

DETAILED TEST LOG

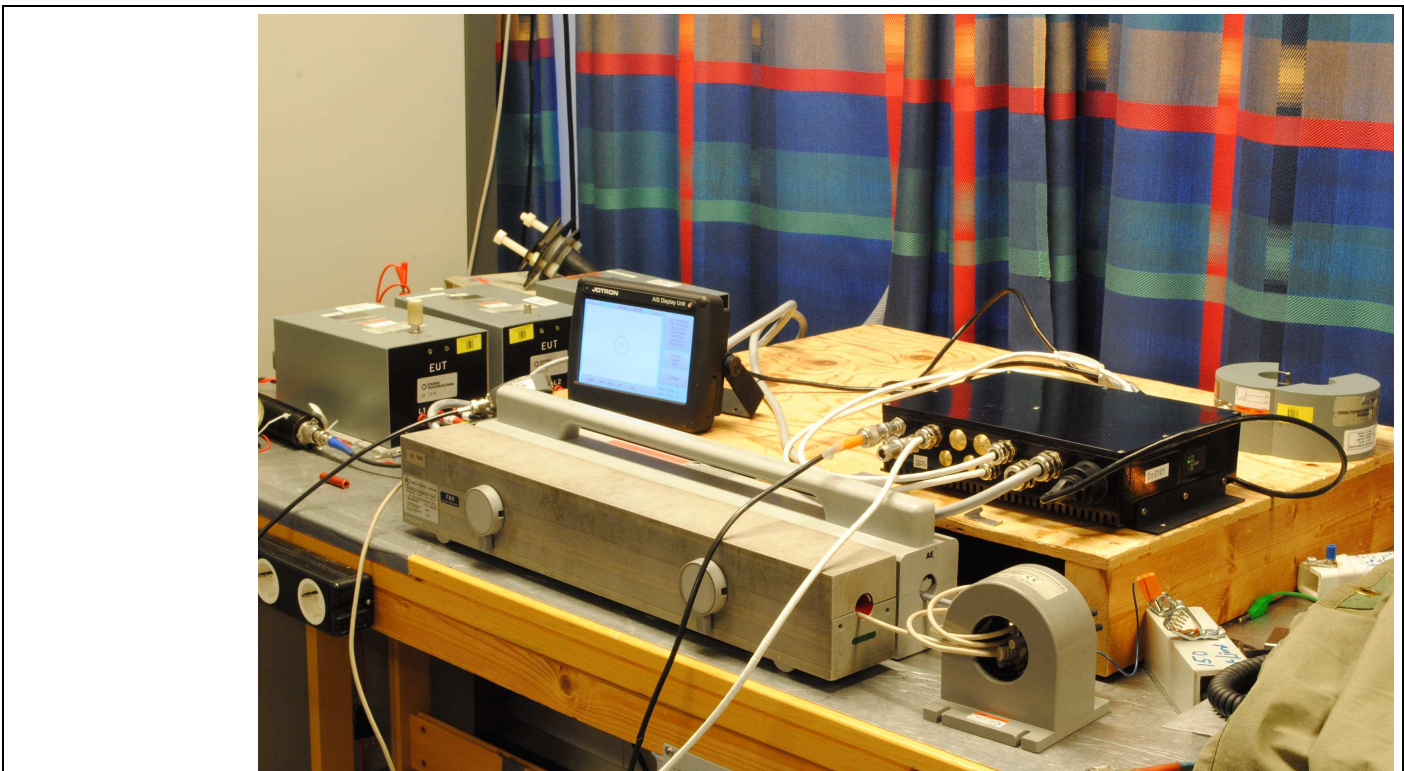
Note: The choice of test levels could differ from the procedure, based on the nature of EuT.
 Note: An asterisk (*) indicates tests not within the scope of accreditation.
 Note: Possible test case performances: <space> = Not tested, or letters indicating level of performance.

Port	Frequency range [MHz]	Applied Level [Vrms] 1)	Injection Method	Required Criteria	Complied Criteria	Result
Radio Unit:						
Power DC 24 V	0.15 – 80	3 + 10	CDN-M3	A	A	PASS
Antenna port VHF	0.15 – 80	3 + 10	EM CLAMP	A	A	PASS
Antenna port GPS	0.15 – 80	3 + 10	BCI	A	A	PASS
Ethernett port	0.15 – 80	3 + 10	EM CLAMP	A	A	PASS
RS-422 port	0.15 – 80	3 + 10	EM CLAMP	A	A	PASS
RS-232 port	0.15 – 80	3 + 10	EM CLAMP	A	A	PASS
Display Unit:						
Power DC 24 V	0.15 – 80	3 + 10	EM CLAMP	A	A	PASS
Ethernet port	0.15 – 80	3 + 10	EM CLAMP	A	A	PASS
RS-422 port	0.15 – 80	3 + 10	EM CLAMP	A	A	PASS

NOTE: 1) Test level was 3 V rms throughout the whole frequency range and in addition 10 V rms at spot frequencies; 2 MHz, 3 MHz, 4 MHz, 6,2 MHz, 8,2 MHz, 12,6 MHz, 16,5 MHz, 18,8 MHz, 22 MHz and 25 MHz

CONCLUSION

No operation errors were detected during or after the applied test(s)



Notes: Test set-up for Conducted RF immunity

IMMUNITY – POWER SUPPLY FAILIURE

TEST DESCRIPTION

Method

The reference method for this test is listed in the table under clause APPLIED TESTS.

Set-up

Only the general laboratory conditions apply. No special requirements are defined for the configuration of the EuT. The DC power input of the EuT is connected to a power supply.

Procedure

The EUT was subject to three breaks in power supply of duration 60 seconds each. The EuT functionality was tested after each power on following the test.

Instruments used during measurement

Instrument list: NA

Comments

No recorded comments.

Severity

Port:	DC Input Port
Intervals	90 sec.

Conformity

Verdict:	PASS
Test engineer:	Jan G Eriksen

CONCLUSION

No operation errors were detected after the applied tests.

ELECTRICAL – COMPASS SAFE DISTANCE

TEST DESCRIPTION

Method

EN 60945 (2002), Section 11.2

EN ISO 694 (2001)

Ships and marine technology. Positioning of magnetic compasses in ships.

Procedure

Compass safe distance is the distance between the nearest point of the EuT and the subject compass, where an unacceptable compass deviation occur

For a standard compass, the horizontal magnetic flux shall be less than 0.942 mGauss (compass deviation of 5.4°H).

For a steering/standby/emergency compass, the horizontal magnetic flux shall be less than 3.142 mGauss (compass deviation of 18°H).

The compass safe distance is measured with a DC milligaussmeter. The EuT is first rotated to determine the worst case direction. Secondly the EuT is moved towards/away from the measurement probe until the required field is measured. The distance is then measured.

Measurements are made at 3 EuT conditions:

- 1) Non-energized (in the magnetic condition received from customer)
- 2) Non-energized after magnetisation in a 1 Gauss (80A/m) DC field, with a superimposed stabilising 50Hz AC field of 18 Gauss (1430A/m) *
- 3) Energized and in normal operating condition

* Test 2) may be omitted if the application of a strong magnetic field may damage the EuT

Instruments used during measurement

Instrument list: Magnetometer: Alphalab DC Milligauss (N-4046) (10/11)
 Magnetization Coil: Nemko HC-1 (N-4216) (NA)
 AC Magnetometer: Combinova MFM 10 (N-4286) (09/11)
 DC Magnetometer: Alphalab DC Magnetometer (N-4258) (10/11)

Comments

No recorded comments.

Conformity

Test engineer: Nguyen Trung Cang

DETAILED TEST LOG

Condition	Standard Compass	Other Compass
Display Unit		
Non-energized	120 cm	75 cm
Non-energized after magnetisation	120 cm	75 cm
Energized and operating	125 cm	80 cm
Transceiver Unit		
Non-energized	90 cm	60 cm
Non-energized after magnetisation	80 cm	40 cm
Energized and operating	95 cm	65 cm

CONCLUSION

Based on the above measurements the overall Compass Safe Distance is considered to be = **125 cm** for **Display Unit** and **95 cm** for **Transceiver Unit**.

