telefication bv
The Netherlands
Chamber of Commerce
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# Test report
## 99624530

based on:
Draft IEC 61097-6 Ed.2 (CDV) 02/2005
EN 61162-1

NAVTEX Receiver
Furuno
NX-700A; NX-700B

# Contents

This report comprises of three modules. The total number of pages is: 36.

# Main module

## 1 Introduction

This report contains the result of tests conducted by:

Telefication bv
Edisonstraat 12a
6902 PK Zevenaar
The Netherlands

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Ordering party:

| | | |
|---|---|---|
| Company name | : | Furuno Electric Co., Ltd. |
| Address | : | 9-52 Ashihara-cho |
| Zipcode | : | 662-8580 |
| City/town | : | Nishinomiya |
| Country | : | Japan |
| Date of order | : | 15 March 2005 |

# 2 Product

A sample of the following product was submitted for testing:

| | | |
|---|---|---|
| Product category | : | NAVTEX Receiver |
| Manufacturer | : | Furuno Electric Co., Ltd. |
| Trade mark | : | Furuno |
| Type designation | : | NX-700A; NX-700B |
| Hardware parts | : | NX-700 (A/B); NX-7001; NX-7H |
| Software release | : | Prog.: 0850193-01; Boot: 0850192-01 |
| Serial number | : | NX-700A: 8523-0001 (RX unit); 00001 (display unit)<br>NX-700B: 8524-0001 (RX unit); 00001 (display unit) |

# 3 Test schedule

Tests were carried out in accordance with the specification detailed in chapter "Summary" of this report.

Tests were carried out at the following location:

- R&D department Furuno Electric Co., Ltd., Nishinomiya, Japan

The sample of the product was received on:

- n.a.

Tests were carried out from:

- 18 April 2005 to 22 April 2005

# 4 Product documentation

For production of this report the following product documentation was used:

| **Description:** | **Date:** | **Identification:** |
|---|---|---|
| Operator's Manual | 20 May 2005 | OME-56490 |
| Installation Manual | -- | Included in OME-56490 |
| System Config., schematics | 18 May 2005 | KT55-013 |
| Photograph File | 12 May 2005 | FLI 01-05-010 |

The above-mentioned documentation will be filed at Telefication for a period of 10 years following the issue of this report.

# 5 Observations and comments

Navtex receiver on 518 kHz and additional receiver on 490 kHz or 4209.5 kHz.
Although not required, receiver performance tests according to clause 10.2 and 10.4.also have been performed with the active ferrite loop antenna included in the signal path.
The storage time until deletion of messages has been declared by the manufacturer to be 66 hours.
Compliance to the utilized specification Draft IEC 61097-6 Ed. 2 (CDV) consequently ascertains compliance to IEC 61097-6 Ed. 1 or EN 300 065 V1.3.1 as well.
Photographs of the equipment are presented in the separate document:
FLI 01-05-010, dated 12 May 2005.
For all references to specification EN 60945 made in this report, refer to test report:
FLI 12-05-020, dated 17 May 2005.

# 6 Summary

The product is intended for use in the following application area:

Global Maritime distress and safety system (GMDSS)

The sample was tested according to the following specifications:

Draft IEC 61097-6 Ed.2 (CDV) 02/2005
EN 61162-1 July 2000
EN 61162-2 September 1998

# 7 Conclusions

The sample of the product showed **NO NON-COMPLIANCES** to the specifications stated in the summary of this report.

The results of the tests as stated in this report, are exclusively applicable to the product item as identified in this report. Telefication does not accept any responsibility for the results stated in this report, with respect to the properties of product items not involved in these tests.

All tests are conducted by:

name : M.W. Jansen

function : Senior Engineer Maritime

signature :

Review of test methods and report by:

name : ing. P.A. Suringa

function : Senior Engineer Radio/EMC

signature :

The above conclusions have been verified by the following signatory.

date :25 May 2005

name : J.P. van de Poll

function : Co-ordinator Test group

signature :

# Test results module

# General information

## Equipment information

| | |
|---|---|
| Equipment series no. | NX-700A; NX-700B |
| Type of equipment | Navtex Receiver operating simultaneously on 518 kHz and 490 kHz / 4209.5 kHz |
| NX-700A | Display unit with integral printer |
| NX-700B | Display unit without printer |
| NX-7001 | Receiver unit |
| NX-7H | Active ferrite loop antenna |
| AC Power supply | PR-240-CE |

# 5 PERFORMANCE REQUIREMENTS

## 5.1 Introduction

## 5.2 General characteristics

| | ***Satisfactory:*** |
|---|---|
| Complies with: | |
| Navtex equipment Resolution MSC 148(77) | *yes* |
| IMO Res. A.694(17) | *yes* |
| ITU-R Rec. M625, annex I,4 collective B-mode | *yes* |
| ITU-R Rec. M540, annex II,3 | *yes* |
| IEC 61162-1/-2 on digital interfaces | *yes* |
| Tested and compliant with IEC 60945 | *yes* |
| Connection to integrated navigation system (INS) | *yes* |

## 5.3 Specific characteristics

***Satisfactory:***

### 5.3.1 B1 and B2 Characters

| | |
|---|---|
| Rejection of unwanted station ID (B1 character) | *yes* |
| Disabling of message types – except A, B, D and L (B2 character) | *yes* |
| Clear indication to user which B1 and B2 are disabled | *yes* |

### 5.3.2 B3 and B4 Characters

| | |
|---|---|
| Two character serial number starting with 01 and special message with 00 | *yes* |

