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HiPAP/HPR 400 Test and alignment procedures

This document describes the test and alignment procedures which must be performed after the system units have been installed but before power is applied to the system.

The procedures are valid for both the High Precision Acoustic Positioning (HiPAP) and the Hydroacoustic Position Reference (HPR 400) systems.

Document revisions

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(The original signatures are recorded in the company's logistic database)

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Document history

(The remainder of the information on this page is for internal use)

- Rev. A** Original issue based on P2420E/D.
- Rev. B** Document converted to Ileaf 6.2, and corrected/updated. Refer to D510.
- Rev. C** Document converted to Word and, and corrected/updated. Refer to 130315C.

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1 INTRODUCTION

1.1 Purpose

After the installation has been performed and before the system is brought into operation for the first time, a series of test and alignment procedures must be carried out to confirm a correct installation.

This document contains the instructions and procedures required to ensure the system is installed correctly, is correctly set up and is safe to switch on and use.

1.2 Test certificates

Once the testing engineer has performed or witnessed the performance of a test or part of a test, he must sign on the test certificate to certify that the unit or system has passed that particular part of the procedure.

The use of these fields is optional, but we recommend that they are properly filled in for future references.

Note !

If the testing engineer is not satisfied with the standard of any part of the installation, he must contact the personnel who performed the installation, to have the work rectified and brought up to the required standards.

1.3 Visual inspections

After the physical installation has been carried out, all the system units must be visually checked to ensure the system has been installed correctly. You must ensure that the units have been mounted in the correct locations, correctly orientated (the right way up) and are correctly secured to the bulkhead/deck mounting brackets.

The hull unit tests are described in the hull unit Installation manual.

Note !

These tests must be made before power is applied to the system. None of these tests will require power to be applied.

1.4 Test and alignments

WARNING ! All required checks must be completed before any power is switched onto the system.

The following related test procedures must also be performed:

- Hull Unit Test and alignment, document no. 130600.
- The HiPAP/HPR Customer Acceptance Test (CAT), document no. 160901.

1.5 Test procedures introduction

In all cases the step-by-step instructions must be followed if the tests are to be trustworthy.

In order to verify that the HiPAP/HPR system works properly, the following tests must be carried out:

- Operator Unit/Station installation
- HiPAP/HPR 400 Transceiver unit
- Roll, pitch and heave sensor
- Heading sensor
- Cabling
- Applying power to the system

Follow the procedures and fill in the tables. Once the system has been tested, sign the signature page (last page).

The test results will be:

OK	when the test is done satisfactory.
FAIL	if the test fails.
NA	if the test is non-applicable.

2 OPERATOR UNIT/STATION

Note ! *This test procedure applies only to those installations where the electronics units have been mounted on a desktop or in a 19" rack. An installation may also be an integrated part in a console - in this case a procedure provided by the console vendor may be used.*

2.1 General

The installation of the Operator Unit/Station is described in the Installation manual.

2.2 Logistics

<i>Safety</i>	Not applicable.
<i>Personnel</i>	Experienced engineer from the shipyard's quality assurance department. Installation supervisor.
<i>Vessel location</i>	Not applicable.
<i>References</i>	Drawings from the Installation manual.
<i>Special tools</i>	None.

2.3 Procedure

- 1 Perform a close visual inspection of the installation.
- 2 Check that the units are installed in the correct locations, and are suitably orientated to enable easy operation.
- 3 Check that the units are not damaged, and that the paintwork is clean.
- 4 Check that the Operator Unit/Station is properly secured to the desktop.
- 5 Check that the display unit is mounted properly as described in the Installation manual.

2.4 Test certificate

Operator unit/station installation	
Item to be checked	Checked (sign)
Visual inspection	
Location and paintwork	
Mounting	
Operator Unit/Station units mounting	
Display unit mounting	
<p>The installation of the desktop assembly has been checked according to the procedures defined in the Installation manual. Comments concerning inaccuracies, faults and/or poor workmanship have been filed as a separate report.</p>	
<i>Shipyard's quality assurance department</i>	
Signature	Date
<i>Installation team supervisor</i>	
Signature	Date

3 HIPAP/HPR 400 TRANSCEIVER UNIT

3.1 General

The transceiver unit must be mounted according to the Installation manual. It is important that environmental requirements are followed. Attention should also be on ease of service.

