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# Report On

Radio Approval Testing of the
JRC JHS-183 Class A AIS Transceiver
In accordance with IEC 61993-2

Document 75918046 Report 01 Issue 3 October 2012

Product Service

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**REPORT ON**

Radio Approval Testing of the
JRC JHS-183 Class A AIS Transceiver
In accordance with IEC 61993-2

Document 75918046 Report 01 Issue 3

October 2012

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**DATED** 11 October 2012

**This report has been up-issued to Issue 3 to correct typographical errors.**

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**CONTENTS**

Product Service

**SECTION 1**

**REPORT SUMMARY**

Radio Approval Testing of the
JRC JHS-183 Class A AIS Transceiver
In accordance with IEC 61993-2

## 1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Radio Approval Testing of the JRC JHS-183 Class A AIS Transceiver to the requirements of IEC 61993-2.

| | |
|---|---|
| Objective | To perform Radio Approval Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out. |
| Manufacturer | JRC |
| Model Number(s) | JHS-183 |
| Serial Number(s) | BB50304<br>BB00006 |
| Number of Samples Tested | Two |
| Test Specification/Issue/Date | IEC 61993-2: 2001 |
| Start of Test | 10 May 2012 |
| Finish of Test | 18 September 2012 |
| Name of Engineer(s) | N Forsyth |

## 1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with IEC 61993-2 is shown below.

| Section | Spec Clause | Test Description | Result | Comments |
|---|---|---|---|---|
| Operational Tests | | | | |
| 2.1 | 14.1 | Operating Modes / Capability | Pass | |
| 2.2 | 14.2 | Multiple Slot Messages | Pass | |
| 2.3 | 14.3 | Information Content | Pass | |
| 2.4 | 14.4 | Reporting Rates | Pass | |
| 2.5 | 14.5 | Security | Pass | |
| 2.6 | 14.6 | Initialisation Period | Pass | |
| 2.7 | 14.7 | Channel Selection | Pass | |
| 2.8 | 14.8 | Transceiver Protection | Pass | |
| 2.9 | 14.9 | Alarms and Indicator, Fall-back Arrangements | Pass | |
| 2.10 | 14.10 | Display and Control | Pass | |
| Physical Tests | | | | |
| - | 15.1 | TDMA Transmitter | Pass | See Document 7591759 Report 03 for details. |
| - | 15.2 | DSC Transmissions | Pass | |
| - | 15.3 | TDMA Receivers | Pass | |
| - | 15.4 | DSC Receiver | Pass | |
| - | 15.5 | Conducted Spurious Emissions Conveyed to the Antenna | Pass | |
| Specific Tests of Link Layer | | | | |
| 2.11 | 16.1 | TDMA Synchronisation | Pass | |
| 2.12 | 16.2 | Time Division (Frame Format) | Pass | |
| 2.13 | 16.3 | Synchronisation Jitter | Pass | |
| 2.14 | 16.4 | Data Encoding (Bit Stuffing) | Pass | |
| 2.15 | 16.5 | Frame Check Sequence | Pass | |
| 2.16 | 16.6 | Slot Allocation (Channel Access Protocols) | Pass | |
| 2.17 | 16.7 | Message Formats | Pass | |
| Specific Tests of Transport Layer | | | | |
| 2.18 | 17.1 | Dual Channel Operation | Pass | |
| 2.19 | 17.2 | Regional Area Designation by VDL Message | Pass | |
| 2.20 | 17.3 | Regional Area Designation by Serial Message | Pass | |
| 2.21 | 17.4 | Power Setting | Pass | |
| 2.22 | 17.5 | Message Priority Handling | Pass | |
| 2.23 | 17.6 | Slot Reuse (Link Congestion) | Pass | |
| 2.24 | 17.7 | Management of Received Regional Operating Settings | Pass | |
| 2.25 | 17.8 | Continuation of Autonomous Mode Reporting Rate | Pass | |

| Section | Spec Clause | Test Description | Result | Comments |
|---|---|---|---|---|
| Specific Tests of Transport Layer | | | | |
| 2.26 | 18.1 | Addressed Messages | Pass | |
| 2.27 | 18.2 | Interrogation Responses | Pass | |
| 2.28 | 18.3 | Other Non Periodic Messages | Pass | |
| Specific Presentation Interface Tests | | | | |
| 2.29 | 19.1 | General | Pass | |
| 2.30 | 19.2 | Check of the Manufacturer's Documentation | Pass | |
| 2.31 | 19.3 | Electrical Test | Pass | |
| 2.32 | 19.4 | Test of Input Sensor Interface Performance | Pass | |
| 2.33 | 19.5 | Test of Sensor Input | Pass | |
| 2.34 | 19.6 | Test of High Speed Output | Pass | |
| 2.35 | 19.7 | High Speed Output Interface Performance | Pass | |
| 2.36 | 19.8 | Test of High Speed Input | Pass | |
| DSC Functionality Tests | | | | |
| - | 20.1 | General | N/A | |
| 2.37 | 20.2 | Regional Area Designation | Pass | |
| - | 20.3 | Scheduling | N/A | |
| - | 20.4 | Polling | N/A | |
| Long Range Functionality Tests | | | | |
| 2.38 | 21.1 | LR Interrogation | Pass | |
| 2.39 | 21.2 | LR "All Ships" Interrogation | Pass | |
| 2.40 | 21.3 | Consecutive LR "All Ships" Interrogation | Pass | |

N/A Not Applicable
N/T Not Tested
N/R Not Requested

Product Service

## 1.3 DECLARATION OF BUILD STATUS

| | |
|---|---|
| **Manufacturer** | Japan Radio.,Ltd |
| **Country of origin** | Japan |
| **Technical Description** | AIS ( Automatic Identification system) |
| **Model No** | JHS-183 |
| **Part No** | |
| **Serial No** | NTE-183 / NCM-983 / NQE-5183<br>BB00302 BB80302 N/A |
| **Drawing Number** | 7ZPJD0553 7ZPJD0558 |
| **Build Status** | |
| **Software Issue** | NTE-183 / NCM-983 DISP / NCM-983 LAN<br>V1.00 V1.00 V1.00 |
| **Hardware Issue** | N/A |
| **FCC ID** | |
| **IC ID** | |
| **Highest Operating Frequency** | 162.025MHz |
| **Signature** | Hideo Otsuki |
| **Date** | 21 September, 2012 |
| **D of B S Serial No** | |

Note: This document has been prepared to enable manufacturers with no mechanism for producing their own Declaration of Build Status, to declare the build state of the equipment submitted for test.

## 1.4 PRODUCT INFORMATION

### 1.4.1 Technical Description

The Equipment Under Test (EUT) was a JRC JHS-183 Class A AIS Transceiver as shown in the photograph below. A full technical description can be found in the manufacturer's documentation.

The JHS-183 comprises three units:

Transceiver unit: NTE-183
AIS Controller (MKD): NCM-983
Connection Box: NQE-5183


Equipment Under Test

## 1.5 DEVIATIONS FROM THE STANDARD

The requirements of test 14.10.3 state that output power may not be switched manually, however there is a menu item in the 'SET UP' menu, where the power can be reduced. This is to allow tankers to set their output power to low when loading/unloading.

## 1.6 MODIFICATION RECORD

The table below details modifications made to the EUT during the test programme. The modifications incorporated during each test are recorded on the appropriate test pages.

| Modification State | Description of Modification | SW Version | MKD S/N | Transceiver S/N | Date of Modification |
|---|---|---|---|---|---|
| 0 | As supplied by the customer | 10/05/2012 | BB80304 | BB00304 | Not Applicable |
| 1 | Software Update | 04/07/2012 | BB80304 | BB00304 | 04/07/2012 |
| 2 | Software Update | 27/07/2012 | BB80304 | BB00304 | 27/07/2012 |
| 3 | Software Update and New MKD Hardware | 06/08/2012 | BB80304 | BB00304 | 06/08/2012 |

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**SECTION 2**

**TEST DETAILS**

Radio Approval Testing of the
JRC JHS-183 Class A AIS Transceiver
In accordance with IEC 61993-2

## 2.1 OPERATING MODES / CAPABILITY

### 2.1.1 Specification Reference

IEC 61993-2, Clause 14.1

### 2.1.2 Equipment Under Test

JHS-183, BB50304

### 2.1.3 Date of Test and Modification State

14 May, 06 June & 06 July 2012 – Modification State 1

### 2.1.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.1.5 Test Results and Methods of Measurement

Autonomous Mode – Clause 14.1.1

*Transmit Position Reports – Clause 14.1.1.1*

***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.

***Required Results***

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

***Test Results***

| Requirement | Verdict |
|---|---|
| Verify MMSI | ✓ |
| Check Message 1 is continuously transmitted | ✓ |
| Verify Lat and Long values | ✓ |
| Verify COG and SOG values | ✓ |
| Verify heading and ROT values | ✓ |

*Receive Position Reports – Clause 14.1.1.2*

***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.

***Required Results***

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

***Test Results***

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

| Requirement | Verdict |
|---|---|
| Verify MMSI of each targets | ✓ |
| Check position reports are continuously received from each target | ✓ |
| Verify Lat and Long values of each target | ✓ |
| Verify COG and SOG values of each target | ✓ |
| Verify heading and ROT values of each target | ✓ |
| Verify that the received messages are output via the PI | ✓ |

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

| Requirement | Verdict |
|---|---|
| Verify MMSI of each target | ✓ |
| Check position reports are continuously received from each target | ✓ |
| Verify Lat and Long values of each target | ✓ |
| Verify COG and SOG values of each target | ✓ |
| Verify heading and ROT values of each target | ✓ |
| Verify that the received messages are output via the PI | ✓ |

Assigned Mode – Clause 14.1.2

***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.

***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 to 8 min.

***Test Results***

a) Slot offset and increment

| **Message 16** | |
|---|---|
| Parameter | Value |
| Slot offset | 5 |
| Increment | 5 |

| Requirement | Verdict |
|---|---|
| Message 16 transmitted to EUT | ✓ |
| First slot offset = 5 slots | ✓ |
| Message 2 increment = 5 (75 slots) | ✓ |
| EUT reverts to SOTDMA Message 1 after 4 to 8 minutes. | ✓ |
| Comments | |
| Time to revert back to message 1 was 6 minutes. | |

b) Designated reporting rate.

| **Message 16** | |
|---|---|
| Parameter | Value |
| Slot offset | 300 |
| Increment | 0 |

| Requirement | Verdict |
|---|---|
| Message 16 transmitted to EUT | ✓ |
| Message 2 rate = 30 per minute | ✓ |
| EUT reverts to SOTDMA Message 1 after 4 to 8 minutes. | ✓ |
| Comments | |
| Message 3 sent for first frame after message 16 received. Message 2 started sending one frame after receiving message 16. Time to revert back to message 1 was 6 minutes. | |

Polled Mode – Clause 14.1.3

*Transmit an Interrogation – Clause 14.1.3.1*

***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) *(M.1371-4 table 43)* requesting the following responses:

a) msg 3, msg 5 from mobile stations
b) msg 4, msg 20, msg 22. from base stations

Record transmitted messages.

***Required Results***

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

***Test Results***

a) msg 3, msg 5 from mobile stations

| **Message 3 – One Destination** | |
|---|---|
| Requirement | Verdict |
| Message "$AIAIR,666000888,3,,,,,," sent to PI | ✓ |
| Message 15 sent over the VDL | ✓ |
| Message 15 contents correct | ✓ |
| Message 3 sent by addressed mobile station (MMSI 666000888) | ✓ |
| Message 3 received by EUT and output on PI | ✓ |
| Acknowledgement on PI, "$AIABK,666000888,,15,,3*65" | ✓ |

| **Message 5 – One Destination** | |
|---|---|
| Requirement | Verdict |
| Message "$AIAIR,666000888,5,,,,,," sent to PI | ✓ |
| Message 15 sent over the VDL | ✓ |
| Message 15 contents correct | ✓ |
| Message 5 sent by addressed mobile station (MMSI 666000888) | ✓ |
| Message 5 received by EUT and output on PI | ✓ |
| Acknowledgement on PI, "$AIABK,666000888,,15,,3*65" | ✓ |

| **Message 3 and 5 – Two Destinations Verifying ID 1** | |
|---|---|
| Requirement | Verdict |
| Message "$AIAIR,666000888,3,,5,,555555555,3," sent to PI | ✓ |
| Message 15 sent over the VDL | ✓ |
| Message 15 contents correct | ✓ |
| Message 3 sent by addressed mobile station (MMSI 666000888) | ✓ |
| Message 5 sent by addressed mobile station (MMSI 666000888) | ✓ |
| Message 3 received by EUT and output on PI | ✓ |
| Message 5 received by EUT and output on PI | ✓ |
| Acknowledgement on PI, "$AIABK,666000888,,15,,3*65" | ✓ |

| Message 3 and 5 – Two Destinations Verifying ID 2 | |
|---|---|
| Requirement | Verdict |
| Message “$AIAIR,555555555,3,,5,,666000888,3,” sent to PI | ✓ |
| Message 15 sent over the VDL | ✓ |
| Message 15 contents correct | ✓ |
| Message 3 sent by addressed mobile station (MMSI 666000888) | ✓ |
| Message 3 received by EUT and output on PI | ✓ |
| Acknowledgement on PI, “$AIABK,666000888,,15,,3*65” | ✓ |

| Message 3 – Initiated by MKD | |
|---|---|
| Requirement | Verdict |
| Interrogation message defined and sent via MKD. MMSI = 666000888 and request type = “POSITION REPORT” | ✓ |
| Message 15 sent over the VDL | ✓ |
| Message 15 contents correct | ✓ |
| Message 3 sent by addressed mobile station (MMSI 666000888) | ✓ |
| Message 3 received by EUT and output on PI | ✓ |
| Acknowledgement on PI, “$AIABK,666000888,,15,,3*65” | ✓ |
| Acknowledgement on MKD, “RESULT:ACK OK” | ✓ |

| Message 5 – Initiated by MKD | |
|---|---|
| Requirement | Verdict |
| Interrogation message defined and sent via MKD. MMSI = 666000888 and request type = ”SHIP STATIC AND VOYAGE(A)” | ✓ |
| Message 15 sent over the VDL | ✓ |
| Message 15 contents correct | ✓ |
| Message 5 sent by addressed mobile station (MMSI 666000888) | ✓ |
| Message 5 received by EUT and output on PI | ✓ |
| Acknowledgement on PI, “$AIABK,666000888,,15,,3*65” | ✓ |
| Acknowledgement on MKD, “RESULT:ACK OK” | ✓ |

a) msg 4, msg 20, msg 22. from base stations

| Message 4 – One Destination | |
|---|---|
| Requirement | Verdict |
| Message “$AIAIR,2222222,4,,,,,,” sent to PI | ✓ |
| Message 15 sent over the VDL | ✓ |
| Message 15 contents correct | ✓ |
| Acknowledgement on PI, “$AIABK,666000888,,15,,3*65” | ✓ |

| Message 20 – One Destination | |
|---|---|
| Requirement | Verdict |
| Message “$AIAIR,2222222,20,,,,,,” sent to PI | ✓ |
| Message 15 sent over the VDL | ✓ |
| Message 15 contents correct | ✓ |
| Acknowledgement on PI, “$AIABK,666000888,,15,,3*65” | ✓ |

| Message 22 – One Destination | |
|---|---|
| Requirement | Verdict |
| Message “$AIAIR,666000888,22,,,,,,” sent to PI | ✓ |
| Message 15 sent over the VDL | ✓ |
| Message 15 contents correct | ✓ |
| Acknowledgement on PI, “$AIABK,666000888,,15,,3*65” | ✓ |

*Interrogation Response – Clause 14.1.3.2*

***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 table13) *(M.1371-4 table 43)* for responses with msg 3, msg 5 and slot offset set to defined value of 10 and also with the slot offset at 0, (auto).

Record transmitted messages and frame structure.

***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.

***Test Results***

| **Message 15 – Requesting message 5 with slot offset = 0** | | |
|---|---|---|
| Requirement | Value | Verdict |
| Verify that the request message 15 is received by the EUT. | Slot = 1833 | ✓ |
| Check that the response VDO is output on the PI. | - | ✓ |
| Check that the response of message 5 is transmitted by EUT. | Slot = 1990 | ✓ |
| Confirm that the response is transmitted on the correct channel. | - | ✓ |

| **Message 15 – Requesting message 5 with slot offset = 10** | | |
|---|---|---|
| Requirement | Value | Verdict |
| Verify that the request message 15 is received by the EUT. | Slot = 1497 | ✓ |
| Check that the response VDO is output on the PI. | - | ✓ |
| Check that the response of message 5 is transmitted by EUT. | Slot = 1507 | ✓ |
| Confirm that the response is transmitted on the correct channel. | - | ✓ |

| **Message 15 – Requesting message 3 with slot offset = 0** | | |
|---|---|---|
| Requirement | Value | Verdict |
| Verify that the request message 15 is received by the EUT. | Slot = 225 | ✓ |
| Check that the response VDO is output on the PI. | - | ✓ |
| Check that the response of message 3 is transmitted by EUT. | Slot = 372 | ✓ |
| Confirm that the response is transmitted on the correct channel. | - | ✓ |

| **Message 15 – Requesting message 5 with slot offset = 20** | | |
|---|---|---|
| Requirement | Value | Verdict |
| Verify that the request message 15 is received by the EUT. | Slot = 1747 | ✓ |
| Check that the response VDO is output on the PI. | - | ✓ |
| Check that the response of message 3 is transmitted by EUT. | Slot = 1767 | ✓ |
| Confirm that the response is transmitted on the correct channel. | - | ✓ |

Addressed Operation – Clause 14.1.4

*Transmit an Addressed Message – Clause 14.1.4.1*

***Method of Measurement***

Set-up standard test environment and operate 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) *(M.1371-4 table 43)* by the EUT.

Record the transmitted messages.

***Required Results***

Check that the EUT transmits the msg 6 as appropriate. Repeat test with the addressed safety related message (msg 12).

***Test Results***

| **Message 6** | |
|---|---|
| Requirement | Verdict |
| Message sent to PI "!AIABM,1,1,0,666000888,1,6,04205@E=B0m<L,2" | ✓ |
| Message transmitted by EUT on channel 1 with sequence number 1 | ✓ |
| Message “TEST MSG” received by addressed station with MMSI = 666000888 | ✓ |
| Message 7 transmitted by addressed station with MMSI = 666000888 | ✓ |
| Acknoweledge message "$AIABK,273000000,A,06,6,0*1B" output on PI. | ✓ |
| Message 7 received on channel 1. | ✓ |

| **Message 12** | |
|---|---|
| Requirement | Verdict |
| Message sent to PI "!AIABM,1,1,0,431100001,1,12,D5CDP=C7,2" | ✓ |
| Message transmitted by EUT on channel 1 with sequence number 1 | ✓ |
| Message “TEST MSG” received by addressed station with MMSI = 666000888 | ✓ |
| Message 13 transmitted by address station with MMSI = 666000888 | ✓ |
| Acknoweledge message "$AIABK,273000000,A,12,7,0*1F" output on PI. | ✓ |
| Message 13 received on channel 1. | ✓ |

*Received Addressed Message – Clause 14.1.4.2*

***Method of Measurement***

Set-up standard test environment and operate 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.

***Required Results***

Check that 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.

***Test Results***

a) EUT outputs the received message via the presentation interface.

| **Message 6 - "61aucimVj46404205@E=B0m<L0"** | |
|---|---|
| Requirement | Verdict |
| EUT outputs the received message via the presentation interface | ✓ |
| Message received correctly and displayed as "TEST MSG" | ✓ |
| Acknowledgement sent by the EUT, (message 7) | ✓ |
| Acknowledgement sent by EUT on the same channel as Message 6 | ✓ |

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

| **Message 6 – "61aucimVj46804205@E=B0m<L0"** | |
|---|---|
| Requirement | Verdict |
| EUT does not output the received message via the presentation interface | ✓ |

## 2.2 MULTIPLE SLOT MESSAGES

### 2.2.1 Specification Reference

IEC 61993-2, Clause 14.2

### 2.2.2 Equipment Under Test

JHS-183, BB50304

### 2.2.3 Date of Test and Modification State

18 June 2012 - Modification State 0

### 2.2.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.2.5 Test Results and Methods of Measurement

5 Slot Messages – Clause 14.2.1

***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).

***Required Results***

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

***Test Results***

| Message 8 | |
|---|---|
| Requirement | Verdict |
| Four messages sent to the PI to transmit message 8:<br>!AIBBM,4,1,0,0,8,04001@PE5DT<d98uLpHuPaDm1<uHE9@PDh5aT@tO37;?CG,0*1B<br>!AIBBM,4,2,0,0,8,KOSU@PE5DT<d98uLpHuPaDm1<uHE9@PDh5aT@tO37;?CGK,0*64<br>!AIBBM,4,3,0,0,8,OSU@PE5DT<d98uLpHuPaDm1<uHE9@PDh5aT@tO37;?CGKO,0*61<br>!AIBBM,4,4,0,0,8,SU@PE5DT<d98uLpHuPaDm1<,2*2D | ✓ |
| Message received by other AIS test unit:<br>!AIVDM,4,1,1,B,86K8@H@0@00521DEB@jhTSmkQSn2UCD4kmQDU21C0FVA3it<,0*2F<br>!AIVDM,4,2,1,B,Ldu=Mev>E21DEB@jhTSmkQSn2UCD4kmQDU21C0FVA3it<Ldu,0*44<br>!AIVDM,4,3,1,B,=Mev>E21DEB@jhTSmkQSn2UCD4kmQDU21C0FVA3it<Ldu=Me,0*0D<br>!AIVDM,4,4,1,B,v>E21DEB@jhTSmkQSn2UCD4h,0*4A | ✓ |

Longer Messages – Clause 14.2.2

***Method of Measurement***

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

**Required results**

Check that the message is not transmitted. Check that a negative acknowledgement is given on the presentation interface.

***Test Results***

| Message 8 | |
|---|---|
| Requirement | Verdict |
| Five messages sent to the PI to transmit message 8:<br>!AIBBM,4,1,0,0,8,04001@PE5DT<d98uLpHuPaDm1<uHE9@PDh5aT@tO37;?CG,0*1B<br>!AIBBM,4,2,0,0,8,KOSU@PE5DT<d98uLpHuPaDm1<uHE9@PDh5aT@tO37;?CGK,0*64<br>!AIBBM,4,3,0,0,8,OSU@PE5DT<d98uLpHuPaDm1<uHE9@PDh5aT@tO37;?CGKO,0*61<br>!AIBBM,4,4,0,0,8,SU@PE5DT<d98uLpHuPaDm1<uH,2*10 | ✓ |
| No VDO message appears on the PI | ✓ |
| Acknowledgment states message could not be broadcast, "$AIABK,,,8,0,2*56" | ✓ |
| Message not transmitted | ✓ |

## 2.3 INFORMATION CONTENT

### 2.3.1 Specification Reference

IEC 61993-2, Clause 14.3

### 2.3.2 Equipment Under Test

JHS-183, BB50304

### 2.3.3 Date of Test and Modification State

06 July 2012 - Modification State 1

### 2.3.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.3.5 Test Results and Methods of Measurement

***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.

***Required results***

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

***Test Results***

| **Message 1** | |
|---|---|
| Requirement | Verdict |
| MMSI = 431100001 | ✓ |
| Nav. Status set to “UNDER WAY USING ENGINE” using MKD. | ✓ |
| ROT | ✓ |
| SOG | ✓ |
| Position Accuracy | ✓ |
| Longitude and Latitude | ✓ |
| COG | ✓ |
| True Heading | ✓ |
| Time Stamp | ✓ |
| Special manoeuvre indicator | ✓ |
| Spare | ✓ |
| RAIM-flag | ✓ |
| Communication state | ✓ |
| Comments | |
| Internal GPS used with no external sensors connected. | |

| **Message 1 – Changes to Navigation Status** |
|---|

| Requirement | Verdict |
|---|---|
| Nav. Status set to “UNDER WAY USING ENGINE” using MKD.<br>Navigation Status in Message 1 = 0. | ✓ |
| Nav. Status set to “AT ANCHOR” using MKD.<br>Navigation Status in Message 1 = 1. | ✓ |
| Nav. Status set to “NOT UNDER COMMAND” using MKD.<br>Navigation Status in Message 1 = 2. | ✓ |
| Nav. Status set to “RESTRICTED MANOUVERABILITY” using MKD.<br>Navigation Status in Message 1 = 3. | ✓ |
| Nav. Status set to “CONSTRAINED BY DRAUGHT” using MKD.<br>Navigation Status in Message 1 = 4. | ✓ |
| Nav. Status set to “MOORED” using MKD.<br>Navigation Status in Message 1 = 5. | ✓ |
| Nav. Status set to “AGROUND” using MKD.<br>Navigation Status in Message 1 = 6. | ✓ |
| Nav. Status set to “ENGAGED IN FISHING” using MKD.<br>Navigation Status in Message 1 = 7. | ✓ |
| Nav. Status set to “UNDERWAY SAILING” using MKD.<br>Navigation Status in Message 1 = 8. | ✓ |
| Nav. Status set to “RESERVED FOR HSC” using MKD.<br>Navigation Status in Message 1 = 9. | ✓ |
| Nav. Status set to “RESERVED FOR WIG” using MKD.<br>Navigation Status in Message 1 = 10. | ✓ |
| Nav. Status set to “NOT DEFINED” using MKD.<br>Navigation Status in Message 1 = 15. | ✓ |

| **Message 5** | |
|---|---|
| Requirement | Verdict |
| MMSI = 431100001 | ✓ |
| AIS Version indicator = 1 | ✓ |
| IMO Number set to 977654321 | ✓ |
| Call sign set to ABCDEF | ✓ |
| Name set to EUT | ✓ |
| Type of ship = “PASSENGER SHIPS”, cargo type = “CATEGORY X” . Ship Type = 61 | ✓ |
| Type of ship = “PASSENGER SHIPS”, cargo type = “CATEGORY Y” . Ship Type = 62 | ✓ |
| Overall dimension/reference points for position – using internal GPS | ✓ |
| Overall dimension/reference points for position – using external GPS | ✓ |
| Type of electronic position fixing device - External GPS. Type of EPFS = 1 | ✓ |
| Type of electronic position fixing device – Internal GPS. Type of EPFS = 15 | ✓ |
| Type of electronic position fixing device – GLONASS | ✓ |
| Type of electronic position fixing device – Combined GPS/GLONASS | ✓ |
| Type of electronic position fixing device – Loran-C | ✓ |
| Type of electronic position fixing device – Integrated navigation system | ✓ |
| Type of electronic position fixing device – Galileo | ✓ |
| ETA verified against MKD | ✓ |
| Maximum present static draught – Set to 12.3m on MKD | ✓ |
| Destination set to “TOKYO” | ✓ |
| DTE – with DTE on, check the flag is set to 0 (available) | ✓ |
| Comments | |
| EUT cannot be used without MKD, therefore DTE set to 1 was not verified. | |

## 2.4 REPORTING RATES

### 2.4.1 Specification Reference

IEC 61993-2, Clause 14.4

### 2.4.2 Equipment Under Test

JHS-183, BB50304

### 2.4.3 Date of Test and Modification State

06 and 08 June and 31 July 2012- Modification State 0 & 2

### 2.4.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.4.5 Test Results and Methods of Measurement

Speed and Course Change – Clause 14.4.1 (Modification State 0)

(6.5.2)

***Method of Measurement***

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

a) Start with own speed of 10kn; record all messages on VDL for 10min 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. *(ITU-R M.1371-4 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.

***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 4 min (speed reduction) or 20 s (ROT reduction).
d) Check that with unavailable sensors the reporting rate reverts to default values (10 s if no sensor connected).

