relevant transducer element. If faulty channels are grouped together on the transducer face, this may cause a visible defect in the display presentation. If they are scattered, the visible defect may be a lot harder to see. In all cases, the echoes from the neighbouring channels cause an interpolation that will restore a lot of the degraded presentation.

Which actions to take if single channels fail depend on the operational impact, the overall performance of the CS90 system, and a cost/benefit assessment. The most important factor in the cost/benefit assessment is whether you need to replace the transducer, or just a single transceiver board. If more than 3% of your transducer elements have failed, we recommend that you contact your dealer for advice.

Note

For further investigations of this issue, use the functionality offered by the **Element BITE** *(Element Built In Test Equipment) dialog box.*

8 If the result from the reception test shows a number of transducer elements that are either defective or offer reduced performance, repeat the test.

With the vessel in port, the environmental conditions are not satisfactory. In the shallow waters of the port, noise from other vessels, dockyard workers or machinery will cause unreliable test results. If you do this tests in a busy harbour, or with noise sources present, the sensitive receivers will detect all the noise in the nearby waters. Excessive noise or interference may be misinterpreted as physical defects.

You may need to repeat the test several times, and - if necessary - implement a "silent ship" to improve the conditions.

9 Finish the test.

a Close the **Diagnostics** dialog box.

b Set **Tx Power** to *Off*.

c Hoist the transducer back up to its upper position.

Result

The maximum number of bad elements is: 5.

Further requirements

If the noise level is higher than specified, you must check the reason(s) for this.

- Check the grounding of the Transceiver Unit.
- Verify that other electric equipment and/or machinery on board, such as cooling systems, hydraulic pumps, electric motors etc, do not influence on the noise reading. Switch off as much machinery as possible, especially electrical motors.
- Check for interference from other hydroacoustic systems.
- Check for environmental noise, such as other vessels in the vicinity or animal life.

Measuring the noise in passive mode

Low noise is a key factor for high quality and reliable measurements. The performance of the CS90 system will always be limited by different noise sources. A high noise level will mask the echoes and make them difficult to read and interpret. The noise is measured while the CS90 system operates in *Passive* mode with the transmit pulses disabled.

Prerequisites

The CS90 system is turned on and operates normally.

- The CS90 system is in *Normal* mode, but **TX Power** is set to *Off* to prevent transmissions.
- The transducer is retracted to its upper position.
- Neither tools nor instruments are required.

In order to do this test, the ship must be "silent".

- The water must be as deep as possible. Recommended minimum depth is 100 metres.
- There must be no other vessels in the vicinity.
- The vessel must lie still in the water.
- As much machinery as possible must be turned off. It is particularly important to turn off electrical motors, as well as cooling systems and hydraulic pumps that may cause electric noise.
- To prevent interference, all other hydroacoustic instruments must be turned off.

Note

With the vessel in port, the environmental conditions are not satisfactory. In the shallow waters of the port, noise from other vessels, dockyard workers or machinery will cause unreliable test results. If you do this tests in a busy harbour, or with noise sources present, the sensitive receivers will detect all the noise in the nearby waters.

Context

This task allows you to check the noise conditions. To measure the noise level, observe the value presented on the **Noise** page in the **Diagnostics** dialog box.

Procedure

1 Make sure that you have sufficient water depth below the keel before you lower the transducer.

2 Lower the transducer to its bottom position.

3 Select the default settings.

   a On the **Main** menu, select **User Settings**.

   b Observe the **Factory Settings** list.

   c Select the setting you want to use.

   d Select **Activate Selected Setting**.

   e Select **OK** to apply your changes and close the **User Settings** dialog box.

4 At the bottom of the display presentation, select a suitable presentation mode, and activate the *Horizontal* view.

5 Make the following preparations.

   a On the **Main** menu: Set **Range** to *1500 m*.

   b On the **Operation** menu: Set **Tx Power** to *Off*.

   c On the **Active** menu:

      1 Set **Pulse Type** to *CW Medium*.

      2 Set **Frequency** to the start frequency:70 kHz

3 Set **Vertical TX Sector** to *Narrow*.

4 Set **Noise Filter** to *Off*.

5 Set the **Bottom Filter Threshold** to *Off*.

d On the **Setup** menu: Select **Diagnostics** to open the dialog box.

6 Select **Noise** to open the page.

7 Select **Start Noise Measurements**.

a Observe the noise curve.

b Read the maximum and average noise values.

c Repeat for selected frequencies.

d Record the frequencies and the measured values in the result table.

8 Finish the test.

a Close the **Diagnostics** dialog box.

b Hoist the transducer back up to its upper position.

Result

For each transmit frequency (in kHz), write down the measured noise levels (in dB).		
Frequency (kHz)	**Maximum**	**Average**
70		
80		
90		

Making a noise/speed curve to determine vessel noise

The performance of the CS90 system will always be limited by different noise sources. During this test, noise measurements are done for different vessel speeds. The weather and sea conditions for the noise measurements will be those at the time of the test.

Prerequisites

The CS90 system is turned on and operates normally. The vessel is at sea. Recommended minimum depth is 100 metres. If the CS90 system is operated from any other compartment than the bridge, an open two-way oral communication channel with the bridge is required. You need the following equipment:

- Personal computer
- Spreadsheet program

If you wish to do the test with a "silent ship" the following prerequisites must be met:

- The water must be as deep as possible. Recommended minimum depth is 100 metres.
- There must be no other vessels in the vicinity.

- As much machinery as possible must be turned off. It is particularly important to turn off electrical motors, as well as cooling systems and hydraulic pumps that may cause electric noise.
- To prevent interference, all other hydroacoustic instruments must be turned off.

If you do this tests in a busy harbour, or with noise sources present, the sensitive receivers will detect all the noise in the nearby waters.

Context

To measure the noise, observe the noise values provided on the **Noise** page in the **Diagnostics** dialog box. Since the noise will vary with each ping, you must make five measurements for each vessel speed, and then calculate the average noise.

Tip

If you record all the raw data during the noise test, you can repeat the test later using the replay file.

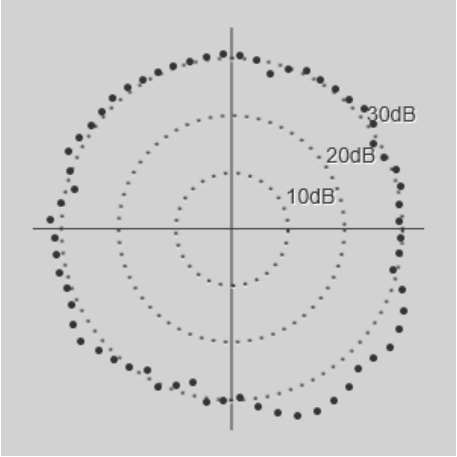
You may wish to make the noise/speed curve under realistic conditions. This means that all relevant vessels systems are in normal use. If you experience very high noise levels, you may wish to repeat the test with "silent ship" settings. To isolate noise sources, turn individual vessel systems off, and check for any changes in the noise level.

Note

When the transducer is fully lowered, the speed of the vessel must not exceed the maximum speed permitted for the hull unit. This maximum speed depends on the physical size of the transducer, the mechanical construction of the hull unit, and how far down the transducer has been lowered. The **System Protection** *page allows you to define a limit that triggers an alarm if the maximum speed is exceeded. The* **System Protection** *page is located in the* **Installation** *dialog box.*

Illustration:

Read the noise value from the noise circle. Use the mean value of the readouts at 0 degrees (straight up).



Procedure

1 Make sure that you have sufficient water depth below the keel before you lower the transducer.

2 Lower the transducer to its bottom position.

3 If necessary, establish a separate communication line with the bridge to verify the vessel speed during the test.

4 Make the following preparations.

a At the bottom of the display presentation, select *Bow Up* presentation mode, and activate the *Horizontal* view.

b Open the **Operation** menu.

1 Set **Operation** to *Normal*.

2 Set **Tx Power** to *Off*.

c Open the **Active** menu.

1 Set **TVG** (Time Variable Gain) to *0 log R*.

2 Set **Ping-Ping Filter** to *Off*.

3 Set **Pulse Type** to *CW Short*.

4 Set **Frequency** to the start frequency:

5 Set **Horizontal TX Sector** to *Omni*.

6 Set **Vertical TX Sector** to *Normal*.

7 Set **AGC** (Automatic Gain Control) to *Off*.

8 Set **RCG** (Reverberation Controlled Gain) to *0* (zero).

9 Set **Noise Filter** to *Off*.

d Open the **Setup** menu.

e Select **Diagnostics** to open the dialog box.

f Select **Noise** to open the page.

g Select **Start Noise Measurements**.

5 Repeat for each vessel speed and operating frequency.

a Ask the bridge to set the speed.

b If possible, verify the vessel speed on the top bar.

c Read the noise value from the noise circle.

d Record the values in the result table.

e Repeat for every 2 kHz up to and including the highest test frequency: 90 kHz

1 Increase the operating frequency with 2 KHz.

2 Read the noise value from the noise circle.

3 Record the values in the result table.

f Ask the bridge to set the next speed.

6 When all the measurements have been made, type the data (speed and noise) into a spreadsheet to create the curve.

7 Finish the test.

a Close the **Diagnostics** dialog box.

b Hoist the transducer back up to its upper position.

Result

Speed/Frequency/Noise		
Speed	**Frequency**	**Noise level**
0		
2		
4		
6		
8		
10		
12		
14		
16		
18		
20		
Sea state:		
Water depth:		
Use this table to record the values. Print it out and make multiple copies. Alternatively, you can type the values straight into a spreadsheet.		

Measuring flow noise

The upper water layers of the sea contain a myriad of small air bubbles created by the breaking waves. When the hull moves through water it will cause a disturbance, and this will generate friction. The friction zone is called the *flow boundary layer*. All objects sticking out from the hull, or dents in the hull, will disturb the flow and will increase the thickness of the boundary layer. When the flow speed is high, the turbulence can be violent enough to destroy the integrity of the water. Small voids or cavities in the water will occur and this is called cavitation.

Prerequisites

The CS90 system is turned on and operates normally.

- The CS90 system is in *Normal* mode, but **TX Power** is set to *Off* to prevent transmissions.
- The transducer is retracted to its upper position.
- If the CS90 system is operated from any other compartment than the bridge, an open two-way oral communication channel with the bridge is required.
- Neither tools nor instruments are required. You may however find this equipment useful:
  - Personal computer
  - Spreadsheet program

In order to do this test, the ship must be "silent".

- The water must be as deep as possible. Recommended minimum depth is 100 metres.
- There must be no other vessels in the vicinity.
- The vessel must lie still in the water.
- As much machinery as possible must be turned off. It is particularly important to turn off electrical motors, as well as cooling systems and hydraulic pumps that may cause electric noise.
- To prevent interference, all other hydroacoustic instruments must be turned off.

Note

With the vessel in port, the environmental conditions are not satisfactory. In the shallow waters of the port, noise from other vessels, dockyard workers or machinery will cause unreliable test results. If you do this tests in a busy harbour, or with noise sources present, the sensitive receivers will detect all the noise in the nearby waters.

Context

To measure the noise, observe the noise values provided on the **Noise** page in the **Diagnostics** dialog box.

Tip

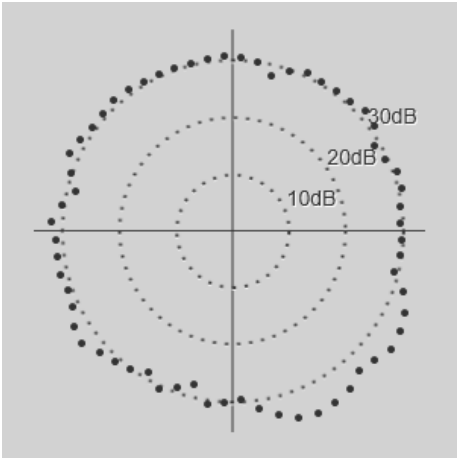
If you record all the raw data during the noise test, you can repeat the test later using the replay file.

You may wish to make the noise/speed curve under realistic conditions. This means that all relevant vessels systems are in normal use. If you experience very high noise levels, you may wish to repeat the test with "silent ship" settings.

Note

When the transducer is fully lowered, the speed of the vessel must not exceed the maximum speed permitted for the hull unit. This maximum speed depends on the physical size of the transducer, the mechanical construction of the hull unit, and how far down the transducer has been lowered. The **System Protection** *page allows you to define a limit that triggers an alarm if the maximum speed is exceeded. The* **System Protection** *page is located in the* **Installation** *dialog box.*

Illustration:



Read the noise value from the noise circle. Use the mean value of the readouts at 0 degrees (straight up).

Procedure

1 Make sure that you have sufficient water depth below the keel before you lower the transducer.

2 Lower the transducer to its bottom position.

3 Select the default settings.

   a On the **Main** menu, select **User Settings**.

   b Observe the **Factory Settings** list.

   c Select the setting you want to use.

   d Select **Activate Selected Setting**.

   e Select **OK** to apply your changes and close the **User Settings** dialog box.

4 At the bottom of the display presentation, select a suitable presentation mode, and activate the *Horizontal* view.

5 Make the following preparations.

   a On the **Main** menu: Set **Range** to *1500 m*.

   b On the **Operation** menu: Set **Tx Power** to *Off*.

   c On the **Active** menu:

      1 Set **Pulse Type** to *CW Medium*.

2 Set **Frequency** to the start frequency:70 kHz

3 Set **Vertical TX Sector** to *Narrow*.

4 Set **Noise Filter** to *Off*.

5 Set the **Bottom Filter Threshold** to *Off*.

d On the **Setup** menu: Select **Diagnostics** to open the dialog box.

6 Select **Noise** to open the page.

7 Establish a separate communication line with the bridge to verify the vessel speed during the test.

8 Measure the flow noise versus the vessel speed.

a Ask the bridge to increase the vessel speed to the maximum permitted speed for the hull unit.

b Wait until maximum speed has been obtained.

c Ask the bridge to abruptly turn off all engine power and - if possible - change the pitch of the propellers to zero.

d Read the noise value from the noise circle.

e For every knot the speed is reduced, read the noise.

(If you find it more convenient, type the data directly into the spreadsheet.)

f Fill in the result table.

9 When all the measurements have been made, type the data (speed and noise) into a spreadsheet to create the curve.

10 Hoist the transducer back up to its upper position.

Result

Speed/Frequency/Noise		
Speed	**Frequency**	**Noise level**
20		
19		
18		
17		
16		

Speed/Frequency/Noise		
Speed	**Frequency**	**Noise level**
15		
14		
13		
12		
11		
10		
9		
8		
7		
6		
5		
4		
3		
2		
1		
Sea state:		

Speed/Frequency/Noise		
Speed	**Frequency**	**Noise level**
Water depth:		
Use this table to record the values. Print it out and make multiple copies. Alternatively, you can type the values straight into a spreadsheet.		

Preventive maintenance

Topics

Preventive maintenance schedule, page 264

Requirements for personnel and tools, page 265

Approved anti-fouling paints, page 265

Preventive maintenance procedures, page 267

Accessing the inside of the installation trunk, page 281

Preventive maintenance schedule

In order to secure a long and trouble-free operation of the CS90 system, certain specific preventive maintenance tasks must be done. The tasks are organized in a *preventive maintenance schedule*.

Note

Even though a preventive maintenance schedule is provided, the CS90 system must be inspected regularly.

Topics

Actions to be taken before each use, page 264

Actions to be taken every month, page 264

Actions to be taken during dry docking, page 265

Actions to be taken whenever required, page 265

Actions to be taken before each use

We recommend that you do these simple tasks each time you shall use the CS90 system.

1 Inspect the sonar room.

2 Make sure that the following systems in the sonar room are in good working order:

- Ventilation
- Heating
- Ambient light
- Power
- Bilge pump (if relevant)

Actions to be taken every month

Once a month we recommend that you inspect and clean the various main units comprised by the CS90 system.

1 Inspect the sonar room. Make sure that the ambient temperature in the room meets the environmental specifications.

2 Inspect and clean the display.

3 Inspect and clean the Processor Unit.

4 Inspect and clean the Operating Panel.

5 Inspect and clean the Transceiver Unit.

6 Inspect the Hull Unit.

Actions to be taken during dry docking

When the vessel is in dry dock you must take the opportunity to inspect and clean the transducer.

1 Do a visual inspection of the transducer.

2 Clean the transducer and remove marine growth.

If necessary, apply anti-fouling paint as described in the dedicated procedure.

3 Make sure that all surfaces under the hull are protected with a high quality coating.

4 Make sure that the inside of the installation trunk is also protected with coating.

5 Inspect the physical conditions of the sacrificial anodes. Check for damage and corrosion. If necessary, replace the sacrificial anodes with new anodes of the same (or similar) type.

Actions to be taken whenever required

The hull unit was lubricated as a part of the production process. It was thus provided fully lubricated when delivered to the vessel. Additional lubrication of the hull unit must only take place when required.

1 Make sure that the hoisting spindle is properly lubricated. Lubricate if required.

2 Inspect the hull unit for water intrusion.

3 If necessary, add grease to the transducer shaft sleeve.

Requirements for personnel and tools

All tasks can be done by the crew.

There is no need for neither technical education nor specific maintenance training. Unless specified in a procedure you will not need any special tools or equipment.

Approved anti-fouling paints

The list of approved anti-fouling paints can be found on our website. Always refer to the manufacturer's documentation and data sheets for a complete procedure and for relevant safety information.

- https://www.kongsberg.com/anti-fouling-paints

Important

Do not paint the transducer with traditional hull plating paint. Use only the correct type of approved paint specified.

Do not use high-pressure water, sandblasting, metal tools or strong solvents to clean the transducer face.

Preventive maintenance procedures

Topics

Checking the environmental conditions in the sonar room, page 267
Inspecting and cleaning the display, page 268
Inspecting and cleaning the Processor Unit, page 268
Inspecting and cleaning the Operating Panel, page 269
Inspecting and cleaning the Transceiver Unit, page 269
Visual inspection of the hull unit, page 270
Visual inspection of the installation trunk, page 271
Inspecting and cleaning the transducer face, page 272
Painting the transducer face, page 275
Inspecting and replacing sacrificial anodes, page 277
Lubricating the hoisting spindle, page 278
Lubricating the transducer shaft sleeve, page 279

Checking the environmental conditions in the sonar room

It is important that the sonar room is kept clean and dry. The system units must not be exposed to excessive temperatures, moisture or humidity. Such conditions can cause corrosive attacks and subsequent failures to the electronic circuitry. Visit the sonar room at regular intervals to check for dust, high temperature and humidity.

Prerequisites

The following specific instruments are required for this task:

- Thermometer
- Hygrometer

Procedure

1 Measure the ambient temperature in the room.

2 Measure the relative humidity in the room.

3 Compare the readings with the environmental requirements for the CS90 system.

4 Make sure that neither the room itself nor any of the system units have been subjected to corrosive attacks.

5 Take the necessary corrective actions if the environmental conditions are poor.

Inspecting and cleaning the display

To ensure long and trouble-free operation of the display, it must be inspected and cleaned at regular intervals.

Prerequisites

No special tools are required for this task. You will however need a commercially available mild detergent and a lint free cloth. You also need a suitable cleaning fluid for the display screen.

For detailed maintenance instructions, observe the information provided in the display documentation.

Procedure

1 Turn off the unit.

2 Make sure that the unit is kept clean and dry.

3 Make sure that the unit is not exposed to excessive dust and vibrations.

4 Check for physical damage to the cabinet and/or the cables.

5 Remove dust and salt water residue with a soft cloth moistened in fresh water. Use a mild detergent.

Note

Do not use strong solvents. The display screen must be handled with care to avoid damage to the anti-glare filter coating.

Inspecting and cleaning the Processor Unit

To ensure long and trouble-free operation of the Processor Unit it must be inspected and cleaned at regular intervals.

Prerequisites

No special tools are required for this task. You will however need a commercially available mild detergent and a lint free cloth.

Procedure

1 Make sure that the unit is kept clean and dry.

2 Make sure that the unit is not exposed to excessive dust and vibrations.

3 Check for physical damage to the cabinet and/or the cables.

4 Remove dust and salt water residue with a soft cloth moistened in fresh water. Use a mild detergent.

Note

Do not use strong solvents.

Inspecting and cleaning the Operating Panel

To ensure long and trouble-free operation of the Operating Panel it must be inspected and cleaned at regular intervals.

Prerequisites

No special tools are required for this task. You will however need a commercially available mild detergent and a lint free cloth.

Procedure

1 Make sure that the Operating Panel is kept clean and dry.

2 Make sure that the unit is not exposed to excessive dust and vibrations.

3 Check for physical damage to the panel and/or the cables.

4 Remove dust and salt water residue with a soft cloth moistened in fresh water. Use a mild detergent.

Note

Do not use strong solvents.

Inspecting and cleaning the Transceiver Unit

To ensure long and trouble-free operation, the Transceiver Unit must be inspected and cleaned at regular intervals.

Prerequisites

No special tools are required for this task. You will however need a commercially available mild detergent and a lint free cloth.

Procedure

Note

Do not open the unit. There are no serviceable parts inside. High voltages are used. You may be exposed to electric shock.

1 Make sure that the Transceiver Unit is kept clean and dry.

2 Make sure that the unit is not exposed to excessive dust and vibrations.

3 Check for physical damage to the cabinet and/or the cables.

4 Remove dust and salt water residue with a soft cloth moistened in fresh water. Use a mild detergent.

Note

Do not *use strong solvents.*

Visual inspection of the hull unit

Regular inspections of the hull unit is required to make sure that it operates properly.

Prerequisites

Neither tools nor instruments are required. You will however need a commercially available mild detergent and a lint free cloth.

Two persons are needed to do the task.

- One person must stay on the bridge in order to operate the CS90 system.
- One person must stay in the sonar room to make sure that the CS90 system starts, and that the hull unit works properly.

Proper oral communication must exist between the bridge and the sonar room.

The steps marked [*Bridge*] are done on the bridge.

Procedure

1 Make sure that the hull unit is kept clean and dry.

2 Make sure that the unit is not exposed to excessive dust and vibrations.

3 Make sure that there are no corrosive attacks on the hull unit, mounting flange, installation trunk, support brackets or other parts of the installation.

4 Remove dust and salt water residue with a soft cloth moistened in fresh water. Use a mild detergent.

Note

Do not *use strong solvents.*

5 *[Bridge]*: Make sure that you have sufficient water depth below the keel before you lower the transducer.

6 *[Bridge]*: Lower the transducer to its bottom position.

7 Make sure that the transducer can be lowered and hoisted without complications or obstacles.

8 Make sure that the transducer cables can move freely when the transducer is lowered and hoisted.

9 *[Bridge]*: Hoist the transducer to its upper position.

Visual inspection of the installation trunk

All surfaces that are in contact with seawater are exposed to marine growth (biological fouling). This includes the hull plating, the blister and the installation trunk. Marine growth inside the installation trunk can damage the transducer. Excessive marine growth on the hull plating close to the transducer can cause noise. Every time your vessel is in dry dock, you must remove the marine growth.

Prerequisites

The vessel is in dry dock. The CS90 system is turned off. Neither tools nor instruments are required for the visual inspection.

- Relevant tools are required to remove marine growth and to apply anti-fouling paint. All tools must be provided by the shipyard.
- Anti-fouling paint must be provided by the shipyard.

Note

Do not *direct high-pressure water or sandblasting spray towards the transducer. This will damage the transducer beyond repair.*

Two persons are needed to do the task.

- One person must stay in the sonar room to operate the hull unit.
- One person must stay in the dry dock, under the hull, to make sure that the transducer is not lowered too far down.

Proper oral communication must exist between the sonar room and the dry dock personnel.

Procedure

1 Make sure that all power to the hull unit is disconnected.

2 Cover the opening in the installation trunk with a solid wooden or steel plate to protect the transducer.

3 Do a close visual inspection of the blister and the hull plating close to the installation trunk.

   a Remove marine growth.

   b Apply anti-fouling paint to protect the hull plating and prevent marine growth.

   c Make sure that all surfaces are protected with a high quality coating.

4 Access the inside of the installation trunk.

5 Do a close visual inspection of the inside of the installation trunk.

   a Remove marine growth.

   Note

   Do not *direct high-pressure water or sandblasting spray towards the transducer. This will damage the transducer beyond repair.*

   b Apply anti-fouling paint.

   c Make sure that the inside of the installation trunk is properly protected with coating.

6 Use the hand crank to hoist the transducer.

7 While hoisting, make sure that you have ample space between the transducer and the inside wall of the installation trunk.

Inspecting and cleaning the transducer face

Marine growth (biological fouling) on the transducer face reduces the performance. For this reason, it is important to keep the transducer face clean. Every time your vessel is in dry dock, you must remove the marine growth. At the same time, you must inspect the transducer closely for physical damage.

Prerequisites

The vessel is in dry dock. The CS90 system is turned off. The following tools and consumables are required:

- Personal protection
- Fresh water
- Plastic brush
- Mild synthetic detergent
- Piece of wood or plastic without sharp corners

Two persons are needed to do the task.

- One person must stay in the sonar room to operate the hull unit.
- One person must stay in the dry dock, under the hull, to make sure that the transducer is not lowered too far down.

Proper oral communication must exist between the sonar room and the dry dock personnel.

Context

During normal use, the transducer is subjected to biological fouling. If this marine growth is excessive, it will reduce the overall performance of your system. Whenever opportunity arise, typically when the vessel is dry-docked, the transducer face must be

cleaned for shells and other marine growth. It is important to check the transducer for physical damage. Any cracks, fractures or holes in the red protective coating may result in a water leak, and a leak may cause irreparable damage to the transducer.

A transducer must always be handled as a delicate instrument. Incorrect actions may damage the transducer beyond repair. A physical blow to the transducer face may easily damage one or more elements. Observe these transducer handling rules:

- **Do not** activate the transducer when it is out of the water.
- **Do not** handle the transducer roughly. Avoid impacts.
- **Do not** expose the transducer to direct sunlight or excessive heat.
- **Do not** damage the outer protective skin of the transducer.
- **Do not** use high-pressure water, sandblasting, metal tools or strong solvents to clean the transducer.
- **Do not** step on the transducer cables.
- **Do not** damage the transducer cables. Avoid exposure to sharp objects.

Procedure

1 Make sure that all power to the hull unit is disconnected.

2 Make sure that you have sufficient height between the hull and the dry dock floor.

3 Lowering the transducer

a Use a spanner to open the door on the Motor Control Unit.

WARNING

High voltages are used. This equipment must be serviced only by qualified personnel familiar with high-voltage equipment and the potential hazards involved. Failure to observe this precaution could result in bodily injury. You may be exposed to electric shock. Read and understand the applicable first aid instructions related to electric shock.

b Locate the **Motor Protecting Switch** (S301).

c Deactivate the **Motor Protecting Switch** (S301) by pressing the operating handle to *OFF*.

d Locate the hand crank inside the Motor Control Unit.

e Remove the hand crank from its storage position.

f Remove the plastic plug on the top cover of the hull unit.

g Mount the hand crank onto the stub shaft through the hole in the top cover.

h Locate the brake release screw on the motor.

i Use an 4 mm Allen key to rotate the screw clockwise until the motor brake is released.

j Turn the crank until the transducer is fully lowered.

4 Allow for sufficient access to clean and inspect the entire surface of the transducer.

5 Remove biological fouling carefully using a plastic brush, a suitable synthetic detergent and fresh water.

Biological material which is strongly rooted in the substrate can be removed carefully with a piece of wood or plastic. If required, you can also use citric acid. Apply, leave it working for several hours, and rinse thoroughly with fresh water.

Be careful so that you do not accidentally make cuts or inflict other physical damage to the transducer face.

Note

Do not *use high-pressure water, sandblasting, metal tools or strong solvents to clean the transducer.* ***Do not*** *damage the outer protective skin of the transducer.*

6 Allow the transducer surface to dry.

7 Do a thorough visual inspection of the transducer.

Inspect it closely for any signs of dents, cracks, fractures or holes. If you find suspicious damage, take high resolution photos that show the damage, and contact Kongsberg Discovery support for advice.

8 Hoisting the transducer

a Turn the crank until the transducer is fully retracted.

b Loosen the brake release screw to engage the motor brake.

c Check with the hand crank to ensure that the motor brake is engaged.

d Remove the hand crank from the stub shaft, and mount it in its storage position in the Motor Control Unit.

e Activate the **Motor Protecting Switch** (S301) by pressing the operating handle to *ON*.

f Make sure that the **Hoist/Lower Switch** is set to *REMOTE*.

Note

For normal operation from the Operating Panel, the switch must be set to REMOTE.

g Close the door on the Motor Control Unit.

Painting the transducer face

Marine growth (biological fouling) on the transducer face reduces the performance. We suggest that you paint the transducer face immediately after installation, and then again as often as required to maintain the protection. It is particularly important to do this if you operate in waters with a lot of marine growth.

Prerequisites

The vessel is in dry dock. The CS90 system is turned off. The following tools and consumables are required:

- Personal protection
- Fresh water
- Plastic brush + Mild synthetic detergent
- Fine-grade sandpaper (240 inch grit size)
- Primer
- Anti-fouling paint
- Wet film gauge
- Airless spray

Note

Because some paint types may be aggressive to the polymer in the transducer, consult our list of approved anti-fouling paints.

Two persons are needed to do the task.

- One person must stay in the sonar room to operate the hull unit.
- One person must stay in the dry dock, under the hull, to make sure that the transducer is not lowered too far down.

Proper oral communication must exist between the sonar room and the dry dock personnel.

Context

The transducer is not designed with any protection against biological fouling. Anti-fouling paint may therefore be applied to the transducer face. To minimize the negative acoustical effects the layer of anti-fouling paint must be as thin as possible.

Note

The use of anti-fouling paint will reduce the acoustical performance of the transducer. The properties of the transducer face combined with the thickness of the anti-fouling paint can also affect the overall performance. Kongsberg Discovery cannot be held responsible for any negative consequences of the anti-fouling paint.

Observe the relevant instructions and safety information provided by the paint manufacturer.

Procedure

1 Make sure that all power to the hull unit is disconnected.

2 Make sure that you have sufficient height between the hull and the dry dock floor.

3 Lowering the transducer

a Use a spanner to open the door on the Motor Control Unit.

WARNING

High voltages are used. This equipment must be serviced only by qualified personnel familiar with high-voltage equipment and the potential hazards involved. Failure to observe this precaution could result in bodily injury. You may be exposed to electric shock. Read and understand the applicable first aid instructions related to electric shock.

b Locate the **Motor Protecting Switch** (S301).

c Deactivate the **Motor Protecting Switch** (S301) by pressing the operating handle to *OFF*.

d Locate the hand crank inside the Motor Control Unit.

e Remove the hand crank from its storage position.

f Remove the plastic plug on the top cover of the hull unit.

g Mount the hand crank onto the stub shaft through the hole in the top cover.

h Locate the brake release screw on the motor.

i Use an 4 mm Allen key to rotate the screw clockwise until the motor brake is released.

j Turn the crank until the transducer is fully lowered.

4 Clean the transducer thoroughly.

Make sure that you remove all oil grease residues, as well as salt and other contamination.

5 Allow the transducer surface to dry.

6 Abrade the transducer surface using a sanding paper with 240 inch grit size.

Do not exceed a surface roughness (R_{max}) of 35 microns as this can influence the transducer performance.

7 Remove all dust.

8 Apply the primer, and let it dry.

9 Apply the paint.

Observe the instructions provided by the paint manufacturer. Use airless spray. Apply the minimum specified film thickness per coat and for the complete layer. It is not possible to measure dry film thickness on transducer surface. You must therefore use a wet film gauge to frequently measure the paint thickness.

Note

We strongly recommend that you do not use a paintbrush and/or a roller.

10 Allow the paint to dry.

11 Hoisting the transducer

a Turn the crank until the transducer is fully retracted.

b Loosen the brake release screw to engage the motor brake.

c Check with the hand crank to ensure that the motor brake is engaged.

d Remove the hand crank from the stub shaft, and mount it in its storage position in the Motor Control Unit.

e Activate the **Motor Protecting Switch** (S301) by pressing the operating handle to *ON*.

f Make sure that the **Hoist/Lower Switch** is set to *REMOTE*.

Note

For normal operation from the Operating Panel, the switch must be set to REMOTE.

g Close the door on the Motor Control Unit.

Further requirements

The contractor or shipyard must keep a daily paint log recording all relevant information from the surface treatment.

Inspecting and replacing sacrificial anodes

Sacrificial anodes are used to protect the hull unit and the installation trunk from corrosion. They are mounted under the mounting flange at the top of the installation trunk. Additional sacrificial anodes may have been mounted by the shipyard during the installation of the CS90 system.

Prerequisites

The vessel is in dry dock. The CS90 system is turned off. No special tools are required for this task. If the sacrificial anodes need to be replaced, you will need the necessary spare items as well as mounting materials. Contact your local dealer or distributor, or the Kongsberg Discovery support organization, for spare parts.

- **Kongsberg Discovery part number**: 629-204660
- Mounting bolts: M8x40
- Spring lock washers
- Nuts

Two persons are needed to do the task.

- One person must stay in the sonar room to operate the hull unit.
- One person must stay in the dry dock, under the hull, to make sure that the transducer is not lowered too far down.

Proper oral communication must exist between the sonar room and the dry dock personnel.

Context

Sacrificial anodes are slowly disintegrating during normal wear and tear. They must be inspected whenever the vessel is in dry dock. If the sacrificial anodes are damaged or severely corroded you must replace them. We recommend that the sacrificial anodes are replaced when 1/3 of their bodies have been spent.

Procedure

1 Make sure that all power to the hull unit is disconnected.

2 Access the location of the sacrificial anodes.

They are mounted under the mounting flange at the top of the installation trunk.

Accessing the inside of the installation trunk, page 281

3 Inspect the physical conditions of the sacrificial anodes.

Check for damage and corrosion.

4 Replace the anodes if they are severely corroded.

Lubricating the hoisting spindle

The hoisting spindle is positioned between the gantry and the transducer shaft. The top of the transducer shaft is mounted to the hoisting spindle with a lifting clamp. When the hoisting spindle turns in either direction the lifting clamp moves up and down, and so does the transducer shaft with the transducer.

Prerequisites

The CS90 system is turned off. No special tools are required for this task. The following specific consumable is required for this task:

- Lubricant

  Use a machine oil that is insoluble in water, does not dry out, and can withstand the rotation without causing stains.

We recommend the following lubricant: Tonna Slideway Oil S68

- **Manufacturer**: Shell
- **Manufacturer's website**: www.shell.com
- **Kongsberg Discovery part number**: 654-078793

Context

The hull unit was lubricated as a part of the production process. It was thus provided fully lubricated when delivered to the vessel. During normal conditions, the lubricant applied will last for a long period of time. Additional lubrication of the hull unit must only take place when required.

Note

Do not use grease on the hoisting spindle. Use a machine oil that is insoluble in water, does not dry out, and can withstand the rotation without causing stains.

Procedure

1 Inspect the ball bearings on the top and the bottom of the hoisting spindle.

2 Inspect the hoisting spindle.

3 Consider whether it is necessary to lubricate the hoisting spindle.

4 Apply a thin layer of lubricant if required.

Note

Do not use excessive amounts of lubricant. If you use too much lubricant, there will be a lot of splashes and spills when the CS90 system is turned on.

Lubricating the transducer shaft sleeve

The transducer shaft sleeve is a vital part of the hull unit. It supports the transducer shaft, and allows the shaft to move down and up to lower and hoist the transducer. The transducer shaft sleeve is filled with grease. The grease ensures that the vertical movement of the transducer shaft is not limited by friction. The grease also ensures that the entire construction is waterproof.

Prerequisites

The CS90 system is turned off. No special tools are required for this task. The following specific consumable is required for this task:

- Grease

  Use an industrial grease designed for heavy-duty applications. The grease must provide efficient protection against rust and corrosion, and resist water washout.

We recommend the following lubricant: Mobil Mobilux EP 2

- **Manufacturer**: Mobil
- **Manufacturer's website**: https://www.mobil.com
- **Kongsberg Discovery part number**: 654-079835

Context

The hull unit was lubricated as a part of the production process. It was thus provided fully lubricated when delivered to the vessel. During normal conditions, the lubricant applied will last for a long period of time. Additional lubrication of the hull unit must only take place when required.

Caution

Open the pressure relief plug before adding grease!

Procedure

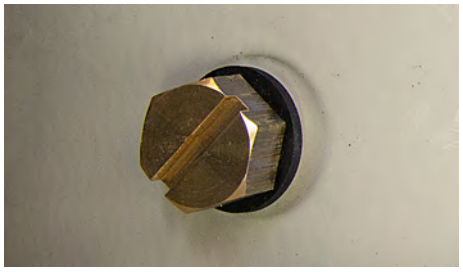
1 Inspect the hull unit for water intrusion.

2 Consider whether it is necessary to add grease to the transducer shaft sleeve.

Adding grease to the transducer shaft sleeve is only required if the shaft is dry, or if water forces its way up along the shaft.

3 Open the pressure relief plug.

You do not need to remove the pressure relief plug completely. It has a groove that allows excess lubricant to drain out.



4 Connect a grease gun to the nipple and add grease.

Note

Do not use excessive amounts of lubricant.
If you add too much grease you may damage the internal bearings. Such damage may result in a large water leak, and it may cause the hull unit to malfunction.

5 Stop applying lubrication when excess grease leaks out of the pressure relief plug.

6 Close the pressure release plug firmly.

Accessing the inside of the installation trunk

Topics

Accessing the installation trunk by lowering the transducer, page 281

Accessing the installation trunk by lifting the hull unit, page 283

Accessing the installation trunk by lowering the transducer

To do a visual inspection of the inside surface of the installation trunk you need access. Access is also required to inspect and or replace the sacrificial anodes. This access can be achieved by lowering the transducer as far as it goes.

Prerequisites

The vessel is in dry dock. The CS90 system is turned off. The shipyard must provide all necessary tools and manpower.

You need a suitable screwdriver or a large coin to open the Motor Control Unit cabinet. You also need a 4 mm Allen key.

Two persons are needed to do the task.

- One person must stay in the sonar room to operate the hull unit.
- One person must stay in the dry dock, under the hull, to make sure that the transducer is not lowered too far down.

Proper oral communication must exist between the sonar room and the dry dock personnel.

Context

On larger hull units, the hoist motor is provided with a motor brake. The motor brake must be released before the transducer is manually lowered or hoisted.

Note

When not in use, the hand crank must always be placed inside the Motor Control Unit. When removed from its storage position the hand crank releases a safety switch which disables hull unit operation.

The transducer is covered with a thick red or black protective coating made of a special plastic type. The protective coating is a vital part of the transducer. It is very important that neither this coating nor the internal parts of the transducer are damaged during the handling, installation or cleaning. Any holes and/or scratches in the transducer surface will allow water to penetrate the transducer. If a leak occurs, the transducer must be replaced.

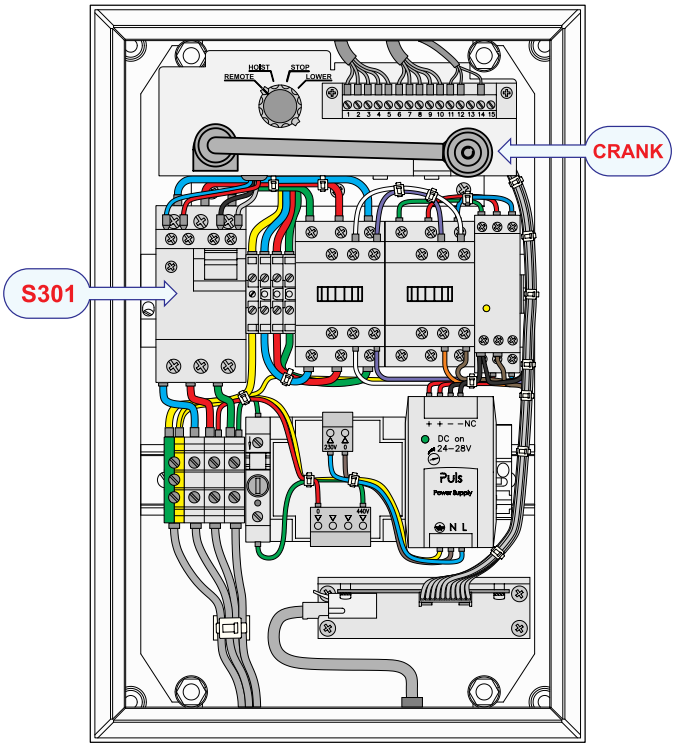
Procedure

1 Make sure that the CS90 system is turned off.

2 Make sure that you have sufficient height between the hull and the dry dock floor.

3 Lowering the transducer

a Use a spanner to open the door on the Motor Control Unit.



WARNING

High voltages are used. This equipment must be serviced only by qualified personnel familiar with high-voltage equipment and the potential hazards involved. Failure to observe this precaution could result in bodily injury. You may be exposed to electric shock. Read and understand the applicable first aid instructions related to electric shock.

b Locate the **Motor Protecting Switch** (S301).

c Deactivate the **Motor Protecting Switch** (S301) by pressing the operating handle to *OFF*.

d Locate the hand crank inside the Motor Control Unit.

e Remove the hand crank from its storage position.

f Remove the plastic plug on the top cover of the hull unit.

g Mount the hand crank onto the stub shaft through the hole in the top cover.

h Locate the brake release screw on the motor.

i Use an 4 mm Allen key to rotate the screw clockwise until the motor brake is released.

j Turn the crank until the transducer is fully lowered.

4 Hoisting the transducer

a Turn the crank until the transducer is fully retracted.

b Loosen the brake release screw to engage the motor brake.

c Check with the hand crank to ensure that the motor brake is engaged.

d Remove the hand crank from the stub shaft, and mount it in its storage position in the Motor Control Unit.

e Activate the **Motor Protecting Switch** (S301) by pressing the operating handle to *ON*.

f Make sure that the **Hoist/Lower Switch** is set to *REMOTE*.

Note

For normal operation from the Operating Panel, the switch must be set to REMOTE.

g Close the door on the Motor Control Unit.

Accessing the installation trunk by lifting the hull unit

To do a visual inspection of the inside surface of the installation trunk you need access. Access is also required to inspect and or replace the sacrificial anodes. This access can be achieved by lifting the entire hull unit up from the installation trunk.

Prerequisites

The vessel is in dry dock. The CS90 system is turned off. The shipyard must provide all necessary tools and manpower. The following specific items are required for this task:

- Torque wrench
- A crane (or other lifting device) capable of lifting the entire hull unit

  The lifting device must be rated to minimum twice the weight of the hull unit. An attachment point for the lifting device must be located directly above the hull unit.

Spare parts:

- Rubber gasket (Part number xxxxxx)

  (Where used: Hull Unit CS90)
- O-ring (Part number)

  (Where used: Hull Unit CS94)

Context

The upper parts of the hull unit include the mechanical gantry, the hoist motor, the hoisting spindle and the Motor Control Unit. The transducer shaft is supported by the

gantry, and penetrates the mounting flange. The transducer cable is placed inside the transducer shaft. The transducer is mounted to the bottom of the transducer shaft. The complete assembly is mounted on the top of the installation trunk.

Note

The hull unit is heavy. Appropriate lifting equipment (lifting tackle, portable crane or ship's crane) is required. You must always use appropriate lifting equipment to minimize risk of injury to personnel or damage to equipment. Only certified equipment must be used.

The upper parts of the hull unit include the mechanical gantry, the hoisting motor, the hoisting spindle and the junction box. The transducer shaft is supported by the gantry, and penetrates the mounting flange. The transducer cable is placed inside the transducer shaft. The transducer is mounted to the bottom of the transducer shaft. The complete assembly is mounted on the top of the installation trunk.

Procedure

1 Make sure that the CS90 system is turned off.

2 Preparations:

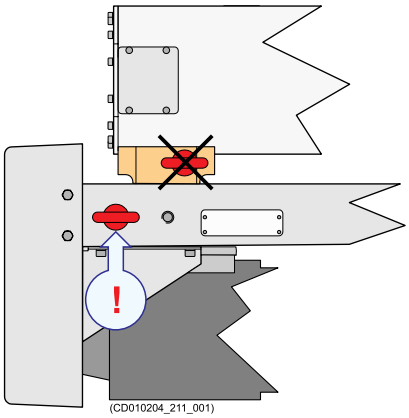
   a Make sure that none of the cables prevent you from lifting the hull unit.

   Disconnect relevant cables.

   b Fasten the lifting tackle to the two lifting eye bolts on either side of the top of the gantry.

   Note

   Make sure that you use the correct lifting eyes! There are two lifting eyes on each side of the hull unit. One is located on the top of the gantry, and one on the top of the transducer shaft. Make sure that you use the lifting eyes on the gantry!



   c Take up the slack.

3 Loosen and remove the bolts that secure the mounting flange to the top of the installation trunk.

4 Lift the hull unit.

   Make sure that you do not damage the delicate parts of the hull unit.

Note

Make sure that you do not damage the transducer or any of the cables. Watch the hull unit carefully during the lift to prevent the delicate parts from being damaged, stuck or hooked on to protruding objects.

5 Remove the rubber gasket to protect it.

Note

This gasket must not be damaged.

Mounting the hull unit on top of the installation trunk:

6 Lift the hull unit and place it vertically over the installation trunk.

7 Check the top of the installation trunk.

a Make sure that the surface of the installation trunk is clean and free from grit or other damaging particles.

b Make sure that the top of the installation trunk has not been damaged, and that it is smooth and even without physical scratches or dents.

8 Rubber gasket:

a Make sure that the gasket is undamaged without cracks or signs of wear.

b Make sure that the gasket is NOT covered with grease or lubricants.

c Place the gasket at its correct location.

Note

If you suspect that the gasket is damaged, replace it. If the gasket has been contaminated with dirt, grease or lubricants, it must be replaced.

9 Lower the hull unit carefully onto the installation trunk.

Important

The transducer is covered with a thick red or black protective coating made of a special plastic type. The protective coating is a vital part of the transducer. It is very important that neither this coating nor the internal parts of the transducer are damaged during the handling, installation or cleaning.

10 Align the mounting holes carefully.

11 Mount and tighten the relevant nuts and bolts.

First, tighten all the nuts to finger tight. Then work alternately on opposite sides of the construction.

Use the following torque: 140 Nm

User interface

Topics

User interface familiarization, page 287

Top bar, page 289

Replay bar description, page 305

Sonar views, page 307

Using markers in the CS90 user interface, page 350

Using target and position tracking, page 362

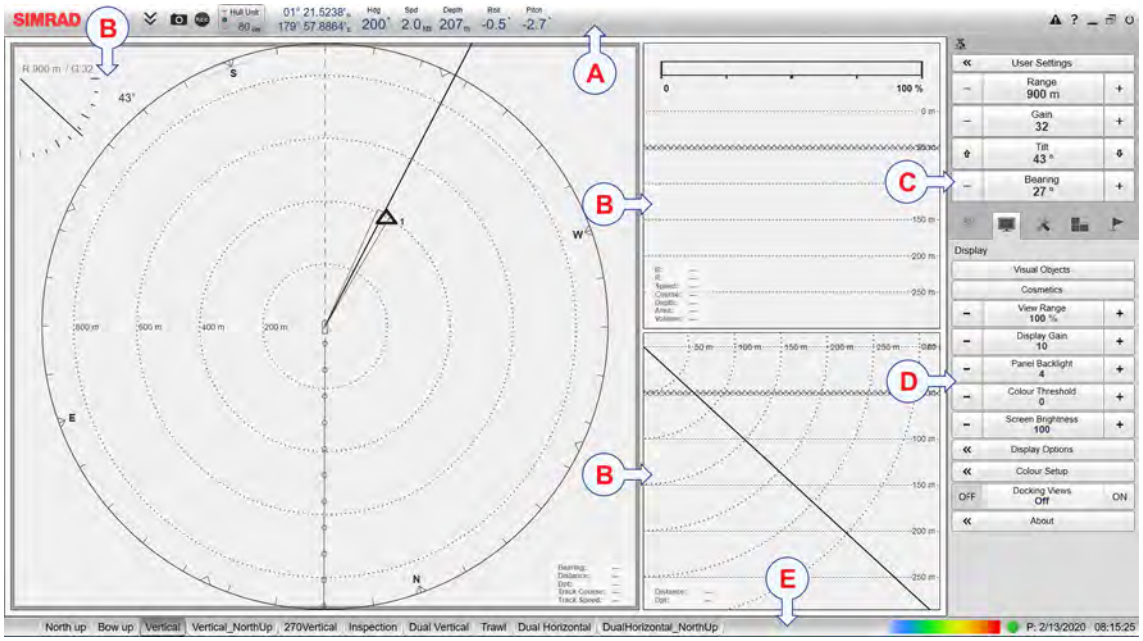
Information panes, page 368

Bottom bar, page 377

User interface familiarization

By default, the display presentation covers the entire screen. The display presentation provided by the CS90 system consists of specific visual elements that work together. The visual elements provide you with the echo information you need, they help you to control the functionality needed to understand this information, and finally, they allow you to control the operational parameters.

This screen capture shows you a typical data replay situation. The presentation provides you with a lot of information. You can see several rectangular sonar views presenting sonar echo data in different ways. The top bar shows you navigational information, and offers buttons for key functions and information panes. The menu system on the right side gives you easy access to all the functionality.



(A) Top Bar

The top bar is located at the top of the display presentation and stretches from the far left to the far right. The top bar gives you fast access to key functionality and navigational information. It provides buttons for hiding and showing the menu, making screen captures, opening the **Messages** dialog box, and opening context-sensitive help. And more importantly, from the top bar you can see when data recording is active.

(B) Replay bar

During replay, the dedicated replay bar is shown immediately under the top bar. The replay bar allows you to retrieve saved files, and to control the playback.

(C) Sonar views

Different sonar views are provided. Combinations of these views are organized in *presentation modes* selectable on the bottom bar.

(D) Information panes

The CS90 system offers several *information panes* to provide additional and detailed data from the presentations. The information panes are opened and closed from the top bar. You can change the appearance of the information panes to suit your preferences. You can change the transparency and the physical size of each pane.

(E) Main menu

The **Main** menu is located at the top of the menu structure. It offers the most common functions for efficient use of the CS90 system. By default, the **Main** menu is open. It is placed on the right side of the display presentation. On the top bar, use **Menu** to hide or show the menu.

(F) Secondary menus

The icons for opening (and closing) the secondary menus are located under the **Main** menu. Select an icon to open the relevant menu. Select it one more time to close the menu.

(G) Bottom Bar

The bottom bar is located at the bottom of the display presentation and stretches from the left side to the right side. The tabs on the bottom bar allow you to choose presentation mode. All echoes offered by the CS90 system are shown in rectangular *views*. Combinations of these views are organized in *presentation modes*. Each presentation mode offered by the CS90 system provides a selection of views in a predefined pattern.

The bottom bar also presents the current colour scale, as well as time and date. You can further monitor the operational status of the transceiver.

Top bar

Topics

Top bar overview, page 289
Logo and product name, page 291
Menu, page 291
Screen Recording, page 292
Screen Capture, page 293
Record, page 294
Hull Unit, page 295
Information panes overview, page 296
Navigational information, page 298
Messages, page 302
Help, page 302
Operating system functions, page 303

Top bar overview

The top bar is located at the top of the display presentation and stretches from the far left to the far right. The top bar gives you fast access to key functionality and navigational information. It provides buttons for hiding and showing the menu, making screen captures, opening the **Messages** dialog box, and opening context-sensitive help. And more importantly, from the top bar you can see when data recording is active.

From left:

Logo and product name

This information identifies the brand and the product.

Menu

Select this button to hide or show the menu.

Screen Recording

The **Screen Recording** function allows you to record and save the echo presentation as a video file. Select **Screen Recording** on the top bar to start and stop the recording.

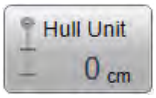
Screen Capture

Select **Screen Capture** to make a copy of the entire display presentation.

Record

The **Record** indicator shows you when recording is active.

Hull Unit



Hull Unit is located on the left side of the top bar. Select it to open the **Hull Unit Control** dialog box.

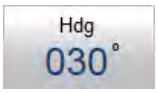
Information panes

The CS90 system offers several *information panes* to provide additional and detailed data from the presentations. The information panes are opened and closed from the top bar. The information pane is only available when an *Inspection* view is "active".

Geographical position read-out

The information shown on the top bar must not be used for vessel navigation.

Sensor read–outs



These fields are separate read-outs. They present information related to the navigation of the vessel and operation of the CS90 system.

Messages

By flashing, **Messages** shows you that the CS90 system has issued a message. The colour of the triangle reflects the severity of the most serious message. Select to open the **Messages** dialog box.

Help

Help is located on the right side of the top bar. Select this button to open the context sensitive on-line help. The help system opens on its start page.

Operating system buttons

Select to open the context-sensitive help, to minimize and maximize the presentation window, and to close the CS90 program.

Related topics

User interface, page 286
Top bar, page 289

Logo and product name

The brand logo and product name are shown on the left side of the top bar.

Description

This information identifies the brand and the product.

Double-click the logo to reduce the size of the CS90 system presentation. Double-click one more time to return to full screen presentation.

Related topics

User interface, page 286
Top bar, page 289

Menu

Menu is located on the left side of the top bar. This is an "on/off" function.

Description

Unless you need to make frequent changes to the operating parameters, you may want to hide the menu from the display presentation. This gives you more space for echo information.

To hide the menu, select **Menu** on the top bar. To retrieve the menu, select **Menu** one more time. When the menu is hidden, it is temporarily shown on the left or right side of the display presentation if you move the cursor to that position.

Related functionality

Menu on the Right Side

The **Menu on the right side** option is provided in the **Display Options** dialog box. Select this option to place the menu system on the right side of the display presentation. This is the default setting. By deselecting this function, the entire menu system is placed permanently on the left side of the display presentation.

Operating Panel (Mk1)

The Mk1 Operating Panel offers a dedicated **Menu** button. *(The Mk1 Operating Panel is no longer provided with new sonars. This information is provided for legacy reasons.)*

Related topics

Hiding the menu system, page 155
User interface, page 286
Top bar, page 289
General page, page 537

Screen Recording

The **Screen Recording** function allows you to record and save the echo presentation as a video file. Select **Screen Recording** on the top bar to start and stop the recording.

Everything that happens in the presentation is recorded. This includes echoes, menus, dialog boxes and cursor movements. Each screen recording you make is saved in `.mp4` format on the Processor Unit hard disk. The file name reflects the current date and time.

Note

Video data files will normally become very large. If you wish to record large amounts of data, make sure that you have enough space on your hard disk. Unless your Processor Unit is equipped with a very large disk, we recommend that you save the data to an external storage device.

Related functionality

Screen Recording page

Use the **Screen Recording** page to define where the video files are saved. This page is located in the **Output** dialog box. This dialog box is opened from the **Operation** menu.

System Protection page

The **Screen Recording** protection stops the recording automatically when the transducer is hoisted to its upper position. The **Timer** function stops the recording automatically when the specified time has elapsed. This page is located in the **Installation** dialog box. To open the page, select **Installation** on the **Setup** menu.

Operating Panel page

The Operating Panel offers all necessary control functions for normal operation. It further allows you to assign certain functions to dedicated buttons and switches. The Mk2 Operating Panel is fitted with three function buttons. The Mk3 Operating Panel is fitted with two rotary switches. Each of these can be assigned a specific function.

Select **Screen Recording** to start and stop the recording from the Operating Panel.

This page is located in the **Installation** dialog box. To open the page, select **Installation** on the **Setup** menu.

Related topics

Capturing the display presentation in image and video files, page 133
User interface, page 286
Top bar, page 289
Screen Recording page, page 532
System Protection page, page 607

Screen Capture

While using the CS90 system you may wish to make a screen capture to save an instantaneous copy of the current presentation.

Select **Screen Capture** to make a copy of the entire display presentation. Each screen capture you make is saved in `.jpg` format on the Processor Unit hard disk.

Related functionality

Screen Captures dialog box

You can choose either a single screen capture or a sequence with multiple screen captures. This dialog box is opened from the **Setup** menu.

Operating Panel

You can also use the **Screen Capture** button on the Operating Panel.

Note

Operating Panel (Mk1): Press **Record** *to make a screen capture.*

Related topics

Capturing the display presentation in image and video files, page 133
User interface, page 286
Top bar, page 289
Screen Captures File Location page, page 534

Record

A useful function of the CS90 system is it ability to record echo data. Use the raw data recording functionality provided by the CS90 system to save echo data using the `*.raw` format. You can save the data to the hard disk, or onto an external storage device. The data files can be played back on the CS90 system. The data files can later be deleted, copied or moved to another storage device.

Description

The indicator is red when recording is in progress.

Note

The data files will normally become very large. If you wish to record large amounts of data, make sure that you have enough space on your hard disk. The CS90 system is not provided with unlimited disk capacity. We recommend that you save the data files to an external storage device.

Tip

Use the processed data recording function provided by the CS90 system to record processed echo data.

Related functionality

Replay bar

During replay, the dedicated replay bar is shown immediately under the top bar. The replay bar allows you to retrieve saved files, and to control the playback.

Record RAW function

The **Record RAW** button allows you to start and stop recording, split the current recording file (if it gets too large), and set up the file output parameters. Once all the recording parameters have been defined, you can start recording by clicking the

red circle on the button, and stop it by clicking the left rectangle. **Record RAW** is located on the **Operation** menu.

Recording dialog box

When the recording is stopped, the **Recording** dialog box opens automatically. Use the **Recording** dialog box to add metadata to your recording.

File Setup page

The **Output** dialog box on the **Operation** menu allows you to set up the recording parameters. To define which disks and folders to use to save the data files, select **File Setup**. Set up the file and folder parameters before you start the recording. If you wish to save your recorded data on an external hard disk, make sure that it is connected to the Processor Unit.

System Protection page

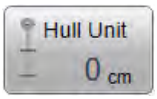
The **Recording** protection stops the recording automatically when the transducer is hoisted to its upper position. The **Timer** function stops the recording automatically when the specified time has elapsed. This page is located in the **Installation** dialog box. To open the page, select **Installation** on the **Setup** menu.

Related topics

Replay bar description, page 305
User interface, page 286
Top bar, page 289
Record RAW function, page 436
File Setup page, page 519
System Protection page, page 607
Recording dialog box, page 500

Hull Unit

Hull Unit is located on the left side of the top bar. Select it to open the **Hull Unit Control** dialog box.



Description

The **Hull Unit Control** dialog box allows you to lower and hoist the transducer. The dialog box also provides status information about the transducer position. You can monitor the current position of the transducer and make changes to the position defaults. The current position of the transducer is shown on the top bar. The colour is used to provide status information.

- Red colour: The hull unit is disconnected.

- Green colour: The hull unit is connected and available for use.
- Grey colour: The hull unit is connected and in use.

A warning message is displayed if a malfunction occurs while you are lowering or hoisting the transducer. Select **Acknowledge** to accept the message. Investigate the cause of the error message before you proceed.

Tip

Retracting the transducer to a middle position may be useful if you use the CS90 system simultaneously with other sonars. If you have the large hull unit you can define two middle positions.

Related functionality

Select **Hull Unit** on the top bar to open the **Hull Unit Control** dialog box.

The **Hull Unit Control** dialog box allows you to lower and hoist the transducer. The dialog box also provides status information about the transducer position. You can monitor the current position of the transducer and make changes to the position defaults.

Related topics

User interface, page 286
Top bar, page 289
Hull Unit Control dialog box, page 514

Information panes overview

The CS90 system offers several *information panes* to provide additional and detailed data from the presentations. The information panes are opened and closed from the top bar. The information panes are only available when an *Inspection* view is "active".

Before you open an information pane, you must first click in an *Inspection* view to make it "active".

Select the relevant information pane on the top bar to open it. In most cases, the data in the information pane are only valid for the selected view. To *close* the information pane, select it one more time on the top bar. You can also select **Close** in the top right corner of the pane.

The CS90 system offers the following information panes (from left):

Biomass

The *Biomass* information pane displays an index of the biomass in the in the current *Inspection* view. The biomass index is the s_A value, or *Nautical area scattering coefficient* (NASC), measured with unit m^2/nmi^2.

Size Distribution

The *Size Distribution* information pane presents a histogram with the echoes from single fish. The calculations are based on the fact that different fish species have different echo strength. The echo strength also depends on the operating frequency you use. The histogram presents the actual size of the fish by weight, length or echo strength (shown in dB).

Fish Position

The *Fish Position* information pane shows the position of the detected single fish echoes. The three circles in the information pane identify the operational frequencies. The dotted inner circle identifies the low frequency in the sweep. The outer dotted circle identifies the high frequency. The circle between them identifies the centre frequency.

The echoes are seen from above. The colours used are the same as the colours used in the colour scale, and these indicate the echo strength from each fish.

Zoom

The *Zoom* information pane allows you to magnify a chosen area of the current *Inspection* view. Once the *Zoom* information pane is opened, the zoomed area is shown as a dotted rectangle in the view. You can change the size of the zoomed area, and you can move the rectangle anywhere inside the active view.

Related topics

User interface, page 286
Top bar, page 289

Navigational information

The navigational information is located in the middle of the top bar. To choose which information to be displayed on the top bar, use the **Top Bar** functions in the **Display Options** dialog box. The **Display Options** dialog box is located on the **Display** menu.

These fields are separate read-outs. They present information related to the navigation of the vessel and operation of the CS90 system.

Note

The information shown on the top bar must not be used for vessel navigation.

The following colours are used to indicate the quality of the information:

- **Blue**: The information is good.
- **Yellow**: The information contains manually overwritten values.
- **Red**: The input from the relevant sensors is missing.

Tip

Which navigation elements to see on the top bar is selected in the **Display Options** *dialog box. To set up the various operational parameters related to navigational inputs, open the* **Installation** *dialog box, and investigate the functionality related to sensor interfaces.*

Topics

Geographical position read-out, page 298

Heading read-out, page 299

Speed read-out, page 300

Bottom Depth read-out, page 301

Motion read-outs (roll and pitch), page 301

Geographical position read-out

When enabled, the vessel's current geographical position is shown on the top bar.

Prerequisites

To see this information on the top bar, you must enable it by using the **Top Bar** functions in the **Display Options** dialog box. Select **General** to open the page. The **Display Options** dialog box is located on the **Display** menu.

Description

If a positioning sensor (GPS) is connected to the CS90 system, the top bar can show you the vessel's geographical position in longitude and latitude.

Note

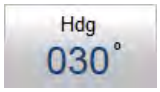
The information shown on the top bar must not be used for vessel navigation.

Related topics

User interface, page 286
Top bar, page 289
General page, page 537

Heading read-out

When enabled, the vessel's current heading is shown on the top bar.



To see this information on the top bar, you must enable it by using the **Top Bar** functions in the **Display Options** dialog box. Select **General** to open the page. The **Display Options** dialog box is located on the **Display** menu.

If a heading sensor (gyro compass) is connected to the CS90 system, the top bar may show you the vessel's current heading.

Note

The information shown on the top bar must not be used for vessel navigation.

You can set up datagram priorities for both heading and course information on the **Sensor Configuration** page. When enabled, the vessel's current heading is shown on the top bar. If the information from the heading sensor fails, the top bar will change to present the course information instead.

Related functionality

General page (Display Options dialog box)

The **General** page in the **Display Options** dialog box controls the location of the menu. You can select which navigational information to be shown on the top bar. You can also choose to see Coordinated Universal Time (UTC) at the bottom of the presentation.

Sensor Configuration page (Installation dialog box)

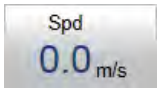
With multiple sensors connected to the CS90 system, many of them will provide the same datagrams. We cannot expect that these datagrams provide the same information. The **Sensor Configuration** page allows you to define a datagram

priority, so that the information from the "most reliable" sensor is used by the CS90 system. You can also define manual values in case a sensor is unserviceable, or not installed.

Related topics
User interface, page 286
Top bar, page 289
General page, page 537

Speed read-out

When enabled, the vessel's current speed is shown on the top bar.



Prerequisites

To see this information on the top bar, you must enable it by using the **Top Bar** functions in the **Display Options** dialog box. Select **General** to open the page. The **Display Options** dialog box is located on the **Display** menu.

Description

Provided that a speed log sensor is interfaced to the CS90 system, the vessel's current speed can be presented in the user interface.

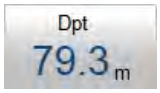
Tip

By default, the vessel speed is shown in knots. You can change the unit of measurement on the **Units** *page. The* **Units** *page is located in the* **Installation** *dialog box.*

Related topics
User interface, page 286
Top bar, page 289
General page, page 537

Bottom Depth read-out

If enabled, the current water depth under the vessel is shown on the top bar.



Prerequisites

To see this information on the top bar, you must enable it by using the **Top Bar** functions in the **Display Options** dialog box. Select **General** to open the page. The **Display Options** dialog box is located on the **Display** menu.

Description

To see a valid depth value on the top bar, you must set up your CS90 system to import depth information from an echo sounder.

Note

The information shown on the top bar must not be used for vessel navigation.

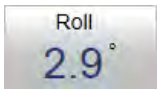
By default, the depth is shown in metres. You can change the unit of measurement on the **Units** page. The **Units** page is located in the **Installation** dialog box.

Related topics

User interface, page 286
Top bar, page 289
General page, page 537

Motion read-outs (roll and pitch)

When enabled, the navigational information on the top bar includes the vessel's current roll and pitch movements.



Prerequisites

To see this information on the top bar, you must enable it by using the **Top Bar** functions in the **Display Options** dialog box. Select **General** to open the page. The **Display Options** dialog box is located on the **Display** menu.

Description

If a suitable motion reference unit (MRU) sensor is connected to the CS90 system, the top bar can show you the vessel's current movements. The roll and pitch information is always shown in degrees.

Related topics

User interface, page 286
Top bar, page 289
General page, page 537

Messages

Messages is located on the right side of the top bar.

Description

A new message is flagged with **Messages** on the top bar. It is flashing to draw your attention. The colour of the triangle reflects the severity of the most serious message.

- **Yellow**: This indicates a warning.
- **Red**: This indicates an alarm.

If you hold the cursor over the triangle, a short list of the current messages is shown. Select to open the **Messages** dialog box.

Related functionality

Messages dialog box

The **Messages** dialog box allows you to read and acknowledge the messages.

Related topics

User interface, page 286
Top bar, page 289
Messages dialog box, page 508

Help

Help is located on the right side of the top bar.

Description

Select this button to open the context sensitive on-line help. The help system opens on its start page.

To navigate in the help file, use the menu system on the left side and the interactive links within the publication.

The context sensitive online help may not be available for the language you have chosen for the user interface. If your language is not supported, the English help is provided.

Tip

Help is also available from the various dialog boxes in the user interface. Select **Help** *[?] in the top right corner of a dialog box to open the context sensitive on-line help.*

Related topics

User interface, page 286
Top bar, page 289

Operating system functions

The operating system functions are located on the right side of the top bar. **Minimize**, **Maximize/Normalize** and **Power Off** are provided.

Minimize

Use this function to minimize the size of the application window. The application is only shown as a button on the operating system taskbar. Select the CS90 button on the operating system taskbar to restore the application window.

Maximize / Normalize

Use this function to change the size of the application window. To restore the window to its previous size, select it one more time.

Power Off

The **Power Off** dialog box offers two options. One is to turn off the entire system, the other is to only close the CS90 program.

Power Off

Power Off hoists the transducer, turns off the operating power to all units, closes the program, and then automatically turns off the Processor Unit.

Exit to Operating System

Exit to Operation System closes the CS90 program.

Related topics

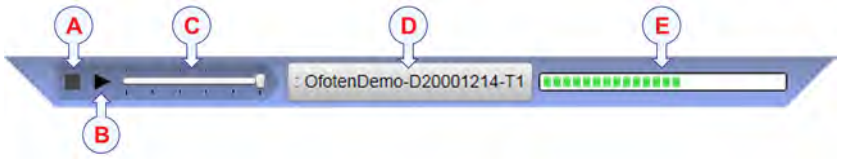
User interface, page 286
Top bar, page 289
Power Off dialog box, page 516

Replay bar description

During replay, the dedicated replay bar is shown immediately under the top bar. The replay bar allows you to retrieve saved files, and to control the playback.

How to open

The replay bar is opened automatically when **Operation** is set to *Replay*.



Description

All playback is controlled by the replay bar. During data playback, the replay offers visual monitoring of the speed and progress. You can also edit the list of replay files that are used.

(A) Stop

Select this button to stop the playback. The replay bar is not removed from the presentation until you select another operating mode.

(B) Play/Pause

Select this button to start the playback, or to pause it.

(C) Replay Speed

Select this slider and move it sideways to adjust the replay speed.

(D) Replay File

The button shows you which file you are replaying. Select the button to open the **Replay File** dialog box.

(E) Playback Progress

This bar shows you the progress of the replay sequence. If you have chosen to restart the replay file(s) automatically (in a loop), the green indicator starts from left every time the file restarts.

Related functionality

Operation function

To select *Replay* operational mode, use the **Operation** function. The **Operation** function is located on the **Operation** menu. If you wish your playback file to run continuously, select **Loop** in the **Replay File** dialog box.

Record RAW function

The **Record RAW** button allows you to start and stop recording, split the current recording file (if it gets too large), and set up the file output parameters. Once all

the recording parameters have been defined, you can start recording by clicking the red circle on the button, and stop it by clicking the left rectangle. **Record RAW** is located on the **Operation** menu.

Sonar views

Topics

Presentation modes, page 308
Horizontal view, page 309
Vertical view, page 324
Inspection view, page 331
Plane view, page 335
Echogram view, page 341
Catch view, page 343
270 Vertical view, page 345

Presentation modes

All echoes offered by the CS90 system are shown in rectangular *views*. Combinations of these views are organized in *presentation modes*. Each presentation mode offered by the CS90 system provides a selection of views in a predefined pattern. You must first find the presentation mode that meets your operational requirements, then you can change the size of the individual views.

To open a presentation mode use the relevant tab on the bottom bar.

The various views provide the graphical presentation of the sonar data. To provide the best possible visualization of the sonar data, several presentation modes are available. Together, these modes offer a flexible choice of views for a large range of user applications.

The graphical information occupies most of the display presentation. Each presentation mode offers a different combination of views. The various presentation modes selected on the bottom bar gives you different view configurations.

Related functionality

Bottom bar

If you have many presentation modes on a small display, two small arrows appear on the left side of the bottom bar. You can use these arrows to scroll the bottom bar sideways.

Presentation Modes

Use the functionality offered by the **Presentation Mode** page to choose which presentation modes to choose from. This can be useful for several reasons:

- A small display monitor may not be able to show you all the presentation mode tabs.
- You don't need to scroll.
- You can hide the presentation modes that you hardly or never use.

This page is located in the **Display Options** dialog box. The **Display Options** dialog box is located on the **Display** menu.

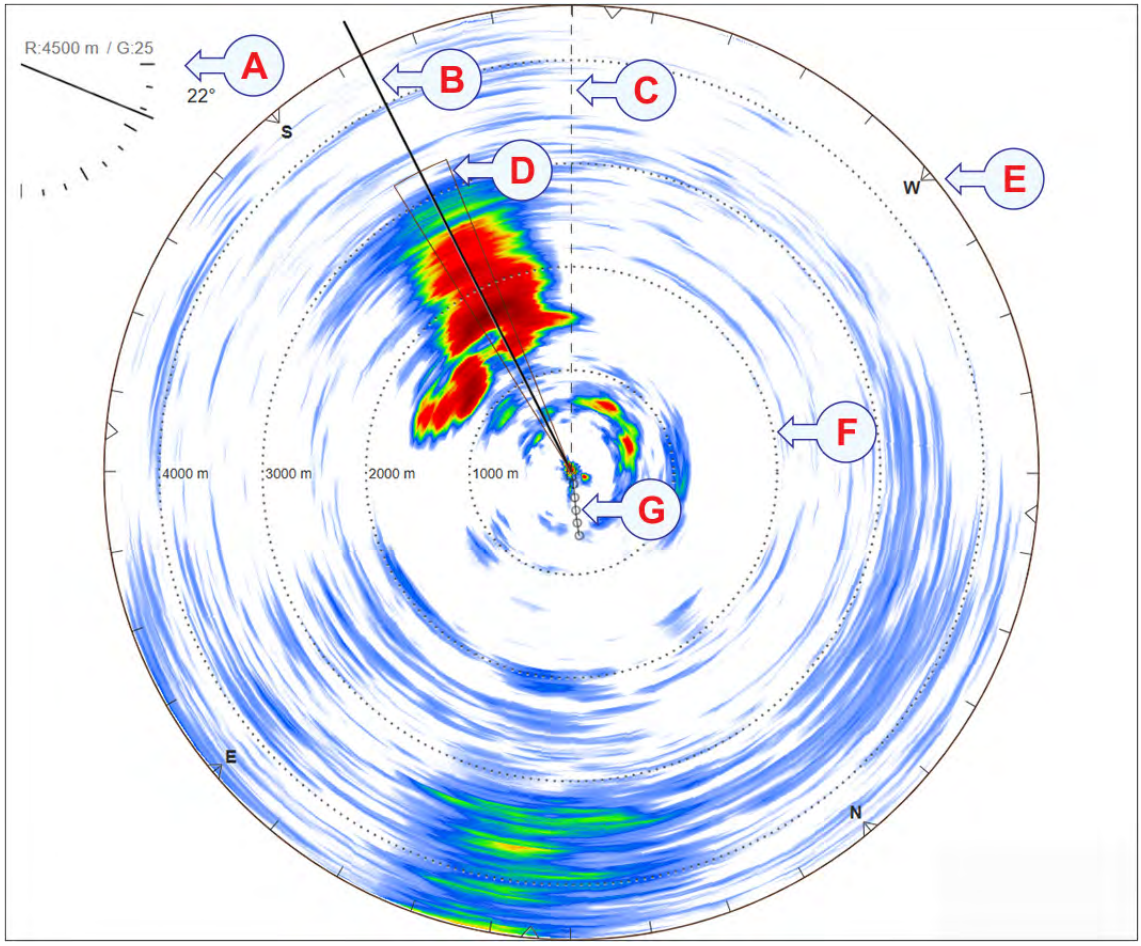
Related topics

User interface, page 286
Sonar views, page 307

Horizontal view

The *Horizontal* view presents the 360 degrees area around your vessel from a bird's eye view. The current bearing is shown with a solid line pointing out from the vessel position.

To activate the *Horizontal* view, select a suitable presentation mode on the bottom bar, then click inside the view.



A *The current settings for range, gain and tilt are shown in the upper left corner of the view.*

B *The current bearing is shown with a solid line pointing out from the vessel position.*

C *The bow marker is shown as a dotted line drawn from the bow of the vessel symbol.*

D *In the Horizontal view, the coverage plot identifies the area covered in the Vertical view.*

E *Activate **Compass Cards** to place evenly spaced compass markers on the outer range ring in horizontal views.*

F *Range rings are a set of concentric circles labelled by distance from the vessel position.*

G *The **Minute Markers** function adds markers to the history line. These markers indicate how far you have sailed in the last few minutes.*

Description

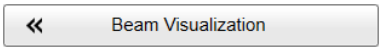
The *Horizontal* view shows the sonar beams “from the top”. The presentation of the echoes in the view is calculated based on your present course and speed combined with the movements of the target(s).

The overall presentation in the *Horizontal* view also depends on the chosen presentation mode.

- *North Up*: When you select *True North* presentation mode, north is always "straight up " in the *Horizontal* view. The vessel symbol is stationary with the bow pointing in the same direction as the current heading. If you change the ships’ heading, the compass card does not rotate.
- *Bow Up*: When you select *Bow Up* presentation mode, the vessel symbol is stationary in the middle of the *Horizontal* view. The bow is always pointing straight up. If you change the ships’ heading, the compass card will rotate to reflect this.

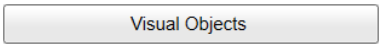
Tip

To fully understand how the beams behave in this view, use the **Beam Visualization** *dialog box. This dialog box is opened from the* **Setup** *menu.*



The **Cosmetics** *menu controls which "cosmetic" features that used.*

The **Visual Objects** *menu controls which graphical elements that are shown in the different views.*



Before you can change the settings related to a view, the view must be active. To activate a view, click in it. The active view is identified with a thicker border.

Although the presentation of the echoes is most important in this view, it also contains a number of other objects. These provide you with additional functionality, as well as information that is useful or important while using the CS90 sonar system.

Topics

Audio beam, page 311

Bearing, page 311

Bow marker, page 312

Compass cards, page 312

Course line, page 313

Coverage plot, page 313

Current vector / Current flow, page 313

Cursor, page 314

Gain, page 315

Gear symbol, page 316

Inspection views, page 317

Markers / Manual Track / Priority Marker, page 318

Minute markers / History line, page 319

Plane view, page 320

Range / Range Rings / Variable Range Ring, page 320

Shortcut menu, page 320

Target tracking, page 321

Tilt, page 322

Horizontal TX Sector / Vertical TX Sector, page 323

User settings, page 323

Audio beam

The solid bearing line in the *Horizontal* view controls the audio beam.

If you have two *Horizontal* views, the solid line in the *Horizontal 1* view controls the audio beam.

Related topics

User interface, page 286
Sonar views, page 307
Horizontal view, page 309

Bearing

The current bearing is shown with a solid line pointing out from the vessel position. You can change the angle by means of the **Bearing** function on the **Main** menu. You can also select the bearing line and drag it sideways.

The bearing for the *Vertical* view is controlled by the bearing in the *Horizontal* view.

Tip

The **Bearing** *function controls the horizontal direction of the Vertical view, the audio beam and the beam in each Inspection view.*

- If you use a presentation mode with two horizontal views you can set **Bearing** to two different values. Both bearings are shown as continuous lines pointing out from the sonar position. Each bearing is shown with a solid line.
- If you use a presentation mode with two vertical views you can set the **Bearing** function to two different values. Both bearing lines are shown in the *Horizontal* view. The bearing for the *Vertical* view is shown with a solid line. The bearing for the *Vertical 2* view is shown with a dotted line.

By default, a new manually initiated tracked object is automatically given priority status. The priority is identified with a "P". The bearing and tilt settings are automatically adjusted to follow the movements of the tracked target. The bearing line is automatically locked on the object to reflects its bearing.

Related topics

User interface, page 286
Sonar views, page 307
Horizontal view, page 309

Bow marker

The bow marker is shown as a dotted line drawn from the bow of the vessel symbol.

The line reflects your vessel's current heading. The bow marker can be enabled or disabled on the **Visual Objects** menu.

Open the **Visual Objects** menu from the **Display** menu.

Related topics

User interface, page 286
Sonar views, page 307
Horizontal view, page 309

Compass cards

Activate **Compass Cards** to place evenly spaced compass markers on the outer range ring in horizontal views.

The compass markers rotate based in the inputs from a navigation sensor. An update takes place when the vessel heading changes more than 1 degree.

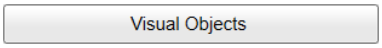
Related topics

User interface, page 286
Sonar views, page 307
Horizontal view, page 309

Course line

Course Line is located on the **Visual Objects** menu. This function displays a dotted line drawn from the bow of the vessel symbol. The line reflects your vessel's current course.

Open the button to select a time period. The **Course Line** function will predict your location after the chosen time period. The information is based on the inputs from the navigation sensors that are connected to the CS90 system.



Related topics

User interface, page 286
Sonar views, page 307
Horizontal view, page 309

Coverage plot

In the *Horizontal* view, use **Coverage Plot** to visualize the area covered by the vertical beam. A circle is added to the *Horizontal* view presentation to indicate the size of the area.

Use the **Tilt** function to change the size of the covered area.

This function is opened from the **Cosmetics** menu. **Cosmetics** is located on the **Display** menu.

