



Ambient temperature +25.0 °C Relative humidity 59 %

CONTINUATION OF AUTONOMOUS MODE REPORTING RATE IEC 61993-2, CLAUSE 17.8
(M.1371-1 A2/3.3.6, IALA Technical clarifications to recommendation ITU-R M.1371-1)

(1) Method of test

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.

(2) Required result

Ensure that the autonomous reporting rate is maintained.

(3) Test results

Conditions	Results
Message 16 sent to EUT whilst in transition zone.	√

The EUT satisfied the requirements of this test.

Software used: 55 to 58

TEST EQUIPMENT USED:

4, 28, 30 to 52, 88 to 90

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Ambient temperature +25.1 °C Relative humidity 65 %

SPECIFIC TESTS OF TRANSPORT LAYER
ADDRESSED MESSAGES
TRANSMISSION

IEC 61993-2, CLAUSE 18 (7.5)
IEC 61993-2, CLAUSE 18.1 (M.1371-1 A2/5.3.1)
IEC 61993-2, CLAUSE 18.1.1 (M.1371-1 A2/5.3)

(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.*

(2) Required results

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

(3) Test results

Conditions	Results
on channel AIS1	√
on channel AIS2	√

The EUT satisfied the requirements of this test.

Software used: 55 to 58

TEST EQUIPMENT USED:

4, 28, 30 to 52, 88 to 90

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Ambient temperature +25.1 °C Relative humidity 65 %

ACKNOWLEDGEMENT

IEC 61993-2, CLAUSE 18.1.2

(1) 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.*

(2) Required results

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

(3) Test results

Conditions	Results
Transmits msg 7	√
Output to PI within 4 seconds (4 times for ch A, 4 times for ch B)	√

The EUT satisfied the requirements of this test.

Software used: 55 to 58

TEST EQUIPMENT USED:
4, 28, 30 to 52, 88 to 90

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Ambient temperature +25.1 °C Relative humidity 65 %

TRANSMISSION RETRY

IEC 61993-2, CLAUSE 18.1.3 (M.1371-1 A2/5.3.1)

(1) 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.

(2) 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 seconds.

Confirm that EUT transmits the overall result with an appropriate message to PI.

(3) Test results

Conditions	Results
<i>Retries the transmission up to 3 times.</i>	√
<i>Configurability.</i>	Configurable 0, 1, 2, 3
<i>Time between transmissions is 4 to 8 seconds</i>	√
<i>Output to PI.</i>	√

The EUT satisfied the requirements of this test.

Software used: 55 to 58

TEST EQUIPMENT USED:

4, 28, 30 to 52, 88 to 90

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Ambient temperature +25.1 °C Relative humidity 65 %

ACKNOWLEDGEMENT OF ADDRESSED SAFETY RELATED MESSAGES IEC 61993-2, CLAUSE 18.1.4

(1) Method of measurement

Repeat test under 18.1.2 with addressed safety related message.

(2) Required results

Same as 18.1.2

(3) Test results

Conditions	Results
Transmits msg 13 (ack)	√
Output to PI	√

The EUT satisfied the requirements of this test.

Software Used: 55 to 58

TEST EQUIPMENT USED:

4, 28, 30 to 52, 88 to 90

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Ambient temperature +25.1 °C Relative humidity 65 %

INTERROGATION RESPONSES

IEC 61993-2, CLAUSE 18.2 (M.1371-1 A2/5.3)

(1) Method of measurement

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

Apply an interrogation message (msg 15; EUT as destination) to the VDL according to table 7 for responses with msg 5 and slot offset set to defined value on channel AIS 1.

Record transmitted messages on both channels.

(2) Required results

Check that EUT transmits the appropriate interrogation response message as requested on channel AIS1.

Repeat test for AIS2.

(3) Test results

Conditions	Results
on channel AIS1	√
on channel AIS2	√

The EUT satisfied the requirements of this test.

Software used: 55 to 58, 75

TEST EQUIPMENT USED:

4, 28, 30 to 52, 63, 66, 67, 79, 88 to 90

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Ambient temperature +25.1 °C Relative humidity 65 %

OTHER NON-PERIODIC MESSAGES

IEC 61993-2, CLAUSE 18.3 (M.1371-1 A2/5.3)

(1) 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.*

(2) Required results

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

(3) Test results

Conditions	Results
Tx 5 binary broadcast messages (msg8)	√

The EUT satisfied the requirements of this test.