***Test Results***

| Speed of 10kn | | |
|---|---|---|
| Requirement | Result | Verdict |
| With a speed of 10kn, the reporting rate (Rr) shall be 10s (±10%) over 10 minutes, every 375 slots. | Min Rr = 8.1 s<br>Max Rr = 11.28 s<br>Average Rr = 10.01 s | ✓ |

| Speed increase to 15kn | | |
|---|---|---|
| Requirement | Result | Verdict |
| New slots shall be allocated with message 3 | Allocation with Message 3 | ✓ |
| Message 3 shall begin within 2 transmissions | Next transmission | ✓ |
| Message 1 shall be transmitted after 1 frame | 1 frame | ✓ |
| The reporting rate shall be 6 seconds, every 225 slots | Min Rr = 5.04 s<br>Max Rr = 7.067 s<br>Average Rr = 5.996 s | |

| Speed increase to 25kn | | |
|---|---|---|
| Requirement | Result | Verdict |
| New slots shall be allocated with message 3 | Allocation with Message 3 | ✓ |
| Message 3 shall begin within 2 transmissions | Next transmission | ✓ |
| Message 1 shall be transmitted after 1 frame | 1 frame | ✓ |
| The reporting rate shall be 2 seconds, every 75 slots | Min Rr = 1.6 s<br>Max Rr = 2.4 s<br>Average Rr = 2 s | ✓ |

| Speed decreased to 15kn | | |
|---|---|---|
| Requirement | Result | Verdict |
| Check slot de-allocation | Timeout set to zero | ✓ |
| Slot de-allocation shall not start until 3 minutes after the speed is changed | De-allocation starts at the beginning of the next frame after 3 minutes. | ✓ |
| The reporting rate shall be established within one frame | One frame | ✓ |
| The reporting rate shall be 6 seconds, every 225 slots | Min Rr = 4.907 s<br>Max Rr = 6.88 s<br>Average Rr = 6.007 s | ✓ |

| Speed decreased to 10kn | | |
|---|---|---|
| Requirement | Result | Verdict |
| Check slot de-allocation | Timeout set to zero | ✓ |
| Slot de-allocation shall not start until 3 minutes after the speed is changed | De-allocation starts at the beginning of the next frame after 3 minutes. | ✓ |
| The reporting rate shall be established within one frame | One frame | ✓ |
| The reporting rate shall be 10 seconds, every 375 slots | Min Rr = 8.987 s<br>Max Rr = 10.827 s<br>Average Rr = 10.011 s | ✓ |

| Heading Change | |
|---|---|
| Requirement | Verdict |
| No change to reporting rate when heading change: 0° to 359° | ✓ |
| No change to reporting rate when heading change: 359° to 0° | ✓ |
| **Heading Change – Speed of 10kn** | |
| Requirement | Verdict |
| Reporting rate is 10s | ✓ |
| Heading increased by 12°: Message 3 used for new report rate | ✓ |
| New rate is established immediately | ✓ |
| New reporting rate shall be 3 1/3 seconds, every 125 slots | ✓ |
| Cease increase of heading: cessation of message 3 | ✓ |
| New reporting rate established | ✓ |
| The reporting rate shall be 10 seconds, every 225 slots | ✓ |
| **Heading Change – Speed of 15kn** | |
| Requirement | Verdict |
| Reporting rate is 6s | ✓ |
| Heading decreased by 12°: Message 3 used for new report rate | ✓ |
| New rate is established immediately | ✓ |
| New reporting rate shall be 2 seconds, every 75 slots | ✓ |
| Cease decrease of heading: cessation of message 3 | ✓ |
| New reporting rate established | ✓ |
| The reporting rate shall be 6 seconds, every 225 slots | ✓ |
| **Heading Change – Speed of 25kn** | |
| Requirement | Verdict |
| Message 1 providing position reports at 2s reporting rate | ✓ |
| Heading increased by 12°: no change to reporting rate | ✓ |
| Heading decreased by 12°: no change to reporting rate | ✓ |

| Sensors Information Unavailable | |
|---|---|
| Requirement | Verdict |
| Speed at 15kn with a reporting rate of 6 seconds | ✓ |
| Reporting rate reverts to default reporting rate of 10 seconds | ✓ |

Change of Navigation Status – Clause 14.4.2 (Modification State 0)

***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 kn
b) Set NavStatus to “at anchor” and speed >3 kn
c) Set NavStatus to other values

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

***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).

***Test Results***

| Requirement | Verdict |
|---|---|
| Navigation status = 1 (at anchor), speed = 1kn. Check reporting rate is 3 minutes | ✓ |
| Navigation status = 1 (at anchor), speed = 4kn. Check reporting rate is 10 seconds | ✓ |
| Navigation status = 1 (at anchor), speed = 15kn. Check reporting rate is 10 seconds | ✓ |
| Navigation status = 1 (at anchor), speed = 25kn. Check reporting rate is 10 seconds | ✓ |
| Navigation status = 2 (not under command), speed = 2kn. Check reporting rate is 3 minutes | ✓ |
| Navigation status = 3 (restricted manoeuvrability), speed = 2kn. Check reporting rate is 10 seconds | ✓ |
| Navigation status = 4 (constrained by draught), speed = 2kn. Check reporting rate is 10 seconds | ✓ |
| Navigation status = 5 (moored), speed = 2kn. Check reporting rate is 3 minutes | ✓ |
| Navigation status = 6 (aground), speed = 2kn. Check reporting rate is 3 minutes | ✓ |
| Navigation status = 7 (fishing), speed = 2kn. Check reporting rate is 10 seconds | ✓ |
| Navigation status = 8 (sailing), speed = 2kn. Check reporting rate is 10 seconds | ✓ |
| Check that when the vessel is at anchor, moored, not under command or aground, message 3 is interleaved three minutes after message 5 | ✓ |

| Requirement | Verdict |
|---|---|
| Navigation status = 0, speed = 2kn. Check reporting rate is 10 seconds | ✓ |
| Navigation status = 1, speed = 2kn. Verify that used slots are release by time-out 0 and slot offset = 0k | ✓ |
| Record if the slots are forced to time-out 0 or if they are released after count down to 0 | ✓ |
| Comments | |
| Slot time out values set to 0. | |
| Requirement | Verdict |
| Check that the position reports are transmitted in RATDMA mode using message 3 | ✓ |
| Navigation status = 0. Check that a procedure like network entry is performed | ✓ |

Assigned Reporting Rates – Clause 14.4.3 (Modification State 2)

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.

***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.

***Test Results***

Part a) Initial slot offset and increment.

| Test 1 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Step | Description | EUT Input | | | | Assigned Mode Command | | | Result | |
| | | Nav Status | SOG | Heading | Rr | Offset | Inc | Rate | Rr | Verdict |
| 1 | Set EUT Rr | 0 | 2 kn | 0°/min | 10 s | - | - | - | 10 s | Pass |
| 2 | Send Assigned Mode Cmd | 0 | 2 kn | 0°/min | 10 s | 50 | 5 | 2 s | 2 s | Pass |
| 3 | Try to increase EUT Rr | 0 | 15 kn | 0°/min | 6 s | - | - | - | 2 s | Pass |
| 4 | Return to autonomous | 0 | 15 kn | 0°/min | 6 s | - | - | - | 6 s | Pass |

| Test 2 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Step | Description | EUT Input | | | | Assigned Mode Command | | | Result | |
| | | Nav Status | SOG | Heading | Rr | Offset | Inc | Rate | Rr | Verdict |
| 1 | Set EUT Rr | 0 | 2 kn | 0°/min | 10 s | - | - | - | 10 s | Pass |
| 2 | Send Assigned Mode Cmd | 0 | 2 kn | 0°/min | 10 s | 50 | 5 | 2 s | 2 s | Pass |
| 3 | Try to decrease EUT Rr | 1 | 2 kn | 0°/min | 3 min | - | - | - | 2 s | Pass |
| 4 | Return to autonomous | 1 | 2 kn | 0°/min | 3 min | - | - | - | 3 min | Pass |

| Test 3 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Step | Description | EUT Input | | | | Assigned Mode Command | | | Result | |
| | | Nav Status | SOG | Heading | Rr | Offset | Inc | Rate | Rr | Verdict |
| 1 | Set EUT Rr | 0 | 2 kn | 0°/min | 10 s | - | - | - | 10 s | Pass |
| 2 | Send Assigned Mode Cmd | 0 | 2 kn | 0°/min | 10 s | 50 | 5 | 2 s | 2 s | Pass |
| 3 | Try to increase EUT Rr | 0 | 2 kn | 20°/min | 3.3 s | - | - | - | 2 s | Pass |
| 4 | Return to autonomous | 0 | 2 kn | 20°/min | 3.3 s | - | - | - | 3.3 s | Pass |

| Test 4 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Step | Description | EUT Input | | | | Assigned Mode Command | | | Result | |
| | | Nav Status | SOG | Heading | Rr | Offset | Inc | Rate | Rr | Verdict |
| 1 | Set EUT Rr | 0 | 2 kn | 0°/min | 10 s | - | - | - | 10 s | Pass |
| 2 | Send Assigned Mode Cmd | 0 | 2 kn | 0°/min | 10 s | 50 | 3 | 6 s | 6 s | Pass |
| 3 | Try to increase EUT Rr | 0 | 2 kn | 20°/min | 3.3 s | - | - | - | 2 s* | Pass |
| 4 | Return to autonomous | 0 | 2 kn | 20°/min | 3.3 s | - | - | - | 3.3 s | Pass |
| * The resultant rate is higher than required Rr. This is allowed according to M.1371-4 clause 4.3.1.2, because two additional Messages 3s have to be inserted between the assigned Message 2s. | | | | | | | | | | |

| Test 5 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Step | Description | EUT Input | | | | Assigned Mode Command | | | Result | |
| | | Nav Status | SOG | Heading | Rr | Offset | Inc | Rate | Rr | Verdict |
| 1 | Set EUT Rr | 0 | 2 kn | 0°/min | 10 s | - | - | - | 10 s | Pass |
| 2 | Send Assigned Mode Cmd | 0 | 2 kn | 0°/min | 10 s | 50 | 3 | 6 s | 6 s | Pass |
| 3 | Try to increase EUT Rr | 0 | 25 kn | 0°/min | 2 s | - | - | - | 2 s | Pass |
| 4 | Return to autonomous | 0 | 25 kn | 0°/min | 2 s | - | - | - | 2 s | Pass |

| Requirement | Verdict |
|---|---|
| EUT transmits position reports message 2 after assigned mode command. | ✓ |
| The reporting rate is unaffected when the course is changed and a lower reporting rate is required. | ✓ |
| The reporting rate changes when the course is changed and a higher reporting rate is required. | ✓ |
| The reporting rate is unaffected when speed is changed and a lower reporting rate is required. | ✓ |
| The reporting rate changes when the speed is changed and a higher reporting rate is required. | ✓ |
| Reporting rate unaffected when NavStatus is changed | ✓ |
| EUT reverts to message 1 or 3 in autonomous mode with standard reporting rate after 4 – 8 minutes | ✓ |

Part b) Designated reporting rate

| Test 1 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Step | Description | EUT Input | | | | Assigned Mode Command | | | Result | |
| | | Nav Status | SOG | Heading | Rr | Offset | Inc | Rate | Rr | Verdict |
| 1 | Set EUT Rr | 0 | 2 kn | 0°/min | 10 s | - | - | - | 10 s | Pass |
| 2 | Send Assigned Mode Cmd | 0 | 2 kn | 0°/min | 10 s | 300 | 0 | 2 s | 2 s | Pass |
| 3 | Try to increase EUT Rr | 0 | 15 kn | 0°/min | 6 s | - | - | - | 2 s | Pass |
| 4 | Return to autonomous | 0 | 15 kn | 0°/min | 6 s | - | - | - | 6 s | Pass |

| Test 2 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Step | Description | EUT Input | | | | Assigned Mode Command | | | Result | |
| | | Nav Status | SOG | Heading | Rr | Offset | Inc | Rate | Rr | Verdict |
| 1 | Set EUT Rr | 0 | 2 kn | 0°/min | 10 s | - | - | - | 10 s | Pass |
| 2 | Send Assigned Mode Cmd | 0 | 2 kn | 0°/min | 10 s | 300 | 0 | 2 s | 2 s | Pass |
| 3 | Try to decrease EUT Rr | 1 | 2 kn | 0°/min | 3 min | - | - | - | 2 s | Pass |
| 4 | Return to autonomous | 1 | 2 kn | 0°/min | 3 min | - | - | - | 3 min | Pass |

| Test 3 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Step | Description | EUT Input | | | | Assigned Mode Command | | | Result | |
| | | Nav Status | SOG | Heading | Rr | Offset | Inc | Rate | Rr | Verdict |
| 1 | Set EUT Rr | 0 | 2 kn | 0°/min | 10 s | - | - | - | 10 s | Pass |
| 2 | Send Assigned Mode Cmd | 0 | 2 kn | 0°/min | 10 s | 300 | 0 | 2 s | 2 s | Pass |
| 3 | Try to increase EUT Rr | 0 | 2 kn | 20°/min | 3.3 s | - | - | - | 2 s | Pass |
| 4 | Return to autonomous | 0 | 2 kn | 20°/min | 3.3 s | - | - | - | 3.3 s | Pass |

| Test 4 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Step | Description | EUT Input | | | | Assigned Mode Command | | | Result | |
| | | Nav Status | SOG | Heading | Rr | Offset | Inc | Rate | Rr | Verdict |
| 1 | Set EUT Rr | 0 | 2 kn | 0°/min | 10 s | - | - | - | 10 s | Pass |
| 2 | Send Assigned Mode Cmd | 0 | 2 kn | 0°/min | 10 s | 100 | 0 | 6 s | 6 s | Pass |
| 3 | Try to increase EUT Rr | 0 | 2 kn | 20°/min | 3.3 s | - | - | - | 2 s* | Pass |
| 4 | Return to autonomous | 0 | 2 kn | 20°/min | 3.3 s | - | - | - | 3.3 s | Pass |
| * The resultant rate is higher than required Rr. This is allowed according to M.1371-4 clause 4.3.1.2, because two additional Messages 3s have to be inserted between the assigned Message 2s. | | | | | | | | | | |

| Test 5 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Step | Description | EUT Input | | | | Assigned Mode Command | | | Result | |
| | | Nav Status | SOG | Heading | Rr | Offset | Inc | Rate | Rr | Verdict |
| 1 | Set EUT Rr | 0 | 2 kn | 0°/min | 10 s | - | - | - | 10 s | Pass |
| 2 | Send Assigned Mode Cmd | 0 | 2 kn | 0°/min | 10 s | 100 | 3 | 6 s | 6 s | Pass |
| 3 | Try to increase EUT Rr | 0 | 25 kn | 0°/min | 2 s | - | - | - | 2 s | Pass |
| 4 | Return to autonomous | 0 | 25 kn | 0°/min | 2 s | - | - | - | 2 s | Pass |

| Requirement | Verdict |
|---|---|
| EUT transmits position reports message 2, after allocation, following the assigned mode command. | ✓ |
| The reporting rate is unaffected when the course is changed and a lower reporting rate is required. | ✓ |
| The reporting rate changes when the course is changed and a higher reporting rate is required. | ✓ |
| The reporting rate is unaffected when speed is changed and a lower reporting rate is required. | ✓ |
| The reporting rate changes when the speed is changed and a higher reporting rate is required. | ✓ |
| Reporting rate unaffected when NavStatus is changed | ✓ |
| EUT reverts to message 1 or 3 in autonomous mode with standard reporting rate after 4 – 8 minutes | ✓ |

Static Data Reporting Rates – Clause 14.4.4 (Modification State 0)

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).

***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.

***Test Results***

| Requirement | Verdict |
|---|---|
| EUT transmits message 5 at a reporting rate of 6 minutes | ✓ |
| Static data changed using MKD and EUT transmits message within 1 minute | ✓ |
| SSD sentence used to change Static data and EUT transmits message within 1 minute | ✓ |
| VSD sentence used to change Static data and EUT transmits message within 1 minute | ✓ |
| EUT reverts to a reporting rate of 6 minutes after changing Static data using MKD | ✓ |
| EUT reverts to a reporting rate of 6 minutes after changing Static data using SSD sentence | ✓ |
| EUT reverts to a reporting rate of 6 minutes after changing Static data using VSD sentence | ✓ |
| Comments | |
| VSD Sentence applied : $AIVSD,,1.8,,,,,,,<br>SSD Sentence applied : $AISSD,,TUV,,,,,, | |

## 2.5 SECURITY

### 2.5.1 Specification Reference

IEC 61993-2, Clause 14.5

### 2.5.2 Equipment Under Test

JHS-183, BB50304

### 2.5.3 Date of Test and Modification State

22 June 2012 - Modification State 0

### 2.5.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.5.5 Test Results and Methods of Measurement

***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.

***Required results***

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

***Test Results***

| Requirement | Verdict |
|---|---|
| Confirm that the EUT records and displays the times and events correctly. | ✓ |
| Comments | |
| In the 'MAINTENENCE' menu, the sub menu 'EVENT LOG' shows the power off and power on times and dates. | |

## 2.6 INITIALISATION PERIOD

### 2.6.1 Specification Reference

IEC 61993-2, Clause 14.6

### 2.6.2 Equipment Under Test

JHS-183, BB50304

### 2.6.3 Date of Test and Modification State

01 June 2012 - Modification State 0

### 2.6.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.6.5 Test Results and Methods of Measurement

***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.

***Required results***

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

***Test Results***

| Requirement | Verdict |
|---|---|
| a) Verify that the EUT transmits within 2 minutes after switching on | ✓ |
| b) Verify that the EUT transmits within 2 minutes after switching off for 0.5 s | ✓ |
| Verify that when no MMSI is entered, the EUT does not transmit. This was achieved by setting the MMSI to all zeros. | ✓ |

## 2.7 CHANNEL SELECTION

### 2.7.1 Specification Reference

IEC 61993-2, Clause 14.7

### 2.7.2 Equipment Under Test

JHS-183, BB50304

### 2.7.3 Date of Test and Modification State

14 June 2012 - Modification State 0

### 2.7.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.7.5 Test Results and Methods of Measurement

(6.9)

***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 25kHz and 12.5kHz channel spacing (incl. 12.5kHz emission on a 25kHz channel):

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

Record the VDL messages.

***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***

12.5 kHz bandwidth is no longer applicable according to ITU-R M.1373-3 onwards.

a) Manually

| Requirement | Verdict |
|---|---|
| Verify the channel frequencies with channels A and B set to 2066 and 2086 | ✓ |
| Check that the bandwidth is 25kHz | ✓ |
| Verify TXT output. The following message was output on the PI: "$AITXT,01,01,36,Channel management parameters changed*5D" | ✓ |
| Verify ACA output. The following message was output on the PI: "$AIACA,6,,,,,,,,1,2066,0,2087,0,0,0,N,1,101459.00*36" | ✓ |

b) By transmission of channel management message

| Requirement | Verdict |
|---|---|
| Verify the channel frequencies with channels A and B set to 2088 and 2060 | ✓ |
| Check that the bandwidth is 25kHz | ✓ |
| Verify TXT output. The following message was output on the PI: "$AITXT,01,01,36,Channel management parameters changed*5D" | ✓ |
| Verify ACA output. The following message was output on the PI: "$AIACA,8,5200.0,N,00200.0,W,5000.0,N,00300.0,W,1,2088,0,2060,0,0,1,B,1,103300.00*36" | ✓ |

c) By application of ACA sentence to the presentation interface

| **$AIACA,0,5200.0,N,00100.0,W,5000.0,N,00300.0,W,5,2078,0,2062,0,0,0,C,,** | |
|---|---|
| Requirement | Verdict |
| Verify the channel frequencies with channels A and B set to 2078 and 2062 | ✓ |
| Check that the bandwidth is 25kHz | ✓ |
| Verify TXT output. The following message was output on the PI: "$AITXT,01,01,36,Channel management parameters changed*5D" | ✓ |
| Verify ACA output. The following message was output on the PI:: "$AIACA,0,5200.0,N,00100.0,W,5000.0,N,00300.0,W,5,2078,0,2062,0,0,0,C,1,110005.00*30" | ✓ |

d) By transmission of DSC telecommand to EUT

| Requirement | Verdict |
|---|---|
| Verify the channel frequencies with channels A and B set to 2084 and 2065 | ✓ |
| Check that the bandwidth is 25kHz | ✓ |
| Verify TXT output. The following message was output on the PI: "$AITXT,01,01,36,Channel management parameters changed*5D" | ✓ |
| Verify ACA output. The following message was output on the PI: "$AIACA,4,5200.0,N,00100.0,W,5000.0,N,00300.0,W,5,2084,0,2065,0,0,0,D,1,111840.00*3F" | ✓ |

## 2.8 TRANSCEIVER PROTECTION

### 2.8.1 Specification Reference

IEC 61993-2, Clause 14.8

### 2.8.2 Equipment Under Test

JHS-183, BB50304

### 2.8.3 Date of Test and Modification State

08 June 2012 - Modification State 0

### 2.8.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.8.5 Test Results and Methods of Measurement

***Method of measurement***

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

***Required results***

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

***Test Results***

| Requirement | Verdict |
|---|---|
| Open circuit the VHF-antenna terminals | ✓ |
| The EUT starts transmission again within 2 minutes | ✓ |
| Short circuit the VHF-antenna terminals | ✓ |
| The EUT starts transmission again within 2 minutes | ✓ |

## 2.9 ALARMS AND INDICATOR, FALL-BACK ARRANGEMENTS

### 2.9.1 Specification Reference

IEC 61993-2, Clause 14.9

### 2.9.2 Equipment Under Test

JHS-183, BB50304 & BB00006

### 2.9.3 Date of Test and Modification State

19 June 2012 - Modification State 0 and 3

### 2.9.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.9.5 Test Results and Methods of Measurement

Loss of Power – Clause 14.9.1 (Modification State 0)

(6.10.2.3)

***Method of measurement***

Disconnect power supplies of the EUT.

***Required results***

Verify that the relay output is “active” when the power is “off”.

***Test Results***

| Requirement | Verdict |
|---|---|
| Power supply disconnected | ✓ |
| Alarm relay output is active | ✓ |
| Comments | |
| The alarm relay consists of two connections on the interface board which are shorted when an alarm is generated. | |

Monitoring of Functions and Integrity – Clause 14.9.2

(6.10.2)

*Tx Malfunction – Clause 14.9.2.1* (Modification State 3)

***Method of measurement***

Disable the transmitter by disconnecting the antenna.

***Required results***

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.

***Test Results***

| Requirement | Verdict |
|---|---|
| Transmitter antenna disconnected | ✓ |
| Confirm that an alarm message appears on the PI with ID = 001:<br>"$AIALR,071208.00,001,A,V,Tx malfunction*11" | ✓ |
| Confirm that the alarm relay connection is shorted. | ✓ |
| Confirm alarm shown on MKD | ✓ |
| Confirm the ALR sentence is repeated every 30 seconds | ✓ |
| Check that transmission is stopped. | ✓ |
| Confirm that the alarm message acknowledge state field changes when the alarm is acknowledged on the MKD:<br>"$AIALR,071208.00,001,A,A,Tx malfunction*06" | ✓ |
| Alarm relay connection is opened after ack. | ✓ |
| Transmitter antenna reconnected | ✓ |
| Confirm that the alarm message acknowledge state field changes when the antenna is reconnected:<br>"$AIALR,071907.00,001,V,A,Tx malfunction*15" | ✓ |
| Check that transmission is resumed. | ✓ |

*Antenna VSWR – Clause 14.9.2.2* (Modification State 3)

***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 at the rated output power.

***Required results***

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.

***Test Results***

| Requirement | Verdict |
|---|---|
| Connect a mismatch to the antenna to create a VSWR of 3:1 | ✓ |
| Confirmation that an alarm message appears on the PI with an ID of 002:<br>$AIALR,072938.00,002,A,V,Antenna VSWR exceeds limit*14 | ✓ |
| Confirm that the alarm relay connection is shorted, indicating a failure state | ✓ |
| Confirm alarm shown on MKD | ✓ |
| Confirm that the EUT continues to transmit | ✓ |
| Confirm the ALR sentence is repeated every 30 seconds | ✓ |
| Confirm that the alarm message acknowledge state field changes when the alarm is acknowledged on the MKD:<br>$AIALR,072938.00,002,A,A,Antenna VSWR exceeds limit*03 | ✓ |
| Alarm relay output light turns on, indicating the failure has been acknowledged | ✓ |
| Antenna reconnected and the alarm state changes back to OK:<br>$AIALR,073359.00,002,V,A,Antenna VSWR exceeds limit*18 | ✓ |

*Rx Malfunction – Clause 14.9.2.3*

***Method of measurement***

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

***Test Results***

| Requirement | Verdict |
|---|---|
| Manufacturer has provided a description, see Annex A. | ✓ |

*Loss of UTC – Clause 14.9.2.4* (Modification State 0)

***Method of measurement***

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

***Required results***

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.

***Test Results***

| Requirement | Verdict |
|---|---|
| GNSS Antenna removed | ✓ |
| Confirm the EUT continues operation | ✓ |
| Confirm that the EUT changes to indirect synchronisation, sync state = 1 | ✓ |
| TXT-Sentence output on PI:<br>“$AITXT,01,01,07,UTC clock lost*79” | ✓ |
| Confirm that the relay output is not activated | ✓ |

*Remote MKD Disconnection, When so Configured – Clause 14.9.2.5*

***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.

***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.

***Test Results***

| Comments |
|---|
| This test is not applicable as a remote MKD cannot be connected to the EUT |

Monitoring of Sensor Data – Clause 14.9.3

(6.10.3)

*Priority of position sensors – Clause 14.9.3.1*

***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.

***Required results***

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.

***Test Results***

Switching Upwards

| Section (f) - No external GNSS input, No internal GNSS input | |
|---|---|
| Requirement | Verdict |
| Default position used in position report | ✓ |
| Position Accuracy Flag = 0 | ✓ |
| RAIM flag = 0 | ✓ |
| ALR Message = ID 026, (no sensor position in use), output to PI every 30 seconds | ✓ |
| Alarm on MKD = ALR ID 026 | ✓ |
| MKD displays no GPS data | ✓ |

| Section (e) - No external GNSS input, internal GNSS input | |
|---|---|
| Requirement | Verdict |
| Verify Status changes after 30 seconds | ✓ |
| Internal GPS position used in position report | ✓ |
| Position Accuracy Flag = 0 | ✓ |
| RAIM Flag = 0 | ✓ |
| Message 5 output with internal reference position | ✓ |
| ALR message ID 026 is cleared | ✓ |
| TXT sentence = ID 025 (internal GNSS in use) and ID 028 (internal SOG/COG in use) output to PI. | ✓ |
| MKD displays position data from internal GPS | ✓ |

| Section (d) - External GNSS input, internal GNSS input | |
|---|---|
| Requirement | Verdict |
| Status changes after 30 seconds | ✓ |
| External GPS position used in position report | ✓ |
| Position accuracy flag = 0 | ✓ |
| RAIM Flag = 0 | ✓ |
| Message 5 output with external reference | ✓ |
| ALR message ID 025 (external EPFS Lost) is cleared | ✓ |
| TXT Sentence = ID 022 (external GNSS in use) and ID 027 (external SOG/COG in use), output to PI | ✓ |
| MKD displays position data from external GPS | ✓ |

| Section (c) – External GNSS input, internal DGNSS input with correction data by beacon | |
|---|---|
| Requirement | Verdict |
| Status changes after 30 seconds | ✓ |
| Internal GPS position used in position report | ✓ |
| Position accuracy flag = 1 | ✓ |
| RAIM Flag = 0 | ✓ |
| Message 5 output with new internal reference point | ✓ |
| TXT sentence ID 023 (internal DGNSS in use (beacon) and ID 028 (internal SOG/COG in use) output to PI | ✓ |
| MKD displays position data from internal GPS | ✓ |

| Section (b) - External GNSS input , internal DGNSS input with correction data by Msg 17 | |
|---|---|
| Requirement | Verdict |
| Verify Status changes after 30 seconds | ✓ |
| Internal GPS position used in position report | ✓ |
| Position Accuracy Flag =1 | ✓ |
| RAIM Flag = 0 | ✓ |
| TXT sentence = ID 024 (internal DGNSS in use (message 17) and ID 028 (internal SOG/COG in use) output to PI | ✓ |

| Section (a) - External DGNSS input, internal GNSS input | |
|---|---|
| Requirement | Verdict |
| Status changed after 30 seconds | ✓ |
| External GPS position used in position report | ✓ |
| Position accuracy flag = 1 | ✓ |
| RAIM Flag = 0 | ✓ |
| TXT Sentence = ID 021 (external DGNSS in use) output to PI | ✓ |
| MKD displays position data from external GPS | ✓ |

Switching Downwards

| Section (a) - External DGNSS input, internal GNSS input | |
|---|---|
| Requirement | Verdict |
| External GPS position used in position report | ✓ |
| Position accuracy flag = 1 | ✓ |
| RAIM Flag = 1/0 | ✓ |
| TXT Sentence = ID 021 (external DGNSS in use) output to PI | ✓ |
| MKD displays position data from external GPS | ✓ |

| Section (b) - External GNSS input, internal DGNSS input with correction data by Msg 17 | |
|---|---|
| Requirement | Verdict |
| Internal GPS position used in position report | ✓ |
| Position Accuracy Flag =1 | ✓ |
| RAIM Flag = 0 | ✓ |
| Message 5 output with new internal reference point | ✓ |
| TXT sentence = ID 024 (internal DGNSS in use (message 17) and ID 028 (internal SOG/COG in use) output to PI | ✓ |
| Internal GPS position used in position report | ✓ |
| Verify Status changes after 5 seconds | ✓ |

| Section (c) – External GNSS input, internal DGNSS input with correction data by beacon | |
|---|---|
| Requirement | Verdict |
| Internal GPS position used in position report | ✓ |
| Position accuracy flag = 1 | ✓ |
| RAIM Flag = 0 | ✓ |
| TXT sentence ID 023 (internal DGNSS in use (beacon) and ID 028 (internal SOG/COG in use) output to PI | ✓ |
| MKD displays position data from internal GPS | ✓ |
| Verify Status changes after 5 seconds | ✓ |

| Section (d) - External GNSS (from DGNSS) input, internal GNSS input | |
|---|---|
| Requirement | Verdict |
| External GPS position used in position report | ✓ |
| Position accuracy flag = 0 | ✓ |
| RAIM Flag = 0 | ✓ |
| Message 5 output with external reference | ✓ |
| TXT Sentence = ID 022 (external GNSS in use) and ID 027 (external SOG/COG in use), output to PI | ✓ |
| MKD displays position data from external GPS | ✓ |
| Verify Status changes after 5 seconds | ✓ |

| Section (e) - No external GNSS input, internal GNSS input | |
|---|---|
| Requirement | Verdict |
| Internal GPS position used in position report | ✓ |
| Position Accuracy Flag = 0 | ✓ |
| RAIM Flag = 0 | ✓ |
| Message 5 output with internal reference position | ✓ |
| TXT sentence = ID 025 (internal GNSS in use) and ID 028 (internal SOG/COG in use) output to PI. | ✓ |
| MKD displays position data from internal GPS | ✓ |
| Status changed after 5 seconds | ✓ |

| Section (f) - No external GNSS input, No internal GNSS input | |
|---|---|
| Requirement | Verdict |
| Default position used in position report | ✓ |
| Position Accuracy Flag = 0 | ✓ |
| RAIM flag = 0 | ✓ |
| ALR Message = ID 026, (no sensor position in use), output to PI every 30 seconds | ✓ |
| Alarm on MKD = ALR ID 026 | ✓ |
| MKD displays no GPS data | ✓ |
| Status changes after 5 seconds | ✓ |

Heading Sensor – Clause 14.9.4 (Modification State 0)

(6.10.3.3)

***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 seconds
d) Reconnect the ROT input

***Required results***

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 an alarm sentence ALR with alarm ID 031 for valid HDG and ID 033 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.

