



***Simrad ST90
Fish-finding sonar
Harbour Acceptance Test***

This is the Harbour Acceptance Test for the Simrad ST90 Fish-finding sonar.

The purpose of this Harbour Acceptance Test is to verify that the ST90 system provided to the vessel is correctly installed, and fully functional. It is then ready for the Sea Acceptance Test. When all the tasks have been done, the report form must be signed by the relevant parties. The completed document then becomes the official report.

Vessel/Customer	

Serial numbers (if applicable)	
Processor Unit	
Operating Panel	
Transceiver Unit	
Hull Unit	
Transducer	

Document information

- **Product:** Simrad ST90
- **Document:** Harbour Acceptance Test
- **Document part number:** 442729
- **Revision:** A
- **Date of issue:** 14 May 2020

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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.

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

Disclaimer

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

Support information

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

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Introduction

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Purpose

This is the Harbour Acceptance Test for the Simrad ST90 Fish-finding sonar.

The purpose of this Harbour Acceptance Test is to verify that the ST90 system provided to the vessel is correctly installed, and fully functional. It is then ready for the Sea Acceptance Test. When all the tasks have been done, the report form must be signed by the relevant parties. The completed document then becomes the official report.

Personnel and location

Successful completion of the test requires qualified and experienced test engineers and/or technicians.

This Harbour Acceptance Test is done on board the vessel, alongside the quay. The test is done by personnel from Kongsberg Maritime. All personnel must have good knowledge of the product and/or module(s) at hand.

A representative from an authorized dealer or distributor can do the Harbour Acceptance Test on behalf of Kongsberg Maritime.

Representatives from the client and/or end user are normally present to witness the test and results.

As with all assembly and test procedures related to advanced technical and/or electronic equipment, the skill of the operator is vital to a successful completion of the tasks. The only way to secure high quality of our products is first rate workmanship and high professional standards throughout the production chain.

It is equally important that all members of the production and test crews show initiative, and are willing to suggest improvements to functionality, design, procedures and documents. If you find a mistake in a document, or find that information is missing, offer this information to the proper authorities without further delay. Likewise, your experience as a skilled worker is valuable. Please forward any suggestions to make improvements to the product, the design, the production method, or any other matters related to your expertise.

Referenced documents

The installation and use of the ST90 is described in several documents and end user manuals. Internal test documents are used throughout the production and test of the ST90.

This list is not complete. Additional documents and end user manuals are available for the ST90. These publications are not relevant for this Harbour Acceptance Test.

Note

Unless specified in the applicable procedure(s), the ST90 publications listed here are not required during this Harbour Acceptance Test.

All the document numbers refer to the English version of each publication.

End user manuals

- **Reference Manual and On-line Help:** 442704
- **Installation Manual:** 442703

Software documents

- **Software Release Note:** 442731

Customer acceptance test procedures

- **Factory Acceptance Test:** 442728
- **Harbour Acceptance Test:** 442729
- **Sea Acceptance Test:** 442730

Qualifying documents

- **EC Declaration of Conformity:** 463849

Tools and test equipment

Specific tools and test equipment are required for this Simrad ST90 Harbour Acceptance Test. The required tools and equipment must be made available before the test can start.

The required test equipment is listed. For each item, record the instrument's serial number and - if relevant - its calibration expiry date.

Multimeter (Make and model)	Serial number	Calibration expiry date

The following tool is required.

- Allen key

Acceptance test summary

The purpose of this Harbour Acceptance Test is to verify that the ST90 system provided to the vessel is correctly installed, and fully functional. This acceptance test summary is provided to offer an overview of the functions and items that need to be tested. References are made to the individual chapters in this Harbour Acceptance Test.

Procedure

- 1 Record the software and hardware items that are included in the test.
 - [Hardware and software registration, page 9](#)
- 2 Do a visual inspection of each unit that is comprised by the ST90 delivery.
 - [Visual inspection, page 17](#)
- 3 Test the main functionality of the ST90.
 - [Testing the ST90 operational functionality, page 29](#)
- 4 Test the interfaces between the ST90 and relevant external devices and/or sensors.
 - [Testing the interfaces with peripheral devices, page 40](#)
- 5 Make sure that all the relevant installation parameters have been defined correctly.
 - [Verifying the installation parameters, page 49](#)
- 6 When all the tests have been successfully concluded, open the *Customer acceptance* form, and fill it in with the relevant signatures.
 - [Customer acceptance form, page 56](#)

Hardware and software registration

Topics

[Verification of previously tested items, page 10](#)

[Software items, page 11](#)

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Verification of previously tested items

It is not necessary to fill in registration tables for software and hardware items that have already been recorded in a previous test.

Are the ST90 user interface software and hardware units the same as those tested during the *Factory Acceptance Test*? If this is the case, it is not necessary to fill out the registration tables again.

- If no changes have been made to neither the software nor the hardware, sign the table below to verify this.
- If the software has been updated, record the new software version.
- If hardware changes have been made (units are replaced), all serial numbers must be recorded again.

Verification of previously tested items
Neither user interface software nor hardware units have been changed on this ST90 system since the <i>Factory Acceptance Test</i> . For this reason, the registration tables have not been filled out.
Date and signature

Software items

Every software program that is provided as a part of the ST90 delivery must be registered. Part number and software version must be registered. When software media (USB flash drive, CD, DVD etc) is provided, the part number of the media and the ST90 software version provided on the media must be registered.

Software	Part number	Software version
Simrad ST90	442725	

Software media	Part number	Software version
Simrad ST90	442727	

The software version on the software media shall be the same as the version installed on the Processor Unit. End user documentation is included on the same software media.

Hardware items

Topics

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[Processor Unit, page 12](#)

[Transceiver Unit, page 13](#)

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Display

Each display provided with the ST90 delivery must be uniquely identified. Make(s), model(s), part number(s) and serial number(s) must be registered. Any unit that is not provided by Kongsberg Maritime AS does not need to be registered.

Display (Make and model ¹)	Part number ²	Serial number	Revision
¹ Fill in the make, model and serial number for each unit that is provided with the ST90 delivery. If applicable, add the part number. The unit contains neither circuit boards nor modules that need to be identified separately.			
² This is the part number on the unit label.			

Processor Unit

The Processor Unit provided with the ST90 delivery must be uniquely identified. Make, model, part number and serial number must be registered.

Processor Unit ¹	Part number ²	Serial number	Revision
ST90 Processor Unit (with ST90 software)	441484		
¹ The unit contains neither circuit boards nor modules that need to be identified separately.			
² This is the part number on the unit label.			

Transceiver Unit

The Transceiver Unit provided with the ST90 delivery must be uniquely identified. Make, model, part number and serial number must be registered. The Transceiver Unit contains circuit boards and modules that must be recorded separately.

ST90 Transceiver Unit

The Transceiver Unit controls the transmission and reception made by the 384 transmitters and 384 receiver channels. 12 identical transceiver boards are used. The Transceiver Unit also holds an Ethernet switch and a large capacitor bank.

