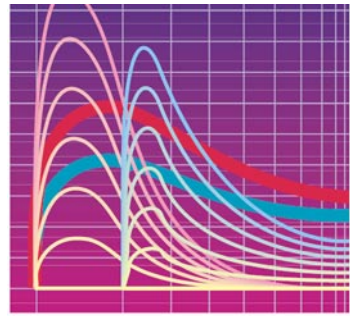




Königswinkel 10
32825 Blomberg, Germany
Phone ++49 5235 9500 0
Fax ++49 5235 9500 10

Test Report

No.: S20273

Designation of equipment under test: AIS-Transponder DEBEG 3400

Test Laboratory

for

**"Safety of Electrical Equipment and
Industrial Low-Voltage Devices
as well as Environmental Tests"**

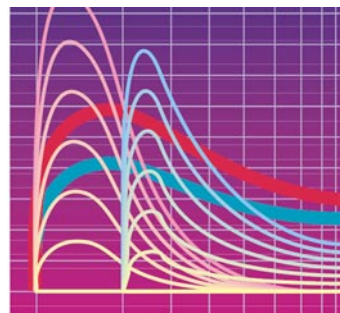
accredited by

DATEch e.V.

in compliance with DIN EN 45001

under

Reg. No. DAT-P-105/00-00



The copying of excerpts from this report is not permitted without written the consent of the testing body. The test results indicated in this report refer exclusively to the equipment under test specified below. It is not permitted to transfer the results to other systems or configurations.

Testing body: PHOENIX TEST-LAB GmbH
Königswinkel 10

D-32825 Blomberg

Applicant: STN ATLAS Marine Electronics GmbH
System Navigation / Communication
Behringsstrasse 120

D-22763 Hamburg

Order number: 20273

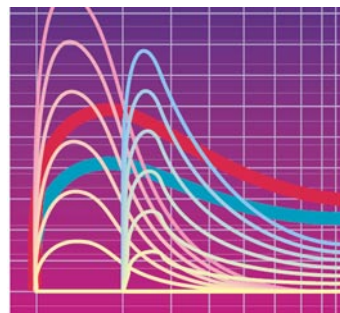
Type of test: Environmental Tests

Method of measurement according to: EN 60945 : 1997
Maritime navigation and radiocommunication equipment and systems

IEC 61993-2 : 2001

According to:

EN 60068-2-1 :1993 +A1 : 1993 +A2 : 1994
EN 60068-2-2 : 1993 +A1 : 1993, EN 60068-2-2 : 1994
EN 60068-2-6 : 1996
EN 60068-2-30 :1999



Equipment under
test (EUT): AIS-Transponder

Type identification: DEBEG 3400

Series number: ---

Manufacturer: See applicant

Date equipment
was received: 02 Mai 2002

Test specifications: EN 60945 : 1997
IEC 61993-2 : 2001

According to:

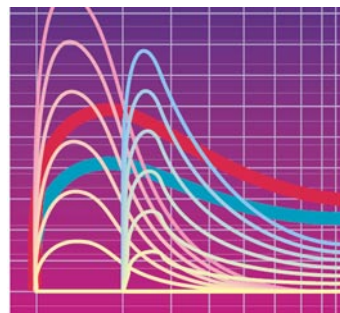
EN 60068-2-1 :1993 +A1 : 1993 +A2 : 1994
EN 60068-2-2 : 1993 +A1 : 1993, EN 60068-2-2 : 1994
EN 60068-2-6 : 1996
EN 60068-2-30 :1999

Annex: Diagrams of the tests and photos of the test set-ups

Applicant/Client
represented during
the test by following
person(s): Mr. Plagge and Mr. Burgdorf

Place of test: PHOENIX TEST-LAB GmbH, Blomberg

Date of test: 02 Mai 2002 - 10 Mai 2002



Test result: The complete test results are present in the following.
The requirements made in the test documents were **fulfilled** by the equipment under test.