***Test Results***

| **a) Disconnect the inputs for HDG and ROT** | |
|---|---|
| Requirement | Verdict |
| Confirm that an alarm sentence with ID 32 is sent to the PI “$AIALR,134406.00,032,A,V,Heading lost/invalid*45” | ✓ |
| Confirm that an alarm sentence with ID 35 is sent to the PI “$AIALR,134407.00,035,A,V,no valid ROT information*03” | ✓ |
| Confirm that default data is sent in message 1, 2, or 3. | ✓ |
| Confirm that the MKD is updated. HDG & ROT are blanked out, indicating no data. | ✓ |

| **b) Reconnect the inputs for HDG and ROT** | |
|---|---|
| Requirement | Verdict |
| Confirm alarm sentence with ID 32 has condition flag = V, the message on the PI was: “$AIALR,134807.00,032,V,V,Heading lost/invalid*5F” | ✓ |
| Confirm alarm sentence with ID 35 has condition flag = V, the message on the PI was: “$AIALR,134805.00,035,V,V,no valid ROT information*1A” | ✓ |
| Confirm that a text message with ID 31 is sent to the PI “$AITXT,01,01,31,Heading valid*4C” | ✓ |
| Confirm that a text message with ID 33 is sent to the PI “$AITXT,01,01,33,Rate of Turn Indicator in use*43” | ✓ |
| Confirm relay output is not activated. | ✓ |
| Confirm that data is correct in message 1, 2 or 3. | ✓ |
| Confirm that the MKD is updated. ROT and HDG is displayed | ✓ |

| c) Disconnect the input for ROT, HDG greater than 5° | |
|---|---|
| Requirement | Verdict |
| Confirm that a text message with ID 034 is sent to the PI<br>“$AITXT,01,01,34,Other ROT source in use*23” | ✓ |

| c) Reconnect the ROT input | |
|---|---|
| Requirement | Verdict |
| Confirm that a text message with ID 033 is sent to the PI<br>“$AITXT,01,01,33,Rate of Turn Indicator in use*43” | ✓ |

Speed Sensor – Clause 14.9.5 (Modification State 0)

(6.10.3.5)

***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.

***Required results***

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.

***Test Results***

| **External COG and SOG data with external GPS data applied** | |
|---|---|
| Requirement | Verdict |
| Verify that the values for COG and SOG from external sensor in position report: COG = 350 and SOG = 10. | ✓ |
| Confirm that the alarm relay is not activated. | ✓ |
| Confirm a text message with ID 027 is output to the PI, the message on the PI was: $AITXT,01,01,27,external SOG/COG in use*33 | ✓ |

| **External COG and SOG data applied with external GPS removed** | |
|---|---|
| Requirement | Verdict |
| Verify that the values for COG and SOG from internal GPS in position report. | ✓ |
| Confirm a text message with ID 28 is output to the PI, the message on the PI was: $AITXT,01,01,28,internal SOG/COG in use*26 | ✓ |
| Check that an alarm is not generated due to invalid COG, ID 029 | ✓ |
| Check that an alarm is not generated due to invalid SOG, ID 030 | ✓ |
| Comments | |
| It is not possible for an alarm not to be generated as an alarm must be activated to inform the user that the GPS service has downgraded from external to internal.<br>$AIALR,153257.00,025,A,V,external EPFS lost*6B<br>Therefore it has been checked that the alarm was not due to invalid COG/SOG and that alarm ID 029 and 030 are not generated. | |

## 2.10 DISPLAY AND CONTROL

### 2.10.1 Specification Reference

IEC 61993-2, Clause 14.10

### 2.10.2 Equipment Under Test

JHS-183, BB50304

### 2.10.3 Date of Test and Modification State

14, 15 & 22 June 2012 - Modification State 0

### 2.10.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.10.5 Test Results and Methods of Measurement

Data Input/Output Facilities – Clause 14.10.1

***Method of measurement***

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

a) Check size of minimum display
b) Record received messages and check contents of minimum display.
c) Input static and voyage related data via the minimum display

***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.

***Test Results***

a) Check size of minimum display

| Requirement | Verdict |
|---|---|
| Confirm that the MKD contains at least three lines of data, with no horizontal scrolling of the range and bearing data display | ✓ |

b) Record received messages and check contents of minimum display

| Requirement | Verdict |
|---|---|
| Verify that it is possible to select messages via MKD | ✓ |
| Confirm that all binary and safety related messages received can be displayed. | ✓ |
| Confirm that all long range messages received can be displayed. | ✓ |
| Verify that the appropriate data fields are available | ✓ |

c) Input static and voyage related data via the minimum keyboard and display

| Requirement | Verdict |
|---|---|
| Verify MMSI can be entered and is protected. | ✓ |
| Verify name of ship can be entered and is protected. | ✓ |
| Verify call sign can be entered and is protected. | ✓ |
| Verify IMO Number can be entered and is protected. | ✓ |
| Comments | |
| Entry protection is provided by key combination on power on, allowing access to the field service menu. | |
| Requirement | Verdict |
| Verify reference point for reported position and dimensions of ship can be entered | ✓ |
| Requirement | Verdict |
| Verify navigation status can be entered | ✓ |
| Comments | |
| Navigation status is selected by scrolling through a list | |
| Requirement | Verdict |
| Verify type of ship and cargo can be entered | ✓ |
| Comments | |
| Type of ship and cargo is selected by scrolling through a list | |
| Requirement | Verdict |
| Verify maximum static draught can be entered | ✓ |
| Verify destination can be entered | ✓ |
| Verify estimated time of arrival can be entered | ✓ |
| Verify persons on board can be entered | ✓ |

Initiate Message Transmission – Clause 14.10.2

***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.

***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.

***Test Results***

Transmission Of Safety Related Broadcast Message

| Requirement | Verdict |
|---|---|
| Verify selection of transmit channel | ✓ |
| Verify data input | ✓ |
| Verify invalid characters cannot be used, only 6-bit ASCII characters can be selected. | ✓ |
| Transmission status displayed during transmission | ✓ |

Transmission Of Addressed Safety Related Message

| Requirement | Verdict |
|---|---|
| Verify selection of transmit channel | ✓ |
| Verify data input | ✓ |
| Verify input of MMSI | ✓ |
| Verify that transmission of messages 4, 16, 17, 18, 19, 20, 21, 22 is not possible. | ✓ |

System Control – Clause 14.10.3

***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.

***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.

***Test Results***

| **RF Parameters** | |
|---|---|
| Requirement | Verdict |
| Verify channel switching shall be possible with the minimum display | ✓ |
| Confirm that output power may not be switched manually. See Comments below. | X |
| Comments | |
| The option to allow output power to be switched manually is for tankers when moored and loading/unloading. | Acceptable |

| **Password Protection** | |
|---|---|
| **The following parameters shall be password protected.** | |
| Requirement | Verdict |
| MMSI | ✓ |
| IMO Number | ✓ |
| Call Sign | ✓ |
| Name | ✓ |
| Dimension/Reference For Position (Internal/External) | ✓ |
| Type Of Ship | ✓ |

| **Unprotected Parameters – Voyage Data** | |
|---|---|
| The following parameters shall not be protected. | |
| Requirement | Verdict |
| Navigational Status | ✓ |
| Type Of Cargo | ✓ |
| Destination | ✓ |
| ETA | ✓ |
| Maximum Static Draught | ✓ |
| Persons On Board | ✓ |

| **Unprotected Parameters – Other Operation Data** | |
|---|---|
| The following parameters shall not be protected. | |
| Requirement | Verdict |
| Area Settings | ✓ |
| Message Transmission and Viewing | ✓ |
| Long Range Settings | ✓ |

## 2.11 TDMA SYNCHRONISATION

### 2.11.1 Specification Reference

IEC 61993-2, Clause 16.1

### 2.11.2 Equipment Under Test

JHS-183, BB50304

### 2.11.3 Date of Test and Modification State

16 June 2012 - Modification State 0

### 2.11.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.11.5 Test Results and Methods of Measurement

Synchronisation Test Using UTC - Clause 16.1.1

***Method of measurement***

Set up standard test environment; chose test conditions in a way that the EUT operates in following synchronisation modes:

a) UTC direct
b) UTC indirect (internal GNSS receiver disabled; at least one other station UTC direct synchronised)
c) BASE direct (internal GNSS disabled; base station with UTC direct synchronisation within range)

Check CommState Parameter SyncState in position Report and reporting rate

***Required results***

Transmitted Communication state shall fit the synchronisation mode..

***Test Results***

| a) UTC direct | |
|---|---|
| Requirement | Verdict |
| Confirm that the sync state is 0. | ✓ |
| Verify that the reporting rate is 10 seconds. | ✓ |

| b) internal GNSS receiver disabled; at least one other station UTC direct synchronised | |
|---|---|
| Requirement | Verdict |
| Confirm that the sync state is 1. | ✓ |
| Verify that the reporting rate is 10 seconds. | ✓ |

| c) internal GNSS disabled; base station with UTC direct synchronisation | |
|---|---|
| Requirement | Verdict |
| Confirm that the sync state is 1. | ✓ |
| Verify that the reporting rate is 10 seconds. | ✓ |

Synchronisation Test Without UTC, Semaphore - Clause 16.1.2

***Method of measurement***

Set up standard test environment without UTC available. Let EUT operate as a sync source (semaphore) for other stations. Check CommState Parameter SyncState in position Report and reporting rate.

***Required results***

Transmitted CommState shall fit the Synchronisation mode.
The EUT shall increase reporting rate to 2 s when acting as a semaphore.

***Test Results***

| a) UTC direct | |
|---|---|
| Requirement | Verdict |
| Confirm that the sync state is 3. | ✓ |
| Verify that the reporting rate is 2 seconds. | ✓ |

Synchronisation Test Without UTC - Clause 16.1.3

***Method of measurement***

Set up standard test environment; chose test conditions in a way that EUT operates in following sync modes:

a) BASE indirect (internal GNSS disabled; no station with UTC direct synchronisation or Base station within range,)
b) Mobile indirect (internal GNSS disabled; other station with UTC direct synchronisation or Base station without range,)
c) Enable internal GNSS in synchronisation modes other than UTC direct

Check CommState Parameter SyncState in position Report and reporting rate.

***Required results***

a) Transmitted Communication state shall fit the Synchronisation mode
b) Transmitted Communication state shall fit the Synchronisation mode
c) Synchronisation mode shall revert to UTC direct

***Test Results***

| **a) No GPS; no station with UTC direct and base station without GPS** | |
|---|---|
| Requirement | Verdict |
| Confirm that the sync state is 2. | ✓ |
| Verify that the reporting rate is 10 seconds. | ✓ |

| **b) No GPS; other station with UTC direct and no base station** | |
|---|---|
| Requirement | Verdict |
| Confirm that the sync state is 1. | ✓ |
| Verify that the reporting rate is 10 seconds. | ✓ |

| **c) GPS; no station with UTC direct and no base station** | |
|---|---|
| Requirement | Verdict |
| Confirm that the sync state is 0. | ✓ |
| Verify that the reporting rate is 10 seconds. | ✓ |

## 2.12 TIME DIVISION (FRAME FORMAT)

### 2.12.1 Specification Reference

IEC 61993-2, Clause 16.2

### 2.12.2 Equipment Under Test

JHS-183, BB00006

### 2.12.3 Date of Test and Modification State

18 June 2012 – Modification State 3

### 2.12.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.12.5 Test Results and Methods of Measurement

***Method of measurement***

Set the EUT to max reporting rate of 2 sec by applying a speed of >23kn and a ROT of >20°/sec. Record VDL messages and check for used slots. Check parameter slot number in CommState of position report. Check slot length (transmission time)

***Required results***

Slot number used and slot number indicated in CommState shall match. Slot number shall not exceed 2249. Slot length shall not exceed 26.67 ms.

***Test Results***

| Requirement | Verdict |
|---|---|
| Verify that the slot number used is the same as the indicated CommState. | ✓ |
| Check that the slot number does not exceed 2249. | ✓ |
| Confirm that the slot length does not exceed 26.67 ms. Maximum value = 24.97 ms. | ✓ |

## 2.13 SYNCHRONISATION JITTER

### 2.13.1 Specification Reference

IEC 61993-2, Clause 16.3

### 2.13.2 Equipment Under Test

JHS-183, BB50304

### 2.13.3 Date of Test and Modification State

10 and 30 July 2012 – Modification State 1 & 2

### 2.13.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.13.5 Test Results and Methods of Measurement

***Method of measurement***

Set-up standard test environment. Set the EUT to 25 kHz bandwidth, max reporting rate of 2 sec and using

d) UTC direct synchronisation
e) UTC indirect synchronisation by disconnecting the GNSS antenna of the EUT.

Record VDL messages and measure the time between the nominal beginning of the slot interval and the initiation of the “transmitter on” function. Alternative methods, e.g. by evaluating the start flag and calculating back to To are allowed.

Repeat the test for 12.5 kHz bandwidth.

***Required results***

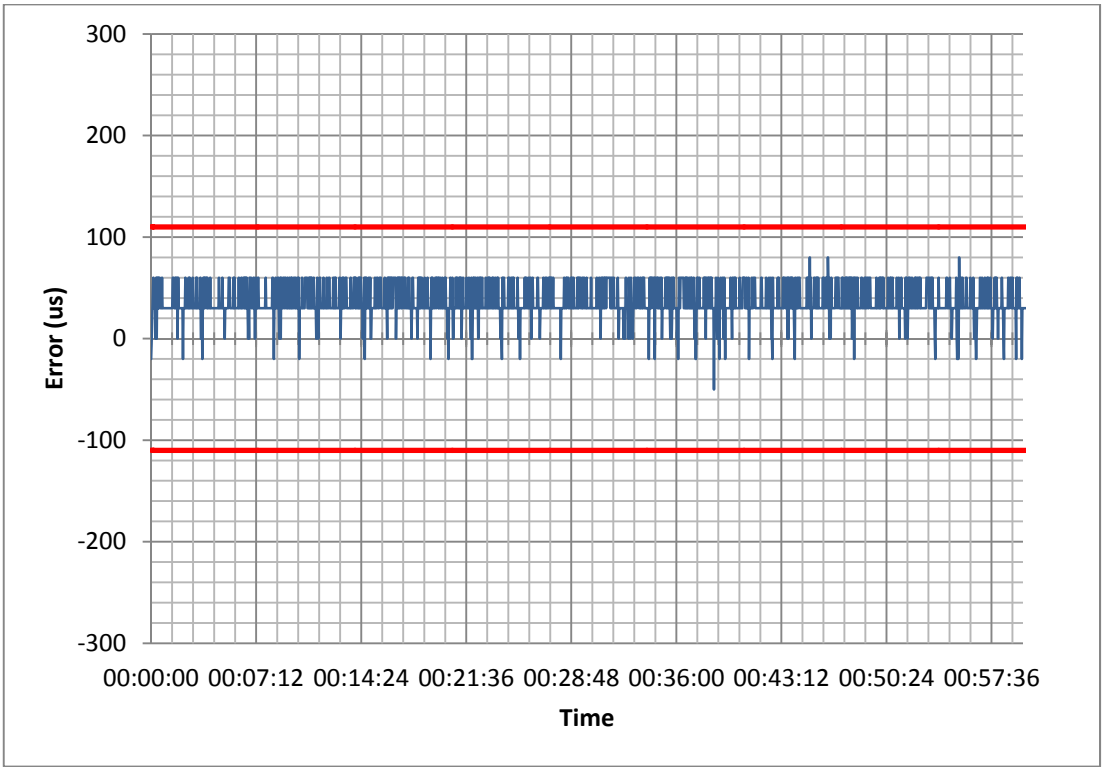
The synchronisation jitter shall not exceed

a) ±104 µs using UTC direct synchronisation
b) ±312 µs using UTC indirect synchronisation.

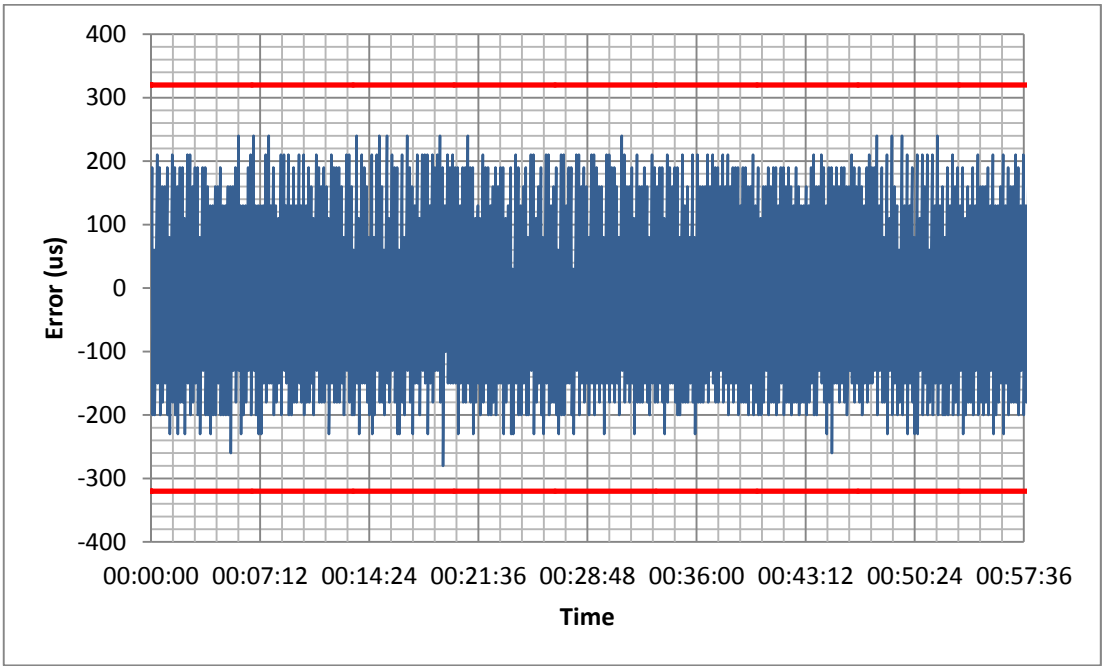
***Test Results***

| **UTC Direct** | |
|---|---|
| Requirement | Verdict |
| Confirm that the jitter does not exceed ±104 µs. | ✓ |

| **UTC Indirect** | |
|---|---|
| Requirement | Verdict |
| Confirm that the jitter does not exceed ±312 µs. | ✓ |




Synchronisation Jitter – UTC Direct




Synchronisation Jitter – UTC Indirect

## 2.14 DATA ENCODING (BIT STUFFING)

### 2.14.1 Specification Reference

IEC 61993-2, Clause 16.4

### 2.14.2 Equipment Under Test

JHS-183, BB50304

### 2.14.3 Date of Test and Modification State

19 June 2012 – Modification State 0

### 2.14.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.14.5 Test Results and Methods of Measurement

***Method of measurement***

Setup standard test environment.

a) Apply a binary broadcast message (msg 8) to the VDL containing the HEX-values “7E 3B 3C 3E 7E” in the data portion and check Presentation Interface output of EUT
b) Apply a BBM message to the EUT initiating the transmission of msg 8 containing the HEX-values as above in the data portion and check the VDL

***Required results***

Confirm that:

– Data output on the presentation interface conforms to transmitted data
– transmitted VDL message conforms to data input on the Presentation Interface

***Test Results***

| **a) From EUT** | |
|---|---|
| Requirement | Verdict |
| Message, “AIBBM,1,1,1,1,8,04001v>khvOP,4” sent to PI. | ✓ |
| Confirm that correct VDO message is output to the PI. | ✓ |
| Check that the target received the message, message received: “AIVDM,1,1,,A,86K8@H@0@007ps?3qv0,2*6E” | ✓ |
| Confirm that the received message data is the same as the transmitted message data. | ✓ |

| **b) To EUT** | |
|---|---|
| Requirement | Verdict |
| Message, “86K29h@0@007ps?3qv0” sent to EUT. | ✓ |
| Check that the EUT received the message, message received and output on PI: “!AIVDM,1,1,,A, 86K29h@0@007ps?3qv0,2*3D” | ✓ |

## 2.15 FRAME CHECK SEQUENCE

### 2.15.1 Specification Reference

IEC 61993-2, Clause 16.5

### 2.15.2 Equipment Under Test

JHS-183, BB50304

### 2.15.3 Date of Test and Modification State

19 June 2012 - Modification State 0

### 2.15.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.15.5 Test Results and Methods of Measurement

***Method of measurement***

Apply a simulated position report message with wrong CRC bit sequence to the VDL.

***Required results***

Confirm that this message is not forwarded to the PI by the EUT.

***Test Results***

| Requirement | Verdict |
|---|---|
| Confirm that the position report with an invalid CRC is not output on the PI. | ✓ |

## 2.16 SLOT ALLOCATION (CHANNEL ACCESS PROTOCOLS)

### 2.16.1 Specification Reference

IEC 61993-2, Clause 16.6

### 2.16.2 Equipment Under Test

JHS-183, BB50304

### 2.16.3 Date of Test and Modification State

19, 26 June and 10 July 2012 - Modification State 0 & 1

### 2.16.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.16.5 Test Results and Methods of Measurement

Network Entry - Clause 16.6.1 (Modification State 0)

***Method of measurement***

Set up standard test environment; switch on EUT. Record transmitted scheduled position reports for the first 3 frames after initialisation period. Check CommState for channel access mode

***Required results***

EUT shall start autonomous transmissions of msg 3 (position report) with ITDMA CommState with KeepFlag set true for first frame and msg 1 with SOTDMA CommState for consecutive frames.

***Test Results***

| **Speed of 10 kn** | |
|---|---|
| Requirement | Verdict |
| Confirm that the first position report occurs after one minute of power on. | ✓ |
| Verify that the first message is message 3. | ✓ |
| Check that the keep flag is set in message 3. | ✓ |
| Confirm that ITDMA CommState is used with message 3. | ✓ |
| Confirm that message 1 is transmitted in the allocated slots in the next frame. | ✓ |
| Verify that the initial slot timeout is between 3 and 7. | ✓ |
| Confirm that the slot timeout values are decreased by one in the next frame. | ✓ |
| Confirm that SOTDMA CommState is used with message 1. | ✓ |

Autonomous scheduled transmissions (SOTDMA) - Clause 16.6.2 (Modification State 0)

***Method of measurement***

Set-up standard test environment and operate EUT in autonomous mode. Record transmitted scheduled position reports msg 1 and check frame structure. Check CommState of transmitted messages for channel access mode and parameters slot timeout, slot number and slot offset

***Required results***

Check that nominal reporting rate is achieved ±20 % (allocating slots in selection interval SI). Confirm that the EUT allocates new slots NTS within SI after 3 min to 8 min. Check that slot offset indicated in CommState matches slots used for transmission.

***Test Results***

| Requirement | Verdict |
|---|---|
| Confirm that position reports are transmitted every 10 seconds. | ✓ |
| Verify that the allocated slots are correct according to the 10 second reporting rate. | ✓ |
| Confirm that each position report slot interval is 375 ± 20%. Min = 319, Max = 428. | ✓ |
| Confirm that each position report is transmitted on alternate channels. | ✓ |
| Verify that the initial slot timeout is between 3 and 7. | ✓ |
| Verify that for timeout values 3, 5 and 7, the sub message contains the number of received stations. | ✓ |
| Verify that for timeout values 2, 4 and 6, the sub message contains the current slot number. | ✓ |
| Verify that for timeout value 1, the sub message contains UTC hour and minute. | ✓ |
| Verify that for timeout value 0, the sub message contains the next slot offset. | ✓ |
| Confirm that after slot time-out is zero, the value indicated by slot offset is used in the following frame. | ✓ |
| Check the slot offset value is 2250 ± 75. | ✓ |

Single message transmission (RATDMA) - Clause 16.6.3 (Modification State 1)

***Method of measurement***

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

a) Apply a 1 slot Binary Broadcast message (msg 8) to the PI of the EUT. Record transmitted messages.
b) Apply combinations of Binary Broadcast message (msg 8), Addressed Binary message( msg 14), Broadcast Safety Related message (msg 6) and Addressed Safety Related message( msg12) to the PI of the EUT. Record transmitted messages and output of the PI of the EUT.

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

***Required results***

a) Confirm that EUT transmits this msg 8 within max. 4 s. Retry with 90 % channel load.
b) Confirm that maximum 20 slots can be used per frame for unannounced messages using RATDMA access scheme and that messages using the twenty-first slot and above are rejected. Confirm that message ABK is sent with acknowledge type 2 (Message could not be broadcast) when the message is rejected.

***Test Results***

| **Part a)** | | |
|---|---|---|
| Requirement | Result | Verdict |
| Confirm that message 8 is sent within 4 seconds when a BBM is sent to the PI. | 3.70 s | ✓ |
| Confirm that message 8 is sent within 4 seconds when a BBM is sent to the PI when the channel load is 90% | 2.84 to 3.57 s | ✓ |

| Part b) | | | |
|---|---|---|---|
| Requirement | | | Verdict |
| Confirm that only 20 message can be sent in one frame. | | | ✓ |
| Confirm that message ABK is sent with acknowledge type 2 for the rejected messages. | | | ✓ |
| No. | Message | Acknowledge | |
| 1 | !AIVDO,1,1,,A,<6K8@HBNjGOPD5CDP=C4,0*07 | $AIABK,666000888,A,13,0,0*11 | |
| 2 | !AIVDO,1,1,,A,<6K8@HFNjGOPD5CDP=C4,0*03 | $AIABK,666000888,A,13,1,0*10 | |
| 3 | !AIVDO,1,1,,A,>6K8@HA@E=@L,0*22 | $AIABK,,,14,0,3*6A | |
| 4 | !AIVDO,1,1,,A,>6K8@HA@E=@L,0*22 | $AIABK,,,14,1,3*6B | |
| 5 | !AIVDO,1,1,,A,86K8@H@0@00521DEB@jhTSh,2*3B | $AIABK,,,8,1,3*56 | |
| 6 | !AIVDO,1,1,,A,66K8@HJNjGOP04001@PE5DT,2*2E | $AIABK,666000888,A,7,1,0*25 | |
| 7 | !AIVDO,1,1,,A,66K8@HFNjGOP04001@PE5DT,2*22 | $AIABK,666000888,A,7,2,0*26 | |
| 8 | !AIVDO,1,1,,A,86K8@H@0@00521DEB@jhTSh,2*3B | $AIABK,,,8,0,3*57 | |
| 9 | !AIVDO,1,1,,A,66K8@HNNjGOP04001@PE5DT,2*2A | $AIABK,666000888,A,7,3,0*27 | |
| 10 | !AIVDO,1,1,,A,86K8@H@0@00521DEB@jhTSh,2*3B | $AIABK,,,8,2,3*55 | |
| 11 | !AIVDO,1,1,,A,>6K8@HA@E=@L,0*22 | $AIABK,,,14,1,3*6B | |
| 12 | !AIVDO,1,1,,A,<6K8@HBNjGOPD5CDP=C4,0*07 | $AIABK,666000888,A,13,0,0*11 | |
| 13 | !AIVDO,1,1,,A,<6K8@HFNjGOPD5CDP=C4,0*03 | $AIABK,666000888,A,13,1,0*10 | |
| 14 | !AIVDO,1,1,,A,>6K8@HA@E=@L,0*22 | $AIABK,,,14,0,3*6A | |
| 15 | !AIVDO,1,1,,A,86K8@H@0@00521DEB@jhTSh,2*3B | $AIABK,,,8,2,3*55 | |
| 16 | !AIVDO,1,1,,A,66K8@HNNjGOP04001@PE5DT,2*2A | $AIABK,666000888,A,7,1,0*25 | |
| 17 | !AIVDO,1,1,,A,66K8@HJNjGOP04001@PE5DT,2*2E | $AIABK,666000888,A,7,2,0*26 | |
| 18 | !AIVDO,1,1,,A,66K8@HFNjGOP04001@PE5DT,2*22 | $AIABK,666000888,A,7,3,0*27 | |
| 19 | !AIVDO,1,1,,A,86K8@H@0@00521DEB@jhTSh,2*3B | $AIABK,,,8,3,3*54 | |
| 20 | !AIVDO,1,1,,A,86K8@H@0@00521DEB@jhTSh,2*3B | $AIABK,,,8,1,3*56 | |
| 21 | !AIBBM,1,1,0,1,8,04001@PE5DT<d98t,2 | $AIABK,,,8,0,2*56 | |
| 22 | !AIABM,1,1,1,666000888,0,6,04001@PE5DT,2 | $AIABK,666000888,,6,1,2*67 | |
| 23 | !AIABM,1,1,2,666000888,0,6,04001@PE5DT,2 | $AIABK,666000888,,6,2,2*64 | |
| 24 | !AIABM,1,1,3,666000888,0,6,04001@PE5DT,2 | $AIABK,666000888,,6,3,2*65 | |
| 25 | !AIABM,1,1,0,666000888,1,12,D5CDP=C7,2 | $AIABK,666000888,,12,0,2*53 | |
| 26 | !AIABM,1,1,1,666000888,1,12,D5CDP=C7,2 | $AIABK,666000888,,12,1,2*52 | |
| 27 | !AIBBM,1,1,1,1,8,04001@PE5DT<d98t,2 | $AIABK,,,8,1,2*57 | |
| 28 | !AIBBM,1,1,0,1,14,D5CD7,0 | $AIABK,,,14,0,2*6B | |
| 29 | !AIBBM,1,1,2,1,8,04001@PE5DT<d98t,2 | $AIABK,,,8,2,2*54 | |
| 30 | !AIBBM,1,1,1,1,14,D5CD7,0 | $AIABK,,,14,1,2*6A | |

Assigned Operation - Clause 16.6.4 (Modification State 0)

*Assigned Mode Using Reporting Rates – Clause 16.6.4.1*

***Method of measurement***

Operate standard test environment and EUT in autonomous mode. Transmit an Assigned mode command msg 16 to the EUT with:

a) the number or reports per 10 min which is not a multiple of 20
b) the number or reports per 10 min which is higher than 600

***Required results***

a) Confirm that the EUT transmits position reports message msg2 at a report rate that corresponds to the next highest multiple of 20.
b) Confirm that the EUT transmits position reports message msg2 at a report rate of one report per second.