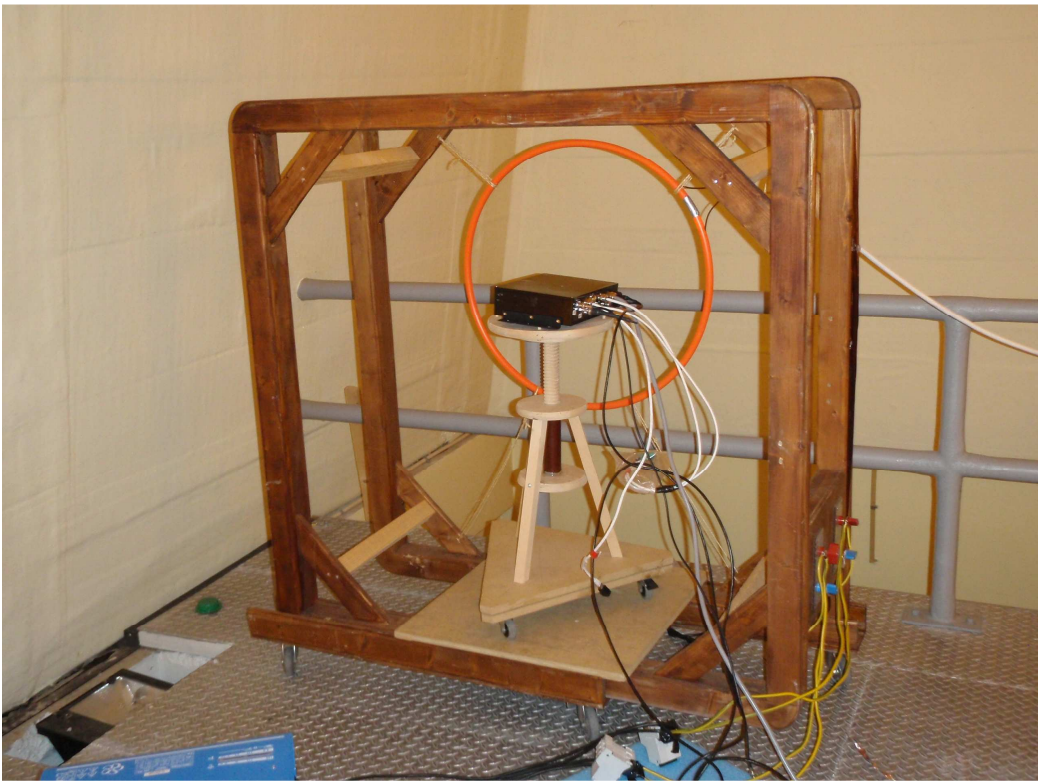
PHOTOS



Notes: Test set-up for Compass Safe Distance, Display unit



Notes: Test set-up for Compass Safe Distance, Display unit



Notes: Test set-up for Compass Safe Distance, Transceiver unit



Notes: Test set-up for Compass Safe Distance, Transceiver unit

ENVIRONMENTAL – VIBRATION

TEST DESCRIPTION

Method

EN 60068-2-06 (2008) (IEC 60068-2-06 (2007))
 Test Fc: Vibration (sinusoidal)

Reference standard

IEC 60945 (2002) Ed.4; Maritime navigation and radiocommunication equipment and systems § 8.7 Vibration

Procedure

The EUT, complete with any shock and vibration absorbers with which it is provided, shall be fastened to the vibration table by its normal means of support and in its normal attitude. The EUT may be resiliently suspended to compensate for weight not capable of being withstood by the vibration table. Provision may be made to reduce or nullify any adverse effect on EUT performance which might be caused by the presence of an electromagnetic field due to the vibration unit. The EUT shall be subjected to sinusoidal vertical vibration at all frequencies between: – 2 Hz to 5 Hz and up to 13,2 Hz with an excursion of $\pm 1 \text{ mm} \pm 10 \%$ (7 m/s^2 maximum acceleration at 13,2 Hz); – above 13,2 Hz and up to 100 Hz with a constant maximum acceleration of 7 m/s^2 . The frequency sweep rate shall be 0.5 octaves/min in order to allow the detection of resonances in any part of the EUT as mounted. A resonance search shall be carried out throughout the test. During the resonance search the EUT shall be externally observed, by unaided visual and aural means, for obvious signs of any resonances of components or sub-assemblies that may affect the integrity of the EUT. Such observations shall be recorded in the test report. If any resonance, as measured by a sensor fixed to the outside of the EUT at the location where obvious signs of resonance have been observed, has a magnitude ratio ≥ 5 measured relative to the surface where the EUT is fastened, the EUT shall be subjected to a vibration endurance test at each resonant frequency at the vibration level specified in the test with a duration of 2 h. When resonant frequencies with magnitude ratios ≥ 5 are harmonically related, only the fundamental frequency shall be tested. If no resonance with a magnitude ratio ≥ 5 occurs, the endurance test shall be carried out at one single observed frequency. If no resonance occurred, the endurance test shall be carried out at a frequency of 30 Hz. Performance check(s) shall be carried out at least once during each endurance test period, and once before the end of each endurance test period. The procedure shall be repeated with vibration in each of two mutually perpendicular directions in the horizontal plane. The requirements of the performance check shall be met.

Instruments used during measurement

Instrument list:

Accelerometer:	PCB / 353B31	(N-4478)	(03/2011)
Accelerometer:	PCB / 353B31	(N-4479)	(03/2011)
Accelerometer:	PCB / 352C33	(N-4482)	(03/2011)
Accelerometer:	PCB / 352C33	(N-4484)	(03/2011)
Accelerometer:	PCB / 352C33	(N-4485)	(03/2011)
Shaker: LDS / V850 (N-4332) (N/A)			
Power Amplifier: LDS / SPA30KCE (N-4332.02) (N/A)			
Vibration controller: Spectral Dynamics Puma (N-4332-3)			
Vibration controller software: 6.6.5.RP1			

Comments

No recorded comments.

Severity

Frequency range:	5Hz – 100Hz
Amplitude:	5Hz – 13.2Hz: 2mm (p-p) 13.2Hz – 100Hz: 7 m/s^2
Sweep rate:	0.5 octave/min
Amplification criteria:	-
Endurance criteria:	Endurance at each resonance $\geq 5:1$, if none, one single observed frequency. if no observed freq., then 30Hz.
Endurance Duration:	120 min. at each chosen frequency
Number of axes:	3 mutually perpendicular

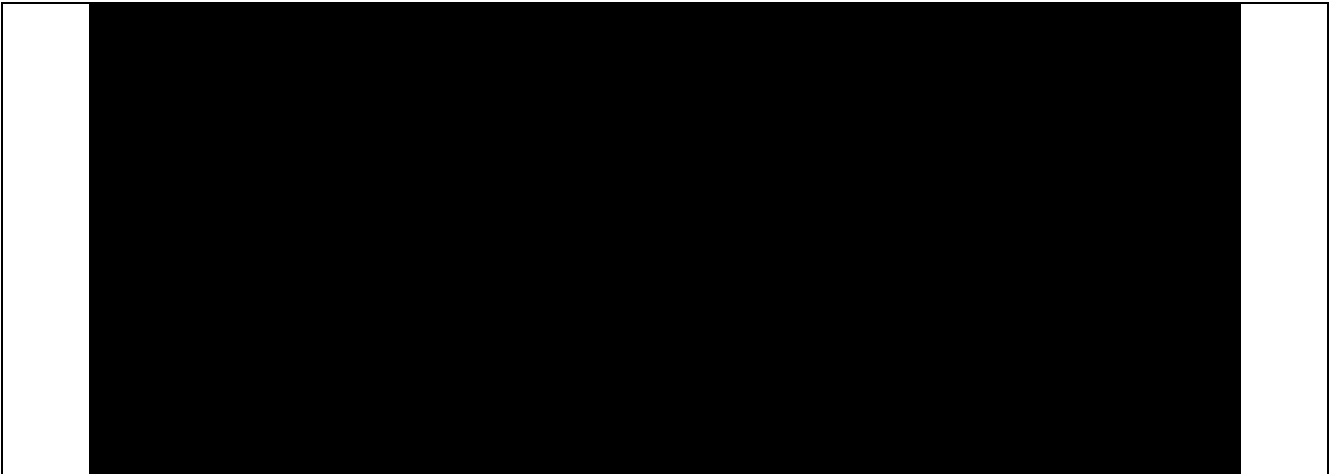
Conformity

Verdict:	PASS
Test engineer:	Steinar Jensen

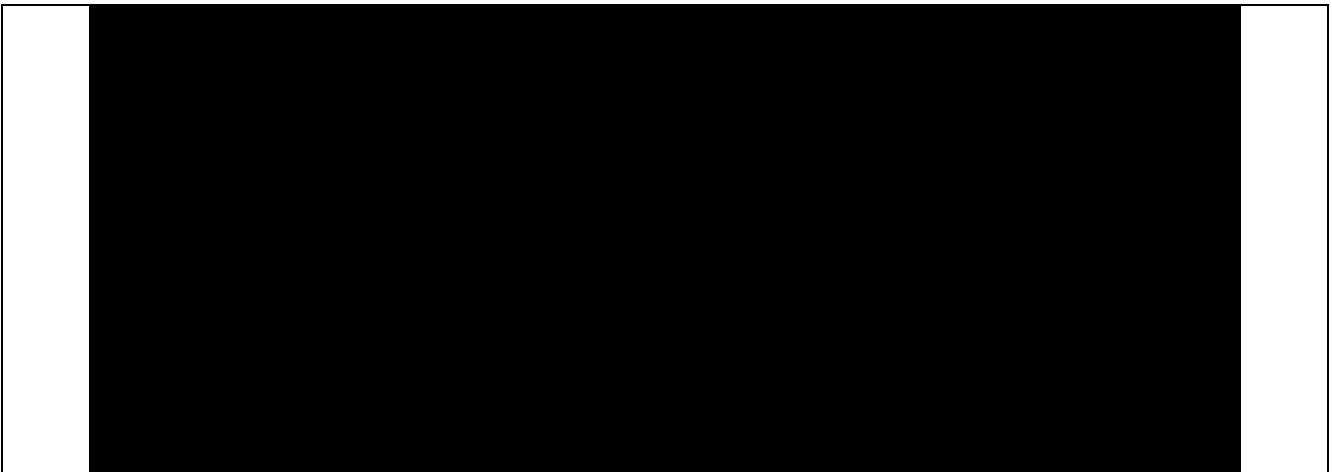
RESONANT POSITIONS

Axis	Position	Sweep number	Resonance Amplification Factor	Frequency
X	Transceiver	1 (ch.2)	-	-
	Display back	1 (ch.3)	13.23 : 1	64.25 Hz
	Display front	1 (ch.4)	9.41 : 1	98.14 Hz
Y	Transceiver	2 (ch.2)	-	-
	Display top	2 (ch.3)	17.91 : 1	52.47 Hz
	Display bottom	2 (ch.4)	17.91 : 1	52.47 Hz
Z	Transceiver	3 (ch.2)	1.35 : 1	46.19 Hz
	Display front	3 (ch.3)	2.08 : 1	63.23 Hz
	Display back	3 (ch.4)	-	-

