
REPORT ON

Type Approval Testing of the Japan Radio Company Limited
JHS-180 Automatic Identification System
in accordance with IEC 61993-2 (December 2001)
and IEC 60945 (1996)

Report Number RM609491 Issue 2

August 2002

REPORT ON

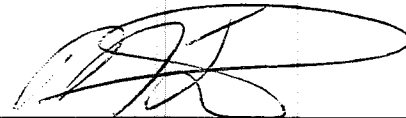
Type Approval Testing of the JHS-180 Automatic Identification System in accordance with IEC 61993-2 (December 2001) and IEC 60945 (1996)

Report Number RM609491 Issue 2

PREPARED FOR

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APPROVED BY



M JENKINS
Wireless Group Leader

DISTRIBUTION

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DERA Mr P Goddard Copy No. 2

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JRC For USCG Copy No: 4

Report No. RM609491 has been re-issued to incorporate information omitted in the first issue, the additional information is included as Annexes B and C.

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Manufacturer:

Japan Radio Company Ltd

Type Designation:

Automatic Identification System Type JHS-180
Comprising:
NTE-180 Transponder with integral antenna,
NQD-4190 Junction Box,
NQE-3111 Connection Box,
NCM-722 AIS Controller.

Serial Nos.:

JHS-180 System: BB40001
NTE-180: BB30001
NQD-4190: BB50001
NQE-3111: BB20010
NCM-722: BB10001

Number of Samples Tested:

One system, comprising four separate units.

Test Specifications:

IEC 60945 (1996)
IEC 61993-2 (December 2001),

**Date of Receipt
of Test Samples:**

1st April 2002

Start of Test:

1st April 2002

Finish of Test:

30th April 2002

Test Engineer:

R.A.Blagg



TEST HOUSE DECLARATION

We, BABT of Segensworth Road, Fareham, Hampshire PO15 5RH, declare under our sole responsibility that the products:

Equipment: Automatic Identification System

Type: JHS-180, comprising:

Model: Transponder: NTE-180,
Junction Box: NQD-4190,
Connection Box: NQE-3111,
AIS Controller: NCM-722

Serial Numbers: JHS-180 System: BB40001
NTE-180: BB30001
NQD-4190: BB50001
NQE-3111: BB20010
NCM-722: BB10001

Quantity: One system, comprising four separate units.

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

IEC 60945 (1996)
IEC 61993-2 (December 2001)

Detailed results are recorded in Report No. RM609491 Issue 2

Place and date of issue: Fareham, August 2002

Signature:

M JENKINS
Wireless Group Leader

Date:

9th August 2002

APPLICANT'S DETAILS

CATEGORY OF APPLICANT
(please tick relevant box opposite)

(a) MANUFACTURER

(b) IMPORTER

If box (b), (c) or (d) is ticked
complete details in box below with
respect to the manufacturer

(c) DISTRIBUTOR

(d) AGENT

COMPANY NAME : Japan Radio Company

ADDRESS :

NAME FOR CONTACT PURPOSES : Mr James Moon

TELEPHONE NO : 01306 631180 FAX NO : 01306 631759

TELEX NO : N/A

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. T. Seno

TELEPHONE NO : +81-422-45-9111 FAX NO : +81-422-45-9110

TELEX NO : 02822-351 JRCMTK J

TYPE DESIGNATION (1)

The type designation may be either a single alphanumeric code or an alphanumeric/code divided into two parts.

Please fill in

EITHER :

TYPE DESIGNATION AS
A SINGLE ALPHANUMERIC CODE JHS-180

OR :

TYPE DESIGNATION IN
TWO PARTS :

1. EQUIPMENT SERIES NO. (2)
("MODEL NUMBER") /

AND

2. EQUIPMENT SPECIFIC NO. (3)
("IDENTIFICATION NO") /

- (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".

TECHNICAL VARIANTS

IDENTIFICATION	COMMENTS



TYPE OF EQUIPMENT	
<input type="checkbox"/> <u>Base Station</u>	(Equipment fitted with an antenna socket for use with an external antenna, and intended for use in a fixed location).
<input type="checkbox"/> <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>	
<input type="checkbox"/>	(fitted with an antenna socket)
<input type="checkbox"/>	(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)
<input checked="" type="checkbox"/> <u>Other</u>	Class A shipborne universal Automatic Identification System.

BASE STATION	
<input type="checkbox"/> Transmitter	<input type="checkbox"/> Simplex
<input type="checkbox"/> Receiver	<input type="checkbox"/> Duplex
<input type="checkbox"/> Transceiver	<input type="checkbox"/> Communal Site Use (70dB limit)
MOBILE STATION	
<input type="checkbox"/> Transmitter	
<input type="checkbox"/> Receiver	
<input type="checkbox"/> Transceiver	
<input type="checkbox"/> Remote Control Head	
HANDPORTABLE	
<input type="checkbox"/> Transmitter	<input type="checkbox"/> Simplex
<input type="checkbox"/> Receiver	<input type="checkbox"/> Duplex
<input type="checkbox"/> Transceiver	

TRANSMITTER TECHNICAL CHARACTERISTICS	
TRANSMITTER FREQUENCY	
Method of frequency generation	
<input type="checkbox"/> CRYSTAL	
<input checked="" type="checkbox"/> SYNTHESIZER	
<input type="checkbox"/> OTHER	
TRANSMITTER CHANNEL SWITCHING FREQUENCY RANGE	
156.025 MHz to 162.025 MHz	
TRANSMITTER FREQUENCY ALIGNMENT RANGE	
156.025 MHz to 162.025 MHz	

TRANSMITTER RF POWER CHARACTERISTICS

MAXIMUM RATED TRANSMITTER OUTPUT POWER as stated by manufacturer

12.5 W AT AMPLIFIER RF OUTPUT CONNECTOR (as declared by manufacturer)

12.5 W EFFECTIVE RADIATED POWER (for equipment with integral antenna)

Is transmitter intended for :

Continuous duty Yes

No

Intermittent duty Yes

No

If intermittent state DUTY CYCLE (Dependent upon operation)

Transmitter ON minute

Transmitter OFF minute

Is transmitter output power variable?