***Test Results***

| **EUT as first transponder** | |
|---|---|
| Requirement | Verdict |
| Confirm that with increment set to 0 and offset set to 30, the report rate is 4 per min. | ✓ |
| Confirm that with increment set to 0 and offset set to 950, the report rate is 1 per sec. | ✓ |

| **EUT as second transponder** | |
|---|---|
| Requirement | Verdict |
| Confirm that with the first destination set to 600 and the second (EUT) to 120, the report rate is 12 per minute. | ✓ |

*Receiving Test – Clause 16.6.4.2*

***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.

***Required results***

Confirm that EUT transmits position report msg 2 according to defined parameters and reverts to SOTDMA msg 1 with standard reporting rate after 4 to 8 min (ITU-R M.1371-1 A2/3.3.8.2.12). *(ITU-R M.1371-4 A8/3.14)*

***Test Results***

| **Using Slot offset of 60 and increment of 3 (225 Slots)** | |
|---|---|
| Requirement | Verdict |
| Check that the first message is transmitted after 60 slots. | ✓ |
| Verify that message type 2 is used initially and for all position reports. | ✓ |
| Confirm that the allocated slots for message 1 are de-allocated with timeout = 0 and slot offset = 0 immediately after the assignment message. | ✓ |
| Verify that the messages are sent on alternating channels. | ✓ |
| Confirm that the increment is 225 slots. | ✓ |
| Verify that all slots for message 2 have the same timeout. | ✓ |
| Check that the timeout value is between 3 and 7. Timeout value = 5. | ✓ |
| Confirm that the timeout value is decremented after each frame. | ✓ |
| Check that the ComState is the same as message 1. | ✓ |
| Check that the EUT de-allocates all message 2 slots with timeout = 0. | ✓ |
| Check that the EUT changes back to message 1 after 4 to 8 minutes. | ✓ |

| **Using reporting rate assignment of 200 message per minute.** | |
|---|---|
| Requirement | Verdict |
| Check that the re-scheduling starts immediately (after 50 slots). | ✓ |
| Verify that message 3 is used to allocate new slots. | ✓ |
| Verify that message type 2 is used for all position reports, after allocation. | ✓ |
| Confirm that the reporting rate is 20 per minute. | ✓ |
| Check that the timeout value is between 2 and 6. Timeout value = 4. | ✓ |
| Check that the EUT changes back to message 1 after 4 to 8 minutes. | ✓ |

*Assignment Selectivity – Clause 16.6.4.3*

***Method of measurement***

Set-up standard test environment and operate EUT in autonomous mode. Check frame structure. Transmit an Assigned mode command (msg 16) to another AIS with a slot offset and increment pointing to a slot used by the EUT. Record transmitted messages.

***Required results***

Confirm that EUT does not allocate slots on a msg 16 addressed to other stations.

***Test Results***

| **EUT as first transponder** | |
|---|---|
| Requirement | Verdict |
| With the wrong MMSI in Message 16, verify that the EUT does not allocate slots indicated by message 16. | ✓ |

*Slot Assignment to FATDMA Reserved Slots – Clause 16.6.4.4*

***Method of measurement***

Set-up standard test environment and operate EUT in autonomous mode. Transmit a Data Link Management message (msg 20) to the EUT with slot offset and increment. Transmit an Assigned Mode Command (msg 16) to the EUT and command it to use one or more of those FATDMA allocated slots. Record transmitted messages.

***Required results***

Confirm that the EUT uses the slots commanded by msg 16 for own transmissions.

***Test Results***

| **EUT as first transponder** | |
|---|---|
| Requirement | Verdict |
| Check that message 20 and 16 are received by the EUT. | ✓ |
| Check that the slots assigned by message 16 are used by the EUT. | ✓ |

Fixed allocated transmissions (FATDMA) - Clause 16.6.5 (Modification State 0)

**Method of measurement**

Set-up standard test environment and operate EUT in autonomous mode. Transmit a Data Link Management message (msg 20) to the EUT with slot offset and increment. Record transmitted messages.

**Required results**

Confirm that EU does not use slots allocated by msg 20 for own transmissions until timeout of 4 min to 8 min.

***Test Results***

| Requirement | Verdict |
|---|---|
| Confirm that the allocated slots are not used within a timeout of 4-8 minutes. | ✓ |
| Check that after the timeout of message 20, the slots are used again. | ✓ |

## 2.17 MESSAGE FORMATS

### 2.17.1 Specification Reference

IEC 61993-2, Clause 16.7

### 2.17.2 Equipment Under Test

JHS-183, BB50304

### 2.17.3 Date of Test and Modification State

21 June and 09 July 2012 - Modification State 0 and 1

### 2.17.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.17.5 Test Results and Methods of Measurement

Received Messages - Clause 16.7.1 (Modification State 0)

**Method of measurement**

Set-up standard test environment and operate EUT in autonomous mode. Apply messages according to Table 7 to the VDL. Record messages output by the PI of EUT.

**Required results**

Confirm that EUT outputs corresponding message with correct field contents and format via the PI or responds as appropriate.

***Test Results***

| Message 1, 2 and 3 – Message contents | | |
|---|---|---|
| Interface | Message | Verdict |
| VDL | !AIVDO,1,1,,A,14uq3EOP?w<tSF0l4Q@>4?v60000,0*55 | ✓ |
| PI | !AIVDM,1,1,,A,14uq3EOP?w<tSF0l4Q@>4?v60000,0*57 | ✓ |
| VDL | !AIVDO,1,1,,A,24uq3EOP?w<tSF0l4Q@>4?wf0000,0*07 | ✓ |
| PI | !AIVDM,1,1,,A,24uq3EOP?w<tSF0l4Q@>4?wf0000,0*05 | ✓ |
| VDL | !AIVDO,1,1,,A,34uq3EOP?w<tSF0l4Q@>4?wb0000,0*02 | ✓ |
| PI | !AIVDM,1,1,,A,34uq3EOP?w<tSF0l4Q@>4?wb0000,0*00 | ✓ |

| Message 1, 2 and 3 – PI output | |
|---|---|
| Requirement | Verdict |
| Verify the number of sentences value is 1. | ✓ |
| Check the sentence number value is 1. | ✓ |
| Check that the Sequential message identifier is null. | ✓ |
| Verify that the correct AIS Channel is indicated. | ✓ |
| Check the number of Fill bits is 0. | ✓ |

| Message 1, 2, and 3 – EUT Response |
|---|
| Comments |
| No response is required for this message type. |

| Message 4 – Message contents | | |
|---|---|---|
| Interface | Message | Verdict |
| VDL | !ABVDO,1,1,9,B,4027`SQuib:oMOrCR`M6peA000S:,0*2A | ✓ |
| PI | !AIVDM,1,1,,B,4027`SQuib:oMOrCR`M6peA000S:,0*1A | ✓ |

| Message 4 – PI output | |
|---|---|
| Requirement | Verdict |
| Verify the number of sentences value is 1. | ✓ |
| Check the sentence number value is 1. | ✓ |
| Check that the Sequential message identifier is null. | ✓ |
| Verify that the correct AIS Channel is indicated. | ✓ |
| Check the number of Fill bits is 0. | ✓ |

| Message 4 – EUT Response |
|---|
| Comments |
| No response is required for this message type. |

| Message 5 – Message contents | | |
|---|---|---|
| Interface | Message | Verdict |
| VDL | !AIVDM,2,1,0,B,59s9Mv400W400000001AEJ22222222222222222bp@60:t@o0I888000000 0,0*05<br>!AIVDM,2,2,0,B,00000000000,2*27<br>Received by test unit | ✓ |
| PI | !AIVDM,2,1,4,B,59s9Mv400W400000001AEJ22222222222222222bp@60:t@o,0*70<br>!AIVDM,2,2,4,B,0I88800000000000000000,2*52 | ✓ |

| Message 5 – PI output | |
|---|---|
| Requirement | Verdict |
| Verify the number of sentences value is 2. | ✓ |
| Check the sentence number value is 1, then 2. | ✓ |
| Check that the Sequential message identifier is incremental with each new message. | ✓ |
| Verify that the correct AIS Channel is indicated. | ✓ |
| Check the number of Fill bits is 0 for the first message and 2 for the second. | ✓ |

| Message 5 – EUT Response |
|---|
| Comments |
| No response is required for this message type. |

| Message 6 – Message contents | | |
|---|---|---|
| Interface | Message | Verdict |
| VDL | !AIVDO,1,1,,A,61aucimVj46404205@E=B0m<L0,4*0A | ✓ |
| PI | !AIVDM,1,1,,A,61aucimVj46404205@E=B0m<L0,4*08 | ✓ |

| Message 6 – PI output of VDM | |
|---|---|
| Requirement | Verdict |
| Verify the number of sentences value is 1. | ✓ |
| Check the sentence number value is 1. | ✓ |
| Check that the Sequential message identifier is null. | ✓ |
| Verify that the correct AIS Channel is indicated. | ✓ |
| Check the number of Fill bits is 4. | ✓ |

| Message 6 – EUT Response and output of VDO on PI | |
|---|---|
| Requirement | Verdict |
| Verify that message 7 is transmitted by the EUT.<br>!AIVDO,1,1,,A,76K8@H@JOJtM,0*68 | ✓ |
| Verify the VDO number of sentences value is 1. | ✓ |
| Check the VDO sentence number value is 1. | ✓ |
| Check that the VDO Sequential message identifier is null. | ✓ |
| Verify that the VDO correct AIS Channel is indicated. | ✓ |
| Check the number of VDO Fill bits is 0. | ✓ |

| Message 7 – Message contents | | |
|---|---|---|
| Interface | Message | Verdict |
| VDL | !AIVDM,1,1,,A,79s9Mv1Vj464,0*62 received by test unit | ✓ |
| PI | !AIVDM,1,1,,A,79s9Mv1Vj464,0*62 | ✓ |

| Message 7 – PI output of VDM | |
|---|---|
| Requirement | Verdict |
| Verify the number of sentences value is 1. | ✓ |
| Check the sentence number value is 1. | ✓ |
| Check that the Sequential message identifier is null. | ✓ |
| Verify that the correct AIS Channel is indicated. | ✓ |
| Check the number of Fill bits is 0. | ✓ |

| Message 7 – EUT ABK acknowledgement to PI | |
|---|---|
| Requirement | Verdict |
| ABK acknowledgement message output to PI. $AIABK,666000888,A,7,0,0*24 | ✓ |
| Verify that the MMSI in the ABK is correct. | ✓ |
| Verify that the AIS channel in the ABK is correct. | ✓ |
| Verify that the message ID in the ABK is correct. | ✓ |
| Verify that the message sequence number in the ABK is correct. | ✓ |
| Verify that the type of acknowledgement in the ABK is correct. | ✓ |

| Message 8 – Message contents | | |
|---|---|---|
| Interface | Message | Verdict |
| VDL | !AIVDO,1,1,,A,81aucil0@80E1Dm83Dih,0*34 | ✓ |
| PI | !AIVDM,1,1,,A,81aucil0@80E1Dm83Dih,0*36 | ✓ |

| Message 8 – PI output of VDM | |
|---|---|
| Requirement | Verdict |
| Verify the number of sentences value is 1. | ✓ |
| Check the sentence number value is 1. | ✓ |
| Check that the Sequential message identifier is null. | ✓ |
| Verify that the correct AIS Channel is indicated. | ✓ |
| Check the number of Fill bits is 0. | ✓ |

| Message 8 – EUT Response |
|---|
| Comments |
| No response is required for this message type. |

| Message 9 – Message contents | | |
|---|---|---|
| Interface | Message | Verdict |
| VDL | !AIVDO,1,1,,A,91mg=5Owww<tSF0l4Q@>47000000,0*0F | ✓ |
| PI | !AIVDM,1,1,,A,91mg=5Owww<tSF0l4Q@>47000000,0*0D | ✓ |

| Message 9 – PI output of VDM | |
|---|---|
| Requirement | Verdict |
| Verify the number of sentences value is 1. | ✓ |
| Check the sentence number value is 1. | ✓ |
| Check that the Sequential message identifier is null. | ✓ |
| Verify that the correct AIS Channel is indicated. | ✓ |
| Check the number of Fill bits is 0. | ✓ |

| Message 9 – EUT Response |
|---|
| Comments |
| No response is required for this message type. |

| Message 10 – Message contents | | |
|---|---|---|
| Interface | Message | Verdict |
| VDL | !AIVDO,1,1,,A,:1auciiVj464,0*52 | ✓ |
| PI | !AIVDM,1,1,,A,:1auciiVj464,0*50 | ✓ |

| Message 10 – PI output of VDM | |
|---|---|
| Requirement | Verdict |
| Verify the number of sentences value is 1. | ✓ |
| Check the sentence number value is 1. | ✓ |
| Check that the Sequential message identifier is null. | ✓ |
| Verify that the correct AIS Channel is indicated. | ✓ |
| Check the number of Fill bits is 0. | ✓ |

| Message 10 – EUT Response and output of VDO | |
|---|---|
| Requirement | Verdict |
| Verify that message 11 is transmitted by the EUT.<br>!AIVDO,1,1,,A,;6K8@HAuib<pJOle`2MEs7i00P00,0*0A | ✓ |
| Verify the VDO number of sentences value is 1. | ✓ |
| Check the VDO sentence number value is 1. | ✓ |
| Check that the VDO Sequential message identifier is null. | ✓ |
| Verify that the VDO correct AIS Channel is indicated. | ✓ |
| Check the number of VDO Fill bits is 0. | ✓ |

| Message 11 – Message contents | | |
|---|---|---|
| Interface | Message | Verdict |
| VDL | !AIVDO,1,1,,A,;9s9Mv0000Htt<tSF0l4Q@000000,0*3B | ✓ |
| PI | !AIVDM,1,1,,A,;9s9Mv0000Htt<tSF0l4Q@000000,0*39 | ✓ |

| Message 11 – PI output of VDM | |
|---|---|
| Requirement | Verdict |
| Verify the number of sentences value is 1. | ✓ |
| Check the sentence number value is 1. | ✓ |
| Check that the Sequential message identifier is null. | ✓ |
| Verify that the correct AIS Channel is indicated. | ✓ |
| Check the number of Fill bits is 0. | ✓ |

| Message 11 – EUT Response |
|---|
| Comments |
| No response is required for this message type. |

| Message 12 – Message contents | | |
|---|---|---|
| Interface | Message | Verdict |
| VDL | !AIVDO,1,1,,A,<1aucimVj464D5CDP=C7,0*3F | ✓ |
| PI | !AIVDM,1,1,,A,<1aucimVj464D5CDP=C7,0*3D | ✓ |

| Message 12 – PI output of VDM | |
|---|---|
| Requirement | Verdict |
| Verify the number of sentences value is 1. | ✓ |
| Check the sentence number value is 1. | ✓ |
| Check that the Sequential message identifier is null. | ✓ |
| Verify that the correct AIS Channel is indicated. | ✓ |
| Check the number of Fill bits is 0. | ✓ |

| Message 12 – EUT Response and output of VDO on PI | |
|---|---|
| Requirement | Verdict |
| Verify that message 13 is transmitted by the EUT.<br>!AIVDM,1,1,,A,=6K8@H@JOJtM,0*60 | ✓ |
| Verify the VDO number of sentences value is 1. | ✓ |
| Check the VDO sentence number value is 1. | ✓ |
| Check that the VDO Sequential message identifier is null. | ✓ |
| Verify that the VDO correct AIS Channel is indicated. | ✓ |
| Check the number of VDO Fill bits is 0. | ✓ |

| Message 13 – Message contents | | |
|---|---|---|
| Interface | Message | Verdict |
| VDL | !AIVDM,1,1,,A,=9s9Mv1Vj465,0*69 – Received by test unit | ✓ |
| PI | !AIVDM,1,1,,A,=9s9Mv1Vj465,0*69 | ✓ |

| Message 13 – PI output of VDM | |
|---|---|
| Requirement | Verdict |
| Verify the number of sentences value is 1. | ✓ |
| Check the sentence number value is 1. | ✓ |
| Check that the Sequential message identifier is null. | ✓ |
| Verify that the correct AIS Channel is indicated. | ✓ |
| Check the number of Fill bits is 0. | ✓ |

| Message 13 – EUT ABK acknowledgement to PI | |
|---|---|
| Requirement | Verdict |
| ABK acknowledgement message output to PI.<br>$AIABK,666000888,A,13,1,0*10 | ✓ |
| Verify that the MMSI in the ABK is correct. | ✓ |
| Verify that the AIS channel in the ABK is correct. | ✓ |
| Verify that the message ID in the ABK is correct. | ✓ |
| Verify that the message sequence number in the ABK is correct. | ✓ |
| Verify that the type of acknowledgement in the ABK is correct. | ✓ |

| Message 14 – Message contents | | |
|---|---|---|
| Interface | Message | Verdict |
| VDL | !AIVDO,1,1,,A,>1aucim@E=B0m<N380,4*32 | ✓ |
| PI | !AIVDM,1,1,,A,>1aucim@E=B0m<N380,4*30 | ✓ |

| Message 14 – PI output of VDM | |
|---|---|
| Requirement | Verdict |
| Verify the number of sentences value is 1. | ✓ |
| Check the sentence number value is 1. | ✓ |
| Check that the Sequential message identifier is null. | ✓ |
| Verify that the correct AIS Channel is indicated. | ✓ |
| Check the number of Fill bits is 4. | ✓ |

| Message 14 – EUT Response |
|---|
| Comments |
| No response is required for this message type. |

| Message 15 – Message contents | | |
|---|---|---|
| Interface | Message | Verdict |
| VDL | !AIVDO,1,1,,A,?1auciiVj464<6@52F000000000,2*6E | ✓ |
| PI | !AIVDM,1,1,,A,?1auciiVj464<6@52F000000000,2*6C | ✓ |

| Message 15 – PI output of VDM | |
|---|---|
| Requirement | Verdict |
| Verify the number of sentences value is 1. | ✓ |
| Check the sentence number value is 1. | ✓ |
| Check that the Sequential message identifier is null. | ✓ |
| Verify that the correct AIS Channel is indicated. | ✓ |
| Check the number of Fill bits is 2. | ✓ |

| Message 15 – EUT Response | |
|---|---|
| Requirement | Verdict |
| Verify that message 3 is transmitted by the EUT.<br>!AIVDO,1,1,,A,36K8@H@P?w<tSF0l4Q@>4?wv0P00,0*72 | ✓ |
| Verify that message 5 is transmitted by the EUT.<br>!AIVDO,2,1,6,A,56K8@HGa5lS448<@DJ1AEH0000000000000000010000006w<,0*3E<br>!AIVDO,2,2,6,A,R4kAF2@kp88888888888880,2*7B | ✓ |

| Message 16 – Message contents | | |
|---|---|---|
| Interface | Message | Verdict |
| VDL | !AIVDO,1,1,,A,@027`SQVj464380h00000000,0*6A | ✓ |
| PI | !AIVDM,1,1,,A,@027`SQVj464380h00000000,0*68 | ✓ |

| Message 16 – PI output of VDM | |
|---|---|
| Requirement | Verdict |
| Verify the number of sentences value is 1. | ✓ |
| Check the sentence number value is 1. | ✓ |
| Check that the Sequential message identifier is null. | ✓ |
| Verify that the correct AIS Channel is indicated. | ✓ |
| Check the number of Fill bits is 0. | ✓ |

| Message 16 – EUT Response | |
|---|---|
| Requirement | Verdict |
| Verify that message 2 is transmitted by the EUT.<br>!AIVDO,1,1,,B,26K8@H@P?w<tSF0l4Q@>4?wv0d02,0*46 | ✓ |

| Message 17 – Message contents | | |
|---|---|---|
| Interface | Message | Verdict |
| VDL | !AIVDO,1,1,,A,A000403vSTt600@0>OP`7grS0Q@E0=P13100QOlE,0*2C | ✓ |
| PI | !AIVDM,1,1,,A,A000403vSTt600@0>OP`7grS0Q@E0=P13100QOlE,0*2E | ✓ |

| Message 17 – PI output of VDM | |
|---|---|
| Requirement | Verdict |
| Verify the number of sentences value is 1. | ✓ |
| Check the sentence number value is 1. | ✓ |
| Check that the Sequential message identifier is null. | ✓ |
| Verify that the correct AIS Channel is indicated. | ✓ |
| Check the number of Fill bits is 0. | ✓ |

| Message 18 – Message contents | | |
|---|---|---|
| Interface | Message | Verdict |
| VDL | !AIVDO,1,1,,A,B000h>@05c?8mP=18D1hRU:1@000,0*49 | ✓ |
| PI | !AIVDM,1,1,,A,B000h>@05c?8mP=18D1hRU:1@000,0*4B | ✓ |

| Message 18 – PI output of VDM | |
|---|---|
| Requirement | Verdict |
| Verify the number of sentences value is 1. | ✓ |
| Check the sentence number value is 1. | ✓ |
| Check that the Sequential message identifier is null. | ✓ |
| Verify that the correct AIS Channel is indicated. | ✓ |
| Check the number of Fill bits is 0. | ✓ |

| Message 18 – EUT Response |
|---|
| Comments |
| No response is required for this message type. |

| Message 19 – Message contents | | |
|---|---|---|
| Interface | Message | Verdict |
| VDL | !AIVDO,1,1,,A,C000h>@0l;?8mP=18D0a`QBPJjJ2VVBd:V@BP0000000J0D33T7h,0*7E | ✓ |
| PI | !AIVDM,2,1,3,A,C000h>@0l;?8mP=18D0a`QBPJjJ2VVBd:V@BP0000000J0D3,0*74<br>!AIVDM,2,2,3,A,3T7h,0*2D | ✓ |

| Message 19 – PI output of VDM | |
|---|---|
| Requirement | Verdict |
| Verify the number of sentences value is 2. | ✓ |
| Check the sentence number value is 1, then 2. | ✓ |
| Check that the Sequential message identifier is null. | ✓ |
| Verify that the correct AIS Channel is indicated. | ✓ |
| Check the number of Fill bits is 0. | ✓ |

| Message 19 – EUT Response |
|---|
| Comments |
| No response is required for this message type. |

| Message 20 – Message contents | | |
|---|---|---|
| Interface | Message | Verdict |
| VDL | !AIVDO,1,1,,A,D027`SP0EN0`000000000000000,2*6F | ✓ |
| PI | !AIVDM,1,1,,A,D027`SP0EN0`000000000000000,2*6D | ✓ |

| Message 20 – PI output of VDM | |
|---|---|
| Requirement | Verdict |
| Verify the number of sentences value is 1. | ✓ |
| Check the sentence number value is 1. | ✓ |
| Check that the Sequential message identifier is null. | ✓ |
| Verify that the correct AIS Channel is indicated. | ✓ |
| Check the number of Fill bits is 0. | ✓ |

| Message 20 – EUT Response | |
|---|---|
| Requirement | Verdict |
| Verify the EUT does not transmit on reserved slots. | ✓ |

| Message 21 – Message contents | | |
|---|---|---|
| Interface | Message | Verdict |
| VDL | !AIVDO,1,1,,A,E000h>@PTR9P0000000000000006NAc0J2@`000000sh3c@0000000000000,0*41 | ✓ |
| PI | !AIVDM,2,1,1,A,E000h>@PTR9P0000000000000006NAc0J2@`000000sh3c@0,0*71<br>!AIVDM,2,2,1,A,000000000000,0*17 | ✓ |

| Message 21 – PI output of VDM | |
|---|---|
| Requirement | Verdict |
| Verify the number of sentences value is 2. | ✓ |
| Check the sentence number value is 1, then 2. | ✓ |
| Check that the Sequential message identifier is null. | ✓ |
| Verify that the correct AIS Channel is indicated. | ✓ |
| Check the number of Fill bits is 0. | ✓ |

| Message 21 – EUT Response |
|---|
| Comments |
| No response is required for this message type. |

| Message 22 – Message contents | | |
|---|---|---|
| Interface | Message | Verdict |
| VDL | !AIVDM,1,1,,A,D027`SP00N000<N0008Nfp0DN00,2*50 | ✓ |
| PI | !AIVDM,1,1,,A,D027`SP00N000<N0008Nfp0DN00,2*50 | ✓ |

| Message 22 – PI output of VDM | |
|---|---|
| Requirement | Verdict |
| Verify the number of sentences value is 1. | ✓ |
| Check the sentence number value is 1. | ✓ |
| Check that the Sequential message identifier is null. | ✓ |
| Verify that the correct AIS Channel is indicated. | ✓ |
| Check the number of Fill bits is 2. | ✓ |

| Message 22 – EUT Response | |
|---|---|
| Requirement | Verdict |
| Verify the EUT modifies its transmission parameters according to the message. | ✓ |
| Confirm that the EUT correctly sets the region according to the message. | ✓ |

| Message 23 – Message contents | | |
|---|---|---|
| Interface | Message | Verdict |
| VDL | !AIVDM,1,1,,A,G027`SSwJPtt7tO1m<100000900,2*0F | ✓ |
| PI | !AIVDM,1,1,,A,G027`SSwJPtt7tO1m<100000900,2*0F | ✓ |

| Message 23 – PI output of VDM | |
|---|---|
| Requirement | Verdict |
| Verify the number of sentences value is 1. | ✓ |
| Check the sentence number value is 1. | ✓ |
| Check that the Sequential message identifier is null. | ✓ |
| Verify that the correct AIS Channel is indicated. | ✓ |
| Check the number of Fill bits is 2. | ✓ |

| Message 23 – EUT Response | |
|---|---|
| Requirement | Verdict |
| Verify that the EUT adjusts its transmit / receive mode accordingly. | ✓ |
| Confirm that the EUT changes its reporting interval. | ✓ |

| Message 24a – Message contents | | |
|---|---|---|
| Interface | Message | Verdict |
| VDL | !AIVDO,1,1,,A,H=?eN>4000000000000000000000,2*4D | ✓ |
| PI | !AIVDM,1,1,,A,H=?eN>0000000000000000000000,2*4B | ✓ |

| Message 24a – PI output of VDM | |
|---|---|
| Requirement | Verdict |
| Verify the number of sentences value is 1. | ✓ |
| Check the sentence number value is 1. | ✓ |
| Check that the Sequential message identifier is null. | ✓ |
| Verify that the correct AIS Channel is indicated. | ✓ |
| Check the number of Fill bits is 2. | ✓ |

| Message 24a – EUT Response |
|---|
| Comments |
| No response is required for this message type. |

| Message 24b – Message contents | | |
|---|---|---|
| Interface | Message | Verdict |
| VDL | !AIVDO,1,1,,A,H6WuQTTRF5>4?BiDEFD5CD2P:td0,0*5F | ✓ |
| PI | !AIVDM,1,1,,A,H6WuQTTRF5>4?BiDEFD5CD2P:td0,0*5D | ✓ |

| Message 24b – PI output of VDM | |
|---|---|
| Requirement | Verdict |
| Verify the number of sentences value is 1. | ✓ |
| Check the sentence number value is 1. | ✓ |
| Check that the Sequential message identifier is null. | ✓ |
| Verify that the correct AIS Channel is indicated. | ✓ |
| Check the number of Fill bits is 0. | ✓ |

| Message 24b – EUT Response |
|---|
| Comments |
| No response is required for this message type. |

| Message 25 – Message contents | | |
|---|---|---|
| Interface | Message | Verdict |
| VDL | !AIVDO,1,1,,A,I;UgjLAVj4640000000000000000,0*09 | ✓ |
| PI | !AIVDM,1,1,,A,I;UgjLAVj4640000000000000000,0*0B | ✓ |

| Message 25 – PI output of VDM | |
|---|---|
| Requirement | Verdict |
| Verify the number of sentences value is 1. | ✓ |
| Check the sentence number value is 1. | ✓ |
| Check that the Sequential message identifier is null. | ✓ |
| Verify that the correct AIS Channel is indicated. | ✓ |
| Check the number of Fill bits is 0. | ✓ |

| Message 25 – EUT Response |
|---|
| Comments |
| No response is required for this message type. |

| Message 26 – Message contents | | |
|---|---|---|
| Interface | Message | Verdict |
| VDL | !AIVDO,1,1,,A,J;UgjL@000000000000000000000000000000000000000000000000000000,2*03 | ✓ |
| PI | !AIVDM,2,1,5,A,J;UgjL@000000000000000000000000000000000000000000000000,0*05<br>!AIVDM,2,2,5,A,00000000000,2*21 | ✓ |

| Message 26 – PI output of VDM | |
|---|---|
| Requirement | Verdict |
| Verify the number of sentences value is 2. | ✓ |
| Check the sentence number value is 1 then 2. | ✓ |
| Check that the Sequential message identifier is null. | ✓ |
| Verify that the correct AIS Channel is indicated. | ✓ |
| Check the number of Fill bits is 0 and 2. | ✓ |

| Message 26 – EUT Response |
|---|
| Comments |
| No response is required for this message type. |

Transmitted Messages - Clause 16.7.2 (Modification State 1)

**Method of measurement**

Set-up standard test environment and operate EUT in autonomous mode. Initiate the transmission of messages relevant for a mobile station according to Table 7 by the EUT. Record transmitted messages.

***Required results***

Confirm that EUT transmits messages with correct field contents and format or responses as appropriate. Confirm that messages 4, 9, 16, 17, 18, 19, 20, 21, 22 are NOT being transmitted by the EUT.