### 5.3.3 Preamble

| | |
|---|---|
| Storage of message only when B1B2B3B4 is error free received | *yes* |

### 5.3.4 Repetition of printing/display

| | |
|---|---|
| Prevention of storage or printing of already satisfactorily received messages | *yes* |

### 5.3.5 Mandatory printing/display

| | |
|---|---|
| A B3B4=00 message shall always be printed stored and displayed | *yes* |

### 5.3.6 Reception of messages with character errors

| | |
|---|---|
| 5.3.6.1 Print/display messages with character error rate of < 33% | *yes* |
| 5.3.6.2 No print/store of messages with character error rate of > 33% | *yes* |

### 5.3.7 Controls and indicators

| | ***Satisfactory:*** |
|---|---|
| Details of (excluded) coverage areas and message categories readily available | *yes* |
| At least 4 message categories can be excluded, except A, B, D and L | *yes* |
| Number of controls enable simple, quick and effective operation | *yes* |
| Minimum chance of inadvertent operation | *yes* |
| Operational controls are easily operated and permit easy performance | *yes* |
| Controls not required for normal operation are not readily accessible | *yes* |
| Adequate illumination to facilitate reading at all times | *yes* |
| Dimming of any equipment's light source | *yes* |
| Misuse of controls do not cause damage to equipment or injury to personnel | *yes* |
| When connected to other units performance of each is maintained | *yes* |
| Digital input panel (0-9) according to ITU-T or ISO standard | *n.a.* |

### 5.3.8 Programmable control memories

| | |
|---|---|
| B1 and B2 designators are permanently stored in non-volatile memory | *yes* |

### 5.3.9 Alarms

| | |
|---|---|
| Reception of B2 = D gives alarm at ships navigation position | *yes* |
| Manual reset of this alarm only | *yes* |
| Equipment contains integral alarm sounder | *yes* |
| Equipment facilitates a pair of relay contacts for external sounder | *yes* |
| Availability of additional alarms | *yes* |
| Provision to suppress these alarms | *yes* |
| Additional alarm distinguishable from SAR alarm | *yes* |
| Audible volume 75-85 dBA *(refer to clause 9.4)* | *yes* |
| Relay contacts for external sounder is free of earth | *yes* |
| Alarm condition is reported via ALR command on INS port | *yes* |

### 5.3.10 Test facilities

| | |
|---|---|
| Provision for testing the radio receiver, display, printer and message memory | *yes* |

## 5.4 Interfaces

| | ***Satisfactory:*** |
|---|---|
| Equipment includes interface of transfer to Nav. And Comm. Equipment | *yes* |
| Interface complies with IEC 61162 (EN 61162-1) | *yes* |
| When no integral printer, interface for standard printed facilitated | *yes* |
| Support of new IEC 61162 sentences for interface to INS | *yes* |

## 5.5 Receiver

### 5.5.1 Number of receivers

| | |
|---|---|
| Equipment includes first receiver for international NAVTEX system 518 kHz | *yes* |
| At least one other receiver operating at least on two other frequencies | *yes* |
| Second receiver is capable of simultaneous operation | *yes* |
| 518 kHz receiver has priority on the display or printing of received information | *yes* |
| Printing or displaying of messages shall not prevent reception by other receiver | *yes* |

### 5.5.2 Receive Frequencies

| | |
|---|---|
| The recognized receive frequencies shall be 518 kHz, 490 kHz and 4209.5 kHz | *yes* |
| Switching frequencies of second receiver by INS port or manually | *yes* |

### 5.5.3 Sensitivity

| | |
|---|---|
| Receiver sensitivity shall be 2uV EMF (-107 dBm) at error rate < 4 % | *yes* |
| *Results (see clause 10.1)* | |

## 5.6 Display

If a display is included as part of the equipment the following is applicable:

### 5.6.1 User Interface

| | |
|---|---|
| A display mode showing selected coverage area (B1) and message types (B2) | *yes* |
| Adjustment for setting of display illumination and contrast | *yes* |
| Indication of which receiver(s) is currently receiving | *yes* |
| New SAR messages shall be displayed immediately, stored and cause alarm | *yes* |
| SAR messages shall be displayed until acknowledged by alarm cancellation | *yes* |
| Reception and storage of new messages shall be clearly indicated | *yes* |
| Independent selection of B1 and B2 for either storage, printing and INS output | *yes* |

***Satisfactory:***

### 5.6.2 Number of characters display per line

The display shall be able to display a minimum of 32 characters per line *yes*

### 5.6.3 Number of lines displayed

The display shall be able to display at least 16 lines of message text *yes*

### 5.6.4 Display requirements

Indication of newly received messages shall be immediately displayed *yes*
Displayed indication remains until acknowledged or until 24 hours after receipt *yes*
Newly received message shall also be capable of being displayed *yes*

### 5.6.5 Visibility of display

Display information easily read under all normal working conditions *yes*
(applies to information from any receiver, in any language and supported alphabet)

### 5.6.6 Automatic line feed

Automatic line feed entailing a word shall be indicated in the displayed text *yes*

### 5.6.7 End of message display

Clear indication of end-of-message by automatic adding line feeds or other *yes*

### 5.6.8 Corrupt characters

Corrupt characters are displayed as an asterisk (*) *yes*

### 5.6.9 Printer interface message selection requirements

When no printer is integrated, the following must be sent to the printer interface:
a) all messages as they are received *yes*
b) all messages stored in memory *yes*
c) messages received on specific frequencies, from specific B1, with specific B2 *yes*
d) all currently displayed messages *yes*
e) individual selected messages *yes*

