
REPORT ON

Limited Type Approval Testing of the Japan Radio Company Limited
NCR-333 Navtex Receiver, NAW-333 Navtex Antenna and NBG-319, NBG-320 Power Supplies
in accordance with IEC 60945 (August 2002) and IEC 61097-6 Ed.2 (February 2005)

COMMERCIAL- IN-CONFIDENCE

Report Number RM614104/01 Issue 1

June 2005



Product Service



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NBG-320 Power Supplies in accordance with IEC 60945 (August 2002)
and IEC 61097-6 Ed.2 (February 2005).

Report Number RM614104/01 Issue 1

June 2005

PREPARED FOR

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DATED

24th June 2005

DISTRIBUTION

Japan Radio Company, Mitaka, Tokyo

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SECTION 1

REPORT SUMMARY

Limited Type Approval Testing of the Japan Radio Company Limited
NCR-333 Navtex Receiver, NAW-333 Navtex Antenna and NBG-319, NBG-320 Power Supplies
in accordance with IEC 60945 (August 2002) and IEC 61097-6 Ed.2 (February 2005)

**1.1 STATUS**

MANUFACTURER:	Japan Radio Company
TYPE DESIGNATION:	Navtex Receiver Type NCR-333 Comprising: NCR-333: Navtex Receiver NAW-333: Navtex Antenna NBG-319: Power Supply Unit NBG-320: Power Supply Unit
SERIAL NUMBERS:	NCR-333: GD67160 (vibration, climatic, receiver) NCR-333: GD67161 (memory tests) NCR-333: GD67162 (power-off test, alarm level) NAW-333: Not serialised (2 units) NBG-319: Not serialised NBG-320: Not serialised
NUMBER OF SAMPLES TESTED:	Three of NCR-333, Two of NAW-333, One of each NBG-319 & NBG320
TEST SPECIFICATIONS:	IEC 60945 (2002-08) IEC 61097-6 Ed.2 (2005-02) DRAFT
START OF TEST:	12 th May 2005
FINISH OF TEST:	27 th May 2005
TEST ENGINEER:	R.A.Blagg

1.2 TEST HOUSE DECLARATION

We, BABT of Octagon House, Concorde Way, Segensworth North, Fareham, Hampshire PO15 5RL, declare under our sole responsibility that the product:

Equipment:	Navtex Receiver	
Type:	NCR-333, comprising:	
Model:	NCR-333:	Navtex Receiver
	NAW-333:	Navtex Antenna
	NBG-319:	Power Supply Unit
	NBG-320:	Power Supply Unit
Serial Numbers:	NCR-333:	GD67160 (vibration, climatic, receiver)
	NCR-333:	GD67161 (memory tests)
	NCR-333:	GD67162 (power-off test, alarm level)
	NAW-333:	Not serialised (2 units)
	NBG-319:	Not serialised
	NBG-320:	Not serialised
Quantity:	Three of NCR-333, Two of NAW-333 One of each NBG-319 & NBG320	

to which this declaration relates are in conformity with the following standard(s) or other normative document(s):

IEC 60945 (August 2002)

Clauses: 7.2, 8.21, 8.2.2, 8.3, 8.4, 8.7, 8.8 and 11.1

IEC 61097-6 Ed.2 (February 2005)

Clauses: 8.1, 8.2, 8.3, 8.4, 8.5, 8.6, 9.1, 9.2, 9.3, 9.4, 9.5, 10.1, 10.2, 10.3, 10.4, 10.5, 10.6, 10.7, 12.1, 12.2, 12.4, 12.5, 12.6, 12.7, 12.8, 13.1, 13.4

Detailed results are recorded in Report No. RM614104/01 Issue 1

Place and date of issue: Fareham, June 2005

Signature:


M J Hardy
 UKAS Signatory

Date:

24th June 2005

1.3 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with IEC 60945 is shown below.

Std / Clause	Test Description	Result	Levels / Comments
IEC 60945 7.2	Excessive Conditions	PASS	
IEC 60945 8.2.1	Dry Heat Storage	PASS	
IEC 60945 8.2.2	Dry Heat	PASS	Zero errors for NCR-333 tests.
IEC 60945 8.3	Damp Heat	PASS	Zero errors for NCR-333 tests.
IEC 60945 8.4	Low Temperature	PASS	Zero errors for NCR-333 tests.
IEC 60945 8.7	Vibration	PASS	All vibration at 30 Hz except NCR-333 in the X Plane which was at 69 Hz.
IEC 60945 8.8	Rain	PASS	
IEC 60945 11.1	Acoustic Noise and Signals	PASS	

A brief summary of the tests carried out in accordance with IEC 61097-6 Ed.2 is shown below.

NUA: Not UKAS Accredited, see Section 5, Accreditation Copyright and Disclaimers

1.3 BRIEF SUMMARY OF RESULTS - CONTINUED

A brief summary of the tests carried out in accordance with IEC 61097-6 Ed.2 is shown below.

NUA: Not UKAS Accredited, see Section 5, Accreditation Copyright and Disclaimers

Std / Clause	Test Description	Result	Levels / Comments
IEC 61097-6 Ed.2 8.1	INS Input Electrical Tests	PASS	NUA
IEC 61097-6 Ed.2 8.2	INS Input Performance Tests	PASS	NUA
IEC 61097-6 Ed.2 8.3	INS Output Electrical Tests	PASS	NUA
IEC 61097-6 Ed.2 8.4	INS Output Performance Tests	PASS	NUA
IEC 61097-6 Ed.2 8.5	Printer Output Electrical Tests	PASS	NUA
IEC 61097-6 Ed.2 8.6	Printer Output Performance Tests	PASS	NUA
IEC 61097-6 Ed.2 9.1	Exclusion Of Stations	PASS	NUA
IEC 61097-6 Ed.2 9.2	Exclusion Of Message Categories	PASS	NUA
IEC 61097-6 Ed.2 9.3	Receiver Test Facility	PASS	NUA
IEC 61097-6 Ed.2 9.4	Search and Rescue (SAR) Alarm Provision and Reset	PASS	NUA. Same as IEC 60945 Clause 11.1 Alarm levels
IEC 61097-6 Ed.2 9.5	Additional Alarms	PASS	NUA

1.3 BRIEF SUMMARY OF RESULTS - CONTINUED

A brief summary of the tests carried out in accordance with IEC 61097-6 Ed.2 is shown below.

NUA: Not UKAS Accredited, see Section 5, Accreditation Copyright and Disclaimers.

Std / Clause	Test Description	Result	Levels / Comments
IEC 61097-6 Ed.2 10.1	Call Sensitivity	PASS	NUA. Zero errors for NCR-333 tests.
IEC 61097-6 Ed.2 10.2	Interference Rejection & blocking Immunity	PASS	NUA. Zero errors for NCR-333 tests.
IEC 61097-6 Ed.2 10.3	Co-channel Rejection	PASS	NUA. Zero errors for NCR-333 tests.
IEC 61097-6 Ed.2 10.4	Intermodulation	PASS	NUA. Zero errors for NCR-333 tests.
IEC 61097-6 Ed.2 10.5	(Effects from) Off-Frequency Transmitter	PASS	NUA. Zero errors for NCR-333 tests.
IEC 61097-6 Ed.2 10.6	Simultaneous Operation on Several Receive Frequencies	PASS	NUA. Zero errors for NCR-333 tests.
IEC 61097-6 Ed.2 10.7	Protection of Input Circuits	PASS	NUA. 30 V rms applied at 4209.5 kHz for 15 minutes.
IEC 61097-6 Ed.2 12.1	Storage, Tagging & Erasure	PASS	NUA
IEC 61097-6 Ed.2 12.2	Erasure of Message Identifications / Storage Time	PASS	NUA
IEC 61097-6 Ed.2 12.4	Reception of Messages With Character errors	PASS	NUA
IEC 61097-6 Ed.2 12.5	Unsatisfactory Reception	PASS	NUA
IEC 61097-6 Ed.2 12.6	Power-Off	PASS	NUA
IEC 61097-6 Ed.2 12.7	Brown-Out Test	PASS	NUA
IEC 61097-6 Ed.2 12.8	UTC Handling Check	PASS	NUA
IEC 61097-6 Ed.2 13.1	Spurious Emissions	PASS	NUA
IEC 61097-6 Ed.2 13.4	Manufacturer's Documentation	Submitted	NUA

1.4 MANUFACTURER'S APPLICATION FORM

APPLICANT'S DETAILS	
CATEGORY OF APPLICANT (please tick relevant box opposite)	(a) ☒ MANUFACTURER
	(b) ☐ IMPORTER
	(c) ☐ DISTRIBUTOR
	(d) ☐ AGENT
If box (b), (c) or (d) is ticked complete details in box below with respect to the manufacturer	
COMPANY NAME :	Japan Radio Company
ADDRESS :	1-1 Shimorenjaku 5-chome Mitaka-Shi Tokyo 181-8510 Japan
NAME FOR CONTACT PURPOSES :	Mr James Moon
TELEPHONE NO : 0031 6547 95448	FAX NO :
	Email : jrcjimmoon@aol.com

MANUFACTURER'S DETAILS	
COMPANY NAME :	Japan Radio Company
ADDRESS :	1-1 Shimorenjaku 5-chome Mitaka-Shi Tokyo 181-8510 Japan
NAME FOR CONTACT PURPOSES :	Mr. Junji Takita
TELEPHONE NO : +81-422-45-9547	FAX NO : +81-422-45-9922
	Email: j04392_takita@m1.jrc.co.jp

[illegible]

- (1) This is the manufacturer's numeric or alphanumeric code or name that is specific to a particular equipment. It may contain information in coded form on the characteristics of the equipment e.g. frequency, power. The manufacturer is free to choose the form of the type designation.
- (2) This is the number, code or trade name used by the manufacturer to describe a series or 'family' of equipment of substantially the same mechanical and electrical construction which will include a number of related equipments. This number is often referred to as the "model number".
- (3) This is the manufacturer's identification number given to a specific equipment in the series or 'family' of equipments. It is often referred to as the "identification number".


1.4 MANUFACTURER'S APPLICATION FORM - CONTINUED

TYPE OF EQUIPMENT	
☐ <u>Base Station</u>	(Equipment fitted with an antenna socket for use with an external antenna, and intended for use in a fixed location).
☐ <u>Mobile Station</u>	(Mobile equipment fitted with an antenna socket, for use with an external antenna, normally used in a vehicle or as a transportable station).
<u>Handportable</u>	
☐	(fitted with an antenna socket)
☐	(without an external antenna socket integral antenna equipment, but fitted with a permanent internal or a temporary internal 50 ohm R.F. connector which allows access to the transmitter output and the receiver input)
☒ <u>Other</u>	Navtex Receiver with associated antenna and power supplies.

TRANSMITTER TECHNICAL CHARACTERISTICS
TRANSMITTER FREQUENCY
Method of frequency generation
☐ CRYSTAL
☐ SYNTHESIZER
☐ OTHER
TRANSMITTER CHANNEL SWITCHING FREQUENCY RANGE
TRANSMITTER FREQUENCY ALIGNMENT RANGE


1.4 MANUFACTURER'S APPLICATION FORM - CONTINUED

TRANSMITTER RF POWER CHARACTERISTICS	
TRANSMITTER PEAK OUTPUT POWER as stated by manufacturer:	
Is transmitter intended for : Continuous duty ☐ Yes ☐ No Intermittent duty ☐ Yes ☐ No If intermittent state DUTY CYCLE (Dependent upon operation)	
Is transmitter output power variable?	
Yes ☐	No ☐
☐ continuously variable ☐ stepped dB per step maximum RF output power (Watts) minimum RF output power (Watts)	

TRANSMITTER – MODULATION	
☐	Angle (FREQUENCY)
☐	Phase
☐	Other :



1.4 MANUFACTURER'S APPLICATION FORM - CONTINUED

RECEIVER CHARACTERISTICS
ITU DESIGNATION OR CLASS OF RECEPTION: F1B
CHANNEL SEPARATION: N/A
-State the maximum number of channels over which the equipment can operate: Three channels: 518 kHz, 490 kHz and 4209.5 kHz.

EXTREME TEMPERATURE RANGE over which equipment is to be type tested
☒ -25°C to +55°C (External Unit) NAW-333
☒ -15°C to +55°C (Protected Units) NCR-333, NBG-319 & NBG-320
☐ -10°C to +55°C

CONSTRUCTION OF EQUIPMENT
☐ Single unit (5)
☒ Multiple units
If multiple units describe each one clearly:
The NCR-333 is a Navtex Receiver operating on 518, 490 & 4209.5 kHz.
The NAW-333 is an externally mounted active whip antenna.
The NBG-319 is a Power Supply Unit, 12V to 24V DC in, 12V to 24V DC out, 6.5V DC out for printer.
The NBG-320 is a Power Supply Unit, 100/120V AC or 200/220/240V AC or 24V DC in, 12V DC and 6.5V DC out.

(5) Unit means a physically separate item of the equipment.

