



EK80 HAT procedure

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Document history

Revision	Description of Change
A	First Issue
B	General update, new standard structure
C	General update, EC150-3C now included
D	Rewrite and simplify the procedure

References

No	Doc No	Description
1	395234	EK80 Reference manual
2	394149	EK80 Installation manual
3	438371	EC150-3C Installation manual
4	401926	EK80 SAT procedure
5	N/A	Delivery system interconnection and setup documentation (supplied by ship owner)

All the Kongsberg referenced documents can be found and downloaded from:

https://www.kongsberg.com/maritime/products/mapping-systems/fishery-research/es_scientific/ek80/ek80docs/

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1 INTRODUCTION

The purpose of this Harbour Acceptance Test (HAT) is to verify that the Echosounders and/or the ADCPs in the EK80 system are correctly installed, and fully functional. It is then ready for the Sea Acceptance Test (SAT).

After the HAT, the Customer Acceptance Form must be signed by the relevant parties. The completed document then becomes the official report. Data logged during the HAT must be downloaded and stored on KM internal servers for future reference.

1.1 Personnel and location

This Harbour Acceptance Test is done onboard the vessel, alongside the quay. The test is done by personnel from Kongsberg Maritime, or by a representative from an authorized dealer or distributor.

The personnel performing the HAT must be qualified operators of the system and have received proper training.

1.2 Test equipment

The following test equipment is required to perform this test:

- 453635 – Shielded dummy load WBT

2 HAT PROCEDURE EK80

2.1 Hardware and Software registration

In Table 3 List of Items, fill in the information for all the units supplied by Kongsberg Maritime. The items supplied can be:

- Computer
- Network switch
- WBTs
- Transducers

2.2 Visual inspection

Perform a visual inspection of all the units in the system. Make sure that they are mounted properly and do not have any physical damage or scratches. Also, check that the equipment and the belonging cables are installed according to the requirements in the installation manual. Check that the units and cables are located so that the risk of electrical interference is kept at a minimum.

2.3 Test Procedure

To start testing the system, make sure all units are powered on.

2.3.1 Check installation

Open the installation menu in the EK80 software and verify:

- All WBTs and/or ADCP transceivers are installed, including proper licenses
- All transducers installed and connected to the correct transceiver (WBT).

2.3.2 Configuration of interfaces

Verify that all ship interfaces are turned on and operational.

In the *Installation* -> *I/O Setup* configure the required inputs and outputs. Configure both the serial ports and the LAN ports according to the system interconnection and setup documentation.

As a minimum the following inputs must be set up:

- GPS position
- Heading of the vessel
- Motion data of the vessel

Note! *If an ADCP is included in the system, the motion data must be in the KM Binary format.*

Note! *If an ADCP is included in the system, it is essential that the ADCP is synchronised to an available NTP server for accurate timing. The time synchronisation settings can be checked in the ADCP Editing menu.*

Other examples of inputs and outputs may be:

- Transmit synchronisation
- Sound velocity sensor
- NMEA outputs
- ...

In the checklist enter OK for the interfaces that are configured and tested OK. For interfaces not configured enter N/A.

2.3.3 Dimensional survey

A dimensional survey must be present for the HAT to be approved.

Note! *The accuracy requirements for the dimensional survey are listed in the EK80 installation manual and the EC150-3C installation manual.*

Note! *Modest accuracy requirements apply when your EK80 system is only used to investigate objects in the water column. When used for Acoustic Doppler current profiler (ADCP) measurements the accuracy requirements are increased.*

In the *Installation* menu, enter the lever arms and angular offsets for all the sensors.

2.3.4 Functional test of Echosounders

Note! *Make sure the transducers are in water when pinging is activated. Pinging in air may damage the transducers. This is especially important to pay notice if the vessel has a drop keel.*

2.3.4.1 *Normal operation*

Activate one frequency at a time and start pinging. Verify that the echogram looks normal and that the system detects the bottom at all frequencies.