In some situations you may wish to expand the range in the sonar presentations. Use **View Range** to expand the range shown in the relevant views to any percentage of the original **Range** setting. When you define a value for **View Range** the presentation will shift to the new range, while the range defined by the **Range** setting is identified with a thicker circle. If you increase the tilt, and then exceed the range using the **View Range** function, **Coverage Plot** will indicate the current practical range with a circle. The same applies if you set **Range Projection** to *True*.

Related topics

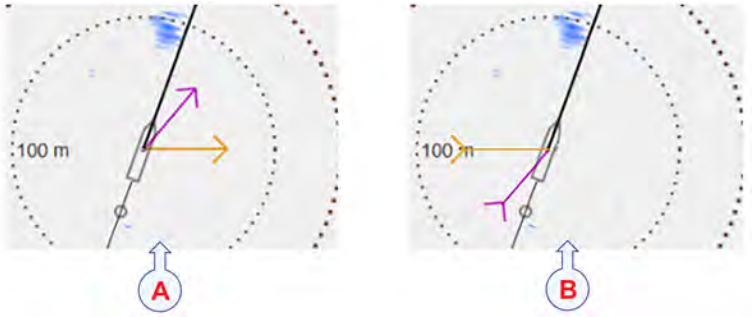
User interface, page 286
Sonar views, page 307
Horizontal view, page 309

Current vector / Current flow

A current sensor can be connected to the CS90 system. This can for example be an acoustic Doppler current profiler (ADCP). The information from this sensor is presented in the applicable views.

The **Current Vector** function shows you the speed and direction of the water current under your vessel. One or more arrow are drawn to or from the vessel symbol to indicate the properties of the sea currents. The direction of the arrows indicate the direction of the

water currents. The length of the arrows reflects their speeds. You can read the numerical value of the water current's velocity (the vector information) in the view's bottom right corner. To read this information in the view's bottom right corner, you must enable it on the **Cursor Readout** page. This page is located in the **Display Options** dialog box.



A ***To****: Use this setting to present the direction in which the ocean current is flowing.*

B ***From****: Use this setting to present the direction from which the ocean current is coming. Observe the inverted arrows.*

The **Current Vector** function is located on the **Visual Objects** menu. Use the **Current Flow** page to define key settings for the presentation of the sensor data. This page is located in the **Display Options** dialog box.

Related topics

User interface, page 286
Sonar views, page 307
Horizontal view, page 309

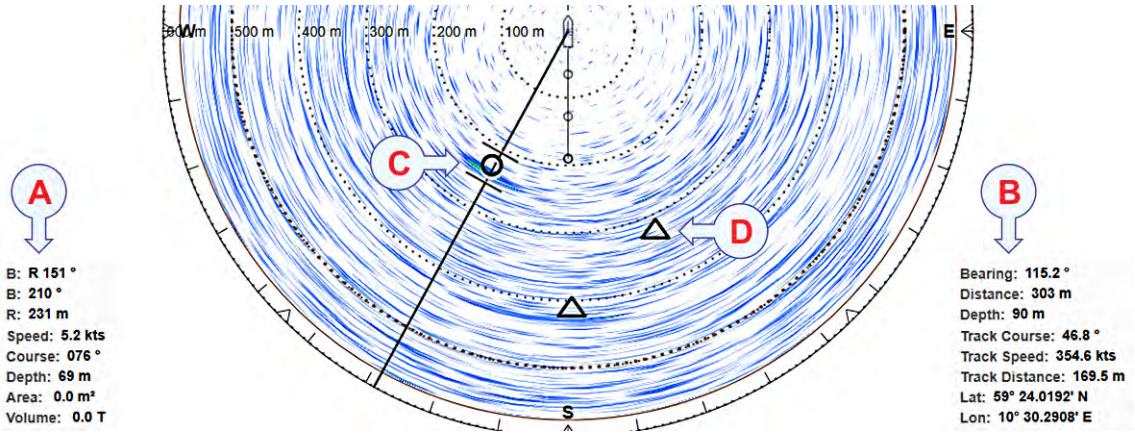
Cursor

The position (bearing and distance) and depth of the cursor's location is shown in the lower right corner of the view. The depth is calculated from the current tilt and the distance from the vessel.

Note

To read this information in the view's bottom right corner, you must enable it on the **Cursor Readout** *page. This page is located in the* **Display Options** *dialog box.*

If you place the cursor over the tilt presentation in the upper left corner of the *Horizontal* view you can use the scroll wheel to change the tilt.



A *Tracked target information / Priority marker information*

B *Cursor information / Manual track information*

C *The tracked target is regarded as an object, and it is identified with a circle and two lines. The two lines reflect the size of the current tracking area.*

D *Marker*

Related topics

User interface, page 286
Sonar views, page 307
Horizontal view, page 309
Plane view, page 335

Gain

The current settings for range, gain and tilt are shown in the upper left corner of the view.

Click on the text to make it larger. Click one more time to restore the original font size.

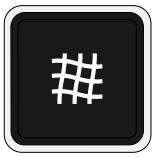
The purpose of the **Gain** function is to adjust the echo level in the display presentations. By adjusting the gain you can control how much amplification the CS90 system applies to the received echoes.

Related topics

User interface, page 286
Sonar views, page 307
Horizontal view, page 309

Gear symbol

The gear symbol is a visual tool to keep track of your fishing gear. You can activate this function from the short-cut menu or use the dedicated button on the Operating Panel.



The gear symbol may be either a purse seine circle or a trawl symbol. The gear symbol is placed in the echo presentation when you activate it on the operating panel or in the shortcut menu. Which gear symbol to present depends on your choice in the **Fishing Gear** function.

Purse seine

The gear symbol is provided as a tool to help you plan and shoot the purse seine. The symbol is intended to be used in a structured sequence that starts when you plan to shoot the purse seine.

Trawl

If you select a single or dual trawl in the **Fishing Gear** function, the CS90 system displays a trawl symbol in the echo view. The size and location of the image reflect the measurements you added in the **Fishing Gear Setup** dialog box.

The trawl image appears aft of the vessel symbol. When your vessel turns, the trawl presentation will reflect this, but the location and movements could be more precise. If you want an accurate trawl positioning, you must equip the trawl with relevant positioning sensors and connect the data to the CS90 system.

Related topics

User interface, page 286
Sonar views, page 307
Horizontal view, page 309

Inspection views

The CS90 system offers three *inspection* beams. Each inspection beam is presented using an *Inspection* view. If you use several *Inspection* views, you can train and tilt the beams individually, and independent of the beams displayed in the other views.

A *Inspection view: Bearing / Range*

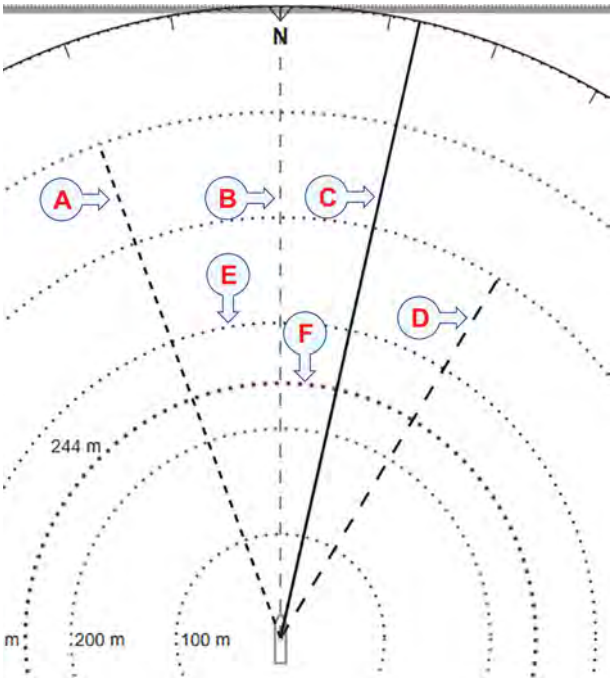
B *Bow marker*

C *Inspection view / Bearing line*

D *Inspection view: Bearing / Range*

E *Range ring*

F *Variable range ring*



You can use the *Inspection* view to study single fish, schools and bottom conditions in detail. The echo presentation in the *Inspection* view resembles the echogram you see on an echo sounder. The *Inspection* view can be regarded as an "echo sounder" with an adjustable direction.

You can train and tilt the beam independent of the beams displayed in the other views. To change the bearing of the *Inspection* view, use the **Bearing** function on the **Main** menu. You can also click on the solid bearing line in the *Horizontal* view and drag it.

Certain presentation modes place the *Inspection* and *Horizontal* views together. When three *Inspection* views are open, the *Horizontal* view presents three different bearing lines. Two dotted bearing lines identify the bearing and the selected range of two inspection beams. The solid bearing line identifies the bearing of the last inspection beam. To change the bearing of an *Inspection* view:

- Select the related bearing line and drag it sideways.

  or:

- Click in the view you want to activate. Select **Bearing** on the **Main** menu.

Related topics

User interface, page 286
Sonar views, page 307
Horizontal view, page 309

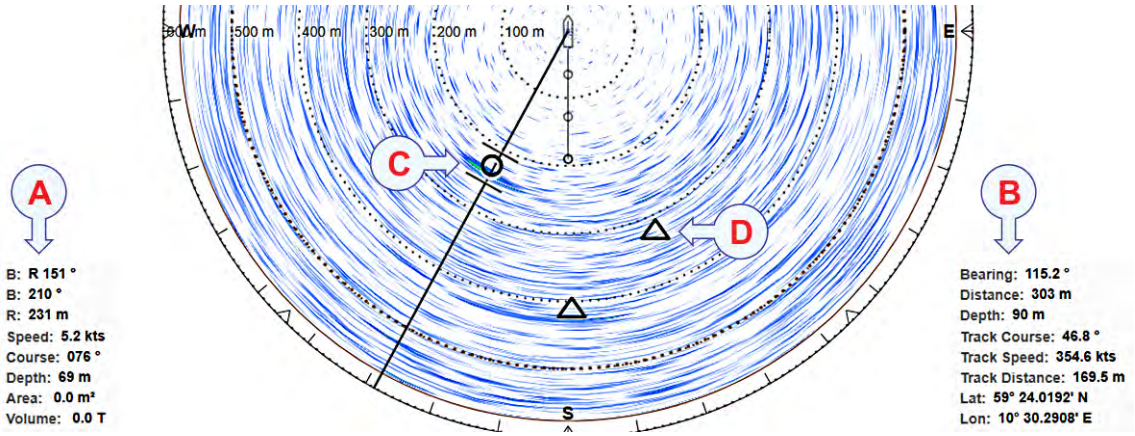
Markers / Manual Track / Priority Marker

One or more markers can be placed in the view to identify specific echoes. Markers are shown as small triangles. Once an echo has been provided with a marker in the display presentation it is regarded as an *object*.

Each marker is numbered sequentially. Use **Markers** to control the presentation of the marker symbols in the currently active view. This function is located on the **Visual Objects** menu. **Visual Objects** is located on the **Display** menu.

The marker is stationary. It has a specified range, bearing and depth related to your own vessel. If the echo moves in the display presentation the marker will not follow.

The CS90 system automatically copies markers generated in the *Horizontal* view to the *Vertical* view and vice versa.



A *Tracked target information / Priority marker information*

B *Cursor information / Manual track information*

C *The tracked target is regarded as an object, and it is identified with a circle and two lines. The two lines reflect the size of the current tracking area.*

D *Marker*

Note

When target tracking is activated, bearing and tilt are automatically adjusted to follow the movements of the tracked target.

You can give priority status to one marker to identify the relevant object as the most important target or position. Bearing and tilt are automatically adjusted to focus on the priority marker.

You can start manual tracking by placing multiple markers on a target echo that moves in the view. You can see the latest marker's course and speed in the view's lower right corner. The values are calculated based on the last two markers you created and the time between them. The physical location of the individual markers and the specific information provided for the latest marker show you the historical path of the chosen target. To read this information in the view's bottom right corner, you must enable it on the **Cursor Readout** page. This page is located in the **Display Options** dialog box.

Relevant information about a priority target can be found in the lower left corner of the view. The information includes the location, speed, course and depth of the target, as well as an estimate of its area and volume. To read this information in the view's bottom left corner, you must enable it on the **Cursor Readout** page. This page is located in the **Display Options** dialog box.

Tip

The **Visual Objects** *menu controls which graphical elements that are shown in the different views. These graphic elements include markers, vectors and targets that are tracked. The majority of the functions are "on/off" buttons to enable or disable these graphic elements in the various views.*

Related topics

User interface, page 286
Sonar views, page 307
Horizontal view, page 309
Plane view, page 335

Minute markers / History line

In order to maintain a visual presentation of your vessel's previous movements, you can draw these with a line. This line is drawn after the vessel symbol in the sonar views, and visualizes your past movements. We refer to this line as the *History Line*.

The **Minute Markers** function adds markers to the track line. These markers indicate how far you have sailed in the last few minutes. The minute markers are shown as small circles on the vessel's track line.

Tip

To draw the history line use the settings on the **Own Ship** *page. The* **Own Ship** *page is located in the* **Display Options** *dialog box. The* **Display Options** *dialog box is located on the* **Display** *menu.*

Related topics

User interface, page 286
Sonar views, page 307
Horizontal view, page 309

Plane view

Certain presentation modes place the *Plane* and *Horizontal* views together. The *Plane* view presents the echo data in a horizontal sector ("fan"). The sector direction can be changed in both vertical and horizontal directions.

The horizontal direction is presented with a dotted line in the *Horizontal* view. Two types of dotted lines are used to distinguish between port and starboard side of the sector.

You can change the bearing on the **Main** menu. You can also click on the dedicated dotted bearing line in a *Horizontal* view and drag it.

Related topics

User interface, page 286
Sonar views, page 307
Horizontal view, page 309

Range / Range Rings / Variable Range Ring

The distance from the vessel symbol in the centre of the circle to the outer ring corresponds to the currently selected range.

The current settings for range, gain and tilt are shown in the upper left corner of the view. Click on the text to make it larger. Click one more time to restore the original font size.

Range rings are a set of concentric circles labelled by distance from the vessel position. The selected range is divided into identical distances. The range rings are shown as dotted curves. Each ring has a range read-out. Use the **Range Rings** function to toggle the range rings *On* or *Off*.

Variable Range Ring adds an adjustable range ring to the view. The ring is shown as a dotted circle with its centre on the vessel symbol. The current range is shown next to the circle. To change the range, left-click on the circle and drag to requested diameter. You can use **VRR Range** to manually define a range. The variable range ring can be used for any type of distance measurement relative to the sonar.

Related topics

User interface, page 286
Sonar views, page 307
Horizontal view, page 309

Shortcut menu

Right-click in the view to open the shortcut menu. The options on the shortcut menu are mainly related to markers.

> In this context, the phrase *marker* is used to identify a visual symbol placed in the display presentation. By placing a marker on the echo it is regarded as an *object* that you can act upon. If relevant, you can further classify the object as a *target*.

The phrase *target* is used to identify an echo in the display presentation that you wish to act upon. The echo may be from a material item, a shallow, reef or rock, or from fish, fish schools or mammals. You must decide which echoes that shall be classified as targets, and whether you shall start target tracking.

Related topics
User interface, page 286
Sonar views, page 307
Horizontal view, page 309

Target tracking

During normal operation, some echoes are clearly more interesting than others.In many situations specific echoes may be regarded as *targets*.To set up the CS90 system to provide such information, you can start *target tracking*.

The tracked target is regarded as an *object*, and it is identified with a circle and two lines. The two lines reflect the size of the current tracking area. By default, a new manually initiated tracked object is automatically given priority status. The bearing line is automatically locked on the object to reflects its bearing.

The phrase *target* is used to identify an echo in the display presentation that you wish to act upon. The echo may be from a material item, a shallow, reef or rock, or from fish, fish schools or mammals. In most cases, the target will move and continuously change its position relative to your own vessel. You must decide which echoes that shall be classified as targets, and whether you shall start manual or automatic target tracking.

Relevant information about the tracked object can be found in the bottom left corner of the view. To read this information in the view's bottom left corner, you must enable it on the **Cursor Readout** page. This page is located in the **Display Options** dialog box.

Cursor Readout page

Target Track

Select **Target Track** to present relevant information about a tracked target or priority object. The bearing and range values are relative to your vessel.

- Bearing (The value relates to the ship's heading.)
- Bearing
- Range
- Speed
- Course
- Depth

The tracked target is regarded as an *object*, and it is identified with a circle and two lines. The two lines reflect the size of the current tracking area. The bearing line is automatically locked on the object to reflects its bearing.

Target Volume

Select **Target Volume** to present calculated area and volume of a tracked target or priority object.

- Area
- Volume

Target tracking

To start target tracking:

1 Place the cursor over the echo you wish to track. Press **Target Track** on the Operating Panel.

or:

2 Place the cursor over the echo you wish to track. Right-click to open the shortcut menu. Select **Initiate Track**.

Related topics

User interface, page 286
Sonar views, page 307
Horizontal view, page 309

Tilt

The current settings for range, gain and tilt are shown in the upper left corner of the view.

Click on the text to make it larger. Click one more time to restore the original font size.

When you change the tilt a dotted line presents the requested tilt while the solid line presents the actual tilt. You can change the tilt angle by means of the **Tilt** function on the **Main** menu. You can also click on the tilt line in a *Vertical* view and drag it up and down. If you place the cursor over the tilt presentation in the upper left corner of the *Horizontal* view you can use the scroll wheel to change the tilt.

Related topics

User interface, page 286
Sonar views, page 307
Horizontal view, page 309

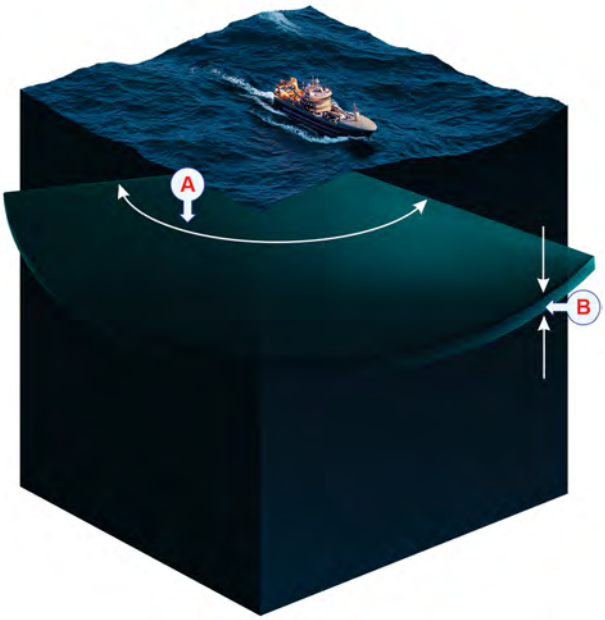
Horizontal TX Sector / Vertical TX Sector

The **Horizontal Tx Sector** function allows you to control whether the system shall transmit acoustic energy into the water in omni (360°) or within a defined sector. The **Vertical Tx Sector** function is used to change the vertical opening angle in horizontal and vertical swaths.

Horizontal swath:

A *This is the horizontal TX sector in a horizontal swath.*

B *This is the vertical TX sector in a horizontal swath.*



If the **Horizontal TX Sector** value in a horizontal swath is smaller than its maximum value, the centre of the sector is defined by the **Bearing** function. In the *Horizontal* view the transmit sector is shown as a triangle originating from the vessel symbol.

Related topics

User interface, page 286
Sonar views, page 307
Horizontal view, page 309

User settings

Any user setting selected on the Operating Panel is identified in the upper left corner of the *Horizontal* view.

The identifying number refers to the **User Setting** number on the **Operating Panel** page. Click on the text to make it larger. Click one more time to restore the original font size.

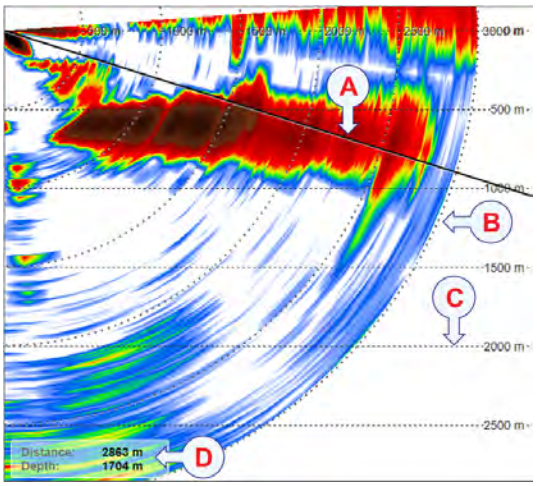
Related topics

User interface, page 286
Sonar views, page 307
Horizontal view, page 309

Vertical view

The *Vertical* view is oriented perpendicularly to the horizontal plane. The *Vertical* view shows you a "vertical slice" of the echo data. The direction of the vertical slice is indicated and controlled by the bearing line in the *Horizontal* view. The area covered by the vertical beam is shown as a triangle in the *Horizontal* view. The upper horizontal line in the view represents the water surface.

To activate the *Vertical* view, select a suitable presentation mode on the bottom bar, then click inside the view.



A *The current tilt is shown with a solid line.*

B *The range rings are shown as dotted curves.*

C *Horizontal dotted lines show the depth intervals.*

D *The distance and depth of the cursor location is shown in the lower left corner of the view.*

Description

By default, the vertical views have the transducer located in the upper left corner of the view. The presentation is made from left towards right.

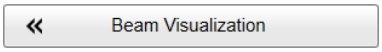
Tip

The **Vertical View Orientation** *page allows you to decide whether the vertical views should be presented from right to left, or from left to right. This page is located in the* **Display Options** *dialog box. This dialog box is opened from the* **Display** *menu.*

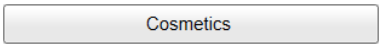
Certain presentation modes provide more than one vertical view. You can then set up these views individually.

Tip

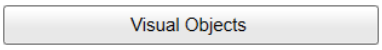
To fully understand how the beams behave in this view, use the **Beam Visualization** *dialog box. This dialog box is opened from the* **Setup** *menu.*



The **Cosmetics** *menu controls which "cosmetic" features that used.*



The **Visual Objects** *menu controls which graphical elements that are shown in the different views.*



Before you can change the settings related to a view, the view must be active. To activate a view, click in it. The active view is identified with a thicker border.

Although the presentation of the echoes is most important in this view, it also contains a number of other objects. These provide you with additional functionality, as well as information that is useful or important while using the CS90 sonar system.

Topics

Bearing, page 325

Tilt, page 326

Depth / Range / Range Rings / Variable Range Ring, page 326

Horizontal TX Sector / Vertical TX Sector, page 327

Coverage plot, page 328

Cursor, page 328

Markers, page 329

Purse depth, page 330

Vertical Reference, page 330

Bearing

The bearing for the *Vertical* view is controlled by the bearing in the *Horizontal* view. You can change the bearing on the **Main** menu. You can also select the bearing line in a *Horizontal* view and drag it sideways.

Tip

The **Bearing** *function controls the horizontal direction of the Vertical view, the audio beam and the beam in each Inspection view.*

If you use a presentation mode with two vertical views you can set the **Bearing** function to two different values. Both bearing lines are shown in the *Horizontal* view. The bearing for the *Vertical* view is shown with a solid line. The bearing for the *Vertical 2* view is shown with a dotted line.

By default, a new manually initiated tracked object is automatically given priority status. The priority is identified with a "P". The bearing and tilt settings are automatically adjusted to follow the movements of the tracked target. The bearing line is automatically locked on the object to reflects its bearing.

Related topics
User interface, page 286
Sonar views, page 307
Vertical view, page 324

Tilt

The current tilt is shown with a solid line. You can change the tilt angle by means of the **Tilt** function on the **Main** menu. You can also click on the tilt line and drag it up and down. When you change the tilt a dotted line presents the requested tilt while the solid line presents the actual tilt.

If you use a presentation mode with two vertical views you can use two different tilt values. The tilt in the *Vertical* view is shown with a solid line. The tilt in the *Vertical 2* view is shown with a dotted line.

Related topics
User interface, page 286
Sonar views, page 307
Vertical view, page 324

Depth / Range / Range Rings / Variable Range Ring

Horizontal dotted lines show the depth intervals. Use **Depth Dividers** on the **Cosmetics** menu to toggle these lines *On* or *Off*.

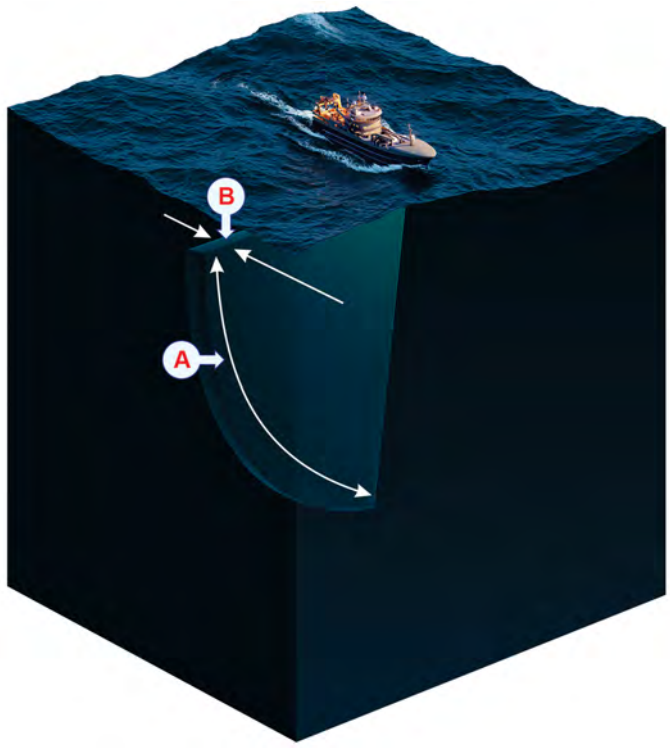
Range rings are a set of concentric circles labelled by distance from the vessel position. The selected range is divided into identical distances. The range rings are shown as dotted curves. Each ring has a range read-out. Use the **Range Rings** function to toggle the range rings *On* or *Off*.

Variable Range Ring adds an adjustable range ring to the view. The variable range ring can be used for any type of distance measurement relative to the sonar. Use **Variable Range Ring** to toggle the ring *On* or *Off*. This function is opened from the **Cosmetics** menu.

Related topics
User interface, page 286
Sonar views, page 307
Vertical view, page 324

Horizontal TX Sector / Vertical TX Sector

The **Horizontal Tx Sector** function controls the "width" of the transmission. The **Vertical Tx Sector** function is used to change the vertical opening angle in horizontal and vertical swaths.



A *This is the vertical TX sector in a vertical swath.*

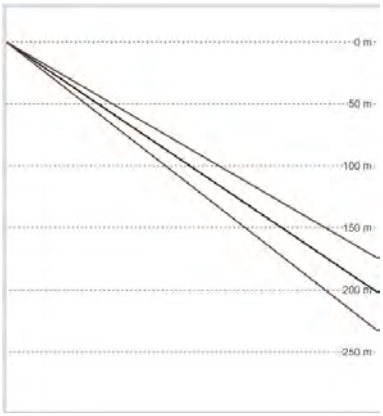
B *This is the horizontal TX sector in a vertical swath.*

Related topics
User interface, page 286
Sonar views, page 307
Vertical view, page 324

Coverage plot

In the *Vertical* view, use **Coverage Plot** to visualize the area covered by the horizontal beam. Two border lines are added to the *Vertical* view presentation to indicate the size of the area.

Use the **Vertical Tx Sector** function in the *Horizontal* view to control the vertical search sector's opening angle.



This function is opened from the **Cosmetics** menu. **Cosmetics** is located on the **Display** menu.

Related topics

User interface, page 286
Sonar views, page 307
Vertical view, page 324

Cursor

The distance and depth of the cursor location is shown in the lower left corner of the view.

The depth is calculated from the current tilt and the distance from the vessel.

Related topics

User interface, page 286
Sonar views, page 307
Vertical view, page 324

Markers

One or more markers can be placed in the view to identify specific echoes. Markers are shown as small triangles. Once an echo has been provided with a marker in the display presentation it is regarded as an *object*.

A *Markers*

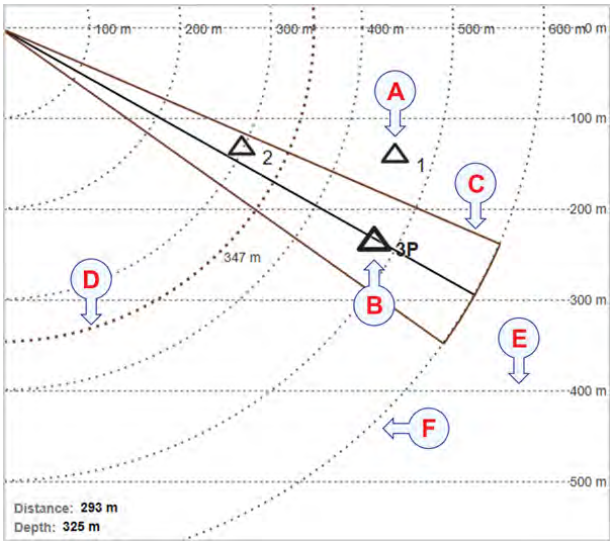
B *Priority marker*

C *Coverage plot*

D *Variable range ring*

E *Horizontal dotted lines show the depth intervals.*

F *The range rings are shown as dotted curves.*



Note

When target tracking is activated, bearing and tilt are automatically adjusted to follow the movements of the tracked target.

You can give priority status to one marker to identify the relevant object as the most important target or position. Bearing and tilt are automatically adjusted to focus on the priority marker.

Each marker is numbered sequentially. Use **Markers** to control the presentation of the marker symbols in the currently active view. This function is located on the **Visual Objects** menu. **Visual Objects** is located on the **Display** menu.

The marker is stationary. It has a specified range, bearing and depth related to your own vessel. If the echo moves in the display presentation the marker will not follow.

The CS90 system automatically copies markers generated in the *Horizontal* view to the *Vertical* view and vice versa.

Tip

The **Visual Objects** *menu controls which graphical elements that are shown in the different views. These graphic elements include markers, vectors and targets that are tracked. The majority of the functions are "on/off" buttons to enable or disable these graphic elements in the various views.*

Related topics

User interface, page 286
Sonar views, page 307
Vertical view, page 324

Purse depth

A line of X'es in the vertical views shows the bottom of the purse seine.

Use **Purse Depth** on the **Cosmetics** menu to toggle this line *On* or *Off*.

Related topics

User interface, page 286
Sonar views, page 307
Vertical view, page 324

Vertical Reference

During operations in a vertical view you may wish to focus on the echoes in the upper or lower part of the view.Use **Vertical Reference** to hide a part of the view. The function is only available in the *Vertical* and *Plane* views.

- Select *Water Column* to see the entire vertical view.
- Select *Surface* to remove the bottom part of the vertical view.
- Select *Bottom* to remove the upper part of the vertical view.

When the function is activated, the vertical range depends on the physical height of the view. A taller view gives you a larger visible depth range while the size of the removed range is reduced. The vertical scale is adjusted automatically.

Click on the view border, hold the button depressed, then drag the border up or down to change the height.

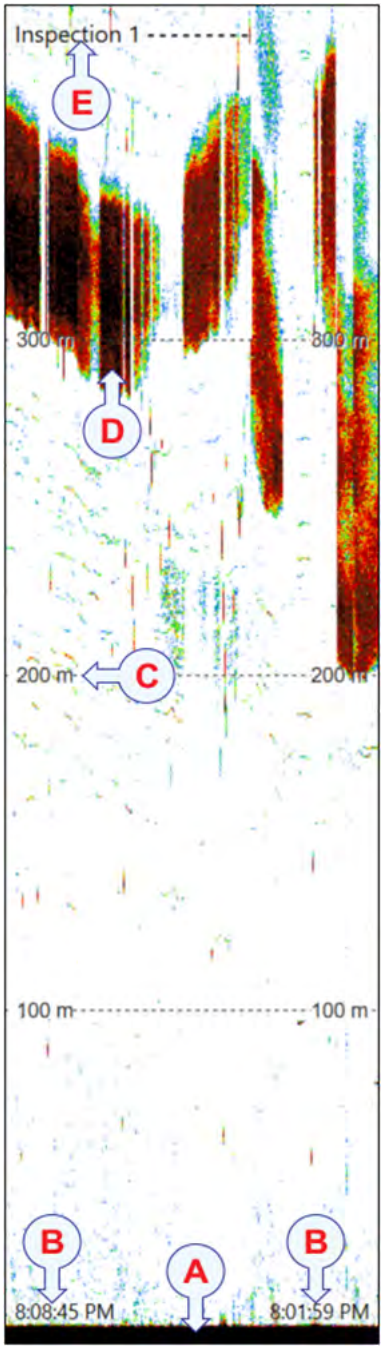
This function is opened from the **Active** menu.

Related topics

User interface, page 286
Sonar views, page 307
Vertical view, page 324

Inspection view

The CS90 system offers three *inspection* beams. Each inspection beam is presented using an *Inspection* view. If you use several *Inspection* views, you can train and tilt the beams individually, and independent of the beams displayed in the other views. You can use the *Inspection* view to study single fish, schools and bottom conditions in detail.



A *This is the start of the echogram The distance from the lower part to the upper part of the view corresponds to the currently selected range.*

B *Small labels are shown in the bottom left and right corners of the view. These labels show you the time in order to identify the scale of the horizontal axis.*

C *Equidistant horizontal scale lines are drawn in the view to indicate the range. The* ***Range*** *setting defines how "far" you wish the CS90 system to detect echoes.*

D *School of fish*

E *The view is identified at the top of the presentation. The line in the identifier reflects the line type used in the Horizontal view to show the bearing.*

At the bottom of the display presentation, select a suitable presentation mode, and activate the *Inspection* view.

The *Inspection* view shows you echo data from a separate beam. The opening angle of the inspection beam depend on the operating frequency. You can train and tilt the beam independent of the beams displayed in the other views. Since the *Inspection* view operates with its own dedicated beam, the operating frequency can be adjusted independently of the other views. The echo data in the *Inspection* view is not subjected to AGC and RCG filtering.

The view is identified at the top of the presentation. The line in the identifier reflects the line type used in the *Horizontal* view to show the bearing.

> Imagine walking through a dark forest. You have a powerful torch with a narrow beam. By moving the light beam you will not be able to get an overview of the forest, but you can easily study details in the vegetation.

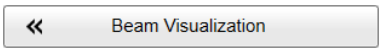
The echo presentation in the *Inspection* view resembles the echogram you see on an echo sounder. The *Inspection* view can be regarded as an "echo sounder" with an

adjustable direction. In the CS90 system we use the phrase *echogram* to describe the information provided by the view.

Tip

Before you can change the settings related to a view, the view must be active. To activate a view, click in it. The active view is identified with a thicker border.

To fully understand how the beams behave in this view, use the **Beam Visualization** *dialog box. This dialog box is opened from the* **Setup** *menu.*



Although the presentation of the echoes is most important in this view, it also contains a number of other objects. These provide you with additional functionality, as well as information that is useful or important while using the CS90 sonar system.

Topics

Bearing, page 332

Tilt, page 333

Range, page 333

Horizontal scroll, page 333

Tooltips, page 334

Bearing

The echo data is taken from the current bearing and tilt. With maximum three *Inspection* views in use, the individual bearings are controlled from the *Horizontal* view.

The current bearings are shown with solid and dotted lines pointing out from the vessel position. The line in the identifier reflects the line type used in the *Horizontal* view to show the bearing.

You can change the angle by means of the **Bearing** function on the **Main** menu. You can also select the bearing line in a *Horizontal* view and drag it sideways.

Related topics

User interface, page 286
Sonar views, page 307
Inspection view, page 331

Tilt

The echo data is taken from the current bearing and tilt. The current tilt is shown with a solid line in the *Vertical* view.

You can change the tilt angle by means of the **Tilt** function on the **Main** menu. You can also click on the tilt line in a *Vertical* view and drag it up and down. If you place the cursor over the tilt presentation in the upper left corner of the *Horizontal* view you can use the scroll wheel to change the tilt.

Related topics

User interface, page 286
Sonar views, page 307
Inspection view, page 331

Range

The distance from the lower part to the upper part of the view corresponds to the currently selected range.

The **Range** setting defines how "far" you wish the CS90 system to detect echoes. This function is opened from the **Main** menu.

Equidistant horizontal scale lines are drawn in the view to indicate the range.

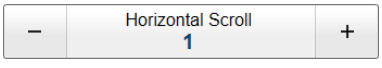
Related topics

User interface, page 286
Sonar views, page 307
Inspection view, page 331

Horizontal scroll

Small labels are shown in the bottom left and right corners of the view. These labels show you the time in order to identify the scale of the horizontal axis.

Use the **Horizontal Scroll** function to control how fast each echogram shall travel across the *Inspection* view. Select a numerical value to set the speed. The speed is controlled by adjusting the number of pixels used to present each ping. A higher speed will update the view faster, but will also reduce the resolution.



You open this function from the **Active** menu.

Related topics

User interface, page 286
Sonar views, page 307
Inspection view, page 331

Tooltips

When you move the cursor over the echo data in the *Echogram* and *Inspection* views, small "tooltips" are shown to provide additional information.

Several tooltips can be shown in the sonar presentation. When a tooltip is enabled, the cursor location is detected and a small information box is shown. By default, the information is related to the exact position of the cursor. The information provided for noise shows you the noise reading for the latest ping independent of the cursor's location. Each tooltip represents a specific piece of information, and they are listed separately.

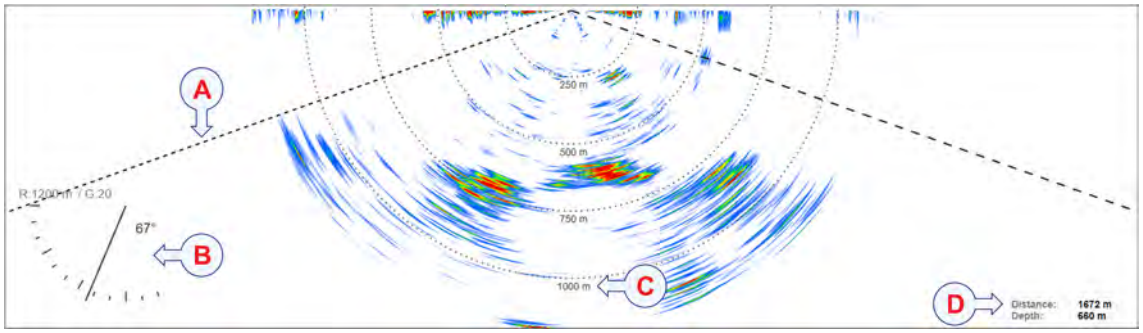
The **Tooltip** page offers a range of "on/off switches". Each tooltip is presented in the list, and you can enable or disable each of them independently. This page is located in the **Display Options** dialog box. The **Display Options** dialog box is located on the **Display** menu.

Related topics

User interface, page 286
Sonar views, page 307
Inspection view, page 331

Plane view

The *Plane* view presents the echo data in a horizontal sector ("fan"). The sector direction can be changed in both vertical and horizontal directions.



A *The current tilt is shown with dotted lines in the view. Two types of dotted lines are used to distinguish between port and starboard side of the sector.*

B *The current settings for range, gain and tilt are show in the lower left corner of the view.*

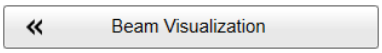
C *Range rings are a set of concentric circles labelled by distance from the vessel position.*

D *The distance and depth of the cursor's location is shown in the lower right corner of the view.*

At the bottom of the display presentation, select a suitable presentation mode, and activate the *Plane* view.

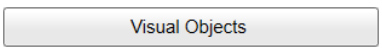
Tip

To fully understand how the beams behave in this view, use the **Beam Visualization** *dialog box. This dialog box is opened from the* **Setup** *menu.*



The **Cosmetics** *menu controls which "cosmetic" features that used.*

The **Visual Objects** *menu controls which graphical elements that are shown in the different views.*



Before you can change the settings related to a view, the view must be active. To activate a view, click in it. The active view is identified with a thicker border.

Although the presentation of the echoes is most important in this view, it also contains a number of other objects. These provide you with additional functionality, as well as information that is useful or important while using the CS90 sonar system.

Topics

Bearing, page 336

Coverage plot, page 336

Cursor, page 337

Gain, page 337

Markers / Manual Track / Priority Marker, page 338

Range / Range Rings, page 339

Tilt, page 339

Vertical Reference, page 340

Bearing

The horizontal direction is presented with a dotted line in the *Horizontal* view.

Two types of dotted lines are used to distinguish between port and starboard side of the sector.

You can change the bearing on the **Main** menu. You can also click on the dedicated dotted bearing line in a *Horizontal* view and drag it.

Related topics

User interface, page 286
Sonar views, page 307
Plane view, page 335

Coverage plot

When you operate with sector transmissions, the area covered by the sonar beams is limited by the chosen transmit sector angle. To make it easier to recognize the area limits, dedicated border lines may be added to the presentation.

These lines are used to outline the sector. This function is opened from the **Cosmetics** menu. **Cosmetics** is located on the **Display** menu.

Important

The coverage plot for the *Plane* view is shown in the *Horizontal* view.

Related topics

User interface, page 286
Sonar views, page 307
Plane view, page 335

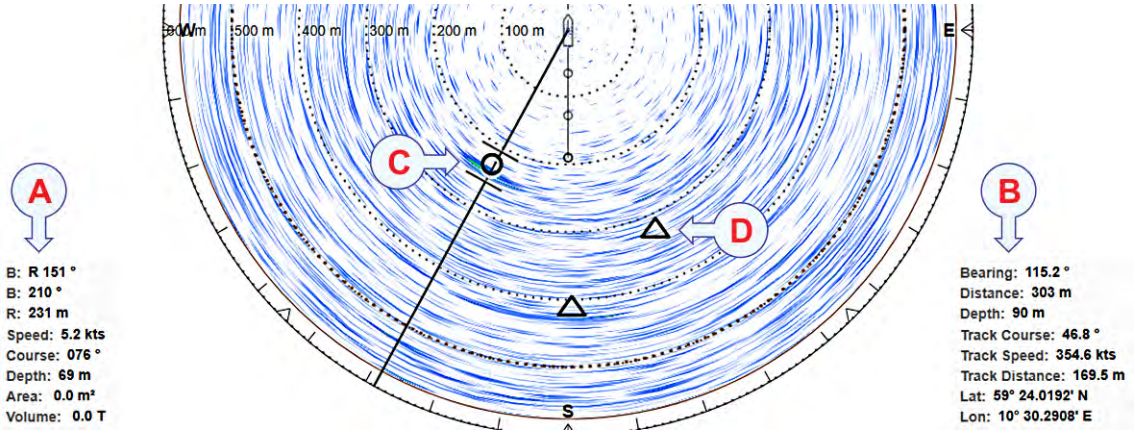
Cursor

The position (bearing and distance) and depth of the cursor's location is shown in the lower right corner of the view. The depth is calculated from the current tilt and the distance from the vessel.

Note

To read this information in the view's bottom right corner, you must enable it on the **Cursor Readout** *page. This page is located in the* **Display Options** *dialog box.*

If you place the cursor over the tilt presentation in the upper left corner of the *Horizontal* view you can use the scroll wheel to change the tilt.



A *Tracked target information / Priority marker information*

B *Cursor information / Manual track information*

C *The tracked target is regarded as an object, and it is identified with a circle and two lines. The two lines reflect the size of the current tracking area.*

D *Marker*

Related topics

User interface, page 286
Sonar views, page 307
Horizontal view, page 309
Plane view, page 335

Gain

The current settings for range, gain and tilt are show in the lower left corner of the view.

Click on the text to make it larger. Click one more time to restore the original font size.

The purpose of the **Gain** function is to adjust the echo level in the display presentations. By adjusting the gain you can control how much amplification the CS90 system applies to the received echoes.

Related topics
User interface, page 286
Sonar views, page 307
Plane view, page 335

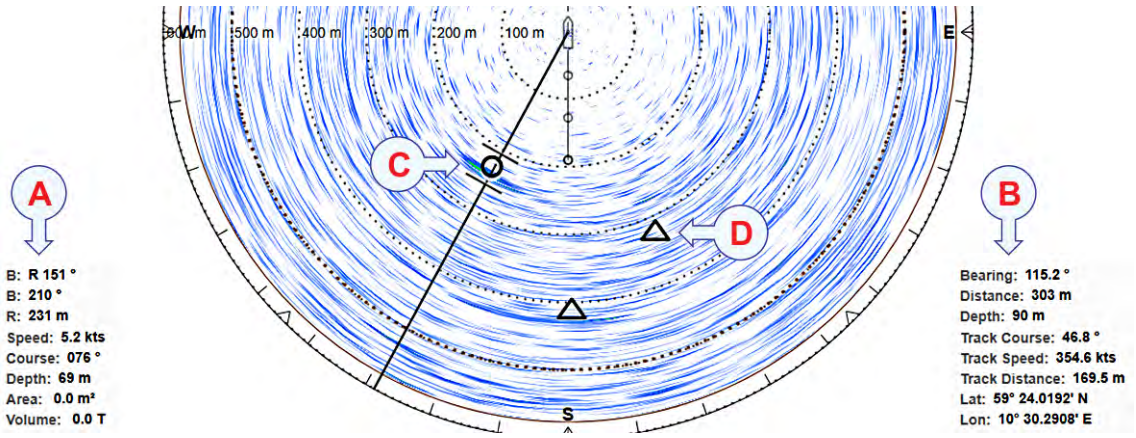
Markers / Manual Track / Priority Marker

One or more markers can be placed in the view to identify specific echoes. Markers are shown as small triangles. Once an echo has been provided with a marker in the display presentation it is regarded as an *object*.

Each marker is numbered sequentially. Use **Markers** to control the presentation of the marker symbols in the currently active view. This function is located on the **Visual Objects** menu. **Visual Objects** is located on the **Display** menu.

The marker is stationary. It has a specified range, bearing and depth related to your own vessel. If the echo moves in the display presentation the marker will not follow.

The CS90 system automatically copies markers generated in the *Horizontal* view to the *Vertical* view and vice versa.



A *Tracked target information / Priority marker information*

B *Cursor information / Manual track information*

C *The tracked target is regarded as an object, and it is identified with a circle and two lines. The two lines reflect the size of the current tracking area.*

D *Marker*

Note

When target tracking is activated, bearing and tilt are automatically adjusted to follow the movements of the tracked target.

You can give priority status to one marker to identify the relevant object as the most important target or position. Bearing and tilt are automatically adjusted to focus on the priority marker.

You can start manual tracking by placing multiple markers on a target echo that moves in the view. You can see the latest marker's course and speed in the view's lower right corner. The values are calculated based on the last two markers you created and the time between them. The physical location of the individual markers and the specific information provided for the latest marker show you the historical path of the chosen target. To read this information in the view's bottom right corner, you must enable it on the **Cursor Readout** page. This page is located in the **Display Options** dialog box.

Relevant information about a priority target can be found in the lower left corner of the view. The information includes the location, speed, course and depth of the target, as well as an estimate of its area and volume. To read this information in the view's bottom left corner, you must enable it on the **Cursor Readout** page. This page is located in the **Display Options** dialog box.

Tip

The **Visual Objects** *menu controls which graphical elements that are shown in the different views. These graphic elements include markers, vectors and targets that are tracked. The majority of the functions are "on/off" buttons to enable or disable these graphic elements in the various views.*

Related topics

User interface, page 286
Sonar views, page 307
Horizontal view, page 309
Plane view, page 335

Range / Range Rings

The current settings for range, gain and tilt are show in the lower left corner of the view.

Range rings are a set of concentric circles labelled by distance from the vessel position. The selected range is divided into identical distances. The range rings are shown as dotted curves. Each ring has a range read-out. Use the **Range Rings** function to toggle the range rings *On* or *Off*.

Related topics

User interface, page 286
Sonar views, page 307
Plane view, page 335

Tilt

The current settings for range, gain and tilt are show in the lower left corner of the view.

Click on the text to make it larger. Click one more time to restore the original font size.

When you change the tilt a dotted line presents the requested tilt while the solid line presents the actual tilt. You can change the tilt angle by means of the **Tilt** function on the **Main** menu. You can also click on the tilt line in a *Vertical* view and drag it up and down.

If you place the cursor over the tilt presentation in the upper left corner of the *Horizontal* view you can use the scroll wheel to change the tilt.

Related topics

User interface, page 286
Sonar views, page 307
Plane view, page 335

Vertical Reference

During operations in a vertical view you may wish to focus on the echoes in the upper or lower part of the view.Use **Vertical Reference** to hide a part of the view. The function is only available in the *Vertical* and *Plane* views.

- Select *Water Column* to see the entire vertical view.
- Select *Surface* to remove the bottom part of the vertical view.
- Select *Bottom* to remove the upper part of the vertical view.

When the function is activated, the vertical range depends on the physical height of the view. A taller view gives you a larger visible depth range while the size of the removed range is reduced. The vertical scale is adjusted automatically.

Click on the view border, hold the button depressed, then drag the border up or down to change the height.

This function is opened from the **Active** menu.

Related topics

User interface, page 286
Sonar views, page 307
Plane view, page 335

Echogram view

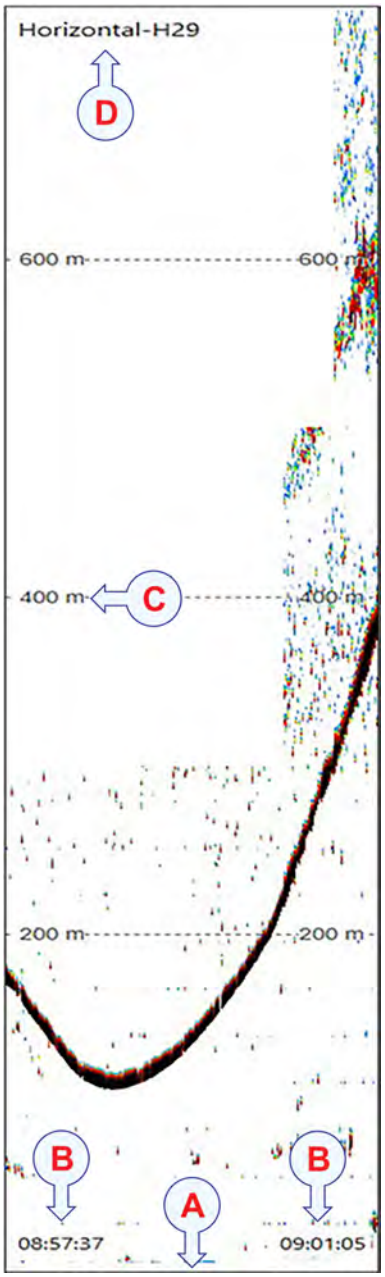
The *Echogram* view shows a time based history for a selected beam. Horizontal dotted lines show the depth intervals. The beam used to provide data is identified in the top left corner of the view.

A *This is the start of the echogram The distance from the lower part to the upper part of the view corresponds to the currently selected range.*

B *Small labels are shown in the bottom left and right corners of the view. These labels show you the time in order to identify the scale of the horizontal axis.*

C *Equidistant horizontal scale lines are drawn in the view to indicate the range. The **Range** setting defines how "far" you wish the CS90 system to detect echoes.*

D *The view is identified at the top of the presentation.*



Description

At the bottom of the display presentation, select a suitable presentation mode, and activate the *Echogram* view.

Although the presentation of the echoes is most important in this view, it also contains a number of other objects. These provide you with additional functionality, as well as information that is useful or important while using the CS90 sonar system.

Bearing

The echo data is taken from the current bearing and tilt. The bearing for the *Echogram* view is controlled by the bearing in the *Horizontal* view. The current bearing is shown with a solid line pointing out from the vessel position. You can change the angle by means of the **Bearing** function on the **Main** menu. You can also select the bearing line in a *Horizontal* view and drag it sideways.

Tilt

The echo data is taken from the current bearing and tilt. The current tilt is shown with a solid line in the *Vertical* view.

You can change the tilt angle by means of the **Tilt** function on the **Main** menu. You can also click on the tilt line in a *Vertical* view and drag it up and down. If you

place the cursor over the tilt presentation in the upper left corner of the *Horizontal* view you can use the scroll wheel to change the tilt.

Range

The distance from the lower part to the upper part of the view corresponds to the currently selected range. The **Range** setting defines how "far" you wish the CS90 system to detect echoes. This function is opened from the **Main** menu.

Equidistant horizontal scale lines are drawn in the view to indicate the range.

Horizontal Scroll

Small labels are shown in the bottom left and right corners of the view. These labels show you the time in order to identify the scale of the horizontal axis.

Use the **Horizontal Scroll** function to control how fast each echogram shall travel across the *Inspection* view. Select a numerical value to set the speed. The speed is controlled by adjusting the number of pixels used to present each ping. A higher speed will update the view faster, but will also reduce the resolution. You open this function from the **Active** menu.

Identifier

The beam used to provide data is identified in the top left corner of the view.

Tooltips

When you move the cursor over the echo data in the *Echogram* and *Inspection* views, small "tooltips" are shown to provide additional information. Several tooltips can be shown in the sonar presentation. When a tooltip is enabled, the cursor location is detected and a small information box is shown. By default, the information is related to the exact position of the cursor. The information provided for noise shows you the noise reading for the latest ping independent of the cursor's location. Each tooltip represents a specific piece of information, and they are listed separately.

The **Tooltip** page offers a range of "on/off switches". Each tooltip is presented in the list, and you can enable or disable each of them independently. This page is located in the **Display Options** dialog box. The **Display Options** dialog box is located on the **Display** menu.

Tip

Before you can change the settings related to a view, the view must be active. To activate a view, click in it. The active view is identified with a thicker border.

To fully understand how the beams behave in this view, use the **Beam Visualization** *dialog box.*

Related topics

User interface, page 286
Sonar views, page 307

Catch view

Use the information in the *Catch* view to monitor the progress of the purse seine operation. The view does not offer any echo data.

Description

At the bottom of the display presentation, select a suitable presentation mode, and activate the *Catch* view.

There are no echoes in this view, only a number of other objects. These provide you with additional functionality, as well as information that is useful or important while using the CS90 sonar system.

Progress bar

The progress bar at the top of the *Catch* view shows you the amount of net that has been spent. The sequence starts when you shoot the net.

Two timers are placed over the progress bar. The first timer starts when you select **Place Gear Symbol**. It stops when the progress bar reads 100%. This action starts the second timer, which stops when you select **Remove Gear Symbol**.

For use with a purse seine, the intended process follows:

1 To start the process:

- Press **Gear** on the Operating Panel. — **or:**
- Right-click and select **Show Gear Symbol** on the shortcut menu.

This places a circle marker in the view. The size and location of the marker is defined by the choices you have made with the **Fishing Gear** function. Until you proceed, the marker follows the movements of the vessel by keeping its relative location to the bow. This allows you to position your vessel in the best possible location before you shoot the purse seine.

2 When you shoot the net:

- Press **Gear** on the Operating Panel. — **or:**
- Right-click and select **Place Gear Symbol** on the shortcut menu.

The first timer starts when you select **Place Gear Symbol**.

A rectangular marker is placed in the view, and marks the position where the purse seine was shot. The circular marker is disconnected from the vessel movements, and acts as a guideline for your manoeuvring. The history line shows the movements of your vessel. Since the CS90 system knows the length of your net, it places a second marker on this line when half the length has been spent. When the entire net has been spent, a third rectangular marker is shown. In this phase the **Fishing Gear** function is disabled.

The first timer stops when the progress bar reads 100%. This action starts the second timer, which stops when you select **Remove Gear Symbol**.

3 When the process is finalized:

- Press **Gear** on the Operating Panel. — **or:**
- Right-click and select **Remove Gear Symbol** on the shortcut menu to delete the markers from the view.

Purse seine

A line of X'es in the vertical views shows the bottom of the purse seine. The depth is defined for the fishing gear you have chosen. The depth is calculated from the sink rate you have defined for the fishing gear. Use **Purse Depth** on the **Cosmetics** menu to toggle this line *On* or *Off*.

Tip

Under **Fishing Gear**, *select* **Fishing Gear Setup** *to open the dialog box. For the selected purse, set the sink rate. For the selected purse, select a depth value.*

If you have connected a compatible catch monitoring system to your CS90 system, information from these sensors are shown in the *Catch* view.

Range

Horizontal dotted lines show the depth intervals. Use **Depth Dividers** on the **Cosmetics** menu to toggle these lines *On* or *Off*.

Markers

Relevant information about a priority target can be found in the lower left corner of the view. The information includes the location, speed, course and depth of the target, as well as an estimate of its area and volume.

Coverage Plot

When you operate with sector transmissions, the area covered by the sonar beams is limited by the chosen transmit sector angle. To make it easier to recognize the area limits, dedicated border lines may be added to the presentation. These lines are used to outline the sector. This function is opened from the **Cosmetics** menu. **Cosmetics** is located on the **Display** menu.

The coverage plot for the *Plane* view is shown in the *Horizontal* view.

Tip

The **Cosmetics** *menu controls which "cosmetic" features that used.*

Before you can change the settings related to a view, the view must be active. To activate a view, click in it. The active view is identified with a thicker border.

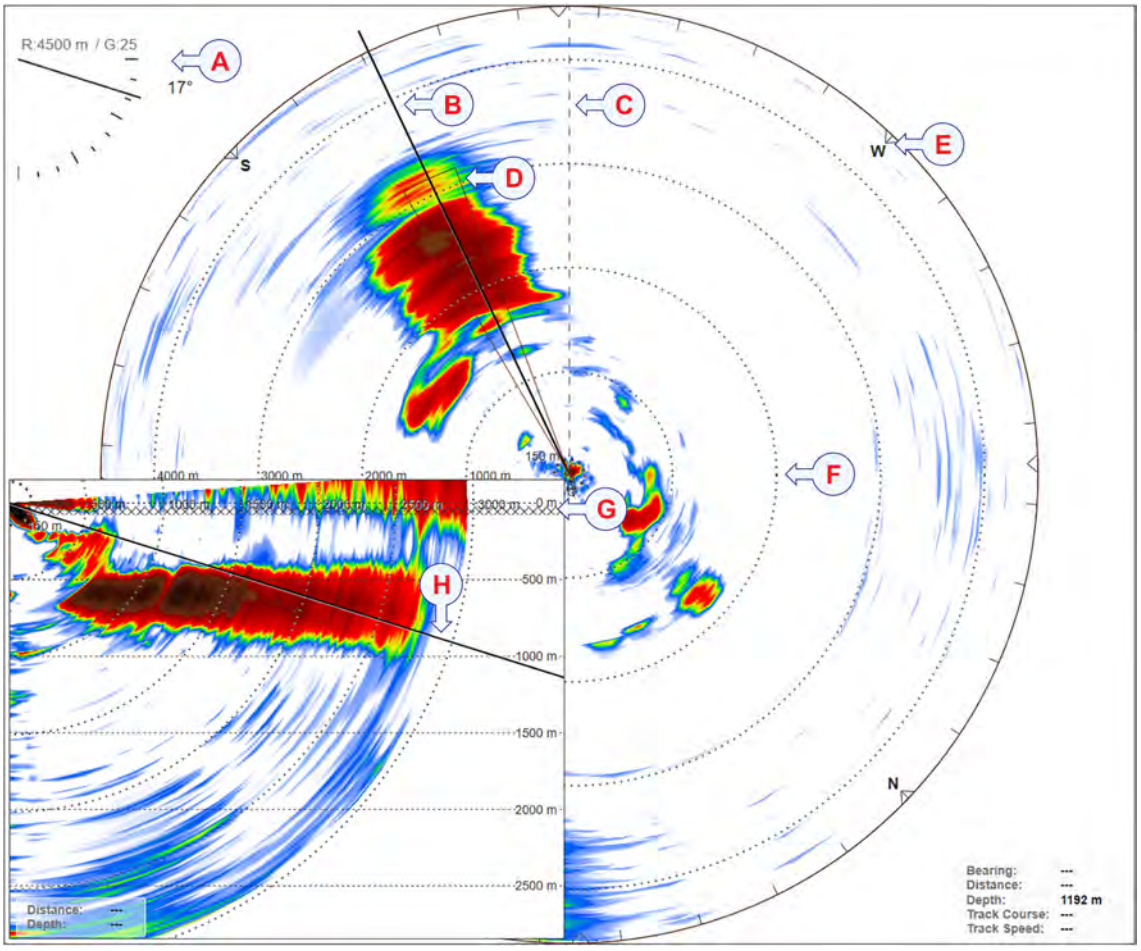
Related topics

User interface, page 286
Sonar views, page 307

270 Vertical view

The *270 Vertical* view is designed for purse seining. The presentation combines a horizontal "bow up" presentation with a vertical slice.

At the bottom of the display presentation, select a suitable presentation mode, and activate the *270 Vertical* view.



A *The current settings for range, gain and tilt are shown in the upper left corner of the view.*

B *The current bearing is shown with a solid line pointing out from the vessel position.*

C *The bow marker is shown as a dotted line drawn from the bow of the vessel symbol.*

D *In the Horizontal view, the coverage plot identifies the area covered in the Vertical view.*

E *Activate **Compass Cards** to place evenly spaced compass markers on the outer range ring in horizontal views.*

F *Range rings are a set of concentric circles labelled by distance from the vessel position.*

G *A line of X'es in the vertical views shows the bottom of the purse seine. The depth is defined for the fishing gear you have chosen.*

H *You can change the tilt angle by means of the **Tilt** function on the **Main** menu. You can also click on the tilt line in a Vertical view and drag it up and down.*

By default, the vertical view is shown in the lower left corner of the presentation. This position is used when you have the net on your starboard side. If you use a net on your port side, you can place the view in the bottom right corner.

Tip

By defining the type of fishing gear you are using, the CS90 system may provide more accurate visual presentations. Use the **Fishing Gear Setup** *dialog box to change the fishing gear properties to match your own equipment.*

Set throw side to Port or Starboard.

Under **Fishing Gear***, select* **Fishing Gear Setup** *to open the dialog box. This dialog box is also provided as a page in the* **Installation** *dialog box.*

This view makes it easy to keep contact with the school. You can determine its size distribution, and monitor the position the school relative to the bottom.

Although the presentation of the echoes is most important in this view, it also contains a number of other objects. These provide you with additional functionality, as well as information that is useful or important while using the CS90 sonar system.

Gain

The current settings for range, gain and tilt are shown in the upper left corner of the view. Click on the text to make it larger. Click one more time to restore the original font size.

The purpose of the **Gain** function is to adjust the echo level in the display presentations. By adjusting the gain you can control how much amplification the CS90 system applies to the received echoes.

Bearing

The current bearing is shown with a solid line pointing out from the vessel position. You can change the angle by means of the **Bearing** function on the **Main** menu. You can also select the bearing line and drag it sideways.

The bearing for the *Vertical* view is controlled by the bearing in the *Horizontal* view.

Tip

The **Bearing** *function controls the horizontal direction of the Vertical view, the audio beam and the beam in each Inspection view.*

By default, a new manually initiated tracked object is automatically given priority status. The priority is identified with a "P". The bearing and tilt settings are

automatically adjusted to follow the movements of the tracked target. The bearing line is automatically locked on the object to reflects its bearing.

Range / Range Rings / Variable Range Ring

The distance from the vessel symbol in the centre of the circle to the outer ring corresponds to the currently selected range.

The current settings for range, gain and tilt are shown in the upper left corner of the view. Click on the text to make it larger. Click one more time to restore the original font size.

Range rings are a set of concentric circles labelled by distance from the vessel position. The selected range is divided into identical distances. The range rings are shown as dotted curves. Each ring has a range read-out. Use the **Range Rings** function to toggle the range rings *On* or *Off*.

Variable Range Ring adds an adjustable range ring to the view. The ring is shown as a dotted circle with its centre on the vessel symbol. The current range is shown next to the circle. To change the range, left-click on the circle and drag to requested diameter. You can use **VRR Range** to manually define a range. The variable range ring can be used for any type of distance measurement relative to the sonar.

Tilt

The current settings for range, gain and tilt are shown in the upper left corner of the view. Click on the text to make it larger. Click one more time to restore the original font size.

When you change the tilt a dotted line presents the requested tilt while the solid line presents the actual tilt. You can change the tilt angle by means of the **Tilt** function on the **Main** menu. You can also click on the tilt line in a *Vertical* view and drag it up and down. If you place the cursor over the tilt presentation in the upper left corner of the *Horizontal* view you can use the scroll wheel to change the tilt.

Bow Marker

The bow marker is shown as a dotted line drawn from the bow of the vessel symbol. The line reflects your vessel's current heading. The bow marker can be enabled or disabled on the **Visual Objects** menu.

Cursor

The distance and depth of the cursor location is shown in the lower right (or left) corner of the view. The depth is calculated from the current tilt and the distance from the vessel. If you place the cursor over the tilt presentation in the upper left corner of the *Horizontal* view you can use the scroll wheel to change the tilt.

Compass Cards

Activate **Compass Cards** to place evenly spaced compass markers on the outer range ring in horizontal views. The compass markers rotate based in the inputs from a navigation sensor. An update takes place when the vessel heading changes more than 1 degree.

Coverage Plot

When you operate with sector transmissions, the area covered by the sonar beams is limited by the chosen transmit sector angle. To make it easier to recognize the area limits, dedicated border lines may be added to the presentation. These lines are used to outline the sector.

In the *Horizontal* view, the coverage plot identifies the area covered in the *Vertical* view.

Current Vectors / Current Flow

A current sensor can be connected to the CS90 system. This can for example be an acoustic Doppler current profiler (ADCP). The information from this sensor is presented in the applicable views.

The **Current Vector** function shows you the speed and direction of the water current under your vessel. One or more arrow are drawn to or from the vessel symbol to indicate the properties of the sea currents. The direction of the arrows indicate the direction of the water currents. The length of the arrows reflects their speeds. A numerical readout of the current vector data is provided in the top right corner of the *Horizontal* view.

The **Current Vector** function is located on the **Visual Objects** menu. Use the **Current Flow** page to define key settings for the presentation of the sensor data. This page is located in the **Display Options** dialog box.

Minute Markers

In order to maintain a visual presentation of your vessel's previous movements, you can draw these with a line. This line is drawn after the vessel symbol in the sonar views, and visualizes your past movements. We refer to this line as the *Track Line*. The **Minute Markers** function adds markers to the track line. These markers indicate how far you have sailed in the last few minutes. The minute markers are shown as small circles on the vessel's track line.

Tip

To draw the track line use the settings on the **Track Line** *page. The* **Track Line** *page is located in the* **Display Options** *dialog box. The* **Display Options** *dialog box is located on the* **Display** *menu.*

Purse seine

A line of X'es in the vertical views shows the bottom of the purse seine. The depth is defined for the fishing gear you have chosen. The depth is calculated from the sink rate you have defined for the fishing gear. Use **Purse Depth** on the **Cosmetics** menu to toggle this line *On* or *Off*.

Tip

Under **Fishing Gear***, select* **Fishing Gear Setup** *to open the dialog box. For the selected purse, set the sink rate. For the selected purse, select a depth value.*

If you have connected a compatible catch monitoring system to your CS90 system, information from these sensors are shown in the *Catch* view.

Tip

The **Cosmetics** *menu controls which "cosmetic" features that used.*

Before you can change the settings related to a view, the view must be active. To activate a view, click in it. The active view is identified with a thicker border.

Related topics

User interface, page 286
Sonar views, page 307

Using markers in the CS90 user interface

Under normal use, the CS90 system presents several different echoes simultaneously. Some of these are clearly more interesting than others. It can be a challenging task to tell these echoes apart. It can also be hard to keep track of the different echoes as both echoes and your own vessel move. To ease the identification of these echoes you can use *markers*.

> In this context, the phrase *marker* is used to identify a visual symbol placed in the display presentation. Placing a marker on an echo identifies the echo as "interesting". It is regarded as an *object* that you can act upon.
>
> Further classification of this echo as a *target* must be done manually.
>
> The phrase *target* is used to identify an echo in the display presentation that you wish to act upon. The echo may be from a material item, a shallow, reef or rock, or from fish, fish schools or mammals. You must decide which echoes that shall be classified as targets, and whether you shall start position or target tracking.

The CS90 offers several different marker types. You can add as many markers as you like. The most common markers can be added using dedicated buttons on the Operating Panel. Other markers are added using the shortcut menu in each view. Each marker is identified with its geographical location.

Tip

If you have placed markers on several echoes to make them objects, you can select one of these and give it priority status. The bearing line in the relevant views will automatically be locked on the object with this priority to reflects its bearing. You can only give priority status to one object. The priority is identified with a "P". If you change the tilt and bearing settings manually, the priority status is lost.

Topics

Place Marker, page 351

Target markers, page 354

Circle Marker, page 356

Own Ship Marker, page 357

Gear Symbol, page 358

Rulers, page 360

Place Marker

The **Place Marker** function allows you to create a marker at the current position of the cursor. Each marker is shown as a small triangle with or without a short identifying label. You can also place a marker by pressing the **Place Marker** button on the Operating Panel.

In this context, the phrase *marker* is used to identify a visual symbol placed in the display presentation. Placing a marker on an echo identifies the echo as "interesting". It is regarded as an *object* that you can act upon.

Further classification of this echo as a *target* must be done manually.

The phrase *position* is used to identify a fixed echo in the display presentation that you wish to act upon. The echo may for example be from a shallow, reef or rock. You must decide which echoes that shall be classified as positions, and whether you shall start position tracking.

Example

When you are manoeuvring close to the coastline, or in otherwise working in confined waters, you may wish to avoid shallow waters and reefs. To keep track of potentially dangerous places, you place markers on them.

To place a marker on an interesting echo:

1 Place the cursor over the echo in the display presentation.

2 Press **Place Marker** on the Operating Panel.

or:

1 Place the cursor over the echo.

2 Right-click and select **Place Marker** on the shortcut menu.

or:

1 Open the **Objects** menu.

2 Select **New**.

3 Provide latitude, longitude and depth for the new marker.

4 Select **OK** to save the selected settings and close the dialog box.

Once an echo has been provided with a marker in the display presentation it is regarded as an *object*.

Note

The marker is stationary. It has a specified range, bearing and depth related to your own vessel. If the echo moves in the display presentation the marker will not follow.

Deleting a marker

There are two ways to delete a marker. You can use the shortcut menu, or select **Delete** in the **Objects** menu.

Tip

You can delete a single marker, or multiple markers simultaneously, by selecting **Delete** *in the* **Objects** *menu. If you use* **Delete Marker** *on the shortcut menu you can only remove one marker at a time.*

1 Place the cursor on the marker you wish to delete.

2 Right-click to open the shortcut menu.

3 Select **Delete Marker**.

or:

1 Open the **Objects** menu.

2 In the list of objects, check the box for the object you wish to delete.

Check **Select All** to select all the markers in the list.

3 Select **Delete**.

Objects menu

The **Objects** menu provides a list of all current objects. This includes all types of objects including those classified as targets.

Tip

The **Objects** *menu provides additional functionality.*

- *Select the check box on the left side of the object to mark it for deletion, or to save it.*
- *Select the object line to activate the control buttons, and to retrieve information about the object. You can also click on the marker in the CS90 presentation to activate the control buttons. The selected marker is then shown with thicker lines.*

Visual Objects menu

The **Visual Objects** menu controls which graphical elements that are shown in the different views. These graphic elements include markers, vectors and targets that are tracked. The majority of the functions are "on/off" buttons to enable or disable these graphic elements in the various views.

Priority status

You can give priority status to one marker to identify the relevant object as the most important target or position. If another object has this priority, the status is transferred to the new object. The priority is identified with a "P". When a marker is given priority it can be regarded as a *position track*.

Relevant information about the priority target can be found in the lower left corner of the view. If you think the text is small and hard to read, double-click on the text field. This will increase the text size.

There are two ways to give a marker priority status.

1 Place the cursor on the marker you wish to give priority status.

2 Right-click to open the shortcut menu.

3 Select **Set Priority Marker**.

or:

1 Open the **Objects** menu.

2 In the object list, select the object *line* to activate the control buttons for that particular object.

3 Select **Priority Target**.

Position track

If you wish to establish a marker on a geographical position, use the standard marker. If you wish to start *position tracking*, press **Position Track** on the Operating Panel, or give a selected marker priority. When a marker is given priority it can be regarded as a *position track*.

The phrase *position* is used to identify a fixed echo in the display presentation that you wish to act upon. The echo may for example be from a shallow, reef or rock. You must decide which echoes that shall be classified as positions, and whether you shall start position tracking.

The position track locks on a position defined by its latitude, longitude and depth. The bearing and tilt settings are automatically adjusted to compensate for the movements of your vessel. The bearing line is automatically locked on the object to reflects its bearing. The marker is stationary. If the echo moves in the display presentation the marker will not follow. If you change the tilt and bearing settings manually, the position track is disabled.

Note

The priority is identified with a "P". You can only give priority status to one object. If you create a new marker and give this priority, the position track is disabled. The same applies if you start a new target track.

Relevant information about the priority target can be found in the lower left corner of the view. If you think the text is small and hard to read, double-click on the text field. This will increase the text size.

Place Marker Continuous

Place Marker Continuous is an on/off switch. Right-click and select **Place Marker Continuous** on the shortcut menu. When enabled, left-click in a CS90 view to add new marker. Each click produces a new marker.

Manual tracking

You can start manual tracking by placing multiple markers on a target echo that moves in the view. You can see the latest marker's course and speed in the view's lower right corner. The values are calculated based on the last two markers you created and the time between them. The physical location of the individual markers and the specific information provided for the latest marker show you the historical path of the chosen target.

Related topics

Using markers in the CS90 user interface, page 350
About position tracking, page 365

Target markers

During normal operation, some echoes are clearly more interesting than others. In many situations specific echoes may be regarded as *targets*. To keep track of the targets you can use *target markers* and/or start *target tracking*. When target tracking is activated, bearing and tilt are automatically adjusted to follow the movements of the tracked target.

> The phrase *target* is used to identify an echo in the display presentation that you wish to act upon. The echo may be from a material item, a shallow, reef or rock, or from fish, fish schools or mammals. In most cases, the target will move and continuously change its position relative to your own vessel. You must decide which echoes that shall be classified as targets, and whether you shall start manual or automatic target tracking.
>
> Once an echo has been provided with a marker in the display presentation it is regarded as an *object*.

To start target tracking:

1 Place the cursor over the echo you wish to track.

2 Press **Target Track** on the Operating Panel.

or:

1 Place the cursor over the echo you wish to track.

2 Right-click to open the shortcut menu.

3 Select **Initiate Track**.

The tracked target is regarded as an *object*, and it is identified with a circle and two lines. The two lines reflect the size of the current tracking area. By default, a new manually initiated tracked object is automatically given priority status. The bearing line is automatically locked on the object to reflects its bearing.

Note

If you change the tilt or bearing settings manually the priority status is lost. The CS90 system will still attempt to track the target, but the tilt and bearing settings are not adjusted.

The priority is identified with a "P". The bearing and tilt settings are automatically adjusted to follow the movements of the tracked target. You can only give priority status to one object. If you start tracking a *new* target the first target will loose its priority. The same applies if you give priority to another marker. The tracking of the first target will however not stop, and the target marker is still shown.

Relevant information about the tracked object can be found in the bottom left corner of the view. If you think the text is small and hard to read, double-click on the text field. This will increase the text size.

Tip

Under certain circumstances the target tracking may not follow the intended echo. This may for example happen if the tracking area is too large. You can start manual tracking by placing multiple markers on a target echo that moves in the view. The physical location of the individual markers and the specific information provided for the latest marker show you the historical path of the chosen target.

On the **User Settings Setup** *page, de-select* **New Manually Initiated Track** *if you do not want new tracked targets to become priority targets. This page is located in the* **Installation** *dialog box. To open the page, select* **Installation** *on the* **Setup** *menu.*

Deleting a marker

There are two ways to delete a marker. You can use the shortcut menu, or select **Delete** in the **Objects** menu.

Tip

You can delete a single marker, or multiple markers simultaneously, by selecting **Delete** *in the* **Objects** *menu. If you use* **Delete Marker** *on the shortcut menu you can only remove one marker at a time.*

1 Place the cursor on the marker you wish to delete.

2 Right-click to open the shortcut menu.

3 Select **Delete Marker**.

or:

1 Open the **Objects** menu.

2 In the list of objects, check the box for the object you wish to delete.

Check **Select All** to select all the markers in the list.

3 Select **Delete**.

Objects menu

The **Objects** menu provides a list of all current objects. This includes all types of objects including those classified as targets.

Tip

The **Objects** *menu provides additional functionality.*

- *Select the check box on the left side of the object to mark it for deletion, or to save it.*
- *Select the object line to activate the control buttons, and to retrieve information about the object. You can also click on the marker in the CS90 presentation to activate the control buttons. The selected marker is then shown with thicker lines.*

Visual Objects menu

The **Visual Objects** menu controls which graphical elements that are shown in the different views. These graphic elements include markers, vectors and targets that are tracked. The majority of the functions are "on/off" buttons to enable or disable these graphic elements in the various views.

Related topics

Using markers in the CS90 user interface, page 350
About target tracking, page 362

Circle Marker

A single circle marker can be placed in the display presentation. The circle is drawn with the same diameter as your purse. By means of the circle you can see the size of the school relative to your purse. You can only add one circle marker to the display presentation.

To place the circle marker:

1 Position the cursor where you wish to place the circle marker.

2 Press **Circle Marker** on the Operating Panel.

or:

1 Position the cursor where you wish to place the circle marker.

2 Right-click and select **Place Circle Marker** on the shortcut menu.

Tip

The **Fishing Gear** *function allows you to define the size of your trawl or purse seine. This function is opened from the* **Setup** *menu.*

Objects menu

The **Objects** menu does not provide any information about the circle marker.

Note

The marker is stationary.

Deleting a marker

To delete the circle marker, press **Circle Marker** on the Operating Panel, or right-click to select **Remove Circle Marker** on the shortcut menu.

Related topics

Using markers in the CS90 user interface, page 350

Own Ship Marker

Select **Place Own Ship Marker** to add a square symbol to the vessel's current position in the echo presentation. The own ship marker is intended as a tool in a search situation.

To place the own ship marker:

- Press **Own Ship Marker** on the Operating Panel. *(This function is not supported by all the operating panels.)*

or:

- Right-click and select **Place Own Ship Marker** on the shortcut menu.

The own ship marker is now regarded as an *object*. All information about the object is shown in the **Objects** menu listed as "OSM". You can place as many own ship markers as you need.

Note

The marker is stationary. If your vessel moves in the CS90 presentation the marker will not follow.

The own ship marker is intended as a tool in a search situation. Place the marker when your echo sounder confirms that you are passing over a school. Then, if you should loose the school from view, you will know where to start looking for it.

During a search your CS90 presentation may be cluttered with multiple markers and echoes. Due to its shape the own ship markers are easy to see among the other markers.

Deleting the marker

There are two ways to delete the marker.

1 Place the cursor on the marker you wish to delete.

2 Right-click to open the shortcut menu.

3 Select **Delete Own Ship Marker**.

or:

1 Open the **Objects** menu.

2 In the list of objects, check the box for the object you wish to delete.

3 Select **Delete**.

Objects menu

The **Objects** menu provides a list of all current objects. This includes all types of objects including those classified as targets.

Tip

The **Objects** *menu provides additional functionality.*

- *Select the check box on the left side of the object to mark it for deletion, or to save it.*
- *Select the object line to activate the control buttons, and to retrieve information about the object. You can also click on the marker in the CS90 presentation to activate the control buttons. The selected marker is then shown with thicker lines.*

Visual Objects menu

The **Visual Objects** menu controls which graphical elements that are shown in the different views. These graphic elements include markers, vectors and targets that are tracked. The majority of the functions are "on/off" buttons to enable or disable these graphic elements in the various views.