**1.4 MANUFACTURER'S APPLICATION FORM - CONTINUED**

AUTOMATIC EQUIPMENT SWITCH OFF	
If the equipment is designed to automatically switch off at a predetermined voltage level which is higher or lower in value than the battery minimum and minimum calculated values this shall be clearly stated.	
☐	Applies cut-off voltage
☒	Does not apply



1.4 MANUFACTURER'S APPLICATION FORM - CONTINUED

POWER SOURCE	
☒ AC MAINS 100/120V or 200/220/240V (NBG-320)	☒ Single phase
AC MAINS FREQUENCY 50/60 Hz	☐ Three phase
☒ DC Voltage 12 to 24 V (NBG-319 & NCR-333)	
DC Maximum Current 0.55 A	
☒ Other: The NAW-333 derives its power from the NCR-333	
BATTERY	
☐ Nickel Cadmium	
☐ Mercury	
☐ Alkaline	
☐ Lead acid (Vehicle regulated)	
☐ Leclanche	
☐ Lithium	
☐ Other	
-- volts nominal. End point voltage as quoted by equipment manufacturer V (Refer to Clause 5.3.2 and 5.4.2 of the Standard when completing the above)	

1.4 MANUFACTURER'S APPLICATION FORM - CONTINUED

DECLARATION		
Are the equipments submitted representative production models?	☐	Yes
	☐	No
If not are the equipments pre-production models?	☒	Yes
	☐	No
If pre-production equipments are submitted will the final production equipments be identical in <u>all</u> respects with the equipment tested	☒	Yes
	☐	No
If no supply full details		
Is the Test Report to be used as part of a Maritime and Coastguard Agency Type Approval Application?	☒	Yes
	☐	No
If yes, has the product, any direct engineering predecessor, or variant ever been granted Type Approval in any EEC member country?	☐	Yes
	☒	No
If yes supply full details:		
Will labelling of the equipment comply with the requirements of IEC 60945?	☒	Yes
	☐	No
If no, supply full details		

The information within this form was supplied by Mr. Junji Takita of JRC Limited, during testing.

BABT formally certifies that the manufacturer's declaration as typed out in this report is a true and accurate record of the information supplied by the applicant.



1.5 ADDITIONAL INFORMATION

This report contains results for type approval testing in accordance with IEC 60945 (August 2002) and IEC 61097-6 Ed.2 DRAFT (February 2005). The test definitions, methods and requirements follow the applicable version (as indicated earlier) of the above specifications.

BABT retains all results, plots and printouts for the test performed and also calibration details of the test equipment used.

The test results relate only to the item(s) tested.

The report shall not be reproduced without the written approval of the testing laboratory.

Testing was performed at Mitaka in Japan, in the presence of Mr Minoru Akatsuka and Mr Tatsuyuki Takahashi of JRC Limited.



SECTION 2

TEST DETAILS

Limited Type Approval Testing of the Japan Radio Company Limited
NCR-333 Navtex Receiver, NAW-333 Navtex Antenna and NBG-319, NBG-320 Power Supplies
in accordance with IEC 60945 (August 2002) and IEC 61097-6 Ed.2 DRAFT (February 2005)



2.1 TEST RESULTS

Ambient temperature +24.9°C Relative humidity 33.9%

EXCESSIVE CONDITIONS

IEC 60945, CLAUSE 7.2
IEC 61097-6 Ed.2, CLAUSE 6.4.2 (NUA)

NCR-333 Navtex Receiver S/No. GD67160

Excessive voltage on 24 V DC input:

An excessive voltage equal to 150% of the normal supply voltage ($1.5 \times 24 \text{ V} = 36 \text{ V DC}$) did not cause the protection circuitry to activate, and the EUT continued to operate at this supply voltage.

The protection circuitry within the NCR-333 Navtex receiver caused the EUT to shut down when the supply voltage was increased above 51 V DC.

Reversed polarity on 24 V DC input:

The EUT was subjected to a reversed polarity 24 V supply for a period of five minutes.

Upon resumption of the normal 24 V DC supply, the EUT operated normally.

On completion of these tests, the NCR-333 was checked and was found to operate normally in all available modes.

Required results (Subclause 6.4.3):

During and after the test the EUT shall not be damaged. After removal of the excessive supply conditions the EUT shall be able to operate normally for all available modes.

The EUT satisfied the requirements of this test.

TEST EQUIPMENT USED:

1, 2, 8, 13, 15, 16, 19, 21, **22**, **23**, 29, 49 (software used shown in bold text)

.....



2.1 TEST RESULTS - CONTINUED

Ambient temperature +24.9°C Relative humidity 33.9%

EXCESSIVE CONDITIONS

IEC 60945, CLAUSE 7.2
IEC 61097-6 Ed.2, CLAUSE 6.4.2 (NUA)

NBG-319 Power Supply

Excessive voltage on 24 V DC input:

An excessive voltage equal to 150% of the normal supply voltage ($1.5 \times 24 \text{ V} = 36 \text{ V DC}$) did not cause the protection circuitry to activate, and the EUT continued to operate at this supply voltage.

The protection circuitry within the NBG-319 power supply caused the EUT to stop operating (all outputs off) when the supply voltage was increased above 38 V DC and resumed normal operation below 37 V DC.

Reversed polarity on 24 V DC input:

The EUT was subjected to a reversed polarity 24 V supply for a period of five minutes.

Upon resumption of the normal 24 V DC supply, the EUT operated normally.

On completion of these tests, the NBG-319 was checked and was found to operate normally.

Required results (Subclause 6.4.3):

During and after the test the EUT shall not be damaged. After removal of the excessive supply conditions the EUT shall be able to operate normally for all available modes.

The EUT satisfied the requirements of this test.

TEST EQUIPMENT USED:

1, 2, 15

.....



2.1 TEST RESULTS - CONTINUED

Ambient temperature +24.9°C Relative humidity 33.9%

EXCESSIVE CONDITIONS

IEC 60945, CLAUSE 7.2
IEC 61097-6 Ed.2, CLAUSE 6.4.2 (NUA)

NBG-320 Power Supply

Excessive voltage on 24 V DC input:

An excessive voltage equal to 150% of the normal supply voltage ($1.5 \times 24 \text{ V} = 36 \text{ V DC}$) did not cause the protection circuitry to activate, and the EUT continued to operate at this supply voltage.

The protection circuitry within the NBG-320 power supply caused the EUT to stop operating (all outputs off) when the supply voltage was increased above 38 V DC and resumed normal operation below 37 V DC.

Reversed polarity on 24 V DC input:

The EUT was subjected to a reversed polarity 24 V supply for a period of five minutes.

Upon resumption of the normal 24 V DC supply, the EUT operated normally.

On completion of these tests, the NBG-320 was checked and was found to operate normally.

Required results (Subclause 6.4.3):

During and after the test the EUT shall not be damaged. After removal of the excessive supply conditions the EUT shall be able to operate normally for all available modes.

The EUT satisfied the requirements of this test.

TEST EQUIPMENT USED:

1, 2, 15

.....



2.1 TEST RESULTS - CONTINUED

Ambient temperature +24.9°C Relative humidity 33.9%

EXCESSIVE CONDITIONS

IEC 60945, CLAUSE 7.2
IEC 61097-6 Ed.2, CLAUSE 6.4.2 (NUA)

NBG-320 Power Supply

Excessive voltage on 100 V AC input:

An excessive voltage equal to 150% of the normal supply voltage ($1.5 \times 100 \text{ V} = 150 \text{ V AC}$) did not cause the protection circuitry to activate, and the EUT continued to operate at this supply voltage.

The protection circuitry within the NBG-320 power supply caused the EUT to stop operating due to a ruptured fuse when the supply voltage was increased above 170 V AC.

On completion of this test and replacement of the fuse, the NBG-320 was checked and was found to operate normally.

Required results (Subclause 6.4.3):

During and after the test the EUT shall not be damaged. After removal of the excessive supply conditions the EUT shall be able to operate normally for all available modes.

The EUT satisfied the requirements of this test.

TEST EQUIPMENT USED:

1, 2, 50

.....



2.1 TEST RESULTS - CONTINUED

Ambient temperature +24.9°C Relative humidity 33.9%

EXCESSIVE CONDITIONS

IEC 60945, CLAUSE 7.2
IEC 61097-6 Ed.2, CLAUSE 6.4.2 (NUA)

NBG-320 Power Supply

Excessive voltage on 220 V AC input:

An excessive voltage equal to 150% of the normal supply voltage ($1.5 \times 220 \text{ V} = 330 \text{ V AC}$) did not cause the protection circuitry to activate, and the EUT continued to operate at this supply voltage.

The protection circuitry within the NBG-320 power supply caused the EUT to stop operating due to a ruptured fuse when the supply voltage was increased above 410 V AC.

On completion of this test and replacement of the fuse, the NBG-320 was checked and was found to operate normally.

Required results (Subclause 6.4.3):

During and after the test the EUT shall not be damaged. After removal of the excessive supply conditions the EUT shall be able to operate normally for all available modes.

The EUT satisfied the requirements of this test.

TEST EQUIPMENT USED:

1, 2, 51

.....



2.1 TEST RESULTS - CONTINUED

Ambient temperature +24.9°C Relative humidity 44.3%

Environment (+70°C): DRY HEAT STORAGE

IEC 60945, CLAUSE 8.2.1

NAW-333 Navtex Antenna

PERFORMANCE CHECK: ANTENNA OUTPUT LEVEL

The following performance checks were conducted as appropriate during testing in accordance with IEC 60945 Clause 8.2.1

Supply Voltage (V DC)	Antenna Output at 518 kHz (dBm)	Antenna Output at 490 kHz (dBm)	Antenna Output at 4209.5 kHz (dBm)
7.2	-45	-45	-45

Remarks

Performance check – Measurement of Antenna Output Power. Declared by manufacturer to be -45dBm $\pm$ 3dB.

The NAW-333 was stored in accordance with the specification for exposed equipment for a period of 12 hours and the performance was checked after recovery to normal ambient conditions.

The EUT satisfied the requirements of this test.

TEST EQUIPMENT USED:

1, 2, 9, 11, 26, 37, 41, 42

.....



2.1 TEST RESULTS - CONTINUED

Ambient temperature +22.5°C Relative humidity 50.5%

Environment (+55°C): DRY HEAT

IEC 60945, CLAUSE 8.2.2
IEC 61097-6 Ed.2, CLAUSE 10.1 (NUA)

NCR-333 Navtex Receiver S/No. GD67160

PERFORMANCE TEST: CALL SENSITIVITY

The following performance tests were conducted as appropriate during testing in accordance with IEC 60945 Clause 8.2.2 and IEC 61097-6 Ed.2 Clause 10.1

Supply Voltage (V DC)	Receive Frequency (kHz)	Test Level (dBm)	Character Error Rate (%)
24 (Normal)	518	-107.0	Zero (no errors)
	490	-107.0	Zero (no errors)
	4209.5	-107.0	Zero (no errors)

PERFORMANCE CHECKS AT EXTREME PSU VARIATION: CALL SENSITIVITY

The following performance checks were conducted as appropriate during testing in accordance with IEC 60945 Clause 8.2.2 and IEC 61097-6 Ed.2 Clause 10.1

Supply Voltage (V DC)	Receive Frequency (kHz)	Test level (dBm)	Character Error Rate (%)
10.8 (V _{min} -10%)	518	-101.0	Zero (no errors)
	490	-101.0	Zero (no errors)
	4209.5	-101.0	Zero (no errors)
31.2 (V _{max} +30%)	518	-101.0	Zero (no errors)
	490	-101.0	Zero (no errors)
	4209.5	-101.0	Zero (no errors)

Required Results (Subclause 10.1.3):

The character error rate shall be $\leq 4\%$.
--

Remarks

The NCR-333 was stored in accordance with the specification for protected equipment and the performance was checked at the end of an 11 hour power on period.

The EUT satisfied the requirements of this test.

TEST EQUIPMENT USED:

1, 2, 7, 8, 9, **22, 23**, 26, 27 (software used shown in bold text)

.....



2.1 TEST RESULTS - CONTINUED

Ambient temperature +23.7°C Relative humidity 40.0%

Environment (+55°C): DRY HEAT

IEC 60945, CLAUSE 8.2.2

NAW-333 Navtex Antenna

PERFORMANCE TESTS: ANTENNA OUTPUT LEVEL

The following performance tests were conducted as appropriate during testing in accordance with IEC 60945 Clause 8.2.2

Supply Voltage (V)	Antenna Output at 518 kHz (dBm)	Antenna Output at 490 kHz (dBm)	Antenna Output at 4209.5 kHz (dBm)
7.2	-45.9	-46.0	-46.8
6.84*	-45.9	-45.8	-46.8
7.56*	-45.8	-45.8	-46.9

Remarks

Performance check – Measurement of Antenna Output Power. Declared by manufacturer to be -45dBm $\pm$ 3dB.

*The manufacturer has declared that the supply voltage variation will not be greater than $\pm$ 5% under excess conditions due to the EUT deriving its power from the NCR-333 Navtex Receiver.

The NAW-333 was stored in accordance with the specification for exposed equipment and the performance was tested at the end of a 10 hour power on period and after recovery to normal ambient conditions.

The EUT satisfied the requirements of this test.

TEST EQUIPMENT USED:

1, 2, 9, 11, 26, 37, 41, 42

.....