If EC150-3C is part of the installation, also run this in echosounder mode.

Test the systems with both CW and LFM pulses, where applicable.

If the water is very shallow it might be necessary to reduce the pulse duration and power.

2.3.4.2 *Transducer measurements*

Measure the impedance and phase for all the echosounder transducers.

Note! *This section does not apply to the EC150-3C.*

2.3.4.2.1 CW pulses

Make sure all frequencies are set to active and that CW is selected for all. Enter the *Diagnostics* -> *TRANSDUCER* menu. Select one system at a time and verify that the impedances and phase are according to acceptance criteria.

CW acceptance criteria: $60\Omega < |Z| < 95\Omega$ and $-30^\circ < \phi < 30^\circ$.

2.3.4.2.2 LFM pulses

Make sure all frequencies are set to active and that LFM is selected for all transducers where this is possible. Enter the *Diagnostics* -> *TRANSDUCER* menu. Select one system at a time and verify that the impedances and phase angle plots are as expected.

Verify that the plots look normal, and that there are no large deviations between the different sectors.

2.3.5 Functional test of ADCP

Note! *Make sure the ADCP is in water when pinging is activated. Pinging in air may damage the transducer.*

Configure the EC150-3C to ADCP mode. Set the power and cell size to minimum. Reduce the colour span of the ADCP to minimum.

Operate the ADCP in both CW and LFM mode.

Verify that you see the bottom return in the echogram and that all beams detect the bottom.

Check if you measure any velocities in the water column.

2.3.6 Noise measurements

To fully utilize the system's capabilities, it is important to achieve the best possible Signal to Noise ratio (SNR) for the installation. The first step is to follow the guidelines given in the installation manual.

For a ship installation, there are other systems and noise sources that inevitably will influence the SNR, but still, it is important to optimize the installation and keep the influence at a minimum. KM can provide a report showing the achievable noise levels under ideal conditions. During the tests, the vessel should have the generators operational and not be running on shore power. It is important to have the conditions as realistic as possible so that they reflect the normal operation as close as possible.

Note! *Be aware that the lower frequencies can be affected by noise caused by construction work in the port or background noise in the sea and the surroundings.*

2.3.6.1 *Setup of system for noise checks*

Note! *The EC150-3C must be configured in ES mode during the noise measurements.*

Set up all the frequencies with the following pulse configurations and settings:

- LFM, passive mode, pulse length 2.048ms, max power, fast ramping
- For frequencies where LFM is not available:
 - CW, passive mode, pulse length 1.024ms, max power, fast ramping
- For EC150-3C in ES mode:
 - LFM, passive mode, depth cell size 2, max velocity 10m/s, max power
- Echogram range 2000 meters
- Ping mode maximum. Bottom detection should be turned off
- Select TVG to Sv (20 log) and echogram threshold -70 dB

Record data for 5 minutes.

2.3.6.2 *Collecting and checking noise data*

2.3.6.2.1 Noise data with transducer

Activate all the systems and log data for 5 minutes.

Check the noise estimate value for all the systems in the *Diagnostics -> Noise* menu. The values will vary from ping to ping. Do an average over 10 pings and enter the value in the checklist.

2.3.6.2.2 Noise data with dummy load

Note! *This section does not apply to the EC150-3C.*

Disconnect the transducer cables from all the WBTs and connect the shielded dummy load (P/N 453635). Activate the system(s) with the dummy load connected and log data for 5 minutes.

Check the noise estimate value for all the systems in the *Diagnostics* -> *Noise* menu. The values will vary from ping to ping. Do an average over 10 pings and enter the value in the checklist.

2.3.7 Data download

If no restrictions exist, download the data to an external disk and bring it home for storage on the KM local server. The data will be used for future reference.

Alternatively, the technical report must include screenshots of installation menus and echograms for documentation.