Related topics

Using markers in the CS90 user interface, page 350

Gear Symbol

You can activate this function from the short-cut menu or use the dedicated button on the Operating Panel.

The gear symbol may be either a purse seine circle or a trawl symbol. The gear symbol is placed in the echo presentation when you activate it on the operating panel or in the shortcut menu. Which gear symbol to present depends on your choice in the **Fishing Gear** function.

Open this function from the **Setup** menu.

Purse seine

The gear symbol is provided as a tool to help you plan and shoot the purse seine. The symbol is intended to be used in a structured sequence that starts when you plan to shoot the purse seine. For use with a purse seine, the intended process follows:

1 To start the process:

- Press **Gear** on the Operating Panel. — **or:**
- Right-click and select **Show Gear Symbol** on the shortcut menu.

This places a circle marker in the view. The size and location of the marker is defined by the choices you have made with the **Fishing Gear** function. Until you proceed, the marker follows the movements of the vessel by keeping its relative location to the bow. This allows you to position your vessel in the best possible location before you shoot the purse seine.

2 When you shoot the net:

- Press **Gear** on the Operating Panel. — **or:**
- Right-click and select **Place Gear Symbol** on the shortcut menu.

The first timer starts when you select **Place Gear Symbol**.

A rectangular marker is placed in the view, and marks the position where the purse seine was shot. The circular marker is disconnected from the vessel movements, and acts as a guideline for your manoeuvring. The history line shows the movements of your vessel. Since the CS90 system knows the length of your net, it places a second marker on this line when half the length has been spent. When the entire net has been spent, a third rectangular marker is shown. In this phase the **Fishing Gear** function is disabled.

The first timer stops when the progress bar reads 100%. This action starts the second timer, which stops when you select **Remove Gear Symbol**.

3 When the process is finalized:

- Press **Gear** on the Operating Panel. — **or:**
- Right-click and select **Remove Gear Symbol** on the shortcut menu to delete the markers from the view.

Trawl

If you select a single or dual trawl in the **Fishing Gear** function, the CS90 system displays a trawl symbol in the echo view. The size and location of the image reflect the measurements you added in the **Fishing Gear Setup** dialog box.

The trawl image appears aft of the vessel symbol. When your vessel turns, the trawl presentation will reflect this, but the location and movements could be more precise. If you want an accurate trawl positioning, you must equip the trawl with relevant positioning sensors and connect the data to the CS90 system.

Catch view

Use the information in the *Catch* view to monitor the progress of the purse seine operation. The view does not offer any echo data.

- The progress bar at the top of the *Catch* view shows you the amount of net that has been spent. The sequence starts when you shoot the net.
- A line of X'es in the vertical views shows the bottom of the purse seine. The depth is defined for the fishing gear you have chosen. The depth is calculated from the sink rate you have defined for the fishing gear. Use **Purse Depth** on the **Cosmetics** menu to toggle this line *On* or *Off*.

  Tip

  Under **Fishing Gear**, *select* **Fishing Gear Setup** *to open the dialog box. For the selected purse, set the sink rate. For the selected purse, select a depth value.*

- Horizontal dotted lines show the depth intervals. Use **Depth Dividers** on the **Cosmetics** menu to toggle these lines *On* or *Off*.
- Relevant information about a priority target can be found in the lower left corner of the view. The information includes the location, speed, course and depth of the target, as well as an estimate of its area and volume.
- The coverage plot for the *Plane* view is shown in the *Horizontal* view.

If you have connected a compatible catch monitoring system to your CS90 system, information from these sensors are shown in the *Catch* view.

Objects menu

The **Objects** menu does not provide any information about the gear symbols.

Related topics

Using markers in the CS90 user interface, page 350

Rulers

Place Ruler allows you to measure the distance and bearing between two objects in the horizontal view. The function creates a straight line - referred to as a "ruler" - between the objects. The length and relative bearing of the ruler is displayed next to it.

To use this functionality:

- Place the cursor over the first echo.
- Right-click to open the shortcut menu. Select **Place Ruler**.
- Once the shortcut menu is closed, position the other end of the ruler and place it with a left-click.

You can place as many rulers as you like in the view. Once a ruler has been established you can not make changes to it.

Select **Delete Ruler** or **Delete All Rulers** on the shortcut menu to delete one or all rulers from the view.

Objects menu

The **Objects** menu does not provide any information about rulers.

Related topics

Using markers in the CS90 user interface, page 350

Using target and position tracking

The phrase *target* is used to identify an echo in the display presentation that you wish to act upon.The echo may be from a material item, a shallow, reef or rock, or from fish, fish schools or mammals.In most cases, the target will move and continuously change its position relative to your own vessel.You must decide which echoes that shall be classified as targets, and whether you shall start manual or automatic target tracking. A position track permits the CS90 system to automatically control the tilt and bearing based on the movements of your vessel.

Topics

About target tracking, page 362

About position tracking, page 365

About target tracking

During normal operation, some echoes are clearly more interesting than others. In many situations specific echoes may be regarded as *targets*. To set up the CS90 system to provide such information, you can start *target tracking*.

> The phrase *target* is used to identify an echo in the display presentation that you wish to act upon. The echo may be from a material item, a shallow, reef or rock, or from fish, fish schools or mammals. In most cases, the target will move and continuously change its position relative to your own vessel. You must decide which echoes that shall be classified as targets, and whether you shall start manual or automatic target tracking.

Once an echo has been provided with a marker in the display presentation it is regarded as an *object*.

> In this context, the phrase *track* (noun) is used to define the movements of a target based on it geographical position, speed and direction (heading). A track is the output from a *track algorithm* implemented in a software program. A track is thus anything the CS90 is tracking either manually (through markers and user interaction) or automatically by the sonar (target tracking) on your initiative.

A target track permits the CS90 system to automatically control the tilt and bearing based on the movements of the chosen target. It locks on the target defined by its position, heading and speed. The bearing and tilt settings are automatically adjusted to follow the movements of the tracked target.

To start target tracking:

1 Place the cursor over the echo you wish to track.

2 Press **Target Track** on the Operating Panel.

or:

1 Place the cursor over the echo you wish to track.

2 Right-click to open the shortcut menu.

3 Select **Initiate Track**.

The tracked target is regarded as an *object*, and it is identified with a circle and two lines. The two lines reflect the size of the current tracking area. By default, a new manually initiated tracked object is automatically given priority status. The bearing line is automatically locked on the object to reflects its bearing.

Note

If you change the tilt or bearing settings manually the priority status is lost. The CS90 system will still attempt to track the target, but the tilt and bearing settings are not adjusted.

The priority is identified with a "P". You can only give priority status to one object. If you start tracking a *new* target the first target will loose its priority. The same applies if you give priority to another marker. The tracking of the first target will however not stop, and the target marker is still shown.

Relevant information about the tracked object can be found in the bottom left corner of the view. To read this information in the view's bottom left corner, you must enable it on the **Cursor Readout** page. This page is located in the **Display Options** dialog box.

- Select **Target Volume** to present calculated area and volume of a tracked target or priority object.
- Select **Target Track** to present relevant information about a tracked target or priority object.
  - Bearing (The value relates to the ship's heading.)
  - Bearing
  - Range
  - Speed
  - Course
  - Depth

  The bearing and range values are relative to your vessel.

You can see this information in the bottom left corner of the view. If you think the text is small and hard to read, double-click on the text field. This will increase the text size.

Tip

Under certain circumstances the target tracking may not follow the intended echo. This may for example happen if the tracking area is too large. You can start manual tracking by placing multiple markers on a target echo that moves in the view. The physical location of the individual markers and the specific information provided for the latest marker show you the historical path of the chosen target.

On the **User Settings Setup** *page, de-select* **New Manually Initiated Track** *if you do not want new tracked targets to become priority targets. This page is located in the* **Installation** *dialog box. To open the page, select* **Installation** *on the* **Setup** *menu.*

Deleting a marker

There are two ways to delete a marker. You can use the shortcut menu, or select **Delete** in the **Objects** menu.

Tip

You can delete a single marker, or multiple markers simultaneously, by selecting **Delete** *in the* **Objects** *menu. If you use* **Delete Marker** *on the shortcut menu you can only remove one marker at a time.*

1 Place the cursor on the marker you wish to delete.

2 Right-click to open the shortcut menu.

3 Select **Delete Marker**.

or:

1 Open the **Objects** menu.

2 In the list of objects, check the box for the object you wish to delete.

Check **Select All** to select all the markers in the list.

3 Select **Delete**.

Objects menu

The **Objects** menu provides a list of all current objects. This includes all types of objects including those classified as targets.

Tip

The **Objects** *menu provides additional functionality.*

- *Select the check box on the left side of the object to mark it for deletion, or to save it.*
- *Select the object line to activate the control buttons, and to retrieve information about the object. You can also click on the marker in the CS90 presentation to activate the control buttons. The selected marker is then shown with thicker lines.*

Visual Objects menu

The **Visual Objects** menu controls which graphical elements that are shown in the different views. These graphic elements include markers, vectors and targets that are tracked. The majority of the functions are "on/off" buttons to enable or disable these graphic elements in the various views.

About position tracking

A position track permits the CS90 system to automatically control the tilt and bearing based on the movements of your vessel.

Example

When you are manoeuvring close to the coastline, or in otherwise working in confined waters, you may wish to avoid shallow waters and reefs. To keep track of potentially dangerous places, you can start *position tracking*.

In this context, the phrase *marker* is used to identify a visual symbol placed in the display presentation. Placing a marker on an echo identifies the echo as "interesting". It is regarded as an *object* that you can act upon.

Further classification of this echo as a *target* must be done manually.

The phrase *position* is used to identify a fixed echo in the display presentation that you wish to act upon. The echo may for example be from a shallow, reef or rock. You must decide which echoes that shall be classified as positions, and whether you shall start position tracking.

The phrase *target* is used to identify an echo in the display presentation that you wish to act upon. The echo may be from a material item, a shallow, reef or rock, or from fish, fish schools or mammals. In most cases, the target will move and continuously change its position relative to your own vessel. You must decide which echoes that shall be classified as targets, and whether you shall start manual or automatic target tracking.

Each marker is identified with its geographical location. Once an echo has been provided with a marker in the display presentation it is regarded as an *object*.

- To start position tracking:
- Place the cursor on the echo from a potentially dangerous shallow or reef.
- Press **Position Track** on the Operating Panel. (Mk1/Mk2)

- Press **Place Marker** on the Operating Panel. (Mk3)

or:

1 Place the cursor on the echo from a potentially dangerous shallow or reef.

2 Right-click to open the shortcut menu.

3 Select **Place Marker**.

4 Open the **Objects** menu.

5 In the object list, select the object *line* to activate the control buttons for that particular object.

6 Select **Priority** to give the currently selected object a priority status.

If another object has this priority, the status is transferred to the new object.

The marker is shown as a small triangle with or without a short identifying label. Once an echo has been provided with a marker in the display presentation it is regarded as an *object*.

The position track locks on a position defined by its latitude, longitude and depth. The bearing and tilt settings are automatically adjusted to compensate for the movements of your vessel. The bearing line is automatically locked on the object to reflects its bearing. The marker is stationary. If the echo moves in the display presentation the marker will not follow.

Note

If you change the tilt and bearing settings manually, the position track is disabled.

The priority is identified with a "P". You can only give priority status to one object. If you create a new marker and give this priority, the position track is disabled. The same applies if you start a new target track.

Relevant information about the tracked object can be found in the bottom left corner of the view. If you think the text is small and hard to read, double-click on the text field. This will increase the text size.

Deleting a marker

There are two ways to delete a marker. You can use the shortcut menu, or select **Delete** in the **Objects** menu.

Tip

You can delete a single marker, or multiple markers simultaneously, by selecting **Delete** *in the* **Objects** *menu. If you use* **Delete Marker** *on the shortcut menu you can only remove one marker at a time.*

1 Place the cursor on the marker you wish to delete.

2 Right-click to open the shortcut menu.

3 Select **Delete Marker**.

or:

1 Open the **Objects** menu.

2 In the list of objects, check the box for the object you wish to delete.

Check **Select All** to select all the markers in the list.

3 Select **Delete**.

Objects menu

The **Objects** menu provides a list of all current objects. This includes all types of objects including those classified as targets.

Tip

The **Objects** *menu provides additional functionality.*

- *Select the check box on the left side of the object to mark it for deletion, or to save it.*
- *Select the object line to activate the control buttons, and to retrieve information about the object. You can also click on the marker in the CS90 presentation to activate the control buttons. The selected marker is then shown with thicker lines.*

Visual Objects menu

The **Visual Objects** menu controls which graphical elements that are shown in the different views. These graphic elements include markers, vectors and targets that are tracked. The majority of the functions are "on/off" buttons to enable or disable these graphic elements in the various views.

Information panes

Topics

Biomass information pane description, page 369

Size Distribution information pane description, page 371

Fish Position information pane description, page 374

Zoom information pane, page 376

Biomass information pane description

The *Biomass* information pane displays an index of the biomass in the in the current *Inspection* view. The biomass index is the s_A value, or *Nautical area scattering coefficient* (NASC), measured with unit m^2/nmi^2.

How to open

Before you open an information pane, you must first click in an *Inspection* view to make it "active". The information provided will only be valid for the selected view.

To open the *Biomass* information pane, click in the chosen view to activate it, then select the **Biomass** button on the top bar. To *close* the information pane, select it one more time on the top bar. You can also select **Close** in the top right corner of the pane.

Note

Information panes are only available for Inspection views.

Description

The digit shown in the *Biomass* information pane is a calculated index.

> If more than one target is located in the acoustic beam at the same depth, it is not usually possible to resolve them separately. This is often the case with schooling fish or aggregations of zooplankton. In these cases, echo integration is used to estimate biomass. Echo integration assumes that the total acoustic energy scattered by a group of targets is the sum of the energy scattered by each individual target. This assumption holds well in most cases. The total acoustic energy backscattered by the school or aggregation is integrated together, and this total is divided by the (previously determined) backscattering coefficient of a single animal, giving an estimate of the total number.
>
> *http://en.wikipedia.org/wiki/Fisheries_acoustics, March 2015*

The CS90 system records all the targets from the smallest plankton to the largest whale. The biomass value is an indicator to how much fish you currently have in the beam. Every single fish will emit an echo, and the sum of all these registered echoes are presented as a number. Smaller organisms such as plankton will also emit echoes, but these are so weak that they will hardly influence on the total biomass.

The biomass value provides you with information about the fish abundance, and as such it may help you to decide if it pays off to start fishing. However, you must consider if the biomass value is a result of large amounts of plankton or bait, or if you have "real fish" below the keel. The biomass value is relative, and after some use your experience will be a valuable factor when the decision is made.

Note

If you have other echo sounders or sonars running asynchronous with the CS90 system, these other systems may cause interference. The CS90 system may detect and measure the transmit pulses from other hydroacoustic systems, and these pulses have an effect on the biomass calculations. To avoid all interference, a full synchronization of the various acoustic instruments is required. If your own vessel produces excessive noise this will also be taken into the biomass calculations and give you inaccurate data.

You can easily change the physical size and shape of each information pane. Click in its lower right corner, and drag to a new size. To reset the information pane to its default size, select the **Reset size** button in its top right corner.

The **Transparency** function allows you to adjust how much you are able to see "through" the information panes you have opened. You can adjust the setting from 0% (no transparency) to 90% (almost full transparency) in steps of 10%.

Details

Close

Select this button to close the information pane. The pane closes immediately. If you wish to reopen it, simply click the button on the top bar one more time.

Reset Size

You may have manually changed the physical size of the information pane. To reset the information pane to its default size, select the **Reset size** button in its top right corner.

Related topics

User interface, page 286
Information panes, page 368

Size Distribution information pane description

The *Size Distribution* information pane presents a histogram with the echoes from single fish. The calculations are based on the fact that different fish species have different echo strength. The histogram presents the actual size of the fish by weight, length or echo strength (shown in dB).

How to open

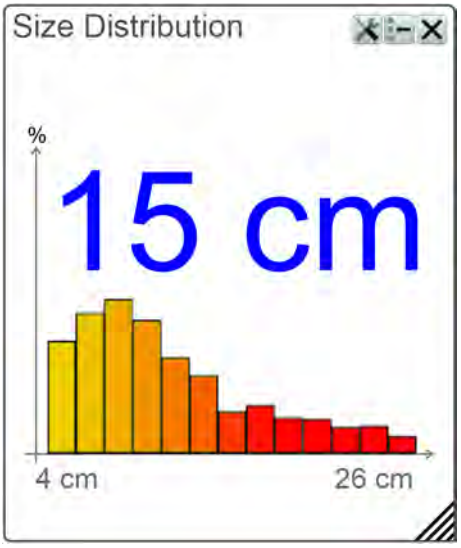
Before you open an information pane, you must first click in an *Inspection* view to make it "active". The information provided will only be valid for the selected view.

To open the information pane, click in the chosen view to activate it, then select **Size Distribution** on the top bar. To *close* the information pane, select it one more time on the top bar. You can also select **Close** in the top right corner of the pane.

Note

Information panes are only available for Inspection views.

Description



The *Size Distribution* information pane presents a histogram with the echoes from single fish. Only the fish detected by the sonar beam in the *Inspection* view are used to create the histogram.

The displayed number shows the average size of all the fish in the histogram. The value is presented in the unit you have chosen on the **Size Distribution** page. For an accurate reading of the X-axis, place the cursor on the axis, and read the value from the tooltip label.

Note

The measurement accuracy in the Size Distribution information pane depends on the vertical angle of the inspection beam. A beam that points nearly straight down corresponds to a traditional echo sounder. This gives the best accuracy since the fish is then viewed from above. If you use a smaller beam angle, you may see the fish from the front or back. This gives significantly smaller echoes, and thus low measurement accuracy.

The abbreviation *TS* is commonly used for target strength. The *target strength* is a measure of the area of an object detected by a sonar or an echo sounder. The target strength is usually quantified as a number of decibels. It is defined as 10 times the

logarithm of the reflected intensity (I_R) at one metre from the fish, divided by the intensity which strikes the fish, i.e. the incident intensity (I_1), i.e. 10 log I_R/I_1.

Tip

Use the **Size Distribution** *page to define the properties for the histogram shown in the Size Distribution information pane. Select* **Setup** *in the information pane to open the* **Size Distribution** *page. The* **Size Distribution** *page is located in the* **Information Pane Options** *dialog box.*

The target strength from fish varies from one specie to another. The **Fish Select** *dialog box allows you to select the fish species you expect to catch. You can then manually adjust the size distribution. The* **Fish Select** *dialog box is located on the* **Setup** *menu.*

Once you are able to assess your catch, you can use the **Fish Size Adjustment** *page to change the average size of the various species. The page is opened in the* **Information Pane Options** *dialog box.*

The **Information Pane Options** *dialog box is located on the* **Active** *menu. The* **Information Pane Options** *dialog box is only available when an Inspection view is active.*

The *Inspection* view can be regarded as an "echo sounder" with an adjustable direction. In the CS90 system we use the phrase *echogram* to describe the information provided by the view.

You can easily change the physical size and shape of each information pane. Click in its lower right corner, and drag to a new size.

To reset the information pane to its default size, select the **Reset size** button in its top right corner.

The **Transparency** function allows you to adjust how much you are able to see "through" the information panes you have opened. You can adjust the setting from 0% (no transparency) to 90% (almost full transparency) in steps of 10%.

Details

Close

Select this button to close the information pane. The pane closes immediately. If you wish to reopen it, simply click the button on the top bar one more time.

Reset Size

You may have manually changed the physical size of the information pane. To reset the information pane to its default size, select the **Reset size** button in its top right corner.

Setup

Select **Setup** to open the **Information Pane Options** dialog box. This dialog box allows you to change the presentation parameters related to the information pane.

Related topics

User interface, page 286
Information panes, page 368

Fish Position information pane description

The *Fish Position* information pane shows the position of the detected single fish echoes. The three circles in the information pane identify the operational frequencies. The echoes are seen from above. The colours indicate the echo strength.

How to open

Before you open an information pane, you must first click in an *Inspection* view to make it "active". The information provided will only be valid for the selected view.

To open the *Fish Position* information pane, click in the chosen view to activate it, then select the **Fish Position** button on the top bar. To *close* the information pane, select it one more time on the top bar. You can also select **Close** in the top right corner of the pane.

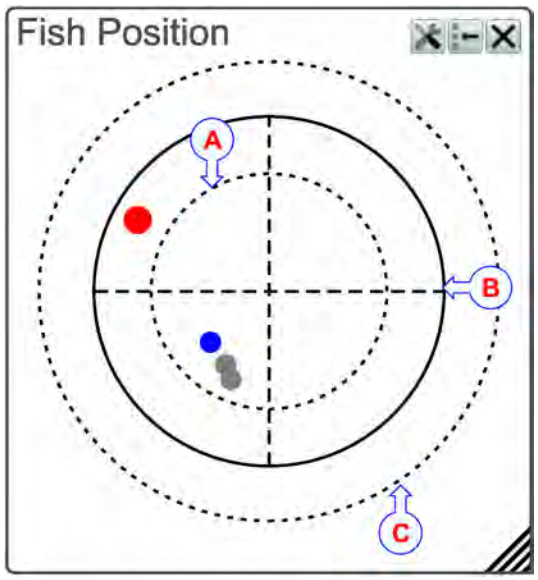
Note

Information panes are only available for Inspection views.

A *The dotted inner circle identifies the low frequency in the sweep.*

B *The circle between them identifies the centre frequency.*

C *The outer dotted circle identifies the high frequency.*



Description

Each coloured circle in the information pane identifies a single fish. You can observe how these move through the beam. The colours used are the same as the colours used in the colour scale, and these indicate the echo strength from each fish.

Tip

This information pane can be useful during trawling. Keep an eye on the Fish Position information pane to make sure that you can manoeuvre the trawl through the areas with most fish.

This is basically the same view as in the *Echo Position* information pane. However, the fish echoes are here viewed from *above* and not from the side.

The information pane provides information about its source, that is from which echogram the data comes from.

You can easily change the physical size and shape of each information pane. Click in its lower right corner, and drag to a new size.

To reset the information pane to its default size, select the **Reset size** button in its top right corner.

The **Transparency** function allows you to adjust how much you are able to see "through" the information panes you have opened. You can adjust the setting from 0% (no transparency) to 90% (almost full transparency) in steps of 10%.

Details

Close

Select this button to close the information pane. The pane closes immediately. If you wish to reopen it, simply click the button on the top bar one more time.

Reset Size

You may have manually changed the physical size of the information pane. To reset the information pane to its default size, select the **Reset size** button in its top right corner.

Setup

Select **Setup** to open the **Information Pane Options** dialog box. This dialog box allows you to change the presentation parameters related to the information pane.

Related topics

User interface, page 286
Information panes, page 368

Zoom information pane

The *Zoom* information pane allows you to magnify a chosen area of the current *Inspection* view.

How to open

Before you open an information pane, you must first click in an *Inspection* view to make it "active". The information provided will only be valid for the selected view.

To open the *Zoom* information pane, click in the chosen view to activate it, then select **Zoom** on the top bar. To open the second and third *Zoom* information panes, simply select the **Zoom** button repeatedly. To *close* the information pane, select it one more time on the top bar. You can also select **Close** in the top right corner of the pane.

Note

Information panes are only available for Inspection views.

Description

Once the *Zoom* information pane is opened, the zoomed area is shown as a dotted rectangle in the view. You can change the size of the zoomed area, and you can move the rectangle anywhere inside the active view.

- Click inside the rectangle, hold the mouse button depressed, and move the rectangle within the borders of the view.
- Click any of the four corners, hold the mouse button depressed, and drag the rectangle to any other size and shape.

The echoes inside the zoomed area will always be shown in the *Zoom* information pane.

Use **Area Pinned To Vessel** to control the behaviour of the zoom function.

Each *Zoom* information pane export information. When opening the *Biomass* and/or the *Size Distribution* information panes, you will automatically receive information from each of the *Zoom* information panes that you have opened.

You can easily change the physical size and shape of each information pane. Click in its lower right corner, and drag to a new size.

To reset the information pane to its default size, select the **Reset size** button in its top right corner.

The **Transparency** function allows you to adjust how much you are able to see "through" the information panes you have opened. You can adjust the setting from 0% (no transparency) to 90% (almost full transparency) in steps of 10%.

Details

Area Pinned to Vessel

Use **Area Pinned To Vessel** to control the behaviour of the zoom function. When the rectangular zoomed area is established, it can either follow the echoes while it moves towards the left, or it can stay put.

- When **Area Pinned To Vessel** is active, the zoomed area will be permanently positioned on the echoes. The echoes shift through the area, and therefore also shift through the *Zoom* information pane.
- When **Area Pinned To Vessel** is switched off, the zoomed area will "follow" the echo data from right towards left.

Close

Select this button to close the information pane. The pane closes immediately. If you wish to reopen it, simply click the button on the top bar one more time.

Reset Size

You may have manually changed the physical size of the information pane. To reset the information pane to its default size, select the **Reset size** button in its top right corner.

Related topics

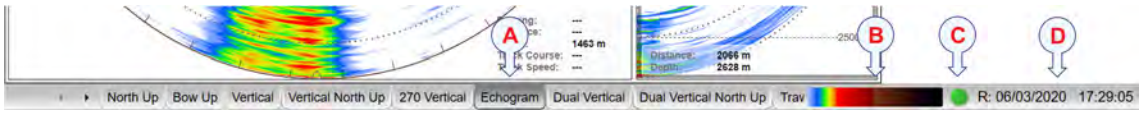
User interface, page 286
Information panes, page 368

Bottom bar

The bottom bar is located at the bottom of the display presentation and stretches from the left side to the right side. The tabs on the bottom bar allow you to choose presentation mode.

How to open

The bottom bar is available all the time.



Description

(A) Presentation Modes

Each presentation mode offered by the CS90 system provides a selection of views in a predefined pattern.

By default, the views are arranged automatically in the presentation. Click on the view border, hold the button depressed, then drag the border to create a smaller or larger rectangle. Note that the size of the other views are changed accordingly!

If you have many presentation modes on a small display, two small arrows appear on the left side of the bottom bar. You can use these arrows to scroll the bottom bar sideways.

Use the functionality offered by the **Presentation Mode** page to choose which presentation modes to choose from.

(B) Colour Scale

The colour scale on the bottom bar reflects the colour choice you have made for the echo presentations. To change the colour scale, use the **Colour Setup** dialog box. You open the **Colour Setup** dialog box from the **Display** menu.

(C) Transceiver Status

The small circular button on the bottom bar reflects the status of the transceiver. Colour codes are used. A green light means that the system is operational. Right-click to start, restart or stop the transceiver. If you want to monitor the start-up sequence, double-click the **Transceiver Status** indicator to open the **Transceiver On/Off** dialog box. In the **Transceiver On/Off** dialog box, select **Advanced** to start, restart or stop the transceiver.

(D) Date and time

The date and time of the latest ping are displayed on the right side of the bottom bar. During replay the date and time in the recording are shown. Date and time are shown with a prefix. **P:** indicates *Normal* mode. **R:** indicates *Replay* mode.

Related functionality

General page

UTC Time: Check the box to use Coordinated Universal Time (UTC). When disabled, the CS90 system uses local time.

Note

To enable UTC time, your CS90 system must be set up to accept the NMEA ZDA datagram. The NMEA ZDA datagram contains the universal time code (UTC), day, month, year and local time zone.

This page is located in the **Display Options** dialog box. The **Display Options** dialog box is located on the **Display** menu.

Presentation Modes

Use the functionality offered by the **Presentation Mode** page to choose which presentation modes to choose from. This can be useful for several reasons:

- A small display monitor may not be able to show you all the presentation mode tabs.
- You don't need to scroll.
- You can hide the presentation modes that you hardly or never use.

This page is located in the **Display Options** dialog box. The **Display Options** dialog box is located on the **Display** menu.

Related topics

General page, page 537
Presentation Modes page, page 551

Menu system

Topics

About the menus and menu buttons, page 381
Using the “smart” menu buttons, page 382
Main menu, page 384
Operation menu, page 386
Display menu, page 389
Setup menu, page 393
Active menu, page 399
Objects menu, page 403
Visual Objects menu, page 407
Cosmetics menu, page 411
Shortcut menus, page 413

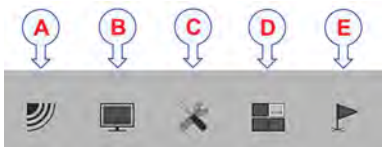
About the menus and menu buttons

To select operating parameters on the CS90 system, use the menu system. The menus are organized in a tree structure with a main menu, a set of secondary menus, and several menu buttons. The menus are organized in a tree structure with a main menu and a secondary menu. Some of the menu buttons open dialog boxes or submenus to offer additional choices.

Description

The **Main** menu is located at the top of the menu structure. It offers the most common functions for efficient use of the CS90 system. Unless you hide the entire menu system, the **Main** menu is visible at all times, even if you close the secondary menus.

Below the **Main** menu, a set of dedicated icons are used to open the secondary menus.



A **Operation menu**: The **Operation** menu allows you to control the operating mode, the recording functionality, and how the CS90 system transmits audio pulses ("ping") into the water.

B **Display menu**: The **Display** menu provides basic functions related to the screen behaviour and presentation of data.

C **Setup menu**: The **Setup** menu provides basic functions related to the installation parameters and the communication with peripheral systems.

D **Active menu**: The **Active** menu offers parameters related to current views and data presentations provided by the CS90 system.

E **Object menu**: The **Objects** menu offers basic functionality related to markers and tracks that you are using in the CS90 presentation.

Tip

Unless you need to make frequent changes to the operating parameters, you may want to hide the menu from the display presentation. This gives you more space for echo information. To hide the menu, select **Menu** *on the top bar. To retrieve the menu, select* **Menu** *one more time. When the menu is hidden, it is temporarily shown on the left or right side of the display presentation if you move the cursor to that position.*

Using the “smart” menu buttons

Each menu provided by the CS90 system contains several menu buttons. Each button shows the purpose of the button. Some of them also display the current setting.

Depending on the properties of each individual button, several methods can be used to change settings.

- Select the *left* side of the button to *decrease* the numerical value. Select the *right* side of the button to *increase* the numerical value.
- Press and hold the left mouse button. Move the cursor *right* to increase the value. Move the cursor *left* to decrease the value.
- Spin the scroll wheel in either direction to increase or decrease the numerical value.
- Type a numerical value. (You can only type a new value if a computer keyboard is connected to your Processor Unit.)
- Select the button to open the button menu. Choose the required setting.
- Select the button to open the dialog box.

Choosing a setting with the [+] and [–] buttons

1 To change the setting, move the cursor to either side of the button.

2 Observe that the background colour changes.

   a Select the *left* side of the button to *decrease* the numerical value.

   b Select the *right* side of the button to *increase* the numerical value.

Choosing a setting by moving the cursor horizontally

1 Place the cursor on the button.

2 Press and hold the left mouse button.

3 Move the cursor horizontally over the button.

   a Move the cursor *right* to increase the value.

   b Move the cursor *left* to decrease the value.

4 Release the mouse button when requested value is shown.

Choosing a numerical setting with the scroll wheel

1 Place the cursor on the button.

2 Spin the scroll wheel in either direction to increase or decrease the numerical value.

3 Release the scroll wheel when the requested value is shown.

Choosing a setting with the keyboard

1 Place the cursor on the button.

2 Select the button to open the text field.

3 Type a numerical value.

If the value exceeds the permitted range, the frame turns red. Type a new value within the accepted range.

4 Press **Enter** on the keyboard.

Choosing a setting on the button menu

1 Place the cursor on the button.

2 Select the button to open the button menu.

3 Choose the required setting.,

The chosen setting is applied, and the menu closes automatically.

Tip

Several of the functions offer **Apply to All**. *If you select* **Apply to All** *your setting is applied to all the views simultaneously.*

4 Whenever applicable, you can make a selection by selecting the left or right side of the button. This method does not show you the menu choices.

a Select the *left* side of the button to select a "lower"' menu choice.

b Select the *right* side of the button to select a "higher"' menu choice.

Selecting settings using a dialog box

Select the button to open the dialog box.

Once you have made the necessary settings, most dialog boxes provide the following options:

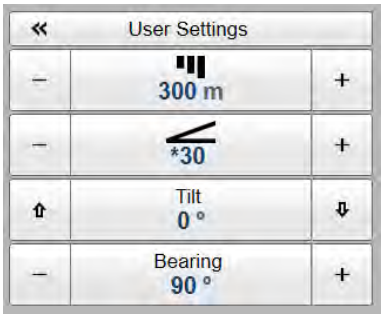
- Select **OK** to save the selected settings and close the dialog box.
- Select **Apply** to save your settings without closing the dialog box.
- Select **Cancel** to close the dialog box without making any changes.

Main menu

The **Main** menu is located at the top of the menu structure. It offers the most common functions for efficient use of the CS90 system. Unless you hide the entire menu system, the **Main** menu is visible at all times, even if you close the secondary menus.

How to open

By default, the **Main** menu is open. It is placed on the right side of the display presentation.



Description

Only brief descriptions are provided.

For detailed information about each function, page or dialog box, refer to the *Functions and dialog boxes* chapter in this publication.

Tip

If you do not need to use the menu system, you can hide it. This allows more space for the echo presentation.

Use the **Menu** *on the top bar to hide or show the menu.*

When the menu system is hidden, it appears temporarily on the left or right-hand side of the screen if you move the cursor to that position.

The icons for opening (and closing) the secondary menus are located under the **Main** menu. Select an icon to open the relevant menu. Select it one more time to close the menu.

Several of the functions offer **Apply to All**. If you select **Apply to All** your setting is applied to *all the views* in the current presentation mode.

Functions and dialog boxes

User Settings

The **User Settings** dialog box allows you to save the current user settings (your current selection of operational parameters), and to retrieve factory or previously saved user settings.

Range

The **Range** function allows you to specify the maximum distance from the transducer to the outer edge of the sonar beam. The range value shown and selected is by default only applied to the currently selected view.

Even though you can choose a large range value, that does not mean that you can detect your targets on the same range. The range value only defines the range that is shown in the views. Actual target detection will always depend on the

operational environment, such as water temperature, salinity, interference and layers in the water column.

Gain

The purpose of the **Gain** function is to adjust the echo level in the display presentations. By adjusting the gain you can control how much amplification the CS90 system applies to the received echoes. The setting is by default only applied to the active view. It is identified with a thick border.

Tilt

The **Tilt** function allows you to control the vertical angle of the sonar beams.

Bearing

The *Horizontal* view presents the 360 degrees area around your vessel from a bird's eye view. For the other views you must define the horizontal direction of the beam. Use **Bearing** to adjust the horizontal angle referenced to the vessel heading. You can also select the bearing line and drag it sideways.

Related topics

Main menu: functions and dialog boxes, page 419

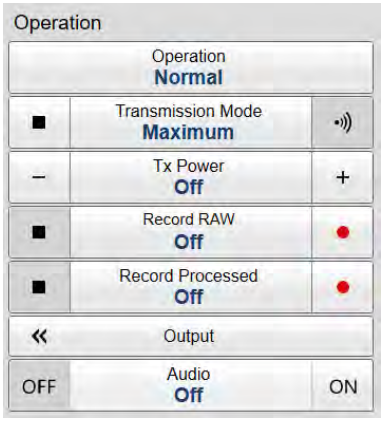
Operation menu

The **Operation** menu allows you to control the operating mode, the recording functionality, and how the CS90 system transmits audio pulses ("ping") into the water.

How to open

Select the **Operation** icon.

The icon is located under the **Main** menu. Select the icon one more time to close the menu.



Note

Immediately after you have turned on the CS90 system, the **Operation** *icon is flashing. The icon is flashing to indicate that even if the CS90 system is turned on, "pinging" is disabled. When the CS90 system is turned on,* **Tx Power** *is by default set to Off. This is a safety precautions to prevent inadvertent transmissions when the vessel is in dry dock.*

Description

Only brief descriptions are provided.

For detailed information about each function, page or dialog box, refer to the *Functions and dialog boxes* chapter in this publication.

Tip

If you do not need to use the menu system, you can hide it. This allows more space for the echo presentation.

Use the **Menu** *on the top bar to hide or show the menu. When the menu system is hidden, it appears temporarily on the left or right-hand side of the screen if you move the cursor to that position.*

Functions and dialog boxes

Operation

The **Operation** function controls the operating mode of the CS90 system. You can set it to *Normal*, *Replay*, *Inactive* or *Simulation*. The *Simulation* mode is an optional function. In order to use this functionality, a dedicated software license is required. Contact you local dealer for more information.

Transmission Mode

Transmission Mode allows you to control how often the CS90 system shall transmit acoustic energy (ping) into the water.

Tx Power

Use **Tx Power** to increase or decrease the output power. The output power is selected from predefined steps.

Record RAW

Record RAW allows you to record the *unprocessed* echo data received by the transducer. You can save the data to the hard disk, or onto an external storage device. The data files can be played back on the CS90 system. You can keep the recorded files for future reference, training purposes and calibration.

Record Processed

The **Record Processed** function allows you to record the *processed* echo data received by the transducer. Which processing to apply is controlled by the settings on the **Processed Data to File** page. **Processed Data to File** is located in the **Output** dialog box.

Output

The purpose of the **Output** dialog box is to collect all functionality related to data output in one easily accessible location. The dialog box is organised in pages grouping parameters for different parts of the application.

The following pages are provided:

File Setup

A useful function of the CS90 system is it ability to record echo data. To retrieve the data files you need to know where they are, and which file names that have been used. The purpose of **File Setup** is to define the file and folder properties for the data files that you are recording. You can select the disk and folder for the files, the maximum file size, and a prefix for the file names.

I/O Setup

To communicate with peripheral devices the Processor Unit offers several serial and/or Ethernet (LAN) ports. The number of communication ports depends on how your Processor Unit is set up and configured. For each port, you can set up the communication parameters, and monitor the data flow.

Processed Data to File

The CS90 system can export several types of processed data file formats. Use **Processed Data to File** to define which processed data formats to save, and where to place the files. This page is located in the **Output** dialog box.

Marker output

Use the **Output Marker** page to export target markers to a communication port.

Relay Output

The CS90 system allows you to export the same sensor data that was originally imported. This can "reuse" the same information on other systems. The **Relay Output** page is used to set up and control this export functionality.

Screen Recording

The **Screen Recording** function allows you to record and save the echo presentation as a video file. Each screen recording you make is saved in `.mp4` format on the Processor Unit hard disk. Use the **Screen Recording** page to define where the video files are saved.

Screen Captures File Location

While using the CS90 system you may wish to make a screen capture to save an instantaneous copy of the current presentation. Use **Screen Capture File Location** to define where to save your screen captures.

Audio

Select **Audio** to turn the audio output on or off. The audio information is retrieved from the audio beam.

The **Bearing** function controls the horizontal direction of the *Vertical* view, the audio beam and the beam in each *Inspection* view. The current bearing applied to the *Horizontal* view is shown with a solid line pointing out from the sonar position.

With the Audio Sector function, you can listen to the audio from all the beams in a user-defined sector. Select **Audio**. Select **Audio Sector** to open the choices under the button.

- Select *Audio Beam* to retrieve audio information only from this beam.
- Select any opening angle to specify the width of the listening beam from which the CS90 system will obtain audio information. The listening beam places the audio beam in the middle. The entire listening beam rotates when the audio beam rotates.

If you need to adjust the volume use the controls on the audio equipment.

Related topics

Operation menu: functions and dialog boxes, page 431
Pages in the Output dialog box, page 519

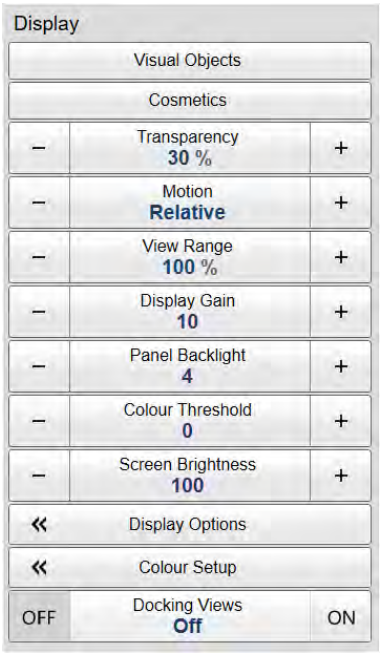
Display menu

The **Display** menu provides basic functions related to the screen behaviour and presentation of the echo data. Use the **Display** menu to control the visual aspects of the system, and to show or hide various elements in the presentation.

How to open

Select the **Display** icon.

The icon is located under the **Main** menu. Select the icon one more time to close the menu.



Description

Only brief descriptions are provided.

For detailed information about each function, page or dialog box, refer to the *Functions and dialog boxes* chapter in this publication.

Tip

If you do not need to use the menu system, you can hide it. This allows more space for the echo presentation.

Use the **Menu** *on the top bar to hide or show the menu. When the menu system is hidden, it appears temporarily on the left or right-hand side of the screen if you move the cursor to that position.*

The choices in this menu depends on which view in the display presentation that is currently "active". The menu may therefore change from one view to another. The screen capture may not show you all the menu choices.

Functions and dialog boxes

Visual Objects

Visual Objects is an "on/off" button used to open the **Visual Objects** menu. The **Visual Objects** menu controls which graphical elements that are shown in the different views. These graphic elements include markers, vectors and targets that are tracked. The majority of the functions are "on/off" buttons to enable or disable these graphic elements in the various views.

Visual Objects menu, page 407

Cosmetics

Use the functions on the **Cosmetics** menu to turn "cosmetic" elements in the sonar presentation on or off. The majority of the functions are on/off buttons to enable or disable "cosmetic" elements in the sonar views. This function is not available in all the views.

Cosmetics menu, page 411

Transparency

When you open an information pane, you will see that it is transparent. This transparency allows you to see the echo data behind the pane, but it may also reduce the visibility of the information in it. The transparency can be adjusted.

Motion

In selected views you can control how the vessel symbol shall "behave" in the presentation. The way the vessel moves in the presentation can be chosen either *true* or *relative*.

View Range

Use **View Range** to expand the range shown in the relevant views to any percentage of the original **Range** setting. This function can be used if you wish to move your ship symbol to the bottom of the view. You can then expand the range without adding zoom.

Display Gain

Use the **Display Gain** function to increase or decrease the strength of the echo presentation.

Panel Backlight

The buttons on the Operating Panel have a built-in backlight to improve visibility on a dark bridge. Use **Panel Backlight** to control the intensity of the lights.

Colour Threshold

The **Colour Threshold** function allows you to reduce or increase the number of colours. This will provide a filtering effect that removes the weakest echoes.

Screen Brightness

The intensity of the light given off by the display presentation can be adjusted. You can use this function to increase or decrease the light from the screen to match the ambient light.

Display Options

The top bar gives you fast access to key functionality and navigational information. It provides buttons to hide or show the menu, to monitor data recording, to open the **Messages** dialog box, and to open the context sensitive on-line help. Which navigation elements to see on the top bar is selected in the **Display Options** dialog box. It controls the location of the menu. You can also select which tooltips to

appear when you move the cursor over the echo information. The dialog box is organised in pages grouping parameters for different parts of the application.

The following pages are provided:

General

The **General** page in the **Display Options** dialog box controls the location of the menu. You can select which navigational information to be shown on the top bar. You can also choose to see Coordinated Universal Time (UTC) at the bottom of the presentation.

Map Display

Once a map service has been chosen, use **Map Display** to choose which map elements to include in the map presentation. The map is only shown in *Horizontal* views when **Range Projection** is set to *True*.

Safety Depth

The **Safety Depth** page allows you to change the safety depth settings, and thus the presentation of the various water depths. Once a map is projected on top of the echo data, the depth contour lines are drawn with specific colours.

Tooltip

When you move the cursor over the echograms in the display presentation, small "tooltips" are shown to provide additional information. The **Tooltip** page controls which tooltips that are shown.

Own Ship

In order to maintain a visual presentation of your vessel's previous movements, you can draw these with a line. This line is drawn after the vessel symbol in the sonar views, and visualizes your past movements. We refer to this line as the *History Line*. When the history line is active, the length (in minutes) of the line can be defined.

Vertical View Orientation

The **Vertical View Orientation** page allows you to decide whether the vertical views should be presented from right to left, or from left to right.

Off Centre

When the vessel symbol is moved away from the centre of the view, more space is made available for the echo presentations. If you keep the same range setting, this added space causes a "zoom" effect. The distance from the vessel to the outer edge of the search area is the same, but it is "stretched" out. You may not want this to happen.

Current Flow

A current sensor can be connected to the CS90 system. This can for example be an acoustic Doppler current profiler (ADCP). The information from this sensor is presented in the applicable views. Use the **Current Flow** page to define key settings for the presentation of the sensor data.

The **Current Vector** function shows you the speed and direction of the water current under your vessel. One or more arrow are drawn to or from the vessel symbol to indicate the properties of the sea currents.

Cursor Readout

It is often helpful to see information about the cursor and the active markers in the view. Use the **Cursor Readout** functionality to add information to the readout fields in the bottom corners of the view. When enabled, you can see the cursor's position (bearing and distance) and depth in the lower right corner of the view. The depth is calculated from the current tilt and the distance from the vessel. You can also place information about a tracked target or a priority marker in the bottom left corner of the view.

Presentation Modes

All echoes offered by the CS90 system are shown in rectangular *views*. Combinations of these views are organized in *presentation modes*. Each presentation mode offered by the CS90 system provides a selection of views in a predefined pattern. To open a presentation mode use the relevant tab on the bottom bar. Use the functionality offered by the **Presentation Mode** page to choose which presentation modes to choose from.

Colour Setup

The **Colour Setup** dialog box controls the presentation colours used by the CS90 system. This includes the palette ("skin"), the number of colours in use, and the colour scale when no Time Variable Gain (TVG) setting has been selected for the presentation.

Docking Views

Each presentation mode offered by the CS90 system provides a selection of views in a predefined pattern. These are placed at different positions with different sizes. With the **Docking Views** function you can move and re-size the views in the display presentation.

Once the **Docking Views** function is activated, the various views are placed in named windows, and docking positions for these windows are shown. The docking positions show you where to drag and drop the selected view. Any view can be selected, and then repositioned as indicated by the docking positions.

Related topics

Display menu: functions and dialog boxes, page 442
Pages in the Display Options dialog box, page 536

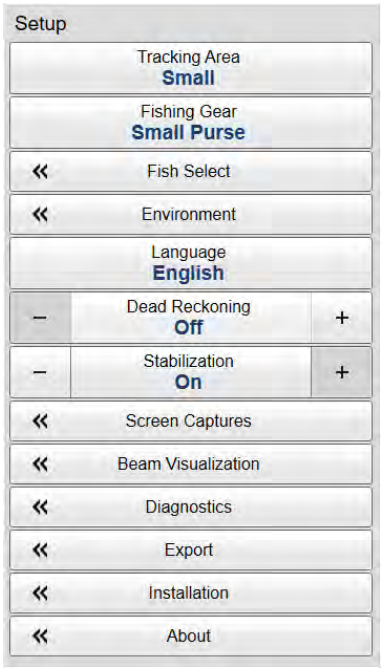
Setup menu

The **Setup** menu provides basic functions related to the installation parameters and the communication with peripheral systems.

How to open

Select the **Setup** icon.

The icon is located under the **Main** menu. Select the icon one more time to close the menu.



Description

Only brief descriptions are provided.

For detailed information about each function, page or dialog box, refer to the *Functions and dialog boxes* chapter in this publication.

Tip

If you do not need to use the menu system, you can hide it. This allows more space for the echo presentation.

Use the **Menu** *on the top bar to hide or show the menu. When the menu system is hidden, it appears temporarily on the left or right-hand side of the screen if you move the cursor to that position.*

Context sensitivity

This is a highly adaptive menu. The choices in this menu depends on which view in the display presentation that is currently "active". The menu may therefore change from one view to another. The name of the currently active view is identified at the top of the menu. The screen capture may not show you all the menu choices.

Note

Before you can change the settings related to a view, you must click inside the view to activate it. The changes you make are by default only valid for the active view. Several of the functions offer **Apply to All**. *If you select* **Apply to All** *your setting is applied to all the views simultaneously.*

Functions and dialog boxes

Tracking Area

Use the **Tracking Area** function to define the size of the area that you want to detect moving objects in. An invisible area - the tracking area - is created as an acquisition area. In order for the CS90 system to find and lock on the intended target, it needs to be kept within this tracking area. If the intended target falls outside the area, the tracking can not be started.

Fishing Gear

By defining the type of fishing gear you are using, the CS90 system may provide more accurate visual presentations. Use the **Fishing Gear Setup** dialog box to change the fishing gear properties to match your own equipment.

School Select

During normal operation, the detection and estimation of fish schools depends on the specie and the density of the school. The **School Select** function offers a selection of species. Based on your choice the CS90 system will adjust its operating parameters to achieve optimal performance.

Open the **School Mass Adjustment** page to adjust the density for a given specie, or to create you own school parameters.

Environment

Environmental parameters such as salinity, sound speed and water temperature all play an important part to present accurate echo data. Use the **Environment** parameters to define these values. Depending on the current sea and weather conditions, you may need to change these values frequently.

Language

You may prefer to use the CS90 system with the user interface in your own language. A selection of languages is provided. The **Language** function allows you to select the language to be used in the display presentations, menus and dialog boxes.

Dead Reckoning

The **Dead Reckoning** function is used to improve the position of the track line relative to the actual position of the drifting fishing gear. For this function to operate, the CS90 system requires input from a speed log.

Stabilization

The CS90 system is provided with a built-in motion sensor to provide electronic stabilization of the sonar beams. If the sensor is malfunctioning the input can be disabled.

Screen Captures

While using the CS90 system you may wish to make a screen capture to save an instantaneous copy of the current presentation. You can choose either a single screen capture or a sequence with multiple screen captures.

Beam Visualization

With the various beams provided by the CS90 system, it may be difficult to understand the concepts. How do these beams "behave" in the water? The beam visualization feature simulates how the acoustic beams cover the seabed and the water column.

Diagnostics

The CS90 system is a computerized sonar. There are hardly any analogue circuitry, and the possibility of traditional troubleshooting is limited. In order to rectify this, a built-in software application is available to offer test and maintenance functionality. The **Diagnostics** dialog box controls the test and diagnose application that checks the performance of the CS90 system.

This dialog box contains a number of pages selected from the menu on the left side.

The following pages are provided:

Processor

The **Processor** page offers an overview of the parameters related to software version, operation and network.

Sensors

The **Sensors** page presents a table with all the sensors currently connected to the CS90 system. For each sensor, the status is provided.

Transceiver

The **Transceiver** page offers key information about each transceiver board in the Transceiver Unit.

The purpose of the transceiver boards is to first create and transmit the acoustic pulses. After the transmission the transceiver boards receive the echoes from the seabed and/or the water column. These echoes are filtered, amplified and finally converted into digital format. This transmission and reception sequence is commonly referred to as a *ping*.

Transducer

Use the **Transducer** page to do a reception test to check the individual transducer elements. Any errors are then easily detected.

Noise

The operational performance of the CS90 system depends on the noise conditions. It is essential that the noise signature is as low as possible.

Export

The **Export** dialog box allows you to export user settings, configuration files, message logs and information mainly related to hardware and software troubleshooting.

Installation

Before you use the CS90 system you must set it up to communicate with the relevant peripherals. This includes the transducer. Use the **Installation** dialog box to set up all interfaces with external devices, and to set up basic parameters related to installation and operation. In most cases, you only need to do this once.

This dialog box contains a number of pages selected from the menu on the left side.

The following pages are provided:

Sensor Installation

For the CS90 system to use and offer correct navigational information, one or more external sensors must be connected. Typical sensors are those providing navigational information (heading, speed or geographical position). Use the **Sensor Installation** page to define which external sensors your CS90 system will import information from. You must also specify which datagram formats to use. For each relevant sensor you must insert the offset values that define the its physical location relative to the vessel's coordinate system.

Sensor Configuration

With multiple sensors connected to the CS90 system, many of them will provide the same datagrams. We cannot expect that these datagrams provide the same information. The **Sensor Configuration** page allows you to define a datagram priority, so that the information from the "most reliable" sensor is used by the CS90 system. You can also define manual values in case a sensor is unserviceable, or not installed.

I/O Setup

To communicate with peripheral devices the Processor Unit offers several serial and/or Ethernet (LAN) ports. The number of communication ports depends on how your Processor Unit is set up and configured. The parameters on the **I/O Setup** page allow you to control the properties of each of the available communication ports. For each port, you can set up the communication parameters, and monitor the data flow.

Motion Reference Unit

The motion reference unit (MRU) measures the roll and pitch movements of the vessel. Some sensor models also measure heave. The information provided by the motion sensor is used by the CS90 system to stabilize the beams.

Installation Parameters

The **Installation Parameters** pages allow you to define the relationship between the physical locations of the various sensors and the transducer. All relevant system units and sensors must be defined with their physical offset values in relation to the defined *Ship Origin* in the vessel's coordinate system. You will only need to define these installation parameters once.

Synchronization

The purpose of the **Synchronization** parameters is to set up the CS90 system to operate alone, or as a master or slave in a synchronized system. Synchronization is required in order to avoid interference if the CS90 system is used simultaneously with other hydroacoustic instruments within the same frequency range.

Units

The user interface presents many measurements. These measurements are for example related to depth, range and distance. From the **Units** page you control which units of measurements are used.

Operating Panel

The Operating Panel offers all necessary control functions for normal operation. It further allows you to assign certain functions to dedicated buttons and switches. The **Operating Panel** page is used to select which physical hardware panel you use, and to assign functionality to the programmable buttons.

Echogram Settings

The CS90 system offers an *inspection* beam. The inspection beam is presented using an *Inspection* view. Use the **Echogram Settings** page to set up basic functionality for the *Inspection* view.

Hull Unit Configuration

The hull unit is used to lower the transducer down below the ship's hull when the CS90 system shall be used. When the CS90 system is turned off, the transducer is hoisted for protection. Use **Hull Unit Configuration** to specify the type of hull unit your CS90 system is using.

System Protection

The **System Protection** parameters allow you to define your own warning limits for the CS90 system.

Fishing Gear

By defining the type of fishing gear you are using, the CS90 system may provide more accurate visual presentations.

Map Setup

If you want to add a map to the display presentation you must first select a *map provider*. Use the **Map Setup** page to choose a map provider and to enter necessary provider URL, API Key or license. In order to use this functionality, a dedicated software license is required. Contact you local dealer for more information.

User Settings Setup

The **User Settings** dialog box allows you to save the current user settings (your current selection of operational parameters), and to retrieve factory or

previously saved user settings. These settings can be related to different operations, environmental conditions or basic personal preferences. By default, information about the current range, bearing and tilt will not be saved. On the **User Settings Setup** page, tick the box to include range, bearing and tilt information the next time you save the user settings.

Software License

The CS90 system does not need any software licenses to operate. However, specific software license codes "unlocks" additional functionality. The **Software License** settings allow you to type a license code (text string) to unlock these optional functions.

Transceiver Upgrade

The CS90 system offers a large number of transceiver channels. 16 identical transceiver boards are used. Certain functions offered by the CS90 system may require the firmware on these transceiver boards to be upgraded. For more information, refer to the relevant software release note.

Simrad Connect

The purpose of the **Simrad Connect** page is to make the CS90 system available for remote control with a suitable portable device.

About

Each software release for the CS90 system is uniquely identified. The **About** dialog box identifies the current software version with its release date. The version described in this publication is 23.9.X.

Tip

For detailed information about each function and dialog box, refer to the Reference Manual or the context sensitive on-line help.

Related topics

Setup menu: functions and dialog boxes, page 454
Pages in the Diagnostics dialog box, page 556
Pages in the Installation dialog box, page 575

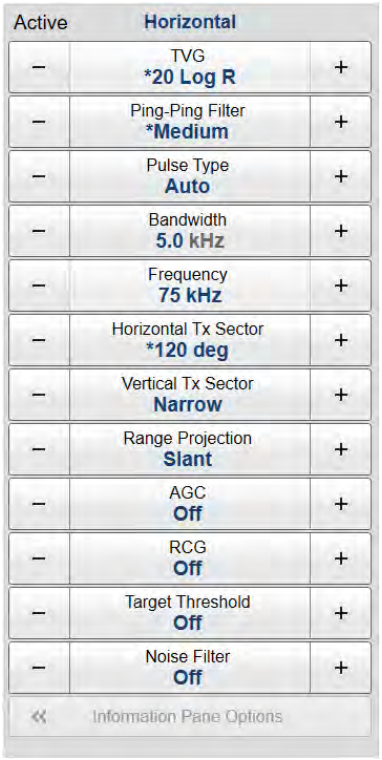
Active menu

The **Active** menu offers parameters related to current views and data presentations provided by the CS90 system.

How to open

Select the **Active** icon.

The icon is located under the **Main** menu. Select the icon one more time to close the menu.



Description

Only brief descriptions are provided.

For detailed information about each function, page or dialog box, refer to the *Functions and dialog boxes* chapter in this publication.

Tip

If you do not need to use the menu system, you can hide it. This allows more space for the echo presentation.

Use the **Menu** *on the top bar to hide or show the menu.*
When the menu system is hidden, it appears temporarily on the left or right-hand side of the screen if you move the cursor to that position.

The choices in this menu depends on which view in the display presentation that is currently "active". The menu may therefore change from one view to another. The name of the currently active view is identified at the top of the menu. The screen capture may not show you all the menu choices.

Note

Before you can change the settings related to a view, you must click inside the view to activate it. The changes you make are by default only valid for the active view.

Several of the functions offer **Apply to All**. If you select **Apply to All** your setting is applied to *all the views* in the current presentation mode.

TVG (Time Variable Gain)

When an acoustic pulse is sent through the water, it will gradually lose its energy. The greater the distance between the transducer and the target(s), the greater the

loss of energy. **TVG** (Time Variable Gain) compensates for the loss of acoustic energy due to geometric spreading and absorption.

Ping-Ping Filter

The **Ping-Ping Filter** analyses the historical information from previous consecutive pings in order to remove unwanted noise and interference from the echo presentation.

Pulse Type

The **Pulse Type** function allows you to select the "shape" of the transmitted pulses ("pings"). Different shapes have different qualities. Which pulse type to use depends on the current environmental conditions, your range to the target(s) and the type and speed of the target(s) you are observing.

Bandwidth

The **Bandwidth** function allows you to select the frequency range in the Hyperbolic Frequency Modulated (HFM) and Linear Frequency Modulated (LFM) transmissions.

Frequency

Use the **Frequency** function to specify the centre frequency for the frequency modulated (FM) transmissions (pings) and the operating frequency for the continuous wave (CW) pings. You can change the frequency in predefined steps from a "start frequency" to an "end frequency".

Horizontal TX Sector

In a horizontal swath the CS90 system transmits with a maximum horizontal opening angle of 360 degrees. Use the **Horizontal Tx Sector** function to control the opening angle - and thus the size - of the horizontal search sector (swath). This is the physical area that is covered with each transmission ("ping").

Vertical TX Sector

The **Vertical Tx Sector** function is used to change the vertical opening angle in horizontal and vertical swaths.

Range Projection

The distance to a target located anywhere in the water column can be measured in two ways. This can either be the horizontal distance to the target (*True*), or along the tilt angle (*Slant*). The **Range Projection** function defines how this distance is measured.

AGC (Automatic Gain Control)

The **AGC** (Automatic Gain Control) function runs an automatic analysis of the echo strength.

RCG (Reverberation Controlled Gain)

The **RCG** (Reverberation Controlled Gain) function removes unwanted reverberation from the bottom and or from the sea surface. This enhances

the visibility of schools. It may however also remove scattered fish from the presentation.

Target Threshold

The CS90 system provides a bottom filter to reduce the sometimes powerful echo from the seabed. This filter is useful if you try to find fish close to the bottom.A higher numerical value increases the filter efficiency and reduces the bottom echo accordingly.

Noise Filter

The **Noise Filter** removes unwanted acoustic noise from the display presentation. It reduces the interference from other acoustic systems (sonars and echo sounders), as well as the noise from the propellers.

Horizontal Scroll

The **Horizontal Scroll** function controls how fast the echoes shall travel across the *Inspection* view.

Vertical Reference

During operations in a vertical view you may wish to focus on the echoes in the upper or lower part of the view.Use **Vertical Reference** to hide a part of the view. The function is only available in the *Vertical* and *Plane* views.

Echogram

The **Echogram** dialog box allows you to control the echogram presentation in the *Inspection* views. Two pages control the horizontal lines and the echogram type with applied TVG (time variable gain). One page controls how fast the echogram travels horizontally across the presentation.

The following pages are provided:

Lines

The echo presentations in the *Inspection* views resemble the echograms you see on an echo sounder. The **Lines** page in the **Echogram** dialog box allows you to control the horizontal and vertical lines used in the echogram presentation. You can make the bottom easier to see, and add lines that hold additional information. The vertical scale of the echogram presentation can be changed. If you wish to add annotations to your echogram, these are enabled on this page.

Echogram

The echo presentations in the *Inspection* views resemble the echograms you see on an echo sounder. The **Echogram** page allows you to choose which type of echogram you wish to display. You can also control the TVG (Time Variable Gain). The CS90 system can work with several different TVG compensation settings. The TVG (Time Variable Gain) compensation is designed to counteract the natural phenomena of geometric spread and absorption loss.

Horizontal Axis

The echo presentations in the *Inspection* views resemble the echograms you see on an echo sounder. The echoes travel from right towards left across the echogram presentation. Use the **Horizontal Axis** to choose the horizontal scale of the echogram. This controls the "speed" of the echoes.

Information Pane Options

The CS90 system offers several *information panes* to provide additional and detailed data from the presentations. The information panes are opened and closed from the top bar. Several of the information panes are fitted with a **Setup** button. Select **Active** to open the **Information Pane Options** dialog box. Use the **Information Pane Options** dialog box to change the operating parameters for the data provided in the information panes. This dialog box contains a number of pages selected from the menu on the left side.

The following pages are provided:

Size Distribution

The *Size Distribution* information pane presents a histogram with the echoes from single fish. The calculations are based on the fact that different fish species have different echo strength. The echo strength also depends on the operating frequency you use. Use the **Size Distribution** page to define the properties for the histogram shown in the *Size Distribution* information pane.

Fish Position

The *Fish Position* information pane shows the position of the detected single fish echoes. The information pane is only available when an *Inspection* view is "active". Use the **Fish Position** page to set up the presentation parameters for the *Fish Position* information pane.

Fish Size Adjustment

The *Size Distribution* information pane presents a histogram with the echoes from single fish. For various reasons, the fish sizes presented in the *Size Distribution* information pane may be inaccurate. Once you are able to assess your catch, you can use the **Fish Size Adjustment** page to change the average size of the various species.

School Mass Adjustment

When you have defined a priority target, the information in the *Horizontal* view includes an estimate of its area and volume. Once you are able to assess your catch, you can use the **School Mass Adjustment** page to change the weight/volume proportions. This will increase the accuracy of the information in the view.

Related topics

Active menu: functions and dialog boxes, page 469
Pages in the Echogram dialog box, page 618
Pages in the Information Pane Options dialog box, page 626

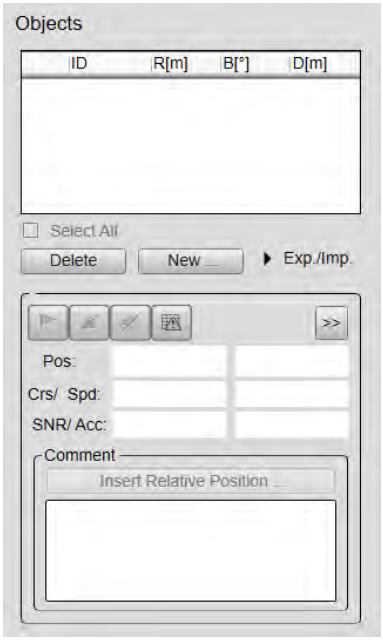
Objects menu

The **Objects** menu is - in spite of its name and location - not a menu at all. This "menu" opens a small view to monitor and control the objects you have defined in the sonar views. Each object is identified with a visual marker.

How to open

Select the **Objects** icon.

The icon is located under the **Main** menu. Select the icon one more time to close the menu.



Description

Once an echo has been provided with a marker in the display presentation it is regarded as an *object*. The **Objects** menu provides a list of all current objects. This includes all types of objects including those classified as targets.

In this context, the phrase *marker* is used to identify a visual symbol placed in the display presentation. By placing a marker on the echo it is regarded as an *object* that you can act upon. If relevant, you can further classify the object as a *target*.

The phrase *target* is used to identify an echo in the display presentation that you wish to act upon. The echo may be from a material item, a shallow, reef or rock, or from fish, fish schools or mammals. You must decide which echoes that shall be classified as targets, and whether you shall start position or target tracking.

If you have placed markers on several echoes to make them objects, you can select one of these and give it *priority* status. The bearing line in the relevant views will automatically be locked on the object with this priority to reflects its bearing. You can only give priority status to one object. The priority is identified with a "P".

Tip

If you do not need to use the menu system, you can hide it. This allows more space for the echo presentation.

Use the **Menu** *on the top bar to hide or show the menu. When the menu system is hidden, it appears temporarily on the left or right-hand side of the screen if you move the cursor to that position.*

Objects list

Once an echo has been provided with a marker in the display presentation it is regarded as an *object*. The table at the top of the **Objects** menu shows you all the objects that are currently identified with markers. Each marked object is listed with the following information:

- **ID**: This is the unique identification of each object marker.

  Each marker is numbered sequentially.

  Objects with allocated markers are identified with an "M" in the **Objects** menu. Objects that are subjected to target tracking are identified with a "T". You can give priority status to one marker to identify the relevant object as the most important target or position. The priority is identified with a "P".

- **R**: This is the range (in metres) from the vessel and to the object identified with the marker.
- **B**: This is the true bearing to the object.
- **D**: This is the object's depth (in metres) relative to the sea surface.

Each marker is specified by its geographical position (latitude and longitude) and its depth. Additional information is provided for objects that are subjected to target tracking.

- Select the check box on the left side of any object to mark it for deletion, or to save it.
- Select the object *line* to activate the control buttons, and to retrieve information about the object.

Select All

Click **Select All** to select all the markers in the list

Delete

Select **Delete** to delete all the markers you have selected in the objects list. Each marker is removed both from the list and from the CS90 presentation.

New

Select **New** to add a new marker manually. The **New Marker** dialog box opens to accept position and depth information.

Export/Import

Once you have defined any number of objects, these can be saved to a file on the hard disk. If necessary, you can later retrieve the file for reuse. The file format is XML. The file is located in the following folder:

```
c:\ProgramData\Simrad\CS90\Markers
```

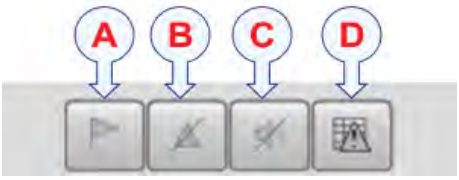
- **To External**: This function is not implemented on the CS90 system.
- **To File**: Select **To File** to save the currently selected objects to a file. The file name is built automatically using date and time information.

- **From File**: Select **From File** to retrieve the previously saved objects. The **Import Marker** dialog box offers a list to choose from.

Control buttons

In the object list, select the object *line* to activate the control buttons for that particular object.

Priority



You can give priority status to one marker to identify the relevant object as the most important target or position. Select **Priority** to give the currently selected object a priority status. If another object has this priority, the status is transferred to the new object. The priority is identified with a "P".

Disable Alarm

When you are tracking a moving target, certain target behaviour may trigger an alarm. Select **Disable Alarm** to disable alarms for the currently selected tracked target.

Suppress Alarm Audio

When you are tracking a moving target, and the target behaviour triggers an alarm, you will hear an audio signal. Select **Suppress Alarm Audio** to disable the audio.

Alarm History

All alarms are presented under the **Alarms** tab in the **Messages** dialog box. Select **Alarm History** to open the **Messages** dialog box.

Object information

In the object list, select the object *line* to retrieve object information about that particular object.Some information is only available for an object that is subjected to target tracking.

Position

Two fields present the geographical position of the currently selected object.

Course/Speed

In the list of objects, select an object on which you have started target tracking. Two fields present the course and speed of the tracked target.

SNR (Signal to Noise ratio)/Acceleration

In the list of objects, select an object on which you have started target tracking. One field presents the acceleration of the tracked target. The Signal to Noise ratio (SNR) gives the strength of the tracked target relative the noise floor defined by the reference cell in the CFAR filter.

Comment

A text field at the bottom of the **Objects** menu allows you to type comments. You can only do this if you have computer keyboard connected to your Processor Unit.

Insert Relative Position

Select **Insert Relative Position** to insert object information into the comment field. The information is inserted as a text string that contains the following information:

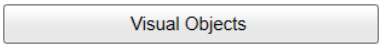
- UTC Time
- Relative bearing
- Range to own ship
- Depth

Visual Objects menu

The **Visual Objects** menu controls which graphical elements that are shown in the different views. These graphic elements include markers, vectors and targets that are tracked. The majority of the functions are "on/off" buttons to enable or disable these graphic elements in the various views.

How to open

Select **Visual Objects** to open the menu.



Visual Objects is located on the **Display** menu.

Description

The majority of the choices provided by this menu are self-explanatory. Only brief descriptions are provided.

Note

Before you can change the settings related to a view, you must click inside the view to activate it. The changes you make are by default only valid for the active view. Several of the functions offer **Apply to All**. *If you select* **Apply to All** *your setting is applied to all the views in the current presentation mode.*

The choices in this menu depends on which view in the display presentation that is currently "active". The menu may therefore change from one view to another. The screen capture may not show you all the menu choices.

Tip

If you do not need to use the menu system, you can hide it. This allows more space for the echo presentation.

Use the **Menu** *on the top bar to hide or show the menu. When the menu system is hidden, it appears temporarily on the left or right-hand side of the screen if you move the cursor to that position.*

Position Object Sizes

The **Place Marker** function allows you to create a marker at the current position of the cursor. Each marker is shown as a small triangle with or without a short identifying label. When you start target or position tracking, a marker is used to identify the object. With this function you can increase or decrease the size of the markers.

Use this function to find the object sizes that fit your preferences. This may for example depend on your physical distance from the screen. The choice you make is saved with the user settings.

Bottom Profile

For each ping transmitted for a vertical view, the CS90 system offers bottom detection functionality. This is an "on/off" switch. Set **Bottom Profile** to *On* to see a bottom contour in the current view. Select **Apply to all** if you wish to use the chosen setting in all the vertical views.

Minute Markers

This is an "on/off" switch. In order to maintain a visual presentation of your vessel's previous movements, you can draw these with a line. This line is drawn after the vessel symbol in the sonar views, and visualizes your past movements. We refer to this line as the *History Line*. The **Minute Markers** function adds markers to the history line. These markers indicate how far you have sailed in the last few minutes. The minute markers are shown as small circles on the history line.

To draw the history line use the settings on the **Own Ship** page. The **Own Ship** page is located in the **Display Options** dialog box. The **Display Options** dialog box is located on the **Display** menu.

Markers

The **Place Marker** function allows you to create a marker at the current position of the cursor. Each marker is shown as a small triangle with or without a short identifying label.

Position information from external objects such as buoys, fish aggregating devices and other similar items can be imported into the CS90 system. The external objects are shown as hexagonal markers in the echo presentation.

Use this function to control if and how the marker symbols are shown in the currently active view. Select **Apply to all** if you wish to use the chosen setting in all the views.

Tracks

This is an "on/off" switch. When you start target or position tracking, a marker is used to identify the object. Each marker is shown as a small circle with or without a short identifying text. Use this function to control if and how the tracking markers are shown in the currently active view. Select **Apply to all** if you wish to use the chosen setting in all the views.

Minute Markers Tracks

This is an "on/off" switch. When you start a target track, a dedicated marker is used to identify the object you are tracking. When enabled, **Track History** draws a position history line after each tracked target. The line identifies the previous positions of the target. This function adds markers to the track history. These indicate the target's travelled distance for each minute.

Track History

When you start a target track, a dedicated marker is used to identify the object you are tracking. Each marker is shown as a small circle with or without a short identifying text. In most cases, the target will move and continuously change its position relative to your own vessel. When enabled, **Track History** draws a position history line after each tracked target. The line identifies the previous positions of the target. This allows you to manually predict its current heading.

Estimated Track Area

This is an "on/off" switch. To keep track of the targets you can use *target markers* and/or start *target tracking*. The tracked target is regarded as an *object*, and it is identified with a circle and two lines. When target tracking is activated, bearing and tilt are automatically adjusted to follow the movements of the tracked target. Relevant information about the tracked object can be found in the bottom left corner of the view. The information includes the location, speed, course and depth of the target, as well as an estimate of its area and volume. The area is provided in m^2 while the volume is presented as weight in metric tons.

The area and volume information is calculated from selected beams in the *Horizontal* view. Due to the noise, acoustic conditions and varying echo strength the size of the tracked target may change from one ping to the next. This will cause the area and volume information to change accordingly. Use the **Estimated Track Area** function to visualize the area estimated by the tracking function. The **Estimated Track Area** function draws a polygon to enclose the target. If this polygon is a lot larger or smaller than the echo in the view, you can assume that the area and/or volume information may be inaccurate.

Speed Vector

This is an "on/off" switch. **Speed Vector** shows you the predicted course and speed of the tracked target. The prediction is based on target's current movements. The estimate is limited to one minute. The information is provided with a line indicating the target's course. The length of the line reflects its speed.

Bow Marker

This is an "on/off" switch. This function displays a dotted line drawn from the bow of the vessel symbol. The line reflects your vessel's current heading. Do not confuse this line with the bearing line.

Current Vector

This is an "on/off" switch. The **Current Vector** function shows you the speed and direction of the water current under your vessel. One or more arrow are drawn to or from the vessel symbol to indicate the properties of the sea currents. The direction of the arrows indicate the direction of the water currents. The length of the arrows reflects their speeds. Multiple arrows are used if the sensor presents information from more than one layer. A numerical readout of the current vector data is provided in the top right corner of the *Horizontal* view.

The **Current Flow** page allows you how to present the direction of the sea current. This page is located in the **Display Options** dialog box.

For this functionality to work, a current sensor must be connected to the CS90 system. The use of an ADCP (Acoustic Doppler Current Profiler) is recommended.

Course Line

This function displays a dotted line drawn from the bow of the vessel symbol. The line reflects your vessel's current course.

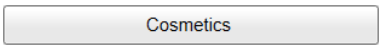
Open the button to select a time period. The **Course Line** function will predict your location after the chosen time period. The information is based on the inputs from the navigation sensors that are connected to the CS90 system.

Cosmetics menu

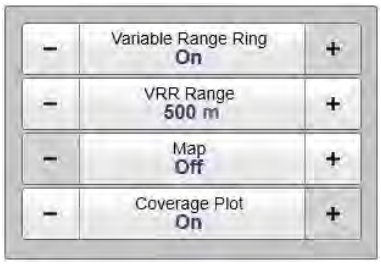
Use the functions on the **Cosmetics** menu to turn "cosmetic" elements in the sonar presentation on or off.

How to open

Select **Cosmetics** to open the menu.



Cosmetics is located on the **Display** menu. The function is not available for the *Inspection* views.



Description

The majority of the choices provided by this menu are self-explanatory. Only brief descriptions are provided.

Note

Before you can change the settings related to a view, you must click inside the view to activate it. The changes you make are by default only valid for the active view. Several of the functions offer **Apply to All**. *If you select* **Apply to All** *your setting is applied to all the views in the current presentation mode.*

The choices in this menu depends on which view in the display presentation that is currently "active". The menu may therefore change from one view to another. The screen capture may not show you all the menu choices.

Tip

If you do not need to use the menu system, you can hide it. This allows more space for the echo presentation.

Use the **Menu** *on the top bar to hide or show the menu. When the menu system is hidden, it appears temporarily on the left or right-hand side of the screen if you move the cursor to that position.*

Range Rings

This function enables range rings to be shown in the relevant views. Range rings are a set of concentric circles labelled by distance from the vessel position. The range rings are shown as dotted curves. Each ring has a range read-out. Use the **Range Rings** function to toggle the range rings *On* or *Off*.

Variable Range Ring

An adjustable range ring can be added to the *Horizontal* and *Vertical* views. The ring is shown as a dotted circle with its centre on the vessel symbol. The current

range is shown next to the circle. To change the range, left-click on the circle and drag to requested diameter. You can use **VRR Range** to manually define a range. The variable range ring can be used for any type of distance measurement relative to the sonar.

VRR Range

(Variable Range Ring Range) You can use **VRR Range** to manually define a range for the variable range ring.

Map

This is an "on/off" switch. Use **Map** to enable or disable the geographical map layer.

The map is only shown in *Horizontal* views when **Range Projection** is set to *True*. This function is opened from the **Active** menu.

Compass Cards

Activate **Compass Cards** to place evenly spaced compass markers on the outer range ring in horizontal views. The compass markers rotate based in the inputs from a navigation sensor. An update takes place when the vessel heading changes more than 1 degree.

Depth Dividers

Depth dividers are horizontal dotted lines used to indicate depth. You can only add these lines to vertical views. Use this function to toggle the depth divider lines *On* or *Off*.

Coverage Plot

When you operate with sector transmissions, the area covered by the sonar beams is limited by the chosen transmit sector angle. To make it easier to recognize the area limits, dedicated border lines may be added to the presentation. These lines are used to outline the sector. Use this function to toggle the coverage plot lines *On* or *Off*.

The function is also useful in omni views. If you increase the tilt, and then exceed the range using the **View Range** function, **Coverage Plot** will indicate the current practical range with a circle. The same applies if you set **Range Projection** to *True*.

Purse Depth

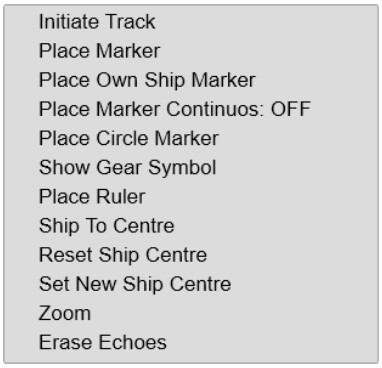
A line of X’es in the vertical views shows the bottom of the purse seine. The depth is defined for the fishing gear you have chosen. Use **Purse Depth** on the **Cosmetics** menu to toggle this line *On* or *Off*.

Shortcut menus

Shortcut menus provide additional functionality for operation.

How to open

Right-click in the view to open the shortcut menu.



Description

To make a choice, right-click in the view and select the relevant option on the shortcut menu.

Note

The functionality provided by the shortcut menus differ from one view to another depending on the view properties. The Inspection views do not provide shortcut menus. Functions from all shortcut menus are listed. The screen capture is provided as an example.

In this context, the phrase *marker* is used to identify a visual symbol placed in the display presentation. By placing a marker on the echo it is regarded as an *object* that you can act upon. If relevant, you can further classify the object as a *target*.

The phrase *target* is used to identify an echo in the display presentation that you wish to act upon. The echo may be from a material item, a shallow, reef or rock, or from fish, fish schools or mammals. You must decide which echoes that shall be classified as targets, and whether you shall start target tracking.

If you have placed markers on several echoes to make them objects, you can select one of these and give it *priority* status. The bearing line in the relevant views will automatically be locked on the object with this priority to reflects its bearing. You can only give priority status to one object. The priority is identified with a "P".

Initiate Track

During normal operation, some echoes are clearly more interesting than others. In many situations specific echoes may be regarded as *targets*. To set up the CS90 system to provide such information, you can start *target tracking*.

The **Initiate Track** function allows you to manually start target tracking.

Place the cursor over the echo you wish to track. Select **Initiate Track**. The tracked target is regarded as an *object*, and it is identified with a circle and two lines. The bearing line is automatically locked on the object to reflects its bearing.