Yes

No

continuously variable

stepped

dB per step

maximum RF output power
(Watts) 12.5

minimum RF output power
(Watts) 2

Maximum power (Watts)

TRANSMITTER – MODULATION

Angle (FREQUENCY)

Phase

Other : GMSK and FSK

TRANSMITTER MODULATION INPUT CHARACTERISTICS			
Modulation input signal level for 60% of maximum deviation at kHz			
At			
Microphone socket	mV	Impedance	Ohms
Accessory socket	mV	Impedance	Ohms
Other (4)	mV	Impedance	Ohms
Lowest audio modulation frequency transmitted by the equipment			
Hz			

(4) For use where direct connection is provided for test purposes.

RECEIVER TECHNICAL CHARACTERISTICS
RECEIVER – FREQUENCY
<p>METHOD OF FREQUENCY GENERATION</p> <p style="padding-left: 40px;"><input type="checkbox"/> CRYSTAL</p> <p style="padding-left: 40px;"><input checked="" type="checkbox"/> SYNTHESIZER</p> <p style="padding-left: 40px;"><input type="checkbox"/> OTHER</p> <p>INTERMEDIATE FREQUENCIES</p> <p style="padding-left: 40px;"><input checked="" type="checkbox"/> 1st 45 MHz and 58.1 MHz (TDMA dual receiver), 21.4 MHz (DSC receiver)</p> <p style="padding-left: 40px;"><input checked="" type="checkbox"/> 2nd 455 kHz</p> <p style="padding-left: 40px;"><input type="checkbox"/> 3rd</p>
<p>Is local oscillator injection frequency higher or lower than the receiver nominal frequency?</p> <p style="padding-left: 40px;"><input checked="" type="checkbox"/> Higher (for 45 MHz I.F.)</p> <p style="padding-left: 40px;"><input checked="" type="checkbox"/> Lower (for 58.1 MHz I.F.) (and DSC receiver)</p>
<p>RECEIVER CHANNEL SWITCHING FREQUENCY RANGE</p> <p>156.025 MHz to 162.025 MHz</p> <p>RECEIVER FREQUENCY ALIGNMENT RANGE</p> <p>156.025 MHz to 162.025 MHz</p>

RECEIVER AUDIO (AF) CHARACTERISTICS	
MAXIMUM RATED AUDIO (AF) FREQUENCY OUTPUT POWER	
INTO LOUDSPEAKER	Watts
TO LINE	dBm
INTO EARPIECE	Watts
BALANCED	<input type="checkbox"/> YES
	<input type="checkbox"/> NO
UNBALANCED	<input type="checkbox"/> YES
	<input type="checkbox"/> NO
Does connection carry DC voltage?	
	<input type="checkbox"/> YES
	<input type="checkbox"/> NO
If yes, state value	
Normal Audio load impedance	
AT LOUDSPEAKER	ohms
AT EARPIECE	ohms
AT LINE OUTPUT	ohms
At audio accessory connection or facility socket (if fitted)	
Output	Watts
Impedance	ohms
Max input level at audio accessory socket	
	mV
Impedance	ohms

TRANSMITTER AND RECEIVER CHARACTERISTICS
ITU DESIGNATION OR CLASS OF EMISSION: G1D (F1D), G2B (F2B)
CHANNEL SEPARATION: 12.5 kHz or 25 kHz
-State the maximum number of channels over which the equipment can operate: 56 channels at 25 kHz spacing, 111 channels at 12.5 kHz spacing.

EXTREME TEMPERATURE RANGE over which equipment is to be type tested
<input checked="" type="checkbox"/> -25°C to +55°C (All units in system)
<input type="checkbox"/> -15°C to +55°C
<input type="checkbox"/> -10°C to +55°C

CONSTRUCTION OF EQUIPMENT
<input type="checkbox"/> Single unit (5)
<input checked="" type="checkbox"/> Multiple units
If multiple units describe each one clearly: The NCM-722 is an AIS Controller with integral display and keypad. The NQD-4190 is a Junction Box. The NQE-3111 is a Connection Box. The NTE-180 is a VHF Transponder with VHF antenna and integral GPS receiver. (These four units comprise the JHS-180 system.)

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

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.
<input type="checkbox"/> Applies cut-off voltage
<input checked="" type="checkbox"/> Does not apply

POWER SOURCE

- AC MAINS 100/110 or 200/220 V rms Single phase
AC MAINS FREQUENCY 50/60 Hz Three phase
- 24V DC Voltage (V)
5A DC Maximum Current (A)
 Other

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)

SIGNALLING (See note (c))

- Is selective signalling fitted Yes
 No
- Is selective signalling
- Analogue
- Digital

If analogue, state format

Tone Frequencies

If digital, state modulation method

bit rate

DUPLEX OPERATION (BASE STATION ONLY)

Is the equipment intended for

Duplex operation Yes

No

Is the equipment fitted with separate transmitter and receiver antenna sockets

Yes

No

Is the equipment fitted with a duplex filter as an integral part of the equipment with a single antenna connection socket

Yes

No

Is the duplex filter externally fitted and connected to the main equipment by co-axial cable(s)

Yes

No

Type and make of duplex filter:

None - only for semi-duplex operation

.....

COMMUNAL SITE OPERATION (1)

Is the equipment fitted with circulators/isolators, internally or externally, as part of the equipment, to achieve the 70dB limit for communal site operations?

Yes

No

If YES, what is the value of attenuation of the circulator/isolator?

..... dB



ALIGNMENT RANGE

The definition of the alignment range AR1 and AR2 are given in Sub Clauses 3.1.2 and 3.1.3 of the Standard. The applicant should ensure that the sample equipment(s) submitted are operational on the appropriate channel(s) as given in Sub Clauses 3.1.5 through to 3.1.11 and tick the appropriate box.

- 3.1.5 One sample single channel equipment of category AR1 []
- or 3.1.6 Three samples of single channel equipments of category AR2 []
- or 3.1.7 One sample two channel equipment of category AR1 []
- or 3.1.8 Three samples of two channel equipment of category AR2 []
- or 3.1.9 One sample multichannel equipment of category AR1 []
- or 3.1.10 Three samples of multichannel equipment of category AR2 []
- or 3.1.11 One sample of multichannel equipment of category AR2 []
where the switching range equals the alignment range

If more than one option of the equipment is being submitted with different Type Designations, one or three samples, as appropriate, of each version shall be submitted.

CHANNEL IDENTIFICATION

Each equipment, whether one or more submitted for tests shall carry clear identification (such as a serial number), together with the frequencies associated with the channel identification displayed on the equipment.