Transceiver Unit ¹	Part number ²	Serial number	Revision
ST90 Transceiver Unit	441481		
¹ This unit contains circuit boards or modules that must identified separately. Observe the relevant hardware registration tables.			
² This is the part number on the unit label.			

Transceiver boards

Transceiver boards (From right)	Serial number	Revision
1		
2		
3		
4		
5		

Transceiver boards (From right)	Serial number	Revision
6		
7		
8		
9		
10		
11		
12		
Transceiver board (Type): LPT32 Transceiver Board		
Part number: 367860		

Ethernet switch

Ethernet switch (Make and model) ¹	Part number ²	Serial number	Revision
Cisco 2960L	454427		
¹ The unit contains neither circuit boards nor modules that need to be identified separately. If the Cisco 2960L Ethernet switch is not used with this delivery, fill in information about the replacement type in the empty row.			
² This is the part number on the unit label.			

Operating Panel

The Operating Panel provided with the ST90 delivery must be uniquely identified. Make, model, part number and serial number must be registered.

Operating Panel ¹	Part number ²	Serial number	Revision
ST90 Operating Panel Mk1	SH8-203593		
ST90 Operating Panel Power Supply	361102	N/A	N/A
¹ These units do not contain any circuit boards or modules that must be identified separately.			
² This is the part number on the unit label.			

Operating Panel ¹	Part number ²	Serial number	Revision
ST90 Operating Panel Mk2	442453		
¹ The unit contains neither circuit boards nor modules that need to be identified separately.			
² This is the part number on the unit label.			

Hull Unit

The hull unit provided with the ST90 delivery must be uniquely identified. If possible, type, part number and serial number must be registered. Several different hull units are available for the ST90, each with different characteristics. Only one hull unit is supplied with the delivery.

The ST90 Fish-finding sonar can be provided with one of the following hull units.

Hull Unit	Part number	Lowering depth	Transducer cable	Maximum speed
ST92	441486	1.2 m	4.6 m	21 knots
	441488		7 m	
ST93	438520	1.6 m	4.6 m	16 knots
	441490		7 m	
ST94	441492	2.1 m	4.6 m	11 knots
	441494		7 m	
Outline dimensions drawings: - ST92: 447567 - ST93: 435546 - ST94: 447545				

The same transducer is used on all hull unit types. The same installation trunk is used on all hull unit types.

Hull Unit (Type)	Part number	Serial number
Hull Unit		
The unit contains neither circuit boards nor modules that need to be identified separately.		

Transducer

The transducer provided with the ST90 delivery must be uniquely identified.

Note

The transducer is not accessible during the Harbour Acceptance Test. The hardware registration is then omitted.

Transducer ¹	Part number ²	Serial number	Revision
ST90 Transducer	435031		
¹ The unit contains neither circuit boards nor modules that need to be identified separately.			
² This is the part number on the unit label.			

Visual inspection

Topics

[Visual inspection of the display, page 17](#)

[Visual inspection of the Processor Unit, page 19](#)

[Visual inspection of the Operating Panel, page 21](#)

[Visual inspection of the Transceiver Unit, page 22](#)

[Visual inspection of the hull unit, page 24](#)

[Environmental inspection of the Transceiver Unit, page 26](#)

[Making sure that all ST90 cables are properly connected, page 27](#)

Visual inspection of the display

A visual inspection of the ST90 display is required to verify that the unit has not been physically damaged during the installation.

Prerequisites

The ST90 is installed as specified in the *ST90 Installation manual*. The ST90 is turned off. You need the following equipment:

- Multimeter

Context

This test procedure is only applicable when the display is provided by Kongsberg Maritime as a part of the ST90 delivery.

Procedure

- 1 Make sure that the unit's serial number has been recorded in the list of hardware items.
- 2 Make sure that the physical installation of the unit has been completed.

- a Make sure that the structure to which the display is fastened is substantial enough to hold the unit securely under all operating conditions.
 - b If applicable, make sure that the display (or the display mounting bracket) is bolted or welded securely to the deck and/or bulkhead.
 - c If the unit is installed inside a rack or in a closed compartment, make sure that ample ventilation is provided to avoid overheating.
 - d Make sure that ample space is provided around the unit to allow for maintenance and replacement of parts.
 - e Make sure that the bolts, screws or studs holding the unit are of the correct size.
 - f Make sure that the correct flat and shake-proof washers have been used.
 - g Make sure that all nuts have been tightened properly.
 - h Make sure that all welds and brackets have been painted with the correct preservation medium to prevent corrosion.
- 3 Make sure that the display is installed in the correct location, and that it is suitably orientated with respect to ambient light conditions and reflections.
 - 4 Make sure that the unit is not physically damaged, and that the paint-work is clean without dents or scratches.

The physical handling of the unit during the installation may have caused some minor scratches to the paint-work. This can be accepted. However, if rough handling has caused serious damage to the unit, this must be recorded with a written statement and necessary photos, so that corrective actions can be made.

- 5 Make sure that the unit is firmly connected to ship's ground.
 - a The unit must be connected to the ship's ground with an earthing strap. The strap must be in addition to any incidental electrical contact made by the mounting lugs on the unit.
 - b Use a standard multimeter to check that the resistance between the unit and the ship's ground is approximately 0 (zero) Ω .
- 6 Make sure that cable installation has been completed.
 - a Make sure that all cables leading to and from the unit have been properly mounted and secured.
 - b Make sure that enough slack has been provided on each cable to allow for maintenance and replacement.
- 7 Make sure that the unit has been identified with the relevant product label(s), and that one label includes the part and serial numbers.

Result

Requirements	Results
The display is correctly installed with easy access for maintenance and replacement of parts.	
The display is free from scratches, dents or other physical damage.	
Free access to all the connectors on the display is provided. All cables are properly mounted with enough slack.	
The display is properly grounded.	
Date and signature:	

Visual inspection of the Processor Unit

A visual inspection of the ST90 Processor Unit is required to verify that the unit has not been physically damaged during the installation.

Prerequisites

The ST90 is installed as specified in the *ST90 Installation manual*. The ST90 is turned off. You need the following equipment:

- Multimeter

Procedure

- 1 Make sure that the unit's serial number has been recorded in the list of hardware items.
- 2 Make sure that the computer is installed in the correct location, and that it is suitably oriented for replacement and cabling.
- 3 Make sure that the physical installation of the unit has been completed.
 - a Make sure that you have free access to rear and front side connectors on the computer for maintenance purposes.
 - b Make sure that ample space is provided to open/close DVD and/or CD lids (if relevant), and to insert and remove USB flash drives.
 - c If the unit is installed inside a rack or in a closed compartment, make sure that ample ventilation is provided to avoid overheating.
 - d Make sure that ample space is provided around the unit to allow for maintenance and replacement of parts.
 - e Make sure that the bolts, screws or studs holding the unit are of the correct size.
 - f Make sure that the correct flat and shake-proof washers have been used.
 - g Make sure that all nuts have been tightened properly.