By default, a new manually initiated tracked object is automatically given priority status. If another object has this priority, the status is transferred to the new object. The priority is identified with a "P".

Tip

On the **User Settings Setup** *page, de-select* **New Manually Initiated Track** *if you do not want new tracked targets to become priority targets. This page is located in the* **Installation** *dialog box. To open the page, select* **Installation** *on the* **Setup** *menu.*

Place Marker

The **Place Marker** function allows you to create a marker at the current position of the cursor. Each marker is shown as a small triangle with or without a short identifying label.

Delete Marker

Delete Marker allows you to delete a marker from the current view. Select **Delete Marker**.

Tip

The Operating Panel offers all necessary control functions for normal operation. It further allows you to assign certain functions to dedicated buttons and switches. The Mk2 Operating Panel is fitted with three function buttons. The Mk3 Operating Panel is fitted with two rotary switches. Each of these can be assigned a specific function.

Select **Delete Oldest Marker** *to use the Operating Panel to remove the oldest marker from the sonar view.*

This page is located in the **Installation** *dialog box. To open the page, select* **Installation** *on the* **Setup** *menu.*

Set Priority Marker

You can give priority status to one marker to identify the relevant object as the most important target or position. If another object has this priority, the status is transferred to the new object. The priority is identified with a "P". When a marker is given priority it can be regarded as a *position track*. Relevant information about the priority target can be found in the lower left corner of the view.

Place Own Ship Marker

Select **Place Own Ship Marker** to add a square symbol to the vessel's current position in the echo presentation. The own ship marker is now regarded as an *object*. All information about the object is shown in the **Objects** menu listed as "OSM".

Delete Own Ship Marker

Use **Delete Own Ship Marker** on the shortcut menu to delete the marker from the current view.

Place Marker Continuous

Place Marker Continuous is an on/off switch. When enabled, left-click in a CS90 view to add new marker. Each click produces a new marker.

Place Circle Marker

Press **Circle Marker** on the Operating Panel, or select **Place Circle Marker** to add a circular marker to the CS90 presentation. A circular symbol appears at the cursor position. The circle is drawn with the same diameter as your purse. By means of the circle you can see the size of the school relative to your purse. You can only add one circle marker to the display presentation.

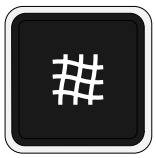
The **Objects** menu does not provide any information about the circle marker.

To delete the circle marker, press **Circle Marker** on the Operating Panel, or right-click to select **Remove Circle Marker** on the shortcut menu.

The **Fishing Gear** function allows you to define the size of your trawl or purse seine. This function is opened from the **Setup** menu.

Show Gear Symbol / Place Gear Symbol / Remove Gear Symbol

The gear symbol is provided as a tool to help you plan and shoot the purse seine. You can activate this function from the short-cut menu or use the dedicated button on the Operating Panel. For use with a purse seine, the intended process follows:



1 To start the process:

- Press **Gear** on the Operating Panel. — **or:**
- Right-click and select **Show Gear Symbol** on the shortcut menu.

This places a circle marker in the view. The size and location of the marker is defined by the choices you have made with the **Fishing Gear** function. Until you proceed, the marker follows the movements of the vessel by keeping its relative location to the bow. This allows you to position your vessel in the best possible location before you shoot the purse seine.

2 When you shoot the net:

- Press **Gear** on the Operating Panel. — **or:**
- Right-click and select **Place Gear Symbol** on the shortcut menu.

The first timer starts when you select **Place Gear Symbol**.

A rectangular marker is placed in the view, and marks the position where the purse seine was shot. The circular marker is disconnected from the vessel movements, and acts as a guideline for your manoeuvring. The history line shows the movements of your vessel. Since the CS90 system knows the length of your net, it places a second marker on this line when half the length has been spent. When the entire net has been spent, a third rectangular marker is shown. In this phase the **Fishing Gear** function is disabled.

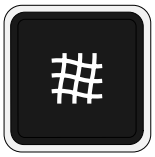
The first timer stops when the progress bar reads 100%. This action starts the second timer, which stops when you select **Remove Gear Symbol**.

3 When the process is finalized:

- Press **Gear** on the Operating Panel. — **or:**
- Right-click and select **Remove Gear Symbol** on the shortcut menu to delete the markers from the view.

Show Trawl Symbol / Remove Trawl Symbol

The **Show Trawl Symbol** option appears on the short-cut menu when you have activated a single or dual trawl using the **Fishing Gear** function.



You can activate this function from the short-cut menu or use the dedicated button on the Operating Panel. When the function is activated, the *Horizontal* view presents a trawl illustration. The size and location of the image reflect the measurements you added in the **Fishing Gear Setup** dialog box.

The trawl image appears aft of the vessel symbol. When your vessel turns, the trawl presentation will reflect this, but the location and movements could be more precise. If you want an accurate trawl positioning, you must equip the trawl with relevant positioning sensors and connect the data to the CS90 system.

Place Ruler

Place the cursor over the first echo. Right-click to open the shortcut menu and select **Place Ruler**. The ruler starts wherever you place the cursor, and ends when you release the button. The length and relative bearing of the ruler is displayed next to it. Once a ruler has been established you can not make changes to it. You can place as many rulers as you like in the view.

Select **Delete Ruler** or **Delete All Rulers** on the shortcut menu to delete one or all rulers from the view.

Delete Ruler

Use **Delete Ruler** to remove one selected ruler from the view. Place the cursor on the line, right-click when the cursor turns into a finger, then select **Delete Ruler** from the shortcut menu.

Delete All Rulers

Delete All Rulers allows you to delete all the rulers in the current view.

Ship To Centre

Select **Ship to Centre** to move the own ship symbol back to the centre of the view. This function is typically used when you have used the **Set New Ship Centre** function to move the ship symbol away from the centre of the view.

Reset Ship Centre

This function is useful when you need to "reset" the view after using the **Set New Ship Centre** or **Zoom** functions. Right-click and **Reset Ship Centre** to move the vessel symbol to the centre of the presentation.

Set New Ship Centre

Place the cursor anywhere in the view, right-click and select **Set New Ship Centre**. The function moves the vessel symbol to the selected position.

Zoom / Zoom Reset

Place the cursor anywhere in the view, right-click and select **Zoom**. Only one zoom level is provided. Once zoom is activated, the text on the shortcut menu changes to **Zoom Reset**. Select **Zoom Reset** to restore the original view

Erase Echoes

Select **Erase Echoes** to "refresh" the view by deleting all the current echoes.

Functions and dialog boxes

Topics

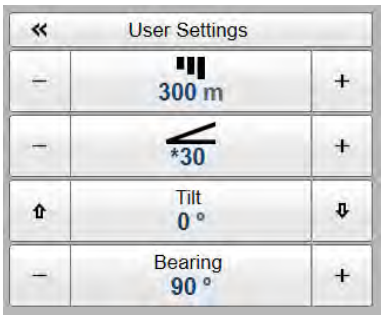
Main menu: functions and dialog boxes, page 419
Operation menu: functions and dialog boxes, page 431
Display menu: functions and dialog boxes, page 442
Setup menu: functions and dialog boxes, page 454
Active menu: functions and dialog boxes, page 469
Secondary functions and dialog boxes, page 496
Pages in the Output dialog box, page 519
Pages in the Display Options dialog box, page 536
Pages in the Environment dialog box, page 553
Pages in the Diagnostics dialog box, page 556
Pages in the Installation dialog box, page 575
Pages in the Echogram dialog box, page 618
Pages in the Information Pane Options dialog box, page 626

Main menu: functions and dialog boxes

The **Main** menu is located at the top of the menu structure. It offers the most common functions for efficient use of the CS90 system. Unless you hide the entire menu system, the **Main** menu is visible at all times, even if you close the secondary menus.

How to open

By default, the **Main** menu is open. It is placed on the right side of the display presentation.



Tip

If you do not need to use the menu system, you can hide it. This allows more space for the echo presentation.

Use the **Menu** *on the top bar to hide or show the menu. When the menu system is hidden, it appears temporarily on the left or right-hand side of the screen if you move the cursor to that position.*

Topics

User Settings dialog box, page 419

Range function, page 422

Gain function, page 423

Tilt function, page 425

Bearing function, page 427

User Settings dialog box

The **User Settings** dialog box allows you to save the current user settings (your current selection of operational parameters), and to retrieve factory or previously saved user settings.

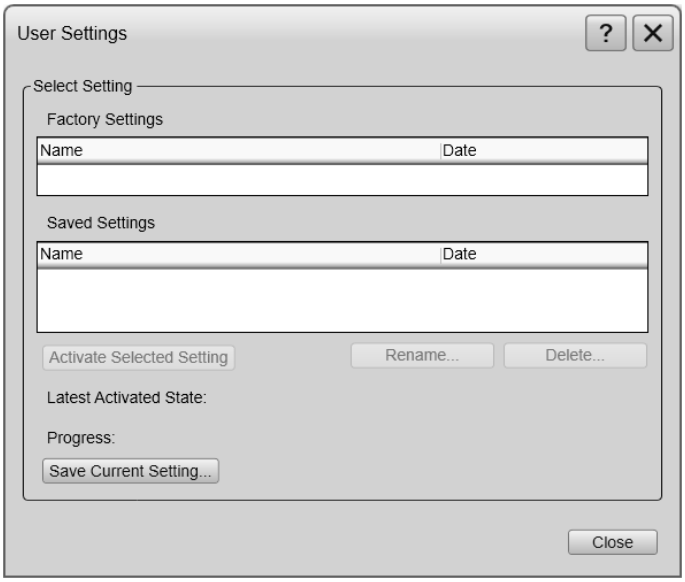
How to open

This dialog box is opened from the **Main** menu.

Description

The **User Settings** dialog box is used to store your favourite settings.

These settings can be related to different operations, environmental conditions or basic personal preferences. You can use different settings to create as many user profiles as you like, and give them any name. All the settings you have chosen using functions and dialog boxes in the user interface are saved.



Tip

The Operating Panel allows you to assign certain functions to dedicated buttons and switches. This includes user settings and presentation modes. On the Mk2 Operating Panel, the four buttons dedicated for user settings or presentation modes are located the top of the panel. On the Mk3 Operating Panel, the requested user setting or presentation mode is chosen with a single button. Press the button repeatedly to cycle through the settings or modes.

Any user setting selected on the Operating Panel is identified in the upper left corner of the Horizontal view. The identifying number refers to the **User Setting** *number on the* **Operating Panel** *page. Click on the text to make it larger. Click one more time to restore the original font size.*

Details

Factory Settings

Sometimes it may be useful to reset the CS90 system to work with a set of known user settings. A set of "factory settings" is provided for this purpose.

These factory settings contain all the default values. They are provided with the CS90 system. The factory settings may be put to use if you are uncertain of which values to use. They offer the "best practice" settings for typical use. When you want to apply the factory settings a small dialog box opens to request your confirmation.

The factory settings cannot be changed.

Note

Unless they are saved, all your current settings are lost when the factory settings are applied.

Saved Settings

"Saved settings" are those created and saved by you and other users.

Each setting is identified by its name, as well as the time and date it was created. These settings may be deleted or renamed. You can save an unlimited number of profile settings, only limited by the size of the hard disk.

Activate Selected Setting

User settings that either you or any of your colleagues have saved can easily be retrieved and put to use. This shortens down the time it takes to get started with the CS90 system.

To activate either a factory setting or a saved setting, select the relevant name in one of the lists, then select **Activate Selected Setting**.

Rename

Use this function to rename one of your saved settings. To rename a user setting, select its name in the list, and then select **Rename**. A small dialog box opens to accept the new name.

Note

The factory settings cannot be renamed.

If you do not have a computer keyboard connected to your CS90 system, select the **Keyboard** button to open an on-screen keyboard.

Delete

When you save the user settings, the files you have created are shown on the **Saved Settings** list. The list may be too long. User settings that you do not need can be deleted.

Use this function to delete one of your saved settings. To delete a user setting, select its name in the list, and then select **Delete**. A small dialog box opens so that you can verify your choice.

Note

The factory settings cannot be deleted.

Save Current Setting

When you have spent some time working with the CS90 system, you are probably using specific settings that you know are efficient for your purpose. It is a good idea to save these settings.

Use this function to save the currently applied settings. To save the settings you are using, select the **Save Current Setting** button. A small dialog opens to accept the name of the new setting.

You can only add settings to the **Saved Settings** list.

If you do not have a computer keyboard connected to your CS90 system, select the **Keyboard** button to open an on-screen keyboard.

Related functionality

User Settings Setup page

On the **User Settings Setup** page, tick the box to include range, bearing and tilt information the next time you save the user settings.By default, information about the current range, bearing and tilt will not be saved. This page is located in the **Installation** dialog box. To open the page, select **Installation** on the **Setup** menu.

Related topics

Saving, retrieving and handling user settings, page 166
Functions and dialog boxes, page 418
Main menu: functions and dialog boxes, page 419

Range function

The **Range** function allows you to specify the maximum distance from the transducer to the outer edge of the sonar beam. The range value shown and selected is by default only applied to the currently selected view.

Specifications: Range

- Minimum: 25 metres
- Maximum: 2000 metres

How to open

This function is opened from the **Main** menu.

Description

The range setting defines from how "far" you want to detect echoes. In other words, you specify the horizontal or vertical distance from the vessel to the outer edge of the search area.

Tip

If you wish to apply the new range setting to all the views, select **Apply to all**.

The current range is shown with the range rings in the sonar views. In each *Inspection* view, the range is identified with range lines. When you move the cursor inside each view, you can read the actual range from the vessel to the current cursor position.

Note

Even though you can choose a large range value, that does not mean that you can detect your targets on the same range. The range value only defines the range that is shown in the views. Actual target detection will always depend on the operational environment, such as water temperature, salinity, interference and layers in the water column.

Related functionality

Operating Panel

The Mk1 Operating Panel offers specific **Range** buttons to control the range in horizontal and vertical views. *(The Mk1 Operating Panel is no longer provided with new sonars. This information is provided for legacy reasons.)*

The Mk2 Operating Panel is fitted with three rotary switches. The Mk3 Operating Panel is fitted with two rotary switches. The switches are identified with numbers. Each switch can be assigned a function related to range, gain, bearing or tilt. The **Operating Panel** page is used to assign functionality to the programmable buttons. This page is located in the **Installation** dialog box.

Microsoft Xbox Controller

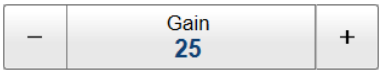
This function can also be controlled from a Microsoft Xbox Controller connected to the Processor Unit.

Related topics

Controlling the gain and range settings, page 91
Defining the user-selected features on the Operating Panel, page 171
Functions and dialog boxes, page 418
Main menu: functions and dialog boxes, page 419

Gain function

The purpose of the **Gain** function is to adjust the echo level in the display presentations. By adjusting the gain you can control how much amplification the CS90 system applies to the received echoes. The setting is by default only applied to the active view.



How to open

Open this function from the **Main** menu.

Description

You can compare this gain setting with the volume control on your car radio. When the gain is increased, the echoes will appear stronger. Weak echoes will be easier to see. However, since you also increase the acoustic noise in the reception, the echo

presentations will also show this noise. Too much gain may therefore "distort" the presentation.

The setting is by default only applied to the active view. It is identified with a thick border.

Tip

You may wish to adjust the gain on all the views of the same type. To do this, click the middle of the **Gain** *button to open it, and select* **Apply to all**.

Do not confuse this **Gain** setting with the **TVG** (Time Variable Gain) setting.

Details

Gain

This setting controls the gain applied to the currently selected ("active") view.

Select either side of the button to choose a value. Select the middle of the button to open it. If you have a keyboard connected to the CS90 system, type the requested value. You can also change the value by selecting - and holding - the middle of the button, and move the cursor sideways. Drag the cursor sideways to increase or decrease the value. Release the mouse button when requested value is shown.

Apply to All

The setting is by default only applied to the active view. It is identified with a thick border. You may wish to adjust the gain on all the views of the same type. To do this, click the middle of the **Gain** button to open it, and select **Apply to all**.

Assigning functions to the rotary switches on the Operating Panel

The Mk2 Operating Panel is fitted with three rotary switches. The Mk3 Operating Panel is fitted with two rotary switches. The switches are identified with numbers. Each switch can be assigned a function related to range, gain, bearing or tilt. The **Operating Panel** page is used to assign functionality to the programmable buttons. This page is located in the **Installation** dialog box.

The Mk1 Operating Panel offers separate **Gain** buttons to control the gain in the horizontal and vertical views. *(The Mk1 Operating Panel is no longer provided with new sonars. This information is provided for legacy reasons.)*

Related topics

Controlling the gain and range settings, page 91
Defining the user-selected features on the Operating Panel, page 171
Functions and dialog boxes, page 418
Main menu: functions and dialog boxes, page 419

Tilt function

The **Tilt** function allows you to control the vertical angle of the sonar beams.

Specifications: Tilt

- **Horizontal views**: –10 to +60 degrees
- **Vertical views**: 0 to +90 degrees
- **Plane view**: –10 to +90 degrees
- **Inspection view:** –10 to +60 degrees

How to open

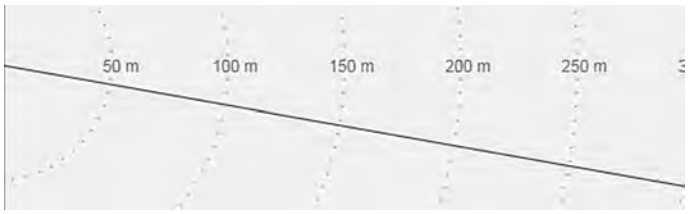
This function is opened from the **Main** menu.

Description

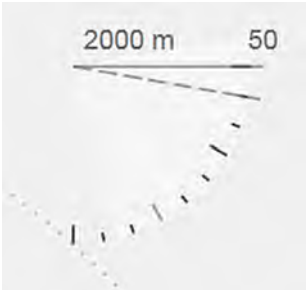
The transmitted sonar beams can be tilted electronically. The following methods can be used to adjust this setting:

- Select either side of the button to choose a value.
- Select the middle of the button and keep the mouse button pressed. Drag the cursor sideways to increase or decrease the value. Release the mouse button when requested value is shown.
- In a *Vertical* view, click on the tilt line, keep the mouse button depressed, and drag the line up or down.

The current tilt is shown with a solid line in the *Vertical* views.



In the *Horizontal* views, the current settings for range, gain and tilt are shown in the top left corner of the view. When you change the tilt a dotted line presents the requested tilt while the solid line presents the actual tilt.



Note

The tilt setting is only valid for currently selected (active) view. The tilt limits depend on the opening angle of the vertical beam. This means that you may not always be permitted to select the maximum specified tilt limits.

Tip

With the various beams provided by the CS90 system, it may be difficult to understand the concepts. How do these beams "behave" in the water? By means of a graphic presentation, the **Beam Visualization** *dialog box attempts to give you a better understanding of how the acoustic beams are transmitted into the water. Open the* **Beam Visualization** *dialog box from the* **Setup** *menu.*

Details

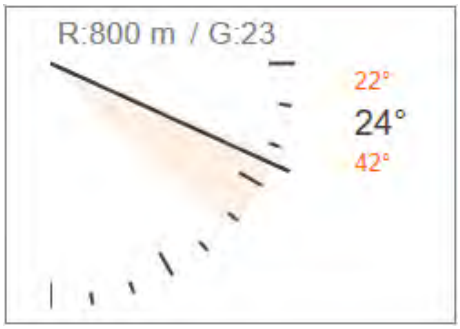
Tilt

The following methods can be used to adjust this setting:

- Select either side of the button to choose a value.
- Select the middle of the button and keep the mouse button pressed. Drag the cursor sideways to increase or decrease the value. Release the mouse button when requested value is shown.
- Select the middle of the button to open it. If you have a keyboard connected to the CS90 system, type the requested value.

Auto

This is an "on/off" function. When *Auto Tilt* mode is activated the beam will automatically change its tilt angle for each transmission ("ping").



The centre of the tilt sector is defined by the chosen tilt angle just before the *Auto Tilt* mode is started. The chosen tilt sector is shown on the tilt indicator in the *Horizontal* view using a shaded background.

Select **Step** to set the size (in degrees) of each tilt step.

Select **Sector** to set the size (in degrees) of the vertical tilt sector.

Tip

The Mk2 Operating Panel is fitted with three function buttons. The buttons are identified as **F1**, **F2** *and* **F3**. *One of these buttons can be assigned to activate the Auto Tilt mode. The* **Operating Panel** *page is used to select which physical hardware panel you use, and to assign functionality to the programmable buttons. This page is located in the* **Installation** *dialog box.*

Step

Select **Step** to set the size of each tilt step (in degrees) in *Auto Tilt* mode.

Select either side of the button to choose a value. Select the middle of the button to open it. If you have a keyboard connected to the CS90 system, type the requested value.

Sector

Select **Sector** to set the size (in degrees) of the vertical tilt sector in *Auto Tilt* mode.

Select either side of the button to choose a value. Select the middle of the button to open it. If you have a keyboard connected to the CS90 system, type the requested value.

Related functionality

Operating Panel

The Mk1 Operating Panel offers separate **Tilt** buttons to control the vertical angle of the sonar beams.. *(The Mk1 Operating Panel is no longer provided with new sonars. This information is provided for legacy reasons.)*

The Mk2 Operating Panel is fitted with three rotary switches. The Mk3 Operating Panel is fitted with two rotary switches. The switches are identified with numbers. Each switch can be assigned a function related to range, gain, bearing or tilt. The **Operating Panel** page is used to assign functionality to the programmable buttons. This page is located in the **Installation** dialog box.

Microsoft Xbox Controller

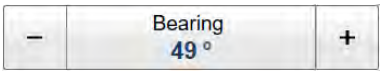
This function can also be controlled from a Microsoft Xbox Controller connected to the Processor Unit.

Related topics

Controlling the gain and range settings, page 91
Defining the user-selected features on the Operating Panel, page 171
Functions and dialog boxes, page 418
Main menu: functions and dialog boxes, page 419

Bearing function

The *Horizontal* view presents the 360 degrees area around your vessel from a bird's eye view. For the other views you must define the horizontal direction of the beam. Use **Bearing** to adjust the horizontal angle referenced to the vessel heading. You can also select the bearing line and drag it sideways.



How to open

This function is opened from the **Main** menu.

Description

The **Bearing** function controls the horizontal direction of the *Vertical* view, the audio beam and the beam in each *Inspection* view. The current bearing applied to the *Horizontal* view is shown with a solid line pointing out from the sonar position.

- The bearing for the *Vertical* view is controlled by the bearing in the *Horizontal* view.
- If you use a presentation mode with two horizontal views you can set **Bearing** to two different values. Both bearing lines are shown in the *Horizontal* view. Both bearings are shown as continuous lines pointing out from the sonar position. The bearing in *Horizontal 1* is shown with a solid line. The bearing in *Horizontal 2* is shown with a dotted line.
- If you use a presentation mode with two vertical views you can set the **Bearing** function to two different values. Both bearing lines are shown in the *Horizontal* view. The bearing for the *Vertical* view is shown with a solid line. The bearing for the *Vertical 2* view is shown with a dotted line.
- The solid bearing line in the *Horizontal* view controls the audio beam. If you have two *Horizontal* views, the solid line in the *Horizontal 1* view controls the audio beam.
- The area covered by the vertical beam is shown as a triangle in the *Horizontal* view.

Note

The choice you make is by default only applied to the currently selected (active) view. The active view is identified with a thicker border.

By default, a new manually initiated tracked object is automatically given priority status. The priority is identified with a "P". The bearing and tilt settings are automatically adjusted to follow the movements of the tracked target. The bearing line is automatically locked on the object to reflects its bearing.

Details

Bearing

The following methods can be used to adjust this setting:

- In a *Horizontal* view, select the bearing line and drag it sideways.
- Use the Operating Panel.
- Select either side of the button to choose a value.
- Select the middle of the button to open it. If you have a keyboard connected to the CS90 system, type the requested value.

Auto

This is an "on/off" function. Set this function to *On* to start the automatic search function. In the *Auto Bearing* mode the CS90 system will automatically search within defined sector limits. The sector is identified in the view using two angular symbols.

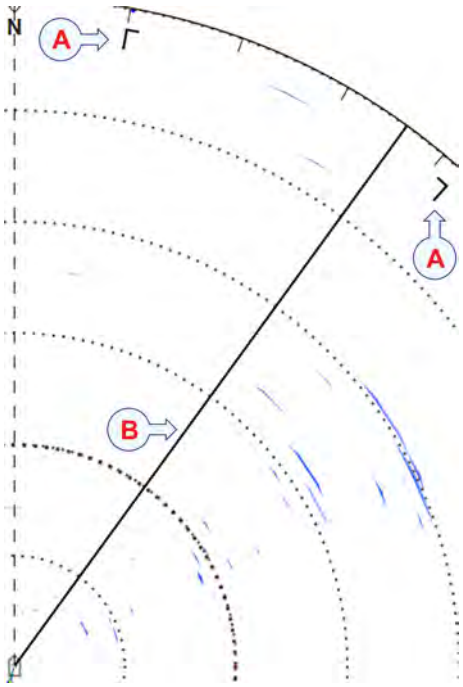


Illustration:

A *Search sector*

B *Bearing line*

Select **Step** to set the size (in degrees) of each bearing step.

Select **Sector** to set the size (in degrees) of the horizontal search sector.

Tip

This function can be assigned to the F1, F2 or F3 button on the Mk2 Operating Panel.

Step

Select **Step** to set the size of each tilt step (in degrees) in *Auto Bearing* mode.

Select either side of the button to choose a value. Select the middle of the button to open it. If you have a keyboard connected to the CS90 system, type the requested value.

Sector

Select **Sector** to set the size (in degrees) of the horizontal search sector in *Auto Bearing* mode.

Select either side of the button to choose a value. Select the middle of the button to open it. If you have a keyboard connected to the CS90 system, type the requested value.

Related functionality

Operating Panel

The Mk1 Operating Panel offers separate **Train** buttons to control of the horizontal angle of the sonar beams as referenced to the vessel heading. *(The Mk1 Operating Panel is no longer provided with new sonars. This information is provided for legacy reasons.)*

The Mk2 Operating Panel is fitted with three rotary switches. The Mk3 Operating Panel is fitted with two rotary switches. The switches are identified with numbers. Each switch can be assigned a function related to range, gain, bearing or tilt. The

Operating Panel page is used to assign functionality to the programmable buttons. This page is located in the **Installation** dialog box.

Microsoft Xbox Controller

This function can also be controlled from a Microsoft Xbox Controller connected to the Processor Unit.

Related topics

Controlling the gain and range settings, page 91
Defining the user-selected features on the Operating Panel, page 171
Functions and dialog boxes, page 418
Main menu: functions and dialog boxes, page 419

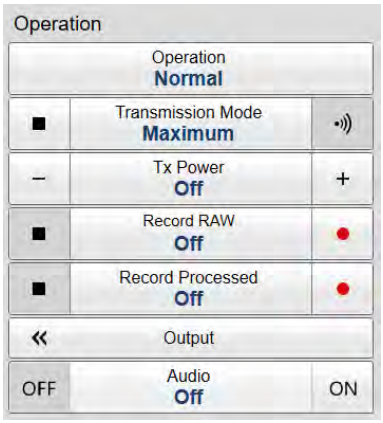
Operation menu: functions and dialog boxes

The **Operation** menu allows you to control the operating mode, the recording functionality, and how the CS90 system transmits audio pulses ("ping") into the water.

How to open

Select the **Operation** icon.

The icon is located under the **Main** menu. Select the icon one more time to close the menu.



Tip

If you do not need to use the menu system, you can hide it. This allows more space for the echo presentation.

Use the **Menu** *on the top bar to hide or show the menu. When the menu system is hidden, it appears temporarily on the left or right-hand side of the screen if you move the cursor to that position.*

Immediately after you have turned on the CS90 system, the **Operation** icon is flashing. The icon is flashing to indicate that even if the CS90 system is turned on, "pinging" is disabled. When the CS90 system is turned on, **Tx Power** is by default set to *Off*. This is a safety precautions to prevent inadvertent transmissions when the vessel is in dry dock.

Topics

Operation function, page 432

Transmission Mode function, page 433

Tx Power function, page 434

Record RAW function, page 436

Record Processed function, page 438

Output dialog box, page 439

Audio function, page 440

Operation function

The **Operation** function controls the operating mode of the CS90 system. You can set it to *Normal*, *Replay*, *Inactive* or *Simulation*.

Prerequisites

The *Simulation* mode is an optional function. In order to use this functionality, a dedicated software license is required. Contact you local dealer for more information.

How to open

This function is opened from the **Operation** menu.

Description

The CS90 system offers several operating modes.

- *Inactive* mode is provided to pause the operation temporarily.
- *Normal* mode allows the CS90 system to transmit ("ping") through the water, and to receive the echoes.
- The *Replay* mode allows you to play back previously recorded data.
- The *Simulation* mode allows you to use the built-in sonar simulator program.

Select the middle of the button to open a small menu with the available options.

Tip

When you set the CS90 system to Replay mode, select **Replay File**. *The* **Replay File** *dialog box allows you to choose which file(s) to be used for playback. To control the actual playback, use the replay bar. The replay bar opens automatically at the top of the display presentation when you choose Replay mode.*

Details

Inactive

Select this option to pause the operation. Neither transmission nor reception takes place. When the CS90 system is disabled with this function, it will stop. The current echoes are removed from the display presentation.

Normal

Select this option to start normal operation. The CS90 system will transmit ("ping") the acoustic pulses into the water and receive the resulting echoes. The information is processed by the Processor Unit, and the resulting data are shown in the display presentation.

Replay

This mode allows you to play back previously recorded data. In *Replay* mode the CS90 system is not able to operate normally. Neither transmission nor reception takes place. For this reason, the CS90 system is inactive during playback.

Replay File

The **Replay File** dialog box allows you to choose the echo data file(s) you wish to play back.

Simulation

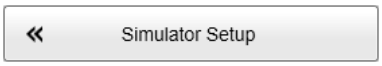
The CS90 system supports a built-in sonar simulator. This is a software program designed to simulate real echoes under different operating conditions. The simulator generates synthetic echo data based on predefined scenarios. The purpose of the simulator is to enable training and troubleshooting even when your vessel is not sailing.

Note

When the built-in simulator is started, the Transceiver Unit is automatically turned off. This means that no actual sonar operations can take place while you use the simulator.

Select **Simulation** to start the built-in sonar simulator program.

Select **Simulator Setup** to define the operating scenario for the simulator.

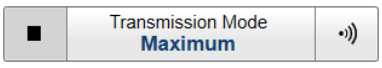


Related topics

Choosing operating mode and key transmit parameters, page 82
Functions and dialog boxes, page 418
Operation menu: functions and dialog boxes, page 431
Simulator Setup dialog box, page 517

Transmission Mode function

Transmission Mode allows you to control how often the CS90 system shall transmit acoustic energy (ping) into the water. For normal use, choose *Maximum*. If you choose *Maximum*, the CS90 system will transmit (ping) continuously and as often as possible. This gives you the maximum refresh rate.



How to open

This function is opened from the **Operation** menu.

Description

Select the middle of the button to open a small menu with the available options.

Note

If you are recording raw data to a very slow external memory device, this may reduce the ping rate. The CS90 will not permit a new "ping" until all the data from the previous ping has been saved.

Details

Single Ping

This option allows the CS90 system to transmit single pings. The CS90 system transmits (pings) only when you click the ping symbol on the **Transmission Mode** button.

Interval

The CS90 system transmits (pings) with a fixed time interval. **Ping Interval** permits you to choose the time (in milliseconds) between each transmission (ping).

Maximum

The CS90 system transmits (pings) as frequent as possible. The time between each ping (the *ping rate*) depends mainly on the current range. How fast your computer communicates with external peripherals may also have an effect on the ping rate.

Ping Interval

The **Ping Interval** function permits you to choose the time (in milliseconds) between each transmission ("ping").

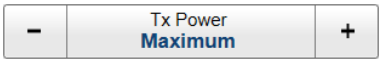
To change the setting, move the cursor to either side of the button. Select the *left* side of the button to *decrease* the value. Select the *right* side of the button to *increase* the value. Select the middle of the button to open it.If you have a keyboard connected to the CS90 system, type the requested value.

Related topics

Functions and dialog boxes, page 418
Operation menu: functions and dialog boxes, page 431

Tx Power function

Use **Tx Power** to increase or decrease the output power. The output power is selected from predefined steps.



How to open

This function is opened from the **Operation** menu.

Description

Tx Power is used to control the output power in the acoustic transmissions (pings). When the output power is reduced, the value of the attenuation is compared to the maximum output level (0 dB).

- *Off*: No transmissions take place. The CS90 is not pinging. The CS90 is in *Passive* mode.
- *–[xx] dB*: The source level of the acoustic transmission is reduced with [xx] dB related to the maximum output power.
- *Maximum*: Select this option to enable maximum power level on all transmissions (pings).

When the CS90 system is turned on, **Tx Power** is by default set to *Off*. This is a safety precautions to prevent inadvertent transmissions when the vessel is in dry dock.

Most users operate the CS90 system with **Tx Power** set to *Maximum*. This allows for maximum range, and works well in open waters with sufficient depth. Certain operating conditions may make it appropriate to adjust the output power.

Tip

If you work in shallow and/or confined waters you may find it useful to reduce the output power to avoid reverberation.

Some of our users claim that reducing the output may be useful if you are looking for scattered fish.

If you work in vicinity of other vessels using hydroacoustic systems in the same frequency range as your CS90 system, interference may cause problems. Reducing the output power is not a practical way to deal with interference. It is more efficient to change the operating frequency.

To investigate unknown and/or unfamiliar targets, some user prefer to "reset" the CS90 system by turning off all the receiver filters and adjust the output power.

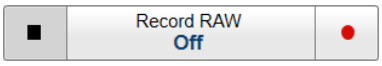
To change the setting, move the cursor to either side of the button. Select the *left* side of the button to *decrease* the value. Select the *right* side of the button to *increase* the value. You can also select the middle of the button to open a small menu with the options available.

Related topics

Choosing operating mode and key transmit parameters, page 82
Functions and dialog boxes, page 418
Operation menu: functions and dialog boxes, page 431

Record RAW function

Record RAW allows you to record the *unprocessed* echo data received by the transducer. You can save the data to the hard disk, or onto an external storage device. The data files can be played back on the CS90 system. You can keep the recorded files for future reference, training purposes and calibration.



How to open

This function is opened from the **Operation** menu.

Description

Use the raw data recording functionality provided by the CS90 system to save echo data using the `*.raw` format. By means of the *Replay* function you can later play back the recorded file(s). This may prove useful if more a detailed study of the data is requested. You can also use the file(s) to experiment with the operational settings, as this will help you to gain more experience. The amount of data you can record is only limited by the size of your storage media.

The recording is controlled by the **Record RAW** function.

Note

The data files will normally become very large. If you wish to record large amounts of data, make sure that you have enough space on your hard disk. The CS90 system is not provided with unlimited disk capacity. We recommend that you save the data files to an external storage device.

The **Output** dialog box on the **Operation** menu allows you to set up the recording parameters. To define which disks and folders to use to save the data files, select **File Setup**.

Ways to start and stop recording

You can start and stop data recording in several ways.

a Select the red circle on the right side of the **Record RAW** button.

b Open the **Record RAW** button and select *On*.

c Select the black rectangle to stop recording.

The **Record** indicator on the top bar will switch to red colour when recording is active. The **Record** indicator can not be used to start or stop recording.

Details

On/Off

You can use the "menu" under the **Record** button to start and stop recording. Click the middle of the button to open it, and select *On* or *Off*. For faster control, use the

right and left side of the **Record** button. To start recording, click the red circle on the right side. To stop recording, click the black rectangle on the left side.

Related functionality

Record

The **Record** indicator on the top bar shows you when recording has been activated.

Record Processed function

The **Record Processed** function allows you to record the *processed* echo data received by the transducer. Which processing to apply is controlled by the settings on the **Processed Data to File** page. **Processed Data to File** is located in the **Output** dialog box.

Recording dialog box

When the recording is stopped, the **Recording** dialog box opens automatically. Use the **Recording** dialog box to add metadata to your recording.

File Setup page

The **File Setup** settings control how and where the recorded files are saved on the hard disk, or on an external storage device. You can select the disk and folder for the files, the maximum file size, and a prefix for the file names. This page is located in the **Output** dialog box. This dialog box is opened from the **Operation** menu.

Replay File dialog box

The **Replay File** dialog box allows you to choose which file(s) to be used for playback. The files listed were generated automatically during recording. Each file is identified with the time and date it was made. To open the **Replay File** dialog box, select **Operation**. Select **Replay File**. The **Operation** function is located on the **Operation** menu.

System Protection page

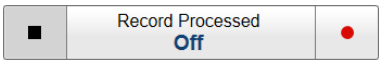
The **Recording** protection stops the recording automatically when the transducer is hoisted to its upper position. The **Timer** function stops the recording automatically when the specified time has elapsed. This page is located in the **Installation** dialog box. To open the page, select **Installation** on the **Setup** menu.

Related topics

Recording and replaying echo data, page 123
Functions and dialog boxes, page 418
Operation menu: functions and dialog boxes, page 431
Replay File dialog box, page 497

Record Processed function

The **Record Processed** function allows you to record the *processed* echo data received by the transducer. Which processing to apply is controlled by the settings on the **Processed Data to File** page. **Processed Data to File** is located in the **Output** dialog box.



How to open

This function is opened from the **Operation** menu. To activate the menu button the following conditions must be met:

- The relevant software license is installed.
- The data output type and the recording parameters are defined on the **Processed Data to File** page. **Processed Data to File** is located in the **Output** dialog box.

Description

You can set up the CS90 system to record the processed echo information on the internal hard disk, or to other recordable media. These files may be kept for future references.

The **Record Processed** button allows you to start and stop recording. Once all the recording parameters have been defined, you can start recording by clicking the red circle on the button, and stop it by clicking the left rectangle.

Tip

The **Output** *dialog box on the* **Operation** *menu allows you to set up the recording parameters. Select* **Processed Data to File**.

The data files will normally become very large. If you wish to record large amounts of data, make sure that you have enough space on your hard disk. The CS90 system is not provided with unlimited disk capacity. We recommend that you save the data files to an external storage device.

Note

This is an optional function. In order to use this functionality, a dedicated software license is required. Contact you local dealer for more information.

Details

On/Off

The **Record Processed** button allows you to start and stop recording. Select the middle of the button to open it, then select *On* or *Off*.

To faster control, select the right or left side of the button. To start recording, select the red circle on the right side of the button. To stop recording, select the black rectangle.

Related functionality

Processed Data to File page

The CS90 system can export several types of processed data file formats. Use **Processed Data to File** to define which processed data formats to save, and where to place the files. This page is located in the **Output** dialog box.

Record RAW function

Record RAW allows you to record the *unprocessed* echo data received by the transducer. You can save the data to the hard disk, or onto an external storage device. The data files can be played back on the CS90 system. You can keep the recorded files for future reference, training purposes and calibration.

Related topics

Recording and exporting processed echo data, page 129
Functions and dialog boxes, page 418
Operation menu: functions and dialog boxes, page 431

Output dialog box

A key function of the CS90 system is its ability to export data. The purpose of the **Output** dialog box is to collect all functionality related to data output in one easily accessible location. The pages in the **Output** dialog box are described in a separate structure.

Prerequisites

The **Output** dialog box is not available when your CS90 system is set to *Inactive* mode.

How to open

This dialog box is opened from the **Operation** menu. The **I/O Setup** page can also be opened from the **Installation** dialog box. The **Installation** dialog box is located on the **Setup** menu.

Description

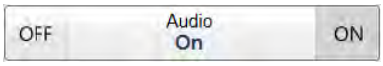
This dialog box contains a number of pages selected from the menu on the left side.

Related topics

Functions and dialog boxes, page 418
Operation menu: functions and dialog boxes, page 431
File Setup page, page 519
I/O Setup page, page 521
Processed Data to File page, page 525
Marker Output page, page 528
Relay Output page, page 530
Screen Recording page, page 532
Screen Captures File Location page, page 534

Audio function

Select **Audio** to turn the audio output on or off.



How to open

To open, select this button on the **Operation** menu.

Description

The audio output provided by the CS90 system adds *sound* to the user experience. Many experienced users find the audio information very useful. They claim that the audio information increases the efficiency. A trained ear easily detects echoes by the way they sound.

To change the setting, move the cursor to either side of the button, and select **On** or **Off**.

Note

If you need to adjust the volume use the controls on the audio equipment.

To use audio, you must connect an amplifier with loudspeakers to the audio output on the Processor Unit. You can use an amplifier with a headset, or a commercial PC speaker system. The audio system must be provided with a separate volume control.

The necessary audio components must be purchased locally.

Related functionality

Audio Sector function

With the Audio Sector function, you can listen to the audio from all the beams in a user-defined sector. Select **Audio Sector** to open the choices under the button.

Select *Audio Beam* to retrieve audio information only from this beam.

Select any opening angle to specify the width of the listening beam from which the CS90 system will obtain audio information. The listening beam places the audio beam in the middle. The entire listening beam rotates when the audio beam rotates.

Bearing function

The **Bearing** function controls the horizontal direction of the *Vertical* view, the audio beam and the beam in each *Inspection* view.

The solid bearing line in the *Horizontal* view controls the audio beam. If you have two *Horizontal* views, the solid line in the *Horizontal 1* view controls the audio beam.

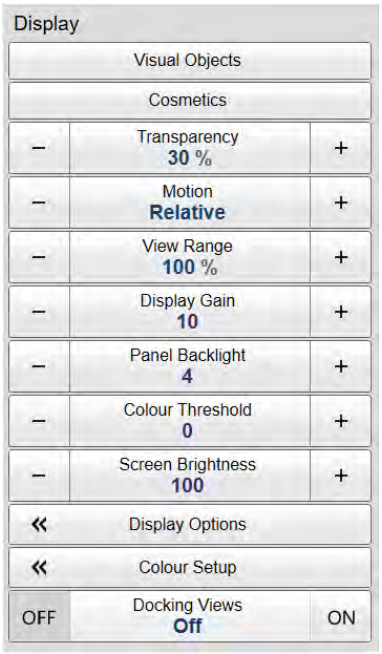
This function is opened from the **Main** menu.

Related topics

Functions and dialog boxes, page 418
Operation menu: functions and dialog boxes, page 431
Audio Sector function, page 499

Display menu: functions and dialog boxes

The **Display** menu provides basic functions related to the screen behaviour and presentation of the echo data. Use the **Display** menu to control the visual aspects of the system, and to show or hide various elements in the presentation.



How to open

Select the **Display** icon.

The icon is located under the **Main** menu. Select the icon one more time to close the menu.

Tip

If you do not need to use the menu system, you can hide it. This allows more space for the echo presentation.

Use the **Menu** *on the top bar to hide or show the menu. When the menu system is hidden, it appears temporarily on the left or right-hand side of the screen if you move the cursor to that position.*

The choices in this menu depends on which view in the display presentation that is currently "active". The menu may therefore change from one view to another. The screen capture may not show you all the menu choices.

Topics

Visual Objects function, page 443

Cosmetics function, page 443

Motion function, page 444

Transparency function, page 445

View Range function, page 445

Display Gain function, page 446

Panel Backlight function, page 447

Colour Threshold function, page 448

Screen Brightness function, page 449

Display Options dialog box, page 450

Colour Setup dialog box, page 450

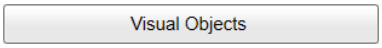
Docking Views function, page 452

Visual Objects function

Visual Objects is an "on/off" button used to open the **Visual Objects** menu.

How to open

Visual Objects is located on the **Display** menu.



Description

The **Visual Objects** menu controls which graphical elements that are shown in the different views. These graphic elements include markers, vectors and targets that are tracked. The majority of the functions are "on/off" buttons to enable or disable these graphic elements in the various views.

The choices in this menu depends on which view in the display presentation that is currently "active". The menu may therefore change from one view to another.

Note

Before you can change the settings related to a view, you must click inside the view to activate it. The changes you make are by default only valid for the active view.

Related topics

Defining the visual information in the sonar views, page 146
Visual Objects menu, page 407
Functions and dialog boxes, page 418
Display menu: functions and dialog boxes, page 442

Cosmetics function

Cosmetics is an "on/off" button used to open the **Cosmetics** menu.

How to open

Cosmetics is located on the **Display** menu.

Description

Use the functions on the **Cosmetics** menu to turn "cosmetic" elements in the sonar presentation on or off. The majority of the functions are on/off buttons to enable or

disable "cosmetic" elements in the sonar views. The function is not available for the *Inspection* views.

Note

Before you can change the settings related to a view, you must click inside the view to activate it. The changes you make are by default only valid for the active view.

Related topics

Cosmetics menu, page 411
Functions and dialog boxes, page 418
Display menu: functions and dialog boxes, page 442

Motion function

In selected views you can control how the vessel symbol shall "behave" in the presentation. The way the vessel moves in the presentation can be chosen either *true* or *relative*.

How to open

This function is opened from the **Display** menu. It is not available in all the views.

Description

The following options are available:

True Motion

In *True Motion* mode, the view is kept geographically motionless. The vessel symbols moves around in the view to reflect its true movements. If the symbol attempts to leave the view, the presentation is automatically adjusted.

Relative

In *Relative* mode, the view is continuously updating its geographical position and orientation based on the vessel movements. The vessel symbols is kept motionless at the centre of the view.

Tip

The map is only shown in Horizontal views when **Range Projection** *is set to True.*

Related topics

Defining the visual information in the sonar views, page 146
Functions and dialog boxes, page 418
Display menu: functions and dialog boxes, page 442

Transparency function

When you open an information pane, you will see that it is transparent. This transparency allows you to see the echo data behind the pane, but it may also reduce the visibility of the information in it. The transparency can be adjusted.

How to open

This function is opened from the **Display** menu.

Description

The information panes provided by the CS90 system can be placed anywhere on top of the views in the presentation.

In order not to loose information, the panes have been designed so you can see through them. The degree of transparency can be controlled with this **Transparency** function. You can adjust the setting from 0% (no transparency) to 90% (almost full transparency) in steps of 1%.

To change the setting, move the cursor to either side of the button. Select the *left* side of the button to *decrease* the value. Select the *right* side of the button to *increase* the value. Select the middle of the button to open it.If you have a keyboard connected to the CS90 system, type the requested value.

Related topics

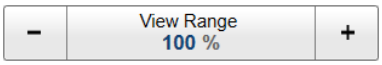
Defining settings related to user preferences and individual customizing, page 154
Functions and dialog boxes, page 418
Display menu: functions and dialog boxes, page 442

View Range function

Use **View Range** to expand the range shown in the relevant views to any percentage of the original **Range** setting. The expansion is made without resizing the echoes using a "zoom" effect.

How to open

This function is opened from the **Display** menu.



Description

The **Range** function allows you to specify the maximum distance from the transducer to the outer edge of the sonar beam. By default, the range shown in each relevant view is

adjusted to the chosen **Range** setting. For example, if you set the range to 500 metres, the outer range of the view is also limited to 500 m.

In some situations you may wish to expand the range in the sonar presentations. Use **View Range** to expand the range shown in the relevant views to any percentage of the original **Range** setting. When you define a value for **View Range** the presentation will shift to the new range, while the range defined by the **Range** setting is identified with a thicker circle.

Tip

This function can be used if you wish to move your ship symbol to the bottom of the view. You can then expand the range without adding zoom.

If you increase the tilt, and then exceed the range using the **View Range** *function,* **Coverage Plot** *will indicate the current practical range with a circle. The same applies if you set* **Range Projection** *to True.*

Related topics

Controlling the gain and range settings, page 91
Functions and dialog boxes, page 418
Display menu: functions and dialog boxes, page 442

Display Gain function

Use the **Display Gain** function to increase or decrease the strength of the echo presentation.

How to open

This function is opened from the **Display** menu.

Description

Use this setting together with **Gain** to adjust the sensitivity of the CS90 system. **Display Gain** controls the "amount" of echo that is displayed, in other words the "strength" or "intensity" of the echo presentation. The function thus increases or decreases the presentation of the echo colours.

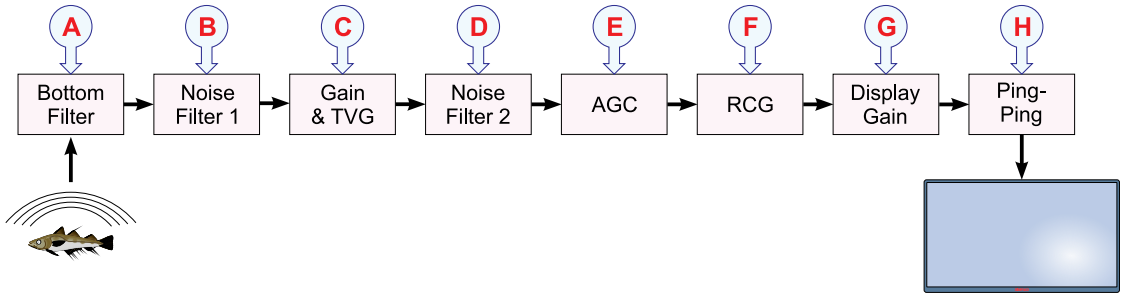
Tip

Adjust the **Display Gain** *so that you can see the targets without too much noise and reverberation. The chosen setting is a matter of personal preferences.*

Additional information for the technically minded

For all practical purposes, adjusting **Display Gain** has the same effect as adjusting **Gain**. The effect of the **Gain** adjustment is minimized if you apply **RCG** (Reverberation

Controlled Gain) and **AGC** (Automatic Gain Control). The **Display Gain** is applied at the end of the filter sequence in the CS90 system. This means that you can use **Display Gain** if you are not completely satisfied with the results of the automatic gain functionality.



A *Bottom Filter*

B *Noise Filter (1)*

C *Gain & TVG (Time Variable Gain)*

D *Noise Filter (2)*

E *AGC (Automatic Gain Control)*

F *RCG (Reverberation Controlled Gain)*

G *Display Gain*

H *Ping-Ping Filter*

Note that **Gain**, **TVG** (Time Varied Gain) and **Display Gain** are not filters, but included only to illustrate the complete "signal path".

Related topics

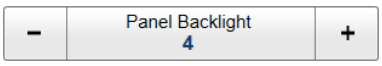
Controlling the gain and range settings, page 91
Improving the recognition of fish and schools using receiver filters, page 114
Functions and dialog boxes, page 418
Display menu: functions and dialog boxes, page 442

Panel Backlight function

The buttons on the Operating Panel have a built-in backlight to improve visibility on a dark bridge. Use **Panel Backlight** to control the intensity of the lights.

How to open

This function is opened from the **Display** menu.



Description

Adjust the background illumination to suit your preferences and the ambient light conditions.

To change the setting, move the cursor to either side of the button. Select the *left* side of the button to *decrease* the value. Select the *right* side of the button to *increase* the value. Select the middle of the button to open it.If you have a keyboard connected to the CS90 system, type the requested value.

Note

The **Panel Backlight** *function does not work for the Mk3 Operating Panel. Use the dedicated button on the Operating Panel.*

Related topics

Defining settings related to user preferences and individual customizing, page 154
Functions and dialog boxes, page 418
Display menu: functions and dialog boxes, page 442

Colour Threshold function

The **Colour Threshold** function allows you to reduce or increase the number of colours. This will provide a filtering effect that removes the weakest echoes.

How to open

This function is opened from the **Display** menu.

Description

The **Colour Threshold** function is used to control how many colours you wish to use in the echo presentation. The selected colour threshold is reflected in the bottom bar.

This setting will thus reduce or increase the number of echo colours in the presentation.

- Weak echoes are shown with "cold" colours (blue).
- Echoes with medium strength have warmer colours (green and yellow).
- The stronger echoes are shown with the warmest colours (orange and red).

The strength of the echoes is indicated using a scale with 16 or 64 colours. When the number of colours is reduced, the CS90 system will start by removing the colours that indicate the weakest echoes. The number of colours to be deleted is defined as a percentage of the total number of colours. The higher the number, the more colours are removed (until only the strongest echoes are shown).

By reducing the number of colours you will therefore remove the weakest echoes from the presentation. This causes the filtering effect. Since most echoes are weak when the range is long, the filter effect will reduce the detection range.

Related topics

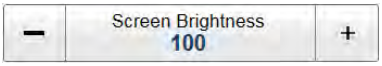
Functions and dialog boxes, page 418
Display menu: functions and dialog boxes, page 442

Screen Brightness function

The intensity of the light given off by the display presentation can be adjusted. You can use this function to increase or decrease the light from the screen to match the ambient light.

How to open

This function is opened from the **Display** menu.



Description

When the bridge is dark, the light emitted by the display presentation can affect your night vision. In order to compensate for this, you can reduce the intensity. The **Screen Brightness** function allows you to reduce the brightness, and hence make the presentation darker. The intensity of light emitted by the display can be reduced from 100% to 0% in steps of 1.

Tip

If you wish to adjust the colour intensity and/or colour scheme of the presentation, you can also try the **Palette** *function in the* **Colour Setup** *dialog box.*

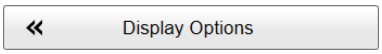
To change the setting, move the cursor to either side of the button. Select the *left* side of the button to *decrease* the value. Select the *right* side of the button to *increase* the value. Select the middle of the button to open it. If you have a keyboard connected to the CS90 system, type the requested value.

Related topics

Defining settings related to user preferences and individual customizing, page 154
Functions and dialog boxes, page 418
Display menu: functions and dialog boxes, page 442

Display Options dialog box

The **Display Options** dialog box is used to specify basic settings for the sonar presentation. The pages in the dialog box are described in a separate structure.



How to open

This dialog box is opened from the **Display** menu.

Description

This dialog box contains a number of pages selected from the menu on the left side. The choices you make in the **Display Options** dialog box have no effect on the overall performance of the CS90 system.

Note

The information shown on the top bar must not be used for vessel navigation.

Related topics

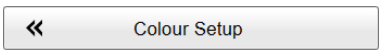
General page, page 537
Map Display page, page 540
Safety Depth page, page 541
Tooltip page, page 543
Own Ship page, page 544
Vertical View Orientation page, page 545
Off Centre page, page 545
Current Flow page, page 547
Cursor Readout page, page 548
Presentation Modes page, page 551

Colour Setup dialog box

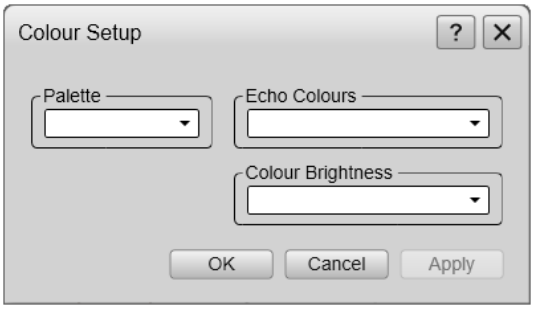
The **Colour Setup** dialog box controls the presentation colours used by the CS90 system.

How to open

This dialog box is opened from the **Display** menu.



Description



The settings in the **Colour Setup** dialog box are organized in three groups.

- The **Palette** function is used to select the overall colour theme ("skin") used in the display presentation.
- Under **Echo Colours**, choose the colour scale you wish to use. The chosen colours are shown on the bottom bar at the bottom of the display presentation.
- Use the **Colour Brightness** setting to adjust the intensity of the colours in the display presentation.

Which settings to use is mainly a personal preference based on ambient light conditions, the nature of the echoes and your own experience. The choices you make have no effect on the overall performance of the CS90 system.

Details

Palette

Select a palette to suit the ambient light conditions and your personal preferences. The choice you make has no effect on the overall performance of the CS90 system. The following options are available:

- *Day Black*: Select this palette for use on the bridge during dusk and dawn.
- *Day White*: Select this palette for daytime use on the bridge.
- *Night*: Select this palette for night-time use on the bridge.

Use these additional palettes for the same purposes:

- *Day Blue*
- *Day Grey*
- *Bright Day*

Echo Colours

Select the colour scale you want to use. The following colour scales are available:

Sonar Colours **Smooth Echosounder** **Grayscale** **Bipolar** **BI500 Colours**

Colour Brightness

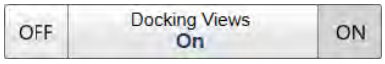
You can choose between weak, normal, strong and linear intensity to be used in the display presentations.

Related topics

Defining settings related to user preferences and individual customizing, page 154
Functions and dialog boxes, page 418
Display menu: functions and dialog boxes, page 442

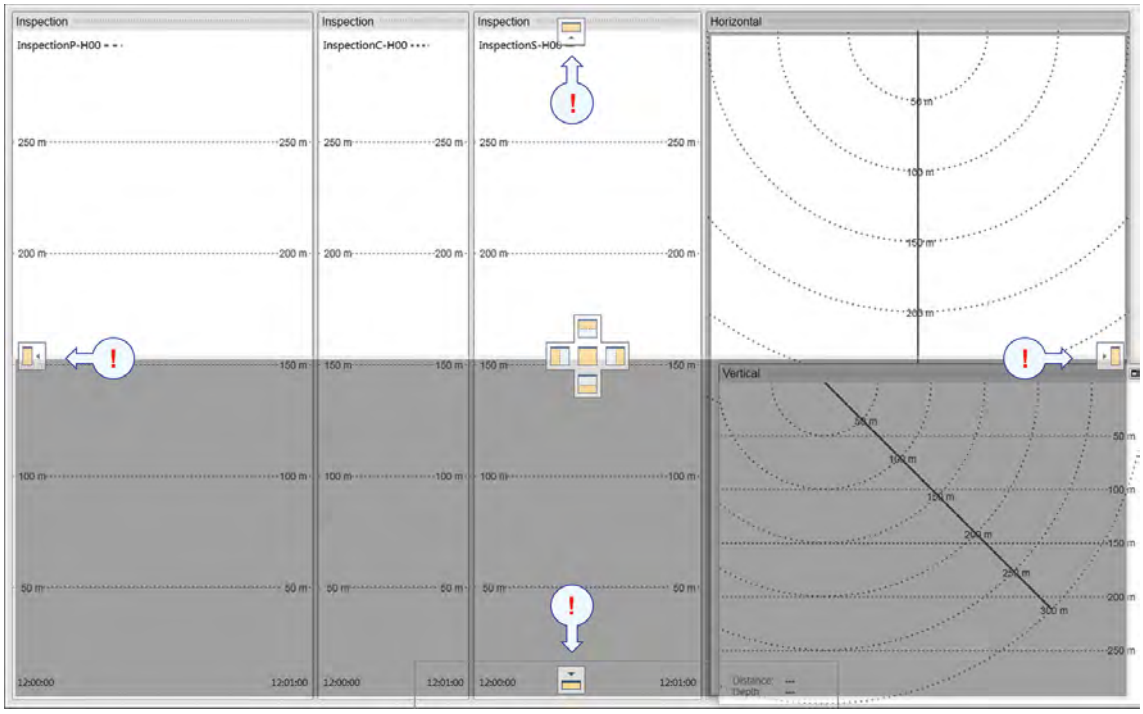
Docking Views function

Each presentation mode offered by the CS90 system provides a selection of views in a predefined pattern. These are placed at different positions with different sizes. With the **Docking Views** function you can move and re-size the views in the display presentation.



How to open

This function is opened from the **Display** menu.



Description

Once the **Docking Views** function is activated, the various views are placed in named windows, and docking positions for these windows are shown. The docking positions show you where to drag and drop the selected view. Any view can be selected, and then repositioned as indicated by the docking positions.

Note

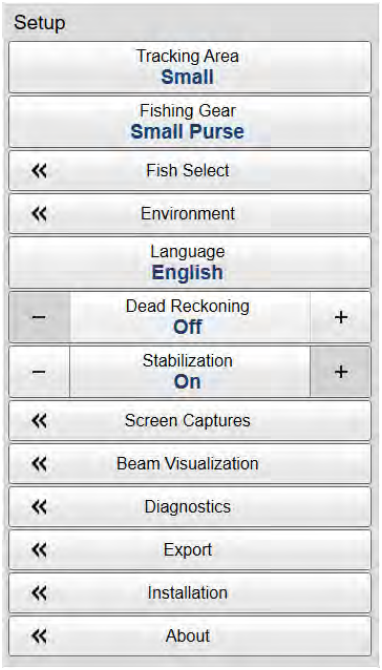
When a complete reorganisation of the view positions and sizes have been completed, you may wish to restore the presentation to what it was before you changed it. You must use the **User Settings** *dialog box to do this. We suggest that you save your current user settings before you activate the* **Docking Views** *function. Unless you do this, you will need to apply the factory defaults to reset the presentation.*

Related topics

Setting up presentation modes and views, page 140
Functions and dialog boxes, page 418
Display menu: functions and dialog boxes, page 442

Setup menu: functions and dialog boxes

The **Setup** menu provides basic functions related to the installation parameters and the communication with peripheral systems.



How to open

Select the **Setup** icon.

The icon is located under the **Main** menu. Select the icon one more time to close the menu.

Topics

Tracking Area function, page 454
Fishing Gear function, page 456
Fish Select dialog box, page 458
Environment dialog box, page 458
Language function, page 459
Dead Reckoning function, page 460
Stabilization function, page 461
Screen Captures dialog box, page 462
Beam Visualization dialog box, page 464
Diagnostics dialog box, page 464
Export dialog box, page 465
Installation dialog box, page 466
About dialog box, page 467

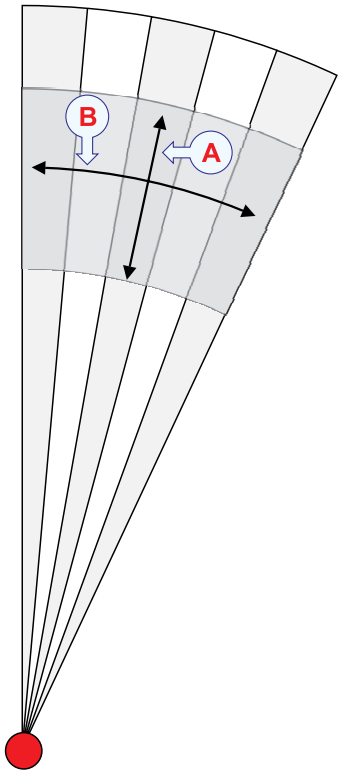
Tracking Area function

Use the **Tracking Area** function to define the size of the area that you want to detect moving objects in. An invisible area - the tracking area - is created as an acquisition area. In order for the CS90 system to find and lock on the intended target, it needs to be kept within this tracking area. If the intended target falls outside the area, the tracking can not be started.

How to open

This function is opened from the **Setup** menu.

Illustration:



A *Each **Tracking Area** option controls the distance from the inner to the outer radius of the area.*

B *The width of the area is fixed, and stretches across a predefined number of beams. This means that the actual width depends on the distance from your vessel to the area.*

Description

The **Tracking Area** function is used to select the physical size of the area. You can choose from a set of predefined sizes.

Note

To track a target efficiently, the area should be as small as possible. For example, use a small area if you track single fish or small schools. However, if the target is large, or moves very fast, a larger area may be beneficial. This may be useful if you track a large school of fish.

Use the **Tracking Area Setup** dialog box to change the size of the predefined area sizes. You can only define the area size as the distance from the inner to the outer radius of the area. The width of the area is fixed, and stretches across a predefined number of beams.

Once you have initiated target tracking, the tracked object is identified with a marker. The bearing line turns to place itself on top of the tracked target.

Tip

Under certain circumstances the target tracking may not follow the intended echo. This may for example happen if the tracking area is too large.

Related topics

Using the markers and tracking features, page 101
Functions and dialog boxes, page 418
Setup menu: functions and dialog boxes, page 454
Tracking Area Setup dialog box, page 511

Fishing Gear function

By defining the type of fishing gear you are using, the CS90 system may provide more accurate visual presentations.

How to open

Open this function from the **Setup** menu.

Description

The **Fishing Gear** function allows you to define the size of your trawl or purse seine. Accurate fishing gear properties are important for the following functionality:

- Circle Marker
- Gear Symbol
- Catch view
- Vertical view

Related functionality

Fishing Gear Setup dialog box

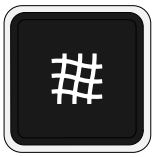
Use the **Fishing Gear Setup** dialog box to change the fishing gear properties to match your own equipment. Under **Fishing Gear**, select **Fishing Gear Setup** to open the dialog box. This dialog box is also provided as a page in the **Installation** dialog box.

Add Fishing Gear dialog box

By defining the type of fishing gear you are using, the CS90 system may provide more accurate visual presentations. Use the **Fishing Gear Setup** dialog box to change the fishing gear properties to match your own equipment. Use the **Add Fishing Gear** to add new equipment to your fishing gear list.

In the **Add Fishing Gear** dialog box, select gear type and gear name.

Show Gear Symbol / Place Gear Symbol / Remove Gear Symbol



The gear symbol is provided as a tool to help you plan and shoot the purse seine. You can activate this function from the short-cut menu or use the dedicated button on the Operating Panel. For use with a purse seine, the intended process follows:

1 To start the process:

- Press **Gear** on the Operating Panel. — **or:**
- Right-click and select **Show Gear Symbol** on the shortcut menu.

This places a circle marker in the view. The size and location of the marker is defined by the choices you have made with the **Fishing Gear** function. Until you proceed, the marker follows the movements of the vessel by keeping its

relative location to the bow. This allows you to position your vessel in the best possible location before you shoot the purse seine.

2 When you shoot the net:

- Press **Gear** on the Operating Panel. — **or:**
- Right-click and select **Place Gear Symbol** on the shortcut menu.

The first timer starts when you select **Place Gear Symbol**.

A rectangular marker is placed in the view, and marks the position where the purse seine was shot. The circular marker is disconnected from the vessel movements, and acts as a guideline for your manoeuvring. The history line shows the movements of your vessel. Since the CS90 system knows the length of your net, it places a second marker on this line when half the length has been spent. When the entire net has been spent, a third rectangular marker is shown. In this phase the **Fishing Gear** function is disabled.

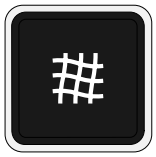
The first timer stops when the progress bar reads 100%. This action starts the second timer, which stops when you select **Remove Gear Symbol**.

3 When the process is finalized:

- Press **Gear** on the Operating Panel. — **or:**
- Right-click and select **Remove Gear Symbol** on the shortcut menu to delete the markers from the view.

Show Trawl Symbol / Remove Trawl Symbol

The **Show Trawl Symbol** option appears on the short-cut menu when you have activated a single or dual trawl using the **Fishing Gear** function.



You can activate this function from the short-cut menu or use the dedicated button on the Operating Panel. When the function is activated, the *Horizontal* view presents a trawl illustration. The size and location of the image reflect the measurements you added in the **Fishing Gear Setup** dialog box.

The trawl image appears aft of the vessel symbol. When your vessel turns, the trawl presentation will reflect this, but the location and movements could be more precise. If you want an accurate trawl positioning, you must equip the trawl with relevant positioning sensors and connect the data to the CS90 system.

Related topics

Using the markers and tracking features, page 101
Functions and dialog boxes, page 418
Setup menu: functions and dialog boxes, page 454
Fishing Gear Setup page, page 610
Add Fishing Gear dialog box, page 512

Fish Select dialog box

The *Size Distribution* information pane presents a histogram with the echoes from single fish. The calculations are based on the fact that different fish species have different echo strength. The echo strength also depends on the operating frequency you use. For various reasons, the fish sizes presented in the *Size Distribution* information pane may be inaccurate. The **Fish Select** dialog box allows you to select the fish species you expect to catch. You can then manually adjust the size distribution.

How to open

You open this dialog box from the **Setup** menu.

« Fish Select

Description

If the information in the *Size Distribution* information pane appears to be inaccurate, or the information does not correspond with the actual catch, the values can be modified.

Select the specie you are catching or looking for.

Tip

Once you are able to assess your catch, you can use the **Fish Size Adjustment** *page to change the average size of the various species. The page is opened in the* **Information Pane Options** *dialog box. The* **Information Pane Options** *dialog box is only available when an Inspection view is active.*

Related topics

Functions and dialog boxes, page 418
Setup menu: functions and dialog boxes, page 454

Environment dialog box

Environmental parameters such as salinity, sound speed and water temperature all play an important part to present accurate echo data. Use the **Environment** parameters to define these values. Depending on the current sea and weather conditions, you may need to change these values frequently.

How to open

This dialog box is opened from the **Setup** menu.

« Environment

Description

You must correctly set the sound speed through the water to obtain accurate depth readings and fish echoes. Several parameters are required to calculate the correct sound speed value. If these parameters are unknown, use the default value of 1494 m/s. This is a typical mean value for sound speed in salt water.

Related topics

Defining settings related to user preferences and individual customizing, page 154
Functions and dialog boxes, page 418
Setup menu: functions and dialog boxes, page 454
Water Column page, page 553

Language function

You may prefer to use the CS90 system with the user interface in your own language. A selection of languages is provided. The **Language** function allows you to select the language to be used in the display presentations, menus and dialog boxes.

How to open

This function is opened from the **Setup** menu.

Description

The text in the menu buttons in the user interface can be provided in several different languages. Use the **Language** function to select the language you want to use. With a few exceptions, the chosen language will also be used for all other texts in the user interface.

Note

The context sensitive online help may not be available for the language you choose.

Related topics

Defining settings related to user preferences and individual customizing, page 154
Functions and dialog boxes, page 418
Setup menu: functions and dialog boxes, page 454

Dead Reckoning function

The **Dead Reckoning** function is used to improve the position of the track line relative to the actual position of the drifting fishing gear. For this function to operate, the CS90 system requires input from a speed log.

How to open

This function is opened from the **Setup** menu.

Description

This is an "on/off" function. When switched “off”, the GPS is used to calculate the position of your vessel. When “on”, the position is calculated based on the current speed and the input from the course gyro.

> In navigation, dead reckoning is the process of calculating current position of some moving object by using a previously determined position, or fix, by using estimations of speed, heading direction and course over elapsed time. [..] Dead reckoning is subject to cumulative errors. Advances in navigational aids that give accurate information on position, in particular satellite navigation using the Global Positioning System, have made simple dead reckoning by humans obsolete for most purposes. However, inertial navigation systems, which provide very accurate directional information, use dead reckoning and are very widely applied. [..] In marine navigation a "dead" reckoning plot generally does not take into account the effect of currents or wind.
>
> Aboard ship a dead reckoning plot is considered important in evaluating position information and planning the movement of the vessel.
>
> *https://en.wikipedia.org/wiki/Dead_reckoning (November 2020)*

When dead reckoning is switched off, the vessel movement and track line are calculated from the GPS data. These are relative to the bottom. When switched on, the inputs from the gyro and speed log are used to positioning the vessel relative to the water.

Tip

To draw the track line use the settings on the **Track Line** *page. The* **Track Line** *page is located in the* **Display Options** *dialog box. The* **Display Options** *dialog box is located on the* **Display** *menu.*

The **Minute Markers** *function adds markers to the track line. These markers indicate how far you have sailed in the last few minutes. The minute markers are shown as small circles on the vessel’s track line. The* **Minute Markers** *function is located on the* **Visual Objects** *menu.*

Related topics
Functions and dialog boxes, page 418
Setup menu: functions and dialog boxes, page 454

Stabilization function

The CS90 system is provided with a built-in motion sensor to provide electronic stabilization of the sonar beams. It is placed inside the Motor Control Unit. For improved operational accuracy, an external motion reference unit (MRU) can be used. If the sensor is malfunctioning the input can be disabled.

How to open

This function is opened from the **Setup** menu.

Description

The **Stabilization** function allows you to enable or disable the input from the motion sensor.

- Select **On** to enable the input.
- Select **Off** to disable the input.

If you disable the input from the sensor, the beams will not be compensated for pitch and roll movements.

Tip *During normal operation, always keep* **Stabilization** *set to On. This is the default setting. Turning stabilization off may be helpful if you suspect that the sensor provides you with bad data, or if you need to troubleshoot the interface. If you turn stabilization off and this improves the echo presentation you must check your motion sensor.*

Details

Roll Offset

To compensate for any sensor misalignment, provide an offset value. Select [—] on the left side to decrease the value, or select [+] on the right side to increase.

Pitch Offset

To compensate for any sensor misalignment, provide an offset value. Select [—] on the left side to decrease the value, or select [+] on the right side to increase.

Stabilize Heave

This is an "on/off" switch. Use the **Stabilize Heave** function to control if the sonar beams shall also be heave compensated.

Related functionality

Motion Reference Unit

Use the **Motion Reference Unit** page to define the data format and the communication port used to import motion information from an external sensor.

Related topics

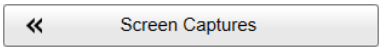
Functions and dialog boxes, page 418
Setup menu: functions and dialog boxes, page 454

Screen Captures dialog box

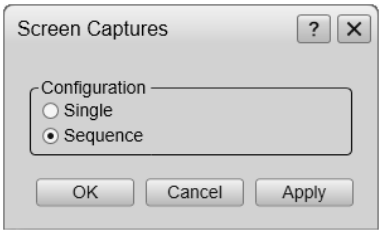
While using the CS90 system you may wish to make a screen capture to save an instantaneous copy of the current presentation. You can choose either a single screen capture or a sequence with multiple screen captures.

How to open

This dialog box is opened from the **Setup** menu.



Description



Each screen capture you make is saved in `.jpg` format on the Processor Unit hard disk. The file name reflects the current date and time.

Use **Screen Capture File Location** to define where to save your screen captures. This page is located in the **Output** dialog box. To open, select it on the **Operation** menu.

Default folder:

`C:\Users\Public\Documents\Simrad\CS90\ScreenDumps`

Details

Single

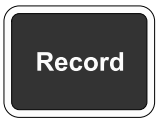
In *Single* mode one screen capture is taken every time you select **Screen Capture** on the top bar.

Sequence

In *Sequence* mode a new screen capture is created for every ping. Select **Screen Capture** on the top bar to start the sequence. Select **Screen Capture** one more time to stop the sequence.

Related functionality

Operating Panel (Mk1)



Press **Record** to make a screen capture.

Operating Panel (Mk2)

Press **Screen Capture** to make a copy of the current display presentation.

Operating Panel (Mk3)

Press **Screen Capture** to make a copy of the current display presentation.

Top bar

Select **Screen Capture** to make a copy of the entire display presentation.

Screen Captures File Location page

Use **Screen Capture File Location** to define where to save your screen captures. This page is located in the **Output** dialog box. To open, select it on the **Operation** menu.

Related topics

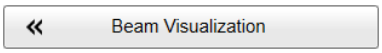
Capturing the display presentation in an image, page 133
Capturing the display presentation using one image for each ping, page 134
Choosing screen capture mode, page 135
Accessing the screen capture images to delete, move or copy them, page 137
Selecting where to save the screen captures, page 136
Capturing the display presentation in image and video files, page 133
Functions and dialog boxes, page 418
Setup menu: functions and dialog boxes, page 454

Beam Visualization dialog box

With the various beams provided by the CS90 system, it may be difficult to understand the concepts. How do these beams "behave" in the water? By means of a graphic presentation, the **Beam Visualization** dialog box attempts to give you a better understanding of how the acoustic beams are transmitted into the water.

How to open

This dialog box is opened from the **Setup** menu.



Prerequisites

You must have a computer mouse with two control buttons and a scroll wheel. You can also use the Operating Panel.

Description

The beam visualization feature simulates how the acoustic beams cover the seabed and the water column.

- Spin the scroll wheel on the mouse to zoom in and out.
- Press and hold the right mouse button, then move the mouse to change the angle.

Change the operating parameter while the **Beam Visualization** dialog is open. The change you make to the beams are reflected in the presentation.

Select **Menu** to access basic settings.

- Select **Show Tx Beams** or **Show Rx Beams** to see the transmit *or* receiver beams.
- Choose you own water depth in the presentation, or allow an automatic depth to be used.

Related topics

Functions and dialog boxes, page 418
Setup menu: functions and dialog boxes, page 454

Diagnostics dialog box

The CS90 system is a computerized sonar. There are hardly any analogue circuitry, and the possibility of traditional troubleshooting is limited. In order to rectify this, a built-in software application is available to offer test and maintenance functionality. The **Diagnostics** dialog box controls the test and diagnose application that checks the performance of the CS90 system.

How to open

This dialog box is opened from the **Setup** menu.

Description

By means of the **Diagnostics** functionality, you can easily determine if the hardware components in the CS90 system are operational. And most important, you can make sure that all the transceivers channels and transducer elements are functional. To open the different pages in the dialog box, use the large "buttons" on the left hand side.

Each button provides a small colour coded indicator.

- **No indicator**: Status is OK. No actions are necessary.
- **Yellow**: This is a warning. A closer investigation is recommended.
- **Red**: This is an alarm. A closer investigation is required.
- **Blue**: A device monitored by the diagnostic system is disabled.
- **Grey**: No information is available.

Note

The **Diagnostics** *dialog box and functionality is only provided for performance monitoring. The functionality offered by the dialog box is not required for normal use of the CS90 system. The dialog box does not permit you to change any operational settings.*

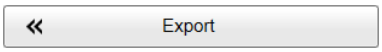
The **Diagnostics** dialog box offers several pages. The pages in the dialog box are described in a separate structure.

Related topics

Functions and dialog boxes, page 418
Setup menu: functions and dialog boxes, page 454
Processor page, page 557
Sensors page, page 559
Transceiver page, page 560
Transducer page, page 561
Noise page, page 564
Hull Unit page, page 566

Export dialog box

The **Export** dialog box allows you to export user settings, configuration files, message logs and information mainly related to hardware and software troubleshooting.



How to open

This dialog box is opened from the **Setup** menu.

Description

Exporting technical information from the CS90 system to a hard disk or USB flash drive is often useful. Both during normal use, and perhaps preferably during software and hardware troubleshooting, it can be helpful to share information. The **Export** dialog box provides you with a list of file types to export. You must specify *where* these files shall be saved.

Details

Select information to be exported

Select the information you wish to export. The total size of the selected files is shown below the list.

Export to

Select **Browse** to locate the desired folder.

You can also type the folder name. If you do not have a computer keyboard connected to your CS90 system, select the **Keyboard** button to open an on-screen keyboard.

Save

Select **Save** to start the data export.

Related topics

Exporting sensor data, marker positions and technical information, page 180
Functions and dialog boxes, page 418
Setup menu: functions and dialog boxes, page 454

Installation dialog box

Before you use the CS90 system you must set it up to communicate with the relevant peripherals. Use the **Installation** dialog box to set up all interfaces with external devices, and to set up basic parameters related to installation and operation. In most cases, you only need to do this once. The pages in the **Installation** dialog box are described in a separate structure.

Prerequisites

The **Installation** dialog box is not available when your CS90 system is set to *Replay* mode.

How to open

This dialog box is opened from the **Setup** menu. The **I/O Setup** page can also be opened from the **Output** dialog box.

Description

This dialog box contains a number of pages selected from the menu on the left side.

Note

When you work in the **Installation** *dialog box, you must always select* **Apply** *to save the changes made on a page. You must do this before you continue working on a different page.*

Related topics

Functions and dialog boxes, page 418
Setup menu: functions and dialog boxes, page 454
Sensor Installation page, page 576
Sensor Configuration page, page 581
Motion Reference Unit page, page 583
Synchronization page, page 591
Units page, page 594
Operating Panel page, page 596
Echogram Settings page , page 605
Hull Unit Configuration page, page 606
System Protection page, page 607
Fishing Gear Setup page, page 610
Map Setup page, page 613
User Settings Setup page , page 614
Software License page, page 615
Transceiver Upgrade page, page 617

About dialog box

Each software release for the CS90 system is uniquely identified. The **About** dialog box identifies the current software version with its release date. The version described in this publication is 23.9.X.