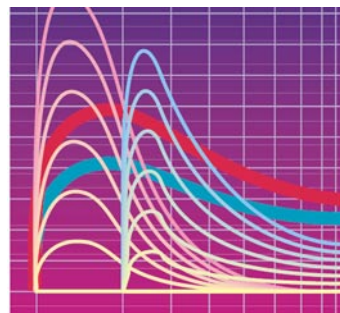
Test result overview:

Test	EN 60945 chapter	Severity according to EN 60945	Performance check or test according to IEC 61993-2 : 2001	Status
Vibration	8.7	7 m/s ²	Performance check	Pass
Low temperature	8.4.2	- 15 °C	Performance check	Pass
Dry heat	8.2.2	+ 55 °C	Performance test	Pass
Damp heat	8.3	+ 40 °C / 93 % r.h.	Performance check	Pass

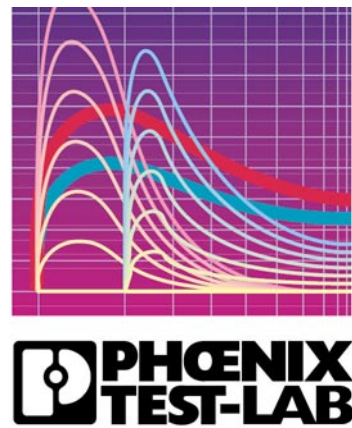
Blomberg, 22 August 2002

Examiner: Uwe Sauerländer

Reviewer: Michael Jonca



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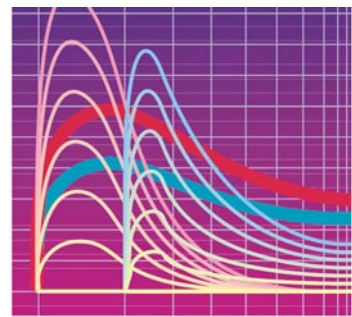


1 Test specifications and test conditions

1.1 Vibration (chapter 8.7, EN 60945)

This test determines the ability of equipment to withstand vibration without resulting in mechanical weakness or degradation in performance. The test simulates the effect of vibration induced in a ship's hull by its propellor and machinery. This is generally at frequencies of up to 13 Hz and predominantly vertical. The tests at higher frequencies simulate the effect of slamming which occurs in irregular stormy seas, and is predominantly horizontal. The test does not simulate the effect of regular seas giving the translational components of surging, swaying and heaving, and the corresponding rotational components of rolling, pitching and yawing which generally produce accelerations too small to be of consequence to electronic equipment.

The EUT, complete with any shock and vibration absorbers with which it is provided, shall be clamped 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.



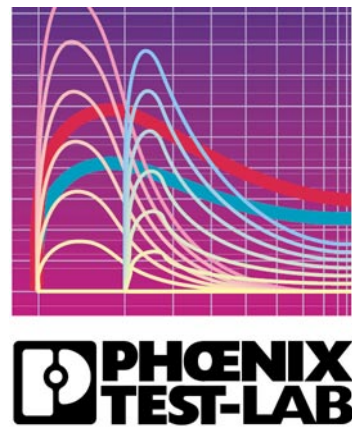
A resonance search shall be carried out throughout the test. If any resonance of the EUT has $Q \geq 5$ measured relative to the base of the vibration table, the EUT shall be subjected to a vibration endurance test at each resonant frequency at the vibration level specified in the test with a duration of 2 h. If no resonance with $Q \geq 5$ 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.

Severity according to chapter 8.7, EN 60945:

Frequency range:	3 Hz to 100 Hz
Cross-over frequency:	13,2 Hz
Displacement amplitude below the cross-over frequency:	1 mm
Acceleration amplitude above the cross-over frequency:	7 m/s ²
Sweep rate:	1 Oct./min.
Axis:	X, Y, Z
Test duration per axis:	2 h on each resonance frequency, otherwise 2 h at 30 Hz



1.2 Low temperature (chapter 8.4.2, EN 60945)

These tests determine the ability of equipment to be operated at low temperatures. They also allow equipment to demonstrate an ability to start up at low ambient temperatures.