Software used: 55 to 58

TEST EQUIPMENT USED:

4, 28, 30 to 52, 88 to 90

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(1) 19.1 General

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.

Supported interface sentences

	Indication	Sentence format	Supported sentence formatters		
			Input data	Recommend	Optional
1.	SENSOR1-1 SENSOR1-2	IEC61162-1/2 Compatible	Longitude/Latitude	GNS	GGA
			Position Accuracy	GLL	RMC
	Time of Position				
	Datum Reference		DTM		
	RAIM Indicator		GBS		
	Speed Over Ground (SOG)		VBW	VTG OSD RMC	
	Course Over Ground (COG)		RMC	VTG OSD	
	Heading		HDT	OSD	
		Rate of Turn	ROT		
2.	SENSOR4-1	ITU-R M.823-2	Input: RTCM SC-104 Ver.2.0 Type 1, 2, 7, 9		
3.	AUX1 AUX3	IEC61162-2	Input: ABM, ACA, ACK, AIR, BBM, LRI, LRF, VSD, SSD		
		IEC61993-2	Output: ABK, ACA, ALR, DSC, DSI, LRF, LR1, LR2, LR3, TXT, VDO, VDM (*1)		
4.	AUX2 AUX4	IEC61162-2	Output: ABK, ACA, ALR, DSC, DSI, LRF, LR1, LR2, LR3, TXT, VDO, VDM (*1)		
		IEC61993-2			
5.	LONGRANGE	IEC61993-2	Input: LRI, LRF Output: LRF, LR1, LR2, LR3		



Checks required:

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

- approved sentences against IEC 61162*
- proprietary sentences against IEC 61162*
- usage of fields as required for different functions including provided default values or settings*
- transmission intervals against IEC 61162*
- configuration of hardware and software if this is relevant to the interface performance and port selection.*

The following checks for compliance with IEC 61162

- output drive capability*
- load on the line of inputs*
- electrical isolation of input circuits*

The EUT satisfied all the requirements listed in this clause.



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ELECTRICAL TEST

IEC 61993-2, CLAUSE 19.3 (7.6.1)
IEC 61162-1, CLAUSE 8.4.1.2

(1) Method of test

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.

(2) Required results

The interfaces shall fulfil the requirements of the relevant standards.

(3) Test results

Conditions	Results
15 V dc applied between I/Ps, O/Ps & GND, all combinations and polarities.	Rx port √ Tx port √

Remarks:

The EUT input and output ports are configured to comply with the requirements of IEC 61162-2.

All input ports are identical electrically and all output ports are identical electrically.

Sensor 1-1 & Sensor 1-2 ports (Rx) and Aux 1 port (Tx) were chosen for this test.

The EUT satisfied the requirements of this test.

Software used: 55 to 58

TEST EQUIPMENT USED:

4, 28, 30 to 52, 88 to 90

.....



Ambient temperature +25.1 °C Relative humidity 65 %

TEST OF INPUT SENSOR INTERFACE PERFORMANCE

IEC 61993-2, CLAUSE 19.4 (7.6.2)

(1) 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 % of the interface's capacity.

Record the VDL and output from the EUT's high speed port.

(2) 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.

(3) Test results

Conditions	Results
2750 cps, 3 ports, 7 sentences, x 10	√

See JRC's method sheet on next page.

The EUT satisfied the requirements of this test.