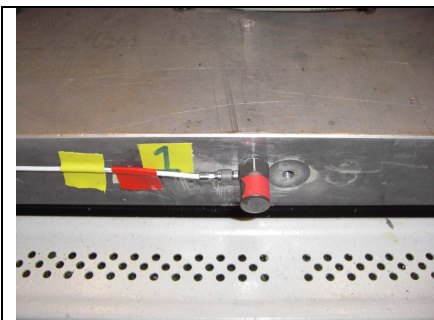
Sweep no.1



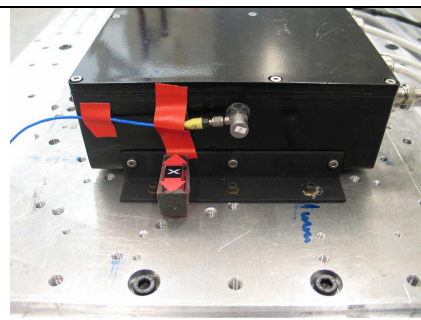
Sweep profile



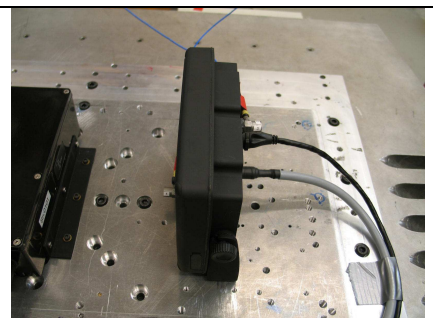
Amplification factor



Ch.1



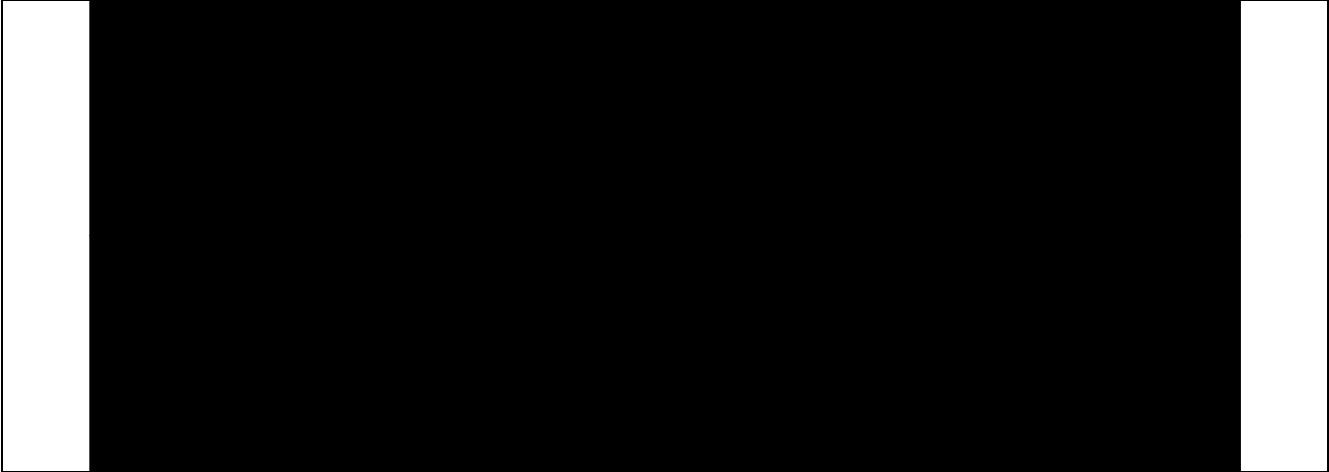
Ch. 2



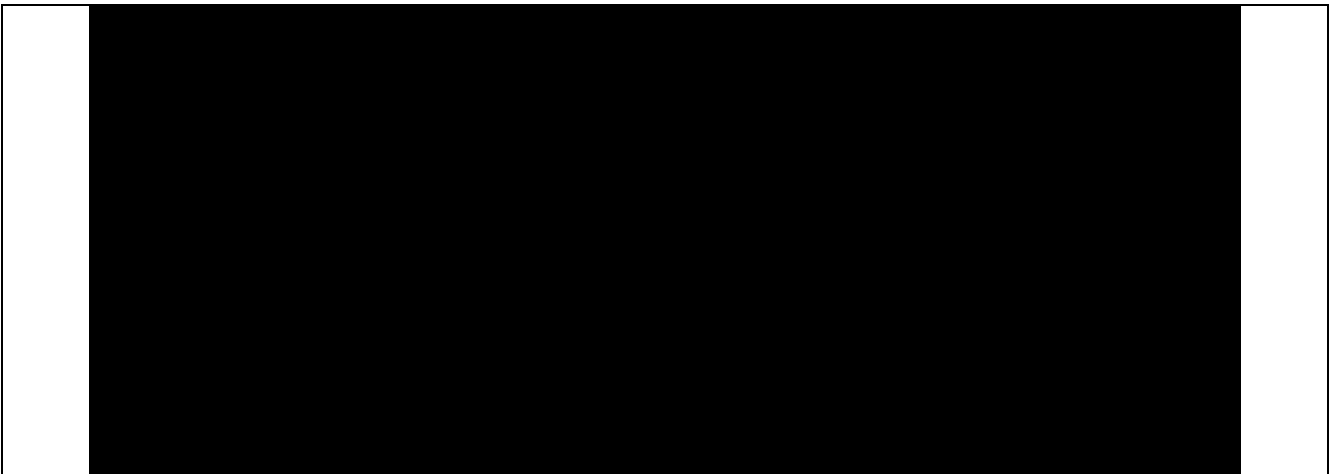
Ch.3 & Ch.4

Accelerometer positions

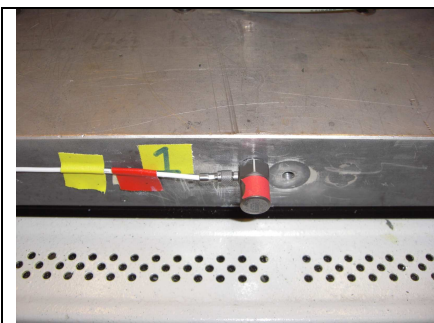
Sweep no.2



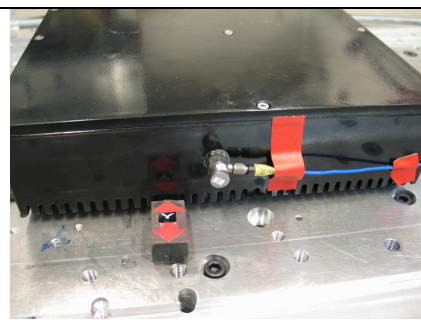
Sweep profile



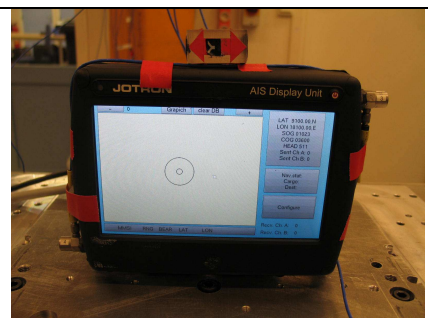
Amplification factor



Ch.1



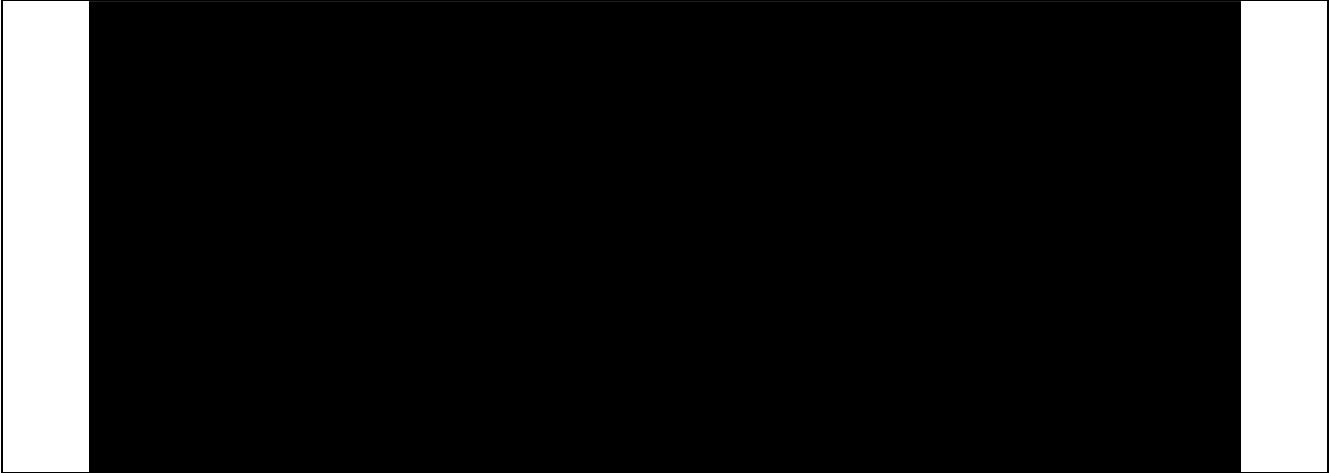
Ch. 2



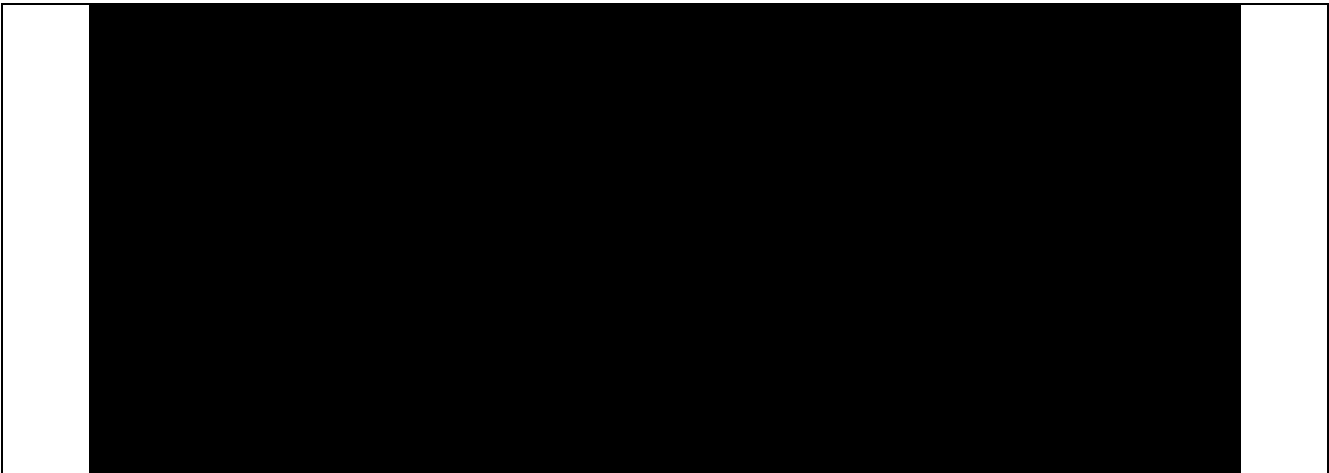
Ch. 3 & Ch.4

Accelerometer positions

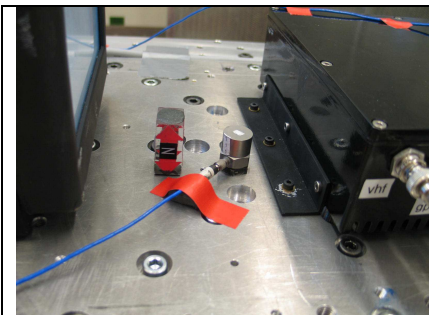
Sweep no.3



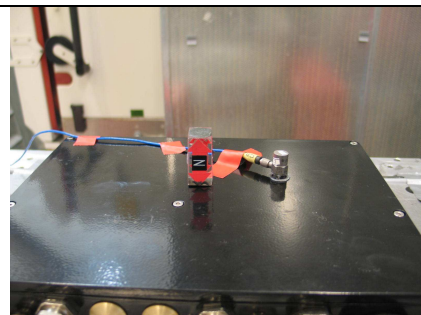
Sweep profile



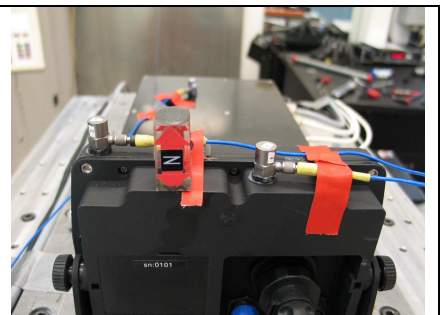
Amplification factor



Ch. 1



Ch. 2



Ch 3 & Ch. 4

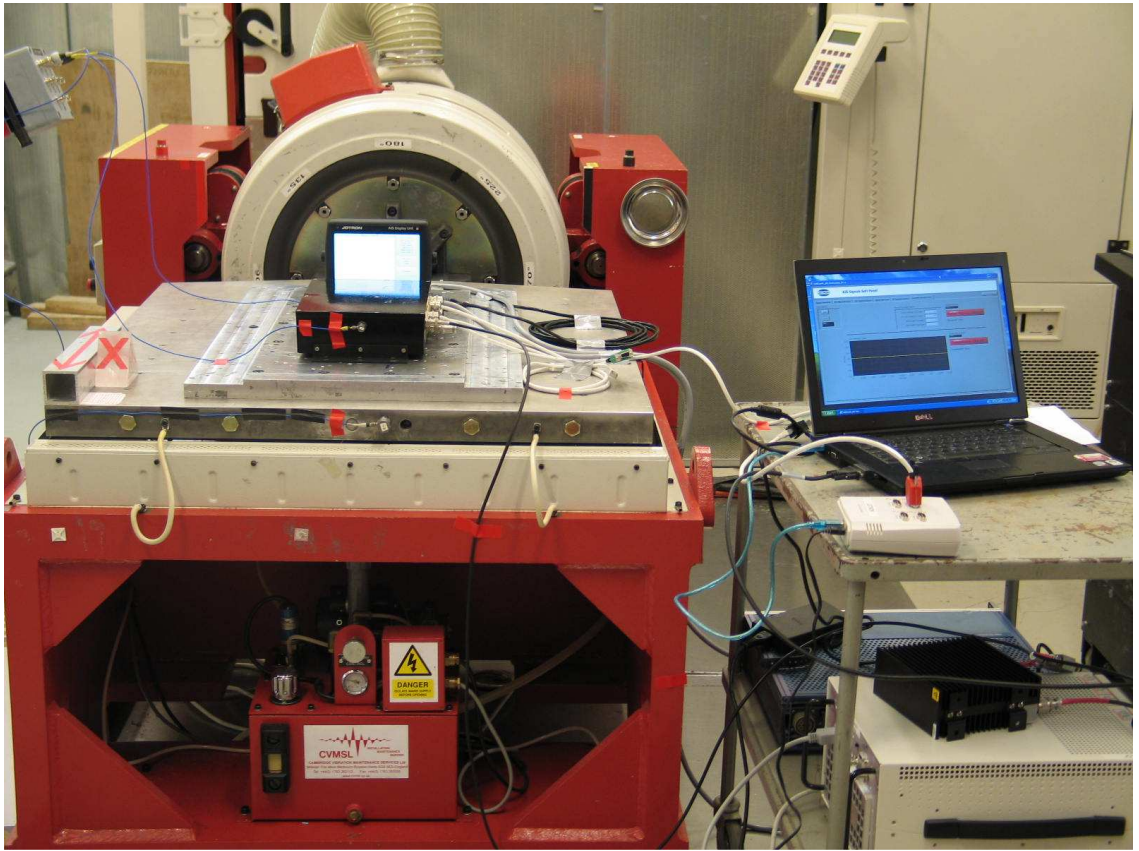
Accelerometer positions

ENDURANCE TEST LOG

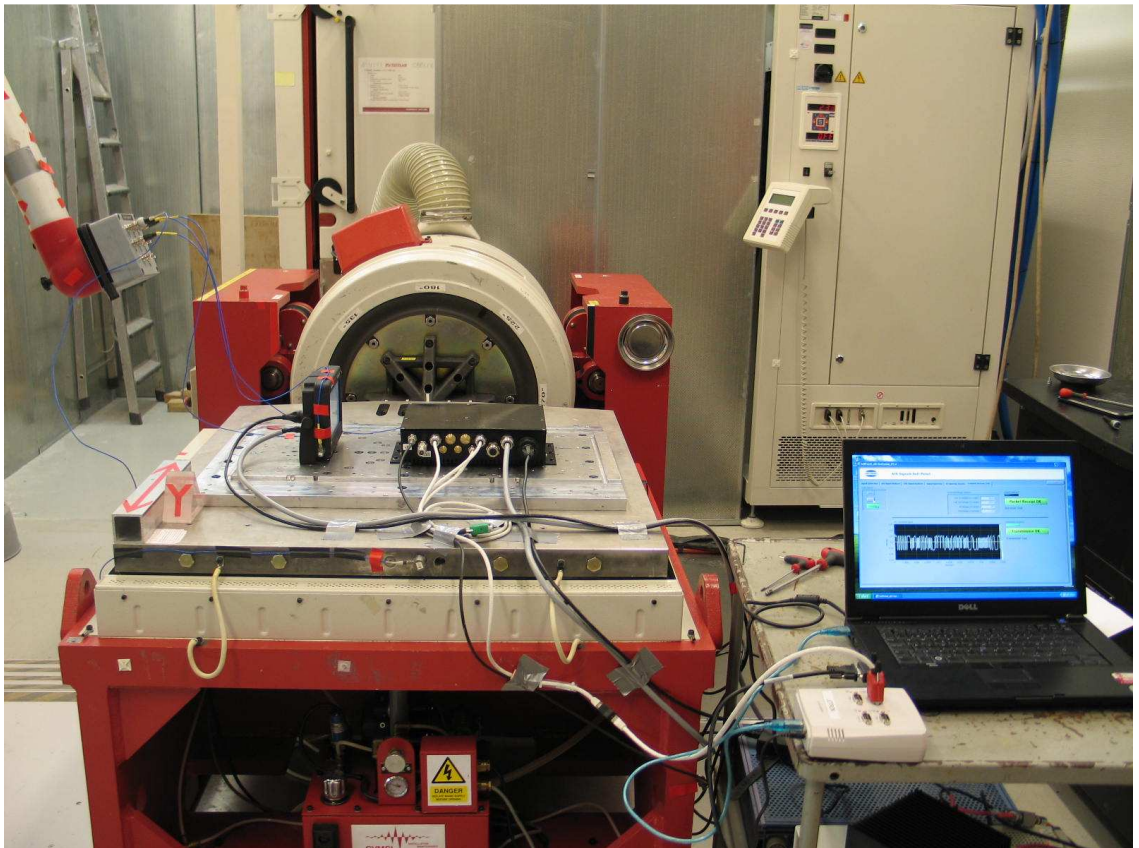
Axis	Frequency	Duration	Functional test	Result
X	30.00 Hz 64.25 Hz 98.14 Hz	120 min.	Before, during and after exposure	PASS
Y	30.00 Hz 52.47 Hz	120 min.	Before, during and after exposure	PASS
Z	46.19 Hz 63.29 Hz	120 min.	Before, during and after exposure	PASS

CONCLUSION

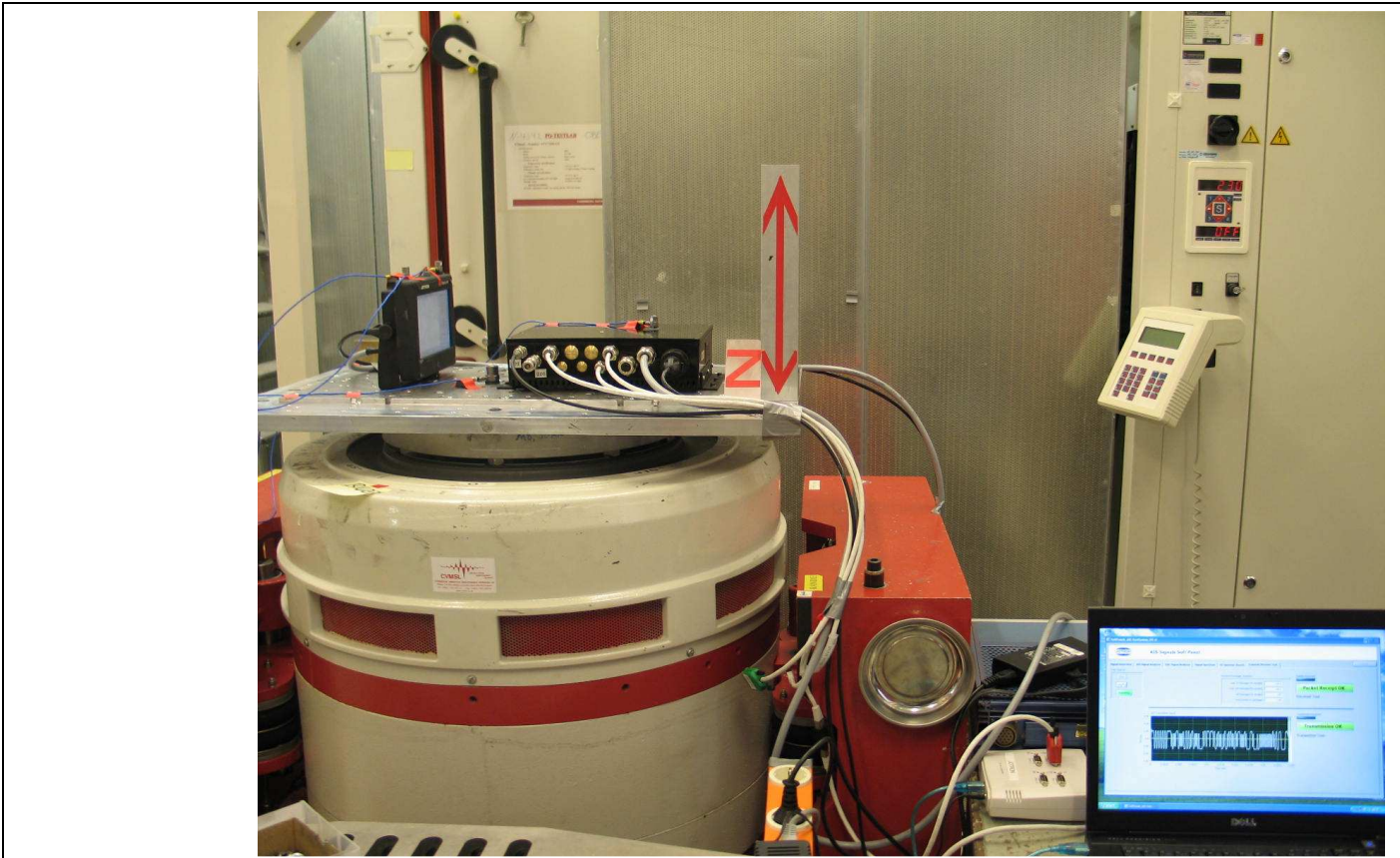