- h Make sure that all welds and brackets have been painted with the correct preservation medium to prevent corrosion.
- 4 Make sure that the unit is not physically damaged, and that the paint-work is clean without dents or scratches.

The physical handling of the unit during the installation may have caused some minor scratches to the paint-work. This can be accepted. However, if rough handling has caused serious damage to the unit, this must be recorded with a written statement and necessary photos, so that corrective actions can be made.

- 5 Make sure that the unit is firmly connected to ship's ground.
 - a Make sure that the unit is securely connected to the ship's ground with an earthing strap. The strap must be in addition to any incidental electrical contact made by the mounting lugs on the unit.
 - b Use a standard multimeter to check that the resistance between the unit and the ship's ground is approximately 0 (zero) Ω .
- 6 Make sure that cable installation has been completed.
 - a Make sure that all cables leading to and from the unit have been properly mounted and secured.
 - b Make sure that enough slack has been provided on each cable to allow for maintenance and replacement.
- 7 Make sure that the unit has been identified with the relevant product label(s), and that one label includes the part and serial numbers.

Result

Requirements	Results
The Processor Unit is correctly installed with easy access for maintenance and replacement of parts.	
The Processor Unit is free from scratches, dents or other physical damage.	
Free access to all the connectors on the Processor Unit is provided. All cables are properly mounted with enough slack.	
The Processor Unit can be fully opened for access to the internal parts.	
The Processor Unit is properly earthed.	
Date and signature:	

Visual inspection of the Operating Panel

A visual inspection of the Operating Panel is required to verify that the unit has not been physically damaged during the installation..

Prerequisites

The ST90 is installed as specified in the *ST90 Installation manual*. The ST90 is turned off. You need the following equipment:

- Multimeter

Procedure

- 1 Make sure that the unit's serial number has been recorded in the list of hardware items.
- 2 Make sure that the physical installation of the unit has been completed.
 - a If the unit is installed inside a rack or in a closed compartment, make sure that ample ventilation is provided to avoid overheating.
 - b Make sure that ample space is provided around the unit to allow for maintenance and replacement of parts.
 - c Make sure that the bolts, screws or studs holding the unit are of the correct size.
 - d Make sure that the correct flat and shake-proof washers have been used.
 - e Make sure that all nuts have been tightened properly.
- 3 Make sure that the Operating Panel is installed in the correct location, and that it is suitably oriented for easy maintenance and replacement of parts.
- 4 Make sure that the unit is not physically damaged, and that the paint-work is clean without dents or scratches.

The physical handling of the unit during the installation may have caused some minor scratches to the paint-work. This can be accepted. However, if rough handling has caused serious damage to the unit, this must be recorded with a written statement and necessary photos, so that corrective actions can be made.

- 5 Make sure that the unit is firmly connected to ship's ground.
 - a Make sure that the unit is securely connected to the ship's ground with an earthing strap. The strap must be in addition to any incidental electrical contact made by the mounting lugs on the unit.
 - b Use a standard multimeter to check that the resistance between the unit and the ship's ground is approximately 0 (zero) Ω .
- 6 Make sure that cable installation has been completed.
 - a Make sure that all cables leading to and from the unit have been properly mounted and secured.
 - b Make sure that enough slack has been provided on each cable to allow for maintenance and replacement.

- 7 Make sure that the unit has been identified with the relevant product label(s), and that one label includes the part and serial numbers.

Result

Requirements	Results
The Operating Panel is correctly installed with easy access for maintenance and replacement of parts.	
The Operating Panel is free from scratches, dents or other physical damage.	
Free access to all the connectors on the Operating Panel are provided.	
All cables are properly mounted with enough slack.	
The Operating Panel is properly grounded.	
Date and signature:	

Visual inspection of the Transceiver Unit

A visual inspection of the Transceiver Unit is required to verify that the unit has not been physically damaged during the installation.

Prerequisites

The ST90 is installed as specified in the *ST90 Installation manual*. The ST90 is turned off. You need the following equipment:

- Multimeter

Procedure

- 1 Make sure that the unit's serial number has been recorded in the list of hardware items.
- 2 Make sure that the Transceiver Unit is installed in the correct location, and that it is suitably oriented for easy maintenance and replacement of parts.
- 3 Make sure that the Transceiver Unit is fully populated with all circuit boards and modules mounted.
- 4 Make sure that the physical installation of the unit has been completed.
 - a Make sure that the cabinet door can be fully opened for unrestricted access.
 - b Make sure that ample space is provided around the unit to allow for maintenance and replacement of parts.
 - c Make sure that the bolts, screws or studs holding the unit are of the correct size.
 - d Make sure that the correct flat and shake-proof washers have been used.
 - e Make sure that all nuts have been tightened properly.

- f Make sure that the welds and support brackets to which the unit is fastened are substantial enough to hold the it securely under all operating conditions.
 - g Make sure that all welds and brackets have been painted with the correct preservation medium to prevent corrosion.
- 5 Make sure that the unit is not physically damaged, and that the paint-work is clean without dents or scratches.
- The physical handling of the unit during the installation may have caused some minor scratches to the paint-work. This can be accepted. However, if rough handling has caused serious damage to the unit, this must be recorded with a written statement and necessary photos, so that corrective actions can be made.
- 6 Make sure that the unit is firmly connected to ship's ground.
- a Make sure that the unit is securely connected to the ship's ground with an earthing strap. The strap must be in addition to any incidental electrical contact made by the mounting lugs on the unit.
 - b Use a standard multimeter to check that the resistance between the unit and the ship's ground is approximately 0 (zero) Ω .
- 7 Make sure that cable installation has been completed.
- a Make sure that all cables leading to and from the unit have been properly mounted and secured.
 - b Make sure that enough slack has been provided on each cable to allow for maintenance and replacement.
- 8 Make sure that the unit has been identified with the relevant product label(s), and that one label includes the part and serial numbers.

Result

Requirements	Results
The Transceiver Unit is correctly installed with easy access for maintenance and replacement of parts.	
The Transceiver Unit is free from scratches, dents or other physical damage.	
Free access to all the connectors on the Transceiver Unit are provided. All cables connected to the Transceiver Unit are properly mounted with enough slack.	
The Transceiver Unit can be fully opened, and you have full access to the circuit boards and modules inside the unit.	
The welds and brackets that support the Transceiver Unit are strong enough to hold the unit securely in place under all operating conditions. The welds and brackets have been painted with the correct preservation medium to prevent corrosion.	
The Transceiver Unit is properly grounded.	
Date and signature:	

Visual inspection of the hull unit

A visual inspection of the hull unit is required to make sure that the unit has not been physically damaged during the installation. It is also important to check that the unit has been installed correctly.