***Satisfactory:***

## 5.7 Integral printer

If a printer is included as part of the equipment the following is applicable:

### 5.7.1 Number of characters printed per line

The printer shall be able to display a minimum of 32 characters per line *yes*

### 5.7.2 Automatic line feed

Automatic line feed entailing a word shall be indicated in the printed text *yes*

### 5.7.3 End of message display

Indication of end-of-message print by automatic inserting line feeds *yes*

### 5.7.4 Corrupt characters

Corrupt characters are printed as an asterisk (*) *yes*

### 5.7.5 General printer requirements

a) print easy legible signs *yes*
b) acoustic noise production < 60dBA *(see clause 11.1)* *yes*
c) run-out or nearly run-out paper alarm *yes*
d) temporarily storage of partially printed messages *yes*
- message printed once new paper loaded *yes*
- storage of further new message ID's inhibited when no paper loaded *yes*

### 5.7.6 Printer message selection requirements

Selectable data to be output to the integral printer:
a) all messages as they are received *yes*
b) all messages received on specific frequencies, from specific B1, with specific B2 *yes*

## 5.8 Navtex message memory

***Satisfactory:***

### 5.8.1 Equipment without integral printers

5.8.1.1 Number of messages

| | |
|---|---|
| For each receiver at least 200 messages (avg. length 500 char.) | *yes* |
| Not possible to erase messages by user | *yes* |
| When memory is full, oldest message shall be overwritten | *yes* |

5.8.1.2 Message tagging

| | |
|---|---|
| Permanent retention by user selectable tagging | *yes* |
| Tagged messages may occupy 50 of the 200 message slots | *yes* |
| Tagged messages may not be overwritten | *yes* |
| Tags shall be user removable | *yes* |

5.8.1.3 Automatic erasure

| | |
|---|---|
| Automatic erasure of message (and ID) (if not tagged) after 60 to 72 hours | *yes* |
| If memory capacity is exceeded, oldest message shall be erased | *yes* |

### 5.8.2 Equipment with integral printer

5.8.2.1 Number of messages

| | |
|---|---|
| The equipment shall store at least 200 message ID’s | yes |

5.8.2.2 Automatic erasure

| | |
|---|---|
| Automatic erasure of message ID’s after 60 to 72 hours | *yes* |
| If memory capacity is exceeded, oldest message ID shall be erased | *yes* |

### 5.9 Power Supplies

See EN 60945 test report

### 5.10 Durability and General Construction

See EN 60945 test report

### 5.11 Interference

See EN 60945 test report

### 5.12 Safety Precautions

See EN 60945 test report

### 5.13 Maintenance

See EN 60945 test report

### 5.14 Marking and Identification

See EN 60945 test report

### 5.15 Source of UTC

UTC is being obtained by the equipment externally with an internal backup

## 6 Test Conditions

Refer to chapter 6 of the standard

# 7 IEC 60945 Tests required

***Satisfactory:***

## 7.1 Ergonomics and HMI

### 7.1.1 General

All required modes of operation are available *yes*

### 7.1.2 Arrangement

Operational controls provide simple, quick and efficient operation *yes*
Control indicators are readily distinguishable *yes*

### 7.1.3 Operation

Arrangement of controls minimises incorrect operation *yes*
Controls not for normal operation are not readily accessible *yes*
Controls are related to function and environment *yes*

### 7.1.4 Identification

Operational controls and indicators comply with marking requirements *yes*
Indicator character-type is simple and clear *yes*
Character height > 3.5mm and character width is 0.7 * height *yes*
Controls and indicators are identified in English language *yes*

### 7.1.5 Screen display and indicators

Illumination of display and indicators is dimmable and can be switched-off *yes*
Alternatively a night mode of display operation may be provided *n.a*
Display contrast is adjustable *manually* *yes*
Display and indicators are clearly visible over temperature range *yes*

### 7.1.6 Voice announcement

Not applicable.

***Satisfactory:***

### 7.1.7 Safety of operation

| | |
|---|---|
| Irreversible actions require confirmation before proceeding | *yes* |
| Equipment utilizes quality indication contained in input from other sources | *yes* |
| INS input port requires all sentences contain valid checksum | *yes* |
| INS output port generates all sentences with valid checksum | *yes* |

## 7.2 Hardware

### 7.2.1 General

| | |
|---|---|
| Blocking off of controls or facilities not fitted | *n.a.* |
| Protection against unintentional operation | *yes* |
| Misuse of controls do not cause damage to equipment or personnel | *yes* |

### 7.2.2 Alarms and indicators

| | |
|---|---|
| Facilities for self test and indication of result of this test | *yes* |
| Alarm indications are highlighted on the display or remote red indicator | *yes* |
| Warning and alarm indicators show no self illumination | *yes* |
| Indirect illumination is low to avoid false indications | *yes* |

### 7.2.3 Illumination

| | |
|---|---|
| Illumination is adequate for operation under all expected conditions | *yes* |
| Illumination is adjustable for night use | *yes* |
| Provision of dimming of any equipment’s light source | *yes* |
| Warning and alarm lamps cannot be dimmed below reading intensity | *yes* |
| Illumination is dazzle-free | *yes* |
| Illumination adjustable to extinction except warning and alarm lamps | *yes* |
| Not illuminated controls are easily locatable by tactile means | *n.a* |
| Information presented with high contrast on low reflectance background | *yes* |
| Transparent covers do not cause reflections reducing readability | *yes* |
| Provision of dimmer function for all lamps used for ambient illumination | *yes* |