2.1 TEST RESULTS - CONTINUED

Ambient temperature +22.5°C Relative humidity 50.5%

Environment (+55°C): DRY HEAT

IEC 60945, CLAUSE 8.2.2
IEC 61097-6 Ed.2, CLAUSE 7.4 (NUA)

NBG-319 Power Supply

PERFORMANCE TESTS: OUTPUT VOLTAGES

The following performance tests were conducted as appropriate during testing in accordance with IEC 60945 Clause 8.2.2 and IEC 61097-6 Ed.2 Clause 7.4

Input Voltage (V DC)	Output Port	Required Results	Results (V DC)
24	DC 12/24V (Load 0.25 A)	Equal to Input Voltage *	23.92
	DC 6.5V	6.5V DC $\pm 10\%$	6.55

PERFORMANCE CHECKS AT EXTREME PSU VARIATION: OUTPUT VOLTAGES

The following performance checks were conducted as appropriate during testing in accordance with IEC 60945 Clause 8.2.2 and IEC 61097-6 Ed.2 Clause 7.4

Input Voltage (V DC)	Output Port	Required Results	Results (V DC)
10.8 ($V_{\min} - 10\%$)	DC 12/24V (Load 0.55 A)	Equal to Input Voltage *	10.65
	DC 6.5V	6.5V DC $\pm 10\%$	6.55
31.2 ($V_{\max} + 30\%$)	DC 12/24V (Load 0.19 A)	Equal to Input Voltage *	31.15
	DC 6.5V	6.5V DC $\pm 10\%$	6.56

Remarks

* The output voltage will always be slightly lower than the input voltage due to the voltage drop along the connecting cables and the voltage drop across the fuse.

The 6.5 V DC output was loaded by a Seiko Instruments Inc. DPU-414 thermal printer (the type recommended for use by NCR-333).

The NBG-319 was stored in accordance with the specification for protected equipment and the performance was checked at the end of an 11 hour power on period.

The EUT satisfied the requirements of this test.

TEST EQUIPMENT USED:

1, 2, 11, 12, 26

.....



2.1 TEST RESULTS - CONTINUED

Ambient temperature +22.5°C Relative humidity 50.5%

Environment (+55°C): DRY HEAT

IEC 60945, CLAUSE 8.2.2
IEC 61097-6 Ed.2, CLAUSE 7.4 (NUA)

NBG-320 Power Supply (100V AC Input)

PERFORMANCE TESTS: OUTPUT VOLTAGES

The following performance tests were conducted as appropriate during testing in accordance with IEC 60945 Clause 8.2.2 and IEC 61097-6 Ed.2 Clause 7.4

Input Voltage & Frequency	Output Port	Required Results	Results (V DC)
100 V AC 50 Hz	DC 12V (Load 0.5 A)	12 V DC $\pm$ 10%	12.04
	DC 6.5V	6.5V DC $\pm$ 10%	6.56

PERFORMANCE CHECKS AT EXTREME PSU VARIATION: OUTPUT VOLTAGES

The following performance checks were conducted as appropriate during testing in accordance with IEC 60945 Clause 8.2.2 and IEC 61097-6 Ed.2 Clause 7.4

Input Voltage & Frequency	Output Port	Required Results	Results (V DC)
90 V AC 47.5 Hz (V_{min} -10%, F_{min} -5%)	DC 12V (Load 0.5 A)	12 V DC $\pm$ 10%	12.03
	DC 6.5V	6.5V DC $\pm$ 10%	6.55
132 V AC 63 Hz (V_{max} +10%, F_{max} +5%)	DC 12V (Load 0.5 A)	12 V DC $\pm$ 10%	12.03
	DC 6.5V	6.5V DC $\pm$ 10%	6.55

Remarks

The NBG-320 was stored in accordance with the specification for protected equipment and the performance was checked at the end of an 11 hour power on period.

The 6.5 V DC output was loaded by a Seiko Instruments Inc. DPU-414 thermal printer (the type recommended for use by NCR-333).

The EUT satisfied the requirements of this test.

TEST EQUIPMENT USED:

1, 2, 10, 12, 26

.....



2.1 TEST RESULTS - CONTINUED

Ambient temperature +22.5°C Relative humidity 50.5%

Environment (+55°C): DRY HEAT

IEC 60945, CLAUSE 8.2.2
IEC 61097-6 Ed.2, CLAUSE 7.4 (NUA)

NBG-320 Power Supply (220V AC Input)

PERFORMANCE TESTS: OUTPUT VOLTAGES

The following performance tests were conducted as appropriate during testing in accordance with IEC 60945 Clause 8.2.2 and IEC 61097-6 Ed.2 Clause 7.4

Input Voltage & Frequency	Output Port	Required Results	Results (V DC)
220 V AC 50 Hz	DC 12V (Load 0.5 A)	12 V DC $\pm$ 10%	12.04
	DC 6.5V	6.5V DC $\pm$ 10%	6.55

PERFORMANCE CHECKS AT EXTREME PSU VARIATION: OUTPUT VOLTAGES

The following performance checks were conducted as appropriate during testing in accordance with IEC 60945 Clause 8.2.2 and IEC 61097-6 Ed.2 Clause 7.4

Input Voltage & Frequency	Output Port	Required Results	Results (V DC)
180 V AC 47.5 Hz (V_{min} -10%, F_{min} -5%)	DC 12V (Load 0.5 A)	12 V DC $\pm$ 10%	12.04
	DC 6.5V	6.5V DC $\pm$ 10%	6.55
264 V AC 63 Hz (V_{max} +10%, F_{max} +5%)	DC 12V (Load 0.5 A)	12 V DC $\pm$ 10%	12.04
	DC 6.5V	6.5V DC $\pm$ 10%	6.55

Remarks

The NBG-320 was stored in accordance with the specification for protected equipment and the performance was checked at the end of an 11 hour power on period.

The 6.5 V DC output was loaded by a Seiko Instruments Inc. DPU-414 thermal printer (the type recommended for use by NCR-333).

The EUT satisfied the requirements of this test.

TEST EQUIPMENT USED:

1, 2, 10, 12, 26

.....



2.1 TEST RESULTS - CONTINUED

Ambient temperature +22.5°C Relative humidity 50.5%

Environment (+55°C): DRY HEAT

IEC 60945, CLAUSE 8.2.2
IEC 61097-6 Ed.2, CLAUSE 7.4 (NUA)

NBG-320 Power Supply (24V DC Input)

PERFORMANCE TESTS: OUTPUT VOLTAGES

The following performance tests were conducted as appropriate during testing in accordance with IEC 60945 Clause 8.2.2 and IEC 61097-6 Ed.2 Clause 7.4

Input Voltage (V DC)	Output Port	Required Results	Result (V DC)
24	DC 12V (Load 0.5 A)	12 V DC $\pm$ 10%	12.04
	DC 6.5V	6.5V DC $\pm$ 10%	6.55

PERFORMANCE CHECKS AT EXTREME PSU VARIATION: OUTPUT VOLTAGES

The following performance checks were conducted as appropriate during testing in accordance with IEC 60945 Clause 8.2.2 and IEC 61097-6 Ed.2 Clause 7.4

Input Voltage (V DC)	Output Port	Required Results	Result (V DC)
21.6 (V -10%)	DC 12V (Load 0.5 A)	12 V DC $\pm$ 10%	12.04
	DC 6.5V	6.5V DC $\pm$ 10%	6.55
31.2 (V +30%)	DC 12V (Load 0.5 A)	12 V DC $\pm$ 10%	12.04
	DC 6.5V	6.5V DC $\pm$ 10%	6.55

Remarks

The NBG-320 was stored in accordance with the specification for protected equipment and the performance was checked at the end of an 11 hour power on period.

The 6.5 V DC output was loaded by a Seiko Instruments Inc. DPU-414 thermal printer (the type recommended for use by NCR-333).

The EUT satisfied the requirements of this test.

TEST EQUIPMENT USED:

1, 2, 11, 12, 26

.....



2.1 TEST RESULTS - CONTINUED

Ambient temperature +25.0°C Relative humidity 58.2%

Environment (+40°C, 93% RH): DAMP HEAT

IEC 60945, CLAUSE 8.3
IEC 61097-6 Ed.2, CLAUSE 10.1 (NUA)

NCR-333 Navtex Receiver S/No. GD67160

PERFORMANCE CHECKS: CALL SENSITIVITY

The following performance checks were conducted as appropriate during testing in accordance with IEC 60945 Clause 8.3 and IEC 61097-6 Ed.2 Clause 10.1

Supply Voltage (V DC)	Receive Frequency (kHz)	Test Level (dBm)	Character Error Rate (%)
24 (Normal)	518	-101.0	Zero (no errors)
	490	-101.0	Zero (no errors)
	4209.5	-101.0	Zero (no errors)

Required Results(Subclause 10.1.3):

The character error rate shall be $\leq 4\%$.
--

Remarks

The NCR-333 was stored in accordance with the specification for protected equipment and the performance was checked during the 2 hour power on period.

The EUT satisfied the requirements of this test.

TEST EQUIPMENT USED:

1, 2, 7, 8, 9, **22, 23**, 26, 27 (software used shown in bold text)

.....



2.1 TEST RESULTS - CONTINUED

Ambient temperature +24.6°C Relative humidity 49.6%

Environment (+40°C, 93% RH): DAMP HEAT

IEC 60945, CLAUSE 8.3

NAW-333 Navtex Antenna

PERFORMANCE CHECKS: ANTENNA OUTPUT LEVEL

The following performance checks were conducted as appropriate during testing in accordance with IEC 60945 Clause 8.3

Supply Voltage (V)	Antenna Output at 518 kHz (dBm)	Antenna Output at 490 kHz (dBm)	Antenna Output at 4209.5 kHz (dBm)
7.2	-45.6	-45.7	-46.1

Remarks

Performance check – Measurement of Antenna Output Power. Declared by manufacturer to be -45dBm $\pm$ 3dB.

The NAW-333 was stored in accordance with the specification for protected equipment and the performance was checked during the 2 hour power on period and after recovery to normal ambient conditions.

The EUT satisfied the requirements of this test.

TEST EQUIPMENT USED:

1, 2, 9, 11, 26, 37, 41, 42

.....



2.1 TEST RESULTS - CONTINUED

Ambient temperature +25.0°C Relative humidity 58.2%

Environment (+40°C, 93% RH): DAMP HEAT

IEC 60945, CLAUSE 8.3
IEC 61097-6 Ed.2, CLAUSE 7.4 (NUA)

NBG-319 Power Supply

PERFORMANCE CHECKS: OUTPUT VOLTAGES

The following performance checks were conducted as appropriate during testing in accordance with IEC 60945 Clause 8.3 and IEC 61097-6 Ed.2 Clause 7.4

Input Voltage (V DC)	Output Port	Required Results	Results (V DC)
24	DC 12/24V (Load 0.25 A)	Equal to Input Voltage *	23.94
	DC 6.5V	6.5V DC $\pm 10\%$	6.57

Remarks

* The output voltage will always be slightly lower than the input voltage due to the voltage drop along the connecting cables and the voltage drop across the fuse.

The 6.5 V DC output was loaded by a Seiko Instruments Inc. DPU-414 thermal printer (the type recommended for use by NCR-333).

The NBG-319 was stored in accordance with the specification for protected equipment and the performance was checked during the 2 hour power on period.

The EUT satisfied the requirements of this test.

TEST EQUIPMENT USED:

1, 2, 11, 12, 26

.....



2.1 TEST RESULTS - CONTINUED

Ambient temperature +25.0°C Relative humidity 58.2%

Environment (+40°C, 93% RH): DAMP HEAT

IEC 60945, CLAUSE 8.3
IEC 61097-6 Ed.2, CLAUSE 7.4 (NUA)

NBG-320 Power Supply (100V AC Input)

PERFORMANCE CHECKS: OUTPUT VOLTAGES

The following performance checks were conducted as appropriate during testing in accordance with IEC 60945 Clause 8.3 and IEC 61097-6 Ed.2 Clause 7.4

Input Voltage & Frequency	Output Port	Required Results	Results (V DC)
100 V AC 50 Hz	DC 12V (Load 0.5 A)	12 V DC $\pm$ 10%	12.04
	DC 6.5V	6.5V DC $\pm$ 10%	6.57

Remarks

The NBG-320 was stored in accordance with the specification for protected equipment and the performance was checked during the 2 hour power on period.

The 6.5 V DC output was loaded by a Seiko Instruments Inc. DPU-414 thermal printer (the type recommended for use by NCR-333).

The EUT satisfied the requirements of this test.

TEST EQUIPMENT USED:

1, 2, 10, 12, 26

.....



2.1 TEST RESULTS - CONTINUED

Ambient temperature +25.0°C Relative humidity 58.2%

Environment (+40°C, 93% RH): DAMP HEAT

IEC 60945, CLAUSE 8.3
IEC 61097-6 Ed.2, CLAUSE 7.4 (NUA)

NBG-320 Power Supply (220V AC Input)

PERFORMANCE CHECKS: OUTPUT VOLTAGES

The following performance checks were conducted as appropriate during testing in accordance with IEC 60945 Clause 8.3 and IEC 61097-6 Ed.2 Clause 7.4

Input Voltage & Frequency	Output Port	Required Results	Results (V DC)
220 V AC 50 Hz	DC 12V (Load 0.5 A)	12 V DC $\pm$ 10%	12.04
	DC 6.5V	6.5V DC $\pm$ 10%	6.57

Remarks

The NBG-320 was stored in accordance with the specification for protected equipment and the performance was checked during the 2 hour power on period.