Prerequisites

The ST90 is installed as specified in the *ST90 Installation manual*. The ST90 is turned off. You need the following equipment:

- Multimeter

Procedure

- 1 Make sure that the unit's serial number has been recorded in the list of hardware items.
- 2 Make sure that the hull unit is installed in the correct location, and that it is suitably oriented for easy maintenance and replacement of parts.
- 3 Make sure that the unit is not physically damaged, and that the paint-work is clean without dents or scratches.

The physical handling of the unit during the installation may have caused some minor scratches to the paint-work. This can be accepted. However, if rough handling has caused serious damage to the unit, this must be recorded with a written statement and necessary photos, so that corrective actions can be made.

- 4 Make sure that the unit has been identified with the relevant product label(s), and that one label includes the part and serial numbers.
- 5 Make sure that the physical installation of the unit has been completed.
 - a Make sure that the welds and brackets used to support the hull unit are substantial enough to hold the unit securely under all operating conditions.
 - b Make sure that the compartment ("sonar room") in which the hull unit is mounted is clean and dry.
 - c Make sure that ample space is provided around the unit to allow for maintenance and replacement of parts.
 - d Make sure that the bolts, screws or studs holding the unit are of the correct size.
 - e Make sure that the correct flat and shake-proof washers have been used.
 - f Make sure that all nuts have been tightened properly.
 - g Make sure that all welds and brackets have been painted with the correct preservation medium to prevent corrosion.
- 6 Make sure that cable installation has been completed.
 - a Make sure that all cables leading to and from the unit have been properly mounted and secured.

- b Make sure that enough slack has been provided on each cable to allow for maintenance and replacement.
 - c Make sure that the transducer cables can move freely when the transducer is lowered and hoisted.
 - d Repeat the inspection of the transducer cables when the ST90 is turned on and put to operational use.
- 7 Make sure that the unit is firmly connected to ship's ground.
- a Make sure that the unit is securely connected to the ship's ground with an earthing strap. The strap must be in addition to any incidental electrical contact made by the mounting lugs on the unit.
 - b Use a standard multimeter to check that the resistance between the unit and the ship's ground is approximately 0 (zero) Ω .
- 8 Make sure that there are no corrosive attacks on the hull unit, mounting flange, installation trunk, support brackets or other parts of the installation.

Result

Requirements	Results
The hull unit is correctly installed with easy access for maintenance and replacement of parts.	
The compartment in which the hull unit is installed ("sonar room") is clean and dry.	
All cables are properly mounted with enough slack.	
The transducer cables can move freely when the transducer is lowered and hoisted.	
The welds and mechanical brackets that support the gantry are strong enough to hold the hull unit securely in place under all operating conditions. The welds and brackets have been painted with the correct preservation medium to prevent corrosion.	
There are no corrosive attacks.	
Date and signature:	

Environmental inspection of the Transceiver Unit

Satisfactory environmental conditions are important to ensure long and trouble-free operation of the Transceiver Unit. An environmental inspection of the Transceiver Unit is required to verify the quality of the sonar room.

Prerequisites

The ST90 is installed as specified in the ST90 *Installation manual*. You need the following equipment:

- Thermometer
- Hygrometer

Context

The *sonar room* is the compartment in which the Transceiver Unit is installed.

Procedure

- 1 Make sure that the compartment ("sonar room") is clean and dry.
- 2 Make sure that the ambient temperature in the sonar room meets the environmental specifications.
 - a Make sure that the temperature in the sonar room is controlled using a suitable ventilation system.
 - b Record the type of ventilation system that is installed.
 - c Make sure that the temperature in the sonar room is monitored.
 - d Measure the ambient temperature in the sonar room when the ST90 is switched off.
 - e Record the value in the result table.
- 3 Make sure that the relative humidity in the sonar room meets the environmental specifications.
 - a Measure the relative humidity in the sonar room.
 - b Record the value in the result table.
- 4 30 minutes after the ST90 has been switched on and put to normal operation, measure the ambient temperature one more time.
Record the value in the result table.
- 5 30 minutes after the ST90 has been switched on and put to normal operation, measure the relative humidity one more time.
Record the value in the result table.
- 6 Make sure that the sonar room, the ST90 Transceiver Unit and the mounting brackets have not been subjected to corrosive attacks.

Result

	ST90 turned off	ST90 turned on
Ambient temperature:		
Relative humidity:		

Requirements	Results
The compartment in which the Transceiver Unit is installed ("sonar room") is clean and dry.	
A ventilation system is installed.	
Record the type of ventilation system that is installed.	
There are no corrosive attacks.	
Date and signature:	

Making sure that all ST90 cables are properly connected

The ST90 relies on communication between each system unit, and between the ST90 and external devices. It is very important that all cables are correctly installed, that the proper cable types have been used, and that all cables are connected correctly.

Prerequisites

The ST90 is installed as specified in the *ST90 Installation manual*.

- The ST90 is turned off.
- All system cables are installed.
- All cable connections are made.

You need the following equipment:

- Cable tester
- Multimeter

Context

All cabling is described in the *Cable layout and interconnections* chapter in the *ST90 Installation Manual*. Refer to the cable plan, the cable list and the basic cable requirements.

Procedure

- 1 For each cable that is in used on the ST90:
 - a Make sure that the cable has been installed as specified in the ST90 *Installation Manual*.

Note _____

Pay special attention to signal cables. These must not be installed too close to power cables.

 - b Make sure that the connections made at each end of the cable are correct.
 - c Make sure that the cable is properly identified.
- 2 Make sure that the transducer cables can move freely when the transducer is lowered and hoisted.
- 3 If possible, use a multimeter or a dedicated cable tester to check the continuity in each cable.
- 4 Use a qualification tester to verify that each Ethernet cable is correctly wired, and meets the specifications related to quality and bandwidth.

Result

Requirements	Results
Each cable is installed correctly.	
All cable connections are made.	
Each cable is properly identified.	
Each Ethernet cable in use meets quality requirement CAT5E STP (Shielded Twisted Pair) or better.	
The transducer cables can move freely when the transducer is lowered and hoisted.	
Date and signature:	

Testing the ST90 operational functionality

Topics

[Checking the transducer lower and hoist functionality, page 29](#)

[Testing the user interface to verify basic functionality, page 34](#)

[Checking the ST90 operation by means of the BITE functionality, page 35](#)

Checking the transducer lower and hoist functionality

The hull unit provided with the ST90 is designed to lower the transducer down below the ship's hull when the ST90 shall be used. This is a key functionality of the ST90. It is very important that the hoist/lower function is tested before the ST90 is put to operational use.

In order to test the lower and hoist functionality of the hull unit, two tasks must be done simultaneously. Two persons are required.

- One person must stay on the bridge in order to operate the ST90.
- One person must stay in the sonar room to verify that the Transceiver Unit starts, and that the hull unit works properly.

Certain steps in the two procedures are location specific.