## 7.3 Software

### 7.3.1 General

See EN 60945 test report

### 7.3.2 Monitoring

See EN 60945 test report

### 7.3.3 Operation

See EN 60945 test report

### 7.3.4 Inter-unit connection

See EN 60945 test report

## 7.4 Power supply tests

See EN 60945 test report

## 7.5 Durability and resistance to environmental conditions

See EN 60945 test report

## 7.6 Electromagnetic emissions

See EN 60945 test report

## 7.7 Immunity to electromagnetic environment

See EN 60945 test report

## 7.8 EMC tests

See EN 60945 test report

# 8 Serial Interface Tests

***Satisfactory:***

## 8.1 INS input electrical tests

| | |
|---|---|
| The interface complies with the applicable requirements of IEC 61162-1/2 | *yes* |

## 8.2 INS input performance tests

| | |
|---|---|
| Performance of INS input is not inhibited by invalid or unavailable data formatters | *yes* |
| Correct operation during 5 minutes 100 % load of the interface | *yes* |
| Displayed data or equipment operation agrees with simulated input data | *yes* |

## 8.3 INS output electrical tests

| | |
|---|---|
| The interface complies with the applicable requirements of IEC 61162-1/-2 | *yes* |

## 8.4 INS output performance tests

| | |
|---|---|
| Correct operation during 100 % load of the interface | *yes* |
| Output data or equipment operation agrees with requested output data | *yes* |

## 8.5 Printer output electrical tests

| | |
|---|---|
| The printer output complies with the applicable requirements of RS-232 | *yes* |

## 8.6 Printer output performance tests

| | |
|---|---|
| Correct operation during 100 % load of the interface capacity | *yes* |
| Output data or equipment operation agrees with requested output data | *yes* |

# 9 General & Signal Processing Tests

***Satisfactory:***

## 9.1 Exclusion of stations

| | |
|---|---|
| Messages from not selected stations (B1) are neither displayed nor printed | *yes* |

## 9.2 Exclusion of message categories

| | |
|---|---|
| Messages with not selected categories (B2) are neither displayed or printed | *yes* |
| Category A, B, D and L cannot be de-selected and is always displayed or printed | *yes* |

## 9.3 Receiver test facility

| | |
|---|---|
| Test message is being displayed or printed with indication pass/fail | *yes* |
| Test message contains at least 36 valid characters | *yes* |
| The test message is being displayed/printed but not stored | *yes* |

## 9.4 SAR alarm provision and reset

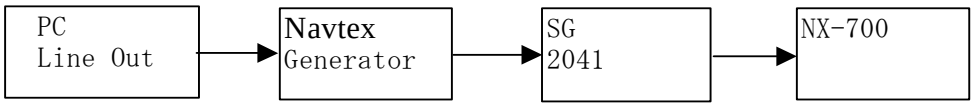
| | |
|---|---|
| Alarm is activated when message with B2=D has been received | *yes* |
| Alarm can be reset manually *(push any key)* | *yes* |
| Alarm can be reset via 61162-ACK-sentence | *yes* |
| Level of audible alarm is 75-85 dBA *(measured: 84 dBA @ 1 m)* | *yes* |

## 9.5 Additional alarms

| | |
|---|---|
| Additional alarms are available | *yes* |
| The additional alarm can be suppressed | *yes* |
| The additional alarm can be reset | *yes* |