3.2 Logistics

<i>Safety</i>	Not applicable.
<i>Personnel</i>	Experienced engineer from the shipyard's quality assurance department. Installation supervisor.
<i>Vessel location</i>	Not applicable.
<i>References</i>	Installation manual.
<i>Special tools</i>	None.

3.3 Procedure

- 1 Perform a close visual inspection of the unit's mounting arrangement.
- 2 Check that the unit is mounted according to Installation manual.
- 3 Check that the unit is located within the environmental specifications.

3.4 Test certificate

HPR 400 Transceiver Unit	
Item to be checked	Checked (sign)
Visual inspection	
Mounting	
Environments	
<p>The installation of the transceiver unit has been checked according to the procedures defined in the Installation manual. Comments concerning inaccuracies, faults and/or poor workmanship have been filed as a separate report.</p>	
<i>Shipyard's quality assurance department</i>	
Signature	Date
<i>Installation team supervisor</i>	
Signature	Date

4 ROLL, PITCH AND HEAVE SENSOR

4.1 General

The unit shall be installed close to the roll and pitch centre of the vessel, to reduce heave as much as possible. The unit may not have a heave output.

The unit must be calibrated to be inline with the vessels roll and pitch axis before calibrating the integrated navigation system. It is of great importance that the unit's reference is not changed after this. If so, a new calibration of the integrated navigation system may be required.

4.2 Logistics

<i>Safety</i>	Not applicable.
<i>Personnel</i>	Experienced engineer from the shipyard's quality assurance department. Installation supervisor.
<i>Vessel location</i>	Not applicable.
<i>References</i>	Manufacturer specifications.
<i>Special tools</i>	None.

4.3 Procedure

- 1 Perform a close visual inspection of the unit's mounting arrangement.
- 2 Check that the unit is installed according to manufacturer specifications.
- 3 Check that the unit is installed in the correct location and that the vibration conditions are within the required limits. Check that the unit casing is not damaged.
- 4 Check that the unit is correctly orientated. It is very important that the unit is mounted with its roll, pitch and axis correctly. Please check with the sensors manual.
- 5 Check that the unit outputs values that is according to the vessel's trim level.

4.4 Test certificate

Roll, pitch and heave sensor	
Item to be checked	Checked (sign)
Visual inspection	
Manufacturer specifications	
Location, vibration	
Orientation	
Trim	
<p>The installation of the roll, pitch and heave sensor has been checked according to the procedures defined in the Installation manual. Comments concerning inaccuracies, faults and/or poor workmanship have been filed as a separate report.</p>	
<i>Shipyard's quality assurance department</i>	
Signature	Date
<i>Installation team supervisor</i>	
Signature	Date

5 HEADING SENSOR

5.1 General

The Heading sensor must be mounted according to manufacturer specifications.

The unit must be calibrated to be inline with the vessels centre line before calibrating the integrated navigation system. It is of great importance that the unit's reference is not changed after this. If so, a new calibration of the integrated navigation system may be required.

5.2 Logistics

<i>Safety</i>	Not applicable.
<i>Personnel</i>	Experienced engineer from the shipyard's quality assurance department. Installation supervisor.
<i>Vessel location</i>	Not applicable.
<i>References</i>	Manufacturer specifications.
<i>Special tools</i>	None.

5.3 Procedure

- 1 Perform a close visual inspection of the unit's mounting arrangement.
- 2 Check that the unit is installed according to manufacturer specifications.
- 3 Check that the unit is correctly orientated and calibrated to be inline with the vessel's centre line.

5.4 Test certificate

Heading sensor	
Item to be checked	Checked (sign)
Visual inspection	
Manufacturer specifications	
Orientation and calibration	
<p>The installation of the heading sensor unit has been checked according to the procedures defined in the Installation manual. Comments concerning inaccuracies, faults and/or poor workmanship have been filed as a separate report.</p>	
<i>Shipyard's quality assurance department</i>	
Signature	Date
<i>Installation team supervisor</i>	
Signature	Date

6 CABLING

6.1 General

This is the test procedures for the system's power and signal interface cables.

WARNING !

These checks must be completed before any power is switched onto the system.

The installation of the cables is described in the *Cable layout* chapter in the Installation manual.