- The steps marked [*Sonar room*] are done in the sonar room.
- The steps marked [*Bridge*] are done on the bridge.

Note

Proper oral communication must exist between the bridge and the sonar room. In the event of problems or malfunctions:

- 1 Locate the **Motor Protecting Switch** (S301).
 - 2 Set the switch to position *OFF*.
-

Topics

[Bridge steps, page 30](#)

[Sonar room steps, page 32](#)

Bridge steps

The hull unit provided with the ST90 is designed to lower the transducer down below the ship's hull when the ST90 shall be used. This is a key functionality of the ST90. It is very important that the hoist/lower function is tested before the ST90 is put to operational use. In order to test the lower and hoist functionality of the hull unit, two tasks must be done simultaneously. These tasks are done on the bridge.

Prerequisites

The ST90 is installed as specified in the *ST90 Installation manual*. The ST90 system is turned on and operates normally. Neither tools nor instruments are required.

Context

Certain steps in the two procedures are location specific. The steps marked [*Sonar room*] are done in the sonar room.

Procedure

- 1 Make sure that you have sufficient water depth below the keel before you lower the transducer.
- 2 [*Sonar room*] Locate the **Motor Protecting Switch** (S301). Set the switch to position *ON*.
- 3 [*Sonar room*] Locate the **Hoist/Lower Switch** (S302). Set the switch to position *REMOTE*.
- 4 Lower the transducer to its middle position.

- a On the Operating Panel, press **Middle**.



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.

- b [*Sonar room*] When the transducer shaft stops, make sure this happens at the correct middle position.

- 5 Lower the transducer to its bottom position.

- a On the Operating Panel, press **Down**.



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.

- b [*Sonar room*] When the transducer shaft stops, verify that the correct bottom position has been reached.

- 6 Hoist the transducer to its middle position.

- a On the Operating Panel, press **Middle**.

- b [*Sonar room*] When the transducer shaft stops, make sure this happens at the correct middle position.

- 7 Hoist the transducer to its upper position.

- a On the Operating Panel, press **Up**.



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.

- b [*Sonar room*] When the transducer shaft stops, verify that the correct upper position has been reached.

- 8 Lower the transducer to its bottom position.

- a On the Operating Panel, press **Down**.

- b [Sonar room] When the transducer shaft stops, verify that the correct bottom position has been reached.
- 9 Hoist the transducer to its upper position.
 - a On the Operating Panel, press **Up**.
 - b [Sonar room] When the transducer shaft stops, verify that the correct upper position has been reached.
- 10 Notify the sonar room to do the next step.
- 11 [Sonar room] Locate the **Hoist/Lower Switch** (S302). Set the switch to position *STOP*.
- 12 Power down the ST90.

If the transducer is lowered when you turn off the ST90, it is automatically retracted to its upper position. The Transceiver Unit is turned off. The ST90 program closes down.
- 13 Notify the sonar room that the test is finished.

Result

Requirements	Results
The lowering and hoisting functionality - as seen from the bridge - is operational.	
Date and signature:	

Sonar room steps

The hull unit provided with the ST90 is designed to lower the transducer down below the ship's hull when the ST90 shall be used. This is a key functionality of the ST90. It is very important that the hoist/lower function is tested before the ST90 is put to operational use. In order to test the lower and hoist functionality of the hull unit, two tasks must be done simultaneously. These tasks are done in the sonar room.

Prerequisites

The ST90 is installed as specified in the *ST90 Installation manual*. The ST90 system is turned on and operates normally. Neither tools nor instruments are required.

Context

Certain steps in the two procedures are location specific. The steps marked [*Bridge*] are done on the bridge.

Note

In the event of problems or malfunctions:

- 1 Locate the **Motor Protecting Switch** (S301).
 - 2 Set the switch to position *OFF*.
-

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.

Procedure

- 1 [Bridge] Make sure that you have sufficient water depth below the keel before you lower the transducer.
- 2 Locate the **Motor Protecting Switch** (S301). Set the switch to position *ON*.
- 3 Locate the **Hoist/Lower Switch** (S302). Set the switch to position *REMOTE*.
- 4 [Bridge] Lower the transducer to its middle position.
When the transducer shaft stops, make sure this happens at the correct middle position.
- 5 [Bridge] Lower the transducer to its bottom position.
When the transducer shaft stops, verify that the correct bottom position has been reached.
- 6 [Bridge] Hoist the transducer to its middle position.
When the transducer shaft stops, make sure this happens at the correct middle position.
- 7 [Bridge] Hoist the transducer to its upper position.
When the transducer shaft stops, verify that the correct upper position has been reached.
- 8 [Bridge] Lower the transducer to its bottom position.
When the transducer shaft stops, verify that the correct bottom position has been reached.
- 9 [Bridge] Hoist the transducer to its upper position.
When the transducer shaft stops, verify that the correct upper position has been reached.
- 10 [Bridge] Notify the sonar room to do the next step.
- 11 Locate the **Hoist/Lower Switch** (S302). Set the switch to position *STOP*.
- 12 [Bridge] Power down the ST90.

13 [Bridge] Notify the sonar room that the test is finished.

Result

Requirements	Results
The lowering and hoisting functionality - as seen from the sonar room - is operational.	
The transducer is lowered and hoisted without complications or obstacles.	
Date and signature:	

Testing the user interface to verify basic functionality

A functional test is done with the ST90 system assembled as a complete product.

Prerequisites

The ST90 has been set up with its hardware units connected as specified in the ST90 *Installation manual*.

- The ST90 system is turned on and operates normally.
- The ST90 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.

Neither tools nor instruments are required.

Caution

You must never set the ST90 to "ping" unless the transducer is submerged in water. The transducer may be damaged if it transmits in open air.

Procedure

- 1 Make sure that the ST90 user interface is fully operational.
 - a Make sure that the ST90 visual presentation is shown with adequate quality.
If necessary, adjust the display and/or the relevant properties in the Processor Unit operating system.
 - b Make sure that the Operating Panel is functional.
Press and/or turn each button, and make sure that the corresponding function is activated in the user interface.

- c Make sure that the menu system offered by the ST90 is operational.
Make random selections, and make sure that the relevant sub-menus, functions or dialog boxes are activated.
 - d Make sure that the relevant views are operational.
Move the cursor to the views in the main ST90 presentation. Click inside one of the views. Make sure that the view is activated, and that relevant changes are made in any dynamic menus.
 - e If relevant, connect a computer mouse to the Processor Unit.
Make sure that the computer mouse works in the ST90 user interface. Make random selections, and make sure that the relevant sub-menus, functions or dialog boxes are activated.
 - f If relevant, connect a keyboard to the Processor Unit.
Make sure that the keyboard works in the ST90 user interface. Open relevant functions or dialog boxes, and make sure that you can type in them.
- 2 Select the icon on the top bar to open the **Messages** dialog box.
- a Verify that no error messages are presented during normal operation.
 - b Close the dialog box by selecting **Close** or [X] in its top right corner.