3 LIST OF ITEMS

Fill in the units included in the delivery			
Item	Item	Item no	Item information
1	Computer		Model: Serial no.:
2	Network Switch		Model: Serial no.:
3	EK80 Software	N/A	Version:
4	WBT #1		FW version: Serial no.:
5	WBT #2		FW version: Serial no.:
6	WBT #3		FW version: Serial no.:
7	WBT #4		FW version.:. Serial no:
8	WBT #5		FW version: Serial no.:
9	WBT #6		FW version: Serial no.:
10	Transducer #1		Model: Serial no.:
11	Transducer #2		Model: Serial no.:
12	Transducer #3		Model: Serial no.:
13	Transducer #4		Model: Serial no.:
14	Transducer #5		Model: Serial no.:
15	Transducer #6		Model: Serial no.:

16	ADCP		Model:
			FW version:
			Serial no.:
17			
18			

4 CHECK LIST

<i>Pos</i>	<i>Test operation</i>	<i>Result</i>		<i>Specifications</i>
		<i>PreHAT</i>	<i>HAT</i>	
2.1	Hardware and Software registration			OK
2.2	Visual inspection			OK
2.3.1	Check installation			
	All WBTs incl. licenses installed			OK
	All transducers installed			OK
2.3.2	Configuration of interfaces			
	GPS position			OK
	Heading of the vessel			OK
	Motion data of the vessel			OK
	Time synchronisation			OK
	Transmit synchronisation			OK
	Sound velocity input			OK
	Others:			OK
2.3.3	Dimensional survey			OK
2.3.4.1	Functional test of Echosounders			
	Normal operation			OK
2.3.4.2.1	Transducer measurements			
	CW pulses 18 kHz			$60\Omega < Z < 95\Omega$

<i>Pos</i>	<i>Test operation</i>	<i>Result</i>		<i>Specifications</i>
		<i>PreHAT</i>	<i>HAT</i>	
				$-30^\circ < \phi < 30^\circ$
	38 kHz			$60\Omega < Z < 95\Omega$
				$-30^\circ < \phi < 30^\circ$
	70 kHz			$60\Omega < Z < 95\Omega$
				$-30^\circ < \phi < 30^\circ$
	120 kHz			$60\Omega < Z < 95\Omega$
				$-30^\circ < \phi < 30^\circ$
	200 kHz			$60\Omega < Z < 95\Omega$
				$-30^\circ < \phi < 30^\circ$
	333 kHz			$60\Omega < Z < 95\Omega$
				$-30^\circ < \phi < 30^\circ$
2.3.4.2.2	LFM pulses			
	38 kHz			OK
	70 kHz			OK
	120 kHz			OK
	200 kHz			OK
	333 kHz			OK
2.3.5	Functional test of ADCP			OK
2.3.6	Noise measurements			
2.3.6.2.1	Noise data with transducer			
	18 kHz			Noise estimate
	38 kHz			Noise estimate

<i>Pos</i>	<i>Test operation</i>	<i>Result</i>		<i>Specifications</i>
		<i>PreHAT</i>	<i>HAT</i>	
	70 kHz			Noise estimate
	120 kHz			Noise estimate
	200 kHz			Noise estimate
	333 kHz			Noise estimate
	EC150-3C			Noise estimate
2.3.6.2.2	Noise data with dummy load			
	18 kHz			Noise estimate
	38 kHz			Noise estimate
	70 kHz			Noise estimate
	120 kHz			Noise estimate
	200 kHz			Noise estimate
	333 kHz			Noise estimate
2.3.7	Data download			OK

5 CUSTOMER ACCEPTANCE FORM

The HARBOR ACCEPTANCE TEST for the EK80, for has been performed according to the test procedure.

The test is: Accepted / Not accepted *(Delete as appropriate)*

Remarks:

Please use capital letters:

Test performed by:		Position:	Company:
			Kongsberg Maritime AS.
Test witnessed by:		Position:	Company:
Date:	Signature:		