How to open

This dialog box is opened from the **Setup** menu.

Description

If you wish to find the latest software version for the CS90 system, check our website.

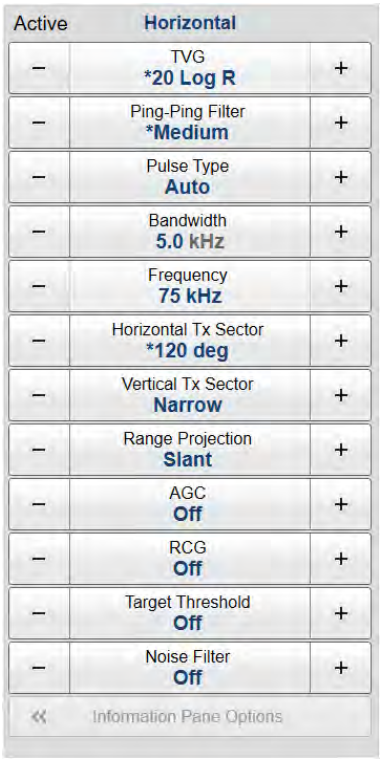
- www.kongsberg.com/simrad

Related topics

Functions and dialog boxes, page 418
Setup menu: functions and dialog boxes, page 454

Active menu: functions and dialog boxes

The **Active** menu offers parameters related to current views and data presentations provided by the CS90 system.



How to open

Select the **Active** icon.

The icon is located under the **Main** menu. Select the icon one more time to close the menu.

The choices in this menu depends on which view in the display presentation that is currently "active". The menu may therefore change from one view to another. The name of the currently active view is identified at the top of the menu. The screen capture may not show you all the menu choices.

Note

Before you can change the settings related to a view, you must click inside the view to activate it. The changes you make are by default only valid for the active view.

Several of the functions offer **Apply to All**. If you select **Apply to All** your setting is applied to *all the views* in the current presentation mode.

Topics

TVG function, page 470

Ping-Ping Filter function, page 472

Pulse Type function, page 474

Bandwidth function, page 477

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Target Threshold function, page 489

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Horizontal Scroll function, page 492

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Echogram dialog box, page 493

Information Pane Options dialog box, page 494

TVG function

TVG (Time Variable Gain) compensates for the loss of acoustic energy due to geometric spreading and absorption. This makes the targets with the same strength appear with the same intensity independent of their physical distance from the transducer.

How to open

This function is opened from the **Active** menu.

Description

By means of algorithms, the time variable gain compensation converts the echo presentation as a function of range. This makes the targets with the same strength appear with the same intensity independent of their physical distance from the transducer. In the CS90 system, the TVG compensation is made using digital signal processing software.

When an acoustic pulse is sent through the water, it will gradually lose its energy. The greater the distance between the transducer and the target(s), the greater the loss of energy. The loss of energy is explained with two factors.

Geometric spread

Once transmitted, the acoustic energy will spread out to form a circular beam. The width of this beam increases with the physical distance to the target(s).

Absorption loss

Depending on the salinity and temperature, the water will absorb some of the energy from the acoustic transmission. The absorption loss increases as the physical distance to the target(s) increases.

Both the geometric spread and the absorption will also have an effect on the returned echo signal. That is why we normally refer to these factors as the two-way transmission loss. TVG (Time Variable Gain) compensates for this loss of acoustic energy.

Details

The TVG compensation is expressed as a logarithmic curve. Each curve is identified with the equation *X log TVG*. The coefficient "*X*" is an integer. Each value for "*X*" will create a different slope with a different gain compensation. Typical values for "*X*" are 10 to 40.

The CS90 system allows you to choose your own compensation. You can choose any value from *0 Log R* to *40 Log R*. If you choose *0 Log R* the TVG compensation is disabled. Some experimentation may be required to find the compensations that fit your purposes for individual catch and environmental conditions. Typical time variable gain compensation values may be:

0 log R

TVG compensation is not implemented. This option is hardly ever used.

20 log R

This setting offers weaker amplification close to the bottom. It is commonly used to provide the best echoes for schools. The physical size of a school allows you to detect it even with reduced gain.

40 log R

This setting offers larger amplification closer to the bottom. It is commonly used to provide the best echoes from single fish.

Other options are provided when this function us used in an *Inspection* view. The echo presentation in the *Inspection* view resembles the echogram you see on an echo sounder. The *Inspection* view can be regarded as an "echo sounder" with an adjustable direction. In the CS90 system we use the phrase *echogram* to describe the information provided by the view.

No TVG

TVG compensation is not implemented. This option is hardly ever used.

School

This setting offers weaker amplification close to the bottom. It has been designed to provide the best echoes for schools. The physical size of a school allows you to detect it even with reduced gain.

Fish

This setting offers larger amplification closer to the bottom. It has been designed to provide the best echoes from single fish.

User

This setting allows you to define your own TVG curve. To choose your own TVG curve, use the dedicated function in the **Echogram** dialog box.

Additional information for the technically minded

When a sound pulse is travelling from the transducer through the water it will undergo geometrical spreading. The sound intensity falls off with the range squared (**$1/r^2$** where r=range). The same applies to the echo from a target in the water column; sound intensity falls off with **$1/r^2$**. The total two-way spreading is therefore:

$1/r^2 \times 1/r^2 = 1/r^4$

To remove this effect, the received echo must be compensated according to **r^4**. In logarithmic terms this is **10 log r^4** or **40 log r**. This compensation applies to single targets.

When a school of fish covers the whole acoustic beam cross section, the received echo will increase with range simply because the acoustic beam cross section increases with range. The received echo increases according to $\mathbf{r^2}$, where **r** is now the radius of the acoustic beam. This introduces an $\mathbf{r^2}$ into the-two way spreading ($\mathbf{r^2/r^4}$) so that the school compensation becomes $\mathbf{r^2}$, or in logarithmic terms **20 log r**.

In addition to the geometrical spreading, sound energy is absorbed in water. Absorption is higher in salt than in fresh water and increases with the operating frequency. The received echo must also be compensated according to the absorption.

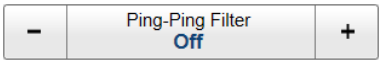
The combined compensation for the geometrical spreading and absorption is the TVG

Related topics

Controlling the gain and range settings, page 91
TVG (Time Variable Gain), page 636
Functions and dialog boxes, page 418
Active menu: functions and dialog boxes, page 469

Ping-Ping Filter function

The **Ping-Ping Filter** analyses the historical information from previous consecutive pings in order to remove unwanted noise and interference from the echo presentation.



How to open

You open this function from the **Active** menu.

Description

The **Ping-Ping Filter** presents the echoes based on the current information as well as the "history" of that specific target. The filter adds historical echo data for the target to the new information from the same target. This "mix" causes a more stable presentation, and some interference and noise are removed and/or reduced. The three different settings define how much "weight" and "priority" the latest echo data is given compared to the historical echoes.

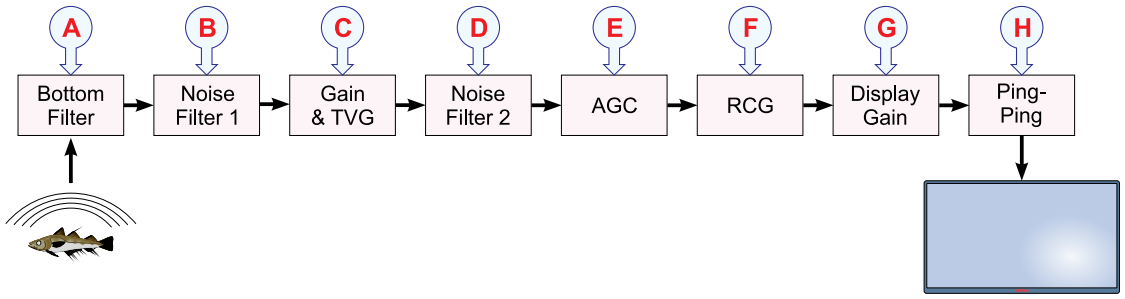
The **Ping-Ping Filter** takes the vessel movements into account. For this reason, a fast moving target will be presented weaker than it actually is.

The following filter options are provided:

- **Off**: Select **Off** to disable the filter. The historical information from previous transmissions ("pings") is *not* used to remove noise and unwanted echoes.
- **Weak**: Select *Weak* to allow the filter to compare the echoes from the latest two pings. For the current echo to be shown, it must be present in both of these pings.

- **Medium**: Choose *Medium* to compare the echoes from the latest four pings. For the current echo to be shown, it must be present in *all* of these pings.
- **Strong**: Select *Strong* to allow the filter to compare the echoes from the latest eight pings. For the current echo to be shown, it must be present in *all* of these eight pings.

The filters in the CS90 system are implemented in “series”.



A *Bottom Filter*

B *Noise Filter (1)*

C *Gain & TVG (Time Variable Gain)*

D *Noise Filter (2)*

E *AGC (Automatic Gain Control)*

F *RCG (Reverberation Controlled Gain)*

G *Display Gain*

H *Ping-Ping Filter*

Note that **Gain**, **TVG** (Time Varied Gain) and **Display Gain** are not filters, but included only to illustrate the complete "signal path".

Details

Ping-Ping Filter

Select the filter setting you want to use

Apply to All

Check this box if you wish to use the chosen setting in all the views in the display presentation.

Related topics

Choosing operating mode and key transmit parameters, page 82
Functions and dialog boxes, page 418
Active menu: functions and dialog boxes, page 469

Pulse Type function

The **Pulse Type** function allows you to select the "shape" of the transmitted pulses ("pings"). Different shapes have different qualities. Which pulse type to use depends on the current environmental conditions, your range to the target(s) and the type and speed of the target(s) you are observing.

Specifications

- CW (Continuous Wave)
- HFM (Hyperbolic Frequency Modulation) (This pulse type is also known as "chirp".)
- Auto

How to open

Open this function from the **Active** menu.

Description

For each pulse type, you can select *Short*, *Medium* or *Long*. These options define the pulse duration. This is the current duration ("length") of the transmitted pulse. Use the **Frequency** function to define the centre frequency used by the transmitted pulse. Use the **Bandwidth** function to define the frequency range during the transmission.

Note

The choice you make is by default only applied to the currently selected (active) view. Before you can change the settings related to a view, you must click inside the view to activate it.

There are no specific procedures that tell you exactly when to use which pulse type. The use of this function depends largely on the range you use to study your target(s), how the target(s) behave, and the current environmental conditions.

Tip

- *Frequency modulated transmissions may provide a more stable echo presentation. You may see an increase in target detection because noise and reverberation are reduced.*
- *With CW transmissions, increasing the duration of the transmitted pulse increases its energy and improves target detection capability. However, this will also reduce the range resolution. Small targets may then be harder to detect. CW pulses with long duration are also sensitive to Doppler.*
- *Decreasing the duration of the transmitted CW pulse increases the range resolution.*
- *When you operate with frequency modulated pulses, the range resolution is independent of the pulse duration. You can increase the pulse duration without decreasing the resolution.*
- *If you wish to investigate targets close to the bottom, a short pulse duration is always recommended.*
- *We recommend that you use Auto or a CW setting during normal operation.*

Details

Auto

Select *Auto* to make the CS90 system choose pulse type and duration for you. The resulting setting is based on the current range. By default, the *Auto* setting will use *LFM Medium* on shorter ranges, and then automatically switch to *LFM Long* when the range is increased.

CW (Continuous Wave)

In CW transmissions the frequency is fixed during the entire duration of the pulse.

Tip

If you select different centre frequency for each view, you will reduce the risk of interference between them. If you operate in the close vicinity of other vessels that are also using a CS90 system - or another sonar system operating within the same frequency range – set each system to use different centre frequency.

HFM (Hyperbolic Frequency Modulation)

In HFM transmissions the frequency changes during the duration of the pulse. The change is hyperbolic. At the beginning of the pulse the frequency increases slowly, while gradually increasing faster and faster towards the end of the pulse. Use the **Frequency** function to define the centre frequency used by the transmitted pulse. Use the **Bandwidth** function to define the frequency range during the transmission.

HFM (Hyperbolic Frequency Modulation) pulses are less sensitive to Doppler. These pulses may be a better choice for fast moving targets.

Each frequency modulated transmission ("ping") from the CS90 system consists of a frequency sweep around the centre frequency. The difference between the lowest and the highest frequency in each transmission is referred to as *bandwidth*. The selected bandwidth will be distributed equally on both sides of the centre frequency.

Related functionality

Pulse Duration

The pulse duration can be selected according to the current range and what kind of targets you are looking at. The longer range you wish to use, the longer pulse duration should be selected. However, when using CW transmissions a long pulse duration will reduce the resolution. It will also cause the CS90 system to transmit less frequent.

Further, increased pulse duration will cause reduced source level when using consecutive transmissions. For example, if the CS90 system is set up to use one horizontal ping and two vertical pings these are transmitted in series. The first ping will reduce the voltage level on the output capacitors, and this reduces the source level on the following transmissions.

Longer pulses will also increase the blind zone close to the transducer and increase the reverberation level.

For these reasons, the use of long pulse durations may not be the best choice.

For CW (Continuous Wave) transmissions:

- Long pulses provides longer detection range. They make the CS90 system less sensitive for noise, but offer lower range resolution.
- Short pulses provides shorter detection range. They make the CS90 system more sensitive for noise, but offer higher range resolution.

For FM (Frequency Modulated) transmissions:

- Long pulses provide longer detection range, and the range resolution is independent of the pulse duration..
- Short pulses provide shorter detection range, and they make the CS90 system more sensitive for noise.

Bandwidth function

The bandwidth used by the frequency modulated transmissions is controlled by the **Bandwidth** function. Each frequency modulated transmission ("ping") from the CS90 system consists of a frequency sweep around the centre frequency. The difference between the lowest and the highest frequency in each transmission is referred to as *bandwidth*. The chosen bandwidth will spread equally to both sides of the centre frequency.

The bandwidth function does not apply to CW (Continuous Wave) transmissions.

Open this function from the **Active** menu.

Frequency function

Use the **Frequency** function to specify the centre frequency for the frequency modulated (FM) transmissions (pings) and the operating frequency for the continuous wave (CW) pings. You can change the frequency in predefined steps from a "start frequency" to an "end frequency".

Open this function from the **Active** menu.

Related topics

Functions and dialog boxes, page 418
Active menu: functions and dialog boxes, page 469

Bandwidth function

The **Bandwidth** function allows you to select the frequency range in the frequency modulated transmissions (pings).

How to open

Open this function from the **Active** menu.

Description

Each frequency modulated transmission ("ping") from the CS90 system consists of a frequency sweep around the centre frequency. The difference between the lowest and the highest frequency in each transmission is referred to as *bandwidth*. The centre frequency in each transmission is chosen with the **Frequency** function. The chosen bandwidth will spread equally to both sides of the centre frequency.

Example

If the chosen operating frequency is 80 kHz, and you set the bandwidth to 3 kHz, the frequency range in the transmission starts on 77 kHz and ends on 83 kHz.

The bandwidth function does not apply to CW (Continuous Wave) transmissions.

Tip

You can adjust the bandwidth to very low values. These values will reduce the resolution in the beam direction, but also increase the range. Some users find it useful to use a smaller bandwith to reduce noise.They will typically use it to remove propeller noise from other vessels in the vicinty.

To change the setting, move the cursor to either side of the button. Observe that the background colour changes. Select [-] on the left side or [+] on the right side to choose

the requested setting. Select the middle of the button to open a small menu with the available options.

Related functionality

Frequency function

Use the **Frequency** function to specify the centre frequency for the frequency modulated (FM) transmissions (pings) and the operating frequency for the continuous wave (CW) pings. You can change the frequency in predefined steps from a "start frequency" to an "end frequency".

Open this function from the **Active** menu.

Pulse Type function

The "shape" of the transmitted pulse is controlled using the **Pulse Type** function.

For each pulse type, you can select *Short*, *Medium* or *Long*. These options define the pulse duration. This is the current duration ("length") of the transmitted pulse.

Open this function from the **Active** menu.

Related topics

Functions and dialog boxes, page 418
Active menu: functions and dialog boxes, page 469

Frequency function

Use the **Frequency** function to specify the centre frequency for the frequency modulated (FM) transmissions (pings) and the operating frequency for the continuous wave (CW) pings. You can change the frequency in predefined steps from a "start frequency" to an "end frequency".

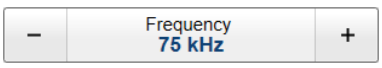
Specifications

Frequency range:

- Start frequency: 70 kHz
- End frequency: 90 kHz
- Frequency steps: 1 kHz

How to open

Open this function from the **Active** menu.



Description

The use of multiple operating frequencies is mainly intended for suppression of interference from other hydroacoustic equipment. If several sonars are used in the same geographical area they should therefore use different centre frequencies. Also, the sound absorption in salt water decreases with the frequency. A lower frequency travels longer since its attenuation loss is smaller. A higher frequency gives you better range resolution. A higher frequency also gives you narrower beams and a "sharper" image".

Tip

If you select different centre frequency for each view, you will reduce the risk of interference between them. If you operate in the close vicinity of other vessels that are also using a CS90 system - or another sonar system operating within the same frequency range – set each system to use different centre frequency.

The bandwidth used by the frequency modulated transmissions is controlled by the **Bandwidth** function. The "shape" of the transmitted pulse is controlled using the **Pulse Type** function.

Note

The centre frequency you choose will only be valid for the currently selected view. This means that you must first click in the chosen view to select it, and then choose the frequency.

Related functionality

Bandwidth function

The bandwidth used by the frequency modulated transmissions is controlled by the **Bandwidth** function. Each frequency modulated transmission ("ping") from the CS90 system consists of a frequency sweep around the centre frequency. The difference between the lowest and the highest frequency in each transmission is referred to as *bandwidth*. The chosen bandwidth will spread equally to both sides of the centre frequency.

The bandwidth function does not apply to CW (Continuous Wave) transmissions.

Open this function from the **Active** menu.

Pulse Type function

The "shape" of the transmitted pulse is controlled using the **Pulse Type** function.

For each pulse type, you can select *Short*, *Medium* or *Long*. These options define the pulse duration. This is the current duration ("length") of the transmitted pulse.

Open this function from the **Active** menu.

Related topics

Choosing operating mode and key transmit parameters, page 82
Functions and dialog boxes, page 418
Active menu: functions and dialog boxes, page 469

Horizontal TX Sector function

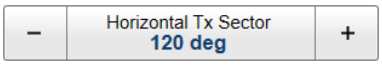
In a horizontal swath the CS90 system transmits with a maximum horizontal opening angle of 360 degrees. Use the **Horizontal Tx Sector** function to control the opening angle - and thus the size - of the horizontal search sector (swath). This is the physical area that is covered with each transmission ("ping").

Specifications

	Maximum	Other options
Horizontal swath	360 degrees	30, 60, 90, 120, 180 degrees
Vertical swath	Normal	Narrow
Plane swath	180 degrees	30, 60, 90, 120 degrees
Inspection beams	-	-

How to open

You open this function from the **Active** menu.



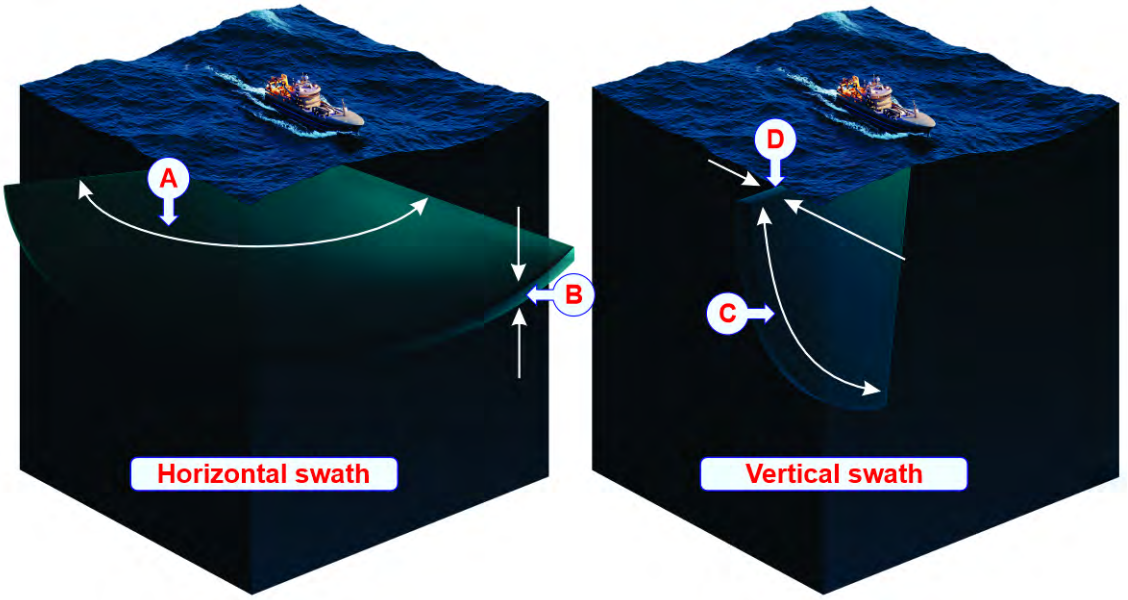
Description

The **Horizontal Tx Sector** function allows you to control whether the system shall transmit acoustic energy into the water in omni (360°) or within a defined sector. Select the middle of the button to open it for access to the available options.

Note

The options provided by this function depend on your current active view.

If the **Horizontal TX Sector** value in a horizontal swath is smaller than its maximum value, the centre of the sector is defined by the **Bearing** function. In the *Horizontal* view the transmit sector is shown as a triangle originating from the vessel symbol.



A *This is the horizontal TX sector in a horizontal swath.*

B *This is the vertical TX sector in a horizontal swath.*

C *This is the vertical TX sector in a vertical swath.*

D *This is the horizontal TX sector in a vertical swath.*

Tip

In some cases, you may want to use **Horizontal TX Sector** *to control the direction of the acoustic transmissions. This can be useful to avoid reverberation if you work close to land, or interference from other sonars in the same area.*

Related functionality

The Mk2 Operating Panel is fitted with three rotary switches. The switches are identified with numbers. Each switch can be assigned a function related to range, gain, bearing or tilt.

Related topics

Functions and dialog boxes, page 418
Active menu: functions and dialog boxes, page 469

Vertical TX Sector function

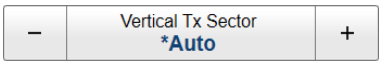
The **Vertical Tx Sector** function is used to change the vertical opening angle in horizontal and vertical swaths.

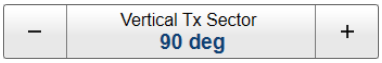
Specifications

	Maximum	Other options
Horizontal swath	Wide	Narrow, Normal, Auto
Vertical swath	90 degrees	30, 60 degrees
Plane swath	Wide	Narrow, Normal, Auto
Inspection beams	-	-

How to open

You open this function from the **Active** menu.



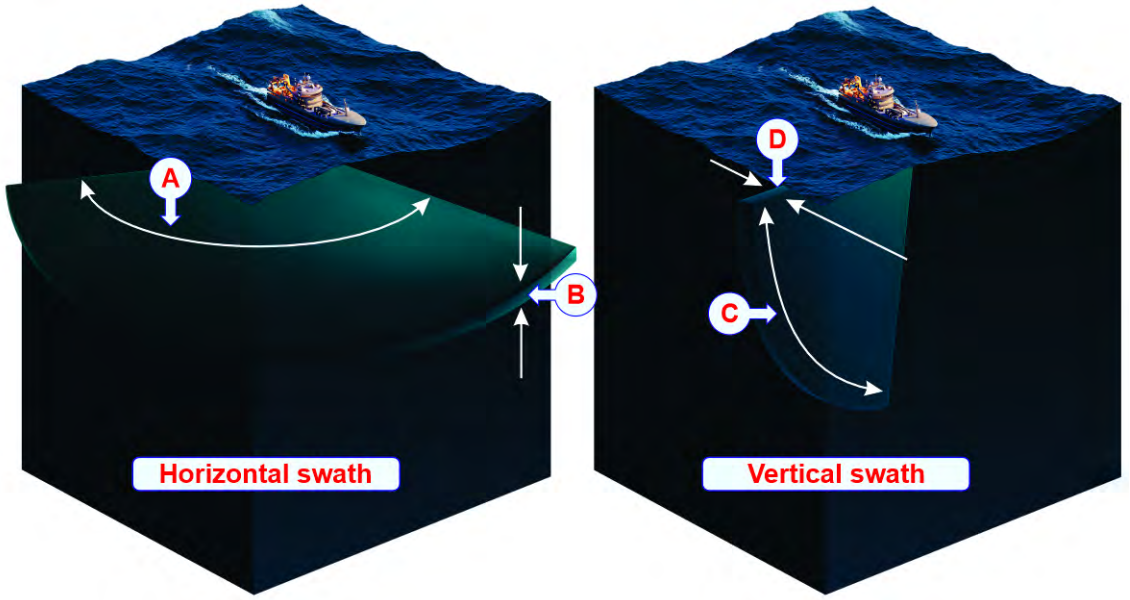


Description

Note

The options provided by this function depend on your current active view.

Use the **Vertical Tx Sector** function to control the opening angle - and thus the size - of the vertical search sector (swath). This is the physical area that is covered with each transmission ("ping"). If you select *Auto*, the sector is defined by the current range.



A *This is the horizontal TX sector in a horizontal swath.*

B *This is the vertical TX sector in a horizontal swath.*

C *This is the vertical TX sector in a vertical swath.*

D *This is the horizontal TX sector in a vertical swath.*

If the **Vertical TX Sector** value in a vertical swath is smaller than its maximum value, the centre of the sector is defined by the **Tilt** function.

Related functionality

Auto Configuration dialog box

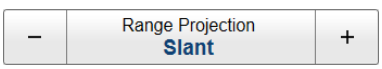
Use the **Auto Configuration** dialog box to define for which ranges the **Vertical TX sector** is set to *Narrow*, *Normal* or *Wide*. Select the middle of the **Vertical Tx Sector** button. Select **Auto Configuration**.

Related topics

Functions and dialog boxes, page 418
Active menu: functions and dialog boxes, page 469
Auto Configuration dialog box, page 513

Range Projection function

The distance to a target located anywhere in the water column can be measured in two ways. This can either be the horizontal distance to the target (*True*), or along the tilt angle (*Slant*). The **Range Projection** function defines how this distance is measured.



How to open

This function is opened from the **Active** menu.

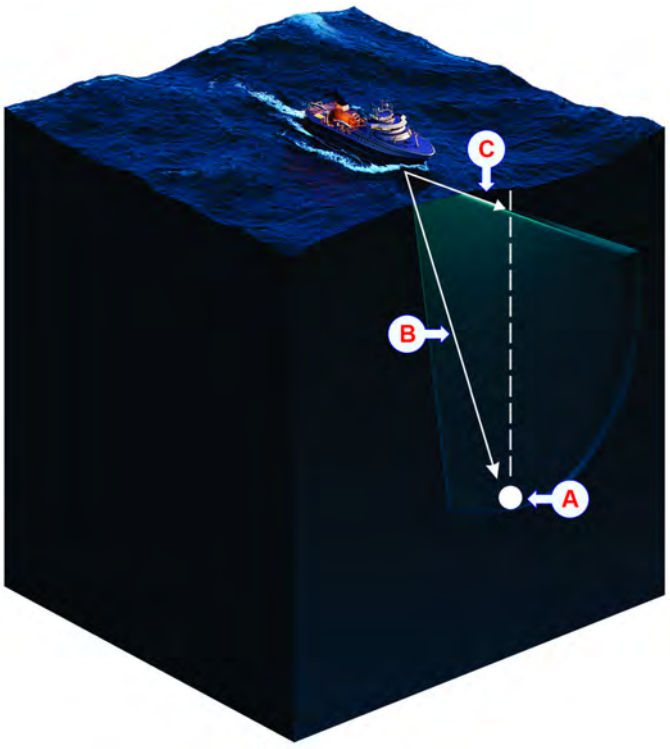
Description

Use the **Range Projection** function to control how the distance to a target is measured in a horizontal view. This is a "selector" function.

1 *Target*

2 *Select Slant range to measure the distance to the target diagonally along the tilt angle.*

3 *Select True range to measure the distance horizontally. This is the distance you must sail to position yourself on top of the target.*



Note

The map is only shown in Horizontal views when **Range Projection** *is set to True.*

Related topics

Functions and dialog boxes, page 418
Active menu: functions and dialog boxes, page 469

AGC (Automatic Gain Control) function

The **AGC** (Automatic Gain Control) function runs an automatic analysis of the echo strength. Based on this analysis the CS90 system maintains a proper dynamic range based on all the current echo values. This is done by automatically reducing the gain if you have reverberation and noise, or increasing the gain if the acoustical conditions permit it.

How to open

You open this function from the **Active** menu.

Description

The AGC (Automatic Gain Control) function adjusts the gain using an image processing algorithm.

This processing depends on the strength of the echo signal. The image is analysed to identify reverberation and echoes. Based on the analysis the weak echoes are amplified, while the strong echoes are weakened. The result is a "normalizing" effect that reduces noise and reverberation.

The automatic gain control is functional up to the maximum range of the CS90 system.

You can choose from four different AGC settings. The settings define the difference between the maximum and minimum echo level for the automatic gain control to take effect.

The chosen AGC (Automatic Gain Control) setting is only be applied to the currently active view. Activate the relevant view *before* you select the AGC setting.

Tip

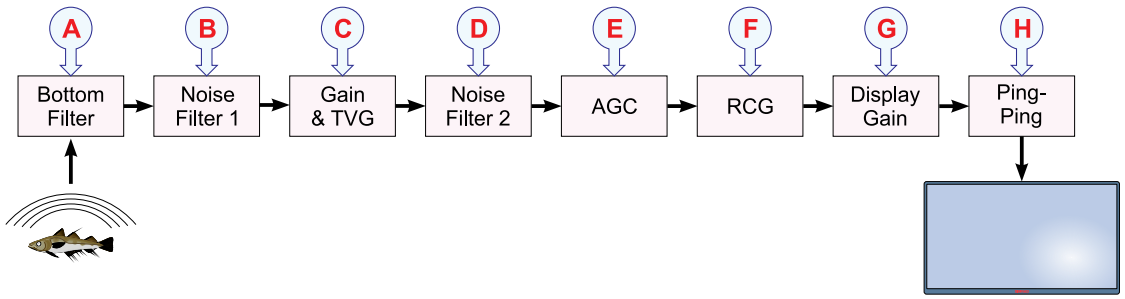
The most practical way to use the AGC (Automatic Gain Control) is to first switch it off. Adjust the echo presentation using the normal gain functionality until you have the best possible result, then activate the AGC.

The AGC works best with even background (homogenous noise conditions) and pronounced targets. With uniform environmental conditions you may benefit from strong compensation. However, if you are looking at scattered fish, reduce the automatic gain control, and try to add normal gain instead.

If you work close to other vessels, the noise from their propellers may be misinterpreted as echoes. This will also reduce the visibility of other echoes. The same applies if the bottom conditions place your vessel with decreasing depth on one side of the vessel and your targets on the other side. Reduce the automatic gain control.

If you have a large school located close to your vessel (typically closer than 150 meters) the school gives you a strong echo. The AGC may misinterpret the school echo for noise. Reduce or disable the automatic gain control.

The filters in the CS90 system are implemented in “series”. The gain compensations are made before the AGC. For this reason, your current gain setting will always have an effect on the automatic gain control.



A *Bottom Filter*

B *Noise Filter (1)*

C *Gain & TVG (Time Variable Gain)*

D *Noise Filter (2)*

E *AGC (Automatic Gain Control)*

F *RCG (Reverberation Controlled Gain)*

G *Display Gain*

H *Ping-Ping Filter*

Note that **Gain**, **TVG** (Time Varied Gain) and **Display Gain** are not filters, but included only to illustrate the complete "signal path".

Details

Off

The automatic gain control (AGC) is disabled.

Weak

A mean value for all the echoes is established. The value is used as a threshold. Echoes below this threshold are suppressed.

Medium

The threshold value is increased by 3 dB compared to *Weak*.

Strong

The threshold value is increased by 3 dB compared to *Medium*.

Related topics

Improving the recognition of fish and schools using receiver filters, page 114
AGC (Automatic Gain Control), page 635
Functions and dialog boxes, page 418
Active menu: functions and dialog boxes, page 469

RCG (Reverberation Controlled Gain) function

The **RCG** (Reverberation Controlled Gain) function removes unwanted reverberation from the bottom and or from the sea surface. It may however also remove scattered fish from the presentation.

How to open

You open this function from the **Active** menu.

Description

Reverberation is often regarded as noise.

There are several types of reverberation.

Volume reverberation

The volume reverberation is caused by minute plankton and air-bubbles in the water. This reverberation has often daily cycles in intensity.

Surface reverberation

The surface reverberation depends on the weather condition and the waves.

Bottom reverberation

The bottom reverberation depends on the roughness and physical properties of the sea bottom.

The **RCG** (Reverberation Controlled Gain) controls the receiver processing. The algorithm handles each receiver beam individually. The filter reduces the unwanted echoes from the bottom and from the sea surface. This enhances the visibility of schools.

Note

The algorithms in the filter may interpret scattered fish as reverberation. Use reverberation controlled gain carefully if you wish to detect scattered fish.

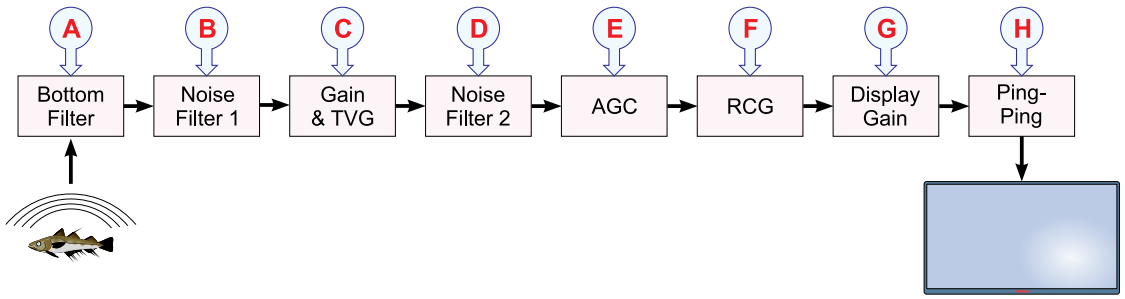
You can choose from nine different filter settings. The numerical settings do not express an increasing filter strength. They represent specific settings using different algorithms.

The chosen **RCG** (Reverberation Controlled Gain) setting is only be applied to the currently active view. Activate the relevant view *before* you select the **RCG** setting.

Tip

We recommend that the reverberation controlled gain is active all the time, but be careful in the vertical presentation.The filter works best on small schools.

The filters in the CS90 system are implemented in “series”.



A *Bottom Filter*

B *Noise Filter (1)*

C *Gain & TVG (Time Variable Gain)*

D *Noise Filter (2)*

E *AGC (Automatic Gain Control)*

F *RCG (Reverberation Controlled Gain)*

G *Display Gain*

H *Ping-Ping Filter*

Note that **Gain**, **TVG** (Time Varied Gain) and **Display Gain** are not filters, but included only to illustrate the complete "signal path".

Details

Off

The filter is disabled.

Weak

Use for schools.

Medium

Use for schools with higher density. This setting can also be used in horizontal views to detect schools close to the bottom.

Strong

Use for scattered fish located close to the bottom. This setting uses a slightly different algorithm than the other scattered fish settings.

4

Use for scattered fish located close to the bottom. This setting uses a slightly different algorithm than the other scattered fish settings.

5

Use for scattered fish located close to the bottom. This setting uses a slightly different algorithm than the other scattered fish settings.

Scattered

Use for scattered fish. This setting uses a slightly different algorithm than the other scattered fish settings.

7

Use for scattered fish. This setting uses an algorithm dedicated for higher bandwidth.

8

Use for schools. This setting uses an algorithm dedicated for higher bandwidth.

9

Use for schools. This setting uses an algorithm dedicated for higher bandwidth.

Experimental

These options are provided for software development purposes.

Related topics

Improving the recognition of fish and schools using receiver filters, page 114
Functions and dialog boxes, page 418
Active menu: functions and dialog boxes, page 469

Target Threshold function

The CS90 system provides a bottom filter to reduce the sometimes powerful echo from the seabed.

How to open

You open this function from the **Active** menu.

Description

This filter is useful if you try to find fish close to the bottom. Select a **Target Threshold** value to control the "strength" of the filter. A higher numerical value increases the filter efficiency and reduces the bottom echo accordingly.

Select the middle of the button to open a small menu with the available options. Select the *left* side of the button to select a "lower"' menu choice. Select the *right* side of the button to select a "higher"' menu choice.

Related topics

Improving the recognition of fish and schools using receiver filters, page 114
Functions and dialog boxes, page 418
Active menu: functions and dialog boxes, page 469

Noise Filter function

The **Noise Filter** removes unwanted acoustic noise from the display presentation. It reduces the interference from other acoustic systems (sonars and echo sounders), as well as the noise from the propellers.

How to open

You open this function from the **Active** menu.

Description

The **Noise Filter** is used to minimize the interference from other acoustics systems (sonars and echo sounders) on your own and/or other vessels. The filter also suppresses noise from your propellers, and from other similar noise sources. The **Noise Filter** is very effective if you are bothered by strong noise or interference, especially from your own vessel, or even from other vessels operating near you.

The four filter settings are used to control the "efficiency" of the filter. To disable the filter, set it to *Off*.

Tip

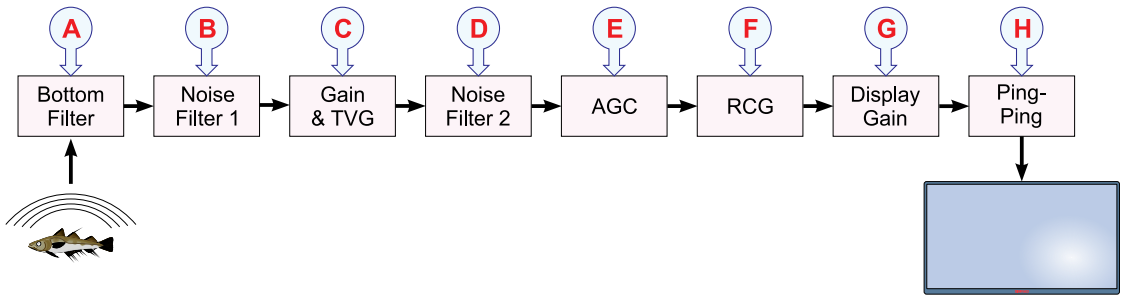
Use weak filtering - or turn the filter off - if you have strong echoes on short ranges. The filter may then be too powerful, and distort the echo presentation.

Select the middle of the button to open a small menu with the available options. Select the *left* side of the button to select a "lower"' menu choice. Select the *right* side of the button to select a "higher"' menu choice.

Additional information for the technically minded:

The filtering is done by overriding the automatic function for the preamplifiers. The number of amplifier stages used is a function of range instead of signal level. There is a total of six amplifier stages. By forcing the CS90 system to use (for example) three amplifier stages at a certain distance, interference will be clipped at this specific range. This is better than suppressing all other echoes at the same range.

The filters in the CS90 system are implemented in “series”. The noise filtering is done early in the receiver process.



A *Bottom Filter*

B *Noise Filter (1)*

C *Gain & TVG (Time Variable Gain)*

D *Noise Filter (2)*

E *AGC (Automatic Gain Control)*

F *RCG (Reverberation Controlled Gain)*

G *Display Gain*

H *Ping-Ping Filter*

Note that **Gain**, **TVG** (Time Varied Gain) and **Display Gain** are not filters, but included only to illustrate the complete "signal path".

Details

Off

Choose this setting to switch the filter off.

Weak

The system starts using one amplifier stage and increases the number as a function of range.

Medium

The system starts using two amplifier stages and increases the number as a function of range.

Strong

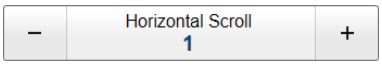
The system starts using three amplifier stages and increases the number as a function of range.

Related topics

Improving the recognition of fish and schools using receiver filters, page 114
Functions and dialog boxes, page 418
Active menu: functions and dialog boxes, page 469

Horizontal Scroll function

The **Horizontal Scroll** function controls how fast the echoes shall travel across the *Inspection* view.



Prerequisites

The function is only available when an *Inspection* view is active.

How to open

You open this function from the **Active** menu.

Description

The CS90 system offers several inspection beams. Each inspection beam is presented using an *Inspection* view. Each *Inspection* view shows you echo data from a separate beam. If you use several *Inspection* views, you can train and tilt the beams individually, and independent of the beams displayed in the other views.

The echo presentations in the *Inspection* views resemble the echograms you see on an echo sounder. Each *Inspection* view can be regarded as an "echo sounder" with an adjustable direction. In the CS90 system we use the phrase *echogram* to describe the information provided by the views.

Use the **Horizontal Scroll** function to control how fast each echogram shall travel across the *Inspection* view. Select a numerical value to set the speed.

The speed is controlled by adjusting the number of pixels used to present each ping. A higher speed will update the view faster, but will also reduce the resolution.

Tip

To activate a view, click in it. The active view is identified with a thicker border. You can select the start range (the depth from which the view starts) and the range (the "length" of the transmitted beam) by means of the **Start Range** *and* **Range** *settings.*

Related topics

Functions and dialog boxes, page 418
Active menu: functions and dialog boxes, page 469

Vertical Reference function

During operations in a vertical view you may wish to focus on the echoes in the upper or lower part of the view.Use **Vertical Reference** to hide a part of the view. The function is only available in the *Vertical* and *Plane* views.

How to open

This function is opened from the **Active** menu.

Description

- Select *Water Column* to see the entire vertical view.
- Select *Surface* to remove the bottom part of the vertical view.
- Select *Bottom* to remove the upper part of the vertical view.

When the function is activated, the vertical range depends on the physical height of the view. A taller view gives you a larger visible depth range while the size of the removed range is reduced. The vertical scale is adjusted automatically.

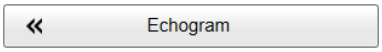
Click on the view border, hold the button depressed, then drag the border up or down to change the height.

Related topics

Functions and dialog boxes, page 418
Active menu: functions and dialog boxes, page 469

Echogram dialog box

The **Echogram** dialog box allows you to control the echogram presentation in the *Inspection* views. Two pages control the horizontal lines and the echogram type with applied TVG (time variable gain). One page controls how fast the echogram travels horizontally across the presentation.



How to open

This dialog box is opened from the **Active** menu.

Description

The CS90 system offers several inspection beams. Each inspection beam is presented using an *Inspection* view. Each *Inspection* view shows you echo data from a separate beam.If you use several *Inspection* views, you can train and tilt the beams individually, and independent of the beams displayed in the other views. The echo presentations in the *Inspection* views resemble the echograms you see on an echo sounder. Each *Inspection*

view can be regarded as an "echo sounder" with an adjustable direction. In the CS90 system we use the phrase *echogram* to describe the information provided by the views.

Note

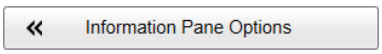
The dialog box is only available when an Inspection view is active. To activate a view, click in it. The active view is identified with a thicker border.

Related topics

Functions and dialog boxes, page 418
Active menu: functions and dialog boxes, page 469
Lines page, page 618
Echogram page, page 621
Horizontal Axis page, page 624

Information Pane Options dialog box

The CS90 system offers several *information panes* to provide additional and detailed data from the presentations. The information panes are opened and closed from the top bar. Several of the information panes are fitted with a **Setup** button. Select **Active** to open the **Information Pane Options** dialog box. Use the **Information Pane Options** dialog box to change the operating parameters for the data provided in the information panes.



How to open

This dialog box is opened from the **Active** menu. You can also open the **Information Pane Options** dialog box by selecting **Setup** in selected information panes.

Description

The **Information Pane Options** dialog box offers a menu on the left side, and several pages for pane parameters on the right side.

Note

The dialog box is only available when an Inspection view is active.

Related topics

Functions and dialog boxes, page 418
Active menu: functions and dialog boxes, page 469
Size Distribution page, page 626
Fish Position page, page 629
Fish Size Adjustment page, page 632
School Mass Adjustment page, page 633

Secondary functions and dialog boxes

Topics

Replay File dialog box, page 497
Audio Sector function, page 499
Recording dialog box, page 500
LAN Port Setup dialog box, page 501
Serial Port Setup dialog box, page 503
Add Serial Port dialog box, page 505
Port Monitor dialog box, page 506
Messages dialog box, page 508
Tracking Area Setup dialog box, page 511
Add Fishing Gear dialog box, page 512
Auto Configuration dialog box, page 513
Hull Unit Control dialog box, page 514
New Marker dialog box, page 515
Power Off dialog box, page 516
Simulator Setup dialog box, page 517

Replay File dialog box

The **Replay File** dialog box allows you to choose which file(s) to be used for playback. The files listed were generated automatically during recording. Each file is identified with the time and date it was made.

How to open

To open the **Replay File** dialog box, select **Operation**. The **Operation** function is located on the **Operation** menu. Select **Replay File**.

Tip

Once the playback has started, you can also open the **Replay File** *dialog box from the replay bar.*

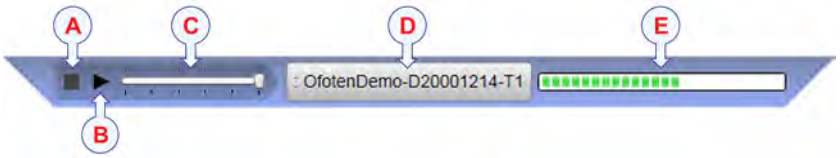
Description

A useful function of the CS90 system is it ability to record echo data. You can save the data to the hard disk, or onto an external storage device. The **Replay File** dialog box allows you to choose which file(s) to be used for playback.

The **Replay File** dialog box allows you to add one or more files to a list of active files for playback.

Select **Loop** to establish continuous playback with all the file(s) you have chosen. To delete a file from the playback list, simply click the filename, and then the **Remove** button. The file is removed from the list, but not from the hard disk.

All playback is controlled by the replay bar. The replay bar opens automatically at the top of the display presentation when you choose *Replay* mode.



A ***Stop****: Select this button to stop the playback.*

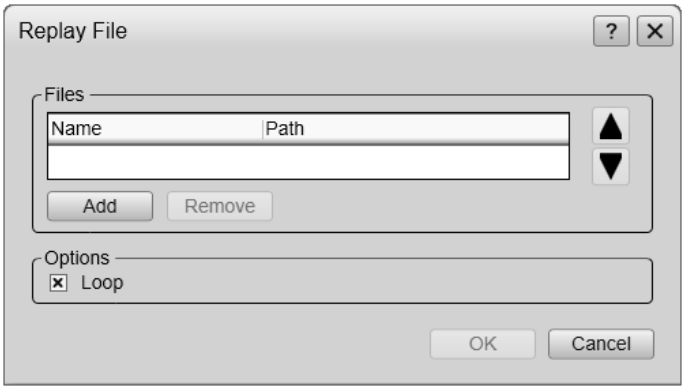
B ***Play/Pause****: Select this button to start the playback, or to pause it.*

C ***Replay Speed****: Select this slider and move it sideways to adjust the replay speed.*

D ***Replay File****: The button shows you which file you are replaying. Select the button to open the* ***Replay File*** *dialog box.*

E ***Playback Progress****: This bar shows you the progress of the replay sequence. If you have chosen to restart the replay file(s) automatically (in a loop), the green indicator starts from left every time the file restarts.*

Details



Files

This list displays the files that are currently available for playback.

Add

Select **Add** to include additional file(s) in the **Files** list. A standard operating system dialog box opens to let you choose files.

Remove

Select a file in **Files** list, then select **Remove**. The file is removed from the list, but not from the hard disk. If you wish to delete a file from your hard disk, you need to use a file manager program.

Loop

Select **Loop** if you want the CS90 system to play back all the files in an endless loop. The replay will run until you stop it in the replay bar, or choose a different operating mode.

Related functionality

Record

The **Record** indicator on the top bar shows you when recording has been activated.

Recording dialog box

When the recording is stopped, the **Recording** dialog box opens automatically. Use the **Recording** dialog box to add metadata to your recording.

File Setup page

The **File Setup** settings control how and where the recorded files are saved on the hard disk, or on an external storage device. You can select the disk and folder for the files, the maximum file size, and a prefix for the file names. This page is located in the **Output** dialog box. This dialog box is opened from the **Operation** menu.

System Protection page

The **Recording** protection stops the recording automatically when the transducer is hoisted to its upper position. The **Timer** function stops the recording automatically when the specified time has elapsed. This page is located in the **Installation** dialog box. To open the page, select **Installation** on the **Setup** menu.

Related topics

Recording and replaying echo data, page 123
Record RAW function, page 436
Functions and dialog boxes, page 418
Secondary functions and dialog boxes, page 496

Audio Sector function

With the Audio Sector function, you can listen to the audio from all the beams in a user-defined sector.

How to open

Open the **Operation** menu. Select **Audio**. Select **Audio Sector** to open the choices under the button.

Description

Select *Audio Beam* to retrieve audio information only from this beam.

Select any opening angle to specify the width of the listening beam from which the CS90 system will obtain audio information. The listening beam places the audio beam in the middle. The entire listening beam rotates when the audio beam rotates.

Related functionality

Audio function

Select **Audio** to turn the audio output on or off.

Bearing function

The **Bearing** function controls the horizontal direction of the *Vertical* view, the audio beam and the beam in each *Inspection* view.

The solid bearing line in the *Horizontal* view controls the audio beam. If you have two *Horizontal* views, the solid line in the *Horizontal 1* view controls the audio beam.

This function is opened from the **Main** menu.

Related topics

Audio function, page 440
Functions and dialog boxes, page 418
Secondary functions and dialog boxes, page 496

Recording dialog box

Record RAW allows you to record the *unprocessed* echo data received by the transducer. You can save the data to the hard disk, or onto an external storage device. When the recording is stopped, the **Recording** dialog box opens automatically. Use the **Recording** dialog box to add metadata to your recording.

How to open

When the recording is stopped, the **Recording** dialog box opens automatically.

Description

The purpose of the **Recording** dialog box is to collect additional information about the recording circumstances before you save the file. After you have stopped the recording we suggest that you keep this dialog box open until you have collected information about the catch.

Select **Advanced** to add information. You can insert information about catch and bycatch, and provide details about species, weight and size. You can also add comments. The comments are saved in a separate text file in the same folder as the raw data files.

Select **Delete** to cancel the recording and delete the raw data file.

Tip

By collecting additional information about the catch you add value to your recording. The catch data will help to build your own experience, as you can play back the data later so study the echo presentations. If you wish to share the recordings with your dealer or us we can use them to make our products better.

Details

Folder Prefix

You can save the data to the hard disk, or onto an external storage device. Type a text to use a prefix on the folder name.

Note

The data files will normally become very large. If you wish to record large amounts of data, make sure that you have enough space on your hard disk. The CS90 system is not provided with unlimited disk capacity. We recommend that you save the data files to an external storage device.

Save

Select **Save** to keep the recording.

Delete

Select **Delete** to cancel the recording and delete the raw data file.

Advanced

Select **Advanced** to add information. You can insert information about catch and bycatch, and provide details about species, weight and size.

Comment

You can also add comments. The comments are saved in a separate text file in the same folder as the raw data files. Type any text into the box.

Related functionality

Record RAW function

To start data recording, select *On* or the red circle on the right side of the **Record RAW** button. Select the black rectangle to stop recording.

File Setup page

You can select the disk and folder for the files, the maximum file size, and a prefix for the file names. This page is located in the **Output** dialog box. This dialog box is opened from the **Operation** menu.

System Protection page

The **Recording** protection stops the recording automatically when the transducer is hoisted to its upper position. The **Timer** function stops the recording automatically when the specified time has elapsed.

Related topics

Recording and replaying echo data, page 123
Record RAW function, page 436
Functions and dialog boxes, page 418
Secondary functions and dialog boxes, page 496

LAN Port Setup dialog box

The **LAN Port Setup** dialog box allows you to define the parameters for Ethernet (Local Area Network (LAN)) communication with external devices. External devices may for example be navigation sensors (speed, position, etc.) or peripheral systems.

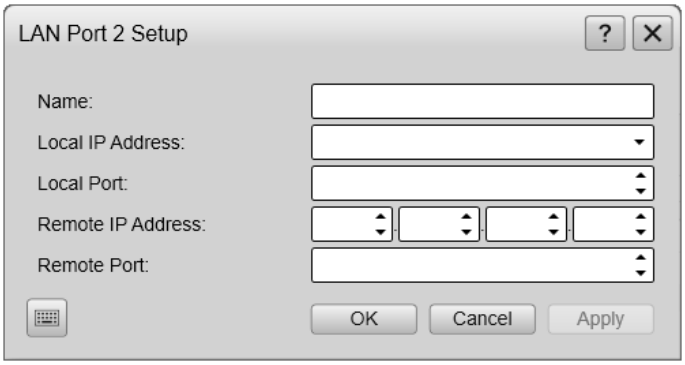
How to open

To open the **LAN Port Setup** dialog box, select a LAN port on the **I/O Setup** page, and select **Setup**.

The **I/O Setup** page is located in the **Installation** and **Output** dialog boxes. The **Installation** dialog box is located on the **Setup** menu. The **Output** dialog box is located on the **Operation** menu.

Description

Ethernet (Local Area Network (LAN)) communication is an efficient way to connect to external sensors, such as a global positioning system (GPS), to receive navigational data. In order for this communication port to work, the parameters must be set up properly.



Tip

The settings in the dialog box are only provided to define the actual communication parameters. You can not select which inputs or outputs to use. However, you must set up these communication parameters before you select input or output datagrams.

All navigation and motion sensors are connected using the **Sensor Installation** *page. You must also specify which datagram formats to use. The* **Sensor Installation** *page is located in the* **Installation** *dialog box. The* **Installation** *dialog box is located on the* **Setup** *menu.*

Details

Name

This is a text box. Type a suitable name for the communication port. If you do not have a computer keyboard connected to your CS90 system, select the **Keyboard** button to open an on-screen keyboard.

Local IP Address

This is the Internet Protocol (IP) address of the Ethernet interface adapter located in your computer. In most cases, each Ethernet adapter has a unique IP address, even when it supports multiple sockets. If you have more than one Ethernet adapter, you are provided with a list of the available addresses.

Local Port

The **Local Port** is important if you want to receive information from a peripheral device to your the Processor Unit. The number you define here must match the port number on the peripheral device that is providing the information. This peripheral device is for example a sensor on the network, or another navigation or hydroacoustic system. To find the port number on the peripheral device, consult the documentation for the device, and/or the application to be used on it.

If the data communication is set up to only export information from the Processor Unit to a peripheral device, this **Local Port** parameter is not required.

Remote IP Address

The **Remote IP Address** is the Internet Protocol (IP) address for a peripheral device. This peripheral device is for example a sensor on the network, or another navigation or hydroacoustic system. If the data communication between your Processor Unit and the peripheral device is set up to only import data from the device, the remote IP address is not required.

If you want to export information from the Processor Unit to one or more peripheral devices (*Broadcast* mode), set **Remote IP Address** to 255.255.255.255. This is the default setting. If you want to use *point-to-point* communication in a closed network, set the remote IP address manually.

Remote Port

The **Remote Port** is important if you want to export information from the Processor Unit to a peripheral device on the local area network (LAN). If you want to use *point-to-point* communication in a closed network, set the remote IP address manually. The application on the peripheral device will "listen" to this port number.

If you want to establish *point-to-point* communication for data import from a peripheral device on the network, you may need to define the network port on this device.

To find the port number on the peripheral device, consult the documentation for the device, and/or the application to be used on it.

Related topics

Setting up the interfaces to peripheral devices, page 192
I/O Setup page, page 521
Functions and dialog boxes, page 418
Secondary functions and dialog boxes, page 496

Serial Port Setup dialog box

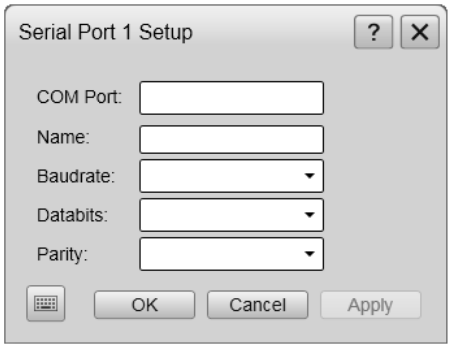
Serial line communication with external devices is important for the CS90 system. The communication between the CS90 system and peripheral devices takes place using "datagrams". For most commercial devices, the formats of the datagrams are defined by NMEA (National Marine Electronics Association). Use the **Serial Port Setup** dialog box to define the communication parameters for serial line ports. These ports are typically used to interface external devices, such as navigation sensors.

How to open

To open the **Serial Port Setup** dialog box, select a serial port on the **I/O Setup** page, and select **Setup**.

The **I/O Setup** page is located in the **Installation** and **Output** dialog boxes. The **Installation** dialog box is located on the **Setup** menu. The **Output** dialog box is located on the **Operation** menu.

Description



A serial port is a serial communication interface that is still very common between maritime systems. It is very important that any serial line between the CS90 system and any external system is setup correctly with identical parameters at each end. The NMEA (National Marine Electronics Association) standard for serial communication defines standard parameters for such interfaces.

According to their web site, the National Marine Electronics Association (NMEA) is "the unifying force behind the entire marine electronics industry, bringing together all aspects of the industry for the betterment of all in our business". For more information, see: http://www.nmea.org

Details

COM Port

This text box identifies the current communication port on the Processor Unit. You can not change this information.

Name

This is a text box. Type a suitable name for the communication port. If you do not have a computer keyboard connected to your CS90 system, select the **Keyboard** button to open an on-screen keyboard.

Baud Rate

Use this setting to specify the baud rate ("speed") for the serial communication. The standard baud rate defined for NMEA serial line communication is 4800 baud.

In digital communications, *symbol rate*, also known as *baud rate* and *modulation rate*, is the number of symbol changes, waveform changes, or signalling events, across the transmission medium per time unit using a digitally modulated signal or a line code. The symbol rate is measured in *baud* (Bd) or symbols per second. In the case of a line code, the symbol rate is the pulse rate in pulses per second. Each symbol can represent or convey one or several bits of data. The symbol rate is related to the gross bit rate expressed in bits per second.

https://en.wikipedia.org/wiki/Symbol_rate

Data Bits

Use this function to specify the number of data bits for serial communication. The standard number of data bits defined for NMEA serial line communication is 8 (eight).

Parity

Use this function to specify the parity for the serial communication. The standard parity defined for NMEA serial line communication is "None".

> A *parity bit*, or *check bit* is a bit added to the end of a string of binary code that indicates whether the number of bits in the string with the value one is even or odd. Parity bits are used as the simplest form of error detecting code. [...] In serial data transmission, a common format is 7 data bits, an even parity bit, and one or two stop bits. This format neatly accommodates all the 7-bit ASCII characters in a convenient 8-bit byte. Other formats are possible; 8 bits of data plus a parity bit can convey all 8-bit byte values.
>
> *https://en.wikipedia.org/wiki/Parity_bit*

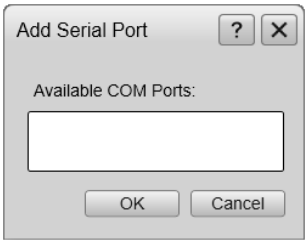
Related topics

Setting up the interfaces to peripheral devices, page 192
I/O Setup page, page 521
Functions and dialog boxes, page 418
Secondary functions and dialog boxes, page 496

Add Serial Port dialog box

Serial line communication with external devices is important for the CS90 system. The communication between the CS90 system and peripheral devices takes place using "datagrams". For most commercial devices, the formats of the datagrams are defined by NMEA (National Marine Electronics Association). The **Add Serial Port** dialog box allows you to put a free serial port (COM port) on the Processor Unit to use for interface purposes.

How to open



To open the **Add Serial Port** dialog box, select **Add** under the list of serial ports on the **I/O Setup** page.

The **I/O Setup** page is located in the **Installation** and **Output** dialog boxes. The **Installation** dialog box is located on the **Setup** menu. The **Output** dialog box is located on the **Operation** menu.

Description

The first time the Processor Unit is turned on after a CS90 system software installation, it will automatically do a search to find available serial ports. Since the Processor Unit was provided by Kongsberg Discovery as a part of the delivery, you can only use the ports that were fitted by the manufacturer.

If you need additional serial ports, consult your dealer for advice.

If you have added new hardware, you must also allow the CS90 system to use the new port(s).. Select **Add** under the list of serial ports on the **I/O Setup** page. First select the port in the list, then select **OK**.

Tip

You can give your new serial port a more descriptive name in the **Serial Port Setup** *dialog box.*

Related topics

Setting up the interfaces to peripheral devices, page 192
I/O Setup page, page 521
Functions and dialog boxes, page 418
Secondary functions and dialog boxes, page 496

Port Monitor dialog box

Communication with external devices is important for the CS90 system. The communication between the CS90 system and peripheral devices takes place using "datagrams". These datagrams are self-contained and independent entities of data carrying information. When setting up or maintaining the CS90 system, it is always useful to verify that the communication lines with external devices are operational. The **Port Monitor** dialog box allows you to study the communication stream on the chosen serial line or local area network (LAN) port.

How to open

To open the **Port Monitor** dialog box, select a serial or LAN port on the **I/O Setup** page, and select **Monitor**.

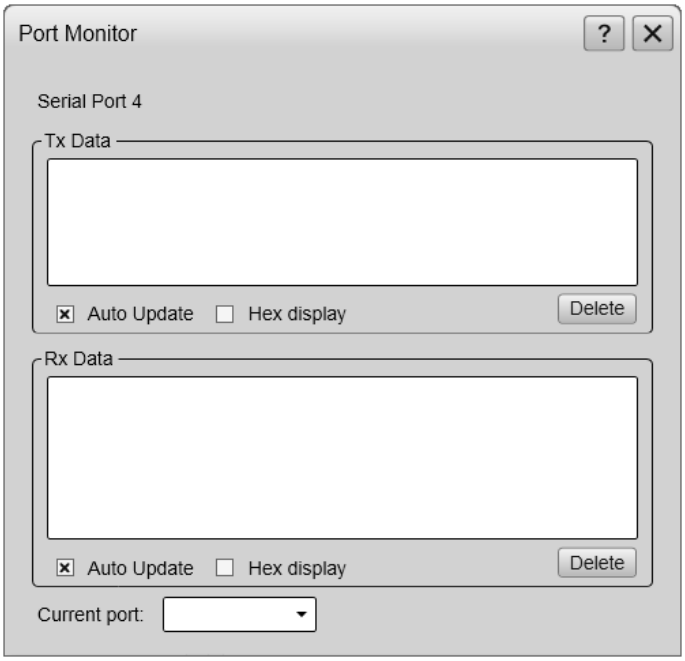
The **I/O Setup** page is located in the **Installation** and **Output** dialog boxes. The **Installation** dialog box is located on the **Setup** menu. The **Output** dialog box is located on the **Operation** menu.

Description

The **Port Monitor** dialog box provides one text box for incoming messages (**Rx Data**), and one for outgoing messages (**Tx Data**). Use these boxes and your knowledge of the data communication to investigate the datagrams.

Note

The **Port Monitor** *dialog box is a tool for debugging purposes. It is neither required nor intended for normal operation of the CS90 system.*



Details

Tx Data

This text box displays the data communication exported from the CS90 to external devices. If you have enabled **Auto Update**, the text box is continuously updated with new information.

Rx Data

This text box displays the data communication received by the CS90 from external devices. These external devices may for example be navigation sensors, motion reference units, or other hydroacoustic systems. If you have enabled **Auto Update**, the text box is continuously updated with new information.

Auto Update

When this function is activated, the relevant text box is continuously updated with new information. If you wish to "freeze" the information for further investigation, deactivate to disable the automatic update.

Hex Display

Select this to show the information in the relevant text box in hexadecimal format.

Delete

This function clears the text box to allow a new stream of communication data to start on a blank page.

Current Port

This box identifies the port you are currently monitoring.

Tip

If you wish to change your attention to a different serial or LAN port, you can choose the communication port here instead of returning to **I/O Setup**.

Related topics

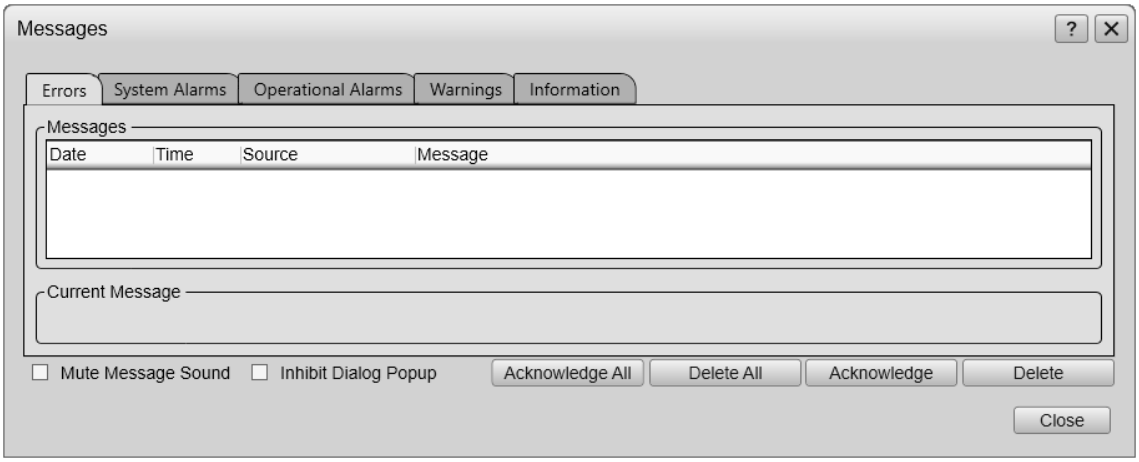
Setting up the interfaces to peripheral devices, page 192
I/O Setup page, page 521
Functions and dialog boxes, page 418
Secondary functions and dialog boxes, page 496

Messages dialog box

The **Messages** dialog box allows you to read and acknowledge the messages.

How to open

To open the **Messages** dialog box, select **Messages** on the top bar. When a new message is issued by the CS90 system, **Messages** on the top bar will flash. The colour of the triangle reflects the severity of the most serious message. If you hold the cursor over the triangle, a short list of the current messages is shown.



Description

Messages from the CS90 system can be related to any type of hardware or software errors. Messages also communicate events related to the operational performance and conditions. The messages are divided into different types related to their importance. Warnings are indicated with a yellow colour, while errors are indicated with a red colour.

The **Messages** dialog box shows you the relevant information, the source of the information, and the time of the message. You can select a message text to copy it to the larger text box under the table. This make abbreviated messages easier to read. Several message types are used. The dialog box offers one page for each type.

Message types

Errors

These errors are serious. Operation of the CS90 system cannot continue. You must turn off the CS90 system and attempt a restart.

System alarms

System alarm messages are related to the operation of the CS90 system or significant software components. You can continue the operation, but the data provided by the CS90 system may be inaccurate. A system restart is recommended.

Operational alarms

Operational alarms are messages related to environmental conditions, interfaces or other events unrelated to software. Depending on the message nature, make sure that all interfaces to the CS90 system are operational. A system restart may be required.

Warnings

A warning is issued when an irregular event occurs. Depending on the nature of the message, investigate what causes the warning. A restart is normally not required.

Information

An information messages is simply a notification of a minor operational event. No corrective actions are required.

Details

Messages

The messages are listed in a table. For each message, the date and time of issue is shown. The source of the information (for example a software function) is also provided. This information is provided for support and maintenance use.

Current Message

The text in a message may be longer than the tabular view shows you. To read the complete message, select it. The full text is then copied into the **Current Message** box.

Mute Message Sound

Messages can be presented using an audible sound. The sound is only provided if your Processor Unit is equipped with a loudspeaker. Select **Mute Message Sound** to disable the audible signal.

Inhibit Dialog Popup

Select this option to prevent the **Messages** dialog box from opening automatically.

Note

When this option is enabled, you must keep an eye on the icon on the top bar, as new messages will only be flagged using this icon.

Delete / Delete All

Select **Delete** to remove the currently selected message, or **Delete All** to remove all messages of the current type.

Acknowledge / Acknowledge All

Select **Acknowledge** to accept the currently selected message, or **Acknowledge All** to accept all new messages of the current type.

Related functionality

Messages

A new message is flagged with **Messages** on the top bar. It is flashing to draw your attention. The colour of the triangle reflects the severity of the most serious message.

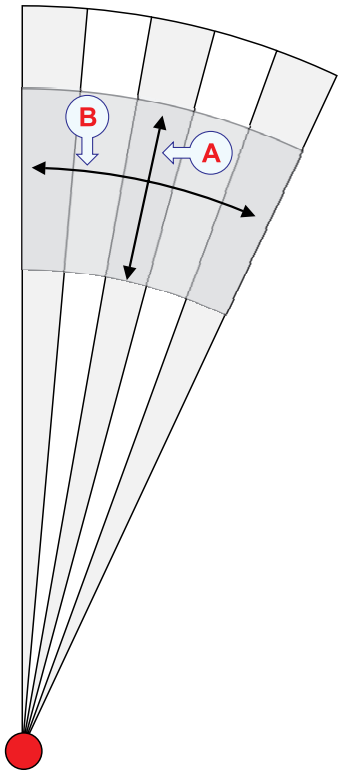
Related topics

Messages, page 302
Functions and dialog boxes, page 418
Secondary functions and dialog boxes, page 496

Tracking Area Setup dialog box

Use the **Tracking Area** function to define the size of the area that you want to detect moving objects in. An invisible area - the tracking area - is created as an acquisition area. In order for the CS90 system to find and lock on the intended target, it needs to be kept within this tracking area. If the intended target falls outside the area, the tracking can not be started. Use the **Tracking Area Setup** dialog box to define or change the physical size of the tracking area.

Illustration:

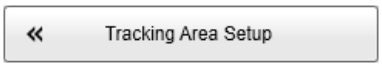


A *Each **Tracking Area** option controls the distance from the inner to the outer radius of the area.*

B *The width of the area is fixed, and stretches across a predefined number of beams. This means that the actual width depends on the distance from your vessel to the area.*

How to open

Select **Tracking Area** on the **Setup** menu, open the button submenu, and select **Tracking Area Setup**.



Description

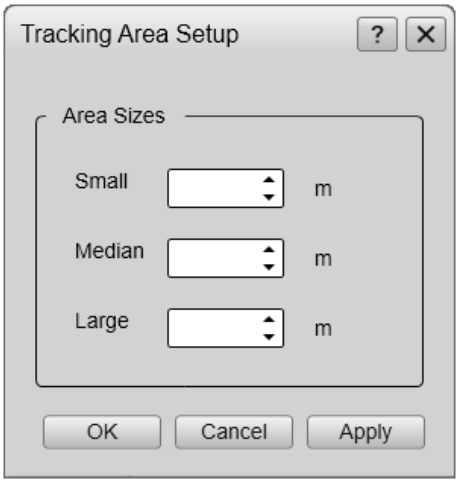
The **Tracking Area** function is used to select the physical size of the area.

You can only define the area size as the distance from the inner to the outer radius of the area. The width of the area is fixed, and stretches across a predefined number of beams.

Note

To track a target efficiently, the area should be as small as possible. For example, use a small area if you track single fish or small schools. However, if the target is large, or moves very fast, a larger area may be beneficial. This may be useful if you track a large school of fish.

When the size of a tracking area has been changed, the new size will take effect the next time a track is manually initiated.



Related topics

Tracking Area function, page 454
Using the markers and tracking features, page 101
Functions and dialog boxes, page 418
Secondary functions and dialog boxes, page 496

Add Fishing Gear dialog box

By defining the type of fishing gear you are using, the CS90 system may provide more accurate visual presentations. Use the **Fishing Gear Setup** dialog box to change the fishing gear properties to match your own equipment. Use the **Add Fishing Gear** to add new equipment to your fishing gear list.

How to open

Open this dialog box from the **Fishing Gear Setup** dialog box.

Under **Fishing Gear**, select **Fishing Gear Setup** to open the dialog box. This dialog box is also provided as a page in the **Installation** dialog box.

Description

In the **Add Fishing Gear** dialog box, select gear type and gear name.

Related functionality

Fishing Gear function

The **Fishing Gear** function allows you to define the size of your trawl or purse seine. Accurate fishing gear properties are important for the following functionality:

- Circle Marker
- Gear Symbol
- Catch view
- Vertical view

Open this function from the **Setup** menu.

Fishing Gear Setup dialog box

Use the **Fishing Gear Setup** dialog box to change the fishing gear properties to match your own equipment. Under **Fishing Gear**, select **Fishing Gear Setup** to open the dialog box. This dialog box is also provided as a page in the **Installation** dialog box.

Related topics

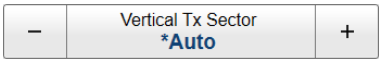
Fishing Gear function, page 456
Using the markers and tracking features, page 101
Fishing Gear Setup page, page 610
Functions and dialog boxes, page 418
Secondary functions and dialog boxes, page 496

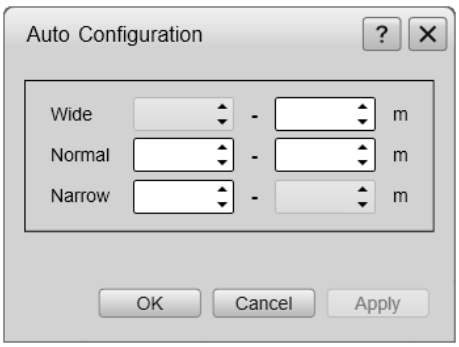
Auto Configuration dialog box

The **Vertical Tx Sector** function is used to change the vertical opening angle in horizontal and vertical swaths. If you select *Auto*, the sector is defined by the current range. Use the **Auto Configuration** dialog box to define for which ranges the **Vertical TX sector** is set to *Narrow*, *Normal* or *Wide*.

How to open

Select the middle of the **Vertical Tx Sector** button. You open this function from the **Active** menu. Select **Auto Configuration**.





Description

Select which range you want to apply to each sector setting.

Related topics
Vertical TX Sector function, page 482
Functions and dialog boxes, page 418
Secondary functions and dialog boxes, page 496

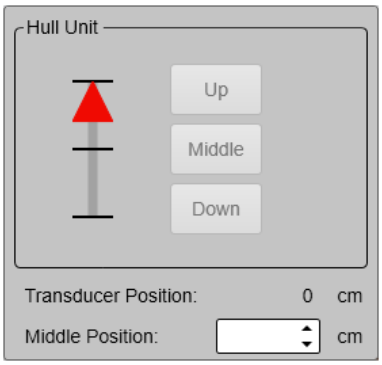
Hull Unit Control dialog box

The **Hull Unit Control** dialog box allows you to lower and hoist the transducer. The dialog box also provides status information about the transducer position. You can monitor the current position of the transducer and make changes to the position defaults.

How to open

To open the **Hull Unit Control** dialog box, select **Hull Unit** on the top bar.

Description



To lower the transducer select **Down**. To hoist the transducer select **Up**. To move the transducer to its predefined middle position, select **Middle**.

The numerical value shown in the **Hull Unit Control** dialog box measures the vertical travelling distance. It stops when the transducer reaches the middle position, and shows you the vertical distance. It stops when the transducer is fully lowered, and shows you how far down this is. It stops when the transducer is fully retracted, and shows you that the vertical distance is 0 (zero).

Tip

Retracting the transducer to a middle position may be useful if you use the CS90 system simultaneously with other sonars. A higher position will permit you to increase the vessel speed. If you operate in very shallow waters, you may also reduce the risk of hitting bottom. However, placing the transducer immediately under the hull may increase the flow noise.

If you have the large hull unit you can define two middle positions.

Tip

The **Middle** *button on the Operating Panel can only be used to lower or hoist the transducer to the initial middle position. If you want to place the transducer in position "Middle 2" you must use the* **Hull Unit Control** *dialog box.*

The CS90 system can be provided with one of the following hull units:

Hull Unit	Lowering depth (m)	Transducer cable (m)	Maximum speed (knots)
CS90	1.0	4.6	20
		10	
CS94	2.1	4.6	19
		7	

Related topics

Getting started, page 78
Hull Unit, page 295
Functions and dialog boxes, page 418
Secondary functions and dialog boxes, page 496

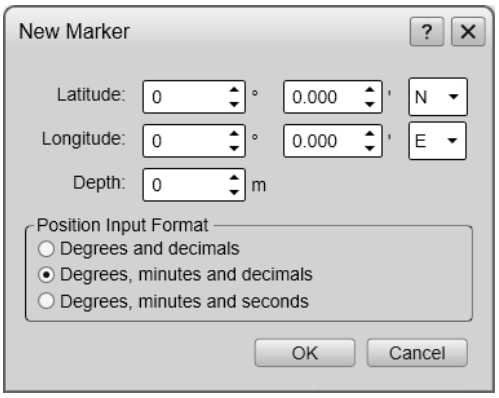
New Marker dialog box

The **New Marker** dialog box allows you to create a new marker based on the known depth and geographical position of a new target.

How to open

The **New Marker** dialog box is opened from the **New** button in the **Objects** menu.

Description



Use this functionality if you need to create a marker based on geographical information from an external source. You can place markers on for example wrecks, obstacles on the seabed or coral reefs. For each new marker you must provide:

- Longitude
- Latitude
- Depth
- Position Input Format

When the new marker is created, it is automatically assigned a unique identifier (UID) by the CS90 system.

Related topics

Functions and dialog boxes, page 418
Secondary functions and dialog boxes, page 496

Power Off dialog box

The operating system functions are located on the right side of the top bar. **Minimize**, **Maximize/Normalize** and **Power Off** are provided. You must always close the CS90 program by selecting **Power Off** on the top bar.

How to open

Select **Power Off** on the top bar.

Description

The **Power Off** dialog box offers two options. One is to turn off the entire system, the other is to only close the CS90 program.

Details

Power Off

> **Power Off** hoists the transducer, turns off the operating power to all units, closes the program, and then automatically turns off the Processor Unit.

Exit to Operating System

> **Exit to Operation System** closes the CS90 program.

Related topics

Getting started, page 78
Operating system functions, page 303
Functions and dialog boxes, page 418
Secondary functions and dialog boxes, page 496

Simulator Setup dialog box

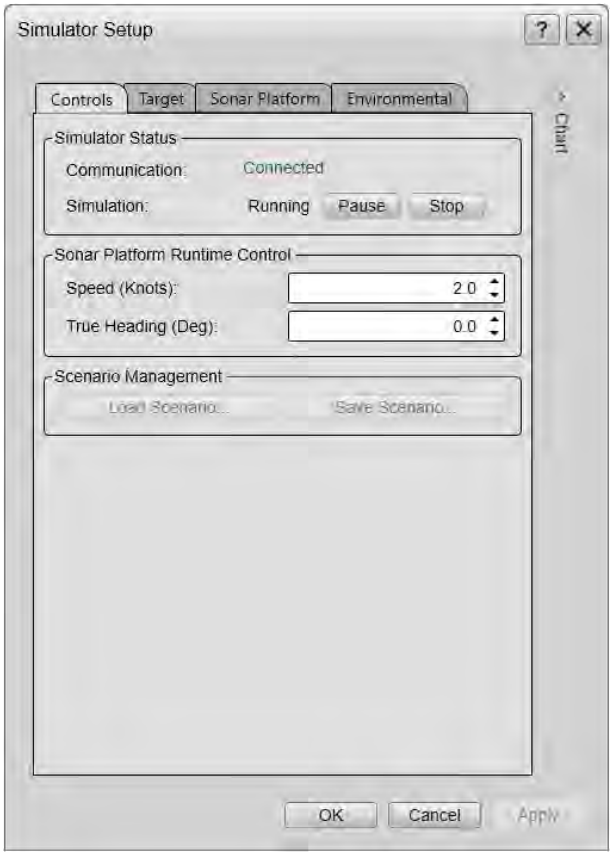
Use the built-in simulator to gain operating experience without using the CS90 system in the usual way. The simulator generates synthetic echo data based on predefined scenarios. Before you can use the simulator you need to set it up with the relevant target and environmental properties.