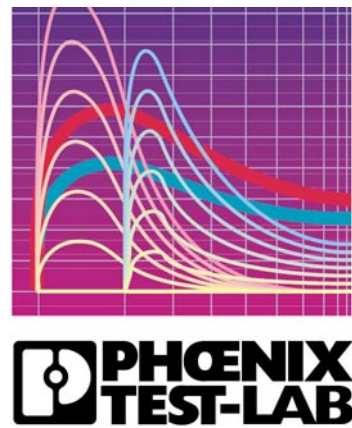
The EUT shall be placed in a chamber at normal room temperature and relative humidity. The temperature shall then be reduced to, and maintained at $-15\text{ °C} \pm 3\text{ °C}$, for a period of 10 h to 16 h. Any climatic control devices provided in the EUT may be switched on at the conclusion of this 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 as specified in the relevant equipment standard. The temperature of the chamber shall be maintained at $-15\text{ °C} \pm 3\text{ °C}$ during the whole test period.

At the end of the test the EUT shall be returned to normal environmental conditions or to those required at the start of the next test.

Severity according to chapter 8.4.2, EN 60945:

Equipment:	Protected equipment
Temperature:	$-15\text{ °C} \pm 3\text{ °C}$



1.3 Dry heat (chapter 8.2.2, EN 60945)

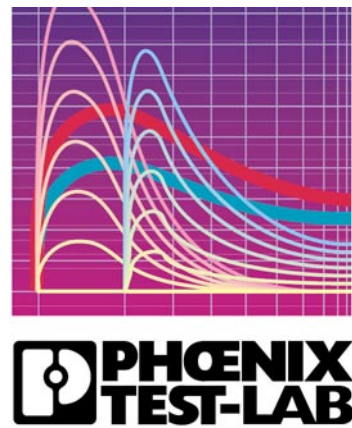
This test determines the ability of equipments to be operated at high ambient temperatures and to operate through temperature changes. The reasonable maximum air temperature likely to be encountered over the sea is + 32 °C and the maximum solar gain at sea is + 23 °C giving + 55 °C as the maximum temperature likely to be encountered by ships at sea.

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 as specified in the relevant equipment standard. 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 or to those required at the start of the next test.

Severity according to chapter 8.2.2, EN 60945:

Equipment:	Protected equipment
Temperature:	+ 55 °C ± 3 °C



1.4 Damp heat (chapter 8.3, EN 60945)

This test determines the ability of equipments to be operated under conditions of high humidity. A single cycle is used with an upper temperature limit of + 40 °C which is the maximum that occurs in the earth's surface atmosphere with a relative humidity of 95 %.

The EUT shall be placed in a chamber at normal room temperature and relative humidity. The temperature shall then be raised to + 40 °C $\pm$ 2 °C, and the relative humidity raised to 93 % $\pm$ 3 % over a period of 3 h $\pm$ 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.

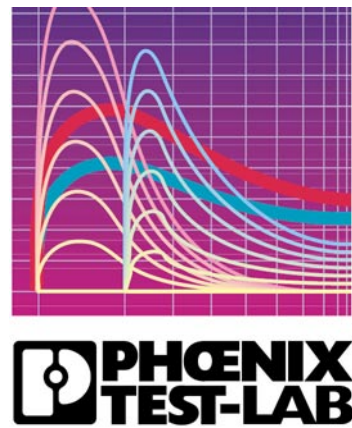
The EUT shall be switched on 30 min later, or after such period as agreed by the manufacturer, and shall be kept operational for at least 2 h during which period the EUT shall be subjected to a performance check as specified in the relevant equipment standard. The temperature and relative humidity of the chamber shall be maintained as specified during 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 or to those required at the start of the next test.