Equipment Identification e.g. Serial Number	Channel No.	Transmit Nominal Freq kHz	Receive Nominal Freq kHz



OTHER ITEMS SUPPLIED

Spare batteries
e.g. (portable equipment) Yes

No

Battery charging device Yes

No

Special tools for dismantling equipment Yes

No

Encoder Yes

No

Test interface box (if applicable) or
where appropriate the RF test fixture Yes

No

Full documentation on equipment
(Handbook and circuit diagrams) Yes

No

Others Yes

No

If Yes, please specify :

DECLARATION		
Are the equipments submitted representative production models?	<input checked="" type="checkbox"/>	Yes
	<input type="checkbox"/>	No
If not are the equipments pre-production models?	<input type="checkbox"/>	Yes
	<input type="checkbox"/>	No
If pre-production equipments are submitted will the final production equipments be identical in <u>all</u> respects with the equipment tested	<input type="checkbox"/>	Yes
	<input type="checkbox"/>	No
If no supply full details		
Is the Test Report to be used as part of a Maritime and Coastguard Agency Type Approval Application?	<input checked="" type="checkbox"/>	Yes
	<input type="checkbox"/>	No
If yes, has the product, any direct engineering predecessor, or variant ever been granted Type Approval in any EEC member country?	<input type="checkbox"/>	Yes
	<input checked="" type="checkbox"/>	No
If yes supply full details:		
Will labelling of the equipment comply with the requirements of IEC 61993-2?	<input checked="" type="checkbox"/>	Yes
	<input type="checkbox"/>	No
If no supply full details		

I hereby declare that I am entitled to sign on behalf of the applicant and that the information supplied is correct and complete.

Signature: Held on file at BABT
 Name: James Moon
 Position held: Technical Manager
 Date: 16th April 2002

BABT formally certifies that the manufacturer's declaration as typed out in this report, is a true and accurate record of the original received from the applicant.

ADDITIONAL INFORMATION.

This report contains results for type approval testing in accordance with IEC 61993-2 (December 2001) and IEC 60945 (1996). 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 tests 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 S Kuromori, Mr M Akatsuka and Mr N Yokoyama of JRC Limited.

Ambient temperature +22°C Relative humidity 31%

EXCESSIVE CONDITIONS

IEC 60945, CLAUSE 5.2.3

> 24 V dc / >220 V ac Supply

Excessive voltage on 24 V dc input:

The protection circuitry within the JHS-180 AIS caused the dc power supply to shut down when the supply voltage was increased to 39 V dc. Upon resumption of 24 V dc supply, the EUT operated normally. No manual reset was required and no fuses were ruptured.

Excessive voltage on 110/220 V ac input:

The ac power supply used for the JHS-180 is type NBD-577A, also manufactured by JRC. This power supply was subjected to the excessive voltage test when tested by BAPT in December 2000. The results of this test were recorded in BAPT report number RM900786.

On completion of this test, the JHS-180 AIS was checked and was found to operate normally in all available modes.

Required results:

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.

Software used: 82, 83, 85, 87, 88

TEST EQUIPMENT USED:

1, 4 to 45, 68, 89 to 91, 98, 100

.....

Ambient temperature +21°C Relative humidity 51%

Environment (+70°C): DRY HEAT STORAGE

IEC 60945, CLAUSE 8.2.1.2

Performance Check : The limits are derived from IEC 61993-2, clause 14.1.1 and IEC 60945, table 3 under extreme conditions.

Test Condition	14.1.1.1 Transmit position reports.	14.1.1.2 Receive position reports.
21.6 V dc	CH A: [✓] CH B: [✓]	a) [✓] b) [✓]
31.2 V dc	CH A: [✓] CH B: [✓]	a) [✓] b) [✓]
100V, 50 Hz (normal)	CH A: [✓] CH B: [✓]	a) [✓] b) [✓]
90 V, 47.5 Hz	CH A: [✓] CH B: [✓]	a) [✓] b) [✓]
121 V, 63 Hz	CH A: [✓] CH B: [✓]	a) [✓] b) [✓]
180 V, 47.5 Hz	CH A: [✓] CH B: [✓]	a) [✓] b) [✓]
242 V, 63 Hz	CH A: [✓] CH B: [✓]	a) [✓] b) [✓]

Remarks

The AIS was stored for 12 hours in accordance with the specification for internally and externally mounted equipment and the performance was checked at normal and extreme conditions after the storage period.

The EUT satisfied the requirements of this test.

Software used: 82, 83, 88

TEST EQUIPMENT USED:

1, 2, 4 to 45

.....



Ambient temperature +19°C Relative humidity 28%

Environment (+55°C): DRY HEAT & EXTREMES

IEC 60945, CLAUSE 8.2.2.2
Extreme supply, IEC 61993-2, CLAUSE 10.2

Performance Check : The limits are derived from IEC 61993-2, clause 14.1.1 and IEC 60945, table 3 under extreme conditions.

Test Condition	14.1.1.1 Transmit position reports.	14.1.1.2 Receive position reports.
242 V, 63 Hz	CH A: [✓] CH B: [✓]	a) [✓] b) [✓]

Remarks

The unit was stored in accordance with the specification for internally and externally mounted equipment and the performance was monitored during the 2 hour period.

The EUT satisfied the requirements of this test.

Software used: 82, 83, 88

TEST EQUIPMENT USED:
1, 2, 4 to 45

.....



Ambient temperature +23°C Relative humidity 20%

Environment: DAMP HEAT +40°C, 93% RH.

IEC 60945, CLAUSE 8.3.1.2

Performance Check : The limit required for output is taken from IEC 61993-2, clause 14.1.1 and IEC 60945, table 3 under extreme conditions.

Test Condition	14.1.1.1 Transmit position reports.	14.1.1.2 Receive position reports.
100V, 50 Hz (normal)	CH A: [✓] CH B: [✓]	a) [✓] b) [✓]

Performance check after ambient recovery and stabilisation:

Test Condition	14.1.1.1 Transmit position reports.	14.1.1.2 Receive position reports.
100V, 50 Hz (normal)	CH A: [✓] CH B: [✓]	a) [✓] b) [✓]

Remarks

The unit was stored in accordance with the specification and the performance check was carried out during the 2 hour power on period.

The EUT satisfied the requirements of this test.

Software used: 82, 83, 88

TEST EQUIPMENT USED:

1, 2, 4 to 45

.....