The 6.5 V DC output was loaded by a Seiko Instruments Inc. DPU-414 thermal printer (the type recommended for use by NCR-333).

The EUT satisfied the requirements of this test.

TEST EQUIPMENT USED:

1, 2, 10, 12, 26

.....



2.1 TEST RESULTS - CONTINUED

Ambient temperature +25.0°C Relative humidity 58.2%

Environment (+40°C, 93% RH): DAMP HEAT

IEC 60945, CLAUSE 8.3
IEC 61097-6 Ed.2, CLAUSE 7.4 (NUA)

NBG-320 Power Supply (24V DC Input)

PERFORMANCE CHECKS: OUTPUT VOLTAGES

The following performance checks were conducted as appropriate during testing in accordance with IEC 60945 Clause 8.3 and IEC 61097-6 Ed.2 Clause 7.4

Input Voltage (V DC)	Output Port	Required Results	Result (V DC)
24	DC 12V (Load 0.5 A)	12 V DC $\pm$ 10%	12.04
	DC 6.5V	6.5V DC $\pm$ 10%	6.57

Remarks

The NBG-320 was stored in accordance with the specification for protected equipment and the performance was checked during the 2 hour power on period.

The 6.5 V DC output was loaded by a Seiko Instruments Inc. DPU-414 thermal printer (the type recommended for use by NCR-333).

The EUT satisfied the requirements of this test.

TEST EQUIPMENT USED:

1, 2, 11, 12, 26

.....

2.1 TEST RESULTS - CONTINUED

Ambient temperature +21.0°C Relative humidity 41.0%

Environment (-15°C): LOW TEMPERATURE

IEC 60945, CLAUSE 8.4
IEC 61097-6 Ed.2, CLAUSE 10.1 (NUA)

NCR-333 Navtex Receiver S/No. GD67160

PERFORMANCE TEST: CALL SENSITIVITY

The following performance tests were conducted as appropriate during testing in accordance with IEC 60945 Clause 8.4 and IEC 61097-6 Ed.2 Clause 10.1

Supply Voltage (V DC)	Receive Frequency (kHz)	Test Level (dBm)	Character Error Rate (%)
24 (Normal)	518	-107.0	Zero (no errors)
	490	-107.0	Zero (no errors)
	4209.5	-107.0	Zero (no errors)

PERFORMANCE CHECKS AT EXTREME PSU VARIATION: CALL SENSITIVITY

The following performance checks were conducted as appropriate during testing in accordance with IEC 60945 Clause 8.2.2 and IEC 61097-6 Ed.2 Clause 10.1

Supply Voltage (V DC)	Receive Frequency (kHz)	Test level (dBm)	Character Error Rate (%)
10.8 (V _{min} -10%)	518	-101.0	Zero (no errors)
	490	-101.0	Zero (no errors)
	4209.5	-101.0	Zero (no errors)
31.2 (V _{max} +30%)	518	-101.0	Zero (no errors)
	490	-101.0	Zero (no errors)
	4209.5	-101.0	Zero (no errors)

Required Results(Subclause 10.1.3):

The character error rate shall be $\leq 4\%$.

Remarks

The NCR-333 was stored in accordance with the specification for protected equipment and the performance was checked during the 2 hour power on period.

The EUT satisfied the requirements of this test.

TEST EQUIPMENT USED:

1, 2, 7, 8, 9, **22**, **23**, 26, 27 (software used shown in bold text)

.....



2.1 TEST RESULTS - CONTINUED

Ambient temperature +23.8°C Relative humidity 45.4%

Environment (-25°C): LOW TEMPERATURE

IEC 60945, CLAUSE 8.4

NAW-333 Navtex Antenna

PERFORMANCE TESTS: ANTENNA OUTPUT LEVEL

The following performance tests were conducted as appropriate during testing in accordance with IEC 60945 Clause 8.4

Supply Voltage (V)	Antenna Output at 518 kHz (dBm)	Antenna Output at 490 kHz (dBm)	Antenna Output at 4209.5 kHz (dBm)
7.2	-43.2	-44.0	-44.5
6.84*	-43.2	-43.9	-44.4
7.56*	-43.3	-43.9	-44.4

Remarks

Performance check – Measurement of Antenna Output Power. Declared by manufacturer to be -45dBm $\pm$ 3dB.

*The manufacturer has declared that the supply voltage variation will not be greater than $\pm$ 5% under excess conditions due to the EUT deriving its power from the NCR-333 Navtex Receiver.

The NAW-333 was stored in accordance with the specification for protected equipment and the performance was tested during the 2 hour power on period and after recovery to normal ambient conditions.

The EUT satisfied the requirements of this test.

TEST EQUIPMENT USED:

1, 2, 9, 11, 26, 37, 41, 42

.....



2.1 TEST RESULTS - CONTINUED

Ambient temperature +21.0°C Relative humidity 41.0%

Environment (-15°C): LOW TEMPERATURE

IEC 60945, CLAUSE 8.4
IEC 61097-6 Ed.2, CLAUSE 7.4 (NUA)

NBG-319 Power Supply

PERFORMANCE TESTS: OUTPUT VOLTAGES

The following performance tests were conducted as appropriate during testing in accordance with IEC 60945 Clause 8.4 and IEC 61097-6 Ed.2 Clause 7.4

Input Voltage (V DC)	Output Port	Required Results	Results (V DC)
24	DC 12/24V (Load 0.25 A)	Equal to Input Voltage *	23.98
	DC 6.5V	6.5V DC $\pm 10\%$	6.56

PERFORMANCE CHECKS AT EXTREME PSU VARIATION: OUTPUT VOLTAGES

The following performance checks were conducted as appropriate during testing in accordance with IEC 60945 Clause 8.4 and IEC 61097-6 Ed.2 Clause 7.4

Input Voltage (V DC)	Output Port	Required Results	Results (V DC)
10.8 ($V_{\min} - 10\%$)	DC 12/24V (Load 0.55 A)	Equal to Input Voltage *	10.65
	DC 6.5V	6.5V DC $\pm 10\%$	6.56
31.2 ($V_{\max} + 30\%$)	DC 12/24V (Load 0.19 A)	Equal to Input Voltage *	31.14
	DC 6.5V	6.5V DC $\pm 10\%$	6.56

Remarks

* The output voltage will always be slightly lower than the input voltage due to the voltage drop along the connecting cables and the voltage drop across the fuse.

The 6.5 V DC output was loaded by a Seiko Instruments Inc. DPU-414 thermal printer (the type recommended for use by NCR-333).

The NBG-319 was stored in accordance with the specification for protected equipment and the performance was checked during the 2 hour power on period.

The EUT satisfied the requirements of this test.

TEST EQUIPMENT USED:

1, 2, 11, 12, 26

.....



2.1 TEST RESULTS - CONTINUED

Ambient temperature +21.0°C Relative humidity 41.0%

Environment (-15°C): LOW TEMPERATURE

IEC 60945, CLAUSE 8.4
IEC 61097-6 Ed.2, CLAUSE 7.4 (NUA)

NBG-320 Power Supply (100V AC Input)

PERFORMANCE TESTS: OUTPUT VOLTAGES

The following performance tests were conducted as appropriate during testing in accordance with IEC 60945 Clause 8.4 and IEC 61097-6 Ed.2 Clause 7.4

Input Voltage & Frequency	Output Port	Required Results	Results (V DC)
100 V AC 50 Hz	DC 12V (Load 0.5 A)	12 V DC $\pm$ 10%	12.06
	DC 6.5V	6.5V DC $\pm$ 10%	6.60

PERFORMANCE CHECKS AT EXTREME PSU VARIATION: OUTPUT VOLTAGES

The following performance checks were conducted as appropriate during testing in accordance with IEC 60945 Clause 8.4 and IEC 61097-6 Ed.2 Clause 7.4

Input Voltage & Frequency	Output Port	Required Results	Results (V DC)
90 V AC 47.5 Hz ($V_{\min}$ -10%, $F_{\min}$ -5%)	DC 12V (Load 0.5 A)	12 V DC $\pm$ 10%	12.06
	DC 6.5V	6.5V DC $\pm$ 10%	6.60
132 V AC 63 Hz ($V_{\max}$ +10%, $F_{\max}$ +5%)	DC 12V (Load 0.5 A)	12 V DC $\pm$ 10%	12.06
	DC 6.5V	6.5V DC $\pm$ 10%	6.60

Remarks

The NBG-320 was stored in accordance with the specification for protected equipment and the performance was checked during the 2 hour power on period.

The 6.5 V DC output was loaded by a Seiko Instruments Inc. DPU-414 thermal printer (the type recommended for use by NCR-333).

The EUT satisfied the requirements of this test.

TEST EQUIPMENT USED:

1, 2, 10, 12, 26

.....



2.1 TEST RESULTS - CONTINUED

Ambient temperature +21.0°C Relative humidity 41.0%

Environment (-15°C): LOW TEMPERATURE

IEC 60945, CLAUSE 8.4
IEC 61097-6 Ed.2, CLAUSE 7.4 (NUA)

NBG-320 Power Supply (220V AC Input)

PERFORMANCE TESTS: OUTPUT VOLTAGES

The following performance tests were conducted as appropriate during testing in accordance with IEC 60945 Clause 8.4 and IEC 61097-6 Ed.2 Clause 7.4

Input Voltage & Frequency	Output Port	Required Results	Results (V DC)
220 V AC 50 Hz	DC 12V (Load 0.5 A)	12 V DC $\pm$ 10%	12.06
	DC 6.5V	6.5V DC $\pm$ 10%	6.60

PERFORMANCE CHECKS AT EXTREME PSU VARIATION: OUTPUT VOLTAGES

The following performance checks were conducted as appropriate during testing in accordance with IEC 60945 Clause 8.4 and IEC 61097-6 Ed.2 Clause 7.4

Input Voltage & Frequency	Output Port	Required Results	Results (V DC)
180 V AC 47.5 Hz (V_{min} -10%, F_{min} -5%)	DC 12V (Load 0.5 A)	12 V DC $\pm$ 10%	12.06
	DC 6.5V	6.5V DC $\pm$ 10%	6.60
264 V AC 63 Hz (V_{max} +10%, F_{max} +5%)	DC 12V (Load 0.5 A)	12 V DC $\pm$ 10%	12.06
	DC 6.5V	6.5V DC $\pm$ 10%	6.60

Remarks

The NBG-320 was stored in accordance with the specification for protected equipment and the performance was checked during the 2 hour power on period.

The 6.5 V DC output was loaded by a Seiko Instruments Inc. DPU-414 thermal printer (the type recommended for use by NCR-333).

The EUT satisfied the requirements of this test.

TEST EQUIPMENT USED:

1, 2, 10, 12, 26

.....



2.1 TEST RESULTS - CONTINUED

Ambient temperature +21.0°C Relative humidity 41.0%

Environment (-15°C): LOW TEMPERATURE

IEC 60945, CLAUSE 8.4
IEC 61097-6 Ed.2, CLAUSE 7.4 (NUA)

NBG-320 Power Supply (24V DC Input)

PERFORMANCE TESTS: OUTPUT VOLTAGES

The following performance tests were conducted as appropriate during testing in accordance with IEC 60945 Clause 8.4 and IEC 61097-6 Ed.2 Clause 7.4

Input Voltage (V DC)	Output Port	Required Results	Result (V DC)
24	DC 12V (Load 0.5 A)	12 V DC $\pm$ 10%	12.06
	DC 6.5V	6.5V DC $\pm$ 10%	6.60

PERFORMANCE CHECKS AT EXTREME PSU VARIATION: OUTPUT VOLTAGES

The following performance checks were conducted as appropriate during testing in accordance with IEC 60945 Clause 8.4 and IEC 61097-6 Ed.2 Clause 7.4

Input Voltage (V DC)	Output Port	Required Results	Result (V DC)
21.6 ($V_{\min}$ -10%)	DC 12V (Load 0.5 A)	12 V DC $\pm$ 10%	12.06
	DC 6.5V	6.5V DC $\pm$ 10%	6.60
31.2 ($V_{\max}$ +30%)	DC 12V (Load 0.5 A)	12 V DC $\pm$ 10%	12.06
	DC 6.5V	6.5V DC $\pm$ 10%	6.60

Remarks

The NBG-320 was stored in accordance with the specification for protected equipment and the performance was checked during the 2 hour power on period.

The 6.5 V DC output was loaded by a Seiko Instruments Inc. DPU-414 thermal printer (the type recommended for use by NCR-333).

The EUT satisfied the requirements of this test.

TEST EQUIPMENT USED:

1, 2, 11, 12, 26

.....



2.1 TEST RESULTS - CONTINUED

Ambient temperature +22.7°C Relative humidity 40.2%

Environment: VIBRATION TEST

IEC 60945, CLAUSE 8.7
IEC 61097-6 Ed.2, CLAUSE 7.5, Table 4 (NUA)

NCR-333 S/No.GD67160, NAW-333, NBG-319 and NBG-320

Vibration Axis: Lateral (X); vibration frequencies: NCR-333: 69 Hz, NAW-333, NBG-319 and NBG-320: 30 Hz.

Performance checks during vibration (30 Hz)	✓
Performance check during vibration (69 Hz)	✓

Vibration Axis: Fore / Aft (Y); vibration frequency: 30 Hz.