***Test Results***

| **Message 1, 2 and 3 – Message contents** | |
|---|---|
| Requirement | Verdict |
| The following field contents were checked for correct values. | |
| Message ID | ✓ |
| Repeat indicator | ✓ |
| User ID | ✓ |
| Navigational status | ✓ |
| ROT | ✓ |
| SOG | ✓ |
| Position accuracy | ✓ |
| Longitude | ✓ |
| Latitude | ✓ |
| COG | ✓ |
| True heading | ✓ |
| Time stamp | ✓ |
| RAIM-flag | ✓ |
| Communication state SOTDMA – Sync state | ✓ |
| Communication state SOTDMA – Slot timeout | ✓ |
| Communication state SOTDMA – Slot offset | ✓ |
| Communication state SOTDMA – UTC Hour | ✓ |
| Communication state SOTDMA – UTC Minute | ✓ |
| Communication state SOTDMA – Slot number | ✓ |
| Communication state SOTDMA – Number of received stations | ✓ |
| Communication state ITDMA – Sync state | ✓ |
| Communication state ITDMA – Slot increment | ✓ |
| Communication state ITDMA – Slot number | ✓ |
| Communication state ITDMA – Keep flag | ✓ |

| Message 1, 2 and 3 – VDO Sentence | | |
|---|---|---|
| Type | Message | Verdict |
| 1 | !AIVDO,1,1,,B,16K8@H@P?w<tSF0l4Q@>4?wv0`ES,0*55 | ✓ |
| 2 | !AIVDO,1,1,,A,26K8@H@00DOle`2MEs7hKwv80t02,0*5B | ✓ |
| 3 | !AIVDO,1,1,,A,36K8@H@P?w<tSF0l4Q@>4?wv0hSM,0*54 | ✓ |
| Requirement | | Verdict |
| Verify the number of sentences value is 1. | | ✓ |
| Check the sentence number value is 1. | | ✓ |
| Check that the Sequential message identifier is null. | | ✓ |
| Verify that the correct AIS Channel is indicated. | | ✓ |
| Check the number of Fill bits is 0. | | ✓ |

| Message 4 |
|---|
| Comments |
| Message 4 cannot be transmitted by the EUT. |

| Message 5 – Message contents | |
|---|---|
| Requirement | Verdict |
| The following field contents were checked for correct values. | |
| Message ID | ✓ |
| Repeat indicator | ✓ |
| User ID | ✓ |
| AIS version indicator | ✓ |
| IMO number | ✓ |
| Call sign | ✓ |
| Name | ✓ |
| Type of ship and cargo type | ✓ |
| Overall dimension/reference for position | ✓ |
| Type of electronic position fixing device | ✓ |
| ETA | ✓ |
| Maximum present static draught | ✓ |
| Destination | ✓ |
| DTE | ✓ |

| Message 5 – VDO Sentence | |
|---|---|
| Message | Verdict |
| !AIVDO,2,1,3,B,56K8@HGa5lS448<@DJ0EEB22222222222222220u<S8N`4O<,0*00<br>!AIVDO,2,2,3,B,RNm3jnCp888888888888880,2*53 | ✓ |
| Requirement | Verdict |
| Verify the number of sentences value is 2. | ✓ |
| Check the sentence number value is 1, then 2. | ✓ |
| Check that the Sequential message identifier is incremental with each new message. | ✓ |
| Verify that the correct AIS Channel is indicated. | ✓ |
| Check the number of Fill bits is 0 for the first message and 2 for the second. | ✓ |

| Message 6 – Message contents | |
|---|---|
| Requirement | Verdict |
| The following field contents were checked for correct values. | |
| Message ID | ✓ |
| Repeat indicator | ✓ |
| Source ID | ✓ |
| Sequence number | ✓ |
| Retransmit flag | ✓ |
| DAC | ✓ |
| FI | ✓ |
| Data | ✓ |

| Message 6 – VDO Sentence | |
|---|---|
| Message | Verdict |
| !AIVDO,1,1,,A,66K8@HBNjGOP04205@E=B0m<L0,4*31 | ✓ |
| Requirement | Verdict |
| Verify the number of sentences value is 1. | ✓ |
| Check the sentence number value is 1. | ✓ |
| Check that the Sequential message identifier is null. | ✓ |
| Verify that the correct AIS Channel is indicated. | ✓ |
| Check the number of Fill bits is 0. | ✓ |

| Message 7 – Message contents | |
|---|---|
| Requirement | Verdict |
| The following field contents were checked for correct values. | |
| Message ID | ✓ |
| Repeat indicator | ✓ |
| Source ID | ✓ |
| Destination ID1 | ✓ |
| Sequence number for ID1 | ✓ |
| Destination ID2 omitted | ✓ |
| Sequence number for ID2 omitted | ✓ |
| Destination ID3 omitted | ✓ |
| Sequence number for ID3 omitted | ✓ |
| Destination ID4 omitted | ✓ |
| Sequence number for ID4 omitted | ✓ |

| Message 7 – VDO Sentence | |
|---|---|
| Message | Verdict |
| !AIVDO,1,1,,A,76K8@H@JOJtM,0*68 | ✓ |
| Requirement | Verdict |
| Verify the number of sentences value is 1. | ✓ |
| Check the sentence number value is 1. | ✓ |
| Check that the Sequential message identifier is null. | ✓ |
| Verify that the correct AIS Channel is indicated. | ✓ |
| Check the number of Fill bits is 0. | ✓ |

| Message 8 – Message contents | |
|---|---|
| Requirement | Verdict |
| The following field contents were checked for correct values. | |
| Message ID | ✓ |
| Repeat indicator | ✓ |
| Source ID | ✓ |
| DAC | ✓ |
| FI | ✓ |
| Data | ✓ |

| Message 8 – VDO Sentence | |
|---|---|
| Message | Verdict |
| !AIVDO,2,1,3,B,86K8@H@0@00521DEB@jhTSmkQSn2UCD4kmQDU21C0FVA3it<,0*29 | ✓ |
| Requirement | Verdict |
| Verify the number of sentences value is 1. | ✓ |
| Check the sentence number value is 1. | ✓ |
| Check that the Sequential message identifier is null. | ✓ |
| Verify that the correct AIS Channel is indicated. | ✓ |
| Check the number of Fill bits is 0. | ✓ |

| Message 9 |
|---|
| Comments |
| Message 9 cannot be transmitted by the EUT. |

| Message 10 – Message contents | |
|---|---|
| Requirement | Verdict |
| The following field contents were checked for correct values. | |
| Message ID | ✓ |
| Repeat indicator | ✓ |
| Source ID | ✓ |
| Spare | ✓ |
| Destination ID | ✓ |
| Spare | ✓ |

| Message 10 – VDO Sentence | |
|---|---|
| Message | Verdict |
| !AIVDO,1,1,,A,:6K8@HBNjGOP,0*6D | ✓ |
| Requirement | Verdict |
| Verify the number of sentences value is 1. | ✓ |
| Check the sentence number value is 1. | ✓ |
| Check that the Sequential message identifier is null. | ✓ |
| Verify that the correct AIS Channel is indicated. | ✓ |
| Check the number of Fill bits is 0. | ✓ |

| Message 11 – Message contents | |
|---|---|
| Requirement | Verdict |
| The following field contents were checked for correct values. | |
| Message ID | ✓ |
| Repeat indicator | ✓ |
| User ID | ✓ |
| UTC year | ✓ |
| UTC month | ✓ |
| UTC day | ✓ |
| UTC hour | ✓ |
| UTC minute | ✓ |
| UTC second | ✓ |
| Position accuracy | ✓ |
| Longitude | ✓ |
| Latitude | ✓ |
| Type of electronic position fixing device | ✓ |

| Message 11 – VDO Sentence | |
|---|---|
| Message | Verdict |
| !AIVDO,1,1,,A,;6K8@HAuibaj<Ole`2MEs7i00P00,0*3B | ✓ |
| Requirement | Verdict |
| Verify the number of sentences value is 1. | ✓ |
| Check the sentence number value is 1. | ✓ |
| Check that the Sequential message identifier is null. | ✓ |
| Verify that the correct AIS Channel is indicated. | ✓ |
| Check the number of Fill bits is 0. | ✓ |

| Message 12 – Message contents | |
|---|---|
| Requirement | Verdict |
| The following field contents were checked for correct values. | |
| Message ID | ✓ |
| Repeat indicator | ✓ |
| User ID | ✓ |
| Sequence number | ✓ |
| Destination ID | ✓ |
| Retransmit flag | ✓ |
| Safety related text | ✓ |

| Message 12 – VDO Sentence | |
|---|---|
| Message | Verdict |
| !AIVDO,1,1,,A,<6K8@HBNjGOPD5CDP=C4,0*07 | ✓ |
| Requirement | Verdict |
| Verify the number of sentences value is 1. | ✓ |
| Check the sentence number value is 1. | ✓ |
| Check that the Sequential message identifier is null. | ✓ |
| Verify that the correct AIS Channel is indicated. | ✓ |
| Check the number of Fill bits is 0. | ✓ |

| Message 13 – Message contents | |
|---|---|
| Requirement | Verdict |
| The following field contents were checked for correct values. | |
| Message ID | ✓ |
| Repeat indicator | ✓ |
| Source ID | ✓ |
| Destination ID1 | ✓ |
| Sequence number for ID1 | ✓ |
| Destination ID2 omitted | ✓ |
| Sequence number for ID2 omitted | ✓ |
| Destination ID3 omitted | ✓ |
| Sequence number for ID3 omitted | ✓ |
| Destination ID4 omitted | ✓ |
| Sequence number for ID4 omitted | ✓ |

| Message 13 – VDO Sentence | |
|---|---|
| Message | Verdict |
| !AIVDO,1,1,,A,=6K8@H@JOJtM,0*62 | ✓ |
| Requirement | Verdict |
| Verify the number of sentences value is 1. | ✓ |
| Check the sentence number value is 1. | ✓ |
| Check that the Sequential message identifier is null. | ✓ |
| Verify that the correct AIS Channel is indicated. | ✓ |
| Check the number of Fill bits is 0. | ✓ |

| Message 14 – Message contents | |
|---|---|
| Requirement | Verdict |
| The following field contents were checked for correct values. | |
| Message ID | ✓ |
| Repeat indicator | ✓ |
| Source ID | ✓ |
| Safety related text | ✓ |

| Message 14 – VDO Sentence | |
|---|---|
| Message | Verdict |
| !AIVDO,1,1,,A,>6K8@H@Hh51<,0*0F | ✓ |
| **Message 14 – PI output of VDO** | |
| Requirement | Verdict |
| Verify the number of sentences value is 1. | ✓ |
| Check the sentence number value is 1. | ✓ |
| Check that the Sequential message identifier is null. | ✓ |
| Verify that the correct AIS Channel is indicated. | ✓ |
| Check the number of Fill bits is 0. | ✓ |

| Message 15 – Message contents | |
|---|---|
| Requirement | Verdict |
| The following field contents were checked for correct values. | |
| Message ID | ✓ |
| Repeat indicator | ✓ |
| Source ID | ✓ |
| Destination ID1 | ✓ |
| Message ID1.1 | ✓ |
| Slot offset 1.1 | ✓ |
| Message ID1.2 | ✓ |
| Slot offset 1.2 | ✓ |
| Destination ID 2 | ✓ |
| Message ID 2.1 | ✓ |
| Slot offset 2.1 | ✓ |

| Message 15 – VDO Sentence | |
|---|---|
| Message | Verdict |
| !AIVDO,1,1,,B,?6K8@HBNjGOP<005008AlJphh00,2*4F | ✓ |
| **Message 15 – PI output of VDO** | |
| Requirement | Verdict |
| Verify the number of sentences value is 1. | ✓ |
| Check the sentence number value is 1. | ✓ |
| Check that the Sequential message identifier is null. | ✓ |
| Verify that the correct AIS Channel is indicated. | ✓ |
| Check the number of Fill bits is 2. | ✓ |

| Message 16 |
|---|
| Comments |
| Message 16 cannot be transmitted by the EUT. |

| Message 17 |
|---|
| Comments |
| Message 17 cannot be transmitted by the EUT. |

| Message 18 |
|---|
| Comments |
| Message 18 cannot be transmitted by the EUT. |

| Message 19 |
|---|
| Comments |
| Message 19 cannot be transmitted by the EUT. |

| Message 20 |
|---|
| Comments |
| Message 20 cannot be transmitted by the EUT. |

| Message 21 |
|---|
| Comments |
| Message 21 cannot be transmitted by the EUT. |

| Message 22 |
|---|
| Comments |
| Message 22 cannot be transmitted by the EUT. |

| Message 23 |
|---|
| Comments |
| Message 23 cannot be transmitted by the EUT. |

| Message 24 |
|---|
| Comments |
| Message 24 cannot be transmitted by the EUT. |

| Message 25 |
|---|
| Comments |
| Message 25 is not supported by the EUT. |

| Message 26 |
|---|
| Comments |
| Message 26 is not supported by the EUT. |

| Message 27 – Message contents | |
|---|---|
| Requirement | Verdict |
| The following field contents were checked for correct values. | |
| Message ID | ✓ |
| Repeat indicator | ✓ |
| MMSI | ✓ |
| Position Accuracy | ✓ |
| RAIM Flag | ✓ |
| Navigation Status | ✓ |
| Longitude | ✓ |
| Latitude | ✓ |
| SOG | ✓ |
| COG | ✓ |
| GNSS Position Status | ✓ |

| Message 27 – VDO Sentence | |
|---|---|
| Message | Verdict |
| !AIVDO,1,1,,A,K6K8@H@?r>ChGU0d,0*7C | ✓ |
| **Message 27 – PI output of VDO** | |
| Requirement | Verdict |
| Verify the number of sentences value is 1. | ✓ |
| Check the sentence number value is 1. | ✓ |
| Check that the Sequential message identifier is null. | ✓ |
| Verify that the correct AIS Channel is indicated. | ✓ |
| Check the number of Fill bits is 0. | ✓ |

## 2.18 DUAL CHANNEL OPERATION

### 2.18.1 Specification Reference

IEC 61993-2, Clause 17.1

### 2.18.2 Equipment Under Test

JHS-183, BB50304

### 2.18.3 Date of Test and Modification State

22 June 2012 - Modification State 0

### 2.18.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.18.5 Test Results and Methods of Measurement

Alternate Transmissions – Clause 17.1.1

***Method of Measurement***

Set-up standard test environment and operate EUT in autonomous mode on default channels AIS1, AIS2. Record transmitted scheduled position reports on both channels. Check CommState for slot allocation.

***Required results***

Confirm that EUT allocates slots in both channels alternating. Repeat check for data link access period.

**Test Results**

| Requirement | Verdict |
|---|---|
| Check that the EUT allocates slots, alternately in both channels. | ✓ |
| Verify that during network entry, both channels are allocates alternately. | ✓ |

## 2.19 REGIONAL AREA DESIGNATION BY VDL MESSAGE

### 2.19.1 Specification Reference

IEC 61993-2, Clause 17.2

### 2.19.2 Equipment Under Test

JHS-183, BB50304

### 2.19.3 Date of Test and Modification State

08 August 2012 - Modification State 3

### 2.19.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.19.5 Test Results and Methods of Measurement

***Method of Measurement***

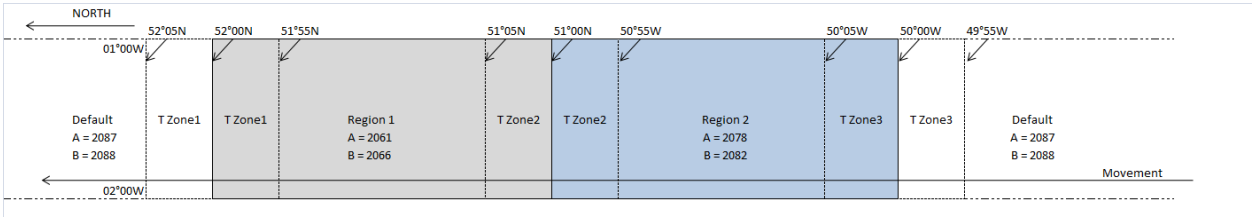
Set-up standard test environment and operate EUT in autonomous mode. Apply Channel management messages (msg 22) to the VDL defining two adjacent regional areas 1 and 2 with different channel assignments for both regions and a transitional zone extending 4nm either side of the regional boundary. At least one channel shall be 12.5kHz channel. Let the EUT approach region 1 from outside region 2 more than 5 nm away from region boundary transmitting on default channels. Record transmitted messages on all 6 channels.

***Required results***

Check that the EUT transmits and receives on the primary channels assigned for each region alternating channels and doubling reporting rate when passing through the transitional zones. EUT shall revert to default autonomous operation on the regional channels after leaving the transitional zones.

***Test Results***

The following regions were setup and the EUT moved through them.



This test was divided up into 6 sections to test for behaviour when crossing bewteen regions and transition zones.

| Test | Zone | Start Position | Stop Position | Boundary Position |
|---|---|---|---|---|
| 1 | HS-HSTZ3 | 49°53 | 49°58 | 49°55 |
| 2 | HSTZ3-R2TZ3 | 49°58 | 49°02 | 50°00 |
| 3 | R2TZ3-R2 | 50°02 | 50°06 | 50°05 |
| 4 | R2-R2TZ2 | 50°54 | 50°58 | 50°55 |
| 5 | R2TZ2-R1TZ2 | 50°58 | 51°02 | 51°00 |
| 6 | R2TZ2-R1 | 51°02 | 51°06 | 51°05 |
| 7 | R1-R1TZ1 | 51°54 | 51°58 | 51°55 |
| 8 | R1TZ1-HSTZ1 | 51°58 | 52°02 | 52°00 |
| 9 | HSTZ1-HS | 52°02 | 52°07 | 52°05 |

HS = High Seas
TZx = Transition Zone
Rx = Region

| **Region Settings by message 22** | |
|---|---|
| Requirement | Verdict |
| Check that message 22 for region 1 is received and output on the PI. | ✓ |
| Check that region 1 is displayed correctly on the PI with the correct settings:<br>$AIACA,1,5200.0,N,00100.0,W,5100.0,N,00200.0,W,5,2061,0,2066,0,0,0,B,0,074607.00*3A<br>$AIACS,1,002222222,074607.00,12,08,2013*7D | ✓ |
| Check that message 22 for region 2 is received and output on the PI. | ✓ |
| Check that region 2 is displayed correctly on the PI with the correct settings:<br>$AIACA,2,5100.0,N,00100.0,W,5000.0,N,00200.0,W,5,2078,0,2082,0,0,0,B,0,074602.00*3C<br>$AIACS,2,002222222,074602.00,12,08,2013*7B | ✓ |

| **Test 1 – High seas to transition zone 3** | |
|---|---|
| Requirement | Verdict |
| Check that the EUT changes settings within ± 0.1 minute of the boundary. | ✓ |
| Verify that channels 2087 and 2078 are used. | ✓ |
| Check that the reporting rate is doubled. | ✓ |
| Confirm that message 1 is released by setting timeout and offset values to 0. | ✓ |
| Check that message 3 is used to allocate new slots. | ✓ |

| **Test 2 – High seas to region 2** | |
|---|---|
| Requirement | Verdict |
| Check that the EUT changes settings within ± 0.1 minute of the boundary. | ✓ |
| Check the in use flag of the ACA message is set to 1. | ✓ |
| Verify the time of in use flag is correct. | ✓ |

| **Test 3 – Transition zone 3 to region 2** | |
|---|---|
| Requirement | Verdict |
| Check that the EUT changes settings within ± 0.1 minute of the boundary. | ✓ |
| Verify that channels 2078 and 2082 are used. | ✓ |
| Check that the reporting rate returns to normal. | ✓ |
| Confirm that message 1 is released by setting timeout and offset values to 0. | ✓ |
| Check that message 3 is used to allocate new slots. | ✓ |

| Test 4 – Region 2 to transition zone 2 | |
|---|---|
| Requirement | Verdict |
| Check that the EUT changes settings within ± 0.1 minute of the boundary. | ✓ |
| Verify that channels 2087 and 2061 are used. | ✓ |
| Check that the reporting rate is doubled. | ✓ |
| Confirm that message 1 is released by setting timeout and offset values to 0. | ✓ |
| Check that message 3 is used to allocate new slots. | ✓ |

| Test 5 – Region 2 to region 1 | |
|---|---|
| Requirement | Verdict |
| Check that the EUT changes settings within ± 0.1 minute of the boundary. | ✓ |
| Check the in use flag of the ACA message is set to 1. | ✓ |
| Verify the time of in use flag is correct. | ✓ |

| Test 6 – Transition zone 2 to region 1 | |
|---|---|
| Requirement | Verdict |
| Check that the EUT changes settings within ± 0.1 minute of the boundary. | ✓ |
| Verify that channels 2061 and 2066 are used. | ✓ |
| Check that the reporting rate returns to normal. | ✓ |
| Confirm that message 1 is released by setting timeout and offset values to 0. | ✓ |
| Check that message 3 is used to allocate new slots. | ✓ |

| Test 7 – Region1 to transition zone 1 | |
|---|---|
| Requirement | Verdict |
| Check that the EUT changes settings within ± 0.1 minute of the boundary. | ✓ |
| Verify that channels 2061 and 2087 are used. | ✓ |
| Check that the reporting rate is doubled. | ✓ |
| Confirm that message 1 is released by setting timeout and offset values to 0. | ✓ |
| Check that message 3 is used to allocate new slots. | ✓ |

| Test 8 – Region 1 to high seas | |
|---|---|
| Requirement | Verdict |
| Check that the EUT changes settings within ± 0.1 minute of the boundary. | ✓ |
| Check the in use flag of the ACA message is set to 1. | ✓ |
| Verify the time of in use flag is correct. | ✓ |

| Test 9 – Transition zone 1 to high seas | |
|---|---|
| Requirement | Verdict |
| Check that the EUT changes settings within ± 0.1 minute of the boundary. | ✓ |
| Verify that channels 2087 and 2088 are used. | ✓ |
| Check that the reporting rate returns to normal. | ✓ |
| Confirm that message 1 is released by setting timeout and offset values to 0. | ✓ |
| Check that message 3 is used to allocate new slots. | ✓ |

## 2.20 REGIONAL AREA DESIGNATION BY SERIAL MESSAGE

### 2.20.1 Specification Reference

IEC 61993-2, Clause 17.3

### 2.20.2 Equipment Under Test

JHS-183, BB50304

### 2.20.3 Date of Test and Modification State

08 August 2012 - Modification State 3

### 2.20.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.20.5 Test Results and Methods of Measurement

***Method of Measurement***

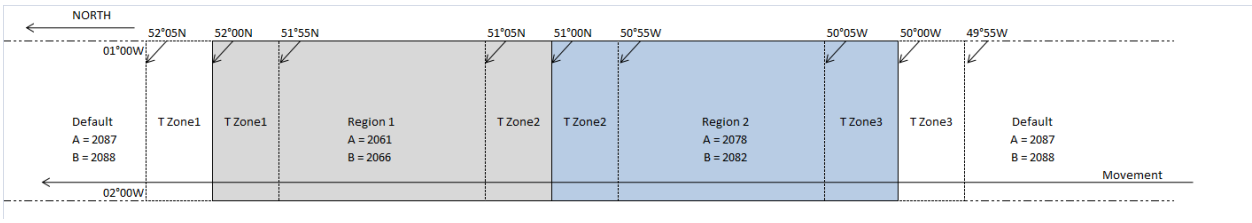
Repeat test 17.2 using ACA serial message for channel assignment.

***Required results***

Check that the EUT transmits and receives on the primary channels assigned for each region alternating channels and doubling reporting rate when passing through the transitional zones. EUT shall revert to default autonomous operation on the regional channels after leaving the transitional zones.

***Test Results***

The following regions were setup and the EUT moved through them.



This test was divided up into 6 sections to test for behaviour when crossing bewteen regions and transition zones.

| Test | Zone | Start Position | Stop Position | Boundary Position |
|---|---|---|---|---|
| 1 | HS-HSTZ3 | 49°53 | 49°58 | 49°55 |
| 2 | HSTZ3-R2TZ3 | 49°58 | 49°02 | 50°00 |
| 3 | R2TZ3-R2 | 50°02 | 50°06 | 50°04 |
| 4 | R2-R2TZ2 | 50°54 | 50°58 | 50°56 |
| 5 | R2TZ2-R1TZ2 | 50°58 | 51°02 | 51°00 |
| 6 | R2TZ2-R1 | 51°02 | 51°06 | 51°04 |
| 7 | R1-R1TZ1 | 51°54 | 51°58 | 51°56 |
| 8 | R1TZ1-HSTZ1 | 51°58 | 52°02 | 52°00 |
| 9 | HSTZ1-HS | 52°02 | 52°07 | 52°05 |

HS = High Seas
TZx = Transition Zone
Rx = Region

| **Region Settings by ACA message** | |
|---|---|
| The following message were sent to the PI:<br>$AIACA,1,5100.0,N,00100.0,W,5000.0,N,00200.0,W,5,2078,0,2082,0,0,0,,,<br>$AIACA,1,5200.0,N,00100.0,W,5100.0,N,00200.0,W,5,2061,0,2066,0,0,0,,, | |
| Requirement | Verdict |
| Check that message 22 for region 1 is received and output on the PI. | ✓ |
| Check that region 1 is displayed correctly on the PI with the correct settings.<br>$AIACA,2,5200.0,N,00100.0,W,5100.0,N,00200.0,W,5,2061,0,2066,0,0,0,C,0,112932.00*30<br>$AIACS,2,,112932.00,13,08,2012*44 | ✓ |
| Check that message 22 for region 2 is received and output on the PI. | ✓ |
| Check that region 2 is displayed correctly on the PI with the correct settings.<br>$AIACA,3,5100.0,N,00100.0,W,5000.0,N,00200.0,W,5,2078,0,2082,0,0,0,C,0,112757.00*3C<br>$AIACS,3,,112757.00,13,08,2012*48 | ✓ |

| **Test 1 – High seas to transition zone 3** | |
|---|---|
| Requirement | Verdict |
| Check that the EUT changes settings within ± 0.1 minute of the boundary. | ✓ |
| Verify that channels 2087 and 2078 are used. | ✓ |
| Check that the reporting rate is doubled. | ✓ |
| Confirm that message 1 is released by setting timeout and offset values to 0. | ✓ |
| Check that message 3 is used to allocate new slots. | ✓ |

| **Test 2 – High seas to region 2** | |
|---|---|
| Requirement | Verdict |
| Check that the EUT changes settings within ± 0.1 minute of the boundary. | ✓ |
| Check the in use flag of the ACA message is set to 1. | ✓ |
| Verify the time of in use flag is correct. | ✓ |

| **Test 3 – Transition zone 3 to region 2** | |
|---|---|
| Requirement | Verdict |
| Check that the EUT changes settings within ± 0.1 minute of the boundary. | ✓ |
| Verify that channels 2078 and 2082 are used. | ✓ |

| Test 3 – Transition zone 3 to region 2 | |
|---|---|
| Requirement | Verdict |
| Check that the reporting rate returns to normal. | ✓ |
| Confirm that message 1 is released by setting timeout and offset values to 0. | ✓ |
| Check that message 3 is used to allocate new slots. | ✓ |

| Test 4 – Region 2 to transition zone 2 | |
|---|---|
| Requirement | Verdict |
| Check that the EUT changes settings within ± 0.1 minute of the boundary. | ✓ |
| Verify that channels 2087 and 2061 are used. | ✓ |
| Check that the reporting rate is doubled. | ✓ |
| Confirm that message 1 is released by setting timeout and offset values to 0. | ✓ |
| Check that message 3 is used to allocate new slots. | ✓ |

| Test 5 – Region 2 to region 1 | |
|---|---|
| Requirement | Verdict |
| Check that the EUT changes settings within ± 0.1 minute of the boundary. | ✓ |
| Check the in use flag of the ACA message is set to 1. | ✓ |
| Verify the time of in use flag is correct. | ✓ |

| Test 6 – Transition zone 2 to region 1 | |
|---|---|
| Requirement | Verdict |
| Check that the EUT changes settings within ± 0.1 minute of the boundary. | ✓ |
| Verify that channels 2061 and 2066 are used. | ✓ |
| Check that the reporting rate returns to normal. | ✓ |
| Confirm that message 1 is released by setting timeout and offset values to 0. | ✓ |
| Check that message 3 is used to allocate new slots. | ✓ |

| Test 7 – Region1 to transition zone 1 | |
|---|---|
| Requirement | Verdict |
| Check that the EUT changes settings within ± 0.1 minute of the boundary. | ✓ |
| Verify that channels 2061 and 2087 are used. | ✓ |
| Check that the reporting rate is doubled. | ✓ |
| Confirm that message 1 is released by setting timeout and offset values to 0. | ✓ |
| Check that message 3 is used to allocate new slots. | ✓ |

| Test 8 – Region 1 to high seas | |
|---|---|
| Requirement | Verdict |
| Check that the EUT changes settings within ± 0.1 minute of the boundary. | ✓ |
| Check the in use flag of the ACA message is set to 1. | ✓ |
| Verify the time of in use flag is correct. | ✓ |

| Test 9 – Transition zone 1 to high seas | |
|---|---|
| Requirement | Verdict |
| Check that the EUT changes settings within ± 0.1 minute of the boundary. | ✓ |
| Verify that channels 2087 and 2088 are used. | ✓ |
| Check that the reporting rate returns to normal. | ✓ |
| Confirm that message 1 is released by setting timeout and offset values to 0. | ✓ |
| Check that message 3 is used to allocate new slots. | ✓ |

## 2.21 POWER SETTING

### 2.21.1 Specification Reference

IEC 61993-2, Clause 17.4

### 2.21.2 Equipment Under Test

JHS-183, BB50304

### 2.21.3 Date of Test and Modification State

25 June 2012 - Modification State 0

### 2.21.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.21.5 Test Results and Methods of Measurement

***Method of Measurement***

Set-up standard test environment and operate EUT in autonomous mode. Transmit channel management message (msg 22) defining output power high/low.
Repeat test using ACA and manual input.

***Required results***

Check that EUT sets output power as defined.

***Test Results***

| Message 22 | |
|---|---|
| Requirement | Verdict |
| Verify that the EUT changes its power to low after receiving message 22 with the power parameter = 1. | ✓ |
| Verify that the EUT changes its power to high after receiving message 22 with the power parameter = 0. | ✓ |
| Confirm that the MKD displays the correct power setting. | ✓ |

| ACA Message | |
|---|---|
| Requirement | Verdict |
| Verify that the EUT changes its power to low after receiving the ACA message with power field = 1. The message sent was: "$AIACA,1,5200.0,N,00100.0,W,5000.0,N,00300.0,W,5,2087,0,2088,0,0,1,,," | ✓ |
| Verify that the EUT changes its power to high after receiving the ACA message with power field = 0. The message sent was: "$AIACA,1,5200.0,N,00100.0,W,5000.0,N,00300.0,W,5,2087,0,2088,0,0,0,,," | ✓ |
| Confirm that the MKD displays the correct power setting. | ✓ |

| Manually | |
|---|---|
| Requirement | Verdict |
| Verify that the EUT changes its power to low after changing the power setting via the MKD. | ✓ |
| Verify that the EUT changes its power to high after changing the power setting via the MKD. | ✓ |

## 2.22 MESSAGE PRIORITY HANDLING

### 2.22.1 Specification Reference

IEC 61993-2, Clause 17.5

### 2.22.2 Equipment Under Test

JHS-183, BB50304

### 2.22.3 Date of Test and Modification State

26 June 2012 - Modification State 0

### 2.22.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.22.5 Test Results and Methods of Measurement

***Method of Measurement***

Set-up standard test environment and operate test equipment with 90% channel load. Set the EUT to max reporting rate of 2 sec by applying a speed of >23kn and a ROT of >20°/sec. Record VDL messages and check for used slots. Initiate the transmission of two 5 slot messages (msg 12 and msg 8) by the EUT. Record transmitted messages on both channels.