Ambient temperature +20°C Relative humidity 29%

Environment (-25°C): LOW TEMPERATURE

IEC 60945, CLAUSE 8.4

Performance Check : . The limits are derived from IEC 61993-2, clauses 14.1.1.1 & 14.1.1.2, and IEC 60945, table 3 under extreme conditions.

Test Condition	14.1.1.1 Transmit position reports.	14.1.1.2 Receive position reports.
100V, 50 Hz (normal)	CH A: [✓] CH B: [✓]	a) [✓] b) [✓]

Remarks

The unit was stored in accordance with the specification for internally and externally mounted equipment and the performance was checked 3 hours after ambient recovery.

The EUT satisfied the requirements of this test.

Software used: 82, 83, 88

TEST EQUIPMENT USED:

1, 2, 4 to 45

.....

Ambient temperature +21°C Relative humidity 40%

Environment: VIBRATION TEST

IEC 61993-2, 14.1.1 & IEC 60945, CLAUSE 8.7

Performance Check : . The limits are derived from IEC 61993-2 clauses 14.1.1.1, 14.1.1.2, and IEC 60945, table 3 under extreme conditions.

Vibration Axis: Fore and Aft (Y)

14.1.1.1 Transmit position reports.	14.1.1.2 Receive position reports.
CH A: [✓] CH B: [✓]	a) [✓] b) [✓]

Vibration Axis: Lateral (X)

14.1.1.1 Transmit position reports.	14.1.1.2 Receive position reports.
CH A: [✓] CH B: [✓]	a) [✓] b) [✓]

Vibration Axis: Vertical (Z)

14.1.1.1 Transmit position reports.	14.1.1.2 Receive position reports.
CH A: [✓] CH B: [✓]	a) [✓] b) [✓]

Required results:

14.1.1.1 Transmit position reports: (2) required results: Confirm that the EUT transmits continuously and that the transmitted data complies with sensor inputs.

14.1.1.2 Receive position reports: (2) required results: Confirm that the EUT receives continuously under conditions a) and b) and outputs the received messages via the PI.

- a) Switch on test targets, then start operation of the EUT.
- b) Start operation of the EUT, then switch on test targets.

Remarks

Resonances with Q>5 occurred only for the NCM-722 in the Lateral (X) plane at 53.83 Hz, and in the Fore/Aft (Y) plane at 92.58 Hz. All other vibration was applied at 30 Hz

At the conclusion of the vibration endurance tests, all four units were internally and externally inspected for loose components and / or mechanical damage. There was no visible damage or loose components in any of the four units.

The EUT satisfied the requirements of this test.

Software used: 82, 83, 88

TEST EQUIPMENT USED:

1, 3 to 45

.....

Ambient temperature +24°C Relative humidity 33%

RAIN TEST

IEC 61993-2, clause 14.1.1; IEC 60945, CLAUSE 8.8

Items subjected to test: NTE-180 and NQD-4190 (Exposed category)

Performance Check : The limits are derived from IEC 61993-2, clause 14.1.1.1, 14.1.1.2; and IEC 60945 table 3 under extreme conditions.

14.1.1.1 Transmit position reports.	14.1.1.2 Receive position reports.
CH A: [✓] CH B: [✓]	a) [✓] b) [✓]

Remarks

The rain test is not applicable to the NQE-3111 and NCM-722 (Protected category).

There was no visible ingress of water inside either the NTE-180 AIS Transponder or the NQD-4190 Junction Box when inspected immediately after the 30 minute rain test.

The EUT satisfied the requirements of this test.

Software used: 82, 83, 88

TEST EQUIPMENT USED:

1, 4 to 45
.....



Test Procedure for Type Approval - Functional Tests

1. Note: *Italic sentences are quotations from IEC 61993-2.*

2. Abbreviations:

EUT	Equipment Under Test
min	minute
MKD	Minimum Keyboard and Display
msg	message(s)
PI	Presentation Interface
Rx	Receive, Receiver
Tx	Transmit, Transmitter
VDL	Very High Frequency (VHF) Data Link

Ambient temperature +25°C Relative humidity 61%

OPERATING MODES/CAPABILITY
AUTONOMOUS MODE
TRANSMIT POSITION REPORTS

IEC 61993-2, CLAUSE 14.1 (4.2)
IEC 61993-2, CLAUSE 14.1.1 (4.2.1, M.1371-1 A2/3.3.5)
IEC 61993-2, CLAUSE 14.1.1.1

(1) Method of measurement

*Set up a test environment of at least 5 test targets.
Record the VDL communication and check for messages of the EUT.*

(2) Required results

Confirm that the EUT transmits continuously and that the transmitted data complies with sensor inputs.

(3) Test results

Conditions	Results
Channel A	√
Channel B	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 68, 89 to 91, 98, 100

Method of measurement

Set up a test environment of at least 5 test targets.

a) Switch on Test targets, then start operation of the EUT

b) Start operation of the EUT, then switch on Test targets

Check the VDL communication and Presentation Interface outputs of the EUT.

(1) Required results

Confirm that the EUT receives continuously under conditions a) and b) and outputs the received messages via the PI.

(2) Test results

Conditions	Results
Switch on Test targets, then start operation of the EUT	√
Start operation of the EUT, then switch on Test targets	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 87, 88

TEST EQUIPMENT USED:

1, 4 to 45, 68, 89 to 91, 98, 100

.....

(1) Method of measurement

Set up standard test environment and operate EUT in autonomous mode.

Transmit an Assigned mode command msg 16 to the EUT with:

- a) Slot offset and increment
 - b) Designated reporting rate.
- Record transmitted messages.

(2) Required results

Confirm that the EUT transmits position reports msg 2 according to defined parameters and reverts to SOTDMA msg 1 with standard reporting rate after 4 min to 8 min.

(3) Test results

Conditions	Results
Slot offset: 100, Increment: 125	√
For Designated reporting rate Slot offset: 120, Increment: 0	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 86, 87, 88

TEST EQUIPMENT USED:

1, 4 to 45, 65, 66, 68, 89 to 91, 98, 100

.....

Ambient temperature +25°C Relative humidity 61%

POLLED MODE

IEC 61993-2, CLAUSE 14.1.3 (4.2.1 M.1371-1 A2/3.3.2)

TRANSMIT AN INTERROGATION

IEC 61993-2, CLAUSE 14.1.3.1

(1) Method of measurement

Set up standard test environment and operate EUT in autonomous mode.