Performance checks during vibration (30 Hz)	✓
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Vibration Axis: Vertical (Z); vibration frequency: 30 Hz.

Performance checks during vibration (30 Hz)	✓
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Remarks:

Supply voltages during vibration; NCR-333: 24 V DC, NAW-333: 7.2 V DC,
NBG-319: 12 V DC, NBG-320: 100 V AC.

Parameters / Functions checked for NCR-333: Call Sensitivity at 519 kHz, 490 kHz and 4209.5 kHz.

Parameters / Functions checked for NAW-333: Antenna Output Level at 519 kHz, 490 kHz and 4209.5 kHz.

Parameters / Functions checked for NBG-319 and NBG-320: Output voltages with 0.5A load on 12V o/p of NBG-319, 0.25A load on 24V o/p of NBG-320.

The 6.5 V DC outputs were loaded by Seiko Instruments Inc. DPU-414 thermal printers (the type recommended for use by NCR-333).

A resonance with a magnification factor >5 occurred only for the NCR-333 in the X plane at 69 Hz.

At the conclusion of the vibration endurance tests, the NCR-333, NAW-333, NBG-319 and NBG-320 were inspected for loose components and / or mechanical damage. There was neither visible damage nor loose components.

The EUTs satisfied the requirements of this test.

TEST EQUIPMENT USED:

1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, **22, 23**, 37, 41, 42 (software used shown in bold text)

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2.1 TEST RESULTS - CONTINUED

Ambient temperature +23.8°C Relative humidity 45.4%

Environment: RAIN TEST

IEC 60945, CLAUSE 8.8

NAW-333 Navtex Antenna

Supply Voltage for Performance Check (V DC)	Antenna Output 518 kHz (dBm)	Antenna Output 490 kHz (dBm)	Antenna Output 4209.5 kHz (dBm)
7.2	-45	-45	-45

Required results:

The requirements of the performance check shall be met. There shall be no visible external indications of damage or of unwanted ingress of water.

Remarks

Performance check – Measurement of Antenna Output Power. Declared by manufacturer to be -45dBm $\pm$ 3dB.

At the conclusion of the rain test, the NAW-333 was inspected for rain water ingress, followed by a performance check of antenna output levels at 518 kHz, 490 kHz and 4209.5 kHz.

The EUT satisfied the requirements of this test.

TEST EQUIPMENT USED:

1, 2, 9, 11, 37, 41, 42

.....

2.1 TEST RESULTS - CONTINUED

Ambient temperature +26.1°C Relative humidity 35.5%

ACOUSTIC NOISE AND SIGNALS

IEC 60945, CLAUSE 11.1
IEC 61097-6 Ed.2, CLAUSE 9.4 (NUA)

NCR-333 Navtex Receiver S/No. GD67162

Function	Maximum Acoustic Pressure dB(A)
Ambient Noise Level	+35.0
1m from EUT, Operational but no Alarm *	+35.0
1m from EUT, Internal Alarm switched on	+45.0
1m from Alarm, External Alarm switched on *	+84.0

Required Results(Subclause 9.4.2):

The acoustic pressure detected shall not exceed a level of 60dB(A) at a distance of 1 metre from any part of the EUT.

With audible alarms switched on, the acoustic noise pressure of an alarm shall be at least 75dB(A) but not greater than 85dB(A) at a distance of 1metre from any part of the EUT which is accessible for its operation.

Remarks

* An external alarm, Type CGC-300A was connected to the EUT. The acoustic pressure level was checked at a distance of 1 metre from this external alarm.

The audio measurements were carried out in an audio anechoic room, 2F in building 204 at JRC Mitaka.

Supply voltage: 12V DC

The EUT satisfied the requirements of this test. (Also see clause 9.4 of IEC 61097-6 Ed.2)

TEST EQUIPMENT USED:

1, 2, 43, 47, 48

.....



2.1 TEST RESULTS - CONTINUED

Ambient temperature +24.9°C Relative humidity 44.3%

SERIAL INTERFACE TESTS:

IEC 61097-6 Ed.2, CLAUSE 8.1 (NUA)
IEC 61162-1/-2

NCR-333 S/No. GD67160

INS Input Electrical Tests

Conditions: IEC 61162-1	Results
Protection Test: 15 V between A and B for a period of 1 min. (both polarities). 15 V between A and Ground for a period of 1 min. (both polarities). 15 V between B and Ground for a period of 1 min. (both polarities).	✓ ✓ ✓
Minimum Voltage and Current: Input Voltage of 2 V and shall not take more than 2mA from the line at that voltage.	✓ (1.35 mA)

Required Results (Subclause 8.1.2)

Remarks

Supply voltage: 24V DC

INS input port checked after test by sending \$INNMK text file to EUT.

The EUT satisfied the requirements of this test.

TEST EQUIPMENT USED:

1, 2, 13, 15, **22**, 43, 44 (software used shown in bold text)

.....



2.1 TEST RESULTS - CONTINUED

Ambient temperature +24.9°C Relative humidity 44.3%

SERIAL INTERFACE TESTS:

IEC 61097-6 Ed.2, CLAUSE 8.2 (NUA)
IEC 61162-1/-2

NCR-333 S/No. GD67160

INS Input Performance Tests

Conditions: IEC 61162-1	Results
NRQ valid test: \$INNRQ,518,00000001,00000001 input \$INNRQ,490,00000001,00000001 input \$INNRQ,4209,00000001,00000001 input	✓ ✓ ✓
NRQ invalid test: \$INNRQ,418,00000001,00000001 input \$INNSQ,490,00000001,00000001 input \$INNRQ,4209,00000001,00000001, input	✓ ✓ ✓
NMK valid test: \$INNMK,518,03FFFFFF,03FFFFFF input \$INNMK,490,03FFFFFF,03FFFFFF input \$INNMK,4209,03FFFFFF,03FFFFFF input	✓ ✓ ✓
NMK invalid test: \$INNMK,517,03FFFFFF,03FFFFFF input \$INNAK,490,03FFFFFF,03FFFFFF input \$INNMK,4209,03FFFFFF,03FFFFFF, input	✓ ✓ ✓
Interface's capacity test: NMK sentence input valid and invalid data to Navtex. \$INNMK,518,03FFFFFF,03FFFFFF*5F(CR)(LF) \$INNMK,518,03FFFFFF,03FFFFFF*00(CR)(LF) Repeat 2250 times	✓

Required results (Subclause 8.2.2):

Verify that the displayed data/EUT operation agrees with the simulated input data and that invalid and unavailable data formats do not stop/inhibit the correct operation of the EUT.

Remarks

Supply voltage: 24V DC

The EUT satisfied the requirements of this test.

TEST EQUIPMENT USED:

1, 2, 13, 15, 17, 19, **22, 25**, 28, 29 (software used shown in bold text)

.....



2.1 TEST RESULTS - CONTINUED

Ambient temperature +24.9°C Relative humidity 44.3%

SERIAL INTERFACE TESTS:

IEC 61097-6 Ed.2, CLAUSE 8.3 (NUA)
IEC 61162-1/-2

NCR-333 S/No. GD67160

INS Output Electrical Tests

Conditions: IEC 61162-1 (ITU-T X27/V.11)	Results
Open-circuit measurement: The open-circuit voltage measurement is made with a 3900 Ohm resistor connected between points A and B. In both binary states, the magnitude of the differential voltage (V_o) shall not be more than 6.0 Volts.	A-C = 4.44 V B-C = 4.44 V
Test-termination measurement: With a test load of two resistors, each 50 Ohms, connected in series between the output points A and B, the differential voltage (V_t) shall not be less than 2.0 Volts.	2.997 V
Short-circuit measurement: With the output points A and B short-circuited to point C, the current flowing through each of the output points A or B in both binary states shall not exceed 150 milliamperes.	A-C = 56 mA B-C = 71 mA

Required results(Subclause 8.3.2):

The interfaces shall fulfil the applicable requirements of IEC 61162-1/-2.

Remarks

Supply voltage: 24V DC

The EUT satisfied the requirements of this test.

TEST EQUIPMENT USED:

1, 2, 15, 45

.....



2.1 TEST RESULTS - CONTINUED

Ambient temperature +24.9°C Relative humidity 44.3%

SERIAL INTERFACE TESTS:

IEC 61097-6 Ed.2, CLAUSE 8.4 (NUA)
IEC 61162-1/-2

NCR-333 S/No. GD67160

INS Output Performance Tests

Conditions: IEC 61162-1	Results
Interface's capacity test: NRQ sentence input. \$INNRQ,518,03FFFFFF,03FFFFFF Check the output NRX sentence.	✓

Required results(Subclause 8.4.2):

Verify that the output data/EUT operation agrees with the requested output data.
--

Remarks

Supply voltage: 24V DC

The INS output terminals were loaded with two 50 Ohm resistors in series.

The EUT satisfied the requirements of this test.

TEST EQUIPMENT USED:

1, 2, 13, 15, 17, 19, **22**, 28, 29 (software used shown in bold text)

.....



2.1 TEST RESULTS - CONTINUED

Ambient temperature +24.9°C Relative humidity 44.3%

SERIAL INTERFACE TESTS:

IEC 61097-6 Ed.2, CLAUSE 8.5 (NUA)

NCR-333 S/No. GD67160

Printer Output Electrical Tests

Conditions: IEC 61162-1	Results
Interface: RS-232C	
Open-circuit between pins 2 and 5 of D9 socket: Mark: Between -15 V and -5 V Space: Between +5 V and +15 V	-5.8 V +7.0 V
3000 Ohm resistor between pins 2 and 5 of D9 socket: Mark: Between -15 V and -5 V Space: Between +5 V and +15 V	-5.6 V +5.4 V

Required results(Subclause 8.5.2):

The interfaces shall fulfil the applicable requirements of the relevant standard.

Remarks

Supply voltage: 24V DC

The printer output terminals were loaded with 3000 Ohms between pins 2 and 5 of the D9 printer socket .

The EUT satisfied the requirements of this test.

TEST EQUIPMENT USED:

1, 2, 15, 46

.....

**2.1 TEST RESULTS - CONTINUED**

Ambient temperature +24.9°C Relative humidity 44.3%

SERIAL INTERFACE TESTS:

IEC 61097-6 Ed.2, CLAUSE 8.6 (NUA)

NCR-333 S/No. GD67160

Printer Output Performance Tests

Conditions:	Results
Navtex message output to printer.	No errors in print-out

Required results(Subclause 8.6.2):

Verify that the output data/EUT operation agrees with the requested output data.
--

Remarks

Supply voltage: 24V DC

The printer output terminals were loaded with 3000 Ohms between pins 2 and 5 of the D9 printer socket, i.e. the output was loaded with the printer in parallel with 3000 Ohms, which equals more than 100% load.

The EUT satisfied the requirements of this test.

TEST EQUIPMENT USED:

1, 2, 15

.....



2.1 TEST RESULTS - CONTINUED

Ambient temperature +24.9°C Relative humidity 44.3%

GENERAL AND SIGNAL PROCESSING TESTS:

IEC 61097-6 Ed.2, CLAUSE 9.1 (NUA)

NCR-333 S/No. GD67160

Exclusion of Stations

Conditions:	Results
518 kHz: Disable 'A' station. 518 kHz: 'A' station message not received and not displayed.	All except 'A' received and displayed.
490 kHz: Disable 'B' station. 490 kHz: 'B' station message not received and not displayed.	All except 'B' received and displayed.
4209.5 kHz: Disable 'C' station. 4209.5 kHz: 'C' station message not received and not displayed.	All except 'C' received and displayed.

Required results(Subclause 9.1.2):

For each value of B ₁ not selected, the EUT shall neither display nor print the test message.
--

Remarks

Supply voltage: 24V DC

The EUT satisfied the requirements of this test.

TEST EQUIPMENT USED:

1, 2, 13, 15, 16, 17, 18, 19, 20, **22, 23**, 28, 29 (software used shown in bold text)

.....



2.1 TEST RESULTS - CONTINUED

Ambient temperature +24.9°C Relative humidity 44.3%

GENERAL AND SIGNAL PROCESSING TESTS:

IEC 61097-6 Ed.2, CLAUSE 9.2 (NUA)

NCR-333 S/No. GD67160

Exclusion of Message Categories

Conditions:	Results
518 kHz: Disable 'C' message. 518 kHz: 'C' message not received and not displayed.	All except 'C' received and displayed.
490 kHz: Disable 'E' message. 490 kHz: 'E' message not received and not displayed.	All except 'E' received and displayed.
4209.5 kHz: Disable 'F' message. 4209.5 kHz: 'F' message not received and not displayed.	All except 'F' received and displayed.

Required results (Subclause 9.2.2):

The EUT shall display or print the messages with the currently programmed B ₂ characters, and also the messages with the B ₂ characters A, B, D and L.
--

Remarks

Supply voltage: 24V DC

The EUT satisfied the requirements of this test.

TEST EQUIPMENT USED:

1, 2, 13, 15, 16, 17, 18, 19, 20, **22, 23**, 28, 29 (software used shown in bold text)

.....

**2.1 TEST RESULTS - CONTINUED**

Ambient temperature +24.9°C Relative humidity 44.3%

GENERAL AND SIGNAL PROCESSING TESTS:

IEC 61097-6 Ed.2, CLAUSE 9.3 (NUA)

NCR-333 S/No. GD67160

Receiver Test Facility

Conditions:	Results
Self test check	✓

Required results(Subclause 9.3.2):

The test display/printout shall contain at least 36 valid characters and an indication of whether the test passed or failed.
The test data shall be displayed but not stored in memory.