Result

Requirements	Results
The basic functionality of the ST90 is present.	
No error messages are presented.	
Date and signature:	

Checking the ST90 operation by means of the BITE functionality

The purpose of the **BITE** (Built-In Test Equipment) dialog box is to allow on-line testing and verification of the ST90 hardware components.

Prerequisites

The ST90 has been set up with its hardware units connected as specified in the ST90 *Installation manual*.

- The ST90 system is turned on and operates normally.
- The ST90 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.

Neither tools nor instruments are required.

Caution

You must never set the ST90 to "ping" unless the transducer is submerged in water. The transducer may be damaged if it transmits in open air.

For the best possible conditions, the ship must be "silent".

- The water must be as deep as possible.
- 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 **BITE** (Built-In Test Equipment) functionality, you can easily determine if the ST90 hardware is operational. And most important, you can make sure that all the transceivers channels and the transducer elements are functional. To open the different pages in the **BITE** (Built-In Test Equipment) 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 BITE system is disabled.
- Grey: No information is available.

The **BITE** (Built-In Test Equipment) dialog box and functionality is only provided for performance monitoring. The functionality is not required for normal use of the ST90. The **BITE** dialog box does not permit you to change any operational parameters.

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.

Note

If you are unable to do this test during the Harbour Acceptance Test, it must be repeated during the Sea Acceptance Test.

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 wish 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 Open the **Operation** menu.
 - Set **Tx Power** to *Off*.
 - c Open the **Active** menu.
 - 1 Set **Pulse Type** to *CW Medium*.
 - 2 Set **Frequency** to 14 kHz.
 - 3 Set **Vertical TX Sector** to *Narrow*.
 - 4 Set **Noise Filter** to *Off*.
 - 5 Set the **Bottom Filter Threshold** to *Off*.
 - d Open the **Setup** menu.
 - Select **BITE** to open the **BITE (Built-In Test Equipment)** dialog box.
- 5 Select **Transceiver** to open the page.

This page provides a graphic presentation of the 12 transceiver boards. The presentation reflects their physical location 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.

- 6 Make sure that all the 12 transceiver boards are fully functional.
- 7 Select **Transducer** to open the page.

The **Transducer** page presents all the elements that are used in the ST90 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.

- 8 Select **Reception Test** to start an automatic test of the individual transducer elements.

The reception test validates each single element in the ST90 transducer, and returns the status using a simple colour coding.

- 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.

- 9 Verify that the maximum number of unserviceable ("dead") elements does not exceed 3.

A small number of unserviceable transducer elements are accepted, even for operational use. This is regarded as "graceful degradation".

The ST90 operates with 384 individual channels handled by 12 transceiver boards. 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 ST90 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.

Note

*For further investigations of this issue, use the functionality offered by the **Element BITE** (Element Built In Test Equipment) dialog box.*

- 10 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.

- 11 Finish the test.

- a Close the **BITE** (Built In Test Equipment) dialog box.
- b Set **Tx Power** to *Off*.
- c Hoist the transducer back up to its upper position.

Result

Requirements	Results
The maximum number of unserviceable elements is 3.	
Date and signature:	

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.

Testing the interfaces with peripheral devices

Topics

[Verifying the communication with a navigation system \(GPS\), page 40](#)

[Verifying the communication with speed log, page 42](#)

[Verifying the communication with the course gyro, page 44](#)

[Verifying the communication with the motion reference unit \(MRU\), page 46](#)

Verifying the communication with a navigation system (GPS)

For the ST90 to use and offer correct navigational information, one or more external sensors must be connected. The communication with the sensor is tested.

Prerequisites

The ST90 is installed as specified in the *ST90 Installation manual*.

- The sensor is connected to a communication port on the ST90. The sensor is on and in normal operation.
- The interface port is set up with the correct communication parameters.
- 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 vessel is berthed or at sea.
- All relevant vessel drawings, installation reports and/or measurement results are available.
- The ST90 system is turned on and operates normally.

- The vessel is berthed.

Neither tools nor instruments are required. For connections and communication parameters, see the relevant end-user documentation from the sensor manufacturer.

Context

Most global positioning system (GPS) receivers provide NMEA 0183 datagrams containing geographical latitude and longitude information, as well as current speed and sailed distance. Some GPS systems will also provide the current heading, but this information is normally taken from the gyro.

The properties of each of the available communication ports are defined on the **I/O Setup** page. The **Sensor Installation** page allows your ST90 to communicate with external sensors and systems. To make sure that the information from the "most reliable" sensors are used by the ST90, use the **Sensor Configuration** page to define a datagram priorities.

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.

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 Installation**.
 - a Select the relevant sensor in the **Installed Sensors** list.
 - b Make sure that the correct installation parameters are used for the sensor.
- 4 On the left side of the **Installation** dialog box, select **Sensor Configuration**.
 - a Select the relevant sensor in the **Sensor** list.
 - b Make sure that the correct parameters are used for sensor configuration.
- 5 Close the **Installation** dialog box without making any changes.
- 6 Observe the top bar.
- 7 Make sure that the information from the sensor is displayed.

If necessary, enable the read-out in the **Display Options** dialog box.

- 8 If possible, use another instrument to verify that the information provided by the ST90 is correct.
- 9 Fill in the result tables.

Result

Sensor	Source sensor	Datagram	Port	Baud rate
Position				
Speed				
Distance				
Heading				

X Offset	Y Offset	Z Offset

Requirements	Results
Position data is provided.	
Speed data is provided.	
Distance data is provided.	
Heading data is provided.	
The relevant communication parameters are recorded.	
Date and signature:	

Verifying the communication with speed log

In order to operate correctly, the ST90 requires input from a speed log. The vessel speed is shown on the top bar if you have enabled this in the **Display Options** dialog box. The communication with the sensor is tested.

Prerequisites

The ST90 is installed as specified in the ST90 *Installation manual*.

- The sensor is connected to a communication port on the ST90. The sensor is on and in normal operation.
- The interface port is set up with the correct communication parameters.
- 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 vessel is berthed or at sea.

- All relevant vessel drawings, installation reports and/or measurement results are available.
- The ST90 system is turned on and operates normally.
- The vessel is berthed.

Neither tools nor instruments are required. For connections and communication parameters, see the relevant end-user documentation from the sensor manufacturer.

Context

Note

The speed input is essential for ST90 operation. Without speed information, the ST90 will neither be able to present correct navigational information, nor compensate for vessel movements. This lack of compensation will prevent the ST90 from providing correct echo information. If you do not use a dedicated speed log, but rather a GPS system, you can skip this test.

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.

The properties of each of the available communication ports are defined on the **I/O Setup** page. The **Sensor Installation** page allows your ST90 to communicate with external sensors and systems. To make sure that the information from the "most reliable" sensors are used by the ST90, use the **Sensor Configuration** page to define a datagram priorities.

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.