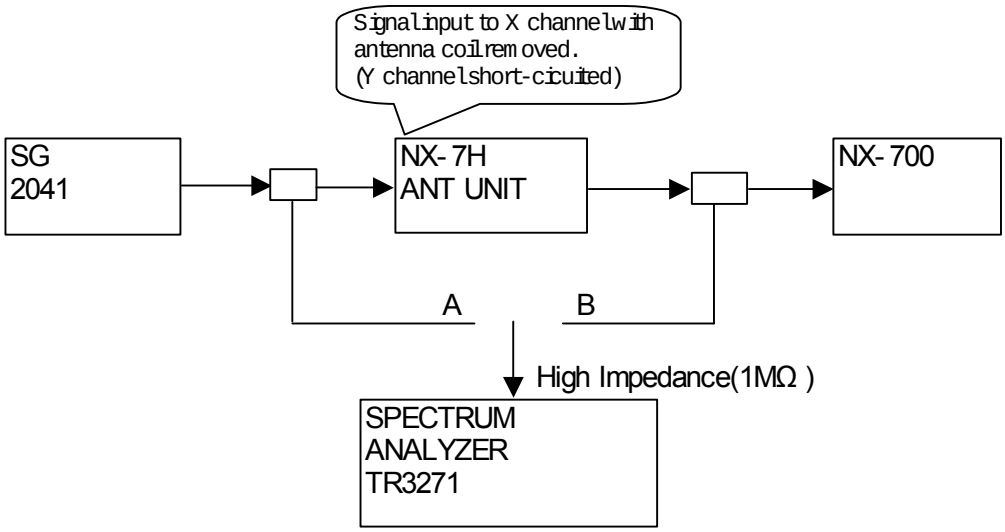
# 10 Receiver Tests

## 10.1 Call sensitivity



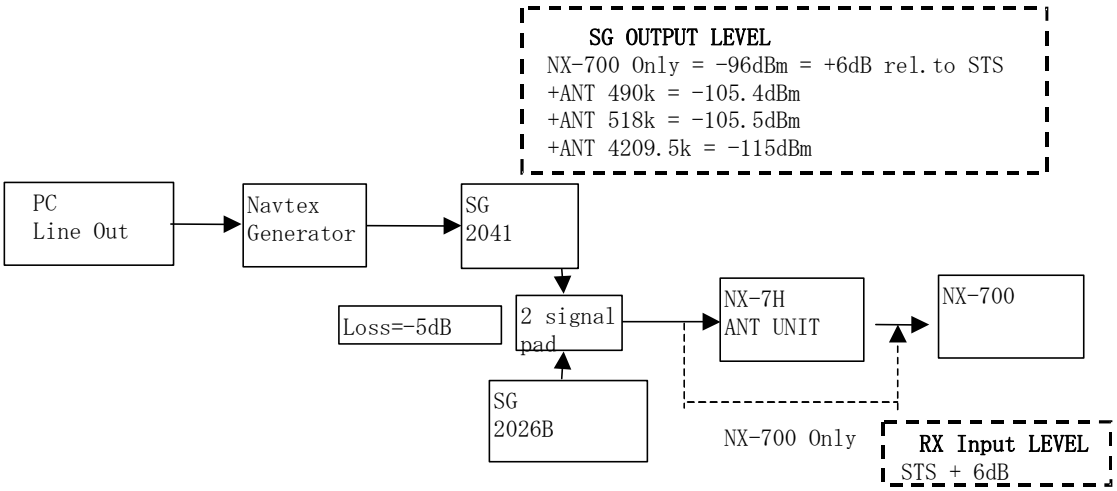

| TEST CONDITIONS | | SENSITIVITY LEVEL (dBm @ CER%) | | |
|---|---|---|---|---|
| | | 518 kHz | 490 kHz | 4209.5 kHz |
| Temperature | Voltage | RF level (dBm) | RF level (dBm) | RF level (dBm) |
| *Tnom (+15 – 35 °C)* | *Vnom (24.0 V)* | - 119 @ 0 % | - 117 @ 0 % | - 115 @ 0 % |
| *Tmin (-15 °C)* | *Vmin (10.8 V)* | - 119 @ 0 % | - 117 @ 0 % | - 115 @ 0 % |
| *Tmin (-15 °C)* | *Vmax (31.2 V)* | - 119 @ 0 % | - 117 @ 0 % | - 115 @ 0 % |
| *Tmax (+55 °C)* | *Vmin (10.8 V)* | - 119 @ 0 % | - 117 @ 0 % | - 115 @ 0 % |
| *Tmax (+55 °C)* | *Vmax (31.2 V)* | - 119 @ 0 % | - 117 @ 0 % | - 115 @ 0 % |
| Measurement uncertainty | | ±1.2 dB | | |
| Limits | | ≤ - 107 dBm @ < 4 % CER under normal test conditions,<br>≤ - 107 dBm @ < 4 % CER under extreme test conditions, | | |

# Determination of antenna gain and substitution levels for active antenna measurements




| Frequency | | A | B | ANT GAIN |
|---|---|---|---|---|
| 490 kHz | | −40dBm | −30.6dBm | +9.4dB |
| 518 kHz | | −40dBm | −30.5dBm | +9.5dB |
| 4209.5 kHz | | −40dBm | −21dBm | +19dB |

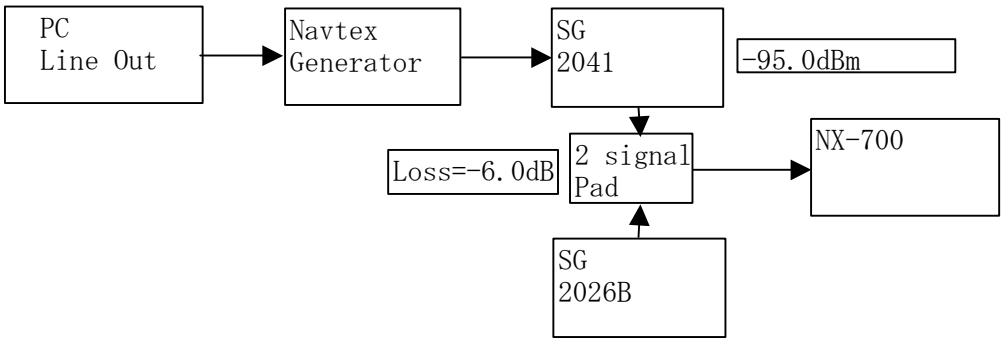
## 10.2 Interference rejection and blocking immunity