Remarks

Supply voltage: 24V DC

The EUT satisfied the requirements of this test.

TEST EQUIPMENT USED:

1, 2, 15

.....



2.1 TEST RESULTS - CONTINUED

Ambient temperature +24.9°C Relative humidity 44.3%

GENERAL AND SIGNAL PROCESSING TESTS:

IEC 61097-6 Ed.2, CLAUSE 9.4 (NUA)

NCR-333 S/No. GD67160 (all tests except Audible Level)

NCR-333 S/No. GD67162 (Audible Level test)

Search and rescue (SAR) Alarm Provision and Reset

Conditions:	Results
An alarm shall be activated.	✓
An alarm can be reset manually. (Press the 'CLR' key)	✓
An alarm can be reset via the INS port and the use of the IEC 61162 'ACK' sentence.	✓
The audible level of the alarm signal shall be measured to be between 75 dbA and 85 dbA.	+84 dbA

Required results(Subclause 9.4.2):

An alarm shall be activated. The EUT shall be examined for the means whereby an alarm is generated.

It shall be demonstrated that that this alarm can be reset manually via the user interface in the case of an EUT with integral display.

It shall be demonstrated that this alarm can be reset via the INS port and the use of the IEC 61162 'ACK' sentence.

The audible level of the alarm signal shall be measured to be between 75 dbA and 85 dbA.

Remarks

Supply voltage: 24V DC for GD67160

Supply voltage: 12V DC for GD67162

The EUT satisfied the requirements of this test.

TEST EQUIPMENT USED:

1, 2, 13, 15, 16, 17, 18, 19, 20, **22, 23**, 28, 29, 43, 47, 48 (software used shown in bold text)

.....



2.1 TEST RESULTS - CONTINUED

Ambient temperature +24.9°C Relative humidity 44.3%

GENERAL AND SIGNAL PROCESSING TESTS:

IEC 61097-6 Ed.2, CLAUSE 9.5 (NUA)

NCR-333 S/No. GD67160

Additional Alarms

Conditions:	Results
ALARM (message categories A, B, L)	
Alarm successfully suppressed	✓
Alarm successfully reset	✓
Received message (other than A, B, L)	
Alarm successfully suppressed	✓
Alarm successfully reset	✓
NAVTEX ALARM (when a failure alarm occurs)	
Alarm successfully suppressed	✓
Alarm successfully reset	✓

Required results(Subclause 9.5.2):

It shall be demonstrated that such additional alarms can be suppressed.

It shall be demonstrated that such additional alarms can be reset.

Remarks

Supply voltage: 24V DC

The EUT satisfied the requirements of this test.

TEST EQUIPMENT USED:

1, 2, 13, 15, 16, 17, 18, 19, 20, **22, 23**, 28, 29 (software used shown in bold text)

.....

2.1 TEST RESULTS - CONTINUED

Ambient temperature +26.3°C Relative humidity 29.5%

RECEIVER TESTS:

IEC 61097-6 Ed.2, CLAUSE 10.1 (NUA)

NCR-333 S/No. GD67160

Call Sensitivity

Test Voltage (V DC)	RF Signal Level (dBm)	Test Frequency (kHz)	Error Rate (%)
24	-107.0	518	Zero (no errors)
		490	Zero (no errors)
		4209.5	Zero (no errors)

Test Voltage (V DC)	RF Signal Level (dBm)	Test Frequency (kHz)	Error Rate (%)
10.8	-107.0	518	Zero (no errors)
		490	Zero (no errors)
		4209.5	Zero (no errors)

Test Voltage (V DC)	RF Signal Level (dBm)	Test Frequency (kHz)	Error Rate (%)
31.2	-107.0	518	Zero (no errors)
		490	Zero (no errors)
		4209.5	Zero (no errors)

Required results (Subclause 10.1.2):

The character error rate shall be $\leq 4\%$
--

Remarks

Tests also performed at Low Temperature, Dry Heat and Damp Heat

The EUT satisfied the requirements of this test.

TEST EQUIPMENT USED:

1, 2, 8, 13, 15, 16, 19, 21, **22, 23**, 29 (software used shown in bold text)

.....

2.1 TEST RESULTS - CONTINUED

Ambient temperature +26.5°C Relative humidity 29.5%

RECEIVER TESTS:

IEC 61097-6 Ed.2, CLAUSE 10.2 (NUA)

NCR-333 S/No. GD67160

Interference Rejection and Blocking Immunity

Receive Frequency (kHz)	Interfering Frequency Range	Interfering Signal Level (above wanted level, dB)	Number of Frequency Steps Used (100ms/step)	Character Error Rate (%)
518	517 kHz to 517.5 kHz	+20	100	Zero (no errors)
	518.5 kHz to 519 kHz	+20	100	Zero (no errors)
	515 kHz to 517 kHz	+40	100	Zero (no errors)
	519 kHz to 521 kHz	+40	100	Zero (no errors)
	100 kHz to 515 kHz	+70	1000	Zero (no errors)
	521 kHz to 30 MHz	+70	1000	Zero (no errors)
	156 MHz to 174 MHz	+70	1000	Zero (no errors)
	450 MHz to 470 MHz	+70	1000	Zero (no errors)
490	489 kHz to 489.5 kHz	+20	100	Zero (no errors)
	490.5 kHz to 491 kHz	+20	100	Zero (no errors)
	487 kHz to 489 kHz	+40	100	Zero (no errors)
	491 kHz to 493 kHz	+40	100	Zero (no errors)
	100 kHz to 487 kHz*	+70	1000	Zero (no errors)
	493 kHz to 30 MHz	+70	1000	Zero (no errors)
	156 MHz to 174 MHz	+70	1000	Zero (no errors)
	450 MHz to 470 MHz	+70	1000	Zero (no errors)
4209.5	4208.5 kHz to 4209 kHz	+20	100	Zero (no errors)
	4210 kHz to 4210.5 kHz	+20	100	Zero (no errors)
	4206.5 kHz to 4208.5 kHz	+40	100	Zero (no errors)
	4210.5 kHz to 4212.5 kHz	+40	100	Zero (no errors)
	100 kHz to 4206.5 kHz	+70	1000	Zero (no errors)
	4212.5 kHz to 30 MHz	+70	1000	Zero (no errors)
	156 MHz to 174 MHz	+70	1000	Zero (no errors)
	450 MHz to 470 MHz	+70	1000	Zero (no errors)

*100 kHz to 487 kHz range tested. Range in specification 100 kHz to 515 kHz is an error.

Required results(Subclause 10.2.3):

The unwanted signal shall not induce a character error rate >4% in any of the received messages.

Remarks

EUT supply voltage: 24V DC.

The EUT satisfied the requirements of this test.

TEST EQUIPMENT USED:

1, 2, 8, 13, 15, 16, 19, 21, **22, 23**, 29, 30, 31, 32, 34, 35, 36, 37 (software used shown in bold text)

.....

**2.1 TEST RESULTS - CONTINUED**

Ambient temperature +26.3°C Relative humidity 28.1%

RECEIVER TESTS:

IEC 61097-6 Ed.2, CLAUSE 10.3 (NUA)

NCR-333 S/No. GD67160

Co-channel Rejection

Receive Frequency (kHz)	Character Error Rate (%)
518	Zero (no errors)
490	Zero (no errors)
4209.5	Zero (no errors)

Required results(Subclause 10.3.3):

The unwanted signal shall not induce a character error rate >4% in any of the received messages.
--

Remarks

EUT supply voltage: 24V DC.

The EUT satisfied the requirements of this test.

TEST EQUIPMENT USED:

1, 2, 8, 13, 15, 16, 19, 21, **22, 23**, 29, 30, 31 (software used shown in bold text)

.....



2.1 TEST RESULTS - CONTINUED

Ambient temperature +25.7°C Relative humidity 28.0%

RECEIVER TESTS:

IEC 61097-6 Ed.2, CLAUSE 10.4 (NUA)

NCR-333 S/No. GD67160

Intermodulation

Receive Frequency (kHz)	Intermodulation Frequency Pair (kHz)		Character Error Rate (%)
518	516	514	Zero (no errors)
	515	512	Zero (no errors)
	514	510	Zero (no errors)
	520	522	Zero (no errors)
	521	524	Zero (no errors)
	522	526	Zero (no errors)
490	488	486	Zero (no errors)
	487	484	Zero (no errors)
	486	482	Zero (no errors)
	492	494	Zero (no errors)
	493	496	Zero (no errors)
	494	498	Zero (no errors)
4209.5	4207.5	4205.5	Zero (no errors)
	4206.5	4203.5	Zero (no errors)
	4205.5	4201.5	Zero (no errors)
	4211.5	4213.5	Zero (no errors)
	4212.5	4215.5	Zero (no errors)
	4213.5	4217.5	Zero (no errors)

Required results(Subclause 10.4.3):

Intermodulation shall not induce a character error rate >4%.

Remarks

EUT supply voltage: 24V DC.

The EUT satisfied the requirements of this test.

TEST EQUIPMENT USED:

1, 2, 8, 13, 15, 16, 19, 21, **22, 23**, 29, 30, 31, 32, 33 (software used shown in bold text)

.....



2.1 TEST RESULTS - CONTINUED

Ambient temperature +25.9°C Relative humidity 30.8%

RECEIVER TESTS:

IEC 61097-6 Ed.2, CLAUSE 10.5 (NUA)

NCR-333 S/No. GD67160

Off Frequency Transmitter

Receive Frequency (kHz)	Frequency Shift (Hz)	Character Error Rate (%)
518	-25	Zero (no errors)
	+25	Zero (no errors)
490	-25	Zero (no errors)
	+25	Zero (no errors)
4209.5	-25	Zero (no errors)
	+25	Zero (no errors)

Required results(Subclause 10.5.3):

The test signal shall not produce in the EUT a character error rate >4% for each test.
--

Remarks

EUT supply voltage: 24V DC.

The EUT satisfied the requirements of this test.

TEST EQUIPMENT USED:

1, 2, 8, 13, 15, 16, 19, 21, **22**, **23**, 29 (software used shown in bold text)

.....



2.1 TEST RESULTS - CONTINUED

Ambient temperature +25.6°C Relative humidity 31.3%

RECEIVER TESTS:

IEC 61097-6 Ed.2, CLAUSE 10.6 (NUA)

NCR-333 S/No. GD67160

Simultaneous Operation on Several Receive Frequencies

Receive Frequencies / Levels (above STS)	Character Error Rates (%)
518 kHz / STS +6 dB (518k/490k)	Zero (no errors)
490 kHz / STS +50 dB (518k/490k)	Zero (no errors)
518 kHz / STS +50 dB (518k/490k)	Zero (no errors)
490 kHz / STS +6 dB (518k/490k)	Zero (no errors)
518 kHz / STS +6 dB (518k/4209.5k)	Zero (no errors)
4209.5 kHz / STS +50 dB (518k/4209.5k)	Zero (no errors)
518 kHz / STS +50 dB (518k/4209.5k)	Zero (no errors)
4209.5 kHz / STS +6 dB (518k/4209.5k)	Zero (no errors)
490 kHz / STS +6 dB (490k/4209.5k)	Zero (no errors)
4209.5 kHz / STS +50 dB (490k/4209.5k)	Zero (no errors)
490 kHz / STS +50 dB (490k/4209.5k)	Zero (no errors)
4209.5 kHz / STS +6 dB (490k/4209.5k)	Zero (no errors)

Required results(Subclause 10.6.3):

The display of the STS transmitted on each frequency shall have a character error rate of $\leq 4\%$.
--

Remarks

EUT supply voltage: 24V DC.

The EUT satisfied the requirements of this test.

TEST EQUIPMENT USED:

1, 2, 8, 9, 13, 15, 16, 19, 20, 21, **22, 23**, 29, 31 (software used shown in bold text)

.....



2.1 TEST RESULTS - CONTINUED

Ambient temperature +26.2°C Relative humidity 43.8%

RECEIVER TESTS:

IEC 61097-6 Ed.2, CLAUSE 10.7 (NUA)

NCR-333 S/No. GD67160

Protection of Input Circuits

Chosen Test Frequency (kHz)	Test Level (W)	Test Time (Minutes)	Result 518 kHz	Result 490 kHz	Result 4209.5 kHz
4209.5	18	15	Zero (no errors)	Zero (no errors)	Zero (no errors)

Required results(Subclause 10.7.2):

The EUT shall continue to operate normally.

Remarks

A level of 18 Watts (into 50 Ohms) which equates to 30 V rms, was applied to the antenna socket of the EUT for a period of fifteen minutes. At the end of the fifteen minutes test period, the EUT was checked for character error rate (%) on all three channels with 25*STS messages.

EUT supply voltage: 24V DC.

The EUT satisfied the requirements of this test.

TEST EQUIPMENT USED:

1, 2, 13, 15, 16, 19, 21, **22, 23**, 29, 38, 39, 40 (software used shown in bold text)

.....