Severity according to chapter 8.3, EN 60945:

Equipment:	Protected equipment
Temperature:	+ 40 °C $\pm$ 2 °C
Relative humidity:	93 % $\pm$ 3 %



1.5 Operating states and test set-up

Performance Check (according to IEC 61993-2 : 2001):

The rf connector of the AIS transponder is connected to the respective AIS test unit connector. This way all transmissions of the AIS transponder are monitored. Furthermore transmissions addressing the AIS transponder are initiated on the test unit. The reaction of the AIS transponder is examined.

A terminal program running on a separate PC acts as a counterpart for the presentation interface of the AIS transponder. A connection is made between the presentation port and a serial port of the PC via a RS422-RS232 converter. The NMEA sentences transmitted on the presentation interface are recorded. Sending a VSD-sentence sent to the transponder triggers the emission of a message type 5 on the rf channels. This again is monitored by the AIS test unit.

Performance Test (according to IEC 61993-2 : 2001):

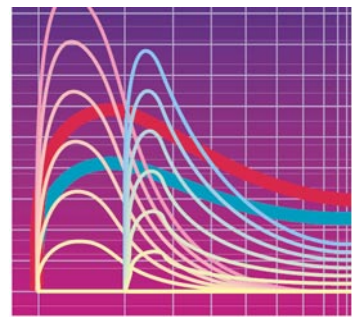
Consist of:

Transmitter:

- Frequency Error (chapter 15.1.1, IEC 61993-2 : 2001)
- Carrier Power (chapter 15.1.2, IEC 61993-2 : 2001)
- Channel Switching (chapter 14.7, IEC 61993-2 : 2001)
- Transmitter Attack time (chapter 15.1.5, IEC 61993-2 : 2001)
- Transmitter Release time (chapter 15.1.6, IEC 61993-2 : 2001)

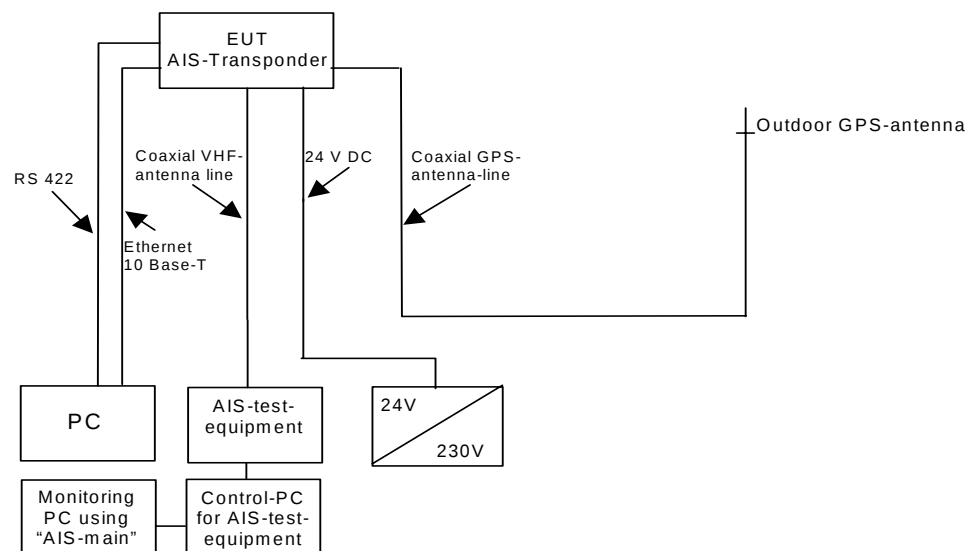
Receiver TDMA and DSC:

- Sensitivity at 25 KHz and 12,5 KHz
(chapter 15.3.1, 15.3.2, 15.4.1, IEC 61993-2 : 2001)
- Channel Switching time (chapter 14.7, IEC 61993-2 : 2001)



The monitoring system was supplied by the applicant.