No operation errors or damages were detected during or after the applied test(s)



Notes: Test set-up for Vibration in X axis



Notes: Test set-up for Vibration in Y axis



Notes: Test set-up for Vibration in Z axis

ENVIRONMENTAL – LOW TEMPERATURE

TEST DESCRIPTION

Method

EN 60068-2-1 (2007) (IEC 60068-2-1 (2007))
 Test Ad: Cold for heat-dissipating specimen with gradual change of temperature.

Reference standard

IEC 60945 (2002) Ed.4; Maritime navigation and radiocommunication equipment and systems §
 8.4.2 Functional tests
 8.4.2.6 Method of test (exposed equipment)

Procedure

The EUT shall be placed in a chamber at normal room temperature and relative humidity. The temperature shall then be reduced to, and maintained at $-25^{\circ} \pm 3^{\circ}\text{C}$, for a period of 10 h to 16 h. Any climatic control devices provided in the EUT may be switched on at the conclusion of this period. The EUT shall be switched on 30 min later, or after such period as agreed by the manufacturer, and shall be kept operational for at least 2 h during which period the EUT shall be subjected to a performance check test and check as specified in the relevant equipment standard. The requirements of the performance test and check shall be met.

Instruments used during test

Instrument list:	Climatic Chamber:	Vötsch / VC 4100	(N-4341)	(05/2011)