2.1 TEST RESULTS - CONTINUED

Ambient temperature +21.7°C Relative humidity 32.4%

MEMORY TESTS:

IEC 61097-6 Ed.2, CLAUSE 12.1 (NUA)

NCR-333 Navtex Receiver S/No. GD67161

Internal Storage, Message Tagging and Erasure of Oldest Message Identifications

Requirement (Clause 12.1.2)	Results		
	518 kHz	490 kHz	4209.5 kHz
a) Storage of all messages of the STF	✓	✓	✓
b) Tagging of five oldest messages	✓	✓	✓
c) Storage of further messages of the STF	✓	✓	✓
c) Storage of first five tagged messages	✓	✓	✓
c) Erasure of ten oldest messages	✓	✓	✓
d) Ten oldest messages replaced by ten new messages	✓	✓	✓

Required Results(Subclause 12.1.2):

- a) A check of the EUT shall indicate that all messages of the STF have been stored.
- b) The EUT shall be checked to ensure it has correctly tagged the messages.
- c) A check of the EUT shall indicate that all messages of the test script have been stored, that the first (oldest) 5 tagged messages are still stored and that the next 10 oldest messages of the STF are no longer stored.
- d) A check of the EUT shall indicate that the 10 oldest messages have been replaced by the 10 new messages.

Remarks

Supply voltage: 24V DC

The EUT satisfied the requirements of this test.

TEST EQUIPMENT USED:

1, 2, 13, 15, 16, 17, 18, 19, 20, 21, **22, 23, 24, 25** (software used shown in bold text)



2.1 TEST RESULTS - CONTINUED

Ambient temperature +24.2°C Relative humidity 53.1%

MEMORY TESTS:

IEC 61097-6 Ed.2, CLAUSE 12.2 (NUA)

NCR-333 Navtex Receiver S/No. GD67161

Erasure of Message Identifications / Storage Time

Requirement (Clause 12.2.2)	Results		
	518 kHz	490 kHz	4209.5 kHz
a) Non storage of new message	✓		
a) Non overwriting of any stored contents	✓	✓	✓
b) 61 hour message 'A' stored		✓	
b) 61 hour message overwrote oldest message		✓	
c) 73 hour check that only message 'A' & tagged message are stored		✓	
d) Storage of test script & tagged message			✓

Required Results(Subclause 12.2.2):

- a) A check of the EUT shall indicate that the message applied after 59 hours was not stored and did not overwrite any of the stored contents of the EUT.
- b) A check of the EUT shall indicate that the message 'A' applied after 61 hours was stored and overwrote the oldest message stored in the EUT.
- c) A check of the EUT after 73 hours shall indicate that only message 'A' and the message tagged for retention are stored in the EUT.
- d) After applying the test script the EUT shall contain the contents of the test script, and the message tagged for retention.

Remarks

Tests were performed using all three input channels in turn.

Supply voltage: 24V DC

The EUT satisfied the requirements of this test.

TEST EQUIPMENT USED:

1, 2, 13, 14, 16, 17, 18, 19, 20, 21, **22, 23, 24, 25** (software used shown in bold text)

.....



2.1 TEST RESULTS - CONTINUED

Ambient temperature +24.9°C Relative humidity 44.8%

MEMORY TESTS:

IEC 61097-6 Ed.2, CLAUSE 12.4 (NUA)

NCR-333 S/No. GD67160

Reception of Messages with Character Errors

Conditions	Results
a) 35 messages with CER at 21.9%	✓
b) 35 messages with CER at 10.9%	✓

Required results(Subclause 12.4.2):

- | |
|--|
| <p>a) The EUT shall store (non-printing EUTs) or print (printing EUTs) the 35 messages, each indicating the character error rate of >20% and ≤33%.</p> <p>b) The EUT shall store (non-printing EUTs) or print (printing EUTs) the 35 messages, each indicating the character error rate of >4% and ≤20%.</p> |
|--|

Remarks

Tests were performed at 518 kHz.

Supply voltage: 24V DC

The EUT satisfied the requirements of this test.

TEST EQUIPMENT USED:

1, 2, 13, 15, 16, 17, 18, 19, 20, **22, 23**, 28, 29 (software used shown in bold text)

.....



2.1 TEST RESULTS - CONTINUED

Ambient temperature +24.9°C Relative humidity 44.8%

MEMORY TESTS:

IEC 61097-6 Ed.2, CLAUSE 12.5 (NUA)

NCR-333 S/No. GD67160

Unsatisfactory Reception

Conditions	Results
35 messages with correct ID and CER > 33%.	✓

Required results(Subclause 12.5.2):

The EUT shall not store messages or message identifications. *An EUT with an integral printer shall not print any of the test messages.*

Remarks

Tests were performed at 518 kHz.

Supply voltage: 24V DC

The EUT satisfied the requirements of this test.

TEST EQUIPMENT USED:

1, 2, 13, 15, 16, 17, 18, 19, 20, **22, 23**, 28, 29 (software used shown in bold text)

.....



2.1 TEST RESULTS - CONTINUED

Ambient temperature +21.7°C Relative humidity 32.4%

MEMORY TESTS:

IEC 61097-6 Ed.2, CLAUSE 12.6 (NUA)

NCR-333 Navtex Receiver S/No. GD67162

Power-Off Check

Requirement (Clause 12.6.2)	Results after six hours power-off		
	518 kHz	490 kHz	4209.5 kHz
Contents of non-volatile message storage	✓	✓	✓
Settings for transmitter coverage area (B ₁)	✓	✓	✓
Settings for message type (B ₂)	✓	✓	✓
Display setting: Contrast, Dimmer, Buzzer, Local Time, User Key Setting, Pos/Time Display Set	✓	✓	✓
Navtex setting: Character Size, CER Display Setting, Message Scroll, Message Speed, Printer Property	✓	✓	✓

Required Results(Subclause 12.6.2):

After a 6 hour power-down cycle, the EUT's non-volatile message storage shall contain the set of messages defined in the STF. All settings that the manufacturer has declared as non-volatile shall be unchanged from before the power-off cycle.

Remarks:

Supply voltage: 12V DC

The EUT satisfied the requirements of this test.

TEST EQUIPMENT USED:

1, 2, 13, 14, 16, 17, 18, 19, 20, 21, **22, 23, 24, 25** (software used shown in bold text)

.....



2.1 TEST RESULTS - CONTINUED

Ambient temperature +24.9°C Relative humidity 44.8%

MEMORY TESTS:

IEC 61097-6 Ed.2, CLAUSE 12.7 (NUA)

NCR-333 Navtex Receiver S/No. GD67160

Brown-Out Test

Requirement (Clause 12.7.2)	Results after brown-out		
	518 kHz	490 kHz	4209.5 kHz
Contents of non-volatile message storage	✓	✓	✓
Settings for transmitter coverage area (B ₁)	✓	✓	✓
Settings for message type (B ₂)	✓	✓	✓
Display setting: Contrast, Dimmer, Buzzer, Local Time, User Key Setting, Pos/Time Display Set	✓	✓	✓
Navtex setting: Character Size, CER Display Setting, Message Scroll, Message Speed, Printer Property	✓	✓	✓

Required Results(Subclause 12.7.2):

After a power supply brown-out, the EUT's non-volatile message storage shall contain the set of messages defined in the STF. All settings that the manufacturer has declared as non-volatile shall be unchanged from before the power-off cycle.

Remarks

Supply voltage: start at 12V DC reducing to 7.2 V DC, 1 minute wait, then increasing to 9.6 V DC (30 second ramp times).

The EUT satisfied the requirements of this test.

TEST EQUIPMENT USED:

1, 2, 13, 15, 16, 17, 18, 19, 20, **22, 23, 25**, 28, 29 (software used shown in bold text)

.....



2.1 TEST RESULTS - CONTINUED

Ambient temperature +24.2°C Relative humidity 53.1%

MEMORY TESTS:

IEC 61097-6 Ed.2, CLAUSE 12.8 (NUA)

NCR-333 Navtex Receiver S/No. GD67162

UTC Handling Check

Requirement (Clause 12.8.2)	Results after six hours power-off		
	518 kHz	490 kHz	4209.5 kHz
Memory contents check after 6 hours power-down	✓	✓	✓
Memory contents check after 59 hours total	✓	✓	✓

Required Results(Subclause 12.8.2):

After a 6 hour power-down cycle, the EUT's non-volatile message storage shall contain the set of messages defined in the STF.

Remarks

Supply voltage: 12V DC

The EUT satisfied the requirements of this test.

TEST EQUIPMENT USED:

1, 2, 13, 14, 17, **24, 25**, 28 (software used shown in bold text)

.....



2.1 TEST RESULTS - CONTINUED

Ambient temperature +27.1°C Relative humidity 42.2%

MISCELLANEOUS TESTS:

IEC 61097-6 Ed.2, CLAUSE 13.1 (NUA)

NCR-333 S/No. GD67160

Spurious Emissions

Spurious	Bandwidth (kHz)	Level (dBm)
None within 10dB of limit		
-		
-		
-		
-		
-		

Required results (Subclause 13.1.1.2):

The power of any discrete component shall be $\leq 1 \times 10^{-9}$ W (1nW) (-60dBm)

Remarks

EUT supply voltage: 24V DC.

There were no spurious emissions within 10dB of the limit.

The EUT satisfied the requirements of this test.

TEST EQUIPMENT USED:

1, 2, 15, 37

.....



SECTION 3

TEST EQUIPMENT USED

3.1 TEST EQUIPMENT, SOFTWARE AND ANCILLARIES USED FOR TESTS

To facilitate inclusion on each page of the test equipment used for related tests, each item of test equipment, software and ancillaries are identified (numbered) by the Test Laboratory.

No.	Instrument/Ancillary	Type	Manufacturer	Serial Number and/or Calibration Number
1*	Thermohygrograph	A1	Rotronic	INV4167 (BABT)
2*	Digital Multimeter	IDM101	Iso-Tech	EMC2296 (BABT)
3	Vibration System	G-8230	Shinken	831-0010-01
4	Accelerometer (used on NCR-333)	Isoshear 7701-50	Endevco	CJ30 831-0010-06
5	Accelerometer (used on NBG-319)	Isoshear 7701-50	Endevco	CJ28 831-0010-05
6	Accelerometer (used on NBG-320)	Isoshear 7701-50	Endevco	CJ32 831-0010-07
7	Laptop PC	LaVie J	NEC	LJ700/5
8	Message Generator	NCR-330	JRC	GD60698
9	RF Signal Generator	HP8665B	Hewlett Packard	3744A01700
10	Power Supply	PCR500L	Kikusui	BK003805
11	Power Supply	PD36-10AD	Kenwood	2100038
12	System DC Electronic Load	HP6063B	Hewlett Packard	3117A00185 19-92065
13	Laptop PC	LaVie M	NEC	LM500/4
14	Power Supply (12V DC)	NBG-320	JRC	-
15	Power Supply (24V DC)	GP 0110-5	Takasago	14084077
16	USB to RS232 Conv	SRC06	Arvel	15496
17	RS232 to RS422 Conv	IC952A	Hitech	502009001
18	RS232 to RS422 Conv	IC952A	Hitech	502008997
19	RS232 to RS422 Conv	IC952A	Hitech	502008996
20	Message Generator	NCR-330	JRC	GD62437
21	RF Signal Generator	HP8665B	Hewlett Packard	3744A01591
22	Tera Term S/W	V2.3 freeware	T.Teranishi	-
23	Navtex Test Signal S/W	V1.0	JRC	-
24	Sensor Simulator S/W	V1.21	JRC	-

3.1 TEST EQUIPMENT, SOFTWARE AND ANCILLARIES USED FOR TESTS - CONTINUED

No.	Instrument/Ancillary	Type	Manufacturer	Serial Number and/or Calibration Number
25	Navtex Sim S/W	V1.0	JRC	-
26	Environmental Chamber	MSL-53S	Tabai	351981
27	Power Supply (24V DC)	GP 035-10	Takasago	11883794
28	USB to RS232 Conv	SRC06	Arvel	19815
29	USB to RS232 Conv	SRC06	Arvel	-
30	RF Signal Generator	HP8663A	Hewlett Packard	2748A01341
31	Combiner	Z164A	Anritsu	M7523
32	RF Signal Generator	HP8642A	Hewlett Packard	2816A01664
33	Combiner	Z164A	Anritsu	M63986
34	Double Balanced Mixer	ZFM-11	Mini Circuits	RF1049 (TU)
35	Notch Filter 518 kHz	Special	JRC	- (TU)
36	Notch Filter 4209.5 kHz	Special	JRC	- (TU)
37	Spectrum Analyser	R3361A	Advantest	01730091
38	HF Transceiver	JST-245	JRC	RG-000350 (TU)
39	RF Power Meter	TP-5J1A	Fujisoku	94428
40	Stopwatch	8A20-0010	Seiko	481-0046
41	Bias 'T'	UM1-BA	Daishinku Corp	-
42	Impedance Converter	50-HiZ	JRC	-
43	Power Supply	521C	Metronix	93-1-275 (TU)
44	Milliammeter	2051	Yokogawa	18166U 04-0-764
45	Ammeter	2051	Yokogawa	18743U 04-0-766
46	Oscilloscope	DL1640	Yokogawa	12C325560
47	Sound Level Meter	NA-60	Rion	67272176 98-4-006
48	Steel Rule	NMY-55	Tajima	49-02246
49	Power Supply	GP 035-30	Takasago	93-1-793
50	Power Supply AC	AA150F	Takasago	48090028
51	Variac	Volt-Slider	Yamabishi	-

3.1 TEST EQUIPMENT, SOFTWARE AND ANCILLARIES USED FOR TESTS - CONTINUED

* Items 1 & 2 are owned by BABT, all other items were supplied by JRC.