Initiate the transmission of an interrogation message (msg 15) by the EUT addressing 1 or 2 destinations according to message table (M.1371-1 table 13) requesting the following responses:

- msg 3, msg 5 from mobile stations*
- msg 4, msg 20, msg 22 from base stations*

Record transmitted messages.

(2) Required results

Check that the EUT transmits the interrogation message (msg 15) as appropriate.

(3) Test results

Conditions	Results
msg 3	√
msg 5	√
msg 4	√
msg 20	√
msg 22	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 87, 88

TEST EQUIPMENT USED:

1, 4 to 45, 68, 89 to 91, 98, 100

.....

(1) Method of measurement

Set up standard test environment and operate EUT in autonomous mode.
Apply an interrogation message (msg 15; EUT as destination) to the VDL according to message table (M.1371-1 table 13) for responses with msg 3, msg 5 and slot offset set to defined value.
Record transmitted messages and frame structure.

(2) Required results

Check that the EUT transmits the appropriate interrogation response message as requested after defined slot offset.
Confirm that the EUT transmits the response on the same channel as where interrogation was received.

(3) Test results

Conditions	Results
msg 3, Slot offset:75	√
msg 3, slot offset:150	√
msg 5, Slot offset:75	√
msg 5, slot offset:150	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 86, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 65, 66, 68, 89 to 91, 98, 100
.....

Ambient temperature +25°C Relative humidity 61%

ADDRESSED OPERATION

IEC 61993-2, CLAUSE 14.1.4 (6.1 M1371-1 A2/3.3.8)

TRANSMIT AN ADDRESSED MESSAGE

IEC 61993-2, CLAUSE 14.1.4.1

(1) Method of measurement

Set up standard test environment and operate the EUT in autonomous mode.

Initiate the transmission of an addressed binary message (msg 6; EUT as source) according to message table (M.1371-1 table 13) by the EUT.

Record the transmitted messages.

(2) Required results

Check that the EUT transmits the msg 6 as appropriate.

Repeat test with the addressed safety related message (msg 12).

(3) Test results

Conditions	Results
msg 6	√
msg 12	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 87, 88

TEST EQUIPMENT USED:

1, 4 to 45, 68, 89 to 91, 98, 100

.....

(1) Method of measurement

Set up standard test environment and operate the EUT in autonomous mode.

- a) Apply an addressed binary message (msg 6; EUT as destination) to the VDL.
 - b) Apply an addressed binary message (msg 6; other station as destination) to the VDL.
- Record transmitted messages and frame structure.

(2) Required results

Check that the EUT transmits the appropriate acknowledgement message.

Confirm that:

- a) EUT outputs the received message via the presentation interface.
- b) EUT does not output the received message via the presentation interface.

(3) Test results

Conditions	Results
msg 6; EUT as destination	√
msg 6; other station as destination	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 68, 89 to 91, 98, 100
.....

Ambient temperature +25°C Relative humidity 61%

MULTIPLE SLOT MESSAGES

IEC 61993-2, CLAUSE 14.2 (4.2 M.1371-1 A2/5.2.1)

5 SLOT MESSAGES

IEC 61993-2, CLAUSE 14.2.1 (M.1371-1 A2/5.2.1)

(1) Method of measurement

Apply a BBM sentence to the PI of EUT with a max. of 121 data bytes of binary data in order to initiate transmission of a binary message (msg 8).

(2) Required results

Check that the message is transmitted in up to 5 slots accordingly.

(3) Test results

Conditions	Results
msg 8; BBM with a max. of 121 data bytes	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 87, 88

TEST EQUIPMENT USED:

1, 4 to 45, 68, 89 to 91, 98, 100

.....

Ambient temperature +25°C Relative humidity 61%

LONGER MESSAGES

IEC 61993-2, CLAUSE 14.2.2 (M.1371-1 A2/5.2.1)

(1) Method of measurement

Apply a BBM sentence to the PI of the EUT with an information content not fitting in 5 slots (i.e. more than 121 data bytes of binary data containing only binary 1's).

(2) Required results

Check that the message is not transmitted.

Check that a negative acknowledgement is given on the presentation interface.

(3) Test results

Conditions	Results
msg 8; BBM with more than 121 data bytes	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 87, 88

TEST EQUIPMENT USED:

1, 4 to 45, 68, 89 to 91, 98, 100

.....

Ambient temperature +25°C .Relative humidity 61%

INFORMATION CONTENT

IEC 61993-2, CLAUSE 14.3 (6.5.1 M.1371-1 A2/3.3.8)

(1) Method of measurement

*Set up standard test environment and operate EUT in autonomous mode.
Apply all static, dynamic and voyage related data to the EUT.
Record all messages on VDL and check the contents of position report msg 1 and static data report msg 5.*

(2) Required results

Confirm that data transmitted by the EUT complies with manual and sensor inputs.

(3) Test results

Conditions	Results
msg 1	√
msg 5	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 68, 89 to 91, 98, 100

.....

(1) Method of measurement

Set up standard test environment and operate EUT in autonomous mode.

- a) start with own speed of 10 knots; record all messages on VDL for 10 min and evaluate reporting rate for position report of EUT by calculating average slot offset over test period.
 - b) Increase speed and change course (ROT > 10°/min, derived from heading) in accordance with 6.5.2, Table 1 and ITU-R M.1371-1 A2/4.3.
 - c) Reduce speed and rotation rate to values below those given in Table 1.
 - d) Make speed and/or heading sensor unavailable.
- For b), c), d) record all messages on VDL and check slot offset between two consecutive transmissions.

(2) Required results

- a) Reporting rate shall comply with table 1 (10 s ± 10 %).
- b) Confirm that the new reporting rate has been established.
- c) Confirm that the reporting rate is reduced after 20 s (ROT reduction), or 4 min (speed reduction).
- d) Check that with unavailable sensors the reporting rate reverts to default values (10 s if no sensor connected).

(3) Test results

Conditions	Results
Speed of 10 knots	√
Speed of 15 knots and changing course	√
Speed of 15 knots and not changing course	√
Speed of 10 knots and not changing course	√
Speed and heading sensor unavailable	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 87, 88

TEST EQUIPMENT USED:

1, 4 to 45, 68, 89 to 91, 98, 100

.....

(1) Method of measurement

Set up standard test environment and operate EUT in autonomous mode.

Change Navigational status by applying voyage data message to the Presentation Interface of the EUT.