| 490 kHz Fregency band | | NX-700 Only | | +ANT | | Limit |
|---|---|---|---|---|---|---|
| 489-489.5kHz | | 54dB | | 54dB | | >20dB |
| 490.5-491kHz | | 52dB | | 53dB | | >20dB |
| 487-489kHz | | 85dB | | 84dB | | >40dB |
| 491-493kHz | | 89dB | | 90dB | | >40dB |
| 100-487kHz | | 90dB | | 90dB | | >70dB |
| 493kHz-30MHz | | 91dB | | 90dB | | >70dB |
| 156-174MHz | | 99dB | | 101dB | | >70dB |
| 450-470MHz | | 98dB | | 101dB | | >70dB |
| | | | | | | |
| 518 kHz Frequency band | | NX-700 Only | | +ANT | | Limit |
| 517-517.5kHz | | 55dB | | 55dB | | >20dB |
| 518.5-519kHz | | 55dB | | 54dB | | >20dB |
| 515-517kHz | | 83dB | | 84dB | | >40dB |
| 519-521kHz | | 90dB | | 91dB | | >40dB |
| 100-515kHz | | 88dB | | 89dB | | >70dB |
| 521kHz-30MHz | | 90dB | | 89dB | | >70dB |
| 156-174MHz | | 95dB | | 101dB | | >70dB |
| 450-470MHz | | 96dB | | 102dB | | >70dB |
| | | | | | | |
| 4209.5 kHz Frequency band | | NX-700 Only | | +ANT | | Limit |
| 4208.5-4209.0kHz | | 57dB | | 56dB | | >20dB |
| 4210.0-4210.5kHz | | 52dB | | 50dB | | >20dB |
| 4206.5-4208.5kHz | | 89dB | | 87dB | | >40dB |
| 4210.5-4212.5kHz | | 89dB | | 87dB | | >40dB |
| 100-4206.5kHz | | 90dB | | 87dB | | >70dB |
| 4212.5kHz-30MHz | | 89dB | | 86dB | | >70dB |
| 156-174MHz | | 114dB | | 119dB | | >70dB |
| 450-470MHz | | 116dB | | 119dB | | >70dB |
| IF(490kHz) | | 75dB | | 95dB | | >70dB |
| F-2xIF(3229.5kHz) | | 87dB | | 96dB | | >70dB |

Levels are obtained at a CER < 4 %; measurement uncertainty: ±2.9 dB

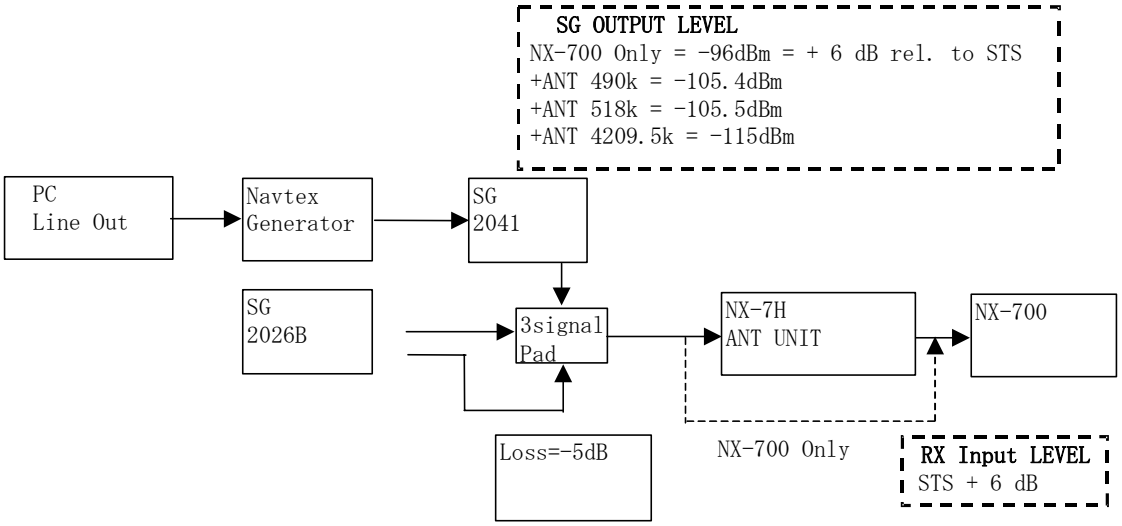
## 10.3 Co-channel rejection




| Frequency (kHz) | Rejection ratio (dB) | CER (%) | Limit: CER (%) |
|---|---|---|---|
| 518 | - 2.5 | 0 | < 4 |
| 490 | - 2.5 | 0 | < 4 |
| 4209.5 | - 2.5 | 0 | < 4 |

Measurement uncertainty: ±1.6 dB
CER: Character Error Rate

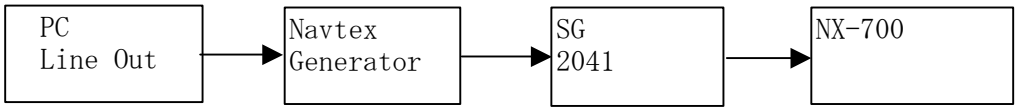
## 10.4 Intermodulation




| 490 kHz | NX-700 Only | | +ANT | | Limit |
|---|---|---|---|---|---|
| 488+486kHz | 77dB | | 74dB | | >70dB |
| 487+484kHz | 77dB | | 74dB | | >70dB |
| 486+482kHz | 77dB | | 74dB | | >70dB |
| 492+494kHz | 76dB | | 74dB | | >70dB |
| 493+496kHz | 76dB | | 74dB | | >70dB |
| 494+498kHz | 77dB | | 74dB | | >70dB |
| | | | | | |
| 518 kHz | NX-700 Only | | +ANT | | Limit |
| 516+514kHz | 77dB | | 74dB | | >70dB |
| 515+512kHz | 76dB | | 74dB | | >70dB |
| 514+510kHz | 77dB | | 74dB | | >70dB |
| 520+522kHz | 76dB | | 73dB | | >70dB |
| 521+524kHz | 76dB | | 74dB | | >70dB |
| 522+526kHz | 77dB | | 74dB | | >70dB |
| | | | | | |
| 4209.5 kHz | NX-700 Only | | +ANT | | Limit |
| 4207.5+4205.5kHz | 73dB | | 71dB | | >70dB |
| 4206.5+4203.5kHz | 73dB | | 72dB | | >70dB |
| 4205.5+4201.5kHz | 73dB | | 72dB | | >70dB |
| 4211.5+4213.5kHz | 72dB | | 71dB | | >70dB |
| 4212.5+4215.5kHz | 72dB | | 72dB | | >70dB |
| 4213.5+4217.5kHz | 72dB | | 71dB | | >70dB |