Software used: 55 to 58

TEST EQUIPMENT USED:

4, 28, 30 to 52, 88 to 90

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Test condition for 19.4 Test input sensor interface performance

Interface's capacity: 38400[bps] = 3840[character per second (cps)]

70%: 3840*0.7 = 2688[cps]

80%: 3840*0.8 = 3072[cps]

	Baud rate [bps]	Input sentences	Input data	Filter	Output data
Sensor1	38400	\$GPDTM,W84,,,,,W84*4A \$GPRMC,121850,A,1000.000,N,11000.000,E,00.0,100,220402,00,E,A*12 \$GPGLL,1000.000,N,11000.000,E,121850,A,A*49 \$GPGGA,121850,1000.000,N,11000.000,E,1,7,01,+0050,M,+001,M,05,0686*5D \$GPVTG,100,T,,00.0,N,,,A*0A \$TIROT,100.0,A*3A \$SHEHDT,100.0,T*2E	N 10 00.00 E110 00.00 SOG:0 COG:100 HDG:100 ROT:100	RMC	N 10 00.00 E 110 00.00 SOG:0 COG:100
Sensor2	38400	\$GPDTM,W84,,,,,W84*4A \$GPRMC,122044,A,2000.000,N,12000.000,E,00.0,200,220402,00,E,A*1F \$GPGLL,2000.000,N,12000.000,E,122044,A,A*47 \$GPGGA,122044,2000.000,N,12000.000,E,1,7,01,+0050,M,+001,M,05,0686*53 \$GPVTG,200,T,,00.0,N,,,A*09 \$TIROT,200.0,A*39 \$SHEHDT,200.0,T*2D	N 20 00.00 E120 00.00 SOG:0 COG:200 HDG:200 ROT:200	HDT	HDG:200
Sensor3	38400	\$GPDTM,W84,,,,,W84*4A \$GPRMC,122106,A,3000.000,N,13000.000,E,00.0,300,220402,00,E,A*19 \$GPGLL,3000.000,N,13000.000,E,122106,A,A*40 \$GPGGA,122106,3000.000,N,13000.000,E,1,7,01,+0050,M,+001,M,05,0686*54 \$GPVTG,300,T,,00.0,N,,,A*08 \$TIROT,300.0,A*38 \$SHEHDT,300.0,T*2C	N 30 00.00 E130 00.00 SOG:0 COG:300 HDG:300 ROT:300	ROT	ROT:300

\$GPDTM,W84,,,,,W84*4A

\$GPRMC,121850,A,1000.000,N,11000.000,E,00.0,100,220402,00,E,A*12

\$GPGLL,1000.000,N,11000.000,E,121850,A,A*49

\$GPGGA,121850,1000.000,N,11000.000,E,1,7,01,+0050,M,+001,M,05,0686*5D

\$GPVTG,100,T,,00.0,N,,,A*0A

\$TIROT,100.0,A*3A

\$SHEHDT,100.0,T*2E

Number of characters + <CR><LF>

23+2=25

64+2=66

43+2=45

69+2=71

28+2=30

17+2=19

17+2=19

Total:275[characters]

275[characters] *10[times] per second = 2750[cps] = 27500[bps] (71.6%)

1 character = 10 bits (1 start bit, 8 data bits and 1 stop bit).



Ambient temperature +25.1 °C Relative humidity 65 %

TEST OF SENSOR INPUT

IEC 61993, CLAUSE 19.5 (7.6.2)

(1) 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*

(2) 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.*

(3) Test results

Conditions	Results
Valid data	√
Invalid data	√

See JRC's table of data tested (next page)

The EUT satisfied the requirements of this test.

Note 1: ROT display is inaccurate due to calculation rounding up to nearest unit (ITU R M1371 table 15a).
JRC advised to publish this error in the specifications for the JHS-182 and to draw the user's attention to this error in the handbook table of Supported Interface Sentences (8.2.4)

Software used: 55 to 58

TEST EQUIPMENT USED:

4, 28, 30 to 52, 88 to 90

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TABLE OF DATA TESTED

DATA	FORMAT		
Position	GNS	a)valid data (Mode:A) b1) invalid data (Mode :N) b2) invalid data (Mode :A)(N100.00,E100)	
Position	GLL	a)valid data (Status,Mode :A,A) b1)invalid data (Status,Mode:A,N) b2)invalid data (Status,Mode:V,A) b3)invalid data (Status,Mode:V,N) b4)invalid data (Status,Mode:A,A) (N200.00,E200)	
Position	GGA	a)valid data (Quality :1) b1)invalid data (Quality :0) b2)invalid data (Quality :1) (N300.00,E300)	
Position/SOG	RMC	a)valid data (Status,Mode :A,A) b1)invalid data (Status,Mode:A,N) b2)invalid data (Status,Mode:V,A) b3)invalid data (Status,Mode:V,N) b4)invalid data (Status,Mode:A,A) (N100.00,□100, SOG-10) b5)incorrect CRC (Status ,Mode:A,A)	
SOG	VBW with GLL	a)valid data (Status:A) b) invalid data (Status:V)	
SOG	VTG with GLL	a)valid data (Mode:A) b1) invalid data (Mode :N) b2) invalid data (Mode :A)(SOG-20)	
SOG	OSD with GLL	a)valid data (Referense:P) b1) invalid data (Referense:V) b2) invalid data (Referense:P)(SOG-30)	
Heading	HDT	a)valid data b) invalid data (data360)	
Heading	OSD	a)valid data (Status:A) b1) invalid data (Status:V) b2) invalid data (Status:A ,data360)	
ROT	ROT	a)valid data (Status:A) b) invalid data (Status:V)	



Ambient temperature +25.1 °C Relative humidity 65 %

TEST OF HIGH SPEED OUTPUT

IEC 61993-2, CLAUSE 19.6 (7.6.3)

(1) 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).*

(2) 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.

(3) Test results

Conditions	Results
VDM & VDO sentences with correct formatting.	√

The EUT satisfied the requirements of this test.

Software used: 55 to 58

TEST EQUIPMENT USED:

4, 28, 30 to 52, 88 to 90

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Ambient temperature +25.1 °C Relative humidity 65 %

HIGH SPEED OUTPUT INTERFACE PERFORMANCE

IEC 61993-2, CLAUSE 19.7 (7.6.3)

(1) 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".

(2) Required results

Confirm that EUT outputs all received messages to the PI.

Repeat test for port "auxiliary display".

(3) Test results

Conditions	Results
External display (AUX1)	√
Auxiliary display (AUX2)	√

The EUT satisfied the requirements of this test.

Software used: 55 to 58

TEST EQUIPMENT USED:

4, 28, 30 to 52, 88 to 90

.....



Ambient temperature +25.1 °C Relative humidity 65 %

TEST OF HIGH SPEED INPUT

IEC 61993-2, CLAUSE 19.8 (7.6.3)

(1) 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.

(2) Required results

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

(3) Test results

Conditions	Results
VSD	✓
SSD	✓
ABM	✓
BBM	✓
AIR	✓
ACA (already tested 17.3)	✓
ACK (already tested 14.9.2.5)	✓
LRF (already tested 21.1)	✓

The EUT satisfied the requirements of this test.

Software used: 55 to 58

TEST EQUIPMENT USED:

4, 28, 30 to 52, 88 to 90

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Ambient temperature +24.7 °C Relative humidity 65 %

**DSC FUNCTIONALITY TESTS
GENERAL**

IEC 61993-2, CLAUSE 20 (M.1371-1 A3)
IEC 61993-2, CLAUSE 20.1 (M.1371-1 A3/1)

(1) Method of measurement

For the tests in this clause (see also IEC 61993-1), set the EUT into autonomous mode using channels AIS1 and AIS2 with a reporting interval of 2 s.
Check with a sequence of valid calls consisting of a test signal number 1, a geographic call from ITU-R M.493, a test signal number 1, an individual call from ITU-R M.493 and a test signal number 1 that the EUT correctly receives and processes the three test calls and its correct AIS operation is not affected by the interleaved calls.
Check that the EUT does not respond to invalid calls – incorrect MMSI position outside addressed geographic area, different course, or ship's type.
Send to the EUT a standard test signal number 1 but with symbol numbers 104 and 03 followed by values 01 and 120 (Activate alternate system with group number 1 and sequence number 120).
Check that the EUT does not respond.