The system was set up as follows:

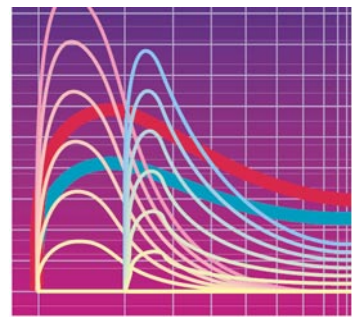


2 Test performance and test results

2.1 Test performance

Test order as follows:

1. Vibration (chapter 8.7, EN 60945)
2. Low temperature (chapter 8.4.2, EN 60945)
3. Dry heat (chapter 8.2.2, EN 60945)
4. Damp heat (chapter 8.3, EN 60945)



2.2 Test results

2.2.1 Vibration (chapter 8.7, EN 60945)

Diagrams of the resonance search see annex.

Requirements fulfilled:

Performance checks were carried out according to chapter 1.5.

Axis	Frequency	Acceleration	Endurance	Pass
X	30 Hz	7 m/s ²	2 h	Yes
Y	30 Hz	7 m/s ²	2 h	Yes
Z	30 Hz	7 m/s ²	2 h	Yes

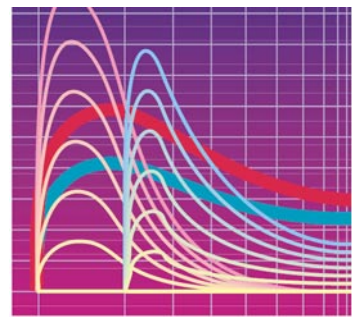
Note: Resonance search: A preliminary test was carried out by stroboscope.

2.2.2 Low temperature (chapter 8.4.2, EN 60945)

Requirements fulfilled:

Performance checks were carried out according to chapter 1.5.

Equipment	Temperature	Pass
Protected equipment	– 15 °C ± 3 °C	Yes



2.2.3 Dry heat (chapter 8.2.2, EN 60945)

Requirements fulfilled:

Performance test was carried out according to chapter 1.5.

Equipment	Temperature	Pass
Protected equipment	+ 55 °C ± 3 °C	Yes

2.2.4 Damp heat (chapter 8.3, EN 60945)

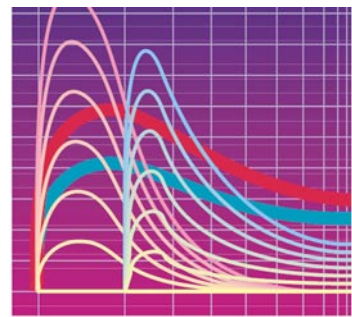
Requirements fulfilled:

Performance checks were carried out according to chapter 1.5.

Equipment	Temperature	Humidity	Pass
Protected equipment	+ 40 °C ± 2 °C	93 % ± 3 %	Yes

3 List of Measurement

Measurement Device	PM Nr.
Shaker V870-640 LPT 900	490022
Amplifier Endevco 133	---
Accelerometer 107,7 mV/g	---
Accelerometer 10,54 mV/g	---
Climatic chamber	490081



Annex

The annex consist of 17 pages and contains diagrams of the test and photos of the test set-up.

Photos:

Test set-up z-axis	20273a.JPG
Accelerometer on the EUT	20273b.JPG
Accelerometer on the EUT	20273c.JPG
Test set-up z-axis	20273d.JPG
Monitoring	20273e.JPG
Test set-up x-axis	20273f.JPG
Accelerometer on the EUT	20273g.JPG
Test set-up y-axis	20273h.JPG
Accelerometer on the EUT	20273i.JPG
Test set-up y-axis	20273j.JPG
EUT in the climatic chamber	20273k.JPG
EUT in the climatic chamber	20273l.JPG
Low temperature profile	20273m.JPG
Dry heat profile	20273n.JPG