How to open

This dialog box is opened from the **Operation** function. The **Operation** function is located on the **Operation** menu.

Note

The Simulation mode is an optional function. In order to use this functionality, a dedicated software license is required. Contact you local dealer for more information.



Description

The **Simulator Setup** dialog box offers several pages to control the simulation parameters and scenarios.

Note

When the built-in simulator is started, the Transceiver Unit is automatically turned off. This means that no actual sonar operations can take place while you use the simulator.

Controls

Use the **Control** page to set up the basic simulator properties. The following options are available:

- Start, stop or pause the simulation.
- Set the speed and course of the sonar platform (simulated vessel).
- Save and load simulation scenarios.

Target

The **Target** page lists all the currently defined targets in the simulated scenario. To change the settings you must stop the simulation on the **Control** page.

Sonar Platform

Use the **Sonar Platform** page to define the speed, course and geographical position of the simulated vessel. To change the settings you must stop the simulation on the **Control** page.

Environmental

Use the **Environmental** page to set up parameters related to the simulation surroundings. Import a sound velocity curve to simulate various sound propagations. To change the settings you must stop the simulation on the **Control** page.

Chart

Use the **Chart** page to place the current targets in relation to each other. If a relevant service is available for the CS90 system, a map is shown with all the targets visible.

Related topics

Operation function, page 432
Functions and dialog boxes, page 418
Secondary functions and dialog boxes, page 496

Pages in the Output dialog box

A key function of the CS90 system is its ability to export data. The purpose of the **Output** dialog box is to collect all functionality related to data output in one easily accessible location.

Prerequisites

The **Output** dialog box is not available when your CS90 system is set to *Inactive* mode.

How to open

This dialog box is opened from the **Operation** menu. The **I/O Setup** page can also be opened from the **Installation** dialog box. The **Installation** dialog box is located on the **Setup** menu.

Description

This dialog box contains a number of pages selected from the menu on the left side.

Topics

File Setup page, page 519

I/O Setup page, page 521

Processed Data to File page, page 525

Marker Output page, page 528

Relay Output page, page 530

Screen Recording page, page 532

Screen Captures File Location page, page 534

File Setup page

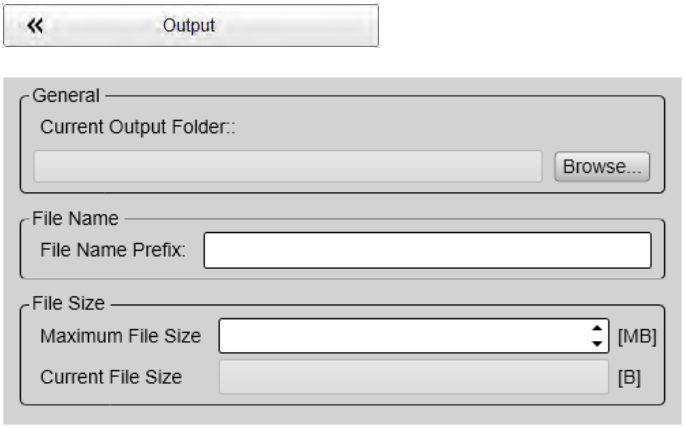
A useful function of the CS90 system is it ability to record echo data. To retrieve the data files you need to know where they are, and which file names that have been used. The purpose of the **File Setup** page is to define the file and folder properties for the data files that you are recording. You can select the disk and folder for the files, the maximum file size, and a prefix for the file names.

Prerequisites

The **Output** dialog box is not available when your CS90 system is set to *Inactive* mode.

How to open

This page is located in the **Output** dialog box. To open, select it on the **Operation** menu.



Description

The **File Setup** settings control how and where the recorded files are saved on the hard disk, or on an external storage device. By adding a prefix to the file names you can identify the files you have recorded during a specific survey. You can also define a maximum size of the files.

Tip

Set up the file and folder parameters before you start the recording. If you wish to save your recorded data on an external hard disk, make sure that it is connected to the computer.

Unless you really need to record data for playback and/or training purposes, you should use this function with care. The data files will fill you hard disk very fast!

Details

Current Output Folder

This text box shows you the file path that is currently used to store the data files. Select **Browse** to choose a different output folder to store the files. This function uses a standard operating system dialog box. You are permitted to create a new folder.

File Name Prefix

By adding a prefix to the file names you can identify the files you have recorded during a specific survey. Type any text into the box. The chosen text will be used as prefix on all the file names. Observe the file name limitations in the operating system. Observe the file name limitations in the operating system.

Max(imum) File Size

Define the maximum amount of bytes to be contained in one data file. Select **Maximum** for 1 GB file size.

The data files will normally become very large. If you wish to record large amounts of data, make sure that you have enough space on your hard disk. The

CS90 system is not provided with unlimited disk capacity. We recommend that you either save the data files to an external storage device, or use a network disk.

Current File Size

The current file size is displayed during data recording.

Related functionality

Record

The **Record** indicator on the top bar shows you when recording has been activated.

Record RAW function

The **Record RAW** button allows you to start and stop recording, split the current recording file (if it gets too large), and set up the file output parameters. Once all the recording parameters have been defined, you can start recording by clicking the red circle on the button, and stop it by clicking the left rectangle. **Record RAW** is located on the **Operation** menu.

System Protection page

The **Recording** protection stops the recording automatically when the transducer is hoisted to its upper position. The **Timer** function stops the recording automatically when the specified time has elapsed. This page is located in the **Installation** dialog box. To open the page, select **Installation** on the **Setup** menu.

Related topics

Recording and replaying echo data, page 123
Functions and dialog boxes, page 418
Operation menu: functions and dialog boxes, page 431
Output dialog box, page 439

I/O Setup page

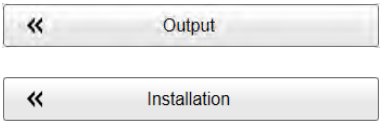
To communicate with peripheral devices the Processor Unit offers several serial and/or Ethernet (LAN) ports. The number of communication ports depends on how your Processor Unit is set up and configured. For each port, you can set up the communication parameters, and monitor the data flow.

Prerequisites

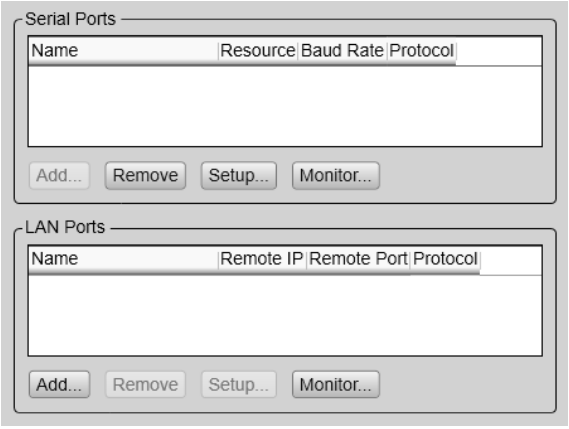
The **Installation** dialog box is not available when your CS90 system is set to *Replay* mode. The **Output** dialog box is not available when your CS90 system is set to *Inactive* mode.

How to open

This page is located in the **Installation** dialog box. This page is also located in the **Output** dialog box.To open, make a selection on the **Operation** or **Setup** menus.



Description



The CS90 software automatically scans the Processor Unit to locate and identify the available communication ports.

Once the software has established a list of valid interfaces, you can set up and control the communication parameters. The **I/O Setup** page provides two lists; one for serial ports and one for Ethernet (LAN) ports. Each list is supported with a set of functions to set up and monitor the communication ports. Select the port you want to work with and then select one of the buttons below the list.

Note

Use the **I/O Setup** *page to add or delete serial ports and Ethernet (LAN) ports, and define the communication parameters for each port. Use the* **Sensor Installation** *page to define which external sensors your CS90 system will import information from. To control the data export, use the* **Output** *dialog box.*

The **Sensors** page in the **Diagnostics** dialog box provides an overview of all the communication lines and sensors in use. All relevant status information is provided. Open the **Diagnostics** dialog box from the **Setup** menu.

When you work in the **Installation** dialog box, you must always select **Apply** to save the changes made on a page. You must do this before you continue working on a different page.

Details

Serial Ports

The table shows the available serial ports on the Processor Unit. The list is automatically populated the first time you open the **I/O Setup** page after a software installation. The list reflects the initial number of serial ports that are available. If you add interface hardware to your computer, you must select **Add** to add the new ports to the list.

Name

This is the given identity of the serial port. By default, the ports are numbered.

Resource

The Processor Unit can have several serial ports. This is the identification of the communication port. The serial ports are normally named COM1, COM2 and so on.

Baud Rate

This is the current baud rate specified for the serial line. The communication parameters defined for NMEA 0183 are:

- **Baud rate**: 4800 bit/s
- **Data bits**: 8
- **Parity**: Even
- **Stop bits**: 1

Some instruments may provide other parameters and/or options. You must always check the relevant technical documentation supplied by the manufacturer.

Protocol

This is the current protocol specified for the port. Each port can receive multiple datagrams simultaneously, provided that they all use the same protocol. However, only one peripheral device can be physically connected to the port. If you want to connect several peripheral devices to a single serial port, you must route them through a "mixer". This can be a hardware unit or a computer (with relevant software) collecting and streaming the datagrams.

Input

This column identifies the external sensor (any type of "measuring device") that is currently connected to the port. To choose what type of device to import data from, select **Input** under the table.

LAN Ports

This table shows the Ethernet (LAN) ports you have available. Each Ethernet adapter supports any number of network ports. Select **Add** to add a new port.

Ports that have not been initiated correctly have a red background colour.

Name

This is the given identity of the network (LAN) port. By default, the ports are numbered.

Remote IP Address

The **Remote IP Address** is the Internet Protocol (IP) address for a peripheral device. If the data communication between your system and the peripheral device is set up to only import data from the device, the remote IP address is not required. If you want to export information to one or more peripheral devices (*Broadcast* mode), set **Remote IP Address** to 255.255.255.255. This

is the default setting. If you want to use *point-to-point* communication in a closed network, set the remote IP address manually.

Remote Port

The **Remote Port** is important if you want to export information from the Processor Unit to a peripheral device on the local area network (LAN). The application on the peripheral device will "listen" to this port number. If you want to establish *point-to-point* communication for data import from a peripheral device on the network, you may need to define the network port on this device. To find the port number on the peripheral device, consult the documentation for the device, and/or the application to be used on it. In most cases, this peripheral device is another computer on a local area network (LAN).

Protocol

This is the current protocol specified for the port. Each port can receive multiple datagrams simultaneously, provided that they all use the same protocol.

Input

This column identifies the external sensor (any type of "measuring device") that is currently connected to the port. To choose what type of device to import data from, select **Input** under the table.

Add

Select **Add** to add a new port. This is necessary if you have added new interface hardware, for example by installing an extra Ethernet or Serial adapter. If you have previously released an unused port, but want to bring it back into use, you must also select **Add**.

If no serial ports are available the **Add** button is disabled. If one or more serial ports are available, you can select a port in the **Add Serial Port** dialog box.

Remove

Select this button to delete a communication port.

Once the CS90 system has identified and listed all the available serial ports and LAN ports, they cannot be used by any other software. If the CS90 system does not need a specific port, it can be released for other use. Click the applicable port to select it, then select **Remove** to delete the port from the list.

Note

No acknowledgement is required; the port is removed instantly. The chosen port is not deleted from the system, it is only taken out of the list of ports.

Setup

In order to use a serial port or LAN (Ethernet) port to receive or transmit information, its communication parameters must be set up to match the peripheral

device. Select one of the listed ports and then **Setup** under the table to set up the port parameters. A dedicated dialog box opens for you to change or accept the settings.

The communication parameters defined for NMEA 0183 are:

- **Baud rate**: 4800 bit/s
- **Data bits**: 8
- **Parity**: Even
- **Stop bits**: 1

Some instruments may provide other parameters and/or options. You must always check the relevant technical documentation supplied by the manufacturer.

Monitor

If you suspect that a serial port or LAN port is ineffective, faulty or missing, you can monitor the flow of datagrams. Select one of the listed ports and then **Monitor** to observe the data communication. The **Port Monitor** dialog box opens.

Related topics

Setting up the interfaces to peripheral devices, page 192
Functions and dialog boxes, page 418
Operation menu: functions and dialog boxes, page 431
Setup menu: functions and dialog boxes, page 454
Output dialog box, page 439
LAN Port Setup dialog box, page 501
Serial Port Setup dialog box, page 503
Add Serial Port dialog box, page 505
Port Monitor dialog box, page 506

Processed Data to File page

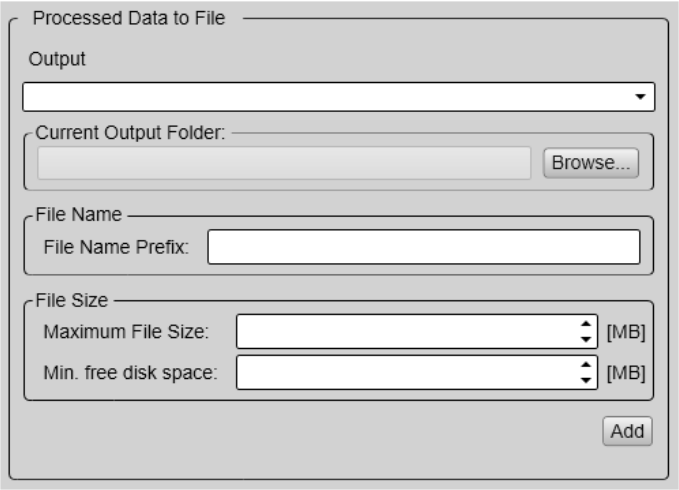
The CS90 system can export several types of processed data file formats. Use **Processed Data to File** to define which processed data formats to save, and where to place the files. This page is located in the **Output** dialog box.

Prerequisites

The **Output** dialog box is not available when your CS90 system is set to *Inactive* mode.

How to open

This page is located in the **Output** dialog box. To open, select it on the **Operation** menu.



Description

Select the output type from the list, and then where to save the files. Select **Add** to save your choices.

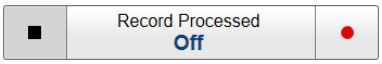
Note

The data files will normally become very large. If you wish to record large amounts of data, make sure that you have enough space on your hard disk. Unless your computer is equipped with a very large disk, we recommend that you save the data to an external storage device.

Once an output type has been defined, it is listed in the **Installed Outputs** box on the left side of the page. To remove or edit an output type, select it in the **Installed Outputs** box. Select **Edit** to change the settings. Select **Remove** to delete the output.

Starting and stopping the recording of processed data

To start and stop recording of processed data, use the **Record Processed** function on the **Operation** menu.



Details

Installed Outputs

The **Installed Outputs** box lists all the currently selected outputs. To remove or edit an output type, select it in the **Installed Outputs** box.

- Select **Remove** to delete the output.
- Select **Edit** to change the settings.
- Select **New** to add a new output.

Output

Select the file format you want to export.

Current Output Folder

This text box shows you the file path that is currently used to store the data files. Select **Browse** to choose a different output folder to store the files. This function uses a standard operating system dialog box. You are permitted to create a new folder.

In order to change the output directory, both **Record** and **Record Processed** recording must be set to *Off*.

File Name Prefix

Define a file name prefix. By adding a prefix to the file names you can identify the files you have recorded during a specific survey. Type any text into the box. The chosen text will be used as prefix on all the file names. Observe the file name limitations in the operating system.

Maximum File Size

Define the maximum amount of bytes to be contained in one data file.

The data files will normally become very large. If you wish to record large amounts of data, make sure that you have enough space on your hard disk. The CS90 system is not provided with unlimited disk capacity. We recommend that you either save the data files to an external storage device, or use a network disk.

Min(imum) Free Disk Space

This is a safety feature to prevent you to from filling your entire hard disk with data. Type the minimum space you wish to keep free on your hard disk. If this limit is reached, the recording of processed data will stop automatically. A relevant message is posted in the **Messages** dialog box.

Add

Select **Add** to allow export of the chosen data format. Once an output type has been defined, it is listed in the **Installed Outputs** box on the left side of the page. To start data recording, open the **Record Processed** button, and select *On*. Alternatively, simply select the red circle on the right side of the button.

Remove

Once an output type has been defined, it is listed in the **Installed Outputs** box on the left side of the page. To remove the output, select the relevant format under **Installed Outputs**, then select **Remove**.

Edit

Once an output type has been defined, it is listed in the **Installed Outputs** box on the left side of the page. To change the output settings, select the relevant format under **Installed Outputs**, then select **Edit**. Select **Save** to keep the changes you have made.

Save

Select **Save** to keep the changes you have made.

Related topics

Recording and exporting processed echo data, page 129
Functions and dialog boxes, page 418
Operation menu: functions and dialog boxes, page 431
Output dialog box, page 439

Marker Output page

Use the **Output Marker** page to export target markers to a communication port. Each marker is identified with its geographical location. This marker location can be very useful for other instruments For example, you can export this information to a chartplotter.

Prerequisites

The **Output** dialog box is not available when your CS90 system is set to *Inactive* mode.

How to open

This page is located in the **Output** dialog box. To open, select it on the **Operation** menu.

Description

Under normal use, the CS90 system presents several different echoes simultaneously. Some of these are clearly more interesting than others. It can be a challenging task to tell these echoes apart. It can also be hard to keep track of the different echoes as both echoes and your own vessel move. To ease the identification of these echoes you can use *markers*. Each marker is identified with its geographical location. If you have placed markers on several echoes to make them objects, you can select one of these and give it *priority* status.

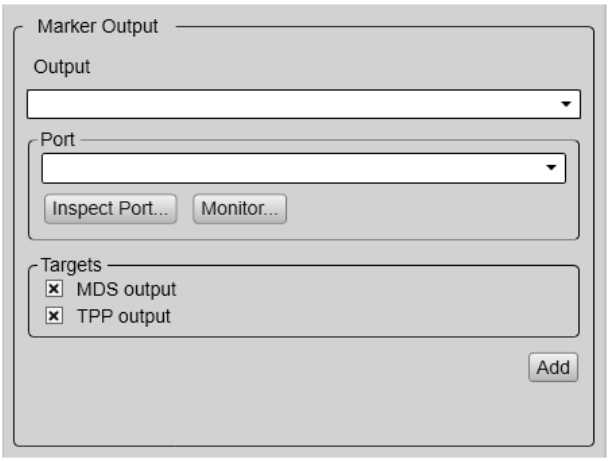
In this context, the phrase *marker* is used to identify a visual symbol placed in the display presentation. Placing a marker on an echo identifies the echo as "interesting". It is regarded as an *object* that you can act upon.

Further classification of this echo as a *target* must be done manually.

Select the output type from the list, and then where to save the files. Select **Add** to save your choices.

Once an output type has been defined, it is listed in the **Installed Outputs** box on the left side of the page. To remove or edit an output type, select it in the **Installed Outputs** box. Select **Edit** to change the settings. Select **Remove** to delete the output.

Details



Installed Outputs

The **Installed Outputs** box lists all the currently selected outputs. To remove or edit an output type, select it in the **Installed Outputs** box.

- Select **Remove** to delete the output.
- Select **Edit** to change the settings.
- Select **New** to add a new output.

Output

Select which marker type to export.

Port

Select the Ethernet port or serial port you want to use for the communication.

Inspect Port

Select **Inspect Port** to check the communication parameters for the port. The relevant port setup dialog box opens. You are not permitted to make any changes.

You cannot define the communication port parameters here. If you need to adjust these, you must select **I/O Setup** after you have defined the data output parameters. The **I/O Setup** page is located in the **Installation** and **Output** dialog boxes.

Monitor

Select **Monitor** to open the **Port Monitor** dialog box. The **Port Monitor** dialog box allows you to study the communication stream on the chosen serial line or local area network (LAN) port.

Targets

Select which datagram format(s) to export.

MDS (Measured Data Shoal)

Simrad MDS is a proprietary datagram format created by Kongsberg Discovery. It contains the location, bearing and depth of a tracked target. All information is presented relative to your own vessel. All data are related to the tracked target.

TPP (Tracked Target Position)

Simrad TPP is a proprietary datagram format created by Kongsberg Discovery. It exports the horizontal range, bearing and depth of a tracked target. All data are related to the tracked target.

Add

Select **Add** to allow export of the chosen data format. Once an output type has been defined, it is listed in the **Installed Outputs** box on the left side of the page. To start data recording, open the **Record Processed** button, and select *On*. Alternatively, simply select the red circle on the right side of the button.

Remove

Once an output type has been defined, it is listed in the **Installed Outputs** box on the left side of the page. To remove the output, select the relevant format under **Installed Outputs**, then select **Remove**.

Edit

Once an output type has been defined, it is listed in the **Installed Outputs** box on the left side of the page. To change the output settings, select the relevant format under **Installed Outputs**, then select **Edit**. Select **Save** to keep the changes you have made.

Save

Select **Save** to keep the changes you have made.

Related topics

Exporting sensor data, marker positions and technical information, page 180
Functions and dialog boxes, page 418
Operation menu: functions and dialog boxes, page 431
Output dialog box, page 439

Relay Output page

The CS90 system allows you to export the same sensor data that was originally imported. This can "reuse" the same information on other systems. The **Relay Output** page is used to set up and control this export functionality.

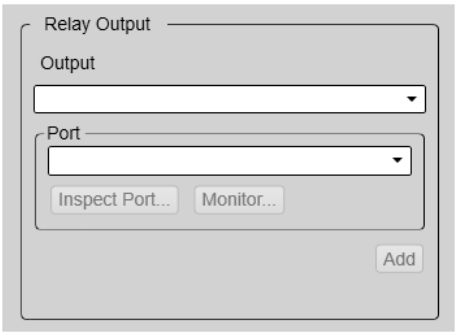
Prerequisites

The **Output** dialog box is not available when your CS90 system is set to *Inactive* mode.

How to open

This page is located in the **Output** dialog box. To open, select it on the **Operation** menu.

Description



The information imported to the CS90 system from various sensors can also be useful for other systems on board your vessel. The CS90 system allows you to "re-export" this sensor information. When activated, the selected sensor information is sent out on the chosen communication port (serial or LAN).

The following sensor data can be exported:

- Navigation
- Motion sensor

Once an output type has been defined, it is listed in the **Installed Outputs** box on the left side of the page. To see the relevant output parameters, select any output in the list. You can edit the output parameters, or delete the output format to stop the export.

> In this context, the phrase "sensor" is used to describe an external device providing information. This information is useful or essential for the operation of the CS90 system. Typical sensors are those providing navigational information (heading, speed or geographical position) or vessel movements in the sea (motion sensors).

You cannot define the communication port parameters here. If you need to adjust these, you must select **I/O Setup** after you have defined the data output parameters. The **I/O Setup** page is located in the **Installation** and **Output** dialog boxes.

Details

Installed Outputs

> The **Installed Outputs** box lists all the currently selected outputs. To remove or edit an output type, select it in the **Installed Outputs** box.
>
> - Select **Remove** to delete the output.
> - Select **Edit** to change the settings.
> - Select **New** to add a new output.

Output

> Select which information to export. The following sensor data can be exported:
>
> - Navigation
> - Motion sensor

Port

> Select the Ethernet port or serial port you want to use for the communication.

Inspect Port

> Select **Inspect Port** to check the communication parameters for the port. The relevant port setup dialog box opens. You are not permitted to make any changes.

You cannot define the communication port parameters here. If you need to adjust these, you must select **I/O Setup** after you have defined the data output parameters. The **I/O Setup** page is located in the **Installation** and **Output** dialog boxes.

Monitor

Select **Monitor** to open the **Port Monitor** dialog box. The **Port Monitor** dialog box allows you to study the communication stream on the chosen serial line or local area network (LAN) port.

Add

Select **Add** to start export of the chosen data format. Once an output type has been defined, it is listed in the **Installed Outputs** box on the left side of the page.

Remove

Once an output type has been defined, it is listed in the **Installed Outputs** box on the left side of the page. To remove the output, select the relevant format under **Installed Outputs**, then select **Remove**.

Edit

Once an output type has been defined, it is listed in the **Installed Outputs** box on the left side of the page. To change the output settings, select the relevant format under **Installed Outputs**, then select **Edit**. Select **Save** to keep the changes you have made.

Save

Select **Save** to keep the changes you have made.

Related topics

Exporting sensor data, marker positions and technical information, page 180
Functions and dialog boxes, page 418
Operation menu: functions and dialog boxes, page 431
Output dialog box, page 439

Screen Recording page

The **Screen Recording** function allows you to record and save the echo presentation as a video file. Use the **Screen Recording** page to define where the video files are saved.

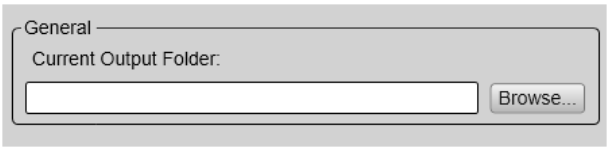
Prerequisites

The **Output** dialog box is not available when your CS90 system is set to *Inactive* mode.

How to open

This page is located in the **Output** dialog box. To open, select it on the **Operation** menu.

Description



Each screen recording you make is saved in `.mp4` format on the Processor Unit hard disk. The file name reflects the current date and time.

Tip

Select **Screen Recording** *on the top bar to start and stop the recording.*

Note

Video data files will normally become very large. If you wish to record large amounts of data, make sure that you have enough space on your hard disk. Unless your Processor Unit is equipped with a very large disk, we recommend that you save the data to an external storage device.

Everything that happens in the presentation is recorded. This includes echoes, menus, dialog boxes and cursor movements. Each screen recording you make is saved in `.mp4` format on the Processor Unit hard disk. The file name reflects the current date and time.

Tip

You can use a USB flash drive to save the video files. This must be a high quality device with very fast data access.

Related functionality

Screen Recording

Select **Screen Recording** on the top bar to start and stop the recording.

System Protection page (Installation dialog box)

The **Screen Recording** protection stops the recording automatically when the transducer is hoisted to its upper position. The **Timer** function stops the recording automatically when the specified time has elapsed. This page is located in the **Installation** dialog box. To open the page, select **Installation** on the **Setup** menu.

Operating Panel page (Installation dialog box)

The Operating Panel offers all necessary control functions for normal operation. It further allows you to assign certain functions to dedicated buttons and switches. The Mk2 Operating Panel is fitted with three function buttons. The Mk3 Operating Panel is fitted with two rotary switches. Each of these can be assigned a specific function.

Select **Screen Recording** to start and stop the recording from the Operating Panel.

This page is located in the **Installation** dialog box. To open the page, select **Installation** on the **Setup** menu.

Related topics

Capturing the display presentation in a video file, page 138
Selecting where to save the video files, page 138
Capturing the display presentation in image and video files, page 133
Screen Recording, page 292
Functions and dialog boxes, page 418
Operation menu: functions and dialog boxes, page 431
Output dialog box, page 439

Screen Captures File Location page

While using the CS90 system you may wish to make a screen capture to save an instantaneous copy of the current presentation. Use **Screen Capture File Location** to define where to save your screen captures.

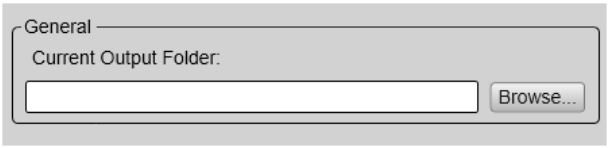
Prerequisites

The **Output** dialog box is not available when your CS90 system is set to *Inactive* mode.

How to open

This page is located in the **Output** dialog box. To open, select it on the **Operation** menu.

Description



Each screen capture you make is saved in `.jpg` format on the Processor Unit hard disk. Alternatively, you can use a USB flash drive or hard drive to save the screen captures. The file name reflects the current date and time.

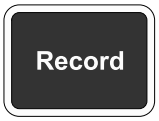
Select **Browse** to locate or create the desired folder.

Default folder:

`C:\Users\Public\Documents\Simrad\CS90\ScreenDumps`

Related functionality

Operating Panel (Mk1)



Press **Record** to make a screen capture.

Operating Panel (Mk2)

Press **Screen Capture** to make a copy of the current display presentation.

Operating Panel (Mk3)

Press **Screen Capture** to make a copy of the current display presentation.

Top bar

Select **Screen Capture** to make a copy of the entire display presentation.

Screen Captures dialog box

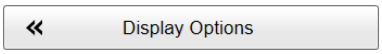
You can choose either a single screen capture or a sequence with multiple screen captures. This dialog box is opened from the **Setup** menu.

Related topics

Capturing the display presentation in image and video files, page 133
Screen Capture, page 293
Functions and dialog boxes, page 418
Operation menu: functions and dialog boxes, page 431
Output dialog box, page 439

Pages in the Display Options dialog box

The **Display Options** dialog box is used to specify basic settings for the sonar presentation.



How to open

This dialog box is opened from the **Display** menu.

Description

This dialog box contains a number of pages selected from the menu on the left side. The choices you make in the **Display Options** dialog box have no effect on the overall performance of the CS90 system.

Note

The information shown on the top bar must not be used for vessel navigation.

Topics

General page, page 537

Map Display page, page 540

Safety Depth page, page 541

Tooltip page, page 543

Own Ship page, page 544

Vertical View Orientation page, page 545

Off Centre page, page 545

Current Flow page, page 547

Cursor Readout page, page 548

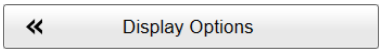
Presentation Modes page, page 551

General page

The **General** page in the **Display Options** dialog box controls the location of the menu. You can select which navigational information to be shown on the top bar. You can also choose to see Coordinated Universal Time (UTC) at the bottom of the presentation.

How to open

This page is located in the **Display Options** dialog box. The **Display Options** dialog box is located on the **Display** menu.

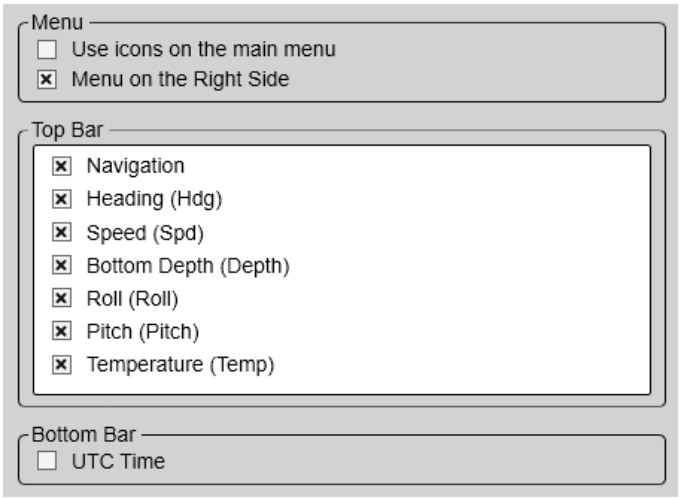


Description

The **General** page offers a range of "on/off switches". You use them to enable or disable the relevant functions.

Note

The information shown on the top bar must not be used for vessel navigation.



Details

Use icons on the main menu

Select this function to use icons instead of text on the **Main** menu.

Menu on the Right Side

Select this option to place the menu system on the right side of the display presentation. This is the default setting. By deselecting this function, the entire menu system is placed permanently on the left side of the display presentation.

Top Bar

The top bar is located at the top of the display presentation and stretches from the far left to the far right. By means of these check boxes, you can select which elements to be shown at the top of the presentation.

For each option, the text in brackets is the identification used on the top bar.

Navigation

Select this check box to see the vessel's current geographical position on the top bar. The position information must be provided by an external navigation system connected to the CS90 system.

Heading

Select this check box to see the vessel's current heading on the top bar. The heading information must be provided by an external positioning system, or by a heading sensor or gyro compass connected to the CS90 system.

You can set up datagram priorities for both heading and course information on the **Sensor Configuration** page. When enabled, the vessel's current heading is shown on the top bar. If the information from the heading sensor fails, the top bar will change to present the course information instead.

Speed

Select this check box to see the vessel's current speed on the top bar. The information must be provided by an external speed log or a navigation system connected to the CS90 system.

Bottom Depth

Select this check box to see the current water depth on the top bar. The information must be provided by an external depth sensor (echo sounder) connected to the CS90 system.

Roll

Select this check box to see the vessel's current roll movements on the top bar. The information must be provided by an external motion sensor (motion reference unit) connected to the CS90 system.

Pitch

Select this check box to see the vessel's current pitch movements on the top bar. The information must be provided by an external motion sensor (motion reference unit) connected to the CS90 system.

Temperature

Select this check box to see the current temperature on the top bar. The information must be provided by an external temperature sensor connected to the CS90 system.

Bottom Bar

UTC Time: Check the box to use Coordinated Universal Time (UTC). The time is shown on the bottom bar at the bottom of the display presentation. When disabled, the CS90 system uses local time.

Note

To enable UTC time, your CS90 system must be set up to accept the NMEA ZDA datagram. The NMEA ZDA datagram contains the universal time code (UTC), day, month, year and local time zone.

Coordinated Universal Time (French: Temps Universel Coordonné, UTC) is the primary time standard by which the world regulates clocks and time. It is one of several closely related successors to Greenwich Mean Time (GMT).

> For most purposes, UTC is used interchangeably with GMT, but GMT is no longer precisely defined by the scientific community. [...]
>
> The current version of UTC is defined by International Telecommunications Union Recommendation (ITU-R TF.460-6), Standard-frequency and time-signal emissions and is based on International Atomic Time (TAI) with leap seconds added at irregular intervals to compensate for the slowing of Earth's rotation. Leap seconds keep UTC within 0.9 seconds of universal time, UT1.
>
> *Wikipedia, Copied June 2014*

Related functionality

Top bar

The top bar is located at the top of the display presentation and stretches from the far left to the far right.The top bar gives you fast access to key functionality and navigational information.It provides buttons for hiding and showing the menu, making screen captures, opening the **Messages** dialog box, and opening context-sensitive help.

Menu

Unless you need to make frequent changes to the operating parameters, you may want to hide the menu from the display presentation. This gives you more space for echo information. To hide the menu, select **Menu** on the top bar. To retrieve the menu, select **Menu** one more time. When the menu is hidden, it is temporarily shown on the left or right side of the display presentation if you move the cursor to that position.

Navigational information

The navigational information is located in the middle of the top bar. These fields are separate read-outs. They present information related to the navigation of the vessel and operation of the CS90 system. The information shown on the top bar must not be used for vessel navigation.

Bottom bar

The bottom bar is located at the bottom of the display presentation and stretches from the left side to the right side. The tabs on the bottom bar allow you to choose presentation mode. The bottom bar is available all the time.

Related topics

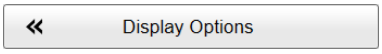
Defining settings related to user preferences and individual customizing, page 154
Menu, page 291
Navigational information, page 298
Bottom bar, page 377
Functions and dialog boxes, page 418
Display menu: functions and dialog boxes, page 442
Display Options dialog box, page 450

Map Display page

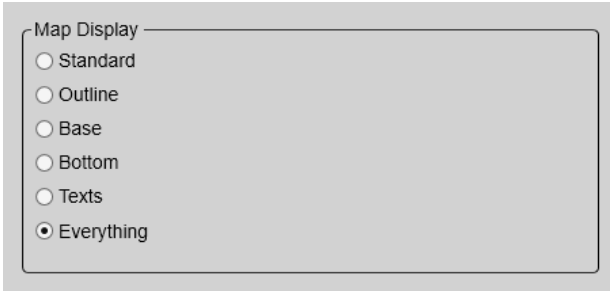
Once a map service has been chosen, use **Map Display** to choose which map elements to include in the map presentation.

How to open

This page is located in the **Display Options** dialog box. The **Display Options** dialog box is located on the **Display** menu.



Description



Select which map elements you want to include. These map settings are only valid for WMS (Web Map Service) maps from a KONGSBERG navigation system.

> A Web Map Service (WMS) is a standard protocol developed by the Open Geospatial Consortium in 1999 for serving georeferenced map images over the Internet. These images are typically produced by a map server from data provided by a GIS database. [] A WMS server usually serves the map in a bitmap format, e.g. PNG, GIF, JPEG, etc. In addition, vector graphics can be included, such as points, lines, curves and text, expressed in SVG or WebCGM format.
>
> *https://en.wikipedia.org/wiki/Web_Map_Service, June 2021*

Note

The map is only shown in Horizontal views when **Range Projection** *is set to True.*

Related functionality

Map function

This is an "on/off" switch. Use **Map** to enable or disable the geographical map layer. This function is opened from the **Cosmetics** menu.

Safety Depth page

The **Safety Depth** page allows you to change the safety depth settings, and thus the presentation of the various water depths.

Map Setup page

If you want to add a map to the display presentation you must first select a *map provider*. Use the **Map Setup** page to choose a map provider and to enter necessary provider URL, API Key or license. This page is located in the **Installation** dialog box. The **Installation** dialog box is located on the **Setup** menu.

Range Projection function

The distance to a target located anywhere in the water column can be measured in two ways. This can either be the horizontal distance to the target (*True*), or along the tilt angle (*Slant*). The **Range Projection** function defines how this distance is measured. This function is opened from the **Active** menu.

Related topics

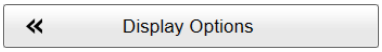
Using maps, page 150
Functions and dialog boxes, page 418
Display menu: functions and dialog boxes, page 442
Display Options dialog box, page 450
Cosmetics menu, page 411
Safety Depth page, page 541
Map Setup page, page 613

Safety Depth page

Once a map service has been chosen, use **Map Display** to choose which map elements to include in the map presentation. The **Safety Depth** page allows you to change the safety depth settings, and thus the presentation of the various water depths.

How to open

This page is located in the **Display Options** dialog box. The **Display Options** dialog box is located on the **Display** menu.

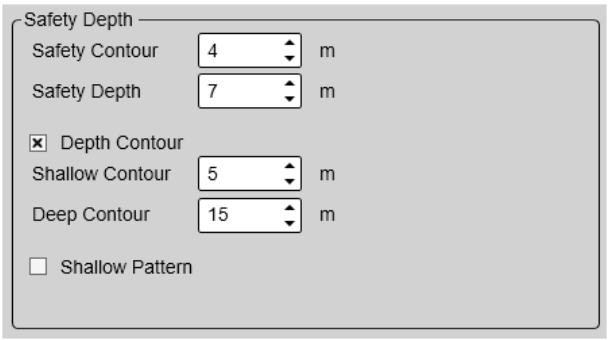


Description

Once a map is projected on top of the echo data, the depth contour lines are drawn with specific colours.

Note

The map is only shown in Horizontal views when **Range Projection** *is set to True.*



Details

Safety Contour

The **Safety Contour** function specifies and shows a safety contour line. The line is marked with depth values at regular intervals. The area inside the safety contour line is marked with a light blue colour to indicate unsafe waters. If the map does not have a contour for the depth value you have specified, the nearest contour with

a *larger* absolute depth value is shown. This contour line will not be marked with depth values. This contour will instead be shown with a thick black line.

Safety Depth

This function specifies the limit for highlighting single depth values. Black colour is used. All depth values indicating *deeper* water than the specified safety depth are shown with grey colour.

Depth Contour

Select **Depth Contour** to allow shallow and deep contours to be drawn.

Shallow Contour

The **Shallow Contour** function specifies and shows a shallow contour line. The line is marked with depth values at regular intervals. If the map does not have a contour for the depth value you have specified, the nearest contour with a *larger* absolute depth value is shown. The area inside this contour line is shown with a dark blue colour.

Deep Contour

The **Deep Contour** function specifies and shows a deep contour line. The line is marked with depth values at regular intervals. If the map does not have a contour for the depth value you have specified, the nearest contour with a *larger* absolute depth value is shown. This contour line will not be marked with depth values. The area inside this contour line is marked with darker colours than outside.

Shallow Pattern

Select **Shallow Pattern** to present the area inside the safety contour line with a hatched (or shaded) pattern.

Related functionality

Map Display page

Once a map service has been chosen, use **Map Display** to choose which map elements to include in the map presentation. These map settings are only valid for WMS (Web Map Service) maps from a KONGSBERG navigation system.

Map function

This is an "on/off" switch. Use **Map** to enable or disable the geographical map layer. This function is opened from the **Cosmetics** menu.

Map Setup page

If you want to add a map to the display presentation you must first select a *map provider*. Use the **Map Setup** page to choose a map provider and to enter necessary provider URL, API Key or license. This page is located in the **Installation** dialog box. The **Installation** dialog box is located on the **Setup** menu.

Range Projection function

The distance to a target located anywhere in the water column can be measured in two ways. This can either be the horizontal distance to the target (*True*), or along

the tilt angle (*Slant*). The **Range Projection** function defines how this distance is measured. This function is opened from the **Active** menu.

Related topics

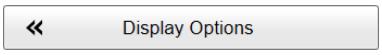
Using maps, page 150
Functions and dialog boxes, page 418
Display menu: functions and dialog boxes, page 442
Display Options dialog box, page 450
Cosmetics menu, page 411
Motion function, page 444
Map Display page, page 540
Map Setup page, page 613

Tooltip page

When you move the cursor over the echo data in the *Echogram* and *Inspection* views, small "tooltips" are shown to provide additional information. The **Tooltip** page controls which tooltips that are shown.

How to open

This page is located in the **Display Options** dialog box. The **Display Options** dialog box is located on the **Display** menu.



Description

Several tooltips can be shown in the sonar presentation. When a tooltip is enabled, the cursor location is detected and a small information box is shown. By default, the information is related to the exact position of the cursor. Each tooltip represents a specific piece of information, and they are listed separately.

The **Tooltip** page offers a range of "on/off switches". Each tooltip is presented in the list, and you can enable or disable each of them independently.

Select a box to activate or deactivate the corresponding tooltip.

Note

The information provided for noise shows you the noise reading for the latest ping independent of the cursor's location.

Related topics

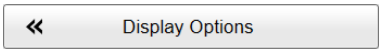
Functions and dialog boxes, page 418
Display menu: functions and dialog boxes, page 442
Display Options dialog box, page 450

Own Ship page

In order to maintain a visual presentation of your vessel's previous movements, you can draw these with a line. This line is drawn after the vessel symbol in the sonar views, and visualizes your past movements. We refer to this line as the *History Line*.

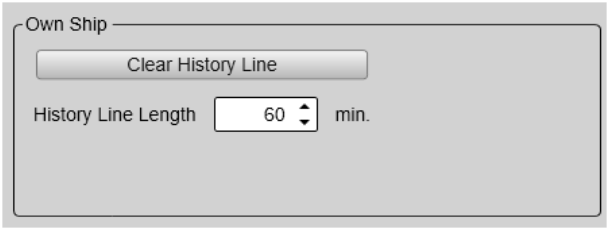
How to open

This page is located in the **Display Options** dialog box. The **Display Options** dialog box is located on the **Display** menu.



Description

The history line shows you the historic movements of your own ship. The line is drawn after the vessel symbol. When the history line is active, the length (in minutes) of the line can be defined.



- Select **Clear History Line** to delete the current line.
- Set **History Line Length** to a value that meets your preferences.
- Set **History Line Length** to 0 (zero) to disable the history line.

Related functionality

Minute Markers

The **Minute Markers** function adds markers to the history line. These markers indicate how far you have sailed in the last few minutes. The minute markers are shown as small circles on the history line. The **Minute Markers** function is located on the **Visual Objects** menu.

Related topics

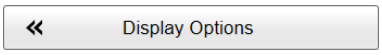
Functions and dialog boxes, page 418
Display menu: functions and dialog boxes, page 442
Display Options dialog box, page 450

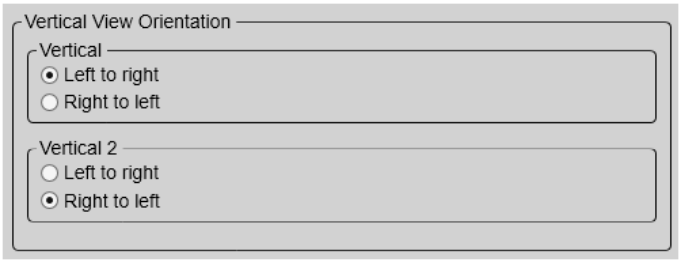
Vertical View Orientation page

The **Vertical View Orientation** page allows you to decide whether the vertical views should be presented from right to left, or from left to right.

How to open

This page is located in the **Display Options** dialog box. The **Display Options** dialog box is located on the **Display** menu.





Description

Each *Vertical* view shows you a "vertical slice" of the echo data. The upper horizontal line in the view represents the water surface. The current tilt is shown with a solid line. The **Cosmetics** menu controls which "cosmetic" features that used.

By default, the vertical views have the transducer located in the upper left corner of the view. The presentation is made from left towards right. If you wish to change the direction of the presentation, make the appropriate choice on this page.

Certain presentation modes provide more than one vertical view. You can then set up these views individually.

Related topics

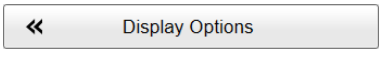
Functions and dialog boxes, page 418
Display menu: functions and dialog boxes, page 442
Display Options dialog box, page 450

Off Centre page

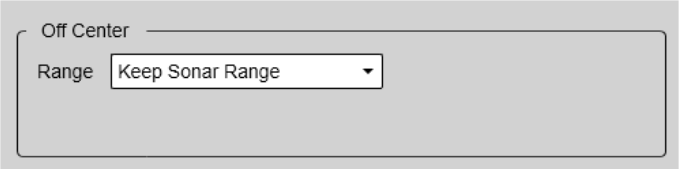
When the vessel symbol is moved away from the centre of the view, more space is made available for the echo presentations. If you keep the same range setting, this added space causes a "zoom" effect. The distance from the vessel to the outer edge of the search area is the same, but it is "stretched" out. You may not want this to happen.

How to open

This page is located in the **Display Options** dialog box. The **Display Options** dialog box is located on the **Display** menu.



Description



The **Set New Ship Centre** function on the shortcut menu moves the ship symbol away from the centre of the view. Place the cursor anywhere in the view, right-click and select **Set New Ship Centre**. The function moves the vessel symbol to the selected position.

The **Off Centre** page allows you to specify the range behaviour when the vessel symbol is moved away from the centre of the view.

Keep Display Range

The range from the vessel symbol to the outer edge of the search area is automatically adjusted in order to keep the scale of the presentation and avoid the "zoom" effect. The value on the **Main** menu is changed accordingly.

Keep Sonar Range

The currently selected range value on the **Main** menu is kept. The distance from the vessel to the outer edge of the search area is the same, but it is "stretched" out.

Tip

The Mk2 Operating Panel is fitted with three function buttons. The buttons are identified as **F1**, **F2** *and* **F3**. *Each button can be assigned a dedicated function.* **Off Centre** *is one of the functions that can be assigned. This is the same function as* **Set New Ship Centre** *on the shortcut menu. Place the cursor anywhere in the view and press the button. The function moves the vessel symbol to the selected position.*

The Mk1 Operating Panel offers a dedicated **Off Centre** *button. (The Mk1 Operating Panel is no longer provided with new sonars. This information is provided for legacy reasons.)*

Related functionality

Set New Ship Centre

Place the cursor anywhere in the view, right-click and select **Set New Ship Centre**. The function moves the vessel symbol to the selected position. This function is available on the shortcut menu in relevant views.

Reset Ship Centre

This function is useful when you need to "reset" the view after using the **Set New Ship Centre** or **Zoom** functions. Right-click and **Reset Ship Centre** to move the vessel symbol to the centre of the presentation. This function is available on the shortcut menu in relevant views.

Ship To Centre

Select **Ship to Centre** to move the own ship symbol back to the centre of the view. This function is typically used when you have used the **Set New Ship Centre**

function to move the ship symbol away from the centre of the view. This function is available on the shortcut menu in relevant views.

Related topics

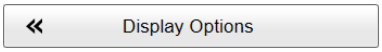
Functions and dialog boxes, page 418
Display menu: functions and dialog boxes, page 442
Display Options dialog box, page 450

Current Flow page

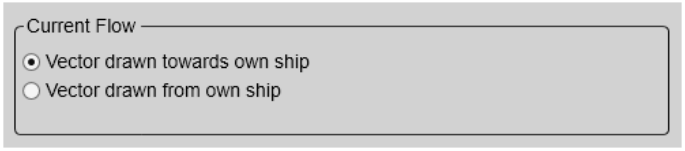
A current sensor can be connected to the CS90 system. This can for example be an acoustic Doppler current profiler (ADCP). The information from this sensor is presented in the applicable views. Use the **Current Flow** page to define key settings for the presentation of the sensor data.

How to open

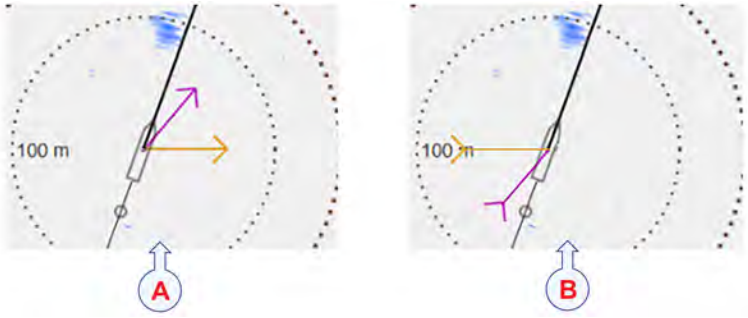
This page is located in the **Display Options** dialog box. The **Display Options** dialog box is located on the **Display** menu.



Description



The data from the current sensor are presented in the relevant views using text and arrows. Multiple arrows are used if the sensor presents information from more than one layer. The **Current Flow** page allows you how to present the direction of the sea current.



A **To**

B **From**: Use this setting to present the direction from which the ocean current is coming. Observe the inverted arrows.

Tip

The **Current Vector** *function shows you the speed and direction of the water current under your vessel. One or more arrow are drawn to or from the vessel symbol to indicate the properties of the sea currents. The direction of the arrows indicate the direction of the water currents. The length of the arrows reflects their speeds. The* **Current Vector** *function is located on the* **Visual Objects** *menu.*

A numerical readout of the current vector data is provided in the top right corner of the *Horizontal* view.

Related topics

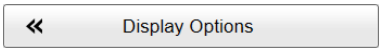
Defining the visual information in the sonar views, page 146
Functions and dialog boxes, page 418
Display menu: functions and dialog boxes, page 442
Display Options dialog box, page 450

Cursor Readout page

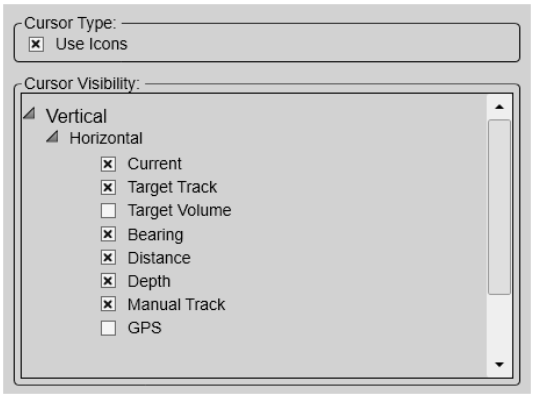
It is often helpful to see information about the cursor and the active markers in the view. Use the **Cursor Readout** functionality to add information to the readout fields in the bottom corners of the view. When enabled, you can see the cursor's position (bearing and distance) and depth in the lower right corner of the view. The depth is calculated from the current tilt and the distance from the vessel. You can also place information about a tracked target or a priority marker in the bottom left corner of the view.

How to open

This page is located in the **Display Options** dialog box. The **Display Options** dialog box is located on the **Display** menu.



Description



All the presentation modes are listed. Open a presentation mode to find a list of all the views it supports. Open a view to select which information to see in the readout fields.

The following information can be provided:

Left side

- Information about the priority marker
- Information about the tracked target

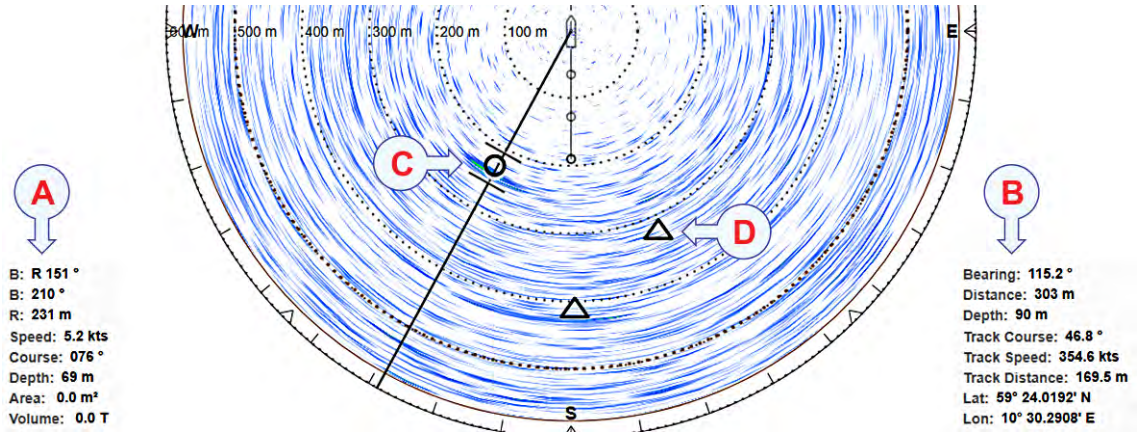
Right side

- Information about the cursor
- Information about the markers

If you think the text is small and hard to read, double-click on the text field. This will increase the text size.

Note

The views are "linked" together. If you, for example, enable Depth in one Horizontal view, it appears automatically in all other Horizontal views in the different presentation modes.



A *Tracked target information / Priority marker information*

B *Cursor information / Manual track information*

C *The tracked target is regarded as an object, and it is identified with a circle and two lines. The two lines reflect the size of the current tracking area.*

D *Marker*

The following information can be provided:

Current

A current sensor can be connected to the CS90 system. This can for example be an acoustic Doppler current profiler (ADCP). You can read the numerical value of the water current's velocity (the vector information) in the view's bottom right corner.

Target Track

Select **Target Track** to present relevant information about a tracked target or priority object. You can see this information in the bottom left corner of the view. The bearing and range values are relative to your vessel.

- Bearing (The value relates to the ship's heading.)
- Bearing
- Range

- Speed
- Course
- Depth

A target track permits the CS90 system to automatically control the tilt and bearing based on the movements of the chosen target. It locks on the target defined by its position, heading and speed. The bearing and tilt settings are automatically adjusted to follow the movements of the tracked target. The tracked target is regarded as an *object*, and it is identified with a circle and two lines. The two lines reflect the size of the current tracking area. By default, a new manually initiated tracked object is automatically given priority status. The bearing line is automatically locked on the object to reflects its bearing.

Target Volume

Select **Target Volume** to present calculated area and volume of a tracked target or priority object. You can see this information in the bottom left corner of the view.

- Area
- Volume

Bearing / Distance / Depth

The position (bearing and distance) and depth of the cursor's location is shown in the lower right corner of the view. The depth is calculated from the current tilt and the distance from the vessel.

Manual Track

You can start manual tracking by placing multiple markers on a target echo that moves in the view. One or more markers can be placed in the view to identify specific echoes.Each marker is shown as a small triangle with or without a short identifying label. You can see the latest marker's course and speed in the view's lower right corner. The values are calculated based on the last two markers you created and the time between them.

1 Place the cursor on the object you wish to be marked.

2 Right-click and select **Place Marker** on the shortcut menu.

3 Create a new marker.

The **Track Course**, **Track Speed**, and **Track Distance** values offered now relate to the *previous* marker you created. The physical location of the individual markers and the specific information provided for the latest marker show you the historical path of the chosen target.

Tip

Once an echo has been provided with a marker in the display presentation it is regarded as an object. The **Objects** *menu provides a list of all current objects. This includes all types of objects including those classified as targets.*

GPS (Global Positioning System)

Select **GPS** to see the cursor's geographic position.

Related topics

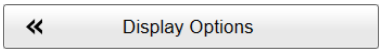
Setting up presentation modes and views, page 140
Functions and dialog boxes, page 418
Display menu: functions and dialog boxes, page 442
Display Options dialog box, page 450

Presentation Modes page

All echoes offered by the CS90 system are shown in rectangular *views*. Combinations of these views are organized in *presentation modes*. Each presentation mode offered by the CS90 system provides a selection of views in a predefined pattern. To open a presentation mode use the relevant tab on the bottom bar. Use the functionality offered by the **Presentation Mode** page to choose which presentation modes to choose from.

How to open

This page is located in the **Display Options** dialog box. The **Display Options** dialog box is located on the **Display** menu.

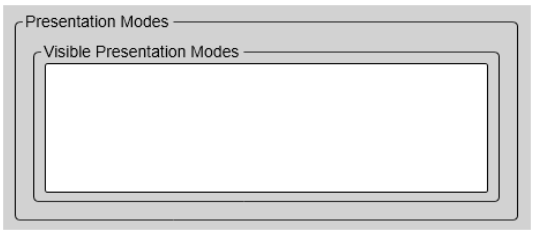


Description

The various views provide the graphical presentation of the sonar data. To provide the best possible visualization of the sonar data, several presentation modes are available. Together, these modes offer a flexible choice of views for a large range of user applications.

The phrase *presentation mode* is used to describe the combination of views that are shown when the mode is selected at the bottom of the display presentation.

The tabs on the bottom bar allow you to choose presentation mode. If you have many presentation modes on a small display, two small arrows appear on the left side of the bottom bar. You can use these arrows to scroll the bottom bar sideways.



Use the functionality offered by the **Presentation Mode** page to choose which presentation modes to choose from. This can be useful for several reasons:

- A small display monitor may not be able to show you all the presentation mode tabs.
- You don't need to scroll.
- You can hide the presentation modes that you hardly or never use.

All the presentation modes are listed. Each of these appears as a tab on the bottom bar. Select which presentation modes to choose from.

Related topics

Setting up presentation modes and views, page 140
Bottom bar, page 377
Functions and dialog boxes, page 418
Display menu: functions and dialog boxes, page 442
Display Options dialog box, page 450

Pages in the Environment dialog box

Environmental parameters such as salinity, sound speed and water temperature all play an important part to present accurate echo data. Use the **Environment** parameters to define these values. Depending on the current sea and weather conditions, you may need to change these values frequently.

How to open

This dialog box is opened from the **Setup** menu.

Description

You must correctly set the sound speed through the water to obtain accurate depth readings and fish echoes. Several parameters are required to calculate the correct sound speed value. If these parameters are unknown, use the default value of 1494 m/s. This is a typical mean value for sound speed in salt water.

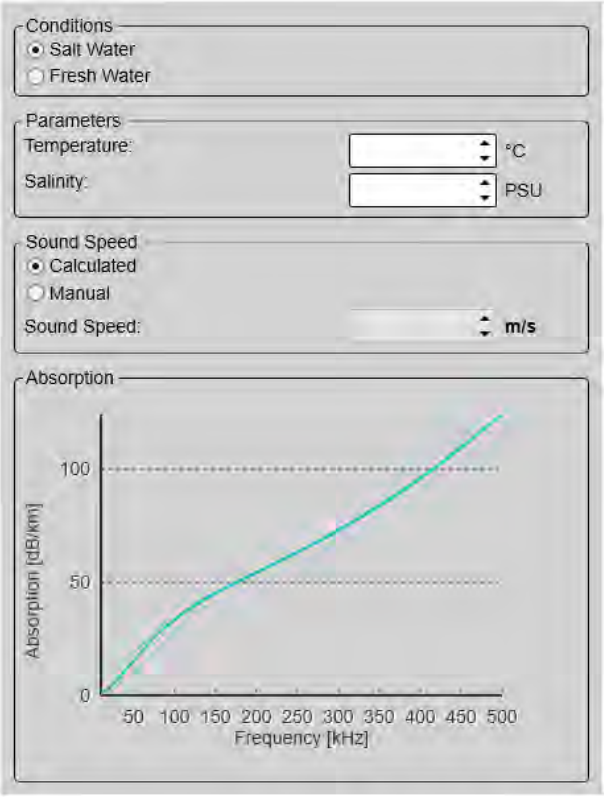
Water Column page

To achieve correct echo information, the current environmental parameters must be known to the CS90 system. The **Water Column** page collects these parameters. These must be defined to match the current conditions.

This page is opened from the **Environment** dialog box. The **Environment** dialog box is opened from the **Setup** menu.

Description

You must correctly set the sound speed through the water to obtain accurate depth readings and fish echoes. Several parameters are required to calculate the correct sound speed value. If these parameters are unknown, use the default value of 1494 m/s. This is a typical mean value for sound speed in salt water.



Details

Conditions

Use these settings to set up the CS90 system for operation in fresh or salt water.

Sound travels at different speeds in salt and fresh water. For this reason, the CS90 system must know your water profile. The default setting is *Salt*.

Parameters

Use these settings to provide manual values.

Freshwater/saltwater settings, temperature, salinity, acidity, depth, and operating frequency are all used to calculate absorption.

Temperature

Specify the water temperature. Once the salinity and temperature information is provided, the CS90 system calculates the sound speed and absorption.

Salinity

Provide the current salinity. Once the salinity and temperature information is provided, the CS90 system calculates the sound speed and absorption.

Sound Speed

You must correctly set the sound speed through the water to obtain accurate depth readings and fish echoes.

Calculated

Select **Calculated** to allow the CS90 to calculate the sound speed and absorption based on your supplied parameters (frequency, salinity, acidity sound speed, and water temperature).

Manual

Select **Manual** to provide a sound speed value manually. A value provided manually can be relevant if neither a sound speed sensor nor a CTD (Conductivity Temperature Depth) sensor is available.

Absorption

The absorption curve is calculated and drawn using the parameters provided.

Related topics

Defining settings related to user preferences and individual customizing, page 154
Functions and dialog boxes, page 418
Setup menu: functions and dialog boxes, page 454
Environment dialog box, page 458

Pages in the Diagnostics dialog box

The CS90 system is a computerized sonar. There are hardly any analogue circuitry, and the possibility of traditional troubleshooting is limited. In order to rectify this, a built-in software application is available to offer test and maintenance functionality. The **Diagnostics** dialog box controls the test and diagnose application that checks the performance of the CS90 system.

How to open

This dialog box is opened from the **Setup** menu.

Description

By means of the **Diagnostics** functionality, you can easily determine if the hardware components in the CS90 system are operational. And most important, you can make sure that all the transceivers channels and transducer elements are functional. To open the different pages in the dialog box, use the large "buttons" on the left hand side.

Each button provides a small colour coded indicator.

- **No indicator**: Status is OK. No actions are necessary.
- **Yellow**: This is a warning. A closer investigation is recommended.
- **Red**: This is an alarm. A closer investigation is required.
- **Blue**: A device monitored by the diagnostic system is disabled.
- **Grey**: No information is available.

Note

The **Diagnostics** *dialog box and functionality is only provided for performance monitoring. The functionality offered by the dialog box is not required for normal use of the CS90 system. The dialog box does not permit you to change any operational settings.*

The **Diagnostics** dialog box offers several pages.

Topics

Processor page, page 557

Sensors page, page 559

Transceiver page, page 560

Transducer page, page 561

Noise page, page 564

Hull Unit page, page 566

Element BITE dialog box, page 567

B-Scan page, page 568

Matrix page, page 571

Processor page

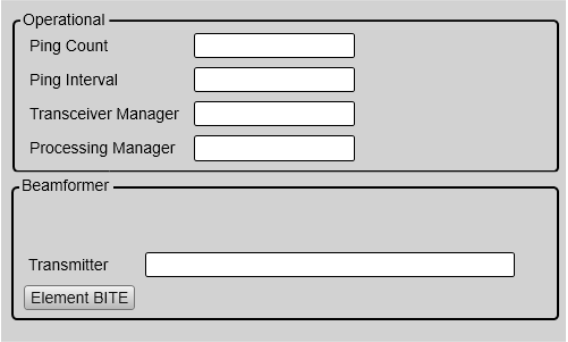
The **Processor** page offers an overview of the parameters related to software version, operation and network.

How to open

This page is located in the **Diagnostics** dialog box.

Open the **Diagnostics** dialog box from the **Setup** menu.

Description



The information on the **Processor** page is offered in groups.

Operation

These boxes provide generic information related to the operating parameters.

Beamformer

These boxes provide information related to the beamforming process.

Beamforming or *spatial filtering* is a signal processing technique used in sensor arrays for directional signal transmission or reception. This is achieved by combining elements in an antenna array in such a way that signals at particular angles experience constructive interference while others experience destructive interference. Beamforming can be used at both the transmitting and receiving ends in order to achieve spatial selectivity. The improvement compared with omnidirectional reception/transmission is known as the *directivity* of the array.

Beamforming can be used for radio or sound waves. It has found numerous applications in radar, sonar, seismology, wireless communications, radio astronomy, acoustics and biomedicine.

https://en.wikipedia.org/wiki/Beamforming (November 2020)

Details

Operation

These boxes provide generic information related to the operating parameters.

Ping Count

: The **Ping Count** value is simply a consecutive count of transmissions ("pings") since the CS90 system was turned on and activated.

Ping Interval

The *ping interval* (1/ping repetition frequency (PRF)) is the ping rate measured in time between each acoustic transmission.

The phrase *ping rate* is used to describe the parameter that controls how often the CS90 system can or shall transmit acoustic energy (a "ping") into the water. The ping rate is normally limited by the maximum range settings. It also depends on hardware limitations. This may be, for example, how fast your CS90 system can handle the information from each ping, how fast it communicates with external peripherals, or how long time it uses to save data.

Transceiver Manager

This function offers specific status information for service engineers.

Processing Manager

This function offers specific status information for service engineers.

Beamformer

This field offers information related to the operating status of the beamforming process, as well as the status of the signal processing and digital beamforming of the transmitter channels. The information is provided for service engineers.

Transmitter

The **Transmitter** read-out offers the current operating status of the transmitter circuitry. The information is provided for service engineers.

Element BITE

Select this button to open a dedicated dialog box. The purpose of the **Element BITE** (Element Built-In Test Equipment) dialog box is to allow on-line test and verification of the individual elements in the transducer.

Related topics

Testing the noise conditions and the sonar functionality, page 247
Functions and dialog boxes, page 418
Setup menu: functions and dialog boxes, page 454
Diagnostics dialog box, page 464
Element BITE dialog box, page 567
B-Scan page, page 568
Matrix page, page 571

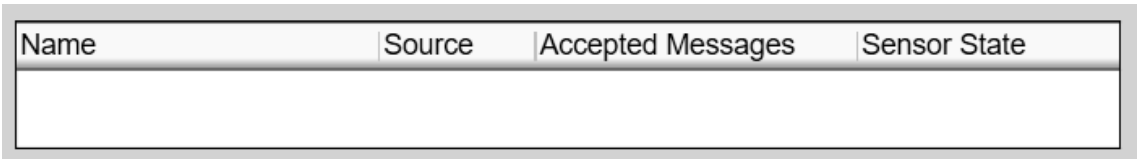
Sensors page

The **Sensors** page presents a table with all the sensors currently connected to the CS90 system. For each sensor, the status is provided.

How to open

This page is located in the **Diagnostics** dialog box.

Open the **Diagnostics** dialog box from the **Setup** menu.



Description

For the CS90 system to use and offer correct navigational information, one or more external sensors must be connected. Typical sensors are those providing navigational information (heading, speed or geographical position). A motion sensor (motion reference unit) can also be connected.

Each sensor connected to the CS90 system for input or output purposes is listed. All relevant status information is provided.

Tip

Use the **Sensor Installation** *page to define which external sensors your CS90 system will import information from. The* **Sensor Installation** *page is located in the* **Installation** *dialog box. The* **Installation** *dialog box is located on the* **Setup** *menu.*

The **Sensor Configuration** *page allows you to define a datagram priority, so that the information from the "most reliable" sensor is used by the CS90 system. You can also define manual values in case a sensor is unserviceable, or not installed. The* **Sensor Configuration** *page is located in the* **Installation** *dialog box.*

The **I/O Setup** *settings allow you to control the properties of each of the available communication ports. The* **I/O Setup** *page is located in the* **Installation** *and* **Output** *dialog boxes.*

Related topics

Testing the noise conditions and the sonar functionality, page 247
Functions and dialog boxes, page 418
Setup menu: functions and dialog boxes, page 454
Diagnostics dialog box, page 464

Transceiver page

The **Transceiver** page offers key information about each transceiver board in the Transceiver Unit.

The purpose of the transceiver boards is to first create and transmit the acoustic pulses. After the transmission the transceiver boards receive the echoes from the seabed and/or the water column. These echoes are filtered, amplified and finally converted into digital format. This transmission and reception sequence is commonly referred to as a *ping*.

How to open

This page is located in the **Diagnostics** dialog box.

Open the **Diagnostics** dialog box from the **Setup** menu.

Description

The **Transceiver** page provides a graphic presentation of the transceiver boards. The visual presentation reflects the physical location of the boards in the Transceiver Unit. Only static information is provided. The **Board Information** parameters offer key information about the supply power to the selected transceiver board, as well as the environmental conditions.

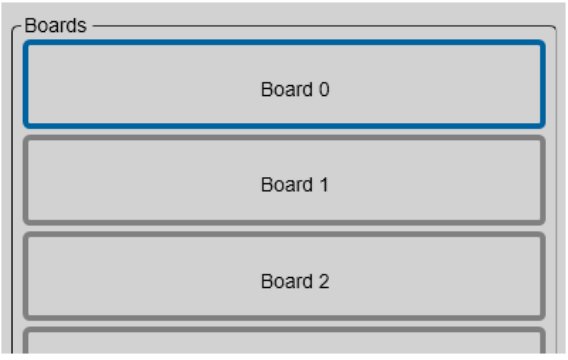
Note

The **Diagnostics** *dialog box and functionality is only provided for performance monitoring. The functionality offered by the dialog box is not required for normal use of the CS90 system. The dialog box does not permit you to change any operational settings.*

Details

Boards

A graphic presentation of the transceiver boards is provided. The visual presentation reflects the physical location of the boards in the Transceiver Unit.



To select a transceiver board, click the "button". Relevant information about the selected transceiver board is provided under **Board Information**.

To disable or enable a transceiver board, right-click the "button" and use the short-cut menu.

Tip

Disabling a transceiver circuit board can be useful for a number of reasons.

- *A circuit board is missing.*

  The CS90 system starts up even if transceiver boards are malfunctioning. The system will then need more time to finish the start-up sequence, and a short message will be provided.

- *A circuit board is creating a lot of noise.*

Each button provides a small colour coded indicator.

- **No indicator**: Status is OK. No actions are necessary.
- **Yellow**: This is a warning. A closer investigation is recommended.
- **Red**: This is an alarm. A closer investigation is required.
- **Blue**: A device monitored by the diagnostic system is disabled.
- **Grey**: No information is available.

Board Information

The **Board Information** parameters offer key information about the supply power to the selected transceiver board, as well as the environmental conditions.

The text field contains software versions and other information related to the firmware on the board. This information is not useful for normal operation, but may be useful in a troubleshooting situation.

Power Status

The **Power Status** parameters present information about the common supply voltages to all the transceiver boards in the Transceiver Unit. It also shows you the current position of the service switch on the power supply module.

Related topics

Testing the noise conditions and the sonar functionality, page 247
Functions and dialog boxes, page 418
Setup menu: functions and dialog boxes, page 454
Diagnostics dialog box, page 464

Transducer page

Use the **Transducer** page to do a reception test to check the individual transducer elements. Any errors are then easily detected.

How to open

This page is located in the **Diagnostics** dialog box.

Open the **Diagnostics** dialog box from the **Setup** menu.

Description

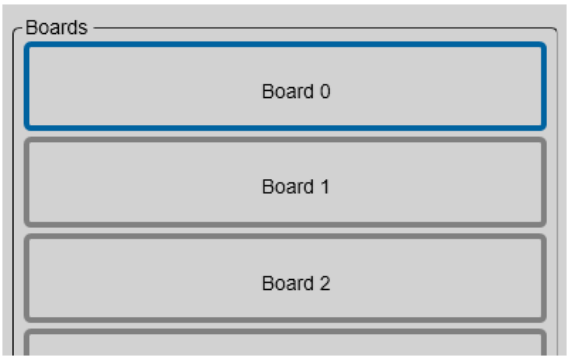
The **Transducer** page presents all the elements that are used in the transducer. The presentation attempts to organize the elements in the same manner as in the physical transducer.

The transceiver boards are shown as "buttons". Select a transceiver board to highlight the elements that are physically connected to the board.

Details

Boards

A graphic presentation of the transceiver boards is provided. The visual presentation reflects the physical location of the boards in the Transceiver Unit.



To select a transceiver board, click the "button". The corresponding transducer elements are identified.

Each button provides a small colour coded indicator.

- No indicator: Status is OK. No actions are necessary.
- Yellow: This is a warning. A closer investigation is recommended.
- Red: This is an alarm. A closer investigation is required.
- Blue: A device monitored by the diagnostic system is disabled.
- Grey: No information is available.

Transducer Elements

Each of the individual elements in the transducer is shown in a grid. The presentation attempts to organize the elements in the same manner as in the physical transducer.

Individual transducer elements may be disabled or enabled. To do this, right-click on the corresponding rectangle, and use the short-cut menu. A disabled element is shown with a blue rectangle.

Disabling a single transducer element can be useful for a number of reasons.

- An element is weak or simply unserviceable.
- An element is creating a lot of noise.

Reception Test

Select **Reception Test** to start an automatic test of the individual transducer elements. For the test to start, the CS90 system must be "pinging".

The reception test validates each single element in the transducer, and returns the status using a simple colour code.

- **Green**: The transducer element is fully operational.
- **Red**: The transducer element offers reduced performance.
- **Black**: The transducer element is not working ("dead").

For more information, observe the tooltip provided for each element rectangle.

A small number of unserviceable transducer elements are accepted, even for operational use. This is regarded as "graceful degradation". The CS90 system offers a large number of transceiver channels. 16 identical transceiver boards are used. If a single channel fails during normal operation, you are not likely to detect it. Even if several channels fail, you may not see it.

The detection of a faulty channel depends on the physical location of the relevant transducer element. If faulty channels are grouped together on the transducer face, this may cause a visible defect in the display presentation. If they are scattered, the visible defect may be a lot harder to see. In all cases, the echoes from the neighbouring channels cause an interpolation that will restore a lot of the degraded presentation.

Which actions to take if single channels fail depend on the operational impact, the overall performance of the CS90 system, and a cost/benefit assessment. The most important factor in the cost/benefit assessment is whether you need to replace the transducer, or just a single transceiver board. If more than 3% of your transducer elements have failed, we recommend that you contact your dealer for advice.

Note

For further investigations of this issue, use the functionality offered by the **Element BITE** *(Element Built In Test Equipment) dialog box.*

Related topics

Testing the noise conditions and the sonar functionality, page 247
Functions and dialog boxes, page 418
Setup menu: functions and dialog boxes, page 454
Diagnostics dialog box, page 464

Noise page

The operational performance of the CS90 system depends on the noise conditions. It is essential that the noise signature is as low as possible. Use the **Noise** page to test the current noise conditions.

How to open

This page is located in the **Diagnostics** dialog box.

Open the **Diagnostics** dialog box from the **Setup** menu.

Description

The **Noise** page allows you to makes noise measurements for all sonar beams. The CS90 system must be active when you run the tests.

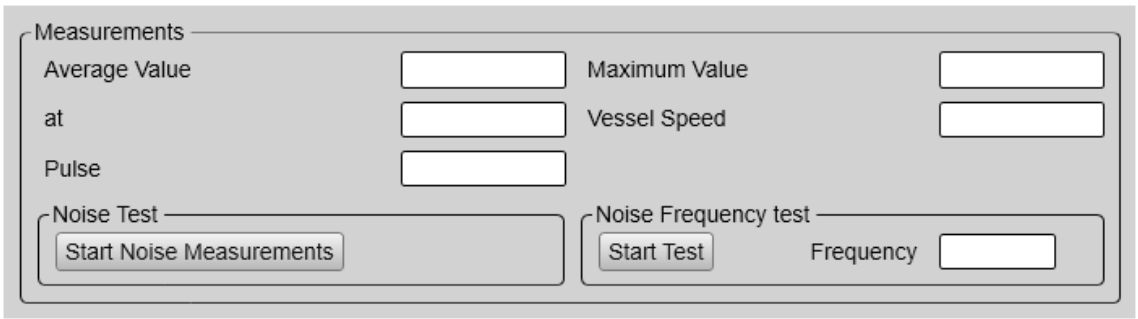
We recommend that you make the following settings before you start the noise test:

- Set **Range** to *1500 m*.
- Set **Operation** to *Normal*.
- Set **Tx Power** to *Maximum*.
- Set **Pulse Type** to *CW Medium*.
- Set **Vertical TX Sector** to *Narrow*.
- Set **Noise Filter** to *Off*.
- Set **Target Threshold** to *Off*.

Select **Start Noise Measurements**. This starts the noise test. The test is run continuously on each of the following pings until you stop it.

Select **Stop Noise Measurements**.

The results for all beams are shown graphically in polar plot. The average and maximum values are shown as numbers. The direction of the maximum value is presented relative to the transducer. The vessel speed and pulse type used during the noise test as also shown.



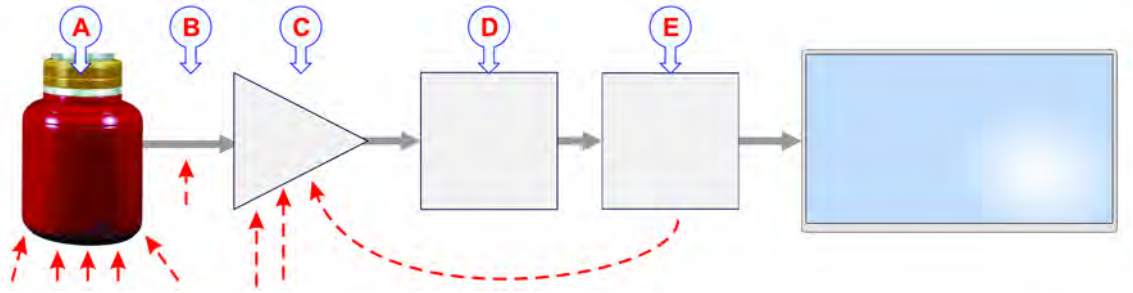
Note

With the vessel in port, the environmental conditions are not satisfactory. In the shallow waters of the port, noise from other vessels, dockyard workers or machinery will cause unreliable test results. If you do this tests in a busy harbour, or with noise sources present, the sensitive receivers will detect all the noise in the nearby waters.

About noise

The noise that contributes to the signal to noise ratio may be divided into the following types of noise:

- Self noise
- Ambient noise
- Electrical noise
- Reverberation
- Underwater noise
- Fishing gear noise



(This is a generic illustration. Any similarities with specific products are accidental.)

A The transducer can pick up noise from:

- Biological disturbances
- Interference
- Cavitation
- Propeller noise
- Flow noise
- Acoustic noise from other hydroacoustic systems

B The transducer cable is long. Electric noise from generators, pumps, cooling systems and other electric or electromechanical devices is easily picked up.

C The preamplifiers are very sensitive. They can easily pick up electrical noise from internal and external power supplies. The preamplifiers are also vulnerable to analogue noise created by their own electronic circuitry. Digital noise created by the converter and processing circuitry can also create noise problems.