The intermodulation rejection values are obtained at a CER of < 4 %.
Measurement uncertainty: ±2.9 dB
CER: Character Error Rate

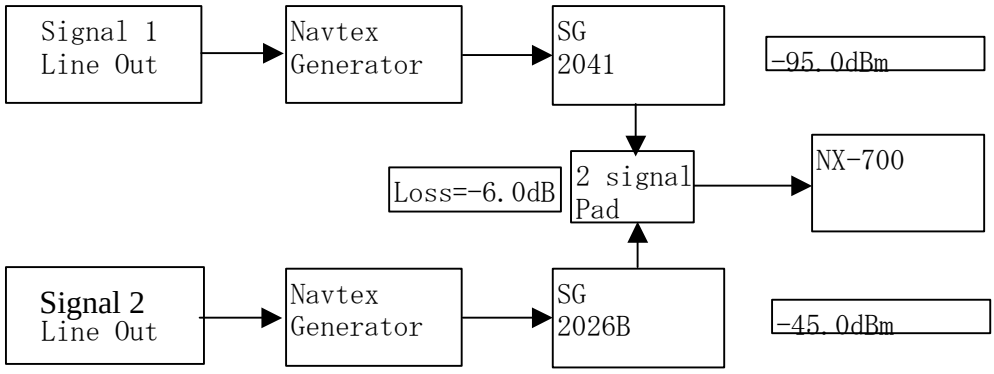
## 10.5 Off frequency transmitter




| Frequency (kHz) | Frequency offset (Hz) | CER (%) | Limit: CER (%) |
|---|---|---|---|
| 518 | +50 / -65 | 0 | < 4 @ 25 Hz offset |
| 490 | +50 / -60 | 0 | < 4 @ 25 Hz offset |
| 4209.5 | +50 / -60 | 0 | < 4 @ 25 Hz offset |

Measurement uncertainty frequency offset: ±0.1 Hz
CER: Character Error Rate

## 10.6 Simultaneous operation on several receive frequencies




| Test script: | Frequency (kHz) | Level: (dBm) | CER (%) | Limit: CER (%) |
|---|---|---|---|---|
| Signal 1 (A) | 518 | -101 | 0 | < 4 |
| Signal 2 (A) | 490 | -51 | 0 | < 4 |
| Signal 1 (B) | 518 | -101 | 0 | < 4 |
| Signal 2 (B) | 4209.5 | -51 | 0 | < 4 |
| Signal 1 (C) | 490 | -101 | 0 | < 4 |
| Signal 2 (C) | 518 | -51 | 0 | < 4 |
| Signal 1 (D) | 4209.5 | -101 | 0 | < 4 |
| Signal 2 (D) | 518 | -51 | 0 | < 4 |

CER: Character Error Rate

## 10.7 Protection of input circuits

| Protection of input circuits 30Vrms for 15 minutes | |
|---|---|
| Test frequency (kHz) | Correct operation after test |
| 4350 | yes |
| 8250 | yes |
| 16850 | yes |
| 22250 | yes |

# 11 Printer Tests

***Satisfactory:***

## 11.1 Basic requirements

Minimum paper roll capacity of 200 000 characters *yes*
*Calculated capacitiy: 274272 characters*
Print-out has 32 easily legible characters per line *yes*
Acoustic noise of the printer < 60 dBA @ 1 meter *yes*
*Measured: 49 dBA*

## 11.2 Paper roll end alarm and storage inhibition

Paper-alarm shall be activated when paper is running out *yes*
Equipment stores and prints out on new paper all meantime received messages *yes*

## 11.3 Automatic line-feed indication and paper feed

A division of a word by automatic line feed is indicated in the print-out *yes*
Two line feeds are inserted at end of the message *yes*

## 11.4 Mutilated character indication

The print-out shall contain an asterisk (*) for each mutilated character *yes*

## 11.5 Tests of technical characteristics (ITU-R Rec. M.540)

### 11.5.1 B1/B2 characters selection

Messages from not selected stations (B1) are neither displayed nor printed *yes*
Messages with not selected categories (B2) are neither displayed nor printed *yes*
Category A, B, D and L cannot be de-selected and is always displayed or printed *yes*

### 11.5.2 Printer activation/error-free preamble B1-B4

No storage or print-out of messages with errors in preamble (B1, B2, B3 or B4) *yes*

### 11.5.3 Non-repetitive printing of a message

This test is covered by section 12.3

### 11.5.4 Message with B3B4 = 00

Messages with B3B4=00 are always printed (selected or non-selected) *yes*

# 12 Memory Tests

***Satisfactory:***

## 12.1 Internal storage, message tagging, erasure of oldest msg ID

This test is required for equipment not fitted with an integral printer
Required test script:

a) - Message memory is 100 % pre-loaded with STF
b) – 5 oldest messages tagged for permanent retention
c) – 10 unique messages are sent to equipment
d) – Tagged messages are untagged and 10 new unique messages sent

Results of above script:

| | |
|---|---|
| The equipment indicates that all messages have been stored (a) | *yes* |
| The equipment has correctly tagged the messages (b) | *yes* |
| Indication that 5 (oldest) tagged messages are still stored (c) | *yes* |
| Indication that next 10 oldest messages are no longer stored (c) | *yes* |
| Indication that 10 oldest messages have been replaced by 10 new messages (d) | *yes* |