	Multimeter :	Fluke / 27	(N-2310)	(06/2011)
	Power supply DC:	Oltronix/ B60-5R	(N1550)	

Comments

No recorded comments.

Test Severity

Temperature:	- 25°C
Duration:	16h

Conformity

Verdict:	PASS
Test engineer:	Steinar Jensen

DETAILED TEST LOG



CONCLUSION

No operation errors were detected during or after the applied test(s)

ENVIRONMENTAL – DRY HEAT (STORAGE)

TEST DESCRIPTION

Method

- EN 60068-2-2 (2007) (IEC 60068-2-2 (2007))
- EN 60068-2-48 (1999) (IEC 60068-2-48 (1982))

Reference standard

IEC 60945 (2002) Ed.4; Maritime navigation and radiocommunication equipment and systems § 8.2.1 Storage test (portable, exposed and submerged equipment)

Procedure

The EUT shall be placed in a chamber at normal room temperature and relative humidity. The temperature shall then be raised to and maintained at +70 °C ± 3 °C, for a period of 10 h to 16 h. At the end of the test, the EUT shall be returned to normal environmental conditions and then subjected to a performance check as specified in the relevant equipment standard (see 7.1).

Instruments used during measurement

Instrument list:	Climatic Chamber:	Vötsch / VC 4100	(N-4341)	(05/2011)
	Multimeter :	Fluke / 27	(N-2310)	(06/2011)
	Power supply DC:	Oltronix/ B60-5R	(N1550)	

Comments

No recorded comments.