(2) Test results

Operation on 156.525 MHz

Method	Message	Reply Message	Result
General	Test signal 1, S103 (position), S111 (name).	S100, S115	√
EUT: AIS 1, 2 ch	VHF geographical call: (M493 lat36 dev10 lon139 dev10).	No response	√
Autonomous mode, Reporting interval 2 sec.	Test signal 1, S103 (position), S111 (name).	S100, S115	√
EUT POSITION N 35.41.00 E 139.20 SOG: 24 knots COG: 90 degrees Ship type 61	VHF individual call (M493 MMSI 431100001).	No response	√
	Test signal 1, S103 (position), S111 (name).	S100, S115	√
	Test signal 1 with incorrect MMSI (431100002).	No response	√
	Test signal 1 with position outside addressed geographical area: (N36 00 dev50, E139 40 dev50).	No response	√
	Test signal 1 with different course (0).	No response	√
	Test signal 1 with different ship type (62).	No response	√
	Test signal 1 with symbol numbers: 104, 03, 01, 120.	No response	√

The EUT satisfied the requirements of this test.

Software used: 55 to 58, 79

TEST EQUIPMENT USED:

4, 28, 30 to 52, 59, 60, 62, 64, 88 to 90



Ambient temperature +25.1 °C Relative humidity 65 %

REGIONAL AREA DESIGNATION

IEC 61993-2, CLAUSE 20.2 (M.1371-1 A3/5)

(1) 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 5 nm in this test.

(2) 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.

(3) Test results

Conditions	Results
Default region	√
First transitional zone	√
Region 2	√
Second transitional zone	√
Region 1	√

The EUT satisfied the requirements of this test.

Software used: 55 to 58, 79

TEST EQUIPMENT USED:

4, 28, 30 to 52, 59, 60, 62, 64, 88 to 90

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Ambient temperature +24.7 °C Relative humidity 65 %

SCHEDULING

IEC 61993-2, CLAUSE 20.3 (M.1371-1 A3/2)

(1) Method of measurement

*Check that the time sequence of the TDMA messages is not changed when the EUT transmits a DSC signal.
 Send a valid geographical call to the EUT.
 Check that the response is transmitted after a random delay distributed over the range of 0 to 20 s and subject to the restrictions of ITU-R M.1371-1 A3/2.2.
 Send a valid geographical call to the EUT followed by a signal consisting of test signal Number 1 with a signal level of -107 dBm at the receiver input of 25 s duration.
 Check that the response is not transmitted.*

(2) Test results

Conditions	Results
Time sequence of the TDMA when transmits a DSC signal	√
Reporting interval 2 seconds	√
A valid geographical call	√
Valid geographical call followed by a signal consisting of test signal Number 1 (25 s duration)	√

Test performed on 156.525 MHz

The EUT satisfied the requirements of this test.

Software used: 55 to 58, 70, 79

TEST EQUIPMENT USED:

4, 19, 28, 30 to 52,59, 60,61, 62, 64, 69, 85, 88 to 90

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Ambient temperature +24.7 °C Relative humidity 65 %

POLLING

IEC 61993-2, CLAUSE 20.4 (M.1371-1 A3/3)

(1) Method of measurement

Check that the EUT is capable of receiving, processing and automatically transmitting a response to the following calls from ITU-R M.825: 101 (command to duplex-channel), 102, 103, 108, 109, 111, 112, and 116.

The sequence of calls consisting of test signals number 1 and valid geographic calls shall demonstrate the capability of the EUT to operate on single frequency channels as well as on two frequency channels.

Verify through this test, that ships maritime mobile service identify (MMSI), ship name, ships length and type of ship is programmed into the EUT.

Send a standard test signal number 1 with additional symbols number 109 and 116 and check that the reply messages 100, 119 and 120 are programmed automatically.

Check that when information is not available to respond to a command the transmitted response is followed by the symbol 126.

Send a standard test signal number 1 with additional symbol 101 followed by channel number 87.

Repeat the test with channel number 88 and with symbol 104 and 00 followed by channel number 2087 and 2088.

Check in all cases that the response is made on channel 70.

Send a DSI sentence to CH 4 and CH 5 (see annex D) with an individual station address and with command sets 103 (report your position) and 111 (report ship name).

Check that the EUT does not transmit a DSC message.

Set the RF output power of the EUT high/low using the appropriate DSC command.

Check that the output power is set accordingly.

(Continued..)