- a) set NavStatus to "at anchor" and speed <3 knots
- b) set NavStatus to "at anchor" and speed >3 knots
- c) set NavStatus to other values

Record all messages on VDL and evaluate reporting rate of position report of EUT.

(2) Required results

- a) Reporting rate shall be 3 min.
- b) Reporting rate shall be 10 s.
- c) Reporting rate shall be adjusted according to speed and course (see 14.4.1).

(3) Test results

Conditions	Results
NavStatus to "at anchor" and speed <3 knots	√
NavStatus to "at anchor" and speed >3 knots	√
NavStatus to other values: NavStatus to "underway using engine" and speed = 15 knots	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 68, 89 to 91, 98, 100

.....

(1) Method of measurement

Set up standard test environment and operate EUT in autonomous mode.

Transmit an Assigned mode command msg 16 to the EUT with:

- a) initial slot offset and increment;
- b) designated reporting rate.

Change course, speed and NavStatus. Record transmitted messages.

(2) Required results

Confirm that the EUT transmits position reports msg 2 according to the parameters defined by msg 16; the reporting rate shall not be affected by course, speed or NavStatus.

The EUT shall revert to msg 1 or 3 in autonomous mode with standard reporting rate after 4 to 8 min.

See IALA clarification

(3) Test results

Conditions	Results
Slot offset: 100, slot increment: 125.	√
Reporting rate: Slot offset 120, increment: 0.	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 86, 87, 88

TEST EQUIPMENT USED:

1, 4 to 45, 65, 66, 68, 89 to 91, 98, 100

.....

Ambient temperature +25°C Relative humidity 61%

STATIC DATA REPORTING RATES

IEC 61993-2, CLAUSE 14.4.4 (6.5.2)

(1) Method of measurement

Set up standard test environment and operate EUT in autonomous mode.

- a) Record the transmitted messages and check for static and voyage related data (msg 5).*
- b) Change static and/or voyage related station data.*

Record the transmitted messages and check for static and voyage related data (msg 5).

(2) Required results

- a) Confirm that the EUT transmits msg 5 with a reporting rate of 6 min.*
- b) Confirm that the EUT transmits msg 5 within 1 min reverting to a reporting rate of 6 min.*

(3) Test results

Conditions	Results
Normal (Not changing) static and voyage related data	√
After changing static and/or voyage related data	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 87, 88

TEST EQUIPMENT USED:

1, 4 to 45, 68, 89 to 91, 98, 100

.....

SECURITY

(1) Method of measurement

*Set up standard test environment and operate EUT in autonomous mode.
Switch the EUT off for more than 15 min and on again at least ten times.
Recover and readout recorded data.*

(2) Required results

Confirm that the EUT records and displays times and events correctly.

(3) Test results

Conditions	Results
Switch the EUT off for more than 15 min. and on again. Repeat 9 more times. Recover and readout recorded data.	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 87, 88

TEST EQUIPMENT USED:

1, 4 to 45, 68, 89 to 91, 98, 100

.....

Ambient temperature +25°C Relative humidity 61%

INITIALISATION PERIOD

IEC 61993-2, CLAUSE 14.6 (6.7 M.1371-1 A2/3.3.3)

(1) Method of measurement

Set up standard test environment with all sensors available.

- a) *Switch on EUT with EUT operating in autonomous mode.*
- b) *Switch off EUT for approx. 0.5 s. Record transmitted messages.*

(2) Required results

Confirm that the EUT starts transmissions within 2 min after switch on.

(3) Test results

Conditions	Results
Switch on EUT with EUT operating in autonomous mode	√
Switch off EUT for approx. 0.5 s and on again. Record transmitted messages	√ (1 min, 17 sec)

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 87, 88

TEST EQUIPMENT USED:

1, 4 to 45, 68, 89 to 92, 98, 100

(1) Method of measurement

Set up standard test environment and operate EUT in autonomous mode.

Switch the EUT to different channels randomly selected from the maritime mobile band as specified by ITU-R M.1084-4, Annex 4 using both 25 kHz and 12.5 kHz channel spacing (incl. 12.5 kHz emission on a 25 kHz channel):

- a) manually,
- b) by transmission of channel management message (msg 22) broadcast and addressed to the EUT,
- c) by application of ACA sentence to the presentation interface,
- d) by transmission of DSC telecommand to the EUT.

Record the VDL messages.

(2) Required results

Confirm that the EUT switches to channel/bandwidth and duplex/simplex channels accordingly.

Confirm that the EUT delivers a TXT-sentence with ID 036, followed by the ACA-sentences needed to inform of changes in the AIS use of regional operating settings.

Test results

TEST CONDITIONS		Test Results				
		a) Manually	b-1) msg22, broadcast	b-2) msg22, addressed to EUT	c) ACA sentence	d) DSC telecommand
T _{nom} (+20°C)	V _{nom} (100 V, 50 Hz)	√	√	√	√	√
T _{min} (-25°C)	V _{min} (90 V, 47.5 Hz)	√	√	√	√	√
T _{max} (+55°C)	V _{max} (242 V, 63 Hz)	√	√	√	√	√

Remarks:

- msg 22 broadcast is same as clause 17.2
- msg 22 addressed to EUT is same as clause 17.7.3
- ACA sentence is same as clause 17.3
- DSC telecommand is same as clause 20.2

The EUT satisfied the requirements of this test.

Software used: 69, 82, 83, 85, 87, 88

TEST EQUIPMENT USED:

1, 4 to 45, 58, 59, 61, 68, 89 to 91, 98, 100

Ambient temperature +25°C Relative humidity 61%

TRANSCIVER PROTECTION

IEC 61993-2, CLAUSE 14.8 (6.9; M.1371-1 A2/2.14, 2.15)

(1) Method of measurement

Set up standard test environment and operate the EUT in autonomous mode.
Open circuit and short circuit VHF-antenna terminals of the EUT for at least 60 s each.

(2) Required results

The EUT shall be operative again within 2 min after refitting the antenna without damage to the transceiver.

(3) Test results

Conditions	Results
Open circuit VHF antenna terminal	√
Short circuit VHF antenna terminal	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 50, 68, 89 to 91, 98, 100

Ambient temperature +25°C Relative humidity 61%

**ALARMS AND INDICATORS, FALL-BACK ARRANGEMENTS
LOSS OF POWER SUPPLY**

IEC 61993-2, CLAUSE 14.9 (6.10)
IEC 61993-2, CLAUSE 14.9.1 (6.10.2.3)

(1) Method of measurement

Disconnect power supplies of the EUT.