## 12.2 Erasure of message identifications/storage time

This test is required for equipment not fitted with an integral printer
Required test script:

After test according to clause 12.1, wait 59 hours;
Send one message with message ID previously used and currently stored;
Tag another previously used message (B) for permanent retention;
Wait 2 hours, send a new unique message (A); wait 12 hours;
Apply test script of clause 12.1 with previously used message ID’s

Results of above test script:

| | |
|---|---|
| Indication that message applied after 59 hours was not stored | *yes* |
| Indication that this message did not overwrite any stored contents | *yes* |
| Indication that message A was stored and overwrote oldest stored message | *yes* |
| Indication that after 73 hours only message A and tagged message (B) are stored | *yes* |
| After application of test script of clause 12.1, store contains only this test script and the tagged message B | *yes* |

***Satisfactory:***

## 12.3 Storage of message identifications

This test is required only for equipment fitted with an integral printer
Required test script:
Character error rate of the messages is < 4%;
35 messages with unique message ID are sent; wait 59 hours;
Send one message with message ID previously used and currently stored;
Wait 2 hours, send a new unique message (A); wait 12 hours;
Resend the 35 messages with previously used message ID's

Results of above test script:

| | |
|---|---|
| Print-out shows character error rate of < 4% and message ID's are stored | yes |
| Indication that message applied after 59 hours was not stored | *yes* |
| Indication that this message did not overwrite any stored contents | *yes* |
| Indication that message A was stored and overwrote oldest stored message | *yes* |
| Indication that after 73 hours only message A is stored | *yes* |
| Re-application of this test script, store contains only this test script and message A | *yes* |

## 12.4 Reception of messages with character errors

This test is required for all equipment

| | |
|---|---|
| The equipment shall store/print messages indicating CER >20 % to ≤ 33 % | *yes* |
| The equipment shall store/print messages indicating CER >4 % to ≤ 20 % | *yes* |

## 12.5 Unsatisfactory reception

This test is required for all equipment

| | |
|---|---|
| The equipment shall not store/print messages (ID's) with CER > 33 % | *yes* |

## 12.6 Power-off check

This test is required for equipment not fitted with an integral printer

| | |
|---|---|
| After 6 hours power-off, the loaded STF in the message store is unchanged | *yes* |
| After 6 hours power-off, all non-volatile equipment settings are unchanged | *yes* |

## 12.7 Brown-out test

This test is required for all equipment
Required test script:
Reduce supply voltage to 40 % of nominal voltage over 30 s time;
Gradually increase supply voltage to 80 % of nominal voltage over 30 s time;

Results of above test script:

| | |
|---|---|
| After brown-out, the loaded STF in the message store is unchanged | *yes* |
| After brown-out, all non-volatile equipment settings are unchanged | *yes* |

***Satisfactory:***

## 12.8 UTC handling check

*The manufacturer declared that UTC is taken from external source (61162-interface).*
*During power-down an internal timer takes over.*

This test is required for equipment not fitted with an integral printer
Required test script:
External UTC is applied and STF loaded;
Remove the power for 6 hours; then apply power and after 53 hours check::
After 6 hours power-down, the loaded STF in the message store is unchanged *yes*

# 13 Miscellaneous tests

## 13.1 Spurious emissions

| SPURIOUS EMISSIONS POWER LEVEL | |
|---|---|
| Spurious frequency (MHz) | Power level (dBm) |
| * | All emissions are more than 10 dB below the limit |
| -- | -- |
| Measurement uncertainty | + 1.7 / - 1.9 dB |
| Limit (9 kHz - 2 GHz) | ≤ - 60 dBm (1 nW) for 9 kHz - 2 GHz |

Utilized measuring resolution bandwidth: 100 kHz.

## 13.2 Special purpose and safety tests

See EN 60945 test report

## 13.3 Maintenance

See EN 60945 test report

## 13.4 Equipment manuals – check of manufacturer's documentation

See EN 60945 test report

## 13.5 Marking and identification

See EN 60945 test report

# Used test equipment module

The following table lists all equipment used.

| Measurement Equipment utilized with Draft. IEC 61097-6 Ed. 2.0 (80/403/CDV) | | | | |
|---|---|---|---|---|
| Nr. | Type | Model | Manufacturer | Serial Nr. |
| *1* | *Signal generator* | *2041* | *Marconi* | *1119333/015* |
| *2* | *Signal generator* | *2026B* | *Marconi* | *202601/524* |
| *3* | *Navtex Generator* | *DSC-G1* | *Furuno* | *DG-0001* |
| *4* | *PC* | *CF-28* | *Panasonic* | *--* |
| *5* | *Splitter* | *60NF50* | *Wiltron* | *658023* |
| *6* | *Splitter* | *ZFSC-3-1* | *Mini-Circuits* | *15542* |
| *7* | *Spectrum analyzer* | *R3271* | *Advantest* | *15050383* |
| *8* | *Frequency counter* | *R5362A* | *Advantest* | *13720092* |
| *9* | *Oscilloscope* | *TDS320* | *Tektronix* | *B012383* |
| *10* | *Power supply* | *GP035-10* | *Takasago* | *1013895093* |
| *11* | *Digital Multimeter* | *04681* | *Futaba-koug* | *--* |
| 12 | *IEC 61162 testsoftware* | *--* | *Furuno* | *--* |
| 13 | *MF/HF transmitter* | FS-1502 | *Furuno* | *--* |
| | | | | |
| | | | | |