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 Installation**.
 - a Select the relevant sensor in the **Installed Sensors** list.
 - b Make sure that the correct installation parameters are used for the sensor.

- 4 On the left side of the **Installation** dialog box, select **Sensor Configuration**.
 - a Select the relevant sensor in the **Sensor** list.
 - b Make sure that the correct parameters are used for sensor configuration.
- 5 Close the **Installation** dialog box without making any changes.
- 6 Observe the top bar.
- 7 Make sure that the information from the sensor is displayed.
If necessary, enable the read-out in the **Display Options** dialog box.
- 8 If possible, use another instrument to verify that the information provided by the ST90 is correct.
- 9 Fill in the result tables.

Result

Datagram	Port	Baud rate	Talker ID

Requirements	Results
Speed data is provided and displayed.	
The relevant communication parameters are recorded.	
Date and signature:	

Verifying the communication with the course gyro

In order to operate correctly, the ST90 requires input from a course gyro. The current heading is shown on the top bar if you have enabled this in the **Display Options** dialog box. The communication with the sensor is tested.

Prerequisites

The ST90 is installed as specified in the *ST90 Installation manual*.

- The sensor is connected to a communication port on the ST90. The sensor is on and in normal operation.
- The interface port is set up with the correct communication parameters.
- 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 vessel is berthed or at sea.
- All relevant vessel drawings, installation reports and/or measurement results are available.
- The ST90 system is turned on and operates normally.
- The vessel is berthed.

Neither tools nor instruments are required. For connections and communication parameters, see the relevant end-user documentation from the sensor manufacturer.

Context

Note

The input from a course gyro is essential for ST90 operation. Without the input from a course gyro, the ST90 will not be able to present correct navigational information. This lack of compensation will prevent the ST90 from providing correct echo information.

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.

The properties of each of the available communication ports are defined on the **I/O Setup** page. The **Sensor Installation** page allows your ST90 to communicate with external sensors and systems. To make sure that the information from the "most reliable" sensors are used by the ST90, use the **Sensor Configuration** page to define a datagram priorities.

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.

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 Installation**.
 - a Select the relevant sensor in the **Installed Sensors** list.
 - b Make sure that the correct installation parameters are used for the sensor.

- 4 On the left side of the **Installation** dialog box, select **Sensor Configuration**.
 - a Select the relevant sensor in the **Sensor** list.
 - b Make sure that the correct parameters are used for sensor configuration.
- 5 Close the **Installation** dialog box without making any changes.
- 6 Observe the top bar.
- 7 Make sure that the information from the sensor is displayed.
If necessary, enable the read-out in the **Display Options** dialog box.
- 8 If possible, use another instrument to verify that the information provided by the ST90 is correct.
- 9 Fill in the result tables.

Result

Datagram	Port	Baud rate	Talker ID

X Offset	Y Offset	Z Offset

Requirements	Results
Heading data is provided and displayed.	
The relevant communication parameters are recorded.	
Date and signature:	

Verifying the communication with the motion reference unit (MRU)

The information from a motion reference unit (MRU) (normally heave, roll and pitch information) is imported into the ST90 to increase the accuracy of the echo data. The communication with the sensor is tested.

Prerequisites

The ST90 is installed as specified in the *ST90 Installation manual*.

- The sensor is connected to a communication port on the ST90. The sensor is on and in normal operation.
- The interface port is set up with the correct communication parameters.

- 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 vessel is berthed or at sea.
- All relevant vessel drawings, installation reports and/or measurement results are available.
- The ST90 system is turned on and operates normally.
- The vessel is berthed.

Neither tools nor instruments are required. For connections and communication parameters, see the relevant end-user documentation from the sensor manufacturer.

Context

A motion reference unit (MRU) measures the vessel's pitch and roll movements in the sea. The information provided by the motion sensor is used by the ST90 to stabilize the beams and the echo 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 **Motion Reference Unit**.
 - a If you use the motion sensor in the Motor Control Unit on the hull unit, make sure that **LAN** is selected.

The sensor uses a local area network (LAN) port on your Processor Unit. A message on the page verifies that it is connected to the ST90 beamformer application.
 - b If you use an external motion reference unit (MRU), make sure that a **COM** port is selected, and that the correct parameters are provided.
 - 4 On the left side of the **Installation** dialog box, select **Installation Parameters** to open the page.
 - a Open the **MRU** (Motion Reference Unit) page.
 - b Make sure that the installation parameters for the motion sensor (offset and rotation) are correct.

The physical location of the sensor (X, Y and Z offsets) must be extracted from the detailed vessel drawings, or from the reports provided by the personnel that did the actual installation. The information about the installation angles must

be extracted from the reports provided by the personnel that did or measured up the actual installation.

- 5 Close the **Installation** dialog box without making any changes.
- 6 Observe the top bar.
- 7 Make sure that the information from the sensor is displayed.
If necessary, enable the read-out in the **Display Options** dialog box.

Note _____

In order to read the motion compensation values, the ST90 must be "pinging". As long as the vessel is in port, you can not expect major changes in the values.

- 8 If possible, use another instrument to verify that the information provided by the ST90 is correct.
- 9 Fill in the result tables.

Result

Port	Baud rate	Protocol

X Offset	Y Offset	Z Offset

Rotation Around X	Rotation Around Y	Rotation Around Z

Requirements	Results
Motion compensation is operational.	
The compensated values are shown.	
Date and signature:	

Verifying the installation parameters

Topics

[Verifying vessel origin and ship dimensions, page 49](#)

[Verifying the installation parameters for the transducer, page 51](#)

[Verifying the installation parameters for the global positioning system \(GPS\) antenna, page 52](#)

[Verifying the installation parameters for the motion reference unit \(MRU\), page 54](#)

Verifying vessel origin and ship dimensions

The physical length and width of the ship are important parameters that need to be recorded in the ST90 software.

Prerequisites

For accurate location of the ship dimensions, you need the detailed vessel drawings. Neither tools nor instruments are required. The ST90 system is turned on and operates normally.

Context

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 For each parameter, makes sure that the current setting is correct.
- 6 Record the information in the result table.
- 7 Continue your work in the **Installation** dialog box, or select **OK** to close it.