(2) Required result

Verify that the relay output is "active" when the power is "off".

(3) Test results

Conditions	Results
Disconnect power supply of EUT	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 68, 89 to 91, 98, 100
.....

Ambient temperature +25°C .Relative humidity 61%

**MONITORING OF FUNCTIONS AND INTEGRITY
Tx MALFUNCTION**

IEC 61993-2, CLAUSE 14.9.2 (6.10.2)
IEC 61993-2, CLAUSE 14.9.2.1

(1) Method of measurement

Disable the transmitter by disconnecting the antenna.

(2) Required result

*Verify that an alarm sentence ALR with alarm ID 001 is sent and the relay output signals the failure state.
Verify that relay deactivates when the EUT receives an ACK and that the status field in the ALR sentence is updated.*

(3) Test results

Conditions	Results
Disable the transmitter by disconnecting the antenna	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 68, 89 to 91, 98, 100
.....

(1) Method of measurement

Prevent the EUT from radiating with full power by mismatching the antenna for a VSWR of 3:1. During the mismatch the output power is not required to be the rated output power

(2) Required result

Verify that the EUT continues operating.

Verify that an alarm sentence ALR with alarm ID 002 is sent and the relay output signals the failure state.

Verify that relay deactivates when the EUT receives an ACK and that the status field in the ALR sentence is updated.

(3) Test results

Conditions	Results
Antenna VSWR exceeding 3:1	√

VSWR applied was 3.5:1

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 87, 88

TEST EQUIPMENT USED:

1, 4 to 45, 62, 68, 89 to 91, 98, 100

.....

Manufacturers shall provide documentation describing how the AIS detects Rx malfunction and that an ALR sentence with alarm ID as appropriate is sent.

(1) Method of measurement

Disable each frequency synthesizer of receiver.

(2) Required result

Verify that an alarm sentence ALR sent and reaction according to the below table and the relay output signals the failure state.

Verify that relay deactivates when the EUT receives an ACK and that the status field in the ALR sentence is updated.

Quoted from IEC61993-2 Table 2

Alarm's description text	Alarm condition threshold exceeded	Alarm condition not exceeded	Alarm ID or Text Identifier	Reaction of the system to the alarm condition threshold exceeded
AIS: Rx channel 1 malfunction	A	V	003	Stop transmission on affected channel
AIS: Rx channel 2 malfunction	A	V	004	Stop transmission on affected channel
AIS: Rx channel 70 malfunction	A	V	005	Stop transmission on affected channel

(3) Test results

Conditions	Results
Disable Rx channel 1	√
Disable Rx channel 2	√
Disable Rx channel 70	√

Note: All synthesizers were disabled by disconnecting the common 12.8MHz reference oscillator.

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 68, 89 to 91, 98, 100

.....

(1) Method of measurement

*Set up standard test environment and operate the EUT in autonomous mode.
Disconnect the GNSS antenna (UTC clock lost).*

(2) Required result

Verify that the system continues to operate but changes to indirect synchronisation and that a TXT-sentence with ID 007 is sent and the relay output is not activated.

(3) Test results

Conditions	Results
Disconnect the internal GNSS antenna	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 87, 88

TEST EQUIPMENT USED:

1, 4 to 45, 68, 89 to 91, 98, 100
.....

(1) Method of measurement

Set up standard test environment and operate EUT in autonomous mode.

- a) Disconnect the connection to the remote MKD.
- b) Provide an alarm acknowledgement, ACK sentence with ID 008, to the PI.

(2) Required results

- a) Verify that an alarm sentence, alarm ID 008, is sent and the relay output signals the failure. Verify that the AIS continues operation, with the DTE value "1" in msg 5.
- b) Verify that the relay deactivates when the EUT receives an ACK and that the status field in the ALR sentence is updated.

(3) Test results

Conditions	Results
Disconnect the connection line to the remote MKD	√
Provide an alarm acknowledgement	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 68, 89 to 91, 98, 100

.....

(1) Method of measurement

Set up standard test environment and operate EUT in autonomous mode.
 Verify the manufacturer's documentation to ascertain the configuration implemented on the EUT for position sensors (see 6.2).

Apply position sensor data in a way that the EUT operates in the states defined below:

- a) external DGNSS in use (corrected)
- b) internal DGNSS in use (corrected; msg 17) if implemented
- c) internal DGNSS in use (corrected; beacon) if implemented
- d) external EPFS in use (uncorrected)
- e) internal GNSS in use (uncorrected) if implemented
- f) no sensor position in use

Check the ALR sentence and the position accuracy flag in the VDL msg 1.

(2) Required result

Verify that the use of position source, position accuracy flag, RAIM flag and position information complies with table 4.

Verify that when the status is changed, an ALR (025, 026, 029, 030), or TXT (021, 022, 023, 024, 025, 027, 028) sentence is sent according to table 2 or table 3 respectively.

Verify that the status is changed after 5 s when switching downwards and 30 s when switching upwards.

(3) Test results

(3.1) Switching downwards

Conditions	Results
External DGNSS in use (corrected)	√
Internal DGNSS in use (corrected; msg 17)	√
Internal DGNSS in use (corrected; beacon)	√
External EPFS in use (uncorrected)	√
Internal GNSS in use (uncorrected)	√
No sensor position in use	√

(3.2) Switching upwards

Conditions	Results
No sensor position in use	√
Internal GNSS in use (uncorrected)	√
External EPFS in use (uncorrected)	√
Internal DGNSS in use (corrected; beacon)	√
Internal DGNSS in use (corrected; msg 17)	√
External DGNSS in use (corrected)	√

(continued on next page)

Ambient temperature +25°C Relative humidity 24%

PRIORITY OF POSITION SENSORS

IEC 61993-2, CLAUSE 14.9.3.1 (6.1.1.3, 6.10.3)

(continued)

Conditions	Result
<i>Check the ALR sentence and the position accuracy flag in the VDL msg 1.</i>	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 84, 85, 86, 87, 88

TEST EQUIPMENT USED:

1, 4 to 45, 65, 66, 68, 84, 89 to 91, 93 to 98, 100
.....

(1) Method of measurement

Set up standard test environment and operate EUT in autonomous mode.