Remarks

TU indicates traceability unscheduled.

For the test equipment listed above which was supplied by JRC Limited, the calibration certificates have been checked by BABT to ensure that they meet UKAS requirements. Copies are held at BABT, Fareham. Where equipment is owned by BABT the calibration records are held at BABT, Fareham.



SECTION 4

PHOTOGRAPHS

4.1 PHOTOGRAPHS OF TEST SAMPLES



Figure 1: NCR-333 front view

4.1 PHOTOGRAPHS OF TEST SAMPLES- CONTINUED

Figure 2: NCR-333 rear view

4.1 PHOTOGRAPHS OF TEST SAMPLES - CONTINUED

Figure 3: NCR-333 internal view

4.1 PHOTOGRAPHS OF TEST SAMPLES - CONTINUED

Figure 4: NCR-333 label view

4.1 PHOTOGRAPHS OF TEST SAMPLES - CONTINUED

Figure 5: NAW-333 external view (whip length is 0.6m – not shown in photograph)

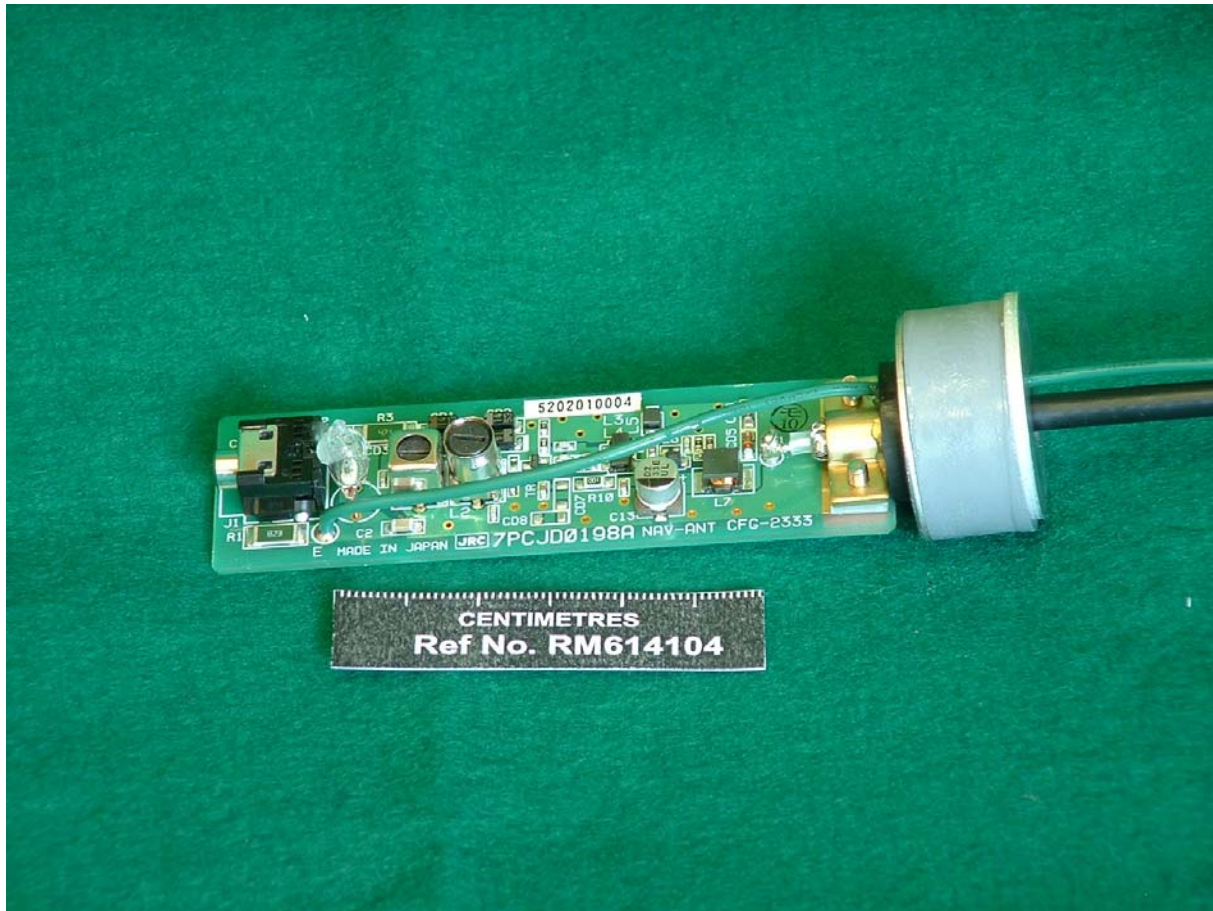
4.1 PHOTOGRAPHS OF TEST SAMPLES - CONTINUED

Figure 6: NAW-333 internal view

4.1 PHOTOGRAPHS OF TEST SAMPLES - CONTINUED

Figure 7: NAW-333 label view

4.1 PHOTOGRAPHS OF TEST SAMPLES - CONTINUED

Figure 8: NBG-319 front view (terminal cover removed)

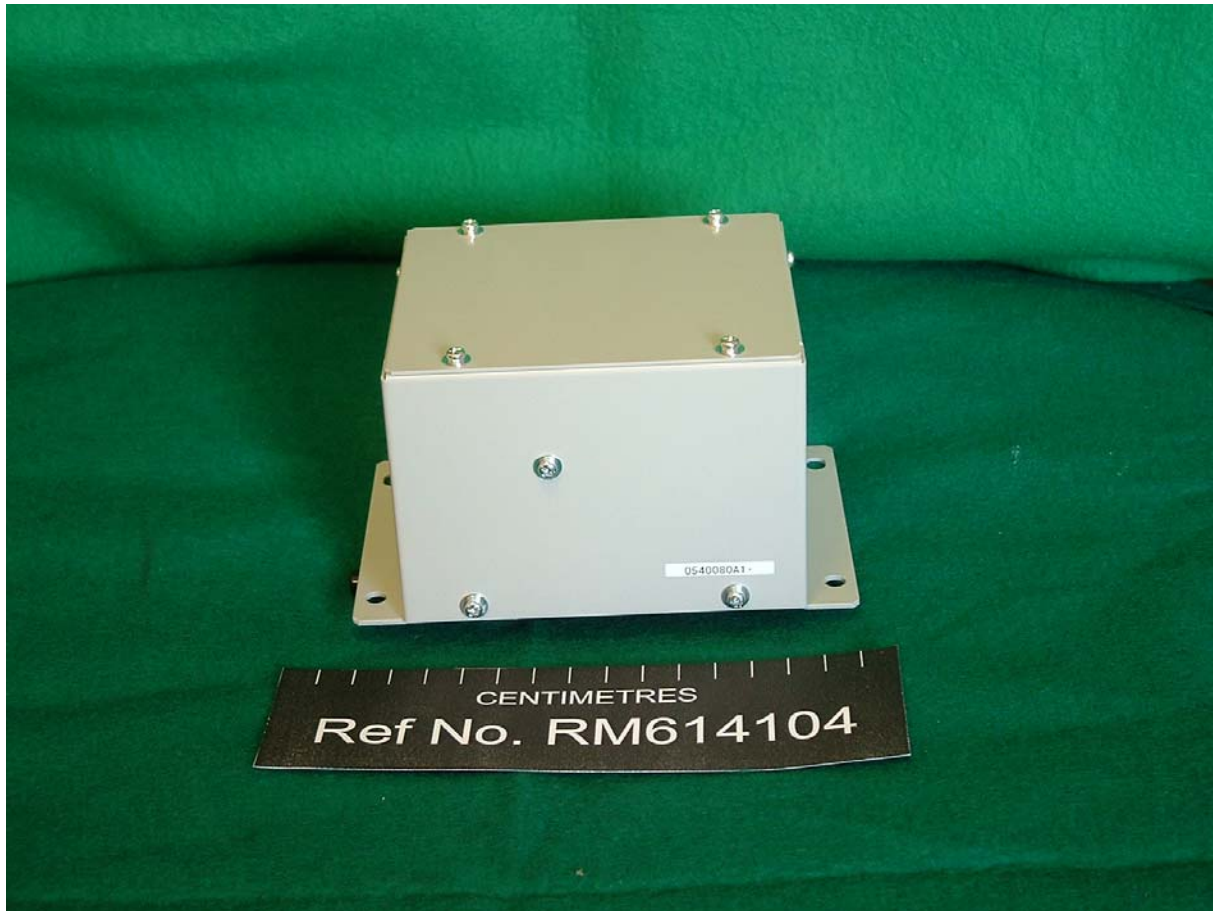
4.1 PHOTOGRAPHS OF TEST SAMPLES - CONTINUED

Figure 9: NBG-319 rear view

4.1 PHOTOGRAPHS OF TEST SAMPLES - CONTINUED

Figure 10: NBG-319 internal view

4.1 PHOTOGRAPHS OF TEST SAMPLES - CONTINUED

Figure 11: NBG-319 label view

4.1 PHOTOGRAPHS OF TEST SAMPLES - CONTINUED

Figure 12: NBG-320 front view (terminal cover removed)

4.1 PHOTOGRAPHS OF TEST SAMPLES - CONTINUED

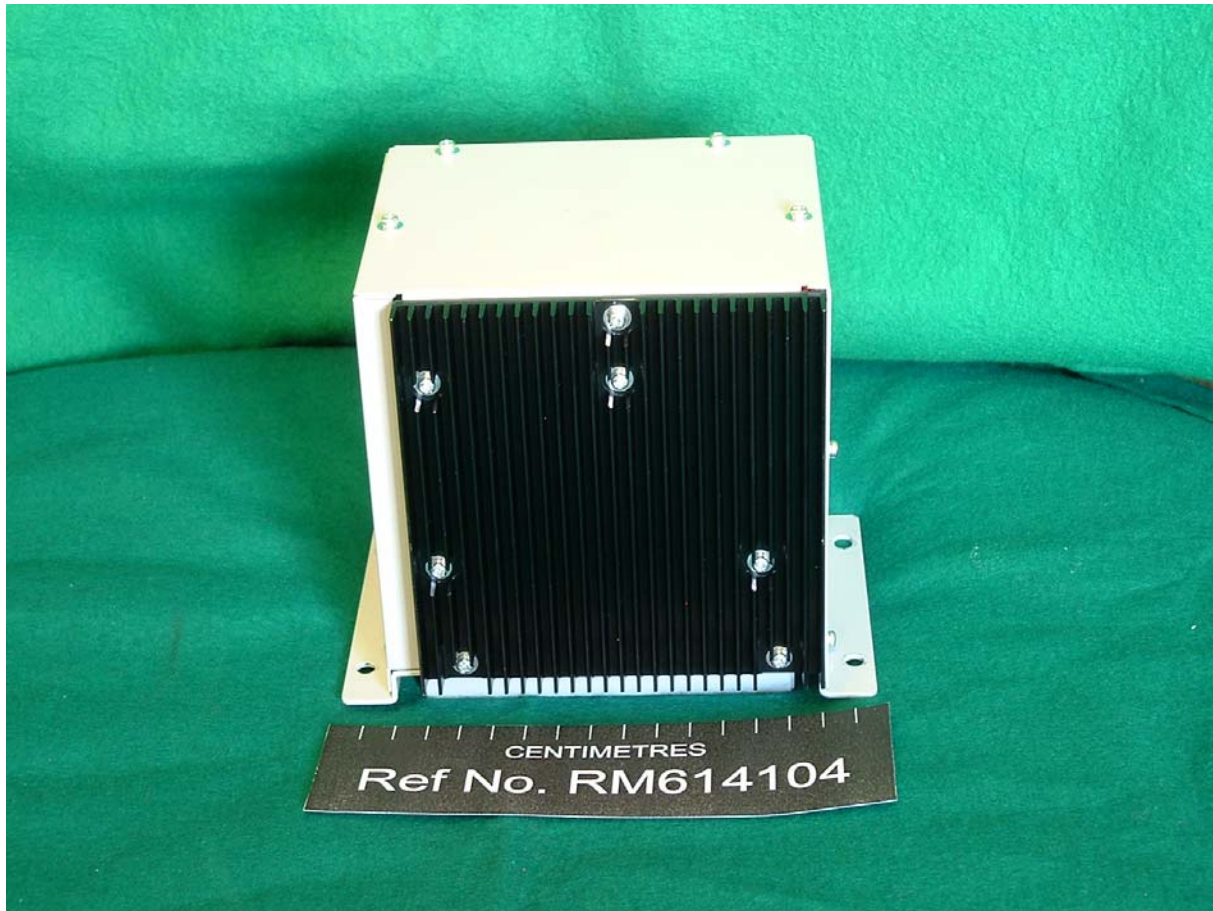


Figure 13: NBG-320 rear view

4.1 PHOTOGRAPHS OF TEST SAMPLES - CONTINUED

Figure 14: NBG-320 internal view

4.1 PHOTOGRAPHS OF TEST SAMPLES - CONTINUED

Figure 14: NBG-320 label view



SECTION 5

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

5.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT



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