D The converters transform the analogue echoes to digital format.

E Signal processing circuitry can create digital noise.

Noise Test

Select **Start Noise Measurements**. This starts the noise test. The test is run continuously on each of the following pings until you stop it.

Noise Frequency Test

Select **Start Test**. This starts the noise test. The test runs continuously until you stop it. The test measures the noise in each beam for operating frequency. It runs through all the frequencies, and then starts again with a new loop.

For each loop, the test results are saved on the hard disk on XML format. The result file specifies:

- Vessel speed
- Operating frequency
  - Noise (Minimum, Average, Maximum)
  - Noise in each beam

The file is located in the following folder:

`programdata/Simrad/CS90/log`

Related topics

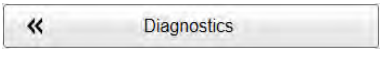
Testing the noise conditions and the sonar functionality, page 247
Functions and dialog boxes, page 418
Setup menu: functions and dialog boxes, page 454
Diagnostics dialog box, page 464

Hull Unit page

Use the **Hull Unit** page to read the software and firmware versions from the hull unit control circuitry.

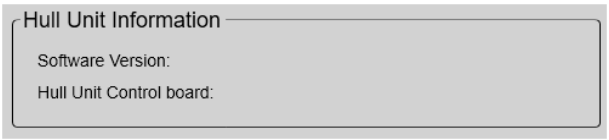
How to open

This page is located in the **Diagnostics** dialog box.



Open the **Diagnostics** dialog box from the **Setup** menu.

Description



The Motor Control Unit contains all the electronics for controlling the hoisting and lowering of the transducer When you make the

appropriate commands on the CS90 system, the Motor Control Unit will start and stop the motor. It will also make sure that the motor rotates the correct way.

Note

If a Hull Unit Controller is supplied with the system, the Motor Control Unit cabinet is used as a junction box. The readouts will then say "Not available".

The Hull Unit Control board is located in the lower right corner of the Motor Control Unit. Its primary purposes are:

- Control the hoisting and lowering the transducer.
- Provide status on the hoisting and lowering operations.
- Read the output from the built-in motion sensor and send this data to the Transceiver Unit.
- Receive error reports from the hull unit sensors and send these to the Processor Unit to generate a message.

Details

Software Version

This is the software version on the Hull Unit Control board.

Hull Unit Control board

The part number, version and firmware version of the Hull Unit Control board is provided.

Related topics

Testing the noise conditions and the sonar functionality, page 247
Functions and dialog boxes, page 418
Setup menu: functions and dialog boxes, page 454
Diagnostics dialog box, page 464

Element BITE dialog box

The purpose of the **Element BITE** (Element Built-In Test Equipment) dialog box is to allow on-line test and verification of the individual elements in the transducer.

How to open

Open the **Element BITE** dialog box from the **Processor** page in the **Diagnostics** dialog box. Open the **Diagnostics** dialog box from the **Setup** menu.

Description

The **Element BITE** dialog box offers these pages:

- **B-Scan**

  The **B-Scan** page allows you to monitor the data received from each of the elements in the transducer. The start sample and the number of samples to be displayed are selectable.

- **Matrix**

  The **Matrix** page allows you to monitor the average signal values or signal phases from each of the channels and transducer elements in the CS90 system. The presentation is provided on a matrix corresponding to the element locations in the transducer.

Note

This dialog box offers specific functionality for service engineers. The functionality is not required for normal use of the CS90 system. The choices you make have no effect on the overall performance of the CS90 system.

Related topics

Processor page, page 557
B-Scan page, page 568
Matrix page, page 571

B-Scan page

The **B-Scan** page allows you to monitor the data received from each of the elements in the transducer. The start sample and the number of samples to be displayed are selectable.

How to open

This page is located in the **Element BITE** dialog box. Open the **Element BITE** dialog box from the **Processor** page in the **Diagnostics** dialog box. Open the **Diagnostics** dialog box from the **Setup** menu.

Description

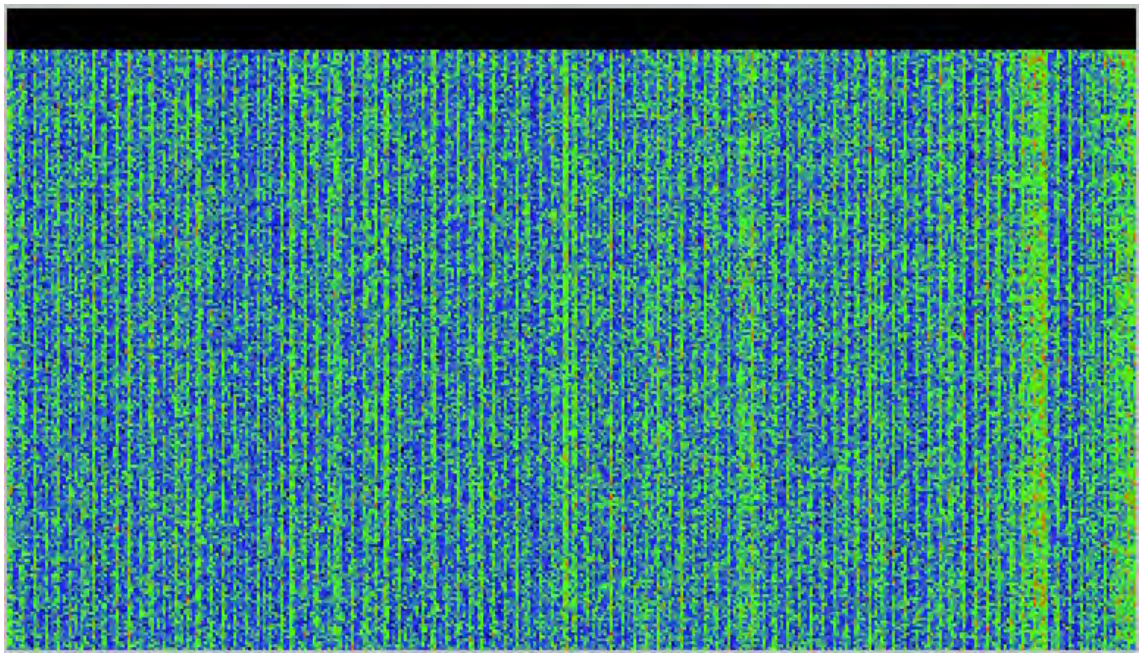
In the B-Scan presentation, each element in the transducer is shown as a long coloured vertical rectangle. If you place the cursor on top of one of these rectangles, a small yellow tool-tip will identify key information about the channel.

- The identification of the transducer element
- The identification of the transceiver board
- The current sample you are looking at
- The measured echo value (in dB)

Tip

To detect unserviceable transducer elements and/or transceiver boards, you must compare the rectangles. When operating the CS90 system in port, the colours will be less homogeneous due to the environmental noise and the shallow depth. During normal operation at sea the colours will be homogeneous.

- *If a single element is "dead" (no transmit, no receive), the rectangle is easily spotted because its colour is black.*
- *If a single element is receiving, but not transmitting, the rectangle is normally presented in lighter shades of blue.*
- *If a transceiver board is "dead" (no transmit, no receive), all the transducer elements connected to the board are easily spotted because they are all black.*



This screen capture shows the B-Scan pattern while testing the receiver in the near range. This is a generic illustration. Any similarities with specific products are accidental.

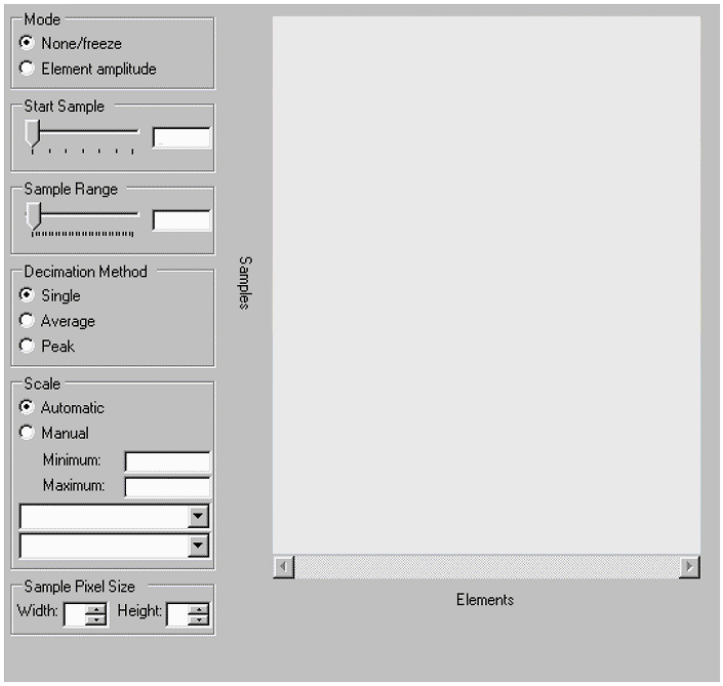
Details

Mode

Select the operating mode of the diagnostic system.

- Select **None/freeze** when you have received the data and wish to freeze the presentation for a closer study of the results.
- Select **Element amplitude** to start the test.

Start Sample



Use **Start Sample** to select which sample to start the test with. Each vertical line shows the signal measured from a single transducer element. Sample 0 (zero) is measured when the ping starts, while (for example) sample 1000 is located several meters out. Use **Start Sample** and **Sample Range** to select which range to show in the B-Scan presentation.

Sample Range

Use **Sample Range** to select how *many* samples you wish to include in the test. Each vertical line shows the signal measured from a single transducer element. Sample 0 (zero) is measured when the ping starts, while (for example) sample 1000 is located several meters out. Use **Start Sample** and **Sample Range** to select which range to show in the B-Scan presentation.

Decimation Method

Sample range is normally selected so that there are no space to display all measurements in the dialog box. If you need to reduce the number of samples, you can select decimation methods *Single*, *Average* or *Peak*.

- *Single* decimation method means that only the first sample is used, the rest are disregarded.
- *Average* decimation method means that the average value of the samples is shown.
- *Peak* decimation method means that the strongest sample value is shown.

Scale

Choose the scale of the presentation.

- Select **Automatic** if you want the scale of the presentation to set itself up automatically.
- Select **Manual** to manually set up the scale of the presentation.

  If you choose manual scale you must define the upper and lower limits. Set **Minimum** and **Maximum** to the desired values.

Logarithmic or linear scale can be chosen for the presentation. Logarithmic scale is normally used since this scale offers the best overview of the complete dynamic range. A linear scale will enhance the differences closer to the maximum value.

Use the **Colour Scale** setting to select the number of colours in the presentation.

Sample Pixel Size

Use **Sample Pixel Size** to define the width and height of each individual sample in the presentation (in pixels).

Text lines

Two text lines are provided under the graphic presentation.

1 The upper information text line below the graphic presentation specifies the current colour scale. The colours used are rated from the weakest (in dB) to the strongest. If you have selected manual colour scale, the values shown here will be the same as those selected.

2 Every sample received will have a value representing an echo. This is identified as a *non-zero* value.

- The **Min(imum) non-zero** value specifies the weakest echo received (in dB).
- The **Max(imum)** value specifies the strongest echo received (in dB).

If you have selected automatic colour scale, the values will be the same as those provided in the logarithmic scale in the upper text line.

The number of *non-zero* and *zero* samples are also specified.

- The **Non-zeroes** value specifies how many samples that contain an echo signal.
- The **Zeroes** value specifies the number of samples that do not contain any echo. These are "dead" receiver channels.

Related topics

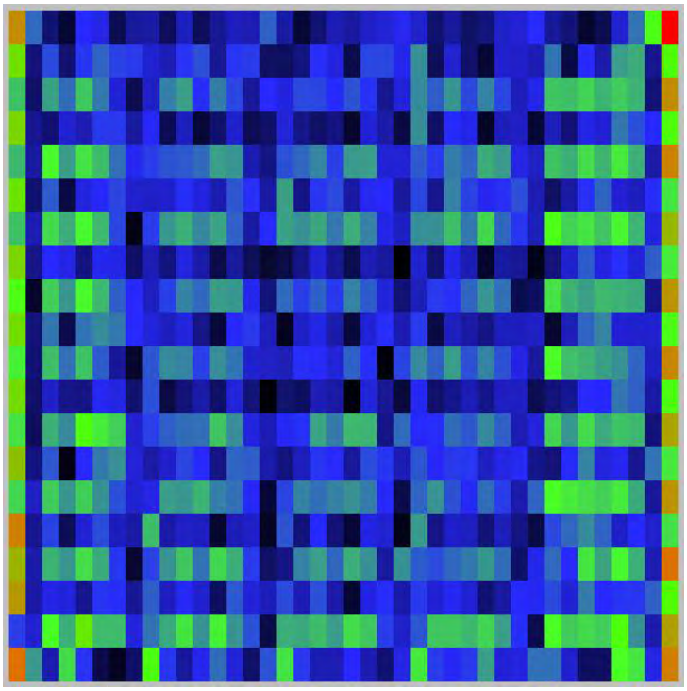
Processor page, page 557
Element BITE dialog box, page 567

Matrix page

The **Matrix** page allows you to monitor the average signal values or signal phases from each of the channels and transducer elements in the CS90 system. The presentation is provided on a matrix corresponding to the element locations in the transducer.

How to open

This page is located in the **Element BITE** dialog box. Open the **Element BITE** dialog box from the **Processor** page in the **Diagnostics** dialog box. Open the **Diagnostics** dialog box from the **Setup** menu.



This illustration shows a typical matrix presentation. This is a generic illustration. Any similarities with specific products are accidental.

Description

When you move the cursor over the matrix presentation of the transceiver channels, each element in the transducer can be clearly identified as a rectangle. If you place the cursor on top of one of these rectangles, a small yellow tool-tip will identify key information. This function is designed to check the operation of the individual channels in the transceiver, as well as the elements in the transducer.

- The identification of the transducer element
- The identification of the transceiver board
- The measured echo value (in dB)

Tip

A rectangle with 32 black elements in the matrix view indicates a failure with a single transceiver board. The tooltip will indicate which board that fails. Restarting the CS90 system will normally fix the problem.

Failure of a number of consecutive transceiver boards indicates a problem with the power supply.

- *Weak signals indicate a problem with the supply power to the analogue amplifiers.*
- *No response indicate a problem with the supply power to the digital circuitry.*
- *A failure in the high voltage power supply to the transmitter circuitry can only be detected in the transmit test.*

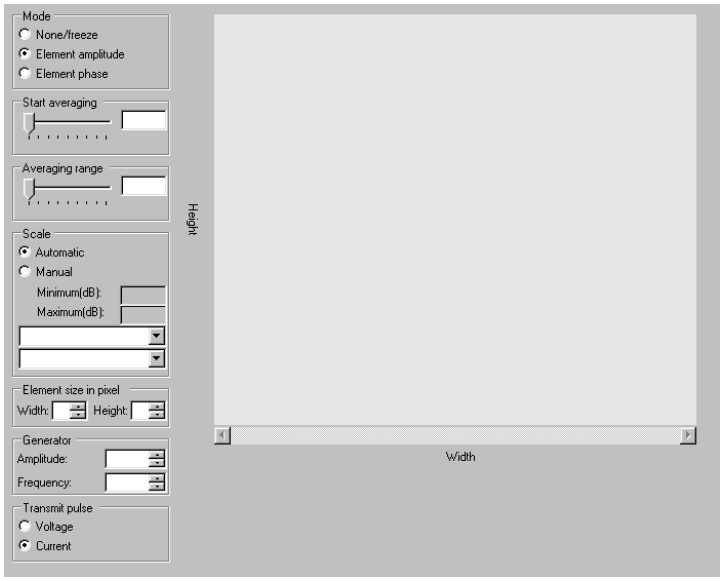
Details

Mode

Select the operating mode of the diagnostic system.

- Select **None/freeze** when you have received the data and wish to freeze the presentation for a closer study of the results.
- Select **Element amplitude** to start the test.
- Select **Element phase** to start the test and observe the element phases.

Start Averaging



The test process collects data from all the channels, and calculates the average value. It may often be useful to start the data collection after the end of the transmit pulse. Use **Start Averaging** to select the first sample to be part of the data collection. Which samples to use, and how many, depends on the purpose of the test.

Use **Averaging Range** to select the number of samples to be included in the data collection.

Averaging Range

Use **Start Averaging** to select the first sample to be part of the data collection. Use **Averaging Range** to select the number of samples to be included in the data collection.

Scale

Choose the scale of the presentation.

- Select **Automatic** if you want the scale of the presentation to set itself up automatically.
- Select **Manual** to manually set up the scale of the presentation.

  If you choose manual scale you must define the upper and lower limits. Set **Minimum** and **Maximum** to the desired values.

Logarithmic or linear scale can be chosen for the presentation. Logarithmic scale is normally used since this scale offers the best overview of the complete dynamic range. A linear scale will enhance the differences closer to the maximum value.

Use the **Colour Scale** setting to select the number of colours in the presentation.

Element Size in Pixels

Use **Element Size in Pixels** to define the width and height of each individual element in the presentation (in pixels).

Generator

In order to run this test, a built-in signal generator is used. You must specify the amplitude and frequency to be used by this generator. The signal generator creates a test signal inserted in parallel with the signal measured on the transducer.

Transmit Pulse

Select **Voltage** or **Current**.

Voltage is always measured during reception. Voltage measurements during transmission are not reliable. By default, the system measures current during transmission.

Text lines

Several text lines are provided under the graphic presentation.

1 The upper information text line below the graphic presentation specifies the current colour scale. The colours used are rated from the weakest (in dB) to the strongest. If you have selected manual colour scale, the values shown here will be the same as those selected.

2 Every sample received will have a value representing an echo. This is identified as a *non-zero* value.

- The **Min(imum) non-zero** value specifies the weakest echo received (in dB).
- The **Max(imum)** value specifies the strongest echo received (in dB).

If you have selected automatic colour scale, the values will be the same as those provided in the logarithmic scale in the upper text line.

The number of *non-zero* and *zero* samples are also specified.

- The **Non-zeroes** value specifies how many samples that contain an echo signal.
- The **Zeroes** value specifies the number of samples that do not contain any echo. These are "dead" receiver channels.

3 The **Average signal level** value presents the average signal level calculated from all the samples.

Related topics

Processor page, page 557
Element BITE dialog box, page 567

Pages in the Installation dialog box

Before you use the CS90 system you must set it up to communicate with the relevant peripherals. Use the **Installation** dialog box to set up all interfaces with external devices, and to set up basic parameters related to installation and operation. In most cases, you only need to do this once.

Prerequisites

The **Installation** dialog box is not available when your CS90 system is set to *Replay* mode.

How to open

This dialog box is opened from the **Setup** menu. The **I/O Setup** page can also be opened from the **Output** dialog box.

Description

This dialog box contains a number of pages selected from the menu on the left side.

Note

When you work in the **Installation** *dialog box, you must always select* **Apply** *to save the changes made on a page. You must do this before you continue working on a different page.*

Topics

Sensor Installation page, page 576

Sensor Configuration page, page 581

Motion Reference Unit page, page 583

Installation Parameters page, page 586

Synchronization page, page 591

Units page, page 594

Operating Panel page, page 596

Echogram Settings page , page 605

Hull Unit Configuration page, page 606

System Protection page, page 607

Fishing Gear Setup page, page 610

Map Setup page, page 613

User Settings Setup page , page 614

Software License page, page 615

Transceiver Upgrade page, page 617

Sensor Installation page

For the CS90 system to use and offer correct navigational information, one or more external sensors must be connected. Typical sensors are those providing navigational information (heading, speed or geographical position). Use the **Sensor Installation** page to define which external sensors your CS90 system will import information from. You must also specify which datagram formats to use. For each relevant sensor you must insert the offset values that define the its physical location relative to the vessel's coordinate system.

How to open

This page is located in the **Installation** dialog box. To open the page, select **Installation** on the **Setup** menu.

Prerequisites

The **Installation** dialog box is not available when your CS90 system is set to *Replay* mode.

Description

The **Sensor Installation** page allows your CS90 system to communicate with external sensors and systems. The parameters are organized in groups.

Installed Sensors

The **Installed Sensors** list contains all the sensors that are currently installed on the CS90 system. Select a sensor in the list to edit its interface properties, or to remove it. Select **New** in the list to add a new sensor interface to the CS90 system.

Sensor

In the **Sensor** group you select which type of sensor you want to receive information from. You must specify which communication port to use (LAN (Local Area Network) or serial port). You can type a custom name to identify the sensor import. Select **Inspect Port** to verify that the communication parameters of the chosen port have been set up correctly.

Datagram

In the list of valid datagram formats, select the format(s) to be accepted by the CS90 system. If necessary, you can also specify a specific **Talker ID**.

Installation

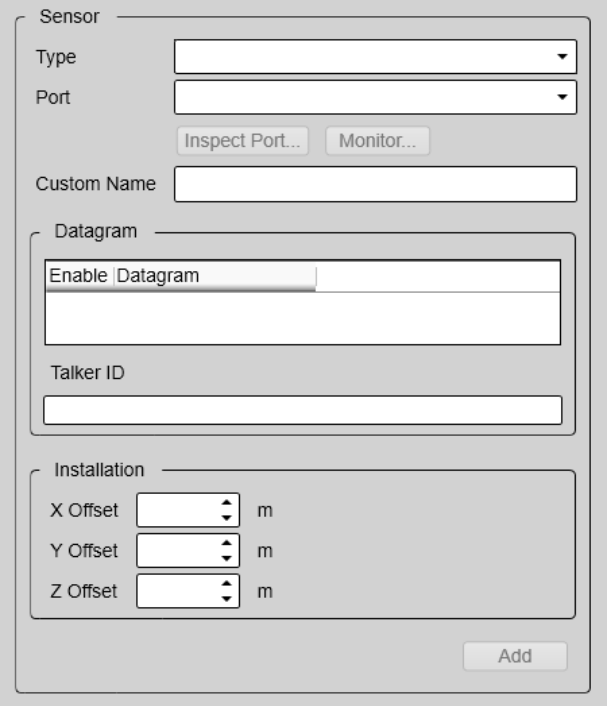
Most sensors are physically mounted somewhere on your vessel. For accurate measurements, the sensor locations - referenced to the vessel's coordinate system - must be known to the CS90 system.

Note

Just making changes and selecting **OK** *at the bottom of the page will not install anything. Select what to install, define the relevant parameters, and then select* **Add**.

A summary of all the sensors that are connected to the CS90 system is provided in the **Diagnostics** dialog box.

Details



Installed Sensors

The **Installed Sensors** list contains all the sensors that are currently installed on the CS90 system. Select a sensor in the list to edit its interface properties, or to remove it. Select **New** in the list to add a new sensor interface to the CS90 system.

Type

The CS90 system can communicate with several different sensor types. Under **Type**, select which type of sensor you want to receive information from.

Tip

The **Sensors** *page in the* **Diagnostics** *dialog box provides an overview of all the communication lines and sensors in use. All relevant status information is provided. Open the* **Diagnostics** *dialog box from the* **Setup** *menu.*

Port

To import the data from the chosen sensor you need to define an input port. This can be any available Local Area Network (LAN) or serial line on your Processor Unit.

We recommend that you set up the relevant communication parameters before you use the port. To set up the communication parameters, use the **I/O Setup** page. The **I/O Setup** page is located in the **Installation** and **Output** dialog boxes.

Inspect Port

Select **Inspect Port** to check the communication parameters for the port. The relevant port setup dialog box opens.

The communication parameters defined for NMEA 0183 are:

- **Baud rate**: 4800 bit/s

- **Data bits**: 8
- **Parity**: Even
- **Stop bits**: 1

Some instruments may provide other parameters and/or options. You must always check the relevant technical documentation supplied by the manufacturer.

Note

*You are not permitted to make any changes. To change the communication parameters, use the **I/O Setup** page. The* **I/O Setup** *page is located in the* **Installation** *and* **Output** *dialog boxes.*

Monitor

This option is only available if you decided to edit the parameters of a previously installed sensor. Select **Monitor** to open the **Port Monitor** dialog box. The **Port Monitor** dialog box allows you to study the communication stream on the chosen serial line or local area network (LAN) port.

Custom Name

For easier recognition of the sensor interface, you can type a custom name. This name is shown in other dialog boxes in the user interface. If you do not have a computer keyboard connected to your CS90 system, select the **Keyboard** button to open an on-screen keyboard.

Datagram

The list presents the available datagram formats for the chosen sensor type. Select the datagrams you want to import.

- When you select sensor type ITI-FS, only one datagram can be selected; ITI-FS Datagrams. This is a group of datagrams that allows the CS90 system to import information from trawl systems.
- When you select sensor type PI50, only one datagram can be selected; PI50 Datagrams. This is a group of datagrams that allows the CS90 system to import information from catch monitoring systems.
- Select sensor type External Objects to import position data from buoys and other devices transmitting their geographical position. The external objects are shown as hexagonal markers in the echo presentation.

Talker ID

If you want to specify a dedicated Talker ID for the datagram format, it can be defined here.

Every NMEA datagram starts with a dollar ($) character. The "talker identifier" (ID) with two characters follows immediately after the dollar character. The Talker ID is followed by three characters that define the *type* of datagram. The Talker ID identifies the system that *sends* the datagram. You can leave this box empty.

This means that blank characters are inserted into the datagram. You may also specify two characters that identifies the CS90 system as the "sender". In most cases, you will only need to define a Talker ID if your receiving system needs it for a specific purpose.

Example

`$ESDBT,x.x,f,y.y,M,z.z,F*hh<CR><LF>`

In this NMEA depth datagram, the Talker ID is "ES", which means "echo sounder".

Tip

If you do not have a computer keyboard connected to your CS90 system, select the **Keyboard** *button to open an on-screen keyboard.*

Offsets

The physical location of each sensor must be defined with reference to the vessel's coordinate system.

The position of certain sensors must be defined as an *offset* to the *Ship Origin* in the coordinate system to maximize performance. These offset values are all required to allow the CS90 system to give you as accurate information as possible. The degree of accuracy offered by the CS90 system is directly related to the accuracy of the information you enter on the **Installation Parameters** pages.

X Offset

Select the offset value on the X axis (fore-and-aft direction) from the *Ship Origin*. Adjust with a positive value for X if the sensor is located ahead of the ship origin.

Y Offset

Select the offset value on the Y axis (athwartship) from the *Ship Origin*. Adjust with a positive value for Y if the sensor is located on the starboard side of the ship origin.

Z Offset

Select the offset value on the Z axis (vertical) from the *Ship Origin*. Adjust with a positive value for Z if the sensor is located under the ship origin.

Rotation

For some sensors - typically motion sensors and transducers – the physical location of the sensor is not sufficient to extract accurate data. These sensors are installed with physical angles. These angles are often referred to as "installation angles" or "offset angles". The sensor can be rotated around the three axis of the vessel coordinate system.

- Rotation Around X(Roll)
- Rotation Around Y(Pitch)

- Rotation Around Z(Yaw)

In the user interface you will only need to specify the installation angles when the parameters are shown.

Rotation Around X

Specify an angle (in degrees) to compensate for any deviation from the X axis (fore-and-aft direction) in the vessel coordinate system.

Rotation Around Y

Specify an angle (in degrees) to compensate for any deviation from the Y axis (athwartship direction) in the vessel coordinate system.

Rotation Around Z

Specify an angle (in degrees) to compensate for any deviation from the Z axis (vertical direction) in the vessel coordinate system.

Add

When you have set the parameters for a new sensor interface, select **Add** to save it. Once a sensor has been added to the CS90 system configuration, it appears in the **Installed Sensors** list.

Remove

The **Installed Sensors** list contains all the sensors that are currently installed on the CS90 system. If you want to delete a sensor, select it in the list, and then select **Remove** at the bottom of the **Sensor Installation** page.

Note

You cannot undo this operation.

Edit

The **Installed Sensors** list contains all the sensors that are currently installed on the CS90 system. If you want to edit the parameters of a previously installed sensor, select it in the list, and then select **Edit** at the bottom of the **Sensor Installation** page.

Related topics

Setting up the interfaces to peripheral devices, page 192
Functions and dialog boxes, page 418
Setup menu: functions and dialog boxes, page 454
Installation dialog box, page 466

Sensor Configuration page

With multiple sensors connected to the CS90 system, many of them will provide the same datagrams. We cannot expect that these datagrams provide the same information. The **Sensor Configuration** page allows you to define a datagram priority, so that the information from the "most reliable" sensor is used by the CS90 system. You can also define manual values in case a sensor is unserviceable, or not installed.

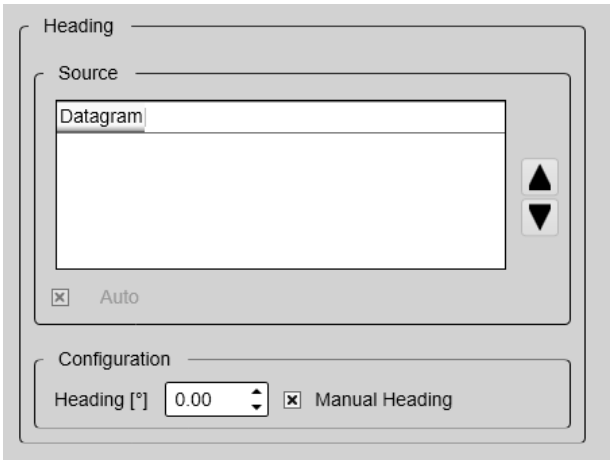
How to open

This page is located in the **Installation** dialog box. To open the page, select **Installation** on the **Setup** menu.

Prerequisites

The **Installation** dialog box is not available when your CS90 system is set to *Replay* mode.

Description



When the CS90 system communicates with peripheral devices (for example, navigation sensors), the information is contained in *datagrams*. The term *datagram* has been defined as follows:

> A self-contained, independent entity of data carrying sufficient information to be routed from the source to the destination computer without reliance on earlier exchanges between this source and destination computer and the transporting network.
>
> *https://tools.ietf.org/html/rfc1594, April 2016*

The majority of the datagrams used by the CS90 system are defined by the National Marine Electronics Association (NMEA). Other proprietary datagrams are defined by third-party organizations or by Kongsberg Discovery.

Any information in a datagram, for example, the vessel speed, may be provided in different datagrams from several sensors. Due to several reasons (environmental conditions, installation, configuration, accuracy, etc.), the numerical values provided can be different from one sensor to another.

Several sensor are provided on the **Sensor Configuration** page, one for each type of information. Select the sensor you wish to configure in the **Sensor** list. For each type, you can define a priority sensor by rearranging the datagrams in a list. You can also define manual values in case a sensor is unserviceable, or not installed.

Tip

The CS90 system can communicate with several different sensor types. Use the **Sensor Installation** *page to define which external sensors your CS90 system will import information from. You must also specify which datagram formats to use. The* **Sensor Installation** *page is located in the* **Installation** *dialog box.*

A summary of all the sensors that are connected to the CS90 system is provided in the **Diagnostics** *dialog box.*

When you save echo data in RAW format, all sensor data are included.

Note

If you have two sensors providing the same information, but on different communication ports, certain limitations apply. During normal operation, you can easily decide which sensor you wish to use. During replay, you can only play back from one of these sensors. For this reason, only the information from the currently "active" sensor is saved.

When you work in the **Installation** dialog box, you must always select **Apply** to save the changes made on a page. You must do this before you continue working on a different page.

Details

Sensor

All the sensors are listed. Select a sensor in this list to set up the datagram priority and/or configuration.

Tip

You can set up datagram priorities for both heading and course information on the **Sensor Configuration** *page. The course information is used to present the Course line in the relevant views. When enabled, the vessel's current heading is shown on the top bar. If the information from the heading sensor fails, the top bar will change to present the course information instead.*

Auto

Select **Auto** to control the functionality.

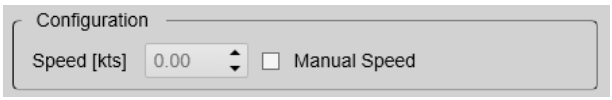
- With **Auto** *enabled*, the priority list is used. Information is imported from the sensor at the top of the list. If the sensor fails to provide information for more than 20 seconds, data from the next sensor is used.
- With **Auto** *disabled*, the priority list is not used. Information is imported from the sensor at the top of the list. All other sensors are ignored.

Source

The **Source** list presents all the datagrams that you have selected to provide input data. Use the two large arrows to move the selected datagram up or down the priority list.

Configuration

For most sensors, you can specify a manual value. Use this functionality if a sensor is unserviceable or not installed. Check this box to enable the function. Select or type the requested value.



When you select the Time sensor, you can set the ZDA datagram to synchronize the internal clock in the Processor Unit. To do this, you need administrative privileges on your Processor Unit.

Related topics

Setting up the interfaces to peripheral devices, page 192
Functions and dialog boxes, page 418
Setup menu: functions and dialog boxes, page 454
Installation dialog box, page 466

Motion Reference Unit page

The motion reference unit (MRU) measures the roll and pitch movements of the vessel. Some sensor models also measure heave. The information provided by the motion sensor is used by the CS90 system to stabilize the beams.

Prerequisites

The **Installation** dialog box is not available when your CS90 system is set to *Replay* mode.

How to open

This page is located in the **Installation** dialog box. To open the page, select **Installation** on the **Setup** menu.

Description

The CS90 system is provided with a built-in motion sensor to provide electronic stabilization of the sonar beams. It is placed inside the Motor Control Unit. For improved operational accuracy, an external motion reference unit (MRU) can be used.

Use the **Motion Reference Unit** page to define the data format and the communication port used to import motion information from an external sensor.

Note

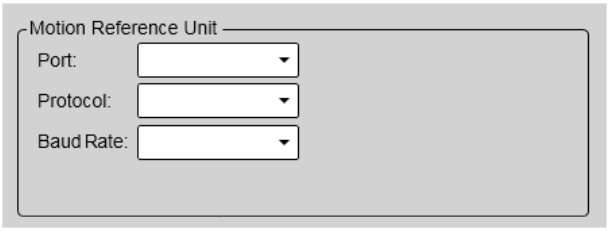
The sensor must be connected with a serial communication line. If you don't have any available COM ports you must first release one on the **I/O Setup** *page. Make sure that you do not put the same COM port to other use on the* **I/O Setup** *page.*

If you select to use the LAN port, the CS90 system will automatically use the built-in motion sensor.

Tip

If the sensor is malfunctioning the input can be disabled. The **Stabilization** *function allows you to enable or disable the input from the motion sensor. This function is opened from the* **Setup** *menu.*

Details



Port

Select the serial port you want to use for communication.
If you select to use the LAN port, the CS90 system will automatically use the built-in motion sensor.

LAN

If you select to use the LAN port, the CS90 system will automatically use the built-in motion sensor.

COM Port

Select **COMx** to connect to the external motion sensor. "COMx" is the serial port to which the motion sensor is connected.

None

Select **None** to disconnect the CS90 system from both external and internal motion sensors.

Protocol

Select which datagram formats to import. The CS90 system supports the following datagram format from a motion sensor:

- **ASCII**
- **Kongsberg EM Attitude 1000**

  The EM Attitude 1000 is a proprietary datagram format created by Kongsberg Discovery for use with digital motion sensors. It holds roll, pitch, heave and heading information. In many new designs, this datagram format has been replaced with EM Attitude 3000 format.
- **Kongsberg EM Attitude 3000**

The Kongsberg EM Attitude 3000 is a proprietary datagram format created by Kongsberg Discovery for use with digital motion sensors. It holds roll, pitch, heave and heading information.

Baud Rate

Use this setting to specify the baud rate ("speed") for the serial communication.

Status

The current status of the sensor communication is shown. "Not connected" means that the input from the sensor is missing. A message like this (example) verifies that the CS90 system is connected to the built-in motion sensor:

```
Connected to 192.168.1.30 CS90 Beamformer
```

Related functionality

Stabilization

The **Stabilization** function allows you to enable or disable the input from the motion sensor. If you disable the input from the sensor, the beams will not be compensated for pitch and roll movements. This function is opened from the **Setup** menu.

Related topics

Setting up the interfaces to peripheral devices, page 192
Functions and dialog boxes, page 418
Setup menu: functions and dialog boxes, page 454
Installation dialog box, page 466

Installation Parameters page

The **Installation Parameters** pages allow you to define the relationship between the physical locations of the various sensors and the transducer. All relevant system units and sensors must be defined with their physical offset values in relation to the defined *Ship Origin* in the vessel's coordinate system. You will only need to define these installation parameters once.

Prerequisites

The **Installation** dialog box is not available when your CS90 system is set to *Replay* mode.

How to open

These pages are located in the **Installation** dialog box. To open the page, select **Installation** on the **Setup** menu.

Description

The physical location and installation angles (rotation) of each sensor must be defined with reference to the vessel's coordinate system. The position of certain sensors must be defined as an *offset* to the *Ship Origin* in the coordinate system to maximize performance.

The physical dimensions and offset values are all required to allow the CS90 system to give you as accurate information as possible. The degree of accuracy offered by the CS90 system is directly related to the accuracy of the information you enter on the **Installation Parameters** pages. The relevant dimensions and offset values can normally be taken from the vessel drawings.

The **Installation Parameters** page contains a number of "sub-pages".

Topics

Ship page, page 587

Transducer page, page 588

MRU (Motion Reference Unit) page, page 589

Ship page

Use the **Ship** page to define a specific reference point (*Ship Origin* or *origo*) for the various sensors connected to the CS90 system. The *origin* is the common reference point where all three axis in the vessel coordinate system meet. All physical locations of the vessel's sensors (radar and positioning system antennas, echo sounder and sonar transducers, motion reference units, etc.) are referenced to the origin.

Description

Use the **Ship** page with the ship's physical dimensions to create a virtual reference point (the *Ship Origin*) in a dedicated coordinate system for the CS90 system. The *Ship Origin* is normally located in the following position:

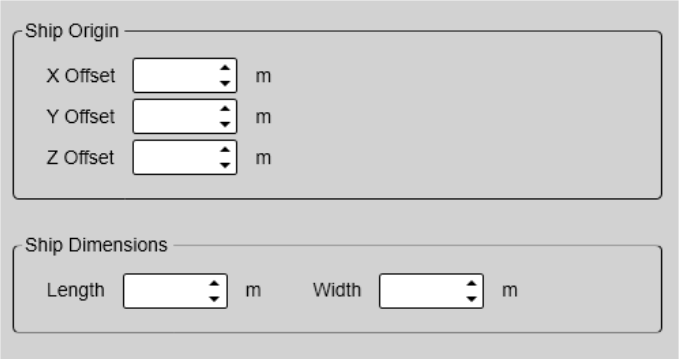
- **X position**: Half the ship's length
- **Y position**: Half the ship's width
- **Z position**: On the waterline

If you want to change the location of the *Ship Origin*, you can do this by providing offset values in the X, Y and/or Z directions. To do this you will need the ship drawings.

Note

We recommend that you place the Ship Origin at the same position as the motion reference unit (MRU). This will minimize the vectors when your vessel is moving. Use the vessel drawings to establish the offset values between the basic position of the Ship Origin and the MRU location.

Details



X Offset

Select the offset value on the X axis (fore-and-aft direction) from the default *Ship Origin*. This is the origin that was defined by the vessel designer and/or the shipyard when the vessel was built. Adjust with a positive value for X if your new preferred origin is located ahead of the default *Ship Origin*.

Y Offset

Select the offset value on the Y axis (athwartship) from the default *Ship Origin*. This is the origin that was defined by the vessel designer and/or the shipyard when the vessel was built. Adjust with a positive value for Y if your new preferred origin is located on the starboard side of the default *Ship Origin*.

Z Offset

Select the offset value on the Z axis (vertical) from the default *Ship Origin*. This is the origin that was defined by the vessel designer and/or the shipyard when the vessel was built. Adjust with a positive value for Z if the new preferred origin is located under the default *Ship Origin*.

Ship Dimensions

Insert the physical dimensions of your vessel (length and width).

Do this as accurately as possible. This information is used to create a new origin in the vessel coordinate system.

Related topics

Inserting the installation parameters, page 210
Functions and dialog boxes, page 418
Setup menu: functions and dialog boxes, page 454
Installation Parameters page, page 586

Transducer page

Use the **Transducer** page to define the physical location of the transducer in the vessel coordinate system, as well as the installation angles (rotation). The installation angles define in which direction the transducer face points.

Description

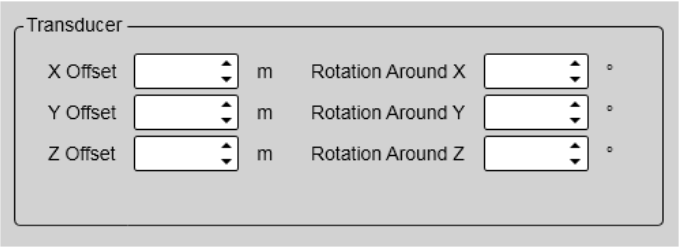
The physical location of the transducer is important for the echo data accuracy.

Use the centre of the transducer face as reference, and define the offset values related to the *Ship Origin*. The installation angles relevant for the transducer must also be defined. These values were recorded during the installation, and they define the direction of the transducer face.

Note

It is very important that the transducer installation angles are measured and recorded accurately during the installation. Incorrect angles will greatly reduce the data accuracy.

Details



X Offset

Select the offset value on the X axis (fore-and-aft direction) from the *Ship Origin*. Adjust with a positive value for X if the transducer is located ahead of the ship origin.

Y Offset

Select the offset value on the Y axis (athwartship) from the *Ship Origin*. Adjust with a positive value for Y if the transducer is located on the starboard side of the ship origin.

Z Offset

Select the offset value on the Z axis (vertical) from the *Ship Origin*. Adjust with a positive value for Z if the transducer is located under the ship origin.

Rotation Around X

Specify an angle (in degrees) to compensate for any deviation from the X axis (fore-and-aft direction) in the vessel coordinate system.

Rotation Around Y

Specify an angle (in degrees) to compensate for any deviation from the Y axis (athwartship direction) in the vessel coordinate system.

Rotation Around Z

Specify an angle (in degrees) to compensate for any deviation from the Z axis (vertical direction) in the vessel coordinate system.

Related topics

Inserting the installation parameters, page 210
Functions and dialog boxes, page 418
Setup menu: functions and dialog boxes, page 454
Installation Parameters page, page 586

MRU (Motion Reference Unit) page

Use the **MRU** (Motion Reference Unit) page to insert the physical location and rotation of the motion reference sensor (MRU) with reference to the vessel coordinate system.

Description

The CS90 system is provided with a built-in motion sensor to provide electronic stabilization of the sonar beams. It is placed inside the Motor Control Unit. The motion sensor measures the roll and pitch movements of the vessel.

Note

If you want to use the built-in motion sensor, you do not need to enter any offset values.

If the hull unit has been installed with the Motor Control Unit pointing straight aft, you do not need to enter any rotation values. If the unit faces in any other direction you must compensate for this by typing the relevant value for **Rotation Around Z**.

For improved operational accuracy, an external motion reference unit (MRU) can be used.

Offsets

The offset values specify the physical location of the motion reference unit relative to the reference point (origin). The relevant offset values can normally be taken from the vessel drawings.

Rotation

The values for rotation around the X, Y and Z axis are used to compensate for any misalignments made during the physical installation of the motion reference unit. Such misalignments occur if the sensor is not placed in parallel with the vessel's horizontal and/or vertical planes. We strongly recommend that you install your motion reference unit so that all rotation angles can be set to 0 (zero).

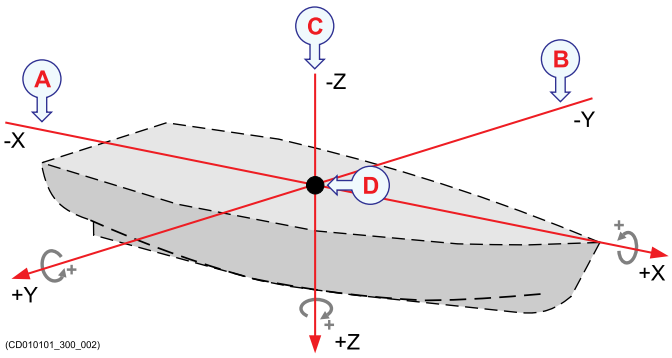
The required accuracy of the offset and rotation angles depends on the accuracy requirements for the echo data.

Note

Correct values for motion sensor rotation are critical for the sonar performance.

The motion sensor offset values (its physical location relative to the vessels' coordinate system) are not important for sonar operation.

The Kongsberg Seapath® - and other GPS systems - allow you to define the MRU location in the positioning system. If this is done, the MRU offset values in the CS90 system must be set to 0 (zero) to avoid "dual compensation". The rotation angles are normally not recorded by the positioning system. These can either be inserted into the MRU control application, or into the CS90 system. Make sure that you do not insert them both places.



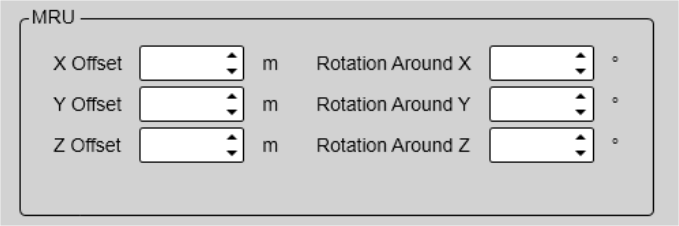
A *Rotation around the x-axis: In the positive horizontal direction (forward), a positive rotation is clockwise.*

B *Rotation around the y-axis: In the positive horizontal direction (starboard), a positive rotation is clockwise.*

C *Rotation around the z-axis: In the positive vertical direction (down), a positive rotation is clockwise.*

D *Reference point (Ship Origin)*

Details



X Offset

Select the offset value on the X axis (fore-and-aft direction) from the *Ship Origin*. Adjust with a positive value for X if the sensor is located ahead of the ship origin.

Y Offset

Select the offset value on the Y axis (athwartship) from the *Ship Origin*. Adjust with a positive value for Y if the sensor is located on the starboard side of the ship origin.

Z Offset

Select the offset value on the Z axis (vertical) from the *Ship Origin*. Adjust with a positive value for Z if the sensor is located under the ship origin.

Rotation Around X

Specify an angle (in degrees) to compensate for any deviation from the X axis (fore-and-aft direction) in the vessel coordinate system.

Rotation Around Y

Specify an angle (in degrees) to compensate for any deviation from the Y axis (athwartship direction) in the vessel coordinate system.

Rotation Around Z

Specify an angle (in degrees) to compensate for any deviation from the Z axis (vertical direction) in the vessel coordinate system.

Related topics

Inserting the installation parameters, page 210
Functions and dialog boxes, page 418
Setup menu: functions and dialog boxes, page 454
Installation Parameters page, page 586

Synchronization page

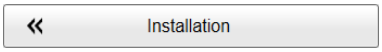
The purpose of the **Synchronization** parameters is to set up the CS90 system to operate alone, or as a master or slave in a synchronized system. Synchronization is required in order to avoid interference if the CS90 system is used simultaneously with other hydroacoustic instruments within the same frequency range.

Prerequisites

The **Installation** dialog box is not available when your CS90 system is set to *Replay* mode.

How to open

This page is located in the **Installation** dialog box. To open the page, select **Installation** on the **Setup** menu.



Description

Whenever more than one hydroacoustic system is installed on a vessel, interference may occur. To avoid interference, you have these options:

- The systems are all connected to a common synchronization system.
- One of the acoustic systems is set up as "master", and controls the transmissions on the other systems.

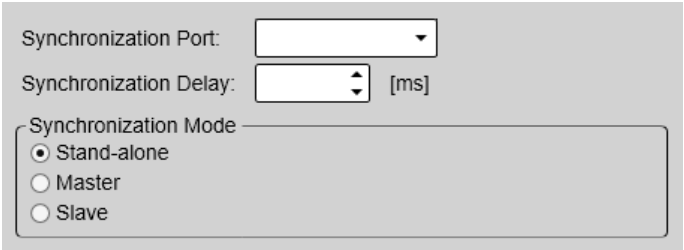
The CS90 system offers functionality for remote transmit synchronization. It can be set up to operate in either *Master* or *Slave* mode.

> In physics, interference is the phenomenon in which two waves superpose each other to form a resultant wave of greater or lower amplitude. Interference usually refers to the interaction of waves that are correlated or coherent with each other, either because they come from the same source or because they have the same or nearly the same frequency. Interference effects can be observed with all types of waves, for example, light, radio, acoustic, surface water waves or matter waves.
>
> *https://en.wikipedia.org/wiki/Wave_interference — April 2016*

Note

When you work in the **Installation** *dialog box, you must always select* **Apply** *to save the changes made on a page. You must do this before you continue working on a different page.*

Details



Synchronization Mode

Choose which synchronization mode to use.

For "slave" operation, a remote system (for example *K-Sync* or *Simrad TU40*) must be available to provide trigger pulses.

For "master" operation, a remote hydroacoustic system (sonar, echo sounder) is connected. This remote system must be set up in "slave" mode.

Stand-alone

This synchronization mode is used when the CS90 system is working by itself. Synchronization is turned off. It is the default setting. The CS90

system operates using the current settings for ping interval. The operation is independent of any trigger signals arriving at the synchronization port.

The **Synchronization Delay** setting is not applicable when synchronization is switched off.

Master

Master mode is used if the CS90 system shall operate as the controlling unit in a synchronized system. Any peripheral hydroacoustic system(s) are only permitted to transmit when enabled by the CS90 system. The CS90 system operates using the current settings for ping interval. It also sends trigger signals to the peripheral system(s).

This mode is unavailable if you set **Synchronization Port** to *Transceiver Auxiliary Port*.

Slave

The *Slave* mode is used if the CS90 system shall transmit only when permitted by a peripheral system. When the *Slave* mode is selected, the CS90 system will not transmit ("ping") unless an external trigger appears on the chosen synchronization port. The peripheral system may be any other hydroacoustic product (for example an echo sounder or sonar), or even a dedicated synchronization system.

The synchronization mode is not fixed. It can be changed at any time during operation.

Note

Simultaneous transmission of more than one hydroacoustic system can only take place if the systems operate with different frequencies.

Synchronization Delay

This delay parameter is used differently depending on the chosen synchronization mode.

Stand-alone

The **Synchronization Delay** setting is not applicable when synchronization is switched off.

Master

In *Master* mode, the CS90 system waits for the delay time after the external trigger signal has been sent to the slaves before transmitting the ping. This is often referred to as a *pre-trigger*.

Note

This delay will only work when the synchronization is set up using a serial port.

Slave

In *Slave* mode, the CS90 system waits for the delay time after the external trigger signal has arrived before transmitting the ping. This is often referred to as a *post-trigger*.

Synchronization Port

This is the interface port currently used to transmit or receive synchronization signals. Since the synchronization function only uses the *Request To Send (RTS)* and *Clear To Send (CTS)* signals on a serial port, you may be able to use a port that is already assigned other interface purposes. For the same reason, you do not need to define any baud rate.

Related topics

Setting up the interfaces to peripheral devices, page 192
Functions and dialog boxes, page 418
Setup menu: functions and dialog boxes, page 454
Installation dialog box, page 466

Units page

The user interface presents many measurements. These measurements are for example related to depth, range and distance. From the **Units** page you control which units of measurements are used.

Prerequisites

The **Installation** dialog box is not available when your CS90 system is set to *Replay* mode.

How to open

This page is located in the **Installation** dialog box. To open the page, select **Installation** on the **Setup** menu.

Description

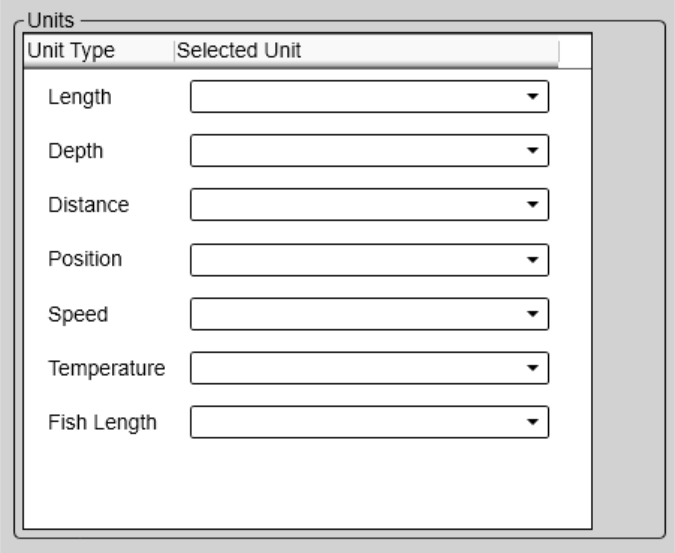
The CS90 system is prepared to work with several international standards for units of measurements.

Use the **Units** options to select the units of measurements you want to work with. The CS90 system uses them in all presentations. You only need to define them once. Use the drop-down lists provided to make the selections.

Note

When you work in the **Installation** *dialog box, you must always select* **Apply** *to save the changes made on a page. You must do this before you continue working on a different page.*

Details



Length

Choose the unit of measurement for all the readouts related to range and distances in the CS90 system user interface. This may for example be the cursor location.

Depth

Choose the unit of measurement for all the presentations of depth. This may for example be the current water depth.

Distance

Choose the unit of measurement for all presentations of sailed distance.

Position

Choose the unit of measurement for geographical positions.

Speed

Choose the unit of measurement for all the presentations of vessel speed.

Temperature

Choose the unit of measurement for all the temperature readings. This may for example be the current water temperature, but only if you have a suitable sensor connected to the CS90 system.

Fish Length

Choose the unit of measurement for all presentations of fish length.

Related topics

Defining settings related to user preferences and individual customizing, page 154
Functions and dialog boxes, page 418
Setup menu: functions and dialog boxes, page 454
Installation dialog box, page 466

Operating Panel page

The Operating Panel offers all necessary control functions for normal operation. It further allows you to assign certain functions to dedicated buttons and switches. The **Operating Panel** page is used to select which physical hardware panel you use, and to assign functionality to the programmable buttons.

Prerequisites

The **Installation** dialog box is not available when your CS90 system is set to *Replay* mode.

How to open

This page is located in the **Installation** dialog box. To open the page, select **Installation** on the **Setup** menu.

Description

The controls provided by the Operating Panel are arranged in logical functional groups. This offers you clear and easy operation with fast access to key functionality. All the functionality provided by the CS90 system can be accessed using the trackball on the Operating Panel and the menu system shown in the display presentation.

The CS90 system supports three different operating panels. These are referred to as "Mk1", "Mk2" and "Mk3".

- The Mk1 Operating Panel is connected to the Processor Unit with three cables. The dual interface cable provides power and serial communication. The USB interface cable is used to read the trackball movements. The Processor Unit must be fitted with a custom made interface board. A small commercial power supply is used to provide power to the Operating Panel. (The Mk1 Operating Panel is no longer provided with new sonars. This information is provided for legacy reasons.)
- The Mk2 Operating Panel is connected to the Processor Unit using an Ethernet cable. The Operating Panel is provided with a built-in power supply.
- The Mk3 Operating Panel is connected to the Processor Unit with a USB cable. A dedicated power supply unit is not required.

Select which operating panel to use. Assign functionality as permitted by each type of operating panel.

Topics

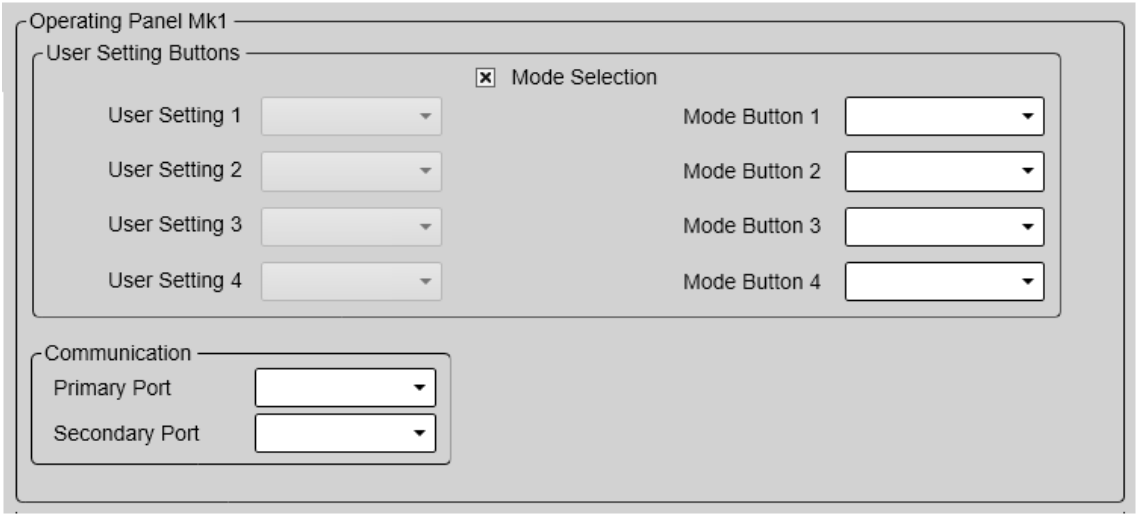
Operating Panel Mk1, page 597

Operating Panel Mk2, page 598

Operating Panel Mk3, page 602

Operating Panel Mk1

The Mk1 Operating Panel is connected to the Processor Unit with three cables. The dual interface cable provides power and serial communication. The USB interface cable is used to read the trackball movements. A small commercial power supply is used to provide power to the Operating Panel.



Details

User Setting Buttons

On the Mk3 Operating Panel, the requested user setting or presentation mode is chosen with a single button. Select **Mode Selection** to specify what you want to use the buttons for. Assign one predefined user setting *or* presentation mode to each button on the Operating Panel.

Tip

Before you can assign custom user settings to the operating panel, a selection of settings must be available from the **User Settings** *dialog box. The* **User Settings** *dialog box is located on the* **Main** *menu.*

Communication

This functionality is only applicable for the Mk1 Operating Panel.The Mk1 Operating Panel is connected to the Processor Unit with three cables. The dual interface cable provides power and serial communication. The USB interface cable is used to read the trackball movements.

Primary Port

Choose which serial line communication port you wish to use to communicate with the Operating Panel.

Secondary Port

If you only use one Operating Panel, set this choice to *None*.

Note

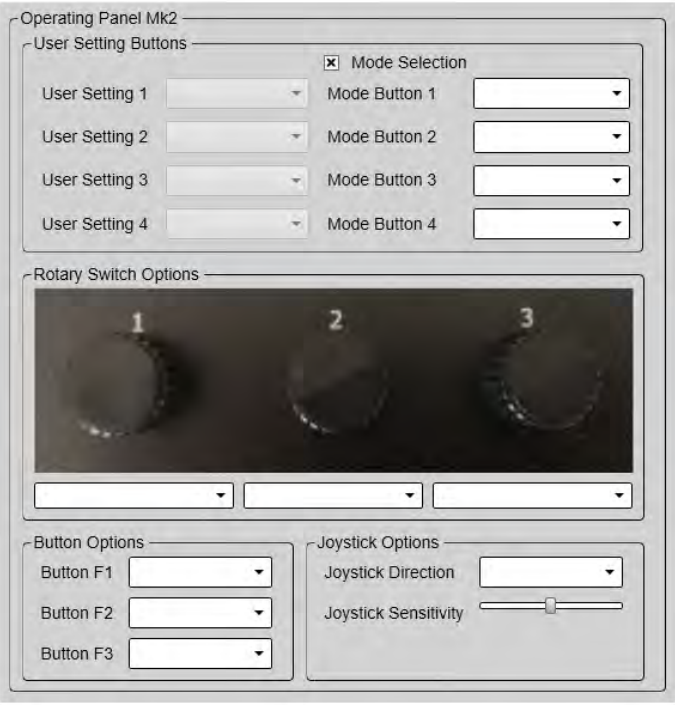
*It is very important that the chosen communication port is not put to other use in the **I/O Setup** page in the* **Installation** *dialog box. If you have two operating panels in use, neither communication ports must be used for any other purposes.*

Related topics

Defining the user-selected features on the Operating Panel, page 171
Functions and dialog boxes, page 418
Setup menu: functions and dialog boxes, page 454
Operating Panel page, page 596

Operating Panel Mk2

The Mk2 Operating Panel is connected to the Processor Unit using an Ethernet cable. The Operating Panel is provided with a built-in power supply.



Details

User Setting Buttons

On the Mk2 Operating Panel, the four buttons dedicated for user settings or presentation modes are located the top of the panel. Select **Mode Selection** to specify what you want to use the buttons for. Assign one predefined user setting *or* presentation mode to each button on the Operating Panel.

Tip

Before you can assign custom user settings to the operating panel, a selection of settings must be available from the **User Settings** *dialog box. The* **User Settings** *dialog box is located on the* **Main** *menu.*

Any user setting selected on the Operating Panel is identified in the upper left corner of the Horizontal view. The identifying number refers to the **User Setting** *number on the* **Operating Panel** *page. Click on the text to make it larger. Click one more time to restore the original font size.*

Rotary Switch Functions

The Mk2 Operating Panel is fitted with three rotary switches. The switches are identified with numbers. Each switch can be assigned a function related to range, gain, bearing or tilt.

Under **Rotary Switch Options**, assign one function to each rotary switch on the Operating Panel. The following functions can be assigned:

Horizontal Range

This is the range setting in the *Horizontal* view.

Vertical Range

This is the range setting in the *Vertical* view.

Inspection Range

This is the range setting in the *Inspection* view.

Horizontal Range 2

This is the range setting in the *second Horizontal* view when a "dual" presentation mode is used.

Vertical Range 2

This is the range setting in the *second Vertical* view when a "dual" presentation mode is used.

Plane Range

This is the range setting in the *Plane* view.

Active Ping Range

This is the range setting in the currently active view.

Active Ping Gain

This is the gain setting in the currently active view

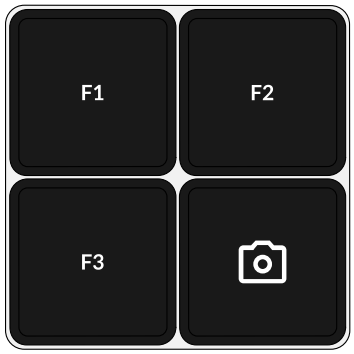
Active Ping Bearing

This is the bearing setting in the currently active view.

Active Ping Tilt

This is the tilt setting in the currently active view

Button Options



The Mk2 Operating Panel is fitted with three function buttons. The buttons are identified as **F1**, **F2** and **F3**. Each button can be assigned a dedicated function. The three function buttons are grouped with the **Screen Capture** button.

Under **Button Options**, assign one function to each **Fx** button on the Operating Panel. The following functions can be assigned:

Auto Tilt

This is an "on/off" function. When *Auto Tilt* mode is activated the beam will automatically change its tilt angle for each transmission ("ping"). The centre of the tilt sector is defined by the chosen tilt angle just before the *Auto Tilt* mode is started. The chosen tilt sector is shown on the tilt indicator in the *Horizontal* view using a shaded background. The sector and step settings are made using the **Tilt** function on the **Main** menu.

Off Centre

This is the same function as **Set New Ship Centre** on the shortcut menu. Place the cursor anywhere in the view and press the button. The function moves the vessel symbol to the selected position.

Zoom

Place the cursor anywhere in the view, right-click and select **Zoom**. Only one zoom level is provided. Select **Zoom** one more time to restore the original view.

Menu Off

This is an "on/off" function. Unless you need to make frequent changes to the operating parameters, you may want to hide the menu from the display presentation. This gives you more space for echo information.

Audio

Select **Audio** to turn the audio output on or off.

Own Ship

This is the same function as **Place Own Ship Marker** on the shortcut menu. Select this function to add a square symbol to the vessel's current position in the echo presentation. The own ship marker is now regarded as an *object*. All information about the object is shown in the **Objects** menu listed as "OSM". Use **Delete Own Ship Marker** on the shortcut menu to delete the marker from the current view.

Auto Bearing

This is an "on/off" function. Set this function to *On* to start the automatic search function. In the *Auto Bearing* mode the CS90 system will

automatically search within defined sector limits. The sector is identified in the view using two angular symbols. The sector and step settings are made using the **Bearing** function on the **Main** menu.

Screen Recording

This is an "on/off" function. The **Screen Recording** function allows you to record and save the echo presentation as a video file. Each screen recording you make is saved in `.mp4` format on the Processor Unit hard disk. The file name reflects the current date and time.

Select **Screen Recording** to start and stop the recording from the Operating Panel.

Use the **Screen Recording** page to define where the video files are saved. This page is located in the **Output** dialog box.

Delete Oldest Marker

The CS90 offers several different marker types. You can add as many markers as you like. The most common markers can be added using dedicated buttons on the Operating Panel. Other markers are added using the shortcut menu in each view. Each marker is identified with its geographical location.

Select **Delete Oldest Marker** to use the Operating Panel to remove the oldest marker from the sonar view.

Joystick Options

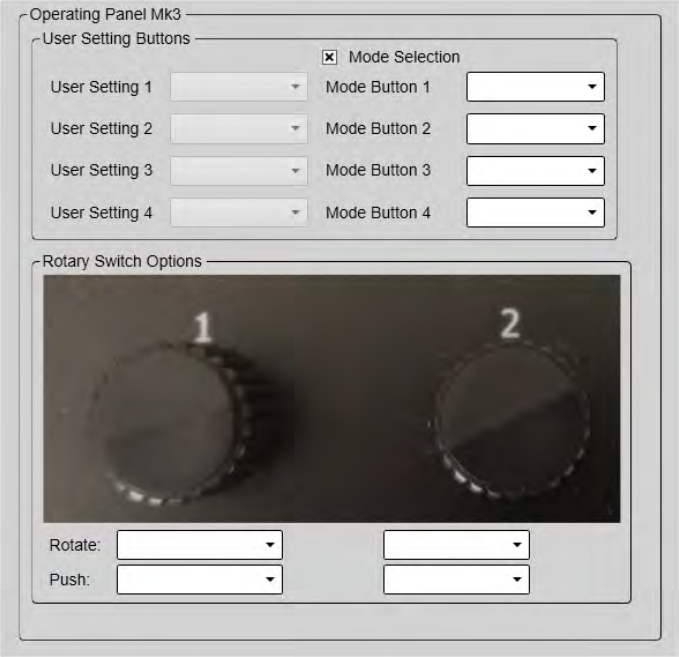
Use these settings to set up the joystick operation.

Related topics

Defining the user-selected features on the Operating Panel, page 171
Functions and dialog boxes, page 418
Setup menu: functions and dialog boxes, page 454
Operating Panel page, page 596

Operating Panel Mk3

The Mk3 Operating Panel is connected to the Processor Unit with a USB cable. A dedicated power supply unit is not required.



Details

User Settings / Presentation Modes

On the Mk3 Operating Panel, the requested user setting or presentation mode is chosen with a single button. Press the button repeatedly to cycle through the settings or modes. Select **Mode Selection** to specify what you want to use the button for.

Tip

Before you can assign custom user settings to the operating panel, a selection of settings must be available from the **User Settings** *dialog box. The* **User Settings** *dialog box is located on the* **Main** *menu.*

Any user setting selected on the Operating Panel is identified in the upper left corner of the Horizontal view. The identifying number refers to the **User Setting** *number on the* **Operating Panel** *page. Click on the text to make it larger. Click one more time to restore the original font size.*

Rotary Switch Functions (Rotate)

The Mk3 Operating Panel is fitted with two rotary switches. The switches are identified with numbers. Each switch can be assigned a function related to range, gain, bearing or tilt.

Under **Rotary Switch Options**, assign one **Rotate** function to each rotary switch on the Operating Panel. The following functions can be assigned:

Horizontal Range

This is the range setting in the *Horizontal* view.

Vertical Range

This is the range setting in the *Vertical* view.

Inspection Range

This is the range setting in the *Inspection* view.

Horizontal Range 2

This is the range setting in the *second Horizontal* view when a "dual" presentation mode is used.

Vertical Range 2

This is the range setting in the *second Vertical* view when a "dual" presentation mode is used.

Plane Range

This is the range setting in the *Plane* view.

Active Ping Range

This is the range setting in the currently active view.

Active Ping Gain

This is the gain setting in the currently active view

Active Ping Bearing

This is the bearing setting in the currently active view.

Active Ping Tilt

This is the tilt setting in the currently active view

Rotary Switch Functions (Push)

Assign one **Push** function to each rotary switch. The assigned function is activated when you *press* the rotary switch.

None

No specific functionality is assigned.

Auto Tilt

This is an "on/off" function. When *Auto Tilt* mode is activated the beam will automatically change its tilt angle for each transmission ("ping"). The centre

of the tilt sector is defined by the chosen tilt angle just before the *Auto Tilt* mode is started. The chosen tilt sector is shown on the tilt indicator in the *Horizontal* view using a shaded background. The sector and step settings are made using the **Tilt** function on the **Main** menu.

Zoom

Place the cursor anywhere in the view, right-click and select **Zoom**. Only one zoom level is provided. Select **Zoom** one more time to restore the original view.

Menu Off

This is an "on/off" function. Unless you need to make frequent changes to the operating parameters, you may want to hide the menu from the display presentation. This gives you more space for echo information.

Audio

Select **Audio** to turn the audio output on or off.

Own Ship

This is the same function as **Place Own Ship Marker** on the shortcut menu. Select this function to add a square symbol to the vessel's current position in the echo presentation. The own ship marker is now regarded as an *object*. All information about the object is shown in the **Objects** menu listed as "OSM". Use **Delete Own Ship Marker** on the shortcut menu to delete the marker from the current view.

Auto Bearing

This is an "on/off" function. Set this function to *On* to start the automatic search function. In the *Auto Bearing* mode the CS90 system will automatically search within defined sector limits. The sector is identified in the view using two angular symbols. The sector and step settings are made using the **Bearing** function on the **Main** menu.

Screen Recording

This is an "on/off" function. The **Screen Recording** function allows you to record and save the echo presentation as a video file. Each screen recording you make is saved in `.mp4` format on the Processor Unit hard disk. The file name reflects the current date and time.

Select **Screen Recording** to start and stop the recording from the Operating Panel.

Use the **Screen Recording** page to define where the video files are saved. This page is located in the **Output** dialog box.

Delete Oldest Marker

The CS90 offers several different marker types. You can add as many markers as you like. The most common markers can be added using dedicated

buttons on the Operating Panel. Other markers are added using the shortcut menu in each view. Each marker is identified with its geographical location.

Select **Delete Oldest Marker** to use the Operating Panel to remove the oldest marker from the sonar view.

Computer audio enabled for transducer movements

The Operating Panel is not fitted with a loudspeaker. Select this function to allow the Processor Unit to provide audio notifications when you lower or hoist the transducer.

Related topics

Defining the user-selected features on the Operating Panel, page 171

Echogram Settings page

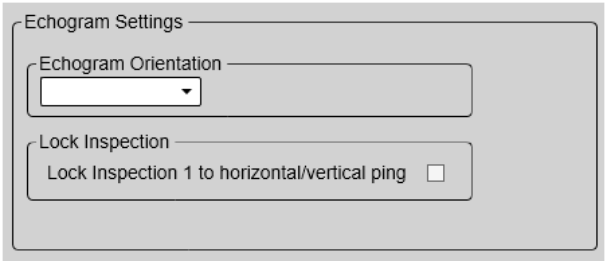
The CS90 system offers an *inspection* beam. The inspection beam is presented using an *Inspection* view. Use the **Echogram Settings** page to set up basic functionality for the *Inspection* view.

How to open

This page is located in the **Installation** dialog box. The **Installation** dialog box is located on the **Setup** menu.

Example

Description



The echo presentation in the *Inspection* view resembles the echogram you see on an echo sounder. The *Inspection* view can be regarded as an "echo sounder" with an adjustable direction. In the CS90 system we use the phrase *echogram* to describe the information provided by the view.

Details

Echogram Orientation

The inspection beam offered by the CS90 system resembles a split beam echo sounders that you can point in the desired directions. The **Echogram Orientation** function allows you to see the echo data with the start depth and the transmit pulse at the transducer face (looking "downwards"), or vice versa (looking "upwards").

Lock Inspection

The bearing of the *Inspection* view can be locked to the bearing the *Horizontal* view.

Related topics

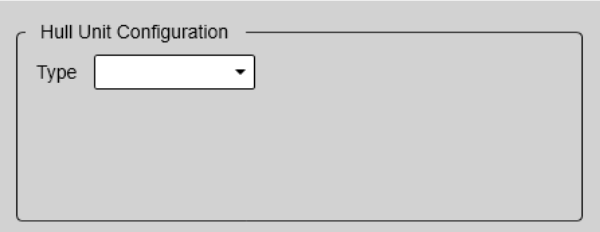
Functions and dialog boxes, page 418
Setup menu: functions and dialog boxes, page 454
Installation dialog box, page 466

Hull Unit Configuration page

The hull unit is used to lower the transducer down below the ship's hull when the CS90 system shall be used. When the CS90 system is turned off, the transducer is hoisted for protection. Use **Hull Unit Configuration** to specify the type of hull unit your CS90 system is using.

Prerequisites

The **Installation** dialog box is not available when your CS90 system is set to *Replay* mode.



How to open

This page is located in the **Installation** dialog box. To open, select it on the **Setup** menu.

Description

The CS90 system can be provided with different hull units. The main difference between these hull units is the length of the transducer shaft, and thus also the physical height of the entire hull unit assembly. The same transducer is used on all hull unit types.

Select which type of hull unit that has been installed. You only need to do this once.

Note

The choice you make is vital for all operation. An accidental change to the setting may cause damage to your CS90 system.

Related topics

Functions and dialog boxes, page 418
Setup menu: functions and dialog boxes, page 454
Installation dialog box, page 466

System Protection page

Safe operation of the CS90 system is made possible using multiple sensors that monitor the operation and the performance. Whenever a suspicious event takes place, a relevant message, warning or alarm is provided. The **System Protection** parameters allow you to define your own warning limits for the CS90 system.

How to open

This page is located in the **Installation** dialog box. To open the page, select **Installation** on the **Setup** menu.

Prerequisites

The **Installation** dialog box is not available when your CS90 system is set to *Replay* mode.

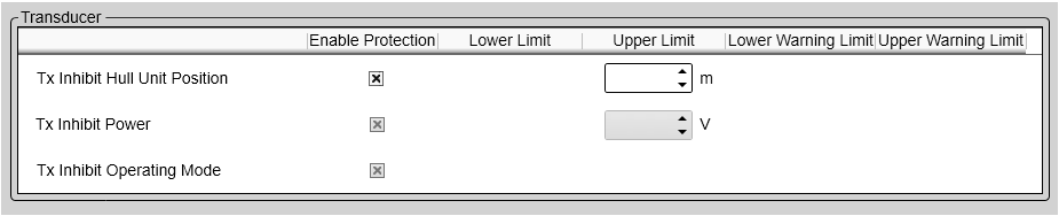
Description

The **System Protection** page allows you to specify alarm limits for the hull unit and the transducer. Additional system protection features are also listed. These function are automatically monitored by the software in the CS90 system. You are not permitted to change the alarm limits.

If an alarm limit is exceeded a relevant message is issued by the CS90 system. At the same time, the relevant descriptive text is provided with a dark background.

Details

Transducer



Tx Inhibit Hull Unit Position

If the transducer is activated when out of the water it may be damaged beyond repair. With the transducer fully retracted, no transmissions ("pings") take place. When you lower the transducer into the water, you can specify a vertical position for when the transmissions start. When the transducer is retracted, transmissions will stop when the transducer reaches the same position.

Tx Inhibit Power

The high voltage supplied to the transceiver boards is monitored. You are not permitted to change the alarm limits. If this voltage differs from the defined

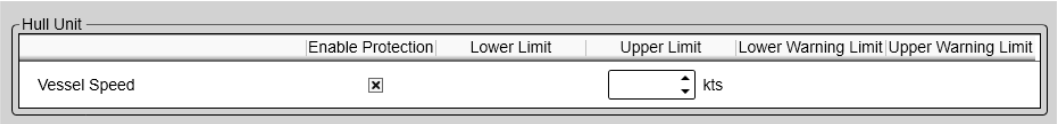
tolerances, alarm message AKH11 will be initiated: `Transmission is inhibited due to a high voltage in the power supply.`

Tx Inhibit Operation Mode

This feature activates the system protection to make sure that the CS90 system does not transmit ("ping") when you have chosen *Replay* or *Inactive* mode.

Hull Unit

You must specify a maximum speed for the vessel. This speed can match the hull unit specification, or you can choose a lower speed for increased safety.



Note

We strongly recommend that you do not specify a higher speed than the hull unit is designed for.

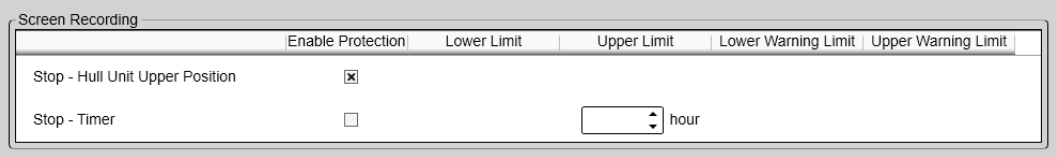
If the speed limit is exceeded a message is issued by the CS90 system.

The CS90 system can be provided with one of the following hull units:

Hull Unit	Lowering depth (m)	Transducer cable (m)	Maximum speed (knots)
CS90	1.0	4.6	20
		10	
CS94	2.1	4.6	19
		7	

Screen Recording

The **Screen Recording** function allows you to record and save the echo presentation as a video file. Each screen recording you make is saved in `.mp4` format on the Processor Unit hard disk. The file name reflects the current date and time.



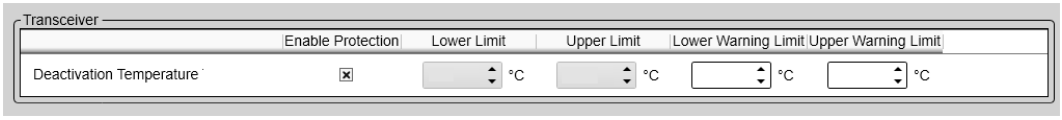
Video data files will normally become very large. If you wish to record large amounts of data, make sure that you have enough space on your hard disk. Unless your Processor Unit is equipped with a very large disk, we recommend that you save the data to an external storage device.

The **Screen Recording** protection stops the recording automatically when the transducer is hoisted to its upper position. Select **Enable Protection** to allow the CS90 system to monitor the value against the chosen limit. The **Timer** function stops the recording automatically when the specified time has elapsed.

Related functionality:

- Select **Screen Recording** on the top bar to start and stop the recording. Everything that happens in the presentation is recorded. This includes echoes, menus, dialog boxes and cursor movements.
- Use the **Screen Recording** page to define where the video files are saved. This page is located in the **Output** dialog box. This dialog box is opened from the **Operation** menu.

Transceiver

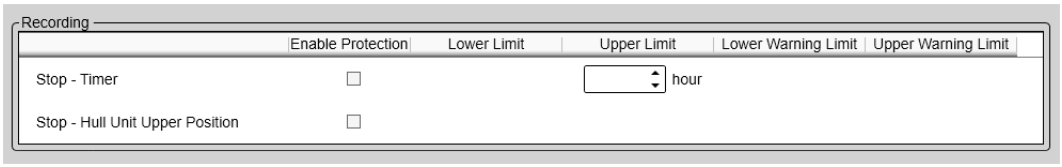


The CS90 software monitors the internal temperature in the Transceiver Unit. The default settings for the CS90 system include fixed values for **Lower Limit** and **Upper Limit**. You can not change these limits. If the temperature inside the transceiver exceeds these limits, it will turn itself off.

To provide you with a warning before this happens, you can specify a **Lower Warning Limit** and an **Upper Warning Limit**. Select **Enable Protection** to allow the CS90 system to monitor the value against the chosen limits.