- a) Disconnect the inputs for HDG and ROT or set their data to invalid (e.g. by wrong checksum, "valid/invalid" flag).
- b) Reconnect the inputs for HDG and ROT.
- c) Disconnect the input for ROT or set the data to invalid (e.g. by wrong checksum, "valid/invalid" flag). Establish a rate of heading change that is greater than 5 degrees in 30 s.
- d) Reconnect the ROT input.

(2) Required result

- a) Check that an alarm sentence ALR with alarm ID 032 for invalid HDG and an alarm sentence ID 035 for invalid ROT are sent to the PI and the "default" data is sent in VDL msg 1, 2, or 3.
- b) Check that a text sentence TXT with ID 031 for valid HDG and ID 035 for valid ROT is sent to the PI. Verify that, in the alarm sentences, the alarm condition flag is set to "V" and that the relay output is not activated. Check that TXT-sentences with ID 031 for valid HDG and ID 033 for ROT indicator in use are sent to the PI.
- c) Check that a TXT-sentence with ID 034 for "other ROT source in use" is sent to the PI and that the contents of the message's ROT field is the correct "direction of turn" (table 5 "ROT sensor fall-back conditions," Priority 2).
- d) Check that a TXT-sentence with ID 033 for ROT indicator in use is sent to the PI.

(3) Test results

Conditions	Results
Disconnect the inputs for HDG and ROT	√
Reconnect the inputs for HDG and ROT	√
Disconnect the input for ROT	√
Reconnect the ROT input	√

Note – spec wording incorrect – P.Goddard's fax refers to this

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, b87, 88

TEST EQUIPMENT USED:

1, 4 to 45, 68, 89 to 91, 98, 100

.....

(1) Method of measurement

Set up standard test environment and operate EUT in autonomous mode.

Verify the manufacturer's documentation to ascertain the configuration implemented on the EUT for position sensors (see 6.10).

a) apply valid external DGNSS position and external speed data.

b) disconnect external DGNSS position, disconnect the inputs for SOG, COG or set their data to invalid (e.g. by wrong checksum, "valid/invalid" flag).

NOTE Test b) is applicable only if the internal GNSS is used as position source.

(2) Required Result

a) Check that an alarm sentence ALR with alarm ID 027 is sent to the PI and the external data for SOG/COG is sent in VDL msg 1, 2 or 3. Verify that the system continues to operate and that the relay output is not activated.

b) Check that an alarm sentence ALR with alarm ID 028 is sent to the PI and the internal data for SOG/COG is sent in VDL msg 1, 2 or 3. Verify that the system continues to operate and that the relay output is not activated.

(3) Test results

Conditions	Results
Valid external DGNSS position and external speed data	√
Disconnect external DGNSS position, disconnect the inputs for SOG, COG	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 87, 88

TEST EQUIPMENT USED:

1, 4 to 45, 68, 84, 89 to 91, 98, 100

.....

Ambient temperature +26°C . Relative humidity 30%

DISPLAY AND CONTROL
DATA INPUT/OUTPUT FACILITIES

IEC 61993-2, CLAUSE 14.10 (6.11)
IEC 61993-2, CLAUSE 14.10.1

(1) Method of measurement

Set up standard test environment and operate EUT in autonomous mode.

- a) Check the MKD indication.*
- b) Record received messages and check contents of the MKD.*
- c) Input static and voyage related data via the MKD.*

(2) Required results

- a) The minimum display shall contain at least three lines of data, with no horizontal scrolling of the range and bearing data display.*
- b) Confirm that all messages including binary and safety related and Long Range messages received can be displayed and that means to select messages and data fields to be displayed are available.*
- c) Confirm that all necessary data can be input.*

(3) Test results

Conditions	Results
MKD indication	√
Reception of binary and safety related messages	√
Reception of Long Range messages	√
Input static and voyage related data	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 68, 89 to 91, 98, 100
.....

(1) Method of measurement

*Set up standard test environment and operate EUT in autonomous mode.
Initiate the transmission of non-scheduled messages and interrogations as provided by the EUT.*

(2) Required results

Confirm that at least the transmission of safety-related addressed and broadcast messages (msg 12 and msg 14) can be initiated by means of the minimum display.

Confirm that transmission of messages 4, 16, 17, 18, 19, 20, 21, 22 is not possible.

NOTE Use of messages 4, 16, 17, 18,19, 20, 21, 22 is restricted to base stations or class B AIS.

(3) Test results

Conditions	Results
Confirm that the transmission of safety-related addressed (msg 12) can be initiated by means of the minimum display.	√
Confirm that the transmission of broadcast messages (msg 14) can be initiated by means of the minimum display.	√
Transmission of messages 4, 16, 17, 18, 19, 20, 21, 22 is not possible	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 68, 89 to 91, 98, 100

.....

(1) Method of measurement

*Set up standard test environment and operate EUT in autonomous mode.
Perform system control/configuration commands as specified.
Check indication of system status/alarms.*

(2) Required results

*At least initiation of channel switching shall be possible with the minimum display.
Output power may not be switched manually.
Confirm that the configuration level and other functions, not intended for use by the operator, are protected by password or adequate means.*

(3) Test results

Conditions	Results
Channel switching operation	√
Protection for the channel switching operation	√

The EUT satisfied the requirements of this test.

Software used: 82, 83, 85, 87, 88

TEST EQUIPMENT USED:
1, 4 to 45, 49, 68, 89 to 91, 98, 100
.....

FREQUENCY ERROR

IEC 61993-2, CLAUSE 15.1.1
 Extreme supply IEC 61993-2, CLAUSE 10.2.2

TEST CONDITIONS		TDMA Transmitter Frequency Error (kHz)			
		156.025 MHz	157.4125 MHz	160.6375 MHz	162.025 MHz
T _{nom} (+25°C)	V _{nom} (100 V, 50 Hz)	-0.027	-0.031	-0.033	-0.035
T _{min} (-25°C)	V _{min} (90 V, 47.5 Hz)	-0.006	-0.007	-0.01	-0.012
T _{max} (+55°C)	V _{max} (242 V, 63 Hz)	-0.111	-0.113	-0.116	-0.117
Maximum frequency error (kHz)		-0.111	-0.113	-0.116	-0.117
Measurement uncertainty (Hz)		±0.01			

Required results:

The frequency error shall not exceed ± 0.5 kHz under normal and ± 1 kHz under extreme test conditions.

Remarks

The EUT satisfied the requirements of this test.

Software used: 70

TEST EQUIPMENT USED:

1, 2, 4, 17, 45, 50, 51, 64