***Required Results***

Check that EUT transmits the messages in correct order according to their priority (ITU-R M.1371-1 A/3.3.8.1 table 13) *(ITU-R M.1371-4 A8/2 table 43)*.

***Test Results***

| Requirement | Verdict |
|---|---|
| Confirm that message 12 is transmitted first. | ✓ |

## 2.23 SLOT REUSE (LINK CONGESTION)

### 2.23.1 Specification Reference

IEC 61993-2, Clause 17.6

### 2.23.2 Equipment Under Test

JHS-183, BB00006

### 2.23.3 Date of Test and Modification State

17 August 2012 - Modification State 3

### 2.23.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.23.5 Test Results and Methods of Measurement

***Method of Measurement***

Set-up standard test environment and operate EUT in autonomous mode. Transmit a Data Link Management message (msg 20) to the EUT with slot offset and increment to allocate slots for a base station. Assure that at test receiver location the signal level received from EUT exceeds the signal level received from test transmitter. Record transmitted messages and check frame structure. Set up additional test targets to simulate a VDL load of >90% until slot reuse by EUT is observed.

***Required Results***

Check that the nominal reporting rate for Position Report msg 1 is achieved ±10% (allocating slots in selection interval SI) under link congestion conditions. Confirm that the slot occupied by the most distant station (within selection interval) is used by the slot reuse algorithm.

Check that a station is not subject to slot reuse more than once a frame. Check that slots allocated by a local base station are not subject to slot reuse.

***Test Results***

The EUT was switched on and the position of message 1 was observed. The VDL generator was setup so that a block of 45 targets were transmitting with a block gap of 5 slots, the 45 targets had a MMSI from 1 to 45. Even numbered MMSI targets were positioned < 120nm from the EUT, odd numbered MMSI targets were positioned > 120 nm from the EUT.

Message 20 was sent every frame, reserving 2 slots for a base station in every 5 slot block gap.

| Requirement | Verdict |
|---|---|
| Confirm that the reporting rate is achieved ±10% | ✓ |
| Confirm that the slot occupied by the most distant station is used. | ✓ |
| Confirm that the same station that is not used for slot re-use more than once per frame. | ✓ |
| Check that slots reserved by the base station are not used. | ✓ |

## 2.24 MANAGEMENT OF RECEIVED REGIONAL OPERATING SETTINGS

### 2.24.1 Specification Reference

IEC 61993-2, Clause 17.7

### 2.24.2 Equipment Under Test

JHS-183, BB50304

### 2.24.3 Date of Test and Modification State

28 August 2012 - Modification State 3

### 2.24.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.24.5 Test Results and Methods of Measurement

Test for replacement or erasure of dated or remote regional operating settings – Clause 17.7.1

(7.4.1)

***Method of Measurement***

Set-up standard test environment and operate EUT in autonomous mode. Send a valid regional operating setting to the EUT by msg 22 with the regional operating area including the own position of the EUT. Consecutively send a total of seven (7) valid regional operation settings to EUT, using both msgs 22 and DSC telecommands, with regional operating areas not overlapping to the first and to each other. Perform the following in the order shown:

a) Send a ninth msg 22 to the EUT with valid regional operating areas not overlapping with the previous eight regional operating areas.
b) Step 1: Set own position of EUT into any of the regional operating areas defined by the second to the ninth telecommands sent to the EUT previously.
   Step 2: Send a tenth telecommand to the EUT, with a regional operating area which partly overlaps the regional operating area to which the EUT was set by Step 1 but which does not include the own position of the EUT.
c) Step 1: Move own position of EUT to a distance of more than 500 miles from all regions defined by previous commands.
   Step 2: Consecutively set own position of EUT to within all regions defined by the previous telecommands.

***Required results***

After the initialization, the EUT should operate according to the regional operating settings defined by the first msg 22 sent.

a) The EUT shall return to the default operating settings.
b) Step 1: Check that the EUT changes its operating settings to those of that region which includes own position of the EUT.
   Step 2: Check that the EUT reverts to the default operating settings.

NOTE Since the regional operating settings to which the EUT was set in Step 1 shall be erased due to Step 2, and since there is no other regional operating setting due to their non-overlapping definition, the EUT shall return to default.

c) Step 1: Check that the EUT operates with the default settings.
Step 2: Check that the EUT operates with the default settings.

***Test Results***

| **Initial Region Configuration** | |
|---|---|
| Requirement | Verdict |
| The EUT was fed external GPS data, positioning it within the first region. | ✓ |
| Check that the 8 regions are output to the PI when the command "$AIAIQ,ACA" is sent to the PI. | ✓ |

| **Step a)** | |
|---|---|
| Requirement | Verdict |
| EUT positioned within region 1. | ✓ |
| Message 22 was sent to the EUT with settings 52°40N 01W, 52°15N 02W. | ✓ |
| Verify that the first region is deleted by sending the command "$AIAIQ,ACA". | ✓ |
| Check that the EUT returns to default values. | ✓ |

| **Step b) – Step 1** | |
|---|---|
| Requirement | Verdict |
| Confirm that the EUT changes it's settings in accordance with the region. | ✓ |

| **Step b) – Step 2** | |
|---|---|
| Requirement | Verdict |
| The following command was sent to the PI:<br>$AIACA,0,5255.0,N,00030.0,W,5230.0,N,00130.0,W,5,2081,0,2082,0,0,0,,, | - |
| Check that the old region is deleted and the new region replaces the old one. | ✓ |
| Confirm that the EUT reverts back to default settings. | ✓ |

| **Step c) – Step 1** | |
|---|---|
| Requirement | Verdict |
| Confirm that all regions are deleted. | ✓ |

| **Step c) – Step 2** | |
|---|---|
| Requirement | Verdict |
| Confirm that the EUT operates with default values. | ✓ |

Test of correct input via Presentation Interface or MKD – Clause 17.7.2

*(7.4.1)*

***Method of Measurement***

Set-up standard test environment and operate EUT in autonomous mode. Perform the following tests in the following order:

a) Send msg 22 or a DSC telecommand with valid regional operating settings to the EUT with a regional operating area, which contains the current position of own station.
b) Input a different, valid regional operating setting via the MKD.
c) Send a different regional operating setting with a regional operating area which partly overlaps the regional operating area input via the MKD to the EUT via the Presentation Interface in the previous step, and which contains the present position of own station.
d) Input the default operating settings via the MKD for the regional operating area, which was received by the previous command via the Presentation Interface.
e) Send msg 22 or a DSC telecommand with a different regional operating setting to the EUT with a regional operating area, which contains current position of own station.
f) Within two hours, after e), send a different regional operating setting to the EUT via Presentation Interface with a valid regional operating area overlapping the regional operating area sent to the EUT by msg 22 or a DSC telecommand.

***Required results***

a) Confirm that the EUT uses the regional operating settings commanded by msg 22 or DSC telecommand.
b) Step 1: Confirm that the regional operating settings of the previous msg 22 or DSC telecommand are displayed to the user on the MKD for editing.
   Step 2: Check, that the EUT allows the user to edit the displayed regional operating settings. Check, that the EUT does not accept incomplete or invalid regional operating settings. Check, that the EUT accepts a complete and valid regional operating setting.
   Step 3: Check, that the EUT prompt the user to confirm the intended change of regional operating settings. Check, that the EUT allows the user to return to the editing menu or to abort the change of the regional operating settings.
   Step 4: Check, that the EUT uses the regional operating settings input via the MKD.
c) Check, that the EUT uses the regional operating settings received via the Presentation Interface.
d) Check, that the EUT accepts the default operating settings for the regional operating area received in c). Check, that the EUT uses the default operating settings.
e) Check, that the EUT uses the regional operating settings commanded to it by msg 22 or DSC telecommand.
f) Check, that the EUT does not use the regional operating setting commanded to it via the Presentation Interface.

***Test results***

| **Step a) – Use of settings** | |
|---|---|
| Requirement | Verdict |
| Verify that the EUT uses the settings in message 22. | ✓ |

| **Step b) – Step 1** | |
|---|---|
| Requirement | Verdict |
| Confirm that the previous message 22 settings are displayed on the MKD | ✓ |

| Step b) – Step 2 | |
|---|---|
| Requirement | Verdict |
| Confirm that the EUT allows the displayed settings to be edited. | ✓ |
| Check that the EUT does not accept incomplete or invalid regional operating settings. | ✓ |
| Check that the EUT accepts a complete and valid regional operating setting. | ✓ |

| Step b) – Step 3 | |
|---|---|
| Requirement | Verdict |
| Check, that the EUT prompt the user to confirm the intended change of regional operating settings. | ✓ |
| Check, that the EUT allows the user to return to the editing menu or to abort the change of the regional operating settings. | ✓ |

| Step b) – Step 4 | |
|---|---|
| Requirement | Verdict |
| Check that the EUT uses the regional operating settings input via the MKD. | ✓ |

| Step c) | |
|---|---|
| Requirement | Verdict |
| Check that the EUT uses the regional operating settings input via the PI. | ✓ |

| Step d) | |
|---|---|
| Requirement | Verdict |
| Check that the EUT accepts the default operating settings for the regional operating area. | ✓ |
| Check that the EUT uses the default operating settings. | ✓ |

| Step e) | |
|---|---|
| Requirement | Verdict |
| Check, that the EUT uses the regional operating settings commanded to it by msg 22 | ✓ |

| Step f | |
|---|---|
| Requirement | Verdict |
| Check, that the EUT does not use the regional operating setting commanded to it via the PI. | ✓ |

Test of addressed telecommand – Clause 17.7.3

*(7.4.1)*

***Method of Measurement***

Set-up a standard test environment and operate EUT in autonomous mode. Perform the following tests in the following order:

a) Send msg 22 or a DSC telecommand with valid regional operating settings, that are different from the default operating settings, to the EUT with a regional operating area, which contains the current position of own station.
b) Send an addressed msg 22 or an addressed DSC telecommand to the EUT with different regional operating settings than the previous command.
c) Move the EUT out of the regional operating area defined by the previous addressed telecommand into an area without regional operating settings.

***Required results***

a) Check, that the EUT uses the regional operating settings commanded to it in a).
b) Check, that the EUT uses the regional operating settings commanded to it in b).
c) Check, that the EUT reverts to default.

***Test results***

| **Step a)** | |
|---|---|
| Requirement | Verdict |
| Check, that the EUT uses the regional operating settings commanded to it | ✓ |

| **Step b)** | |
|---|---|
| Requirement | Verdict |
| Message 22 sent using ID1. | - |
| Check, that the EUT uses the regional operating settings commanded to it | ✓ |
| Message 22 sent using ID2. | - |
| Check, that the EUT uses the regional operating settings commanded to it | ✓ |

| **Step c)** | |
|---|---|
| Requirement | Verdict |
| Check, that the EUT reverts to default settings. | ✓ |

Test for invalid regional operating areas (3 areas with same corner) – Clause 17.7.4

*(7.4.1)*

***Method of Measurement***

Set-up standard test environment and operate EUT in autonomous mode. Perform the following tests in the following order after completion of all other tests related to change of regional operating settings:

d) Send three different valid regional operating settings with adjacent regional operating areas, their corners within eight miles of each other, to the EUT by msg 22 or DSC telecommand, Presentation Interface input and manual input via MKD. The current own position of the EUT shall be within the regional operating area of the third regional operating set ting.
e) Move current own position of the EUT consecutively to the regional operating areas of the first two valid regional operating settings.

***Required results***

a) Check, that the EUT uses the operating settings that were in use prior to receiving the third regional operating setting.
b) Check, that the EUT consecutively uses the regional operating settings of the first two received regional operating areas.

***Test results***

| **Step a)** | |
|---|---|
| Requirement | Verdict |
| Confirm that the EUT uses the operating settings that were in use prior to receiving the third regional operating setting. | ✓ |

| **Step b)** | |
|---|---|
| Requirement | Verdict |
| Confirm that the EUT consecutively uses the regional operating settings of the first two received regional operating areas. | ✓ |

Self-Certification of other conditions – Clause 17.7.5

*(7.4.1)*

***Required results***

The fulfilment of all other conditions of 7.4.1 shall be self-certified by the manufacturer.

***Test results***

| Requirement | Verdict |
|---|---|
| All stored regional operating settings shall be time/date-tagged and they should be tagged with information by what input means this regional operating setting was received (TDMA Msg 22, DSC telecommand, Manual input via MKD, ACA sentence input via Presentation Interface). | ✓ |
| Comments | |
| NTE-183 AIS Transponder stores all 8 regional operation settings with date, time, and input means in its memory. The AIS Transponder can output the ACA and ACS sentences to presentation interface (PI) replying for query of ACA. ACA and ACS sentences include information source, date and time. | |

| Requirement | Verdict |
|---|---|
| The AIS shall constantly check, if the nearest boundary of the regional operating area of any stored regional operating setting is more than 500 miles away from the current position of own station, or if any stored regional operating setting was older than five weeks. Any stored regional operating setting which fulfils any one of these conditions shall be erased from the memory. | ✓ |
| Comments | |
| Testing of a boundary more than 500 miles away is tested in section 17.7.1. For settings older than 5 weeks, the manufacturer declared that “the AIS transponder compares the tagged time and date with present time input from GPS receiver and when it passed five weeks from the record, the AIS Transponder erases the data.“ | |

| Requirement | Verdict |
|---|---|
| The regional operating settings set shall be handled as a whole, i.e. a change requested for any parameter of the regional operating settings shall be interpreted as a new regional operating setting. | ✓ |
| Comments | |
| This is tested in section 17.7.2. | |

| Requirement | Verdict |
|---|---|
| When the user requests to manually input a regional operating setting via the Minimum Keyboard and Display (MKD), the regional operating settings in use, which may be the default operating settings, shall be presented to the user on the MKD. The user shall then be allowed to edit these settings partly or in full. The AIS shall ensure, that a regional operating area is always input and that it conforms to the rules for regional operating areas laid out in M.1371-1 A2/4.1 *(ITU-R M.1371-4 A2/4.1)*. After completion of input of an acceptable regional operating settings set, the AIS shall require the user to confirm a second time that the input data shall be stored and possibly used instantaneously. | ✓ |
| Comments | |
| This is tested in section 17.7.2. | |

| Requirement | Verdict |
|---|---|
| The AIS shall not accept, i.e. ignore, any new regional operating setting which includes a regional operating area, which does not conform to the rules for regional operating areas laid out in M.1371-1 A2/4.1 *(ITU-R M.1371-4 A2/4.1)* | ✓ |
| Comments | |
| This is tested in section 17.7.4. | |

| Requirement | Verdict |
|---|---|
| The AIS shall not accept a new regional operating setting, which was input to it via the Presentation Interface, if the regional operating area of this new regional operating setting partly or totally overlaps or matches the regional operating area of any of the stored regional operating settings, which were received from a base station either by msg 22 or by DSC telecommand within the last two hours. | ✓ |
| Comments | |
| This is tested in section 17.7.2. | |

| Requirement | Verdict |
|---|---|
| A message 22 addressed to own station or a DSC telecommand addressed to own station shall be accepted only if the AIS is in a region defined by one of the stored regional operating settings. In this case the set of regional operating settings shall be composed by combining the received parameters with the regional operating area in use. | ✓ |
| Comments | |
| This is tested in section 17.7.3. | |

| Requirement | Verdict |
|---|---|
| If the regional operating area of the new, accepted regional operating setting overlaps in part or in total or matches the regional operating areas of one or more older regional operating settings, this or these older regional operating settings shall be erased from the memory. The regional operating area of the new, accepted regional operating setting may be neighbouring tightly and may thus have the same boundaries as older regional operating settings. This shall not lead to the erasure of the older regional operating settings. | ✓ |
| Comments | |
| This is tested in section 17.7.1. | |

| Requirement | Verdict |
|---|---|
| Subsequently the AIS shall store a new, accepted regional operating setting in one free memory location of the eight memories for regional operating settings. If there is no free memory location, the oldest regional operating setting shall be replaced by the new, accepted one. | ✓ |
| Comments | |
| This is tested in section 17.7.1. | |

| Requirement | Verdict |
|---|---|
| No means other then defined herein shall be allowed to clear any or all of the stored regional operating settings. In particular, it shall not be possible to solely clear any or all of the stored regional operating settings by a manual input via the MKD or by an input via the Presentation Interface without inputting a new regional operating setting. | ✓ |
| Comments | |
| The AIS Controller has no menu to clear the stored regional operating settings and the stored regional operating setting data in the AIS Transponder can not be cleared without than inputting a new setting. | |

## 2.25 CONTINUATION OF AUTONOMOUS MODE REPORTING RATE

### 2.25.1 Specification Reference

IEC 61993-2, Clause 17.8

### 2.25.2 Equipment Under Test

JHS-183, BB50304

### 2.25.3 Date of Test and Modification State

25 June 2012 - Modification State 0

### 2.25.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.25.5 Test Results and Methods of Measurement

***Method of Measurement***

When in the presence of an assigned mode command and in a transition zone, check that the EUT continues to report at the autonomous mode-reporting rate.

***Required result***

Ensure that the autonomous reporting rate is maintained.

***Test Results***

| Requirement | Verdict |
|---|---|
| Confirm that when message 16 is sent to the EUT with a higher reporting rate than the current reporting rate, using report rate assignment, the EUT maintains its reporting rate and ignores the message. | ✓ |
| Confirm that when message 16 is sent to the EUT with a higher reporting rate than the current reporting rate, using slot increments, the EUT maintains its reporting rate and ignores the message. | ✓ |

## 2.26 ADDRESSED MESSAGES

### 2.26.1 Specification Reference

IEC 61993-2, Clause 18.1

### 2.26.2 Equipment Under Test

JHS-183, BB50304

### 2.26.3 Date of Test and Modification State

25 June 2012 - Modification State 0

### 2.26.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.26.5 Test Results and Methods of Measurement

Transmission – Clause 18.1.1

***Method of Measurement***

Set-up standard test environment and operate EUT in autonomous mode. Set up a test target for scheduled transmissions on channel AIS1 only. Initiate the transmission of an addressed binary message (msg 6) by the EUT (test target as destination). Record transmitted messages on both channels.

***Required result***

Check that the EUT transmits msg 6 on channel AIS1. Repeat test for AIS2.

***Test Results***

| Requirement | Verdict |
|---|---|
| Check the EUT transmits message 6 on channel 1 when the following is sent to the PI: "!AIABM,1,1,0,431000001,1,6,04001@PE5DT,2*31" | ✓ |
| Check the EUT transmits message 6 on channel 2 when the following is sent to the PI: "!AIABM,1,1,0,431000001,2,6,04001@PE5DT,2*32" | ✓ |
| Verify that message 6 is transmitted and the contents are correct by viewing the message on the VDL analyser. | ✓ |

Acknowledgment – Clause 18.1.2

***Method of Measurement***

Operate standard test environment and EUT in autonomous mode. Apply up to 4 addressed binary messages (msg 6; EUT as destination) to the VDL on Channel AIS 1. Record transmitted messages on both channels. Repeat with AIS2.

***Required results***

Confirm that EUT transmits a binary acknowledge message (msg 7) with the appropriate sequence numbers within 4 sec on the channel where the msg 6 was received. Confirm that EUT transmit the result with an appropriate message to PI.

***Test Results***

| Requirement | Verdict |
|---|---|
| Confirm that the PI displays the first received message 6 from the VDL generator. | ✓ |
| Verify that the sequence number = 0 and the channel number = 1. | ✓ |
| Confirm that the EUT transmits message 7 on the same channel with the same sequence number within 4 seconds. | ✓ |
| Confirm that the PI displays the second received message 6 from the VDL generator. | ✓ |
| Verify that the sequence number = 1 and the channel number = 1. | ✓ |
| Confirm that the EUT transmits message 7 on the same channel with the same sequence number within 4 seconds. | ✓ |
| Confirm that the PI displays the third received message 6 from the VDL generator. | ✓ |
| Verify that the sequence number = 2 and the channel number = 1. | ✓ |
| Confirm that the EUT transmits message 7 on the same channel with the same sequence number within 4 seconds. | ✓ |
| Confirm that the PI displays the fourth received message 6 from the VDL generator. | ✓ |
| Verify that the sequence number = 3 and the channel number = 1. | ✓ |
| Confirm that the EUT transmits message 7 on the same channel with the same sequence number within 4 seconds. | ✓ |
| Confirm that the PI displays the first received message 6 from the VDL generator. | ✓ |
| Verify that the sequence number = 0 and the channel number = 2. | ✓ |
| Confirm that the EUT transmits message 7 on the same channel with the same sequence number within 4 seconds. | ✓ |
| Confirm that the PI displays the second received message 6 from the VDL generator. | ✓ |
| Verify that the sequence number = 1 and the channel number = 2. | ✓ |
| Confirm that the EUT transmits message 7 on the same channel with the same sequence number within 4 seconds. | ✓ |
| Confirm that the PI displays the third received message 6 from the VDL generator. | ✓ |
| Verify that the sequence number = 2 and the channel number = 2. | ✓ |
| Confirm that the EUT transmits message 7 on the same channel with the same sequence number within 4 seconds. | ✓ |
| Confirm that the PI displays the fourth received message 6 from the VDL generator. | ✓ |
| Verify that the sequence number = 3 and the channel number = 2. | ✓ |
| Confirm that the EUT transmits message 7 on the same channel with the same sequence number within 4 seconds. | ✓ |

Transmission Retry – Clause 18.1.3

***Method of Measurement***

Set-up standard test environment and operate EUT in autonomous mode. Initiate the transmission of up to 4 addressed binary messages by the EUT which will not be acknowledged (i.e. destination not available). Record transmitted messages.

***Required results***

Confirm that EUT retries the transmission up to 3 times (configurable) for each addressed binary message. Confirm that the time between transmissions is 4 to 8 s. Confirm that EUT transmit the overall result with an appropriate message to PI.

***Test Results***

| **Message 6** | |
|---|---|
| Requirement | Verdict |
| Check the PI output of VDO message when the following is sent to the PI:<br>“AIABM,1,1,0,431000001,0,6,04001@PE5DT,2”<br>“AIABM,1,1,1,431000001,0,6,04001@PE5DT,2”<br>“AIABM,1,1,2,431000001,0,6,04001@PE5DT,2”<br>“AIABM,1,1,3,431000001,0,6,04001@PE5DT,2” | ✓ |
| Verify that the VDO messages are sent 3 times. | ✓ |
| Confirm that the time between messages is 4 to 8 seconds.<br>Time between messages varied between 7.75 s and 7.85 s | ✓ |
| Check the acknowledgement message is type 1. The following was output on the PI:<br>$AIABK,431000001,,6,2,1*6E<br>$AIABK,431000001,,6,0,1*6C<br>$AIABK,431000001,,6,1,1*6D<br>$AIABK,431000001,,6,3,1*6F | ✓ |

Aknowledgement of Addresed Safety Related Messages – Clause 18.1.4

***Method of Measurement***

Repeat test under 18.1.2 with addressed safety related message.

***Required results***

Confirm that EUT transmits a safety related acknowledge message (msg 13) with the appropriate sequence numbers within 4 sec on the channel where the msg 6 was received. Confirm that EUT transmit the result with an appropriate message to PI.

***Test Results***

| Requirement | Verdict |
|---|---|
| Confirm that the PI displays the first received message 12 from the VDL generator. | ✓ |
| Verify that the sequence number = 0 and the channel number = 1. | ✓ |
| Confirm that the EUT transmits message 13 on the same channel with the same sequence number within 4 seconds. | ✓ |
| Confirm that the PI displays the second received message 12 from the VDL generator. | ✓ |
| Verify that the sequence number = 1 and the channel number = 1. | ✓ |
| Confirm that the EUT transmits message 13 on the same channel with the same sequence number within 4 seconds. | ✓ |
| Confirm that the PI displays the third received message 12 from the VDL generator. | ✓ |
| Verify that the sequence number = 2 and the channel number = 1. | ✓ |
| Confirm that the EUT transmits message 13 on the same channel with the same sequence number within 4 seconds. | ✓ |
| Confirm that the PI displays the fourth received message 12 from the VDL generator. | ✓ |
| Verify that the sequence number = 3 and the channel number = 1. | ✓ |
| Confirm that the EUT transmits message 13 on the same channel with the same sequence number within 4 seconds. | ✓ |
| Confirm that the PI displays the first received message 12 from the VDL generator. | ✓ |
| Verify that the sequence number = 0 and the channel number = 2. | ✓ |
| Confirm that the EUT transmits message 13 on the same channel with the same sequence number within 4 seconds. | ✓ |
| Confirm that the PI displays the second received message 12 from the VDL generator. | ✓ |
| Verify that the sequence number = 1 and the channel number = 2. | ✓ |
| Confirm that the EUT transmits message 13 on the same channel with the same sequence number within 4 seconds. | ✓ |
| Confirm that the PI displays the third received message 12 from the VDL generator. | ✓ |
| Verify that the sequence number = 2 and the channel number = 2. | ✓ |
| Confirm that the EUT transmits message 13 on the same channel with the same sequence number within 4 seconds. | ✓ |
| Confirm that the PI displays the fourth received message 12 from the VDL generator. | ✓ |
| Verify that the sequence number = 3 and the channel number = 2. | ✓ |
| Confirm that the EUT transmits message 13 on the same channel with the same sequence number within 4 seconds. | ✓ |

## 2.27 INTERROGATION RESPONSES

### 2.27.1 Specification Reference

IEC 61993-2, Clause 18.2

### 2.27.2 Equipment Under Test

JHS-183, BB50304

### 2.27.3 Date of Test and Modification State

25 June 2012 - Modification State 0

### 2.27.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.27.5 Test Results and Methods of Measurement

***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 7 for responses with msg 5 and slot offset set to defined value on channel AIS 1. Record transmitted messages on both channels.

***Required results***

Check that EUT transmits the appropriate interrogation response message as requested on channel AIS1. Repeat test for AIS2.

***Test Results***

In order to test the four possibilities of message 15, this test is repeated with four formats of message 15.

| **Message format 1** | |
|---|---|
| **Request of message 5 on AIS 1 with slot offset = 10<br>?1auciiVj464D0`000000000000** | |
| Requirement | Verdict |
| Verify that the EUT displays the received message on the PI. | ✓ |
| Confirm that message 5 is transmitted and the VDO message displayed on the PI. | ✓ |
| Check on the VDL analyser that the slot offset = 10. | ✓ |
| Verify that the response is received on channel 1. | ✓ |

| Message format 1 | |
|---|---|
| **Request of message 5 on AIS 2 with slot offset = 10 ?1auciiVj464D0`000000000000** | |
| Requirement | Verdict |
| Verify that the EUT displays the received message on the PI. | ✓ |
| Confirm that message 5 is transmitted and the VDO message displayed on the PI. | ✓ |
| Check on the VDL analyser that the slot offset = 25. | ✓ |
| Verify that the response is received on channel 2. | ✓ |

| Message format 2 | |
|---|---|
| **Request of message 5 & 3 on AIS 1 with slot offset 1.1 = 15 & slot offset 1.2 = 35 ?1auciiVj464D0t30S000000000** | |
| Requirement | Verdict |
| Verify that the EUT displays the received message on the PI. | ✓ |
| Confirm that message 5 is transmitted and the VDO message displayed on the PI. | ✓ |
| Check on the VDL analyser that the slot offset = 15. | ✓ |
| Verify that the response is received on channel 1. | ✓ |
| Confirm that message 3 is transmitted and the VDO message displayed on the PI. | ✓ |
| Check on the VDL analyser that the slot offset = 35. | ✓ |
| Verify that the response is received on channel 1. | ✓ |

| Message format 3 | |
|---|---|
| **Request of message 3 from another AIS and message 5 from the EUT on AIS 2 with slot offset 2.1 = 130 ?1auciiVj468D0t0006K8@HA@PP** | |
| Requirement | Verdict |
| Verify that the EUT displays the received message on the PI. | ✓ |
| Confirm that message 5 is transmitted and the VDO message displayed on the PI. | ✓ |
| Check on the VDL analyser that the slot offset = 130. | ✓ |
| Verify that the response is received on channel 2. | ✓ |

| Message format 4 | |
|---|---|
| **Request of message 3 & 5 from another AIS and message 5 from the EUT on AIS 1 with slot offset 2.1 = 80 ?1auciiVj468D0t50I6K8@HA@D0** | |
| Requirement | Verdict |
| Verify that the EUT displays the received message on the PI. | ✓ |
| Confirm that message 5 is transmitted and the VDO message displayed on the PI. | ✓ |
| Check on the VDL analyser that the slot offset = 80. | ✓ |
| Verify that the response is received on channel 1. | ✓ |

## 2.28 OTHER NON PERIODIC MESSAGES

### 2.28.1 Specification Reference

IEC 61993-2, Clause 18.3

### 2.28.2 Equipment Under Test

JHS-183, BB50304

### 2.28.3 Date of Test and Modification State

25 June 2012 - Modification State 0

### 2.28.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.28.5 Test Results and Methods of Measurement

***Method of Measurement***

Set-up standard test environment and operate EUT in autonomous mode. Initiate the transmission of 5 binary broadcast messages (msg 8) by the EUT. Record transmitted messages on both channels.

***Required results***

Check that EUT transmits the msg 8 messages on channels A and B alternating.