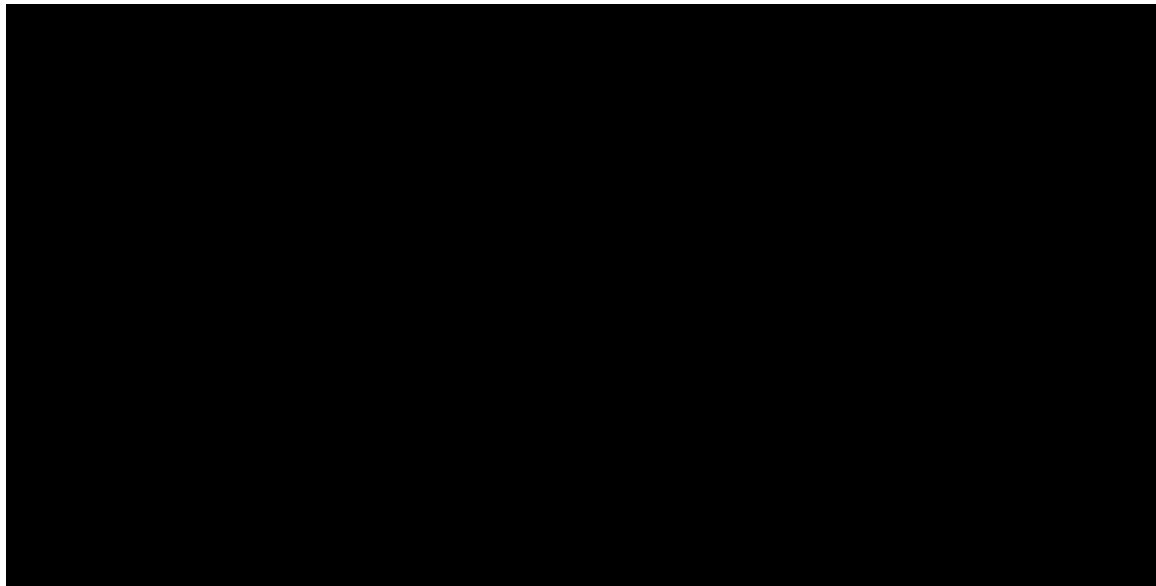
Severity

Temperature:	+70°C
Duration:	16 hours

Conformity

Verdict:	PASS
Test engineer:	Steinar Jensen

DETAILED TEST LOG



CONCLUSION

No operation errors were detected during or after the applied test(s)

ENVIRONMENTAL – DRY HEAT (FUNCTIONAL)

TEST DESCRIPTION

Method

EN 60068-2-2 (2007) (IEC 60068-2-2 (2007))

Tests Bd: Dry heat tests for heat-dissipating specimens with gradual change of temperature.

Reference standard

IEC 60945 (2002) Ed.4; Maritime navigation and radiocommunication equipment and systems § 8.2.2 Functional test (portable, protected and exposed equipment)

Procedure

The EUT shall be placed in a chamber at normal room temperature and relative humidity. The EUT and, if appropriate, any climatic control devices with which it is provided shall then be switched on. The temperature shall then be raised to and maintained at +55 °C ± 3 °C. At the end of a soak period of 10 h to 16 h at +55 °C ± 3 °C, the EUT shall be subjected to a performance test and check as specified in the relevant equipment standard (see 7.1). The temperature of the chamber shall be maintained at +55 °C ± 3 °C during the whole performance test period. At the end of the test, the EUT shall be returned to normal environmental conditions.

The requirements of the performance test and check shall be met.

Instruments used during measurement

Instrument list:	Climatic Chamber:	Vötsch / VC 4100	(N-4341)	(05/2011)
	Multimeter :	Fluke / 27	(N-2310)	(06/2011)
	Power supply DC:	Oltronix/ B60-5R	(N1550)	

Comments

No recorded comments.

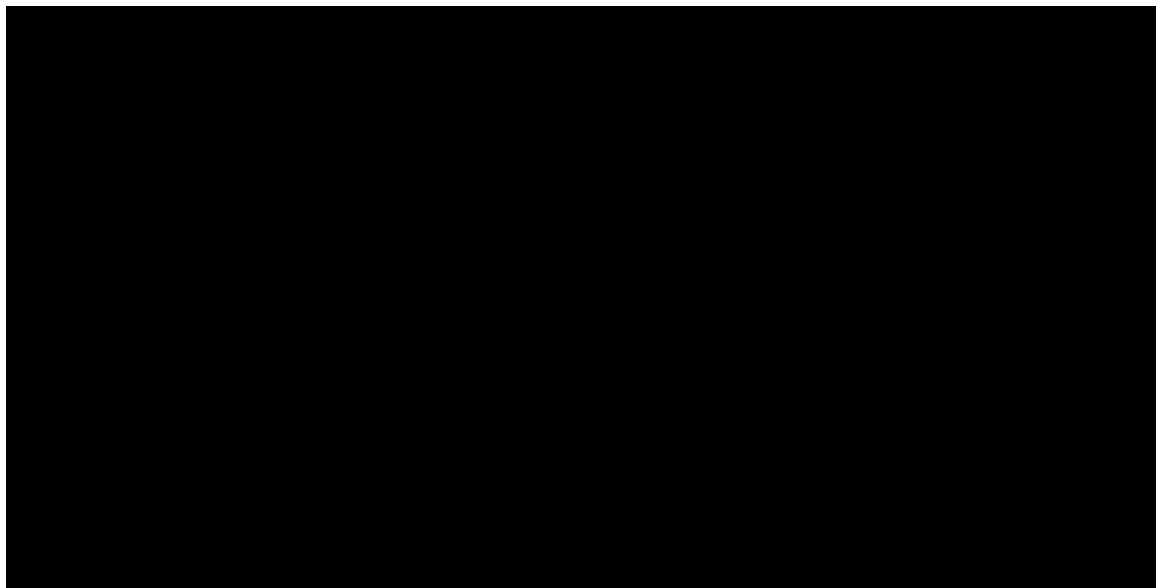
Severity

Temperature:	+55°C
Duration:	16 hours

Conformity

Verdict:	PASS
Test engineer:	Steinar Jensen

DETAILED TEST LOG



CONCLUSION

No operation errors were detected during or after the applied test(s)

ENVIRONMENTAL – DAMP HEAT

TEST DESCRIPTION

Method

EN 60068-2-30 (2007) (IEC 60068-2-30 (2007))

Reference standard

IEC 60945 (2002) Ed.4; Maritime navigation and radiocommunication equipment and systems § 8.3.1 Functional test (portable, exposed and submerged equipment)

Procedure

The EUT shall be placed in a chamber at normal room temperature and relative humidity. The temperature shall then be raised to +40 °C ± 2 °C, and the relative humidity raised to 93 % ± 3 % over a period of 3 h ± 0,5 h. These conditions shall be maintained for a period of 10 h to 16 h. Any climatic control devices provided in the EUT may be switched on at the conclusion of this period. The EUT shall be switched on 30 min later, or after such period as agreed by the manufacturer, and shall be kept operational for at least 2 h during which period the EUT shall be subjected to a performance check as specified in the relevant equipment standard. The temperature and relative humidity of the chamber shall be maintained as specified the whole test period. At the end of the test period and with the EUT still in the chamber, the chamber shall be brought to room temperature in not less than 1 h. At the end of the test the EUT shall be returned to normal environmental conditions.

Instruments used during measurement

Instrument list:	Climatic Chamber:	Vötsch / VC 4100	(N-4341)	(05/2011)
	Multimeter :	Fluke / 27	(N-2310)	(06/2011)
	Power supply DC:	Oltronix/ B60-5R	(N1550)	

Comments

No recorded comments.

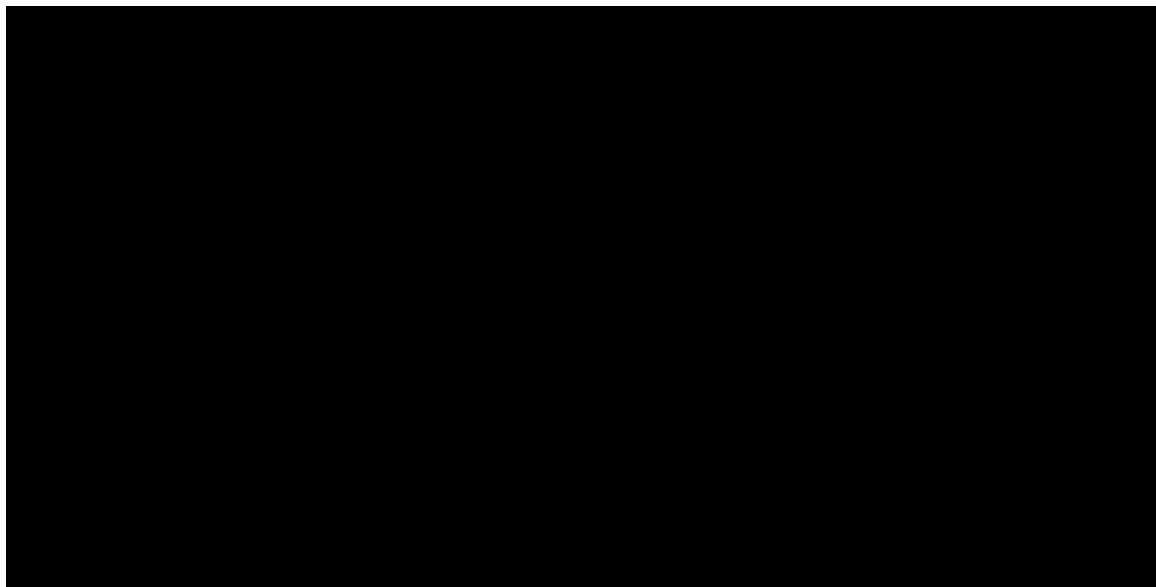
Severity

Temperature:	40°C
Humidity:	93%RH
Duration:	16h

Conformity

Verdict:	Pass
Test engineer:	Steinar Jensen

DETAILED TEST LOG



CONCLUSION

No operation errors were detected during or after the applied test(s)

ELECTRICAL – EXTREME POWER SUPPLY

TEST DESCRIPTION

Method

EN 60945 (2002) §7.1

Procedure

Performance checks/tests has been performed at normal and at extreme power supply conditions prior to the environmental conditioning and then repeated after the Dry Heat test, the Damp Heat test and the Cold test, as specified below.