6.2 Logistics

<i>Safety</i>	Not applicable.
<i>Personnel</i>	Experienced engineer from the shipyard's quality assurance department. Electrician supervisor.
<i>Vessel location</i>	Not applicable.
<i>References</i>	Drawings from the Installation manual.
<i>Special tools</i>	None.

6.3 Procedures

6.3.1 Visual inspection of the cabling

Refer to the cable plans and interconnection diagrams, and check all power and interconnection cables. Any locally fitted plugs and connectors should also be checked to ensure the correct types have been used for the specific locations. (Sealed/spark-proof connectors in areas where flammable gasses may accumulate, etc.)

Ensure all cable connections have been made according to the cable plan, and that all connections are tight and secure. Ensure all cables are correctly laid in conduits, or are otherwise protected according to the regulations and recommendations laid down by the vessel's registration authority. Ensure all protective covers are fastened correctly.

6.3.2 Cable connections and continuity

After the cable connections have been completed and the visual inspection has been carried out, all the cable cores must be checked for correct connection and continuity. Refer to the cable plans and interconnection diagrams, and check all inter-connection cables. Any locally fitted plugs and connectors should also be checked for shorts or open circuits. Ensure all cable connections have been made according to the cable plan, and that all connections are tight and secure.

WARNING !

These checks must be completed before any power is switched onto the system.

This check procedure will require pairs of engineers, equipped with the appropriate cable plans and wiring diagrams, two-way communication devices and tool kits. The “tester” will require continuity test equipment, the assistant will require a suitable shorting strap.

Note !

The exact resistance values will depend on the type and lengths of the cables, and the units to which the cables are connected. If in doubt, check with the manufacturers.

Follow the check procedure below for **each cable core**:

- 1 The test engineers should position themselves one at each end of the cable to be checked.
- 2 Good communications must be established.
- 3 Ensure the cable to be tested is not connected to any power source.
 - If a cable terminates in a plug at the unit, the test will be more easily conducted if the plug is disconnected from the unit.
- 4 Select one pair of cable cores, and check that the cores are connected to the correct terminals in the unit/plug.
- 5 The tester then connects his continuity tester to the two terminals in question and checks the continuity.
 - If a low resistance exists between the two cores, this may indicate the cores are connected to circuits or units with low internal resistance. If this is the case, disconnect the cores from the terminal block and test again. The resistance should be nearing $\infty \Omega$ If so:

- 6 The assistant then shorts the two cores together, and the tester repeats the test. The Resistance should be approximately 0Ω .
- 7 The assistant then removes the shorting strap, and the resistance should go up to approximately $\infty \Omega$ again.
- 8 The tester then checks each core's resistance to ground, (this should be approximately $\infty \Omega$ depending on the cable and unit(s)), and each core's resistance to all the other cores in the cable, (this should be approximately $\infty \Omega$).
- 9 Assuming the test results are correct, the cores must be reconnected to the terminal block (if they had been removed), and the terminals checked to ensure they are correct and tight.
- 10 On completion, move on to the next pair of cores and repeat the tests till the entire cable has been checked.

6.4 Test certificate

Cabling	
Item to be checked	Checked (sign)
Visual inspection	
Connections	
Continuity	
The installation of the system cabling has been checked according to the procedures defined in the Installation manual. Comments concerning inaccuracies, faults and/or poor workmanship have been filed as a separate report.	
<i>Shipyard's quality assurance department</i>	
Signature	Date
<i>Electrician supervisor</i>	
Signature	Date

7 APPLYING POWER TO THE SYSTEM

Once all the checks have been completed, power can be applied to the system. Follow the procedure below:

- 1 Check to ensure that all the test and alignment procedures have been carried out.
- 2 Check that all power switches to the system, and those on the system units, are set to OFF.
- 3 Insert the system fuses into the main fuse panel and switch power on to those fuses.
- 4 Check on the supply terminals in all the various units that the correct supply voltages are being fed to those units.
- 5 Switch on the units one at a time and ensure each unit operates.
- 6 Switch on the entire system and perform the Setting To Work procedures as detailed in the contract.

8 REMARKS AND SIGNATURES

8.1 Remarks

Remarks (if any) must be noted here or in a separate report.

8.2 Signatures

Checked by:

Place	Date	Signature
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Approved by:

Place	Date	Signature
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