***Test Results***

| Requirement | Verdict |
|---|---|
| The following message were sent to the PI:<br>!AIBBM,1,1,0,0,8,04001@PE5DT<d98t,2<br>!AIBBM,1,1,1,0,8,04001@PE5DT<d98t,2<br>!AIBBM,1,1,2,0,8,04001@PE5DT<d98t,2<br>!AIBBM,1,1,3,0,8,04001@PE5DT<d98t,2<br>!AIBBM,1,1,4,0,8,04001@PE5DT<d98t,2 | ✓ |
| Verify the VDO output on the PI:<br>!AIVDO,1,1,,B,86K8@H@0@00521DEB@jhTSh,2*38<br>!AIVDO,1,1,,A,86K8@H@0@00521DEB@jhTSh,2*3B<br>!AIVDO,1,1,,B,86K8@H@0@00521DEB@jhTSh,2*38<br>!AIVDO,1,1,,A,86K8@H@0@00521DEB@jhTSh,2*3B<br>!AIVDO,1,1,,B,86K8@H@0@00521DEB@jhTSh,2*38 | ✓ |
| Check that the messages are transmitted on alternating channels. | ✓ |
| Confirm the received ABK messages have the correct sequence number and type:<br>$AIABK,,,8,4,3*53<br>$AIABK,,,8,3,3*54<br>$AIABK,,,8,2,3*55<br>$AIABK,,,8,1,3*56<br>$AIABK,,,8,0,3*57 | ✓ |

## 2.29 GENERAL

### 2.29.1 Specification Reference

IEC 61993-2, Clause 19.1

### 2.29.2 Equipment Under Test

JHS-183, BB50304

### 2.29.3 Date of Test

25 June 2012

### 2.29.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.29.5 Test Results

The EUT (Equipment Under Test) including all necessary test equipment shall be set-up and checked that it is operational before testing commences.

The manufacturer shall provide sufficient technical documentation of the EUT and its interfaces in particular.

The following tests shall be carried out under "Normal" environmental conditions as defined in IEC 60945.

Where appropriate, tests against different clauses of this and other chapters may be carried out simultaneously.

***Test Results***

| Requirement | Verdict |
|---|---|
| Verify that the technical documentation of the EUT and its interfaces is sufficient. | ✓ |
| Comments | |
| Manual describes the operation of the EUT and provides a description of the available interfaces including a wiring diagram and interconnection diagram. | |

## 2.30 CHECK OF THE MANUFCATURER'S DOCUMENTATION

### 2.30.1 Specification Reference

IEC 61993-2, Clause 19.2

### 2.30.2 Equipment Under Test

JHS-183, BB00006

### 2.30.3 Date of Test

16 August 2012 – Modification State 3

### 2.30.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.30.5 Test Results

***Required Results***

The following checks for formal consistency and compliance shall be made for all ports

a) Approved sentences against IEC 61162
b) Proprietary sentences against IEC 61162
c) Usage of fields as required for different functions including provided default values or settings
d) Transmission intervals against IEC 61162
e) Configuration of hardware and software if this is relevant to the interface performance and port selection
f) The following checks for compliance with IEC 61162
g) output drive capability
h) Load on the line of inputs
i) Electrical isolation of input circuits

***Test Results***

The JHS-183 has a DIP switch used to switch in a 100 ohm load when configured for high speed data and using long cables. This is available for sensor 1, 2 and 3.

| Requirement | Verdict |
|---|---|
| Approved sentences against IEC 61162 | ✓ |
| Proprietary sentences against IEC 61162 | ✓ |
| Usage of fields | ✓ |
| Transmission intervals against IEC 61162 | ✓ |
| Configuration of hardware and software | ✓ |
| Output drive capability | ✓ |
| Load on the line of inputs | ✓ |
| Electrical isolation of input circuits | ✓ |

## 2.31 ELECTRICAL TEST

### 2.31.1 Specification Reference

IEC 61993-2, Clause 19.3

### 2.31.2 Equipment Under Test

JHS-183, BB00006

### 2.31.3 Date of Test and Modification State

24 July 2012 - Modification State 1

### 2.31.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.31.5 Test Results and Methods of Measurement

Input / Output Ports configured as IEC 61162-1 or IEC 61162-2 shall be tested according to the relevant standard with regard to minimum and maximum voltage and current at the input terminals.

***Required Results***

The interfaces shall fulfil the requirements of the relevant standards.

***Test Results***

The JHS-183 has a DIP switch used to switch in a 100 ohm load when configured for high speed data and using long cables. This is available for sensor 1, 2 and 3.

| Requirement | Verdict |
|---|---|
| Verify that the IEC 61162-1 configured sensor inputs operate correctly with a 2v differential input. | ✓ |
| Confirm that the IEC 61162-1 configured input sensors do not take more than 2mA. | ✓ |
| Check that the IEC 61162-1 and IEC 61162-2 configured inputs are not damaged by a maximum voltage of 15v. | ✓ |

## 2.32 TEST OF INPUT SENSOR INTERFACE PERFORMANCE

### 2.32.1 Specification Reference

IEC 61993-2, Clause 19.4

### 2.32.2 Equipment Under Test

JHS-183, BB00006

### 2.32.3 Date of Test and Modification State

17 August 2012 - Modification State 3

### 2.32.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.32.5 Test Results and Methods of Measurement

*(7.6.2)*

***Method of Measurement***

Connect all inputs and outputs of the EUT as specified by the manufacturer and simulate VDL-messages using test system. Operate inputs with simulated sensor data that are both the relevant data and additional data with formatters not provided for the relevant input. Each sensor input shall be loaded with 70 to 80 percent of the interface's capacity. Record the VDL and output from the EUT's high speed port.

***Required results***

Verify that the output on the VDL and the presentation interface agree with simulated input and all output data is transmitted without loss or additional delay.

***Test Results***

The EUT has 3 ports, all can be configured to 4800 or 38400 baud. All three ports were configured to 38400 baud and subjected to a 70-80% load of data.

| Requirement | Verdict |
|---|---|
| Check that the VDL contents are correct according to the input data and no data is lost. | ✓ |
| Verify that the messages on the PI are correct and data is not lost. | ✓ |
| Check that there is no delay when data is changed. | ✓ |

## 2.33 TEST OF SENSOR INPUT

### 2.33.1 Specification Reference

IEC 61993-2, Clause 19.5

### 2.33.2 Equipment Under Test

JHS-183, BB50304

### 2.33.3 Date of Test and Modification State

03 August 2012 - Modification State 2

### 2.33.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.33.5 Test Results and Methods of Measurement

(7.6.2)

***Method of Measurement***

Set-up standard test environment and operate inputs with simulated sensor data. Record VDL output.

a) Simulate sensor information for position, speed, heading, ROT
b) Simulate invalid and unavailable data

***Required Results***

a) Verify that the recorded VDL message contents agree with the simulated sensor information.
b) Verify that affected data is set to default values.

***Test Results***

The EUT supports the following messages.

| Sentence | Description | Requirement | Supported |
|---|---|---|---|
| DTM | Reference datum | Required | Yes |
| GNS | Positioning system, COG & SOG | Required | Yes |
| RMC | Positioning system | Required | Yes |
| GGA | Positioning system | Optional | Yes |
| GLL | Positioning system | Required | Yes |
| GBS | Positioning system | Required | Yes |
| VBW | COG & SOG | Required | Yes |
| VTG | COG & SOG | Required | Yes |
| HDT | Heading | Required | Yes |
| OSD | Own Ships Data | Optional | No |
| ROT | Rate Of Turn | Required | Yes |

Test 1 – GLL Input

*Part a)*

| **a) Set Status to valid and Mode indicator to A (Autonomous)** | |
|---|---|
| Requirement | Verdict |
| Verify that the latitude and longitude in the position report is correct. | ✓ |
| Check that the position accuracy flag in the position report = 0. | ✓ |

| **b) Set Mode indicator to D (Differential)** | |
|---|---|
| Requirement | Verdict |
| Verify that the latitude and longitude in the position report is correct. | ✓ |
| Check that the position accuracy flag in the position report = 1. | ✓ |

| **c) Set Mode indicator to E (Estimated)** | |
|---|---|
| Requirement | Verdict |
| Verify that external position is not used or that the time stamp = 62. | ✓ |
| Comments | |
| Time stamp = 62. | |

| **d) Set Mode indicator to M (Manual)** | |
|---|---|
| Requirement | Verdict |
| Verify that external position is not used or that the time stamp = 61. | ✓ |
| Comments | |
| Time stamp = 61. | |

| **e) Set Mode indicator to S (Simulator)** | |
|---|---|
| Requirement | Verdict |
| Verify that external position is not used. | ✓ |

| **f) Set Status to invalid and Mode indicator to N (Data not valid)** | |
|---|---|
| Requirement | Verdict |
| Verify that external position is not used. | ✓ |

| g) Set GPS mode indicator to A (Autonomous) and time stamp field null | |
|---|---|
| Requirement | Verdict |
| Verify that the latitude and longitude in the position report is correct. | ✓ |
| Check that the position accuracy flag in the position report = 0. | ✓ |
| Confirm that the time stamp = 60. | ✓ |

*Part b)*

| a) Invalid position data. Latitude = 92°N, Longitude = 182°W | |
|---|---|
| Requirement | Verdict |
| Verify that the latitude and longitude in the position report is default (91 and 181). | ✓ |
| Check that the position accuracy flag in the position report = 0. | ✓ |
| Confirm that MKD does not display the position. | ✓ |

| b) Position data to 2 decimal places | |
|---|---|
| Requirement | Verdict |
| Verify that the latitude and longitude in the position report is correct. | ✓ |

| c) Position data to 6 decimal places | |
|---|---|
| Requirement | Verdict |
| Verify that the latitude and longitude in the position report is correct. | ✓ |

| d) Position data as integer | |
|---|---|
| Requirement | Verdict |
| Verify that the latitude and longitude in the position report is correct. | ✓ |

Test 2 – GNS Input

*Part a)*

| a) Set Mode indicator to AA (Autonomous) | |
|---|---|
| Requirement | Verdict |
| Verify that the latitude, longitude RAIM flag in the position report is correct. | ✓ |
| Check that the position accuracy flag in the position report = 0. | ✓ |
| Verify that the time stamp is correct. | ✓ |

| b) Set Mode indicator to AD, DA and DD (Differential) | |
|---|---|
| Requirement | Verdict |
| Verify that the latitude, longitude RAIM flag in the position report is correct. | ✓ |
| Check that the position accuracy flag in the position report = 1. | ✓ |
| Verify that the time stamp is correct. | ✓ |

| c) Set Mode indicator to E (Estimated) | |
|---|---|
| Requirement | Verdict |
| Verify that external position is not used or that the time stamp = 62. | ✓ |
| Comments | |
| External position not used, time stamp = 63. | |

| d) Set Mode indicator to M (Manual) | |
|---|---|
| Requirement | Verdict |
| Verify that external position is not used or that the time stamp = 61. | ✓ |
| Comments | |
| External position not used, time stamp = 63. | |

| e) Set Mode indicator to S (Simulator) | |
|---|---|
| Requirement | Verdict |
| Verify that external position is not used. | ✓ |

| f) Set Mode indicator to N and NN (Data not valid) | |
|---|---|
| Requirement | Verdict |
| Verify that external position is not used. | ✓ |

*Part b)*

| a) Invalid position data. Latitude = 92°N, Longitude = 182°W | |
|---|---|
| Requirement | Verdict |
| Verify that the latitude and longitude in the position report is default (91 and 181). | ✓ |
| Check that the position accuracy flag in the position report = 0. | ✓ |
| Confirm that MKD does not display the position. | ✓ |

Test 3 – RMC Input

*Part a)*

| a) Set Status to valid and Mode indicator to A (Autonomous) | |
|---|---|
| Requirement | Verdict |
| Verify that the latitude, longitude RAIM flag in the position report is correct. | ✓ |
| Confirm that the COG and SOG are correct. | ✓ |
| Check that the position accuracy flag in the position report = 0. | ✓ |
| Verify that the time stamp is correct. | ✓ |

| b) Set Mode indicator to D (Differential) | |
|---|---|
| Requirement | Verdict |
| Verify that the latitude, longitude RAIM flag in the position report is correct. | ✓ |
| Confirm that the COG and SOG are correct. | ✓ |
| Check that the position accuracy flag in the position report = 1. | ✓ |
| Verify that the time stamp is correct. | ✓ |

| c) Set Mode indicator to E (Estimated) | |
|---|---|
| Requirement | Verdict |
| Verify that external position and COG/SOG is not used or that the time stamp = 62. | ✓ |
| Comments | |
| External position, COG and SOG not used. Time stamp = 63. | |

| d) Set Mode indicator to M (Manual) | |
|---|---|
| Requirement | Verdict |
| Verify that external position and COG/SOG is not used or that the time stamp = 61. | ✓ |
| Comments | |
| External position, COG and SOG not used. Time stamp = 63. | |

| e) Set Mode indicator to S (Simulator) | |
|---|---|
| Requirement | Verdict |
| Verify that external position and COG/SOG is not used. | ✓ |

| f) Set Status to invalid and Mode indicator to N (Data not valid) | |
|---|---|
| Requirement | Verdict |
| Verify that external position and COG/SOG is not used. | ✓ |

*Part b)*

| a) Invalid position data. Latitude = 92°N, Longitude = 182°W | |
|---|---|
| Requirement | Verdict |
| Verify that the latitude and longitude in the position report is default (91 and 181). | ✓ |
| Confirm that the COG and SOG are correct. | See comments |
| Check that the position accuracy flag in the position report = 0. | ✓ |
| Confirm that MKD does not display the position. | ✓ |
| Comments | |
| COG and SOG are not used when the position is invalid. When the position is invalid, the RMC sentence is considered invalid by the JHS-183 software. | |

Test 4 – GGA Input

*Part a)*

| a) Set GPS quality indicator to 1 (Autonomous) | |
|---|---|
| Requirement | Verdict |
| Verify that the latitude, longitude RAIM flag in the position report is correct. | ✓ |
| Check that the position accuracy flag in the position report = 0. | ✓ |
| Verify that the time stamp is correct. | ✓ |

| b) Set GPS quality indicator to 2 (Differential) | |
|---|---|
| Requirement | Verdict |
| Verify that the latitude, longitude RAIM flag in the position report is correct. | ✓ |
| Check that the position accuracy flag in the position report = 1. | ✓ |
| Verify that the time stamp is correct. | ✓ |

| c) Set GPS quality indicator to 6 (Estimated) | |
|---|---|
| Requirement | Verdict |
| Verify that external position and COG/SOG is not used or that the time stamp = 62. | ✓ |
| Comments | |
| Time stamp = 62. | |

| d) Set GPS quality indicator to 7 (Manual) | |
|---|---|
| Requirement | Verdict |
| Verify that external position is not used or that the time stamp = 61. | ✓ |
| Comments | |
| Time stamp = 61. | |

| e) Set GPS quality indicator to 8 (Simulator) | |
|---|---|
| Requirement | Verdict |
| Verify that external position is not used. | ✓ |

| f) Set GPS quality indicator to 0 (Data not valid) | |
|---|---|
| Requirement | Verdict |
| Verify that external position is not used. | ✓ |

*Part b)*

| a) Invalid position data. Latitude = 92°N, Longitude = 182°W | |
|---|---|
| Requirement | Verdict |
| Verify that the latitude and longitude in the position report is default (91 and 181). | ✓ |
| Check that the position accuracy flag in the position report = 0. | ✓ |
| Confirm that MKD does not display the position. | ✓ |

Test 5 – DTM Input

*Part a) DTM with GLL Sentence*

| a) Set Local datum in the DTM sentence to other value than "W84" | |
|---|---|
| Requirement | Verdict |
| Confirm that position data is not used and default data is used. | ✓ |

| b) Set Local datum in the DTM sentence to "W84" | |
|---|---|
| Requirement | Verdict |
| Confirm that the position data from sensor input is used. | ✓ |

| c) Set Local datum in the DTM sentence to other value than "W84" | |
|---|---|
| Requirement | Verdict |
| Confirm that position data is not used and default data is used. | ✓ |

*Part b) DTM with GNS Sentence*

| a) Set Local datum in the DTM sentence to other value than "W84" | |
|---|---|
| Requirement | Verdict |
| Confirm that position data is not used and default data is used. | ✓ |

| b) Set Local datum in the DTM sentence to "W84" | |
|---|---|
| Requirement | Verdict |
| Confirm that the position data from sensor input is used. | ✓ |

| c) Set Local datum in the DTM sentence to other value than "W84" | |
|---|---|
| Requirement | Verdict |
| Confirm that position data is not used and default data is used. | ✓ |

*Part c) DTM with RMC Sentence*

| a) Set Local datum in the DTM sentence to other value than "W84" | |
|---|---|
| Requirement | Verdict |
| Confirm that position data is not used and default data is used. | ✓ |

| b) Set Local datum in the DTM sentence to "W84" | |
|---|---|
| Requirement | Verdict |
| Confirm that the position data from sensor input is used. | ✓ |

| c) Set Local datum in the DTM sentence to other value than "W84" | |
|---|---|
| Requirement | Verdict |
| Confirm that position data is not used and default data is used. | ✓ |

*Part d) DTM with GGA Sentence*

| a) Set Local datum in the DTM sentence to other value than "W84" | |
|---|---|
| Requirement | Verdict |
| Confirm that position data is not used and default data is used. | ✓ |

| b) Set Local datum in the DTM sentence to "W84" | |
|---|---|
| Requirement | Verdict |
| Confirm that the position data from sensor input is used. | ✓ |

| c) Set Local datum in the DTM sentence to other value than "W84" | |
|---|---|
| Requirement | Verdict |
| Confirm that position data is not used and default data is used. | ✓ |

Test 6 – GBS Input

*Part a) GBS with GLL Sentence*

| **a) Set expected RAIM error to a value < 10 m, Mode indicator = A** | |
|---|---|
| Requirement | Verdict |
| Verify that the RAIM flag = 1. | ✓ |
| Check that the position accuracy flag = 1. | ✓ |

| **b) Set expected RAIM error to a value > 10 m, Mode indicator = A** | |
|---|---|
| Requirement | Verdict |
| Verify that the RAIM flag = 1. | ✓ |
| Check that the position accuracy flag = 0. | ✓ |

| **c) Set expected error fields to null, Mode indicator = A** | |
|---|---|
| Requirement | Verdict |
| Verify that the RAIM flag = 0. | ✓ |
| Check that the position accuracy flag = 0. | ✓ |

| **d) Set expected RAIM error to a value < 10 m, Mode indicator = D** | |
|---|---|
| Requirement | Verdict |
| Verify that the RAIM flag = 1. | ✓ |
| Check that the position accuracy flag = 1. | ✓ |

| **e) Set expected RAIM error to a value > 10 m, Mode indicator = D** | |
|---|---|
| Requirement | Verdict |
| Verify that the RAIM flag = 1. | ✓ |
| Check that the position accuracy flag = 0. | ✓ |

| **f) Set expected error fields to null, Mode indicator = D** | |
|---|---|
| Requirement | Verdict |
| Verify that the RAIM flag = 0. | ✓ |
| Check that the position accuracy flag = 1. | ✓ |

*Part b) GBS with GNS Sentence*

| a) Set expected RAIM error to a value < 10 m, Mode indicator = A | |
|---|---|
| Requirement | Verdict |
| Verify that the RAIM flag = 1. | ✓ |
| Check that the position accuracy flag = 1. | ✓ |

| b) Set expected RAIM error to a value > 10 m, Mode indicator = A | |
|---|---|
| Requirement | Verdict |
| Verify that the RAIM flag = 1. | ✓ |
| Check that the position accuracy flag = 0. | ✓ |

| c) Set expected error fields to null, Mode indicator = A | |
|---|---|
| Requirement | Verdict |
| Verify that the RAIM flag = 0. | ✓ |
| Check that the position accuracy flag = 0. | ✓ |

| d) Set expected RAIM error to a value < 10 m, Mode indicator = D | |
|---|---|
| Requirement | Verdict |
| Verify that the RAIM flag = 1. | ✓ |
| Check that the position accuracy flag = 1. | ✓ |

| e) Set expected RAIM error to a value > 10 m, Mode indicator = D | |
|---|---|
| Requirement | Verdict |
| Verify that the RAIM flag = 1. | ✓ |
| Check that the position accuracy flag = 0. | ✓ |

| f) Set expected error fields to null, Mode indicator = D | |
|---|---|
| Requirement | Verdict |
| Verify that the RAIM flag = 0. | ✓ |
| Check that the position accuracy flag = 1. | ✓ |

*Part c) GBS with RMC Sentence*

| a) Set expected RAIM error to a value < 10 m, Mode indicator = A | |
|---|---|
| Requirement | Verdict |
| Verify that the RAIM flag = 1. | ✓ |
| Check that the position accuracy flag = 1. | ✓ |

| b) Set expected RAIM error to a value > 10 m, Mode indicator = A | |
|---|---|
| Requirement | Verdict |
| Verify that the RAIM flag = 1. | ✓ |
| Check that the position accuracy flag = 0. | ✓ |

| c) Set expected error fields to null, Mode indicator = A | |
|---|---|
| Requirement | Verdict |
| Verify that the RAIM flag = 0. | ✓ |
| Check that the position accuracy flag = 0. | ✓ |

| d) Set expected RAIM error to a value < 10 m, Mode indicator = D | |
|---|---|
| Requirement | Verdict |
| Verify that the RAIM flag = 1. | ✓ |
| Check that the position accuracy flag = 1. | ✓ |

| e) Set expected RAIM error to a value > 10 m, Mode indicator = D | |
|---|---|
| Requirement | Verdict |
| Verify that the RAIM flag = 1. | ✓ |
| Check that the position accuracy flag = 0. | ✓ |

| f) Set expected error fields to null, Mode indicator = D | |
|---|---|
| Requirement | Verdict |
| Verify that the RAIM flag = 0. | ✓ |
| Check that the position accuracy flag = 1. | ✓ |

Test 7 – VTG Input

| a) Set Mode indicator to A (Autonomous) | |
|---|---|
| Requirement | Verdict |
| Verify that the COG and SOG are correct in the position report. | ✓ |
| Check that the COG and SOG values are displayed on the MKD. | ✓ |

| b) Set Mode indicator to D (Differential) | |
|---|---|
| Requirement | Verdict |
| Verify that the COG and SOG are correct in the position report. | ✓ |
| Check that the COG and SOG values are displayed on the MKD. | ✓ |

| c) Remove SOG, knots (Null field) & insert SOG, km/h | |
|---|---|
| Requirement | Verdict |
| Verify that the SOG value, converted to knots, is correct in the position report. | X* |
| Check that the COG and SOG values are displayed on the MKD. | - |
| Comments | |
| * JHS-183 does not allow values in knots to be input via the VTG sentence. This is stated in the manual. | |

| d) Set Mode indicator to N (Data not valid) | |
|---|---|
| Requirement | Verdict |
| Verify that the COG and SOG values are not used in the position report. | ✓ |
| Check that the COG and SOG values are not displayed on the MKD. | ✓ |

Test 8 – VBW Input

| a) Set Status, ground speed, to valid | |
|---|---|
| Requirement | Verdict |
| Verify that the COG and SOG are correct in the position report. | ✓ |
| Check that the correct COG and SOG values are displayed on the MKD. | ✓ |

| b) Set Status, ground speed, to invalid | |
|---|---|
| Requirement | Verdict |
| Verify that the COG and SOG are set to default in the position report. | ✓ |
| Check that the COG and SOG values are not displayed on the MKD. | ✓ |

| c) Set Status, ground speed, to valid , set heading to invalid | |
|---|---|
| Requirement | Verdict |
| Verify that the COG is set to default in the position report. | ✓ |
| Check that the COG value is not displayed on the MKD. | ✓ |
| Verify that the SOG is correct in the position report. | ✓ |
| Check that the correct SOG values is displayed on the MKD. | ✓ |

| d) Set Status, ground speed, to valid and remove transverse ground speed | |
|---|---|
| Requirement | Verdict |
| Verify that the COG and SOG are set to default in the position report. | ✓ |
| Check that the COG and SOG values are not displayed on the MKD. | ✓ |

Test 10 – HDT Input

*Part a)*

| a) Set valid heading data in HDT | |
|---|---|
| Requirement | Verdict |
| Verify that the heading is correct in the position report. | ✓ |
| Check that the correct heading value is displayed on the MKD. | ✓ |

| b) Remove heading data from HDT | |
|---|---|
| Requirement | Verdict |
| Verify that the heading value is set to default in the position report. | ✓ |
| Check that the heading value is not displayed on the MKD. | ✓ |

| a) Set Heading to 359.0° | |
|---|---|
| Requirement | Verdict |
| Verify that the heading is correct in the position report. | ✓ |
| Check that the correct heading value is displayed on the MKD. | ✓ |

| b) Set Heading to 359.9° | |
|---|---|
| Requirement | Verdict |
| Verify that the heading is correct in the position report. | ✓ |
| Check that the correct heading value is displayed on the MKD. | ✓ |

Test 11 – ROT Input

| a) Set ROT status to valid (“A”), Talker ID = “TI”, ROT = 0° | |
|---|---|
| Requirement | Verdict |
| Verify that the ROT is 0 in the position report. | ✓ |
| Check that ROT = 0 is displayed on the MKD. | ✓ |

| b) Set ROT to several values between 0 & 708°/min turning left & right, Talker ID =“TI” | |
|---|---|
| Requirement | Verdict |
| Verify that the ROT is 21 in the position report when ROT = 20. | ✓ |
| Verify the value on the MKD is correct. MKD displays ROT: 19.7°/MIN | ✓ |
| Verify that the ROT is -55 (201) in the position report when ROT = -135. | ✓ |
| Verify the value on the MKD is correct. MKD displays ROT: -135°/MIN | ✓ |
| Verify that the ROT is 93 in the position report when ROT = 387. | ✓ |
| Verify the value on the MKD is correct. MKD displays ROT: 386.1°/MIN | ✓ |
| Verify that the ROT is 100 in the position report when ROT = 444. | ✓ |
| Verify the value on the MKD is correct. MKD displays ROT: 446.4°/MIN | ✓ |
| Verify that the ROT is -125 (131) in the position report when ROT = -701. | ✓ |
| Verify the value on the MKD is correct. MKD displays ROT: -697.5°/MIN | ✓ |

| c) Set ROT to a value of more than 708 °/min turning left and right, Talker ID = “TI” | |
|---|---|
| Requirement | Verdict |
| Verify that the ROT is -126 (130) in the position report when ROT = 709 turning left. | ✓ |
| Verify that the ROT is 126 in the position report when ROT = 709 turning right. | ✓ |
| Verify the value on the MKD is correct. MKD displays ROT: ±707.7°/MIN | ✓ |

| d) Set ROT status to invalid (“V”) | |
|---|---|
| Requirement | Verdict |
| Verify that the ROT value is default or correct from HDT, in the position report. | ✓ |
| Check that the ROT is not displayed on the MKD or displayed from HDT. | ✓ |
| Comments | |
| When no HDT present, default values are used. When HDT is present, the ROT is calculated by the HDT and displayed as ROT: 0.0°/MIN, ROT: TURNING RIGHT or ROT: TURNING LEFT. | |

The following tests are performed due to the fact that the ROT is calculated from the HDT data when the ROT data is invalid.

| **h) Change the heading value in HDT with 0.1°/sec and –0.1°/sec** | |
|---|---|
| Requirement | Verdict |
| Verify that the ROT = 0 in the position report. | ✓ |
| Check that the correct heading value is displayed on the MKD. | ✓ |

| **i) Change the heading value in HDT with 0.2°/sec** | |
|---|---|
| Requirement | Verdict |
| Verify that the ROT = +127 in the position report. | ✓ |
| Check that the correct heading value is displayed on the MKD. | ✓ |

| **j) Change the heading value in HDT with -0.2°/sec** | |
|---|---|
| Requirement | Verdict |
| Verify that the ROT = -127 in the position report. | ✓ |
| Check that the correct heading value is displayed on the MKD. | ✓ |

## 2.34 TEST OF HIGH SPEED OUTPUT

### 2.34.1 Specification Reference

IEC 61993-2, Clause 19.6

### 2.34.2 Equipment Under Test

JHS-183, BB50304

### 2.34.3 Date of Test and Modification State

03 August 2012 - Modification State 2

### 2.34.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.34.5 Test Results and Methods of Measurement

(7.6.3)

***Method of Measurement***

Set-up standard test environment and simulate VDL-position reports using test system. Record output from the EUT high speed port (see table 11).

***Required results***

Verify that the recorded message contents agree with the simulated VDL contents (VDM) and own transmitted data (VDO) and in accordance with the sentence specifications of IEC 61162-1.

***Test Results***

*Part a) Position Reports - VDM Messages*

| Message 1, 2 and 3 – Message contents | |
|---|---|
| Requirement | Verdict |
| The following field contents were checked with the sent values. | |
| Message ID | ✓ |
| Repeat indicator | ✓ |
| User ID | ✓ |
| Navigational status | ✓ |
| ROT | ✓ |
| SOG | ✓ |
| Position accuracy | ✓ |
| Longitude | ✓ |
| Latitude | ✓ |
| COG | ✓ |
| True heading | ✓ |
| Time stamp | ✓ |
| RAIM-flag | ✓ |
| Communication state SOTDMA – Sync state | ✓ |
| Communication state SOTDMA – Slot timeout | ✓ |
| Communication state SOTDMA – Slot offset | ✓ |
| Communication state SOTDMA – UTC Hour | ✓ |
| Communication state SOTDMA – UTC Minute | ✓ |
| Communication state SOTDMA – Slot number | ✓ |
| Communication state SOTDMA – Number of received stations | ✓ |
| Communication state ITDMA – Sync state | ✓ |
| Communication state ITDMA – Slot increment | ✓ |
| Communication state ITDMA – Slot number | ✓ |
| Communication state ITDMA – Keep flag | ✓ |

| Message 1, 2 and 3 – PI specific output of VDM | |
|---|---|
| Requirement | Verdict |
| Verify the number of sentences value is 1. | ✓ |
| Check the sentence number value is 1. | ✓ |
| Check that the Sequential message identifier is null. | ✓ |
| Verify that the correct AIS Channel is indicated. | ✓ |
| Check the number of Fill bits is 0. | ✓ |
| Verify the checksum is correct. | ✓ |

*Part b) Position Reports - VDO Messages*

| Message 1, 2 and 3 – VDO Message contents | |
|---|---|
| Requirement | Verdict |
| The following field contents were checked for correct values. | |
| Message ID | ✓ |
| Repeat indicator | ✓ |
| User ID | ✓ |
| Navigational status | ✓ |
| ROT | ✓ |
| SOG | ✓ |
| Position accuracy | ✓ |
| Longitude | ✓ |
| Latitude | ✓ |
| COG | ✓ |
| True heading | ✓ |
| Time stamp | ✓ |
| RAIM-flag | ✓ |
| Communication state SOTDMA – Sync state | ✓ |
| Communication state SOTDMA – Slot timeout | ✓ |
| Communication state SOTDMA – Slot offset | ✓ |
| Communication state SOTDMA – UTC Hour | ✓ |
| Communication state SOTDMA – UTC Minute | ✓ |
| Communication state SOTDMA – Slot number | ✓ |
| Communication state SOTDMA – Number of received stations | ✓ |
| Communication state ITDMA – Sync state | ✓ |
| Communication state ITDMA – Slot increment | ✓ |
| Communication state ITDMA – Slot number | ✓ |
| Communication state ITDMA – Keep flag | ✓ |

| Message 1, 2 and 3 – PI specific output of VDO | |
|---|---|
| Requirement | Verdict |
| Verify the number of sentences value is 1. | ✓ |
| Check the sentence number value is 1. | ✓ |
| Check that the Sequential message identifier is null. | ✓ |
| Verify that the correct AIS Channel is indicated. | ✓ |
| Check the number of Fill bits is 0. | ✓ |
| Verify the checksum is correct. | ✓ |

## 2.35 HIGH SPEED OUTPUT INTERFACE PERFORMANCE

### 2.35.1 Specification Reference

IEC 61993-2, Clause 19.7

### 2.35.2 Equipment Under Test

JHS-183, BB50304

### 2.35.3 Date of Test and Modification State

05 July 2012 - Modification State 2

### 2.35.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.35.5 Test Results and Methods of Measurement

***Method of Measurement***

Set-up standard test environment and operate EUT in autonomous mode. Increase the VDL load to >90%. Record transmitted messages and check PI output of EUT on port for "external Display" and ” auxiliary Display”.