The checks/tests were performed at extreme conditions as specified below.

Table 1 – Extreme power supply variation

Power supply	Voltage variation %	Frequency variation %
a.c.	±10	±5
d.c.	+30 -10	Not applicable

Instruments used during measurement

Instrument list: Multimeter : Fluke / 27 (N-2310) (06/2011)
 Power supply DC:Oltronix/ B60-5R (N1550)

Comments

No recorded comments.

Severity

Vnom: 12Vdc - 24Vdc
 Fnom: _____

Conformity

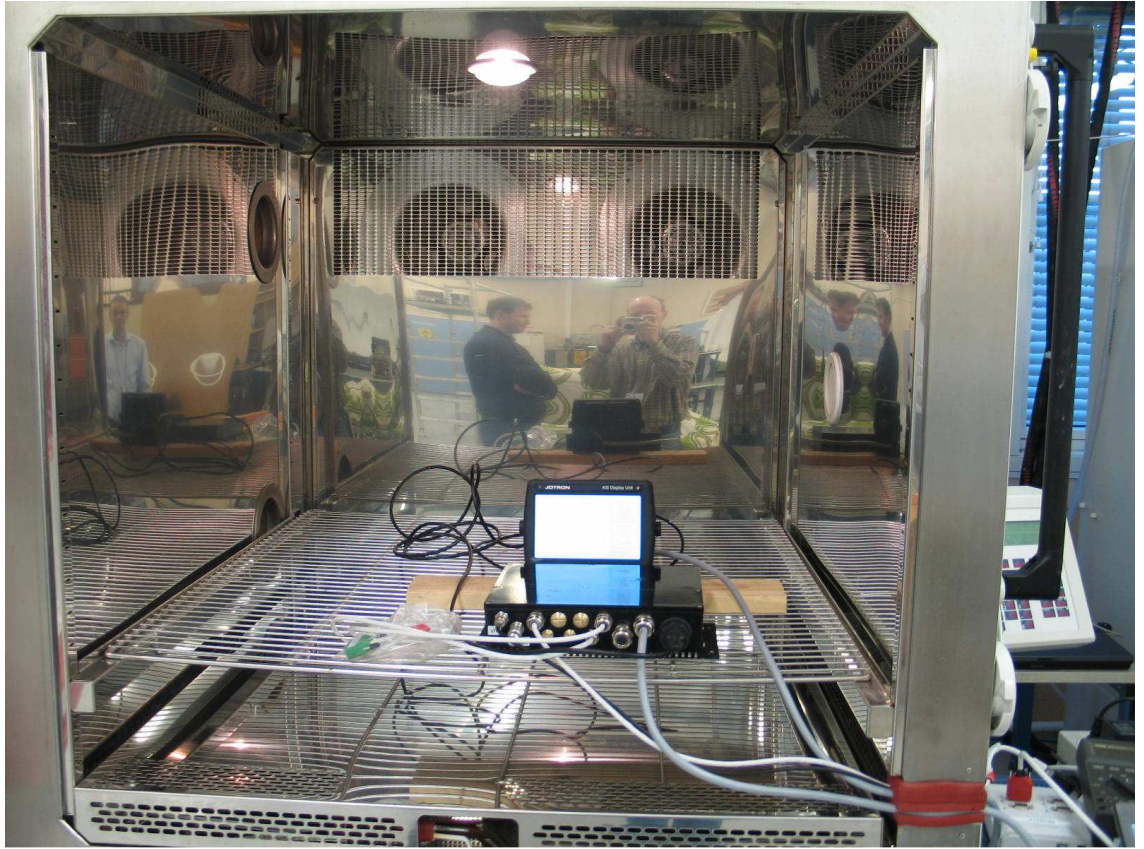
Verdict: PASS
 Test engineer: Steinar Jensen

DETAILED TEST LOG

Condition	Voltage	Frequency	Action	Result
Dry heat	Vnom	NA	Performance test	PASS
Dry heat	Vnom + 30%	NA	Performance check	PASS
Dry heat	Vnom - 10%	NA	Performance check	PASS
Damp heat	Vnom	NA	Performance check	PASS
Cold	Vnom	NA	Performance test	PASS
Cold	Vnom + 30%	NA	Performance check	PASS
Cold	Vnom - 10%	NA	Performance check	PASS
Normal temperature	Vnom	NA	Performance test	PASS
Normal temperature	Vnom + 30%	NA	Performance test	PASS
Normal temperature	Vnom - 10%	NA	Performance test	PASS

CONCLUSION

Proper performance was verified during normal and extreme power supply conditions at all the required test points



Notes: Test set-up for all climatic tests

Environmental – Ingress Protection (IP) Including rain and spray and immersion test

Test Description

Method

IEC/EN 60529 Ed.2.1 (2001) Degrees of protection provided by enclosures (IP Code)
IEC 60945 (2002) Ed.4; § 8.8 Rain and spray (exposed equipment)

Procedure

IP5X, IEC 60529: (Dust chamber)

- The EUT was placed in the dust chamber and connected to a vacuum pump.
The suction connection is made through a drilled hole in the enclosure.
- The depression is adjusted to 2 kPa (20mbar).
- The test time is calculated by comparing the extraction rate with the internal volume of the enclosure.

After the test the EuTs were subjected to a functional test before it was inspected for ingress of talcum powder.

Water splash, IEC 60529 (IPX4):

- The EuT was placed in normal operating position, or if not obvious in most unfavorable position, on a fixture and sprayed from all direction by use of oscillating tube with spray nozzles over the whole 180° of the semicircle.
- The tube is caused to oscillate almost 180° on either side of the vertical.
- The time for one complete oscillation (2x360°) is about 12 seconds.
- The duration of the test is 10 min.

Rain and spray, IEC 60945 (IPX6 for 30 min.):

- The EUT was placed on a turntable and sprayed from all direction in 30 minutes.
- The nozzle diameter was 12,5mm
- The distance from the nozzle to the EuT was 3m.
- The water flow was adjusted to 100l / min.

After the tests the EuTs were subjected to a functional test before it was inspected for ingress of water.

Instruments used during test

Instrument list:	Dust chamber:	PTL / PSS 45 (N-3428) (05/2011)
	Splash equipment:	Nemko (N-3549) (06/2011)
	Spray equipment:	Nemko (N-4012) (05/2011)

Comments

The dust test (IP5X) is carried out on the TR-8000 Display Unit and the TR-8000 CLASS A Transceiver.
The IPX4 test carried out on the TR-8000 Display Unit only.
The Rain and spray test according to IEC 60945 (IPX6 for 30 min.) is carried out on the TR-8000 A Transceiver only.
The signal connectors on the Display Unit have been protected with screw caps during the IP-test.
The cable glands on the Transceiver have been provided with cables during the IP- and Rain and spray test.

The IP54 test for TR-8000 Display Unit and the IP6X test for TR-8000 Transceiver are additional tests ordered by the manufacturer.