Result

Ship Dimensions	
Length	
Width	

Vessel origin		
X Offset	Y Offset	Z Offset

Requirements	Results
The ship dimensions are entered in the ST90.	
All values are correct.	
All values are recorded in the relevant table.	
Date and signature:	

Verifying the installation parameters for the transducer

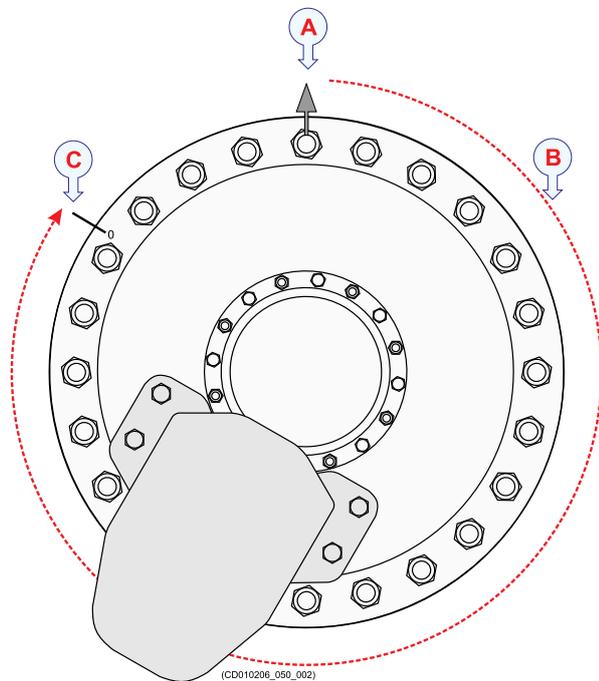
When the installation trunk is mounted, it may not be positioned with the mounting holes perfectly aligned to the centre line of the vessel. When the hull unit is placed on the trunk, the "forward" mark on the transducer shaft sleeve - and thus also "forward" on the transducer - may not point forward at all, but several degrees off the centre line. To obtain accurate ST90 presentations, this misalignment must be adjusted by changing the installation parameters.

Prerequisites

For accurate location of the transducer, you need the detailed vessel drawings. You also need the alignment angle that was recorded when the hull unit was installed. Neither tools nor instruments are required. The ST90 system is turned on and operates normally.

Illustration:

- A** Bow
- B** This is the alignment angle.
- C** 0° transducer mark



Context

Independent of the hull unit orientation, the alignment is always defined as:

The angle measured clockwise from the bow to the 0 degrees 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.

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.
 - a Obtain the alignment angle from the personnel that installed the hull unit.
 - b Make sure that the correct offset values have been inserted.
 - c Make sure that the correct installation angles have been inserted.
 - d Record the information in the result table.
- 5 Continue your work in the **Installation** dialog box, or select **OK** to close it.

Result

Transducer offsets		
X Offset	Y Offset	Z Offset
Installation angle X	Installation angle Y	Installation angle Z

Requirements	Results
All offset values and installation angles are entered in the ST90.	
All values are correct.	
All values are recorded in the relevant table.	
Date and signature:	

Verifying the installation parameters for the global positioning system (GPS) antenna

Information from a few key sensors are vital for the ST90 accuracy. In order to achieve maximum accuracy, the physical locations of these sensors - normally referred to the *Ship Origin* - must be recorded in the ST90 setup. For future reference, the offset values for each sensor is recorded.

Prerequisites

For accurate location of the global positioning system (GPS) antenna, you need the detailed vessel drawings. Neither tools nor instruments are required. The ST90 system is turned on and operates normally.

Context

The physical location of the global positioning system (GPS) antenna relative to the transducer is required to allow the ST90 to show the correct navigational information in the ST90 presentation. The locations of the transducer and the Global Positioning System (GPS) antenna must be referenced to a common *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 **Sensor Installation**.
- 4 Select the relevant sensor in the **Installed Sensors** list.
- 5 Make sure that the correct offset values have been inserted.
- 6 Fill in the result table.

Result

Global positioning system (GPS) offsets	
X Offset	
Y Offset	
Z Offset	

Requirements	Results
All offset values are entered in the ST90.	
All values are correct.	
All values are recorded in the relevant table.	
Date and signature:	

Verifying the installation parameters for the motion reference unit (MRU)

The physical location of the motion reference unit (MRU) relative to the transducer is required to allow the ST90 to adjust for roll and pitch as accurately as possible. This task is only applicable if you are using an external motion reference unit on your ST90.

Prerequisites

For accurate location of the motion reference unit (MRU), you need the detailed vessel drawings. The information about the installation angles must be retrieved from the reports provided by the personnel that installed the equipment. Neither tools nor instruments are required. The ST90 system is turned on and operates normally.

Context

The information from a motion reference unit (MRU) (normally heave, roll and pitch information) is imported into the ST90 to increase the accuracy of the echo data. The ST90 is provided with a built-in motion sensor. It is placed inside the Motor Control Unit. For improved operational accuracy, an external motion reference unit (MRU) may be used. The motion reference unit (MRU) measures the roll and pitch motions of the vessel. Some sensor models also measure heave.

On the **MRU** page, you must define the physical location of the motion reference unit related to the reference point you created on the **Ship** page. The rotation around the X, Y and Z axis is used to compensate for 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. The required accuracy of the offset and rotation angles depends on the accuracy requirement for the ST90 data.

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.
 - a From the vessel drawings, extract the relevant offset information, and insert those values.

- b From the information provided by the personnel installing the motion sensor, obtain the relevant rotation information.
- c Make sure that the correct offset values have been inserted.
- d Make sure that the correct installation angles have been inserted.
- e Record the information in the result table.

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 ST90 must be set to 0 (zero) to avoid "dual compensation". The rotation information is normally not recorded by the positioning system, and must therefore be defined in the ST90.

- 5 Select **Cancel** to close the dialog box without making any changes.

Result

Motion reference unit (MRU) offsets		
X Offset	Y Offset	Z Offset
Installation angle X	Installation angle Y	Installation angle Z

Requirements	Results
All offset values and installation angles are entered in the ST90.	
All values are correct.	
All values are recorded in the relevant table.	
Date and signature:	

Customer acceptance form

Fill in and sign this form for formal acceptance of the Simrad ST90 system.

The Simrad ST90 system is (<i>tick relevant column</i>):		
Accepted	Accepted with comments	Not accepted
Vessel/Customer		
Place and date		
Comments		
Test done by (name)	Company/Position	Date and signature
Test accepted by (name)	Company/Position	Date and signature
<p>When this test procedure has been completed with all relevant signatures and applicable forms filled in, the document must be sent to the Simrad Support Department at Strandpromenaden 50, P.O.Box 111, 3191 Horten, Norway. Alternatively, scan all the pages to PDF using minimum 200 DPI resolution, and send the file to simrad.support@simrad.com.</p>		

Secondary procedures

The end user and technical documentation for the ST90 contains several procedures that are also applicable for this Harbour Acceptance Test. These procedures are not part of the Harbour Acceptance Test. They are provided for reference purposes only. If you scan a completed Harbour Acceptance Test for archiving or reporting purposes, it is not necessary to include these procedures.

Topics

[Setting up the Operating Panel \(Mk2\), page 57](#)

Setting up the Operating Panel (Mk2)

The Operating Panel offers all necessary control functions for normal operation of the ST90. Before it can be put to use, the 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 ST90 *Installation manual*. The ST90 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):

```
ST90
157.237.60.12
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 ST90, 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 front panel of 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.
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 ST90 icon to start the program.
Wait until the ST90 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 ST90 is turned off.
 - d Turn on the ST90 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.

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