***Required Results***

Confirm that EUT outputs all received messages to the PI. Repeat test for port "auxiliary display".

***Test Results***

The EUT does not have an auxiliary display port. The test was performed on the ports AUX1 and AUX2..

| **AUX1** | |
|---|---|
| Result | Verdict |
| Channel A receive message performance = 99.85% | ✓ |
| Channel B receive message performance = 99.76% | ✓ |

| **AUX2** | |
|---|---|
| Result | Verdict |
| Channel A receive message performance = 99.85% | ✓ |
| Channel B receive message performance = 99.76% | ✓ |

## 2.36 TEST OF HIGH SPEED INPUT

### 2.36.1 Specification Reference

IEC 61993-2, Clause 19.8

### 2.36.2 Equipment Under Test

JHS-183, BB50304

### 2.36.3 Date of Test and Modification State

03 August 2012 - Modification State 2

### 2.36.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.36.5 Test Results and Methods of Measurement

(7.6.3)

***Method of Measurement***

Set-up standard test environment. Apply simulated input data, in accordance with the sentence specifications of IEC 61162-1 and 7.6.3.3 table 10, to the EUT and record VDL output.

***Required Results***

Verify that the VDL message contents agree with simulated input data.

***Test Results***

| **VSD Sentence: "$AIVSD,53,22,513,TUVPRODUCTSERVICE,235959,11,09,2,0"** | |
|---|---|
| Requirement | Verdict |
| Confirm that message 5 is transmitted when data is changed by the VSD sentence. | ✓ |
| The following field contents in message 5 were verified against the values in the VSD sentence. | |
| Type of ship. | ✓ |
| Maximum present static draught. | ✓ |
| Persons on board. | ✓ |
| Destination | ✓ |
| Estimated UTC of arrival. | ✓ |
| Estimated Day of arrival. | ✓ |
| Estimated Month of arrival. | ✓ |
| Navigation status | ✓ |
| Comments | |
| When setting the field "Destination", if trailing spaces are not used, the remaining characters are filled with "@". | |

| SSD Sentence: "$AISSD,OCTAGON,TUVTEST,133,431,55,23,0,GP" | |
|---|---|
| Requirement | Verdict |
| Confirm that message 5 is transmitted when data is changed by the VSD sentence. | ✓ |
| The following field contents in message 5 were verified against the values in the VSD sentence. | |
| Name. | ✓ |
| Call sign. | ✓ |
| Reference point A. | ✓ |
| Reference point B. | ✓ |
| Reference point C. | ✓ |
| Reference point D. | ✓ |
| Confirm that the changed data is updated on the MKD. | ✓ |

All other messages defined in section 7.6.3.3, table 10, are tested and verified in other test cases in the specification.

## 2.37 REGIONAL AREA DESIGNATION

### 2.37.1 Specification Reference

IEC 61993-2, Clause 20.2

### 2.37.2 Equipment Under Test

JHS-183, BB00006

### 2.37.3 Date of Test and Modification State

28 August 2012 - Modification State 3

### 2.37.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

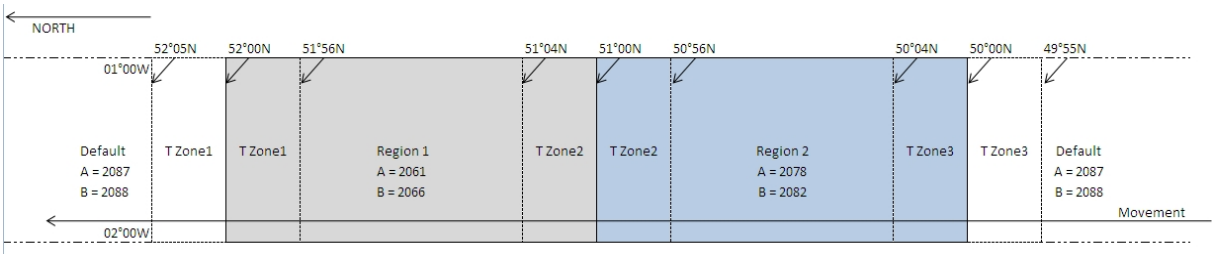
### 2.37.5 Test Results and Methods of Measurement

***Method of Measurement***

Perform the test specified in 17.2 using the following DSC command:

Send to the EUT a standard test signal number 1 but with symbol numbers appropriate to the geographical regions and channels specified in the test. Note the transition boundary is 5nm in this test.

The following regions were setup and the EUT moved through them.



This test was divided up into 6 sections to test for behaviour when crossing bewteen regions and transition zones.

| Test | Zone | Start Position | Stop Position | Boundary Position |
|---|---|---|---|---|
| 1 | RD-TZ3 | 49°53 | 49°57 | 49°55 |
| 2 | RD-R2 | 49°58 | 49°02 | 50°00 |
| 3 | TZ3-R2 | 50°03 | 50°07 | 50°05 |
| 4 | R2-TZ2 | 50°53 | 50°57 | 50°55 |
| 5 | R2-R1 | 50°58 | 51°02 | 51°00 |
| 6 | TZ2-R1 | 51°03 | 51°07 | 51°05 |
| 7 | R1-TZ1 | 51°53 | 51°57 | 51°55 |
| 8 | R1-RD | 51°58 | 52°02 | 52°00 |
| 9 | TZ1-RD | 52°03 | 52°07 | 52°05 |

RD = Region default
TZ = Transition Zone
R = Region

***Test Results***

| **Region Settings by DSC** | |
|---|---|
| Requirement | Verdict |
| Check that the regions have been set upon reception of both DSC commands. | ✓ |

| **Test 1 – High seas to transition zone 3** | |
|---|---|
| Requirement | Verdict |
| Check that the EUT changes settings within ± 0.1 minute of the boundary. | ✓ |
| Verify that channels 2087 and 2078 are used. | ✓ |
| Check that the reporting rate is doubled. | ✓ |
| Confirm that message 1 is released by setting timeout and offset values to 0. | ✓ |
| Check that message 3 is used to allocate new slots. | ✓ |

| **Test 2 – High seas to region 2** | |
|---|---|
| Requirement | Verdict |
| Check that the EUT changes settings within ± 0.1 minute of the boundary. | ✓ |
| Check the in use flag of the ACA message is set to 1. | ✓ |
| Verify the time of in use flag is correct. | ✓ |

| **Test 3 – Transition zone 3 to region 2** | |
|---|---|
| Requirement | Verdict |
| Check that the EUT changes settings within ± 0.1 minute of the boundary. | ✓ |
| Verify that channels 2078 and 2082 are used. | ✓ |
| Check that the reporting rate returns to normal. | ✓ |
| Confirm that message 1 is released by setting timeout and offset values to 0. | ✓ |
| Check that message 3 is used to allocate new slots. | ✓ |

| Test 4 – Region 2 to transition zone 2 | |
|---|---|
| Requirement | Verdict |
| Check that the EUT changes settings within ± 0.1 minute of the boundary. | ✓ |
| Verify that channels 2087 and 2061 are used. | ✓ |
| Check that the reporting rate is doubled. | ✓ |
| Confirm that message 1 is released by setting timeout and offset values to 0. | ✓ |
| Check that message 3 is used to allocate new slots. | ✓ |

| Test 5 – Region 2 to region 1 | |
|---|---|
| Requirement | Verdict |
| Check that the EUT changes settings within ± 0.1 minute of the boundary. | ✓ |
| Check the in use flag of the ACA message is set to 1. | ✓ |
| Verify the time of in use flag is correct. | ✓ |

| Test 6 – Transition zone 2 to region 1 | |
|---|---|
| Requirement | Verdict |
| Check that the EUT changes settings within ± 0.1 minute of the boundary. | ✓ |
| Verify that channels 2061 and 2066 are used. | ✓ |
| Check that the reporting rate returns to normal. | ✓ |
| Confirm that message 1 is released by setting timeout and offset values to 0. | ✓ |
| Check that message 3 is used to allocate new slots. | ✓ |

| Test 7 – Region1 to transition zone 1 | |
|---|---|
| Requirement | Verdict |
| Check that the EUT changes settings within ± 0.1 minute of the boundary. | ✓ |
| Verify that channels 2061 and 2087 are used. | ✓ |
| Check that the reporting rate is doubled. | ✓ |
| Confirm that message 1 is released by setting timeout and offset values to 0. | ✓ |
| Check that message 3 is used to allocate new slots. | ✓ |

| Test 8 – Region 1 to high seas | |
|---|---|
| Requirement | Verdict |
| Check that the EUT changes settings within ± 0.1 minute of the boundary. | ✓ |
| Check the in use flag of the ACA message is set to 1. | ✓ |
| Verify the time of in use flag is correct. | ✓ |

| Test 9 – Transition zone 1 to high seas | |
|---|---|
| Requirement | Verdict |
| Check that the EUT changes settings within ± 0.1 minute of the boundary. | ✓ |
| Verify that channels 2087 and 2088 are used. | ✓ |
| Check that the reporting rate returns to normal. | ✓ |
| Confirm that message 1 is released by setting timeout and offset values to 0. | ✓ |
| Check that message 3 is used to allocate new slots. | ✓ |

## 2.38 LR INTERROGATION

### 2.38.1 Specification Reference

IEC 61993-2, Clause 21.1

### 2.38.2 Equipment Under Test

JHS-183, BB50304

### 2.38.3 Date of Test and Modification State

10 August 2012 - Modification State 2

### 2.38.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.38.5 Test Results and Methods of Measurement

(9.2)

***Method of Measurement***

Set-up standard test environment and operate EUT in autonomous mode. Apply a LR addressed interrogation message to the LR-interface port of EUT; Record LR output port and AIS high-speed output port Set EUT to

a) Automatic response
b) Manual response via MKD
c) Manual response via PI

***Required results***

Check that EUT displays LR interrogation messages and sends to PI.
Check that EUT outputs a LR position report message

– automatically (and indicates action on display)
– after manual confirmation via MKD
– after manual confirmation via PI

***Test Results***

| **Automatic mode – All data** | |
|---|---|
| LR Sentences sent to the LR interface port:<br>"$LRLRI,5,0,000012346,431100001,,,,,,,"<br>"$LRLRF,5,000012346,TUV,ABCDEFIOPUW," | |
| Requirement | Verdict |
| Confirm that the request is displayed on the MKD. | ✓ |
| Verify that the LRF response message is correct. The following message was output:<br>$AILRF,5,000012346,TUV,ABCEFIOPUW,2222222222*3B | ✓ |
| Comments | |
| Function identification character "D" is not valid, therefore it is not included in the reply. | |
| Requirement | Verdict |
| Confirm that the LR1 sentence is correct. The following message was output:<br>$AILR1,5,431100001,000012346,TUV@@@@@@@@@@@@@@@@@@,ABCDEF ,977654321*18 | ✓ |
| Confirm that the LR2 sentence is correct. The following message was output:<br>$AILR2,5,431100001,06072012,072800.00,5116.79,N,00227.94,W,11.1,T,30.4,N*36 | ✓ |
| Confirm that the LR3 sentence is correct. The following message was output:<br>$AILR3,5,431100001,TUV@@@@@@@@@@@@@@@@@@,010600,123400.00,22.0,53,0.0,0.0,50,513.0*04 | ✓ |

| **Automatic mode – Selected data "A"** | |
|---|---|
| LR Sentences sent to the LR interface port:<br>"$LRLRI,2,0,000012346, 431100001,,,,,,,"<br>"$LRLRF,2000012346,TUV,A," | |
| Requirement | Verdict |
| Confirm that the request is displayed on the MKD. | ✓ |
| Check that the request is output on the PI. | ✓ |
| Verify that the LRF response message is correct. The following message was output:<br>$AILRF,2,000012346,TUV,A,2*58 | ✓ |
| Confirm that the LR1 sentence is correct. The following message was output:<br>$AILR1,2,431100001,000012346,TUV@@@@@@@@@@@@@@@@@@,ABCDEF ,977654321*1F | ✓ |
| Confirm the LR2 requested fields are null. The following message was output:<br>$AILR2,2,431100001,,,,,,,,,*20 | ✓ |
| Confirm the LR3 requested fields are null. The following message was output:<br>$AILR3,2,431100001,,,,,,,,,*0D | ✓ |

| Automatic mode – Selected data “AEF” | |
|---|---|
| LR Sentences sent to the LR interface port:<br>“$LRLRI,1,0,000012346, 431100001,,,,,,,,”<br>“$LRLRF,1,000012346,TUV,AEF,” | |
| Requirement | Verdict |
| Confirm that the request is displayed on the MKD. | ✓ |
| Check that the request is output on the PI. | ✓ |
| Verify that the LRF response message is correct. The following message was output:<br>$AILRF,1,000012346,TUV,AEF,222*58 | ✓ |
| Confirm that the LR1 sentence is correct. The following message was output:<br>$AILR1,1,431100001,000012346,TUV@@@@@@@@@@@@@@@@@@@,ABCDEF ,977654321*1C | ✓ |
| Confirm the LR2 sentence is correct. The following message was output:<br>$AILR2,1,431100001,,,,,,,11.1,T,30.4,N*3F | ✓ |
| Confirm the LR3 requested fields are null. The following message was output:<br>$AILR3,1,431100001,,,,,,,,,*0E | ✓ |

| Automatic mode – Selected data “CEF” | |
|---|---|
| LR Sentences sent to the LR interface port:<br>“$LRLRI,1,0,000012346, 431100001,,,,,,,,”<br>“$LRLRF,1,000012346,TUV,CEF,” | |
| Requirement | Verdict |
| Confirm that the request is displayed on the MKD. | ✓ |
| Check that the request is output on the PI. | ✓ |
| Verify that the LRF response message is correct. The following message was output:<br>$AILRF,1,000012346,TUV,CEF,222*5A | ✓ |
| Confirm that the LR1 sentence is correct. The following message was output:<br>$AILR1,1,431100001,000012346,,,*12 | ✓ |
| Confirm the LR2 sentence is correct. The following message was output:<br>$AILR2,1,431100001,,,5116.79,N,00227.94,W,11.1,T,30.4,N*11 | ✓ |
| Confirm the LR3 requested fields are null. The following message was output:<br>$AILR3,1,431100001,,,,,,,,,*0E | ✓ |

| Automatic mode – Selected data "PW" | |
|---|---|
| LR Sentences sent to the LR interface port:<br>"$LRLRI,7,0,000012346, 431100001,,,,,,,,"<br>"$LRLRF,7,000012346,TUV,PW," | |
| Requirement | Verdict |
| Confirm that the request is displayed on the MKD. | ✓ |
| Check that the request is output on the PI. | ✓ |
| Verify that the LRF response message is correct. The following message was output:<br>$AILRF,7,000012346,TUV,PW,22*29 | ✓ |
| Confirm that the LR1 requested fields are null. The following message was output:<br>$AILR1,7,431100001,000012346,,,*14 | ✓ |
| Confirm the LR2 requested fields are null. The following message was output:<br>$AILR2,7,431100001,,,,,,,,,,*25 | ✓ |
| Confirm the LR3 requested sentence is correct. The following message was output:<br>$AILR3,7,431100001,,,,,53,,,,513.0*27 | ✓ |

| Manual response by MKD | |
|---|---|
| LR Sentences sent to the LR interface port:<br>"$LRLRI,5,0,000012346, 431100001,,,,,,,,"<br>"$LRLRF,5,000012346,TUV,ABCDEFIOPUW," | |
| Requirement | Verdict |
| Confirm that the request for a manual response is displayed on the MKD. | ✓ |
| Verify that the response is transmitted when accepting to reply. | ✓ |

| Manual response by PI | |
|---|---|
| LR Sentences sent to the LR interface port:<br>"$LRLRI,5,0,000012346, 431100001,,,,,,,,"<br>"$LRLRF,5,000012346,TUV,ABCDEFIOPUW," | |
| Requirement | Verdict |
| Verify that the response is transmitted on the LR port when responding via the PI. | ✓ |

## 2.39 LR “ALL SHIPS” INTERROGATION

### 2.39.1 Specification Reference

IEC 61993-2, Clause 21.2

### 2.39.2 Equipment Under Test

JHS-183, BB50304

### 2.39.3 Date of Test and Modification State

10 August 2012 - Modification State 2

### 2.39.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.39.5 Test Results and Methods of Measurement

(9.2)

***Method of Measurement***

Set-up standard test environment and operate EUT in autonomous mode. Apply a LR “all ships” interrogation message to the LR-interface port of EUT defining a geographical area which contains own ships position; Record LR output port. Set EUT to

a) Automatic response
b) Manual response

Repeat check with own ship outside specified area.

***Required results***

Check that EUT outputs a LR position report message

– automatically (and indicates action on display)
– after manual confirmation.

No response shall be output on the repeat check.

***Test Results***

| Automatic mode – In area | |
|---|---|
| EUT fed external GPS position:<br>"$GPGLL,5116.7905,N,0227.9425,W,,A,A"<br>LR Sentences sent to the LR interface port:<br>"$LRLRI,5,1,000012346,,5200.0,N,00200.0,W,5100.0,N,00300.0,W"<br>"$LRLRF,5,000012346,TUV,ABCEFIOPUW," | |
| Requirement | Verdict |
| Confirm that the request is displayed on the MKD. | ✓ |
| Verify that the LRF response message is correct. The following message was output:<br>$AILRF,5,000012346,TUV,ABCEFIOPUW,2222222222*3B | ✓ |
| Confirm that the LR1 sentence is correct. The following message was output:<br>$AILR1,5,431100001,000012346,TUVTEST@@@@@@@@@@@@@@,OCT@@@@,977654321*71 | ✓ |
| Confirm that the LR2 sentence is correct. The following message was output:<br>$AILR2,5,431100001,12082010,075500.00,5116.79,N,00227.94,W,11.1,T,10.0,N*32 | ✓ |
| Confirm that the LR3 sentence is correct. The following message was output:<br>$AILR3,5,431100001,HELLO ,110800,105900.00,22.0,53,564,78,50,513*51 | ✓ |

| Automatic mode – Not in area | |
|---|---|
| EUT fed external GPS position:<br>"$GPGLL,5116.7905,N,0227.9425,W,,A,A"<br>LR Sentences sent to the LR interface port:<br>"$LRLRI,5,0,000012346,,5000.0,N,02000.0,W,4900.0,N,00300.0,W"<br>"$LRLRF,5,000012346,TUV,ABCEFIOPUW," | |
| Requirement | Verdict |
| Confirm that the request is not displayed on the MKD. | ✓ |
| Check that the request is not output on the PI. | ✓ |
| Verify that the EUT does not respond. | ✓ |

| Manual mode – In area | |
|---|---|
| EUT fed external GPS position:<br>“$GPGLL,5116.7905,N,0227.9425,W,,A,A”<br>LR Sentences sent to the LR interface port:<br>“$LRLRI,5,1,000012346,,5200.0,N,00200.0,W,5100.0,N,00300.0,W”<br>“$LRLRF,5,000012346,TUV,ABCEFIOPUW,” | |
| Requirement | Verdict |
| Confirm that the request is displayed on the MKD. | ✓ |
| Check that the request is output on the PI. | ✓ |
| Verify that the EUT responds when manually accepted. | ✓ |

| Manual mode – Not in area | |
|---|---|
| EUT fed external GPS position:<br>“$GPGLL,5116.7905,N,0027.9425,W,,A,A”<br>LR Sentences sent to the LR interface port:<br>“$LRLRI,5,0,000012346,,5000.0,N,02000.0,W,4900.0,N,00300.0,W”<br>“$LRLRF,5,000012346,TUV,ABCEFIOPUW,” | |
| Requirement | Verdict |
| Confirm that the request is not displayed on the MKD. | ✓ |
| Check that the request is not output on the PI. | ✓ |
| Verify that the EUT does not respond. | ✓ |

## 2.40 CONSECUTIVE LR "ALL SHIPS" INTERROGATION

### 2.40.1 Specification Reference

IEC 61993-2, Clause 21.3

### 2.40.2 Equipment Under Test

JHS-183, BB50304

### 2.40.3 Date of Test and Modification State

28 June 2012 - Modification State 0

### 2.40.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.40.5 Test Results and Methods of Measurement

(9.2)

***Method of Measurement***

Set-up standard test environment and operate EUT in autonomous mode. Set EUT to automatic mode. Apply 5 LR "all ships" interrogation messages to the LR-interface port of EUT defining a geographical area which contains own ships position;

Record LR output port. Set the control flag in the LRI message to

a) 0 (reply on first interrogation only)
b) 1 (reply on all applicable interrogations)

***Required results***

Check that EUT outputs a LR position report message

– on the first interrogation only
– on all interrogations.

***Test results***

| Control Flag = 0 | |
|---|---|
| 5 LR Sentences sent to the LR interface port:<br>$AILRI,1,0,100000008,,4000.00,N,14000.00,E,3000.00,N,13000.00,E<br>$AILRF,1,100000008,POSITION REQUEST8,C, | |
| Requirement | Verdict |
| Confirm that the EUT responds to the first interrogation. | ✓ |
| Confirm that the EUT does not respond to the remaining 4 interrogations. | ✓ |

| Control Flag = 1 | |
|---|---|
| $AILRI,1,1,100000009,,4000.00,N,14000.00,E,3000.00,N,13000.00,E<br>$AILRF,1,100000009,POSITION REQUEST9,C, | |
| Requirement | Verdict |
| Confirm that the EUT responds to all the interrogations. | |

Product Service

**SECTION 3**

**TEST EQUIPMENT USED**

## 3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

| Instrument Description | Manufacturer | Model Type | TE Number | Cal Period (months) | Calibration Due Date |
|---|---|---|---|---|---|
| AIS Test Unit | Attingimus | MK II | 4057 | - | OP MON |
| AIS Base Station | SAAB | R40 | S/N:5006 | - | OP MON |
| Power Supply | Iso-Tech | IPS-2010 | 2439 | - | OP MON |
| DVM | Iso-Tech | Iso-Tech | 2421 | 12 | 26-Oct-2012 |

TU – Traceability Unscheduled
OP MON – Output Monitored with Calibrated Equipment

Product Service

**SECTION 4**

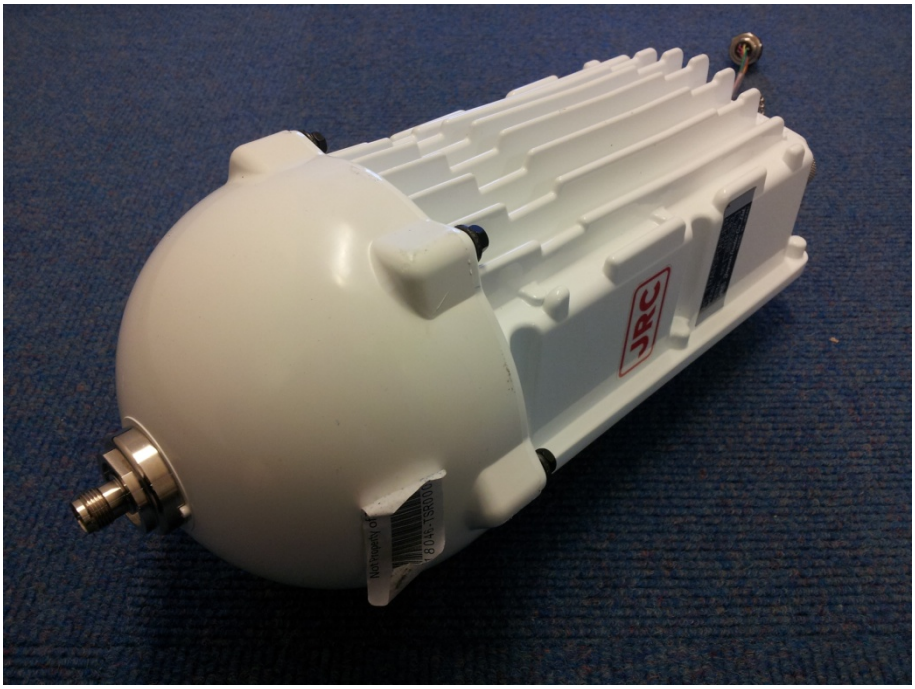
**PHOTOGRAPHS**

## 4.1 PHOTOGRAPHS OF EQUIPMENT UNDER TEST (EUT)

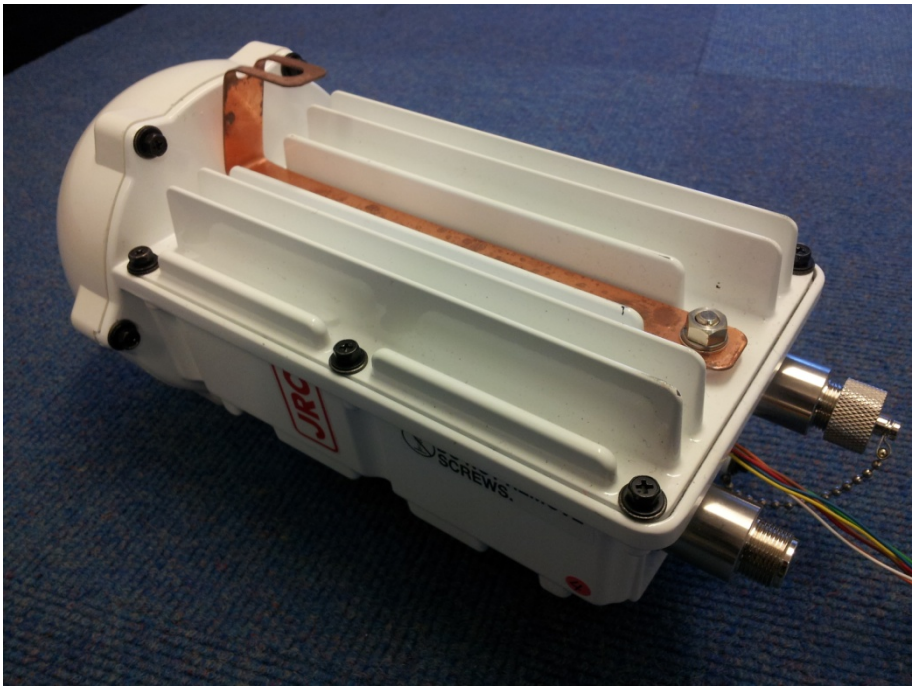

NCM-983 Front View

NCM-983 Rear View


NCM-983 Label View



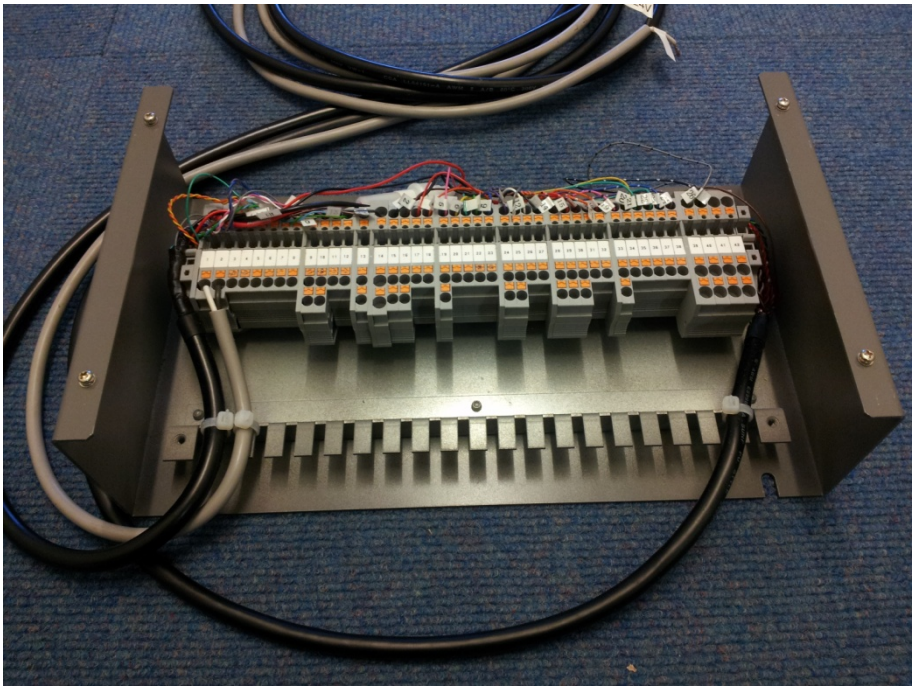

NTE-183 Front View




NTE-183 Rear View


NTE-183 Label View


NQE-5183 Front View



NQE-5183 Rear View

## SECTION 5

## ACCREDITATION, DISCLAIMERS AND COPYRIGHT

## 5.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

This report relates only to the actual item/items tested.

Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation.

Results of tests not covered by our UKAS Accreditation Schedule are marked NUA (Not UKAS Accredited).