Severity

IP numeral:	IP5X
Test time IP5X	8h
IP numeral:	IPX4
Diameter of the tube IPX4:	R400 (40cm)
Water flow IPX4:	1,8l / min.
Test time IPX4	10 min

Conformity

IP numeral:	IPX6 (Rain and Spray 30 min.)
Nozzle diameter IPX6	12,5mm
Distance from nozzle to EuT:	3m
Water flow IPX6	100l / min.
Test time IPX6	30 minutes (Rain and Spray)

Verdict:	PASS
Test engineer(s):	Finn-T. Jørgensen
	Thomas B. Hansen

Detailed Test Log

IP numeral	Test	Data	Result
1X	50 mm sphere probe	-	NA
2X	12.5 mm finger probe	-	NA
3X	2.5 mm tool probe	-	NA
4X	1 mm wire probe	-	NA
5X	Dust, limited ingress	IP5X	PASS
6X	Dust, no ingress	-	NA

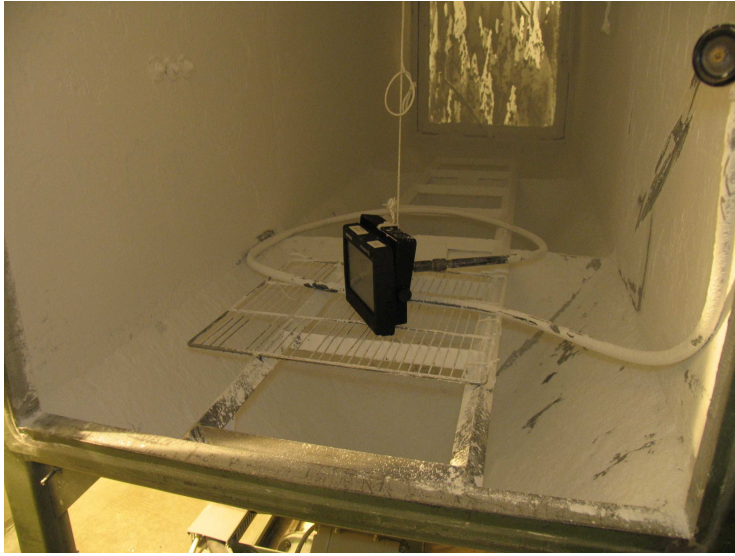
Note:

IP numeral	Test	Data	Result
X1	Drip	-	NA
X2	Drip	-	NA
X3	Oscillating tube 60°	-	NA
X4	Oscillating tube 180°	Sprayed for 10 minutes	PASS
X5	Nozzle 6,3 mm	-	NA
X6	Nozzle 12.5 mm	Sprayed for 30 minutes	PASS
X7	Submerge	-	NA
X8	Submerge	-	NA

Note:

Conclusion

During the functional tests carried out after the IP-tests, the EuTs functioned as normal. No harmful ingress of dust or water could be observed inside the enclosures of the EuTs after the IP-tests. The TR-8000 Display Unit is found to comply the requirement for the degree of protection IP54. The TR-8000 CLASS A Transceiver is found to comply the requirements for the degree of protection IP56 and IPX6 for 30 minutes (Rain and spray test according to IEC 60945).



IP5X TR-8000 Display



IP5X TR-8000 Display



IPX4 TR-8000 Display



IP5X TR-8000 CLASS A Transceiver



IP5X T TR-8000 CLASS A Transceiver



Rain and spray (IPX6 30 min.)
TR-8000 CLASS A Transceiver

ENVIRONMENTAL – CORROSION (SALT MIST)

TEST DESCRIPTION

Method

EN 60068-2-52 (1996) (IEC 60068-2-52 (1996))
Test Kb: Salt mist, cyclic (sodium chloride solution)

Reference standard

IEC 60945 (2002), clause 8.12.

Pre-conditioning

None

Procedure

The specimen was placed in a salt mist chamber with temperature $30 \pm 5^\circ\text{C}$ and sprayed with the salt solution for 2h. At the end of the spraying period the specimen was transferred to a humidity chamber and stored for 7 days at a temperature of $40 \pm 2^\circ\text{C}$ and a relative humidity between 90% and 95%. This conditioning was repeated 4 times (total 4 weeks).

The test severities for the test are listed below.

Measurements

At the conclusion of the conditioning period a visual inspection and performance check were made.

Instruments used during test

Instrument list: Salt Spray Testing Chamber Weiss Technik S1000 (N2184) (06-2011)
 Climatic Chamber: Vötsch / VC4100 (N-4343) (11-2011)

Comments

The Salt Mist test is carried out on the TR-8000 Display Unit and the TR-8000 CLASS A Transceiver. The signal connectors on the Display Unit have been protected with screw caps during the Salt Mist test. The cable glands on the Transceiver have been provided with cables during the Salt Mist test.

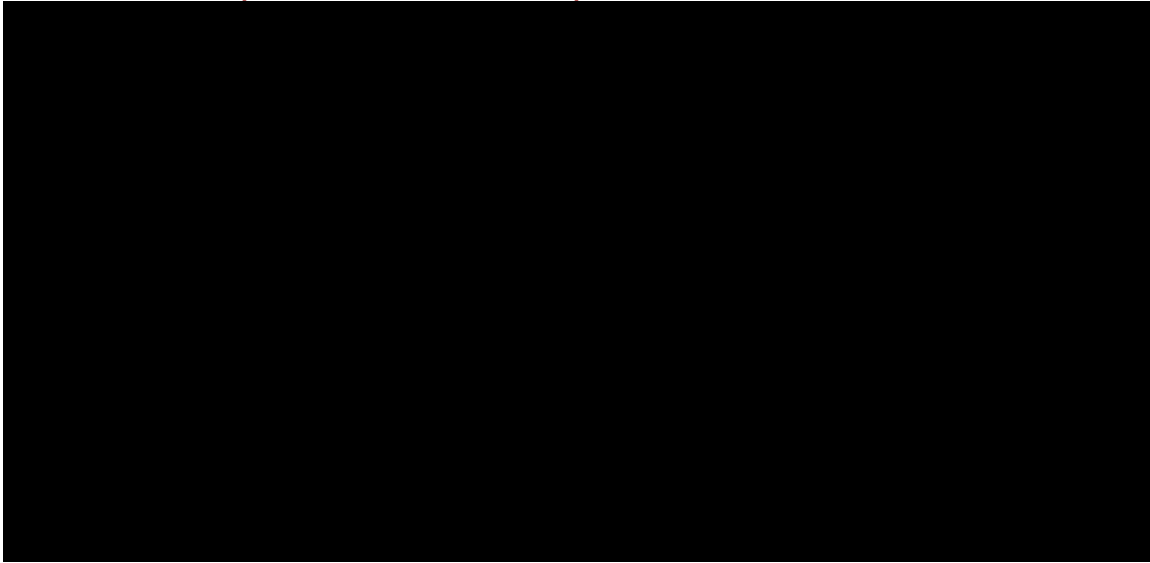
Severity

Severity No.:	1 (IEC 60068-2-52 (1996))
Salt solution:	5% sodium chloride (NaCl)
Salt Mist chamber:	$30 \pm 5^\circ\text{C}$
Humidity chamber:	$40 \pm 2^\circ\text{C}$ / 90-95%Rh
Salt Mist duration:	4x2 hours
Humidity chamber duration:	4x7 days
Number of periods:	4 (total 4 weeks)

Conformity

Verdict:	PASS
Test engineer:	Finn-Tore Jørgensen
	Thomas Bård Hansen

DETAILED TEST LOG (HUMIDITY CHAMBER).



CONCLUSION

No corrosion was observed, either outside or inside of the enclosures.
No operation errors were detected during the performance check.



The units in the Salt Mist chamber



The units in the Humidity chamber.

Annex

UNCERTAINTY FIGURES

	Gaustad	Kjeller
Mains Port Disturbance Voltage	± 3.8 dB (9 kHz – 150 kHz) ± 3.5 dB (150 kHz – 30 MHz)	+ 2.9 dB / - 4.1 dB
Load Port Disturbance Voltage	± 2.7 dB (150 kHz – 30 MHz)	+ 2.9 dB / - 4.1 dB
Signal Port Disturbance Voltage	± 2.7 dB (150 kHz – 30 MHz)	+ 3,0 dB / - 4,4 dB
Discontinuous Disturbance Voltage	± 4.3 dB (150 kHz – 30 MHz)	
Insertion Loss	± 2.5 dB (150 kHz – 1.605 MHz)	
Disturbance Power	± 3.4 dB (30 MHz – 300 MHz)	
Radiated Electromagnetic Field	± 2.7 dB (9 kHz – 30 MHz)	
Radiated Disturbance (3 meter)		± 4.8 dB (150 kHz – 30 MHz) ± 4.7 dB (30 MHz – 200 MHz) ± 4.8 dB (200 MHz – 1000 MHz)
Radiated Disturbance (10 meter)		± 4.7 dB (30 MHz – 200 MHz) ± 4.8 dB (200 MHz – 1000 MHz)
Harmonic Current Emissions	± 2.1mA	<
Flicker	± 0.64 V (Dc and Dmax) ± 5 % (Pst and Plt)	<
Electrostatic Discharges	± 10 % (peak voltage) ± 30 % (pulse shape)	<
Radiated RF Field		± 2.4 dB
Electric Fast Transients	± 10 % (peak voltage) ± 30 % (pulse shape)	<
Surge	± 10 % (peak voltage) ± 30 % (rise time) ± 20 % (duration)	<
Conducted RF Disturbance	± 2 dB	± 2.8 dB (150 kHz – 26 MHz) ± 3.7 dB (26 MHz – 80 MHz)
Power Frequency Magnetic Field	± 2 %	
Dips/Interruptions	± 5 % (voltage) ± 10% (zero crossing control) ± 10° (phase relationship)	<
Compass Safe Distance	± 9 % (on measured level) ± 5 cm (on distance)	
Acoustic Noise	± 1 dB	
Vibration	± 5.6 % (acceleration) ± 0.01% (frequency)	
Temperature	± 2°C	<
Humidity	± 5 %Rh	<
Voltage	± 1.5 %	<
Frequency	± 0.2 %	<

The instruments specified are subject to periodic calibration. Monthly controls ensure, with 95% confidence level, that the instruments remain within the calibrated levels