Recording

Record RAW allows you to record the *unprocessed* echo data received by the transducer. You can save the data to the hard disk, or onto an external storage device. The data files can be played back on the CS90 system. You can keep the recorded files for future reference, training purposes and calibration.



The data files will normally become very large. If you wish to record large amounts of data, make sure that you have enough space on your hard disk. The CS90 system is not provided with unlimited disk capacity. We recommend that you save the data files to an external storage device.

The **Recording** protection stops the recording automatically when the transducer is hoisted to its upper position. Select **Enable Protection** to allow the CS90 system to monitor the value against the chosen limit. The **Timer** function stops the recording automatically when the specified time has elapsed.

Related functionality:

- The recording is controlled by the **Record RAW** function. Use the raw data recording functionality provided by the CS90 system to save echo data using the `*.raw` format. By means of the *Replay* function you can later play back the recorded file(s). This may prove useful if more a detailed study of the data is requested. You can also use the file(s) to experiment with the operational settings, as this will help you to gain more experience. The amount of data you can record is only limited by the size of your storage media.
- The **File Setup** settings control how and where the recorded files are saved on the hard disk, or on an external storage device. You can select the disk and folder for the files, the maximum file size, and a prefix for the file names. This page is located in the **Output** dialog box. This dialog box is opened from the **Operation** menu.
- When the recording is stopped, the **Recording** dialog box opens automatically. Use the **Recording** dialog box to add metadata to your recording.

Related topics

Defining settings related to user preferences and individual customizing, page 154
Functions and dialog boxes, page 418
Setup menu: functions and dialog boxes, page 454
Installation dialog box, page 466

Fishing Gear Setup page

By defining the type of fishing gear you are using, the CS90 system may provide more accurate visual presentations. Use the **Fishing Gear Setup** page to change the fishing gear properties to match your own equipment.

How to open

This page is located in the **Installation** dialog box.

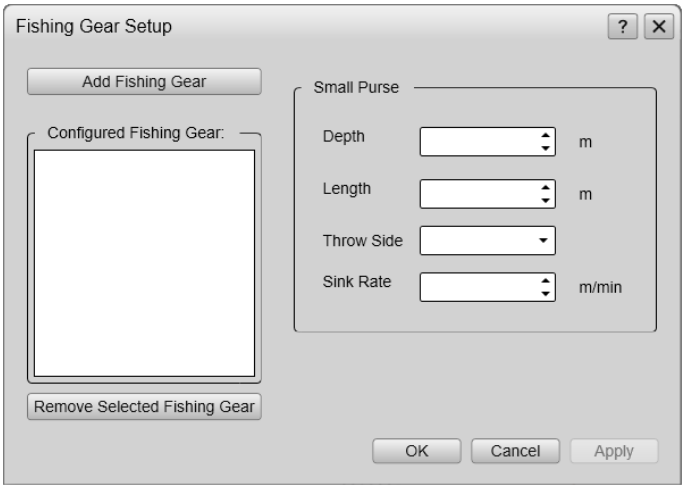
This page is also available as a separate dialog box. Under **Fishing Gear**, select **Fishing Gear Setup** to open the dialog box.

Description

On the list of available fishing gears, select the gear you wish to set up.

Tip

If the relevant gear is not listed, select **Add Fishing Gear**. *In the* **Add Fishing Gear** *dialog box, select gear type and gear name.*



Purse seine

When you select a purse seine, the right side of the dialog box changes to accept the purse parameters.

- For the selected gear, select a depth value. The depth value defines how deep the gear will sink when it is fully deployed.
- Select the length of the fishing gear.
- Set throw side to *Port* or *Starboard*.
- Set the sink rate. The sink rate defines how fast the gear will sink.

For fishing with a purse seine, the intended process follows:

1 To start the process:

- Press **Gear** on the Operating Panel. — **or:**
- Right-click and select **Show Gear Symbol** on the shortcut menu.

This places a circle marker in the view. The size and location of the marker is defined by the choices you have made with the **Fishing Gear** function. Until you proceed, the marker follows the movements of the vessel by keeping its relative location to the bow. This allows you to position your vessel in the best possible location before you shoot the purse seine.

2 When you shoot the net:

- Press **Gear** on the Operating Panel. — **or:**
- Right-click and select **Place Gear Symbol** on the shortcut menu.

The first timer starts when you select **Place Gear Symbol**.

A rectangular marker is placed in the view, and marks the position where the purse seine was shot. The circular marker is disconnected from the vessel movements, and acts as a guideline for your manoeuvring. The history line shows the movements of your vessel. Since the CS90 system knows the length of your net, it places a second marker on this line when half the length has been spent. When the entire net has been spent, a third rectangular marker is shown. In this phase the **Fishing Gear** function is disabled.

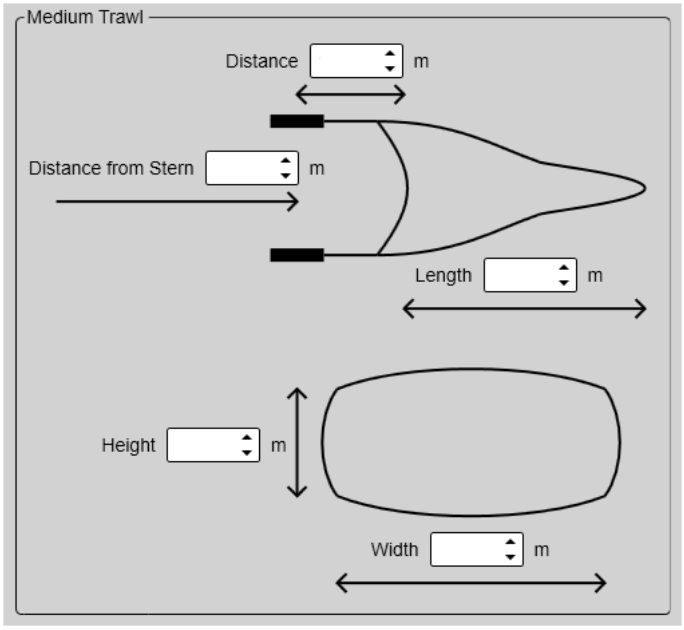
The first timer stops when the progress bar reads 100%. This action starts the second timer, which stops when you select **Remove Gear Symbol**.

3 When the process is finalized:

- Press **Gear** on the Operating Panel. — **or:**
- Right-click and select **Remove Gear Symbol** on the shortcut menu to delete the markers from the view.

Trawl

When you select a single or dual trawl, the right side of the dialog box changes to accept the trawl parameters.



Related functionality

Fishing Gear function

The **Fishing Gear** function allows you to define the size of your trawl or purse seine. Accurate fishing gear properties are important for the following functionality:

- Circle Marker
- Gear Symbol
- Catch view
- Vertical view

Open this function from the **Setup** menu.

Add Fishing Gear dialog box

By defining the type of fishing gear you are using, the CS90 system may provide more accurate visual presentations. Use the **Fishing Gear Setup** dialog box to change the fishing gear properties to match your own equipment. Use the **Add Fishing Gear** to add new equipment to your fishing gear list.

In the **Add Fishing Gear** dialog box, select gear type and gear name.

Related topics

Using the markers and tracking features, page 101
Functions and dialog boxes, page 418
Setup menu: functions and dialog boxes, page 454
Installation dialog box, page 466

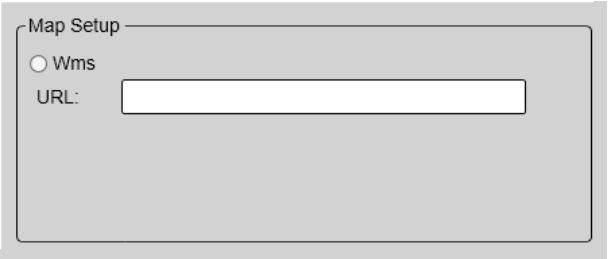
Map Setup page

If you want to add a map to the display presentation you must first select a *map provider*. Use the **Map Setup** page to choose a map provider and to enter necessary provider URL, API Key or license.

How to open

This page is located in the **Installation** dialog box. The **Installation** dialog box is located on the **Setup** menu.

Description



Specific map providers are listed. Choose map provider, then insert relevant information to make the connection.

Note

The map is only shown in Horizontal views when **Range Projection** *is set to True.*

Details

WMS (Web Map Service)

Only WMS (World Map Service) maps from a KONGSBERG navigation system are supported. The Processor Unit must be connected to the ship network. Type the correct URL to make contact with the map server.

A Web Map Service (WMS) is a standard protocol developed by the Open Geospatial Consortium in 1999 for serving georeferenced map images over the Internet. These images are typically produced by a map server from data provided by a GIS database. [] A WMS server usually serves the map in a bitmap format, e.g. PNG, GIF, JPEG, etc. In addition, vector graphics can be included, such as points, lines, curves and text, expressed in SVG or WebCGM format.

https://en.wikipedia.org/wiki/Web_Map_Service, June 2021

Related functionality

Map function

This is an "on/off" switch. Use **Map** to enable or disable the geographical map layer. This function is opened from the **Cosmetics** menu.

Map Display page

Once a map service has been chosen, use **Map Display** to choose which map elements to include in the map presentation. This page is located in the **Display Options** dialog box. The **Display Options** dialog box is located on the **Display** menu.

Safety Depth page

The **Safety Depth** page allows you to change the safety depth settings, and thus the presentation of the various water depths.

Range Projection function

The distance to a target located anywhere in the water column can be measured in two ways. This can either be the horizontal distance to the target (*True*), or along the tilt angle (*Slant*). The **Range Projection** function defines how this distance is measured. This function is opened from the **Active** menu.

Related topics

Using maps, page 150
Functions and dialog boxes, page 418
Setup menu: functions and dialog boxes, page 454
Installation dialog box, page 466
Cosmetics menu, page 411
Map Display page, page 540
Safety Depth page, page 541

User Settings Setup page

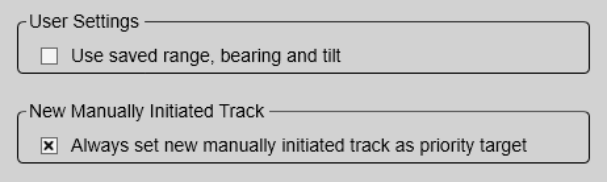
The **User Settings Setup** page is established to offer generic settings that do not naturally belong elsewhere.

Prerequisites

The **Installation** dialog box is not available when your CS90 system is set to *Replay* mode.

How to open

This page is located in the **Installation** dialog box. To open the page, select **Installation** on the **Setup** menu.



Description

User Settings

The **User Settings** dialog box allows you to save the current user settings (your current selection of operational parameters), and to retrieve factory or previously saved user settings. These settings can be related to different operations, environmental conditions or basic personal preferences. By default, information about the current range, bearing and tilt will not be saved. On the **User Settings Setup** page, tick the box to include range, bearing and tilt information the next time you save the user settings.

New Manually Initiated Track

During normal operation, some echoes are clearly more interesting than others. In many situations specific echoes may be regarded as *targets*. To set up the CS90 system to provide such information, you can start *target tracking*.

The **Initiate Track** function allows you to manually start target tracking.

Place the cursor over the echo you wish to track. Select **Initiate Track**. The tracked target is regarded as an *object*, and it is identified with a circle and two lines. The bearing line is automatically locked on the object to reflects its bearing.

By default, a new manually initiated tracked object is automatically given priority status. If another object has this priority, the status is transferred to the new object. The priority is identified with a "P".

On the **User Settings Setup** page, *de-select* **New Manually Initiated Track** if you do not want new tracked targets to become priority targets.

Related functionality

User Settings dialog box

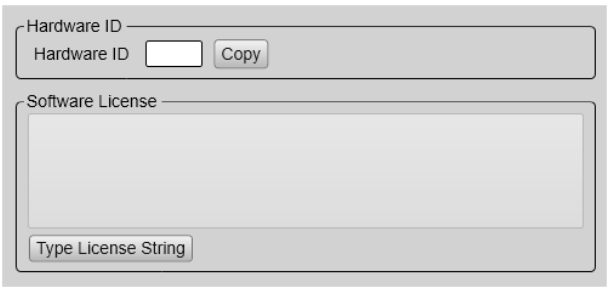
The **User Settings** dialog box allows you to save the current user settings (your current selection of operational parameters), and to retrieve factory or previously saved user settings. This dialog box is opened from the **Main** menu.

Related topics

Functions and dialog boxes, page 418
Setup menu: functions and dialog boxes, page 454
Installation dialog box, page 466

Software License page

The CS90 system does not need any software licenses to operate. However, specific software license codes "unlocks" additional functionality. The **Software License** settings allow you to type a license code (text string) to unlock these optional functions.



Prerequisites

The **Installation** dialog box is not available when your CS90 system is set to *Replay* mode.

How to open

This page is located in the **Installation** dialog box. To open the page, select **Installation** on the **Setup** menu.

Description

The software license is a 32 character hexadecimal string based on the hardware identifier (**Hardware ID**). This unique identifier is generated using information from key components in the Processor Unit. The software license is linked to the physical Processor Unit. You cannot move the CS90 system software from one Processor Unit to another unless you also request and install a new license.

In order to obtain a software license you must contact one of our dealers or distributors. You can also use the request form on our website, or contact our support department directly.

Note

Once you receive your software license string(s), do not lose them. We suggest that you copy the information into a text file (for example Notepad), and add relevant information. Place the text file on the computer desktop, and make sure that backup copies are made.

When you work in the **Installation** dialog box, you must always select **Apply** to save the changes made on a page. You must do this before you continue working on a different page.

The following licensing option is available for the CS90 system:

NetCDF

The CS90 system supports netCDF4, where the number refers to the version of the format. SONAR-NetCDF4 is a data and metadata convention for storage of data from active sonars in NetCDF4 formatted files, defined by The International Council for the Exploration of the Sea (ICES). Sonar-NetCDF4 consists primarily of a naming convention and a data structure within the NetDCF4 data model.

Details

Hardware ID

This unique identifier is generated using information from key components in the computer. Select **Copy** to copy the identifier to the clipboard.

Software License

This list shows you the software licenses that you have currently activated on your computer.

Type License String

Select **Type License String** to open a dedicated dialog box. Type the license code.

You do not need to type the string manually. You can copy the code using the **Ctrl-C** and **Ctrl-V** keyboard combination, or right-click the mouse to use **Copy** and **Paste**.

Related topics

Installing and maintaining software, page 225
Functions and dialog boxes, page 418
Setup menu: functions and dialog boxes, page 454
Installation dialog box, page 466

Transceiver Upgrade page

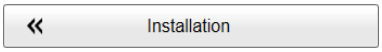
The CS90 system offers a large number of transceiver channels. 16 identical transceiver boards are used. Certain functions offered by the CS90 system may require the firmware on these transceiver boards to be upgraded. For more information, refer to the relevant software release note.

Prerequisites

The **Installation** dialog box is not available when your CS90 system is set to *Replay* mode.

How to open

This page is located in the **Installation** dialog box. To open the page, select **Installation** on the **Setup** menu.



Description

If a firmware upgrade is required, the necessary software will be included with the operational software. Once the new CS90 system software has been installed, the **Upgrade** button will be available.

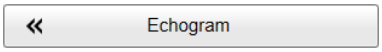
If the **Upgrade** button is unavailable, a firmware upgrade is *not* required.

Related topics

Functions and dialog boxes, page 418
Setup menu: functions and dialog boxes, page 454
Installation dialog box, page 466

Pages in the Echogram dialog box

The **Echogram** dialog box allows you to control the echogram presentation in the *Inspection* views. Two pages control the horizontal lines and the echogram type with applied TVG (time variable gain). One page controls how fast the echogram travels horizontally across the presentation.



How to open

This dialog box is opened from the **Active** menu.

Description

The CS90 system offers several inspection beams. Each inspection beam is presented using an *Inspection* view. Each *Inspection* view shows you echo data from a separate beam.If you use several *Inspection* views, you can train and tilt the beams individually, and independent of the beams displayed in the other views. The echo presentations in the *Inspection* views resemble the echograms you see on an echo sounder. Each *Inspection* view can be regarded as an "echo sounder" with an adjustable direction. In the CS90 system we use the phrase *echogram* to describe the information provided by the views.

Note

The dialog box is only available when an Inspection view is active. To activate a view, click in it. The active view is identified with a thicker border.

Lines page

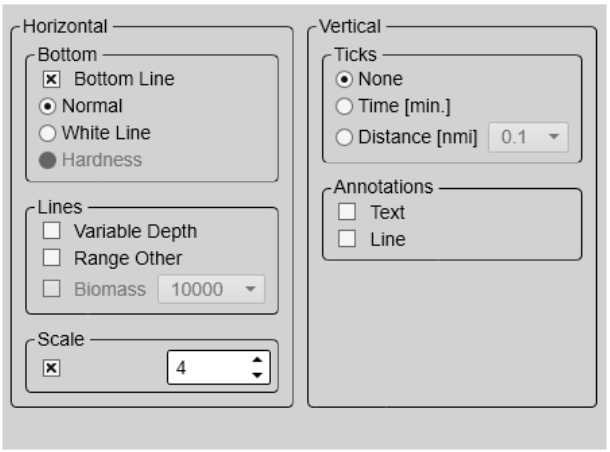
The echo presentations in the *Inspection* views resemble the echograms you see on an echo sounder. The **Lines** page in the **Echogram** dialog box allows you to control the horizontal and vertical lines used in the echogram presentation. You can make the bottom easier to see, and add lines that hold additional information. The vertical scale of the echogram presentation can be changed. If you wish to add annotations to your echogram, these are enabled on this page.

How to open

This page is located in the **Echogram** dialog box. The **Echogram** dialog box is located on the **Active** menu. The dialog box is only available when an *Inspection* view is active.

Description

The settings on the **Lines** page are all related to visual appearance. The changes you make are by default only valid for the active *Inspection* view. Click in the *Inspection* view to activate it. The active view is identified with a thicker border.



Details

Bottom

The bottom line can be switched off or on. You can enable a white line to enhance the bottom contour presentation.

Bottom Line

This is an "on/off" switch. Select the box to enable the function. A bottom line can be added to your echogram to enhance the visual bottom detection. It appears as thin line that follows the bottom contour. The line is drawn in the current foreground colour.

Normal

This is an "off" switch. The white line is disabled. The bottom line is drawn in the current foreground colour.

White Line

This is an "on" switch. A white line can be added to your echogram to enhance the visual bottom detection. It appears as thick line in the current background colour (normally white) that follows the bottom contour. This line will not remove information, it will simply "push" the echo information further down in order to make the bottom easier to see. You can use the white and the bottom lines simultaneously. Select **Normal** to disable the line.

Hardness

This is an "on" switch. The *Hardness Line* can be added to your echogram to retrieve additional information. It appears as thick colour coded line that follows the bottom contour. This line does not remove information, it simply "pushes" the echo information further down in order to show you the bottom reflectivity. You can use the *Hardness Line* and the *Bottom Line* functions simultaneously, but each can not be used together with the *White Line*. To disable the line, select **None**.

When you study the bottom hardness, you can learn more about the bottom. Certain species are known to prefer specific bottom conditions. With more knowledge, you are better qualified to estimate the possible catch.

Note

This is an optional function. In order to use this functionality, a dedicated software license is required. Contact you local dealer for more information.

Lines

You can enable or disable one or more horizontal lines on the echogram.

Variable Depth

This is an "on/off" switch. Select the box to enable the function. The *Variable Depth Line* can be added to your echogram to measure the depth. A horizontal line with a depth readout is placed in the echogram. To change the depth, select the line, keep the mouse button depressed, and move it up and down to place it at the requested position. This function is typically used to measure the water depth, the depth of a school, or even single fish.

Range Other

This is an "on/off" switch. Select the box to enable the function. This function is used when you set up your CS90 system with both a surface related and bottom related echogram shown simultaneously. When enabled, two horizontal lines in the surface echogram indicate the range selected in the bottom echogram.

Biomass

This is an "on/off" switch. Select the box to enable the function. This function writes an extra thick and brightly coloured curve on the echogram. The biomass line shows you the integrated biomass for the pings within the selected calculation interval. Change the scale to fit the vertical space available on the echogram.

Scale

When enabled, equidistant horizontal scale lines are drawn inside the view in the current foreground colour; black during day and white during night. A maximum of 10 scale lines can be selected. No scale lines are drawn when the scale line count is set to 0 (zero).

Vertical

These options control vertical markers and annotations.

Ticks

This function places short vertical markers on the top of the echogram. These lines are used to measure time or distance.

- **None**: No vertical markers are shown.
- **Time**: A short vertical line is drawn in the upper part of the echogram once every minute.

- **Distance**: A short vertical line is drawn in the upper part of the echogram once every specified number of nautical miles.

Annotations

Select **Text** or **Line** to allow annotation markers to be shown. If you select **Line**, each text annotation is followed by a vertical line for improved visibility. Annotations can be typed in manually, set up for automatic generation, or imported from an external device.

Tip

Use the **Annotations** *page to type comments and insert annotations into views. Several different annotation types may be added to the echograms or other views. The* **Annotations** *page is located in the* **Installation** *dialog box.*

When you save raw data, the annotations you have defined are stored as annotation datagrams.

Related topics

Functions and dialog boxes, page 418
Active menu: functions and dialog boxes, page 469
Echogram dialog box, page 493

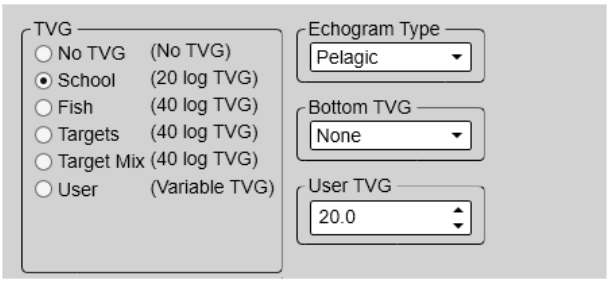
Echogram page

The echo presentations in the *Inspection* views resemble the echograms you see on an echo sounder. The **Echogram** page allows you to choose which type of echogram you wish to display. You can also control the TVG (Time Variable Gain). The CS90 system can work with several different TVG compensation settings. The TVG (Time Variable Gain) compensation is designed to counteract the natural phenomena of geometric spread and absorption loss.

How to open

This page is located in the **Echogram** dialog box. The **Echogram** dialog box is located on the **Active** menu. The dialog box is only available when an *Inspection* view is active.

Description



Each *Inspection* view offered by the CS90 system can show you a different echogram type. Which type to see is chosen on this **Echogram** page. The page also allows you to select which TVG curve to use for the chosen echogram.

The changes you make are by default only valid for the active *Inspection* view. Click in the *Inspection* view to activate it. The active view is identified with a thicker border.

Tip

You can also select TVG setting with the **TVG** *function. The* **TVG** *(Time Variable Gain) function is located on the* **Active** *menu.*

Details

TVG (Time Variable Gain)

When an acoustic pulse is sent through the water, it will gradually lose its energy. The greater the distance between the transducer and the target(s), the greater the loss of energy.

The TVG (Time Variable Gain) compensation is designed to counteract the natural phenomena of geometric spread and absorption loss. The TVG compensation is expressed as a logarithmic curve. You can choose from a selection of curves. Each curve has a different slope creating a different gain compensation.

Select the TVG (Time Variable Gain) setting you want to use. Several TVG compensation settings are available.

No TVG

TVG compensation is not implemented. This option is hardly ever used.

School (20 log R)

This setting offers weaker amplification close to the bottom. It has been designed to provide the best echoes for schools. The physical size of a school allows you to detect it even with reduced gain.

Fish (40 log R)

This setting offers larger amplification closer to the bottom. It has been designed to provide the best echoes from single fish.

Targets (40 log R)

This setting uses the same TVG compensation as *Fish (40 log R)*, but additional filtering and compensation is implemented.

Only echoes detected and interpreted as single fish are shown. The echoes are compensated for their physical position in the beam (beam compensation). This means that fish in the outer region of the beam are adjusted to correct size even though their echoes are weaker.

Target mix (40 log R)

This setting uses the same TVG compensation as *Fish (40 log R)*, but additional beam compensation is implemented. Echoes detected and interpreted as single fish are adjusted to their correct size according to their physical position in the beam.

User

This setting allows you to define your own TVG curve. To choose your own TVG curve, use the dedicated function in the **Echogram** dialog box.

Echogram Type

Use this function to select what kind of echogram you wish to see in the current (active) view.

Surface

A *Surface* echogram is mainly used when you wish to look at the entire water column starting from the sea surface and down to the sea bottom. Since this echogram is referenced to the sea surface, the sea bottom contour will vary with the actual depth. If you set up the **Start Range** and **Range** depths to place the sea bottom contour at the lower end of the echogram, you will have good opportunity to study the echoes from the water column.

In the surface echogram, all calculations are made from the sea surface and down to the detected sea bottom. Use this echogram type to obtain correct calculation of the biomass. It will also provide valid data for the *Size Distribution* information pane.

Bottom

A *Bottom* echogram is mainly used when you want to examine the echoes from fish close to the sea bottom. Since this echogram is referenced to the sea bottom, the sea surface will vary with the actual depth, while the bottom is drawn flat. This makes it easy to study the echoes from the sea bottom. You can investigate the sea bottom conditions and hardness, and detect fish.

The echogram is only drawn for pings that have a successful bottom detection.

Pelagic

A *Pelagic* echogram is mainly used when you wish to look at the water column starting from any distance below the sea surface down towards the bottom, but without seeing the bottom contour. Pelagic echograms are useful when you work in deeper waters. The reduced range and the fact that you do not need to wait for the bottom echo means that the ping rate is increased.

In a *Pelagic* echogram the calculations disregard any bottom detection. All calculations are based on the entire echogram shown in the view. If the bottom echo is present in the echogram, the biomass calculation will be wrong.

Bottom TVG

Use the **Bottom TVG** function to specify a separate Time Variable Gain (TVG) compensation for the bottom detection.

The CS90 system allows you to use different TVG compensation for the echoes from the water column than from the bottom. By making the bottom echoes individually adjustable, you can fine tune the presentation from the bottom to investigate the bottom type and conditions. The **Bottom TVG** adjustment has no effect on fish close to the bottom.

If you set **Bottom TVG** to *None* there will be no gain change in the TVG at the detected bottom depth. The TVG selected for the echogram is then used for the entire depth range.

User TVG

If you are very familiar with the TVG principles, you can choose to use your own curve. In order to use the chosen curve, the TVG mode must be set to *User*. You can also select TVG setting with the **TVG** function. The **TVG** (Time Variable Gain) function is located on the **Active** menu.

Related topics

Functions and dialog boxes, page 418
Active menu: functions and dialog boxes, page 469
Echogram dialog box, page 493

Horizontal Axis page

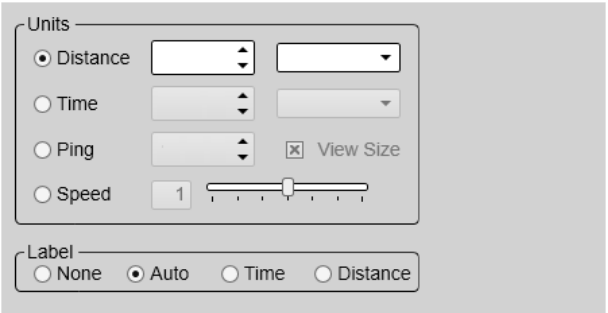
The echo presentations in the *Inspection* views resemble the echograms you see on an echo sounder. The echoes travel from right towards left across the echogram presentation. Use the **Horizontal Axis** to choose the horizontal scale of the echogram. This controls the "speed" of the echoes.

How to open

This page is located in the **Echogram** dialog box. The **Echogram** dialog box is located on the **Active** menu. The dialog box is only available when an *Inspection* view is active.

Description

The horizontal scale controls how "fast" the echoes move from right towards left across the presentation. The changes you make are by default only valid for the active *Inspection* view. Click in the *Inspection* view to activate it. The active view is identified with a thicker border.



Details

Horizontal Axis

The echoes travel from right towards left across the echogram presentation. Use the **Horizontal Axis** to choose the horizontal scale of the echogram. This controls the "speed" of the echoes.

- **Distance**: The horizontal scale is based on sailed distance. Select resolution and unit.
- **Time**: The horizontal scale is based on time. Select resolution and unit.
- **Ping**: The horizontal scale is based on the number of transmissions (“pings”) made. Select **View Size** to specify that the number of horizontal pixels shall define the number of displayed horizontal pings using one ping per pixel.
- **Speed**: The horizontal scale is based on the relative speed you choose. Select speed with the ruler.

Label

Small labels are shown in the bottom left and right corners of the view. These labels can contain time or distance to identify the horizontal axis of the echogram. You can hide the labels from view.

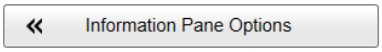
- **None**: The labels are hidden
- **Auto**: The horizontal scale is set automatically
- **Time**: The horizontal scale is defined by time. The time shown in the bottom right corner of the echogram is then the current time (now).
- **Distance**: The horizontal scale is defined by distance. The distance shown in the bottom right corner of the echogram is then 0 nautical miles (starting point).

Related topics

Functions and dialog boxes, page 418
Active menu: functions and dialog boxes, page 469
Echogram dialog box, page 493

Pages in the Information Pane Options dialog box

The CS90 system offers several *information panes* to provide additional and detailed data from the presentations. The information panes are opened and closed from the top bar. Several of the information panes are fitted with a **Setup** button. Select **Active** to open the **Information Pane Options** dialog box. Use the **Information Pane Options** dialog box to change the operating parameters for the data provided in the information panes.



How to open

This dialog box is opened from the **Active** menu. You can also open the **Information Pane Options** dialog box by selecting **Setup** in selected information panes.

Description

The **Information Pane Options** dialog box offers a menu on the left side, and several pages for pane parameters on the right side.

Note

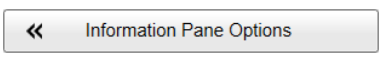
The dialog box is only available when an Inspection view is active.

Size Distribution page

The *Size Distribution* information pane presents a histogram with the echoes from single fish. The calculations are based on the fact that different fish species have different echo strength. The echo strength also depends on the operating frequency you use. Use the **Size Distribution** page to define the properties for the histogram shown in the *Size Distribution* information pane.

How to open

The page is opened in the **Information Pane Options** dialog box. To open, select the button on the **Active** menu.

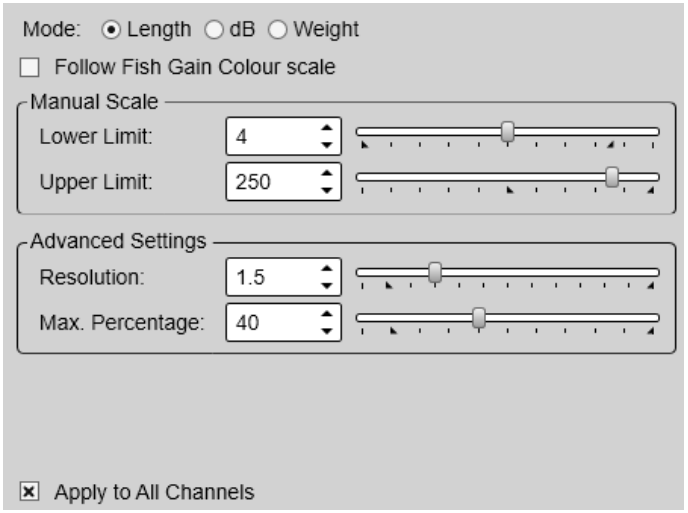


You can also open the page by selecting **Setup** in the information pane.

Prerequisites

The **Information Pane Options** dialog box is only available when an *Inspection* view is active.

Description



The settings provided by the **Size Distribution** page allow you to shape the vertical bars in the *Size Distribution* information pane to meet your own requirements. You can define the upper and lower limits, the accuracy, and the vertical resolution.

Note

The measurement accuracy in the Size Distribution information pane depends on the vertical angle of the inspection beam. A beam that points nearly straight down corresponds to a traditional echo sounder. This gives the best accuracy since the fish is then viewed from above. If you use a smaller beam angle, you may see the fish from the front or back. This gives significantly smaller echoes, and thus low measurement accuracy.

Details

Mode

The **Mode** function specifies if the histogram shall present the size distribution based on the fish size, echo strength, or fish weight.

Length

The histogram shows the size distribution as a *length* in metric units.

dB

The histogram shows the size distribution as an *echo strength value* i dB.

Weight

The histogram shows the size distribution as a *weight* in metric units.

Follow Fish Gain Colour Scale

Select this option to let the threshold follow the minimum level defined on the **Colour Scale** page for the corresponding channel.

Manual Scale

Choose the lower and upper limits (in dB) of the scale.

Lower Limit

This function specifies the lower limit of the target strengths shown in the histogram. The value reflects the current mode you have chosen.

Example: If you have chosen the *Length* mode, and specifies *10* in this spin box, fish shorter than 10 cm will not be shown in the histogram.

Upper Limit

This function specifies the upper limit of the target strengths shown in the histogram. The value reflects the current mode you have chosen.

Example: If you have chosen the *Weight* mode, and specifies *7000* in this spin box, fish heavier than 7 kg will not be shown in the histogram.

Advanced Settings

Resolution

This function specifies accuracy of the histogram; that is how many vertical bars that are used to display the target strength.

Max(imum) Percentage

This function controls the vertical resolution of the histogram.

Apply to All Channels

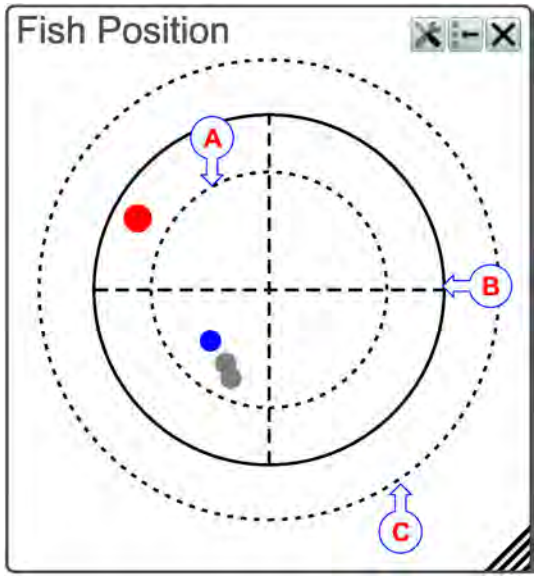
Check this box to apply the current setting to all the channels on your CS90 system. In this context, the term *channel* is used as a common term to identify the combination of transceiver, transducer and operating frequency.

Related topics

Functions and dialog boxes, page 418
Active menu: functions and dialog boxes, page 469
Information Pane Options dialog box, page 494

Fish Position page

The *Fish Position* information pane shows the position of the detected single fish echoes. The information pane is only available when an *Inspection* view is "active". Use the **Fish Position** page to set up the presentation parameters for the *Fish Position* information pane.



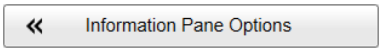
A *The dotted inner circle identifies the low frequency in the sweep.*

B *The circle between them identifies the centre frequency.*

C *The outer dotted circle identifies the high frequency.*

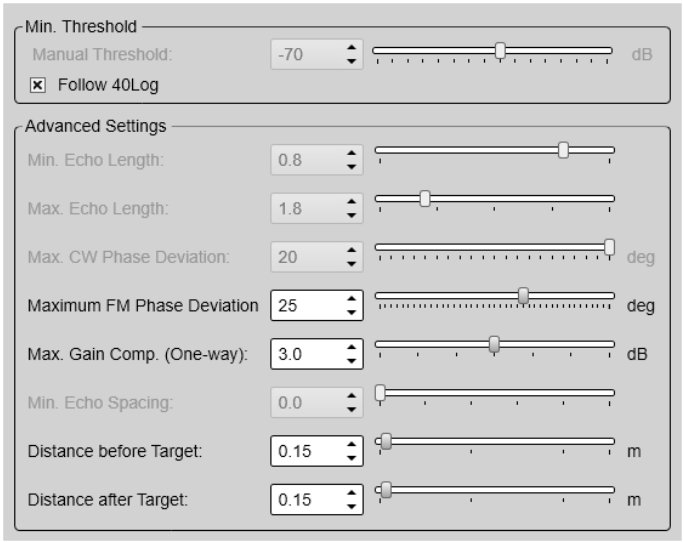
How to open

This page can be opened from several places in the user interface. The page is opened in the **Information Pane Options** dialog box. You can also select the **Setup** button in the relevant information pane.



The **Information Pane Options** dialog box is only available when an *Inspection* view is active.

Description



Each coloured circle in the information pane identifies a single fish. You can observe how these move through the beam. The colours used are the same as the colours used in the colour scale, and these indicate the echo strength from each fish. This information pane can be useful during trawling. Keep an eye on the *Fish Position* information pane to make sure that you can manoeuvre the trawl through the areas with most fish.

Several specific parameters are available for studies of single fish. In order to detect single fish correctly, these parameters should be defined to suit the specie characteristics.

Details

Minimum Threshold

Some echoes are stronger than others. If you have noise problems, or you are bothered with for example smaller fish (different species), jellyfish or plankton, you can use the **Minimum Threshold** function to adjust the sensitivity. The target strength (TS) for a single target must exceed this threshold (in dB) to be accepted.

Use this function to define a "filter" value.

Follow 40 Log

Select this option to let the threshold follow the minimum level defined on the **Colour Scale** page for the corresponding channel.

Minimum Echo Length / Maximum Echo Length

These settings only apply to CW operation.

The echo from a single target will normally have a similar (or slightly longer) length than the length of the transmitted signal. This is due to the physical properties of the target.

Some single targets are so close in range that they are overlapping. These will give you a longer echo than the length of the transmitted pulse. It is important that such multiple targets are excluded. By using the echo length values, you can define the maximum and minimum length of the echo compared to the transmitted pulse. If the echo is too long or too short, it will be excluded.

Example

If you set **Minimum Echo Length** to 0.8, all echoes shorter than 0.8 times the length of the transmitted pulse will be deleted.

If you set **Maximum Echo Length** to 1.8, all echoes longer than 1.8 times the length of the transmitted pulse will be deleted.

Maximum CW Phase Deviation

This setting only applies to CW operation.

Several single targets occurring at the same range will give you echoes in different parts of the beam's cross section. All samples in an echo from a single target will normally have similar phase value (angles) as the samples arrives from the same location. Echoes from multiple targets or random noise will show great variation in phase.

To remove the bad targets, the angle (phase) between the samples in the echo are measured. If the angle is too large, the echoes are deleted.

Maximum FM Phase Deviation

This setting only applies to FM operation.

Several single targets occurring at the same range will give you echoes in different parts of the beam's cross section. To remove the bad targets, the angle (phase)

between the samples in the echo are measured. If the angle is too large, the echoes are deleted.

If the angle at a given range is too large, this indicates multiple targets.

Maximum Gain Compensation

This setting applies to both CW and FM operation.

Not all single targets are located in the centre of the beam. Targets located off centre will offer weaker echoes due to the beam properties. The CS90 system automatically compensates for this using a mathematical model, and you can manually control the effect of this algorithm by defining a maximum gain value.

Using the 3 dB setting all echoes from within the nominal beam width of the transducer will be accepted. By reducing the value, you will only accept echoes that appear closer to the centre of the beam. Reducing the value of this parameter will effectively narrow the beam opening angles for single target detections, but will normally improve the accuracy of the target strength values for the detected single targets.

Minimum Echo Spacing

This setting only applies to CW operation.

This parameter defines the minimum distance between two single echoes when you are using CW pulses. If they are too close, the echoes are skipped.

The distance is defined as a relation to the length of the transmitted signal. Selecting *1* means that the minimum spacing corresponds to the physical distance covered by the transmit pulse. Increasing the value will require the targets to be further separated, but can improve the accuracy of the target strength values.

Tip

Overlapping targets will not be identified with this function. Use the **Minimum Echo Length***,* **Maximum Echo Length** *and* **Maximum CW Phase Deviation** *to handle these.*

Distance Before Target / Distance After Target

These settings only apply to FM operation.

The **Distance Before Target** and **Distance After Target** settings define the required spacing before and after one target to the end and beginning of the next target. This is the same functionality as the **Minimum Echo Spacing** function for CW operations, but the algorithms are very different.

They also define the range of target samples which are used for Fourier transformation to create the target strength frequency response (the curve in the *TS(f)* information pane) and the target position phase values.

Increasing the distance values will require the targets to be further separated, but can increase the frequency resolution for the target strength frequency response (in the *TS(f)* information pane).

The value for the **Distance After Target** should normally be larger than the value for **Distance Before Target** due to the backscattering properties of a target. The values are specified in meters and are applied on the matched filtered/pulse compressed sample data.

Related topics

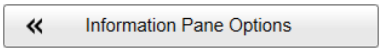
Functions and dialog boxes, page 418
Active menu: functions and dialog boxes, page 469
Information Pane Options dialog box, page 494

Fish Size Adjustment page

The *Size Distribution* information pane presents a histogram with the echoes from single fish. For various reasons, the fish sizes presented in the *Size Distribution* information pane may be inaccurate. Once you are able to assess your catch, you can use the **Fish Size Adjustment** page to change the average size of the various species.

How to open

The page is opened in the **Information Pane Options** dialog box. To open, select the button on the **Active** menu.

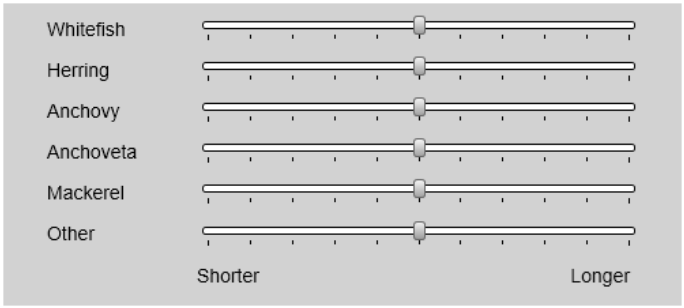


You can also open the page by selecting **Setup** in the information pane.

Prerequisites

The **Information Pane Options** dialog box is only available when an *Inspection* view is active.

Description



For each specie, adjust the average size of the fish.

Note

The measurement accuracy in the Size Distribution information pane depends on the vertical angle of the inspection beam. A beam that points nearly straight down corresponds to a traditional echo sounder. This gives the best accuracy since the fish is then viewed from above. If you use a smaller beam angle, you may see the fish from the front or back. This gives significantly smaller echoes, and thus low measurement accuracy.

Use the **Size Distribution** page to define the properties for the histogram shown in the *Size Distribution* information pane. Select **Setup** in the information pane to open the

Size Distribution page. The **Size Distribution** page is located in the **Information Pane Options** dialog box.

The target strength from fish varies from one specie to another. The **Fish Select** dialog box allows you to select the fish species you expect to catch. You can then manually adjust the size distribution. The **Fish Select** dialog box is located on the **Setup** menu.

Related topics

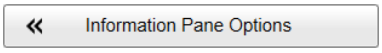
Functions and dialog boxes, page 418
Active menu: functions and dialog boxes, page 469
Information Pane Options dialog box, page 494

School Mass Adjustment page

When you have defined a priority target, the information in the *Horizontal* view includes an estimate of its area and volume. Once you are able to assess your catch, you can use the **School Mass Adjustment** page to change the weight/volume proportions. This will increase the accuracy of the information in the view.

How to open

The page is opened in the **Information Pane Options** dialog box. To open, select the button on the **Active** menu.



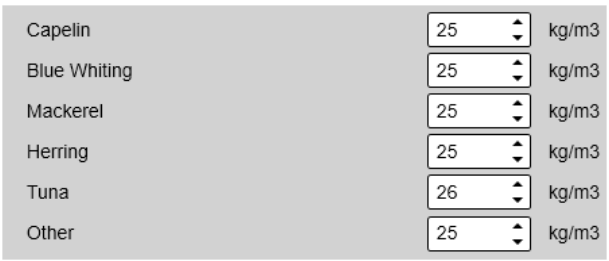
You can also open the page by selecting **Setup** in the information pane.

Prerequisites

The **Information Pane Options** dialog box is only available when an *Inspection* view is active.

Description

For the selected specie, adjust the density.



Related topics

Functions and dialog boxes, page 418
Active menu: functions and dialog boxes, page 469
Information Pane Options dialog box, page 494

Concept descriptions

Topics

Important settings, page 635

Basic sonar theory, page 639

Acoustic noise, page 645

Important settings

Topics

AGC (Automatic Gain Control), page 635

TVG (Time Variable Gain), page 636

AGC (Automatic Gain Control)

The **AGC** (Automatic Gain Control) function runs an automatic analysis of the echo strength. Based on this analysis the CS90 system maintains a proper dynamic range based on all the current echo values. This is done by automatically reducing the gain if you have reverberation and noise, or increasing the gain if the acoustical conditions permit it.

The AGC (Automatic Gain Control) function adjusts the gain using an image processing algorithm.

This processing depends on the strength of the echo signal. The image is analysed to identify reverberation and echoes. Based on the analysis the weak echoes are amplified, while the strong echoes are weakened. The result is a "normalizing" effect that reduces noise and reverberation.

The automatic gain control is functional up to the maximum range of the CS90 system.

You can choose from four different AGC settings. The settings define the difference between the maximum and minimum echo level for the automatic gain control to take effect.

The chosen AGC (Automatic Gain Control) setting is only be applied to the currently active view. Activate the relevant view *before* you select the AGC setting.

Tip

The most practical way to use the AGC (Automatic Gain Control) is to first switch it off. Adjust the echo presentation using the normal gain functionality until you have the best possible result, then activate the AGC.

The AGC works best with even background (homogenous noise conditions) and pronounced targets. With uniform environmental conditions you may benefit from strong compensation. However, if you are looking at scattered fish, reduce the automatic gain control, and try to add normal gain instead.

If you work close to other vessels, the noise from their propellers may be misinterpreted as echoes. This will also reduce the visibility of other echoes. The same applies if the bottom conditions place your vessel with decreasing depth on one side of the vessel and your targets on the other side. Reduce the automatic gain control.

If you have a large school located close to your vessel (typically closer than 150 meters) the school gives you a strong echo. The AGC may misinterpret the school echo for noise. Reduce or disable the automatic gain control.

The automatic gain control (AGC) may override the effect of the TVG (Time Varied Gain).

Related topics

Concept descriptions, page 634
Important settings, page 635
AGC (Automatic Gain Control) function, page 484

TVG (Time Variable Gain)

TVG (Time Variable Gain) compensates for the loss of acoustic energy due to geometric spreading and absorption. This makes the targets with the same strength appear with the same intensity independent of their physical distance from the transducer.

When an acoustic pulse is sent through the water, it will gradually lose its energy. The greater the distance between the transducer and the target(s), the greater the loss of energy. By means of algorithms, the time variable gain compensation converts the echo presentation as a function of range. This makes the targets with the same strength appear with the same intensity independent of their physical distance from the transducer. In the CS90 system, the TVG compensation is made using digital signal processing software.

Tip

The automatic gain control (AGC) may override the effect of the TVG (Time Varied Gain).

If you want to examine weak echoes that are very close to your vessel, use a low TVG setting (for example, 10 log R) or turn the TVG off.

If a school is hard to see or follow when it moves closer to your vessel, try to reduce the TVG setting. Remember to adjust the tilt accordingly!

The loss of energy is explained with two factors.

Geometric spread

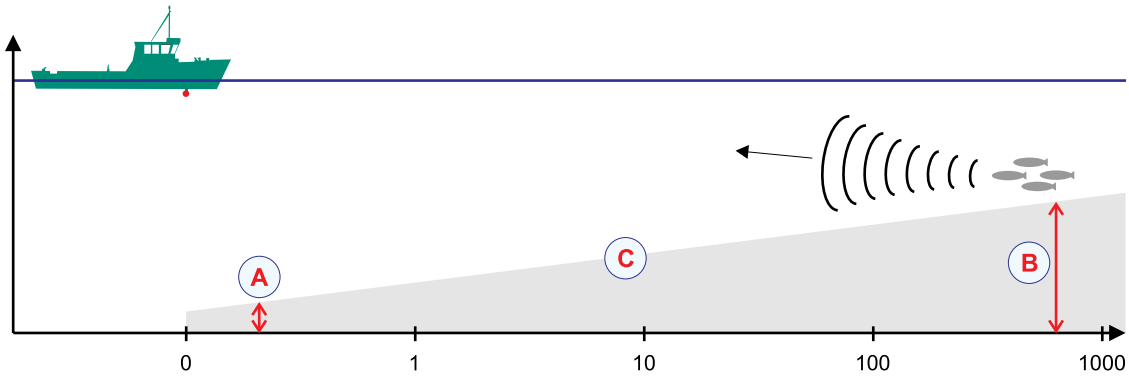
Once transmitted, the acoustic energy will spread out to form a circular beam. The width of this beam increases with the physical distance to the target(s).

Absorption loss

Depending on the salinity and temperature, the water will absorb some of the energy from the acoustic transmission. The absorption loss increases as the physical distance to the target(s) increases.

Both the geometric spread and the absorption will also have an effect on the returned echo signal. That is why we normally refer to these factors as the two-way transmission loss. TVG (Time Variable Gain) compensates for this loss of acoustic energy.

The TVG compensation is expressed as a logarithmic curve. Each curve is identified with the equation *X log TVG*. The coefficient "*X*" is an integer. Each value for "*X*" will create a different slope with a different gain compensation. Typical values for "*X*" are 10 to 40.



The drawing illustrates the TVG principle: The gain at time (B) is larger than at time (A). The different settings determine how much gain the CS90 system will use as time elapses along the X-axis. A higher value for "X" will make the angle (C) steeper.

The CS90 system allows you to choose your own compensation. You can choose any value from *0 Log R* to *40 Log R*. If you choose *0 Log R* the TVG compensation is disabled. Some experimentation may be required to find the compensations that fit your purposes for individual catch and environmental conditions. Typical time variable gain compensation values may be:

0 log R

TVG compensation is not implemented. This option is hardly ever used.

20 log R

This setting offers weaker amplification close to the bottom. It is commonly used to provide the best echoes for schools. The physical size of a school allows you to detect it even with reduced gain.

40 log R

This setting offers larger amplification closer to the bottom. It is commonly used to provide the best echoes from single fish.

Other options are provided when this function us used in an *Inspection* view. The echo presentation in the *Inspection* view resembles the echogram you see on an echo sounder. The *Inspection* view can be regarded as an "echo sounder" with an adjustable direction. In the CS90 system we use the phrase *echogram* to describe the information provided by the view.

No TVG

TVG compensation is not implemented. This option is hardly ever used.

School

This setting offers weaker amplification close to the bottom. It has been designed to provide the best echoes for schools. The physical size of a school allows you to detect it even with reduced gain.

Fish

This setting offers larger amplification closer to the bottom. It has been designed to provide the best echoes from single fish.

User

This setting allows you to define your own TVG curve. To choose your own TVG curve, use the dedicated function in the **Echogram** dialog box.

Related topics

Concept descriptions, page 634
Important settings, page 635
TVG function, page 470

Basic sonar theory

Topics

Vessel coordinate system, page 640

Layers and deflections, page 642

What is sampling?, page 644

Vessel coordinate system

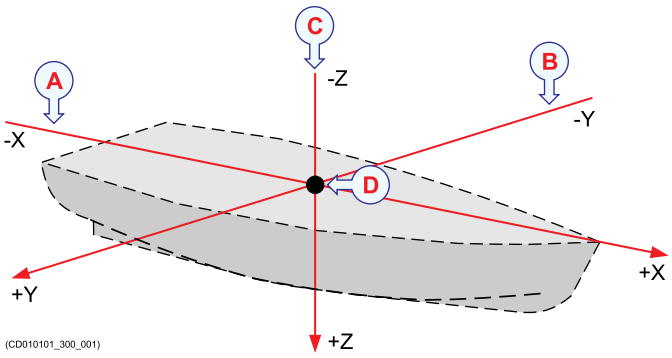
The vessel coordinate system is established to define the relative physical locations of system units and sensors.

When you have several different sensors and transducers on your vessel, and you wish each of them to provide accurate data, you need to know their relative physical positions. The antenna of a position sensor is typically mounted high above the superstructure, while a motion sensor is located close to the vessel's centre of gravity. Both of these are physically positioned far away from the transducer, which may be located closer to the bow. Very often, the information from one sensor depends on data from an other. It is then important that the relevant measurements are compensated for these relative distances.

Example

If you wish to measure the actual water depth, you will need to know the vertical distance from the echo sounder transducer to the water line. Since the vessel's displacement changes with the amount of cargo, fuel etc, the physical location of the water line on the hull must either be measured at a regular basis, or measured with a second sensor.

In order to establish a system to measure the relative distance between sensors, a virtual coordinate system is established. This coordinate system uses three vectors; X, Y and Z.



A *The X-axis is the longitudinal direction of the vessel, and in parallel with the deck. A positive value for X means that a sensor or a reference point is located ahead of the reference point (origin).*

B *The Y-axis is the transverse direction of the vessel, and in parallel with the deck. A positive value for Y means that a sensor or a reference point is located on the starboard side of the reference point (origin).*

C *The Z-axis is vertical, and in parallel with the mast. A positive value for Z means that a sensor or a new reference point is located under the reference point (origin).*

D *Reference point (Ship Origin)*

Vessel coordinate system origin

The *origin* is the common reference point where all three axis in the vessel coordinate system meet. All physical locations of the vessel's sensors (radar and positioning system antennas, echo sounder and sonar transducers, motion reference units, etc.) are referenced to the origin. In most cases, the location of the vessel's "official" origin

has been defined by the designer or shipyard. This origin is normally identified with a physical marking, and also shown on the vessel drawings.

Frequently used locations are:

- Aft immediately over the rudder (frame 0)
- Vessel's centre of gravity
- The physical location of the motion sensor

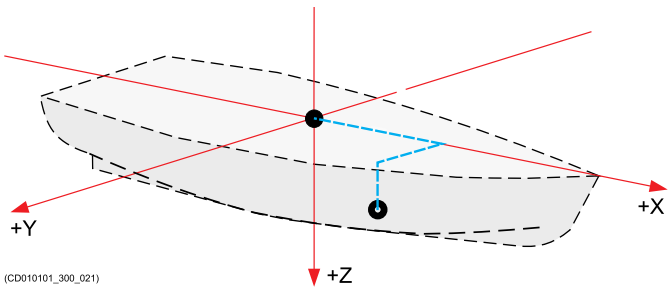
Vessel coordinate system alternative origins

If necessary, other origin locations may be defined for specific products or purposes. One example is the *Navigation Reference Point* that is frequently used. Whenever a vessel is surveyed to establish accurate offset information, the surveyor may also establish an alternative origin location. Whenever relevant, any such alternative locations must be defined using offset values to the "official" origin established by the designer or shipyard. A commonly used alternative origin is the physical location of the vessel's motion sensor.

Defining the physical location of each sensor

By means of the vessel coordinate system, the physical location of every sensor can be defined using three numerical values for X, Y and Z. These values must define the vertical and horizontal distances from a single reference point; the origin. The physical location of the motion reference unit (MRU) is often the most important sensor to define. For many systems, the vessel heading is also a critical measurement.

In this example, a second reference point has been established. It is defined with three positive offset values for X, Y and Z. All values are positive because the new reference point is in front of and below the origin, and on the starboard side.



The accuracy of the three numerical values for X, Y and Z defines the accuracy of the sensor data. If you require a high accuracy, for example for underwater positioning, underwater mapping or scientific measurements, you must have each sensor positioned using professional land surveying. For such use, a good alignment survey is critical for high quality results. Surveys are normally done by qualified and trained surveyors using proven survey equipment and methods.

Related topics

Concept descriptions, page 634
Basic sonar theory, page 639

Layers and deflections

Daily operation of the CS90 system may be disturbed by environmental situations that you are unable to control. Typical conditions are temperature and salinity layers, as well as deflections caused by increasing or decreasing water temperature.

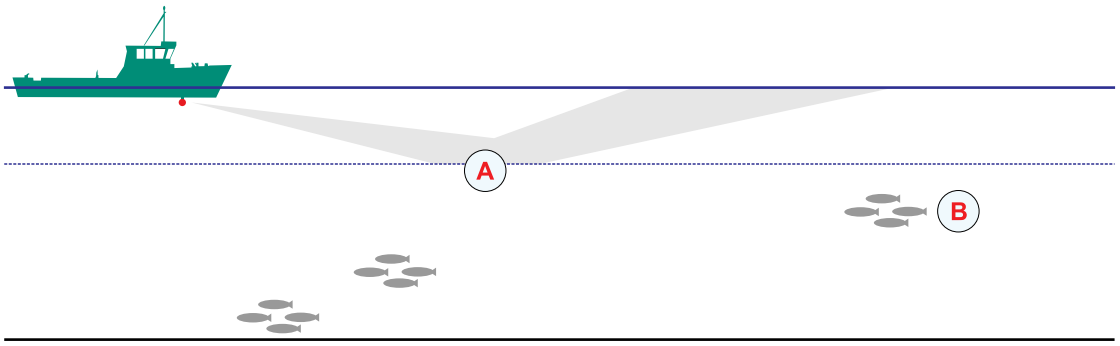
Topics

Temperature and salinity layers, page 642

Sonar beam deflections, page 643

Temperature and salinity layers

You may experience that temperature and/or salinity layers exist in the water column. Since the speed of sound in water depends on its temperature and salinity, such layers will cause the sound beam to be reflected.



If you transmit a sonar beam down towards a temperature or salinity layer (A), it may be reflected as indicated in the illustration. The school of fish (B) you thought you would see will not be visible at all.

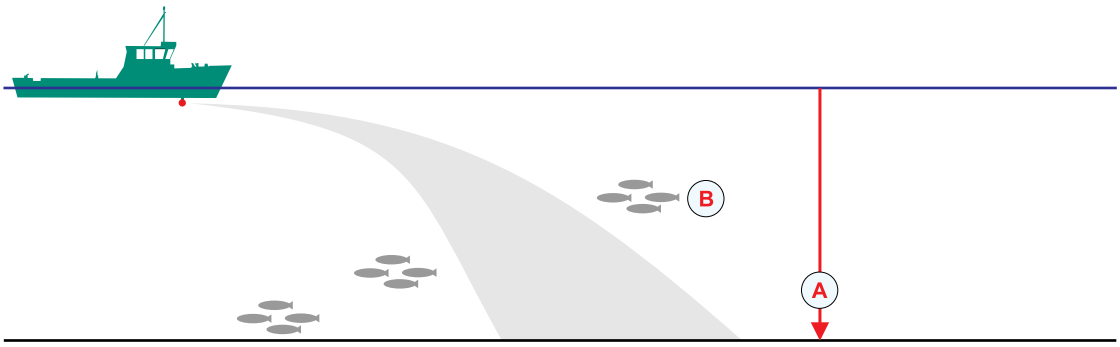
Related topics

Concept descriptions, page 634
Basic sonar theory, page 639

Sonar beam deflections

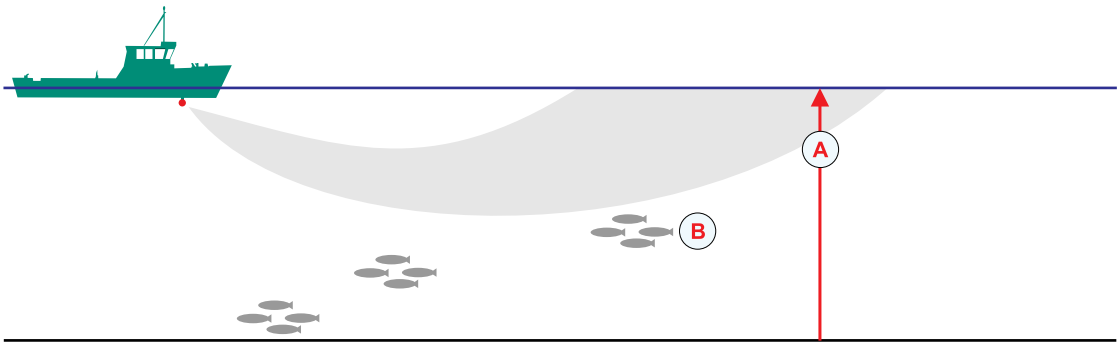
On warm days – especially during summer – the sea surface will be heated by the sun. The water temperature will gradually decrease with increasing depth. On cold days, you may experience the opposite. The cold water will be close to the surface, and the water temperature increases with increasing depth.

Water temperatures on a warm day



When the temperature decreases (A) closer to the bottom, the sonar beam is deflected down as indicated by the illustration. The school of fish (B) you thought you would see will not be visible at all.

Water temperatures on a cold day



When the temperature decreases (A) closer to the surface, the sonar beam is deflected up as indicated by the illustration. The school of fish (B) you thought you would see will not be visible at all. Instead you will probably see a ring of surface echoes.

Related topics

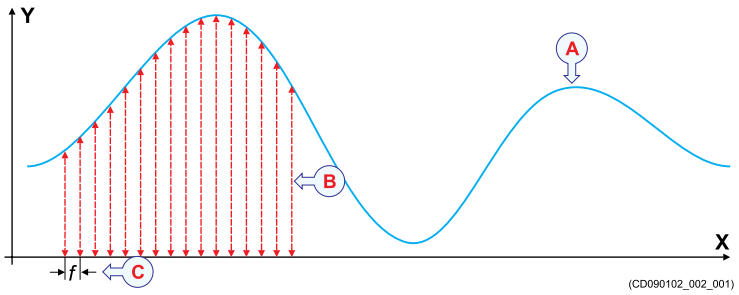
Concept descriptions, page 634
Basic sonar theory, page 639

What is sampling?

The information from the transducer on the CS90 system is a continuous flow of analogue data. In signal processing, *sampling* is the reduction of this continuous signal to a discrete signal.

A common example is exactly what we do in the CS90 system. We convert a sound wave (which is an analogue *continuous-time signal*) to a sequence of samples (which is a *discrete-time signal*). A discrete (or discrete-time) signal is a sequence of data capsules. This typically a signal that has been sampled from a continuous-time signal. Unlike a continuous signal, a discrete signal is not a function of a time argument, but a sequence of quantities, a function over a domain of discrete integers. Each value in the sequence is called a *sample*. Using this technique, the analogue signal is converted to a stream of discrete signals.

In this coordinate system, the Y-axis is voltage (or "volume") and the X-axis is time.



A *This is a continuous flow of data, an analogue signal, for example an echo.*

B *This line identifies the samples that the system is extracting from the analogue signal. Each sample is identified with the time it was taken. It will contain the value of the analogue signal at that time.*

C *The distance between each vertical line is the time between each sample. This time is identified as the sampling rate.*

Related topics

Concept descriptions, page 634
Basic sonar theory, page 639

Acoustic noise

Topics

Introduction to the acoustic noise challenge, page 645
Contributing factors, page 645
Self noise, page 647
Ambient noise, page 650
Electrical self noise, page 650
Reverberation, page 650
Some means to reduce acoustic noise, page 652

Introduction to the acoustic noise challenge

Even with the advanced noise filtering offered by the sonar system, we must address the noise challenge. This is important during the planning and preparations for the system installation. The echoes from any large and small target must be detected inside the noise.

It is important that we keep the noise level as low as possible. This is necessary to obtain long range and dependable interpretations of the echoes.

Related topics

Improving the recognition of fish and schools using receiver filters, page 114
Concept descriptions, page 634
Acoustic noise, page 645

Contributing factors

Several factors are contributing to the performance of the hydroacoustic equipment used on board a vessel.

Factors contributing to the performance of the hydroacoustic equipment used on board a vessel are:

- The quality and properties of the transmitted signal
- The quality of the receiving system
- The operational settings made during operation
- The properties of the target(s)
- The signal-to-noise ratio

The majority of these factors can neither be controlled nor improved by means of installation methods or transducer locations. The quality and properties of the

transmitting and receiving systems are key factors during our product development, while our end user documentation aims to help you to make the right filter settings during operation. As for the target properties, there is nothing any of us can do with those.

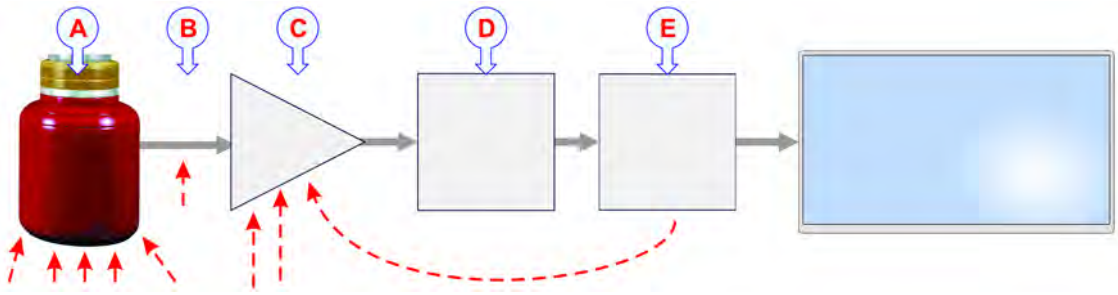
The *signal-to-noise ratio*, however, can be improved by making the correct choices during installation.

> Signal-to-noise ratio (often abbreviated SNR or S/N) is a measure used in science and engineering that compares the level of a desired signal to the level of background noise. It is defined as the ratio of signal power to the noise power, often expressed in decibels. A ratio higher than 1:1 (greater than 0 dB) indicates more signal than noise. While SNR is commonly quoted for electrical signals, it can be applied to any form of signal [...].
>
> *Wikipedia, Copied September 2013*

The *signal* is the echo that we want to know something about, while the *noise* is any unwanted signals or disturbances. The echo must be detected in the noise and therefore it is necessary to keep the noise level as low as possible in order to obtain high echo interpretation.

The noise that contributes to the signal to noise ratio may be divided into the following types of noise:

- Self noise
- Ambient noise
- Electrical noise
- Reverberation
- Underwater noise
- Fishing gear noise



(This is a generic illustration. Any similarities with specific products are accidental.)

A The transducer can pick up noise from:

- Biological disturbances
- Interference
- Cavitation
- Propeller noise

- Flow noise
- Acoustic noise from other hydroacoustic systems

B The transducer cable is long. Electric noise from generators, pumps, cooling systems and other electric or electromechanical devices is easily picked up.

C The preamplifiers are very sensitive. They can easily pick up electrical noise from internal and external power supplies. The preamplifiers are also vulnerable to analogue noise created by their own electronic circuitry. Digital noise created by the converter and processing circuitry can also create noise problems.

D The converters transform the analogue echoes to digital format.

E Signal processing circuitry can create digital noise.

Related topics

Improving the recognition of fish and schools using receiver filters, page 114
Concept descriptions, page 634
Acoustic noise, page 645

Self noise

Any vessel equipped with a hydroacoustic system (for example echo sounder or sonar) will produce more or less self noise.

There are many sources of such self noise. It is necessary to analyse the different sources of self-noise on a vessel, and find out how each source can affect the noise level of the hydroacoustic instruments.

Machinery noise

The main contributor to machinery noise is usually the main engine on board the vessel. The contribution from auxiliary machinery may, however, be considerable, especially if it is in poor shape. The machinery noise can be transmitted to the transducer as:

- Structure-borne noise through the ship structure and the transducer mountings.
- Water-borne noise through the hull into the water to the transducer.

Electrical noise

Modern vessels are normally equipped with a lot of electric instruments such as hydroacoustic systems, radars, navigation systems, and communication equipment. Any electric instruments may in some cases cause electrical interference and noise. International regulations and certifications are used to control and reduce this, but even these are limited if the electrical systems are poorly installed and/or maintained.

Propeller noise

Propeller noise is often the main source of noise at higher vessel speeds. Variable pitch propellers or fast moving propellers usually make more noise than fixed propellers or slow moving propellers.

Propeller noise is usually water-borne. In some cases, however, shaft vibrations or vibrations in the hull near the propeller may be structure-borne to the transducer. If a propeller blade is damaged, this may increase the noise considerably.

Propeller cavitation is a severe source of noise. "Singing" propellers might be a source of noise, which interferes at discrete frequencies. In some cases static discharge from the rotating propeller shaft may be quite disturbing.

Cavitation

Cavitation is the formation of small air bubbles close to the transducer face. The bubbles appear because the local pressure becomes negative during parts of the acoustic pressure cycles. The cavitation threshold increases with the hydrostatic pressure. The noise is made when the bubbles implode.

Cavitation noise may appear near extruding objects at higher speeds, but more often it is caused by the propellers. Propeller cavitation is a severe source of noise. The cavitation starts when the water flows in the same direction as the propeller blades. This is where the propeller blades move downwards.

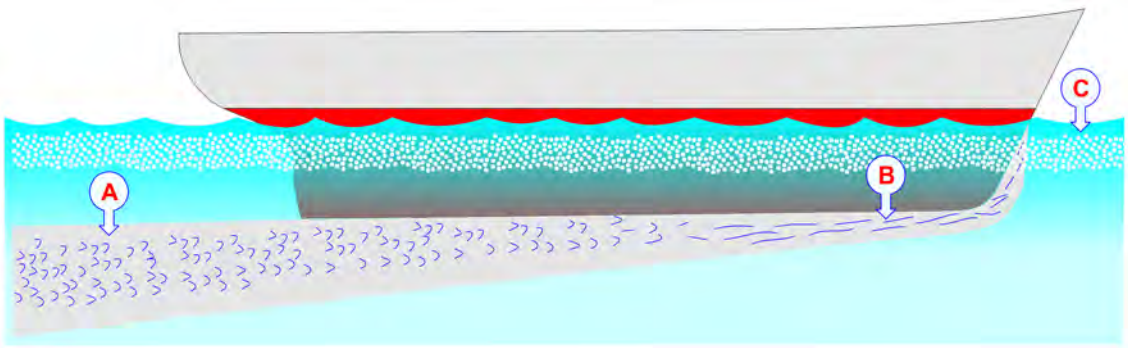
In some cases a resonant phenomenon is set up in a hole near the hull. This sound will have a discrete frequency, while all other flow noise will have a wide frequency spectrum.

(Image from U. S. Navy in the public domain.)

Flow noise

The upper water layers of the sea contain a myriad of small air bubbles created by the breaking waves. When the hull moves through water it will cause a disturbance, and this will generate friction. The friction zone is called the *flow boundary layer*. The water flow in this boundary layer may be *laminar* or *turbulent*.

- The *laminar* flow is a nicely ordered, parallel movement of the water.
- The *turbulent* flow is a disorderly flow pattern, full of eddies.



A *Turbulent flow*

B *Laminar flow*

C *Air bubbles*

Air bubbles absorb and reflect the sound energy, and they may in worst cases block the sound transmission altogether.

The boundary layer increases in thickness when it becomes turbulent. The boundary layer is thin in the forward part of the vessel hull, and increases as it moves aft. The thickness depends on ships speed and on the roughness of the hull. All objects sticking out from the hull, or dents in the hull, will disturb the flow and will increase the thickness of the boundary layer. When the flow speed is high, the turbulence can be violent enough to destroy the integrity of the water. Small voids or cavities in the water will occur and this is called cavitation.

Rattle noise

Rattle noise may be caused by loose objects in the vicinity of the transducer, like fixing bolts. The rattle may also come from loose objects inside the hull.

Interference

Interference from other hydroacoustic equipment on board the same vessel may be an annoying source of disturbance. Unless the same frequency is used for more than one piece of equipment only the transmitted pulse will contribute to the interference.

> In physics, interference is the phenomenon in which two waves superpose each other to form a resultant wave of greater or lower amplitude. Interference usually refers to the interaction of waves that are correlated or coherent with each other, either because they come from the same source or because they have the same or nearly the same frequency. Interference effects can be observed with all types of waves, for example, light, radio, acoustic, surface water waves or matter waves.
>
> *https://en.wikipedia.org/wiki/Wave_interference — April 2016*

Related topics

Improving the recognition of fish and schools using receiver filters, page 114
Concept descriptions, page 634
Acoustic noise, page 645

Ambient noise

Ambient noise is usually not a limiting factor to the performance of sonars and echo sounders.

The ambient noise may be split up as follows:

- **Sea noise**: Air bubbles, seismic disturbances, waves, boundary turbulence, etc.
- **Biological noise**: Fish, mammals
- **Man made noise**: Other vessels, interference
- **Precipitation noise**: Heavy rain or hail

In some areas, where many vessels operate together, the engine and propeller noise from other vessels may be disturbing. Interference from hydroacoustic instruments located in other vessels may also be a limiting factor. The sea noise depends on the weather conditions. In bad weather the sea noise can be quite high due to the waves.

Related topics

Improving the recognition of fish and schools using receiver filters, page 114
Concept descriptions, page 634
Acoustic noise, page 645

Electrical self noise

Electrical or electronic self noise is picked up or generated in any other part of the equipment than the transducer.

The most common source of electrical self-noise is hum. Hum is typically generated by low-quality power supplies. Transducer cables and sensitive electronic circuitry can easily pick up hum. At higher frequencies – where rather wide bandwidths are necessary – the noise from components, transistors or other analogue electronic may be a limiting factor.

Related topics

Improving the recognition of fish and schools using receiver filters, page 114
Concept descriptions, page 634
Acoustic noise, page 645

Reverberation

When you transmit an acoustic pulse into the water to search for a target, echoes will also be returned from any other objects in the beam. The energy reflected from these "unwanted" objects is referred to as *reverberation*.

Reverberation is generated when the echoes from your transmissions are reflected not only by fish and valid targets in the water, but also from the sea bottom and the sea surface. Reverberation is often regarded as noise.

There are several types of reverberation.

Volume reverberation

The volume reverberation is caused by minute plankton and air-bubbles in the water. This reverberation has often daily cycles in intensity.

Surface reverberation

The surface reverberation depends on the weather condition and the waves.

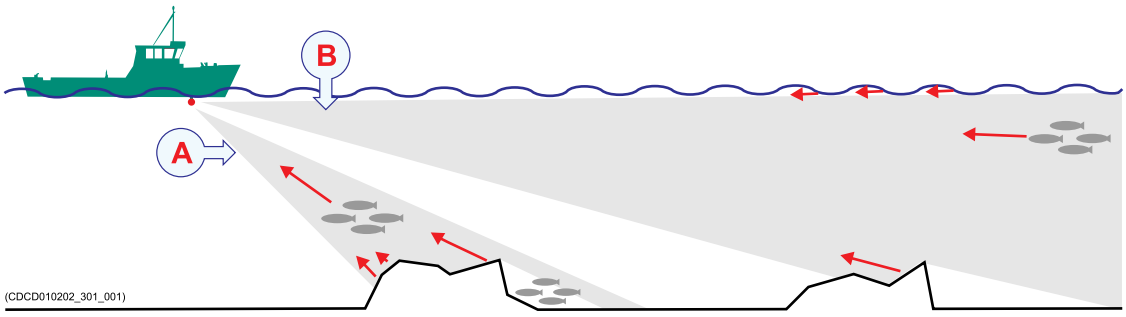
Bottom reverberation

The bottom reverberation depends on the roughness and physical properties of the sea bottom.

Reverberation is often a limiting factor, especially if you are searching for smaller targets. The echoes from the bottom will always depend on the sea bottom properties. How uneven the seabed is will affect the echoes. What kind of bottom you have under your vessel is also significant, as rock, mud or sand will provide different reverberation. The bottom reverberation usually makes it difficult to investigate targets located close to the seabed.

Your current tilt setting will also have an effect on the reverberation. The echoes from the sea surface will vary with the current sea state and your current tilt setting.

The illustration demonstrates how the sea bottom and the sea surface return echoes back to your sonar system.



A In this situation you will be able to identify the upper school of fish, but the lower school will be hidden in the shadow of the seabed rock formation.

B In this situation you will see several weak echoes from the waves and from the rock on the bottom, but you will still be able to identify the school of fish.

The reverberation is caused by the transmission pulse itself. It can only be reduced by shortening the pulse duration or using a smaller beamwidth.

Related topics

Improving the recognition of fish and schools using receiver filters, page 114
Concept descriptions, page 634
Acoustic noise, page 645

Some means to reduce acoustic noise

Several factors are contributing to the performance of the hydroacoustic equipment used on board a vessel. Careful planning of the installation may reduce the acoustic noise.

Unfortunately, it is impossible to simply provide a number of specific procedures to reduce the noise.

The physical location of the installation trunk and the hull unit is important. This depends on the vessel's design and construction, how the hull is shaped, and how the water runs along the hull. Other factors deal with other equipment mounted on board, and this will also be vessel dependant. At moderate ship speeds the machinery noise is usually dominant. At medium speeds the flow noise increases more rapidly and takes over, while at higher speed the propeller noise will be the main contributor.

Note

The information here must be considered as general advice. Each system installation must be handled separately depending on the hull design and the other electrical and mechanical systems installed on the vessel.

Reducing flow noise

The shape of the hull plating around the installation trunk opening must be as streamlined as possible. It is particularly important that the hull plating in front of the installation trunk is as smooth as possible.

Important

Be especially aware of bilge keels and sacrificial anodes. The keel must be rounded off without sharp edges. Neither extruding objects nor abrupt transitions must be present.

The fairing around the installation trunk must be streamlined. The transducer must be protruding far enough down to reach out of the boundary layer.

Reducing machinery noise

The hull unit must be installed far away from the engine room. The main engine and relevant auxiliary engines and equipment must be fixed to rigid foundations to avoid vibrations. Any hull structure that may vibrate must be damped or coated to reduce the vibrations.

The use of shock absorbers or floating rafts may sometimes reduce this noise. The structure-borne noise may be reduced by isolation, for example by providing vibration clamping between the transducer and the hull structure.

Reducing propeller noise

The hull unit must be installed far away from the propellers.

Sufficient clearance between the propellers and the hull, the rudder and the keel must be provided. Place the sacrificial anodes in places where the water flow is the least disturbed.

Ensure that the propellers blades are correctly designed and without damages.

The use of a baffle between the propellers and the transducer may reduce noise appreciably. Static discharges caused by the rotating propeller shaft may be removed by proper grounding or by mounting a coal brush from the shaft to vessel ground.

Reducing rattle noise

Ensure that no parts near the transducers can rattle as a result of water flow or vibrations.

Reducing interference

Interference from the transmission pulses from other hydroacoustic instruments on board the vessel is difficult to avoid. The problem may be reduced by choosing the working frequencies carefully and to some extent by separating the different transducers. On vessels with a large number of separate hydroacoustic systems installed and in simultaneous use, a separate synchronizing system (for example the K-Sync) should be considered.

Reducing electrical noise

Make sure that all units are properly grounded. This is important to avoid electrical noise.

Make sure that all units are properly grounded, including shielded cables.

Separate the cables used by the CS90 system from other cables with high voltages, large currents or transients. Place all high voltage power cables in metal conduits.

Related topics

Improving the recognition of fish and schools using receiver filters, page 114
Concept descriptions, page 634
Acoustic noise, page 645

Technical specifications

The technical specifications summarize the main functional and operational characteristics of the CS90 system. They also provide information related to power requirements, physical properties and environmental conditions.

Note

At Kongsberg Discovery, we are continuously working to improve the quality and performance of our products. The technical specifications may be changed without prior notice.

The specifications are provided in a separate publication. See our website for more information.

- www.kongsberg.com/cs90

Tip

The information is included in the CS90 context sensitive online help. Select **Help** *on the top bar.*

Datagram formats

The CS90 system can send and receive information to and from several different peripherals. All transmissions take place as *datagrams* with data sentences. Each datagram has a defined format and length.

The most common standard is NMEA 0183. The National Marine Electronics Association describes it as follows:

> The NMEA 0183 Interface Standard defines electrical signal requirements, data transmission protocol and time, and specific sentence formats for a 4800-baud serial data bus. Each bus can have only one talker but many listeners.
>
> *National Marine Electronics Association*

The specifications are provided in a separate publication. See our website for more information.

- www.kongsberg.com/cs90

Tip

The information is included in the CS90 context sensitive online help. Select **Help** *on the top bar.*

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