(2) Test results

Send message	Response message	Results
Switch to VHC channel (101)	Message acknowledged (110)	√
Report your position now and at intervals of ... minutes (102)	My position is .. at time .. (100)	√
Report your position (103)	My position is .. at time .. (100)	√
Report length of ship (108)	Length of ship is .. meters (124)	√
Report course of ship (109)	Course of ship is .. degrees (119)	√
Report ship's name / identification (111)	Ship's name/identification is .. (115)	√
Acknowledge message (112)	Message acknowledged (110)	√
Report speed of ship (116)	Speed of ship is .. knots (120)	√
standard test signal number 1 with symbols 109 and 116	(100),(115),(119),(120)	√
Report your position now and at intervals of ... minutes (102)	No information (126)	√
Report your position (103)	No information (126)	√
Report length of ship (108)	No information (126)	√
Report course of ship (109)	No information (126)	√
Report ship's name / identification (111)	No information (126)	√
standard test signal number 1 with 101 followed by channel number 87.	response is made on channel 70	√
with 101 followed by channel number 88.	response is made on channel 70	√
with symbol 104 and 00 followed by channel number 2087	response is made on channel 70	√
with symbol 104 and 00 followed by channel number 2088	response is made on channel 70	√
Send a DSI sentence to PI (CH4, CH5) with an individual station address and with command sets 103 and 111.	not transmit a DSC message	√
Set the RF output power Low (104)	output power is set to Low	√
Set the RF output power High (104)	output power is set to High	√

(Continued..)



POLLING (continued)

IEC 61993-2, CLAUSE 20.4

The EUT satisfied the requirements of this test.

Software used: 55 to 58, 79

TEST EQUIPMENT USED:

4, 28, 30 to 52, 59, 60, 62, 64, 88 to 90

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Ambient temperature +24.7 °C Relative humidity 65 %

**LONG RANGE FUNCTIONALITY TESTS
LR INTERROGATION**

IEC 61993-2, CLAUSE 21 (9)
IEC 61993-2, CLAUSE 21.1 (9.2)

(1) 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

- automatic response*
- manual response via MKD*
- manual response via PI*

(2) 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*

(3) Test results

Conditions	Results
Automatic response	√
Manual response via MKD	√
Manual response via PI	√

The EUT satisfied the requirements of this test.

Software used: 55 to 58

TEST EQUIPMENT USED:

4, 28, 30 to 52, 88 to 90

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Ambient temperature +24.7 °C Relative humidity 65 %

LR "ALL SHIPS" INTERROGATION

IEC 61993-2, CLAUSE 21.2 (9.2)

(1) 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 ship's position; Record LR output port. Set EUT to:

- automatic response*
- manual response.*

Repeat check with own ship outside specified area.

(2) 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.

(3) Test results

Conditions	Results inside specified area	Results outside specified area
Automatic response	√	√
Manual response	√	√

The EUT satisfied the requirements of this test.

Software used: 55 to 58

TEST EQUIPMENT USED:

4, 28, 30 to 52, 88 to 90

.....



Ambient temperature +24.7 °C Relative humidity 65 %

CONSECUTIVE LR "ALL SHIPS" INTERROGATIONS

IEC 61993-2, CLAUSE 21.3 (9.2)

(1) 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 ship's position;

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

- 0 (reply on first interrogation only)

- 1 (reply on all applicable interrogations).

(2) Required results

Check that EUT outputs a LR position report message

- on the first interrogation only

- on all interrogations.

(3) Test results

Conditions	Results
- 0 (reply on first interrogation only)	√
- 1 (reply on all applicable interrogations)	√

The EUT satisfied the requirements of this test.

Software used: 55 to 58

TEST EQUIPMENT USED:

4, 28, 30 to 52, 88 to 90

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TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

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

No	Instrument/Ancillary	Type	Manufacturer	Serial Number
1	Vibration System	G-8230	Shinken	SG-4085
2	Temperature and Humidity Chamber	EC-850LHPS	Hitachi	U5971329
3	Pressure and Temperature Chamber	MZH-11S	Espec Corp.	851983
4	Digital Multimeter	87	Fluke	JRC INV 00-94290
5	Stopwatch	8A20-0010	Seiko	600361
6	Termination Power Meter	TP-2503A-01	Fujisoku	64815
7	Frequency Counter	MF57A	Anritsu	M79035
8	RF Communication Test Set	8920B	Agilent	US36412119
9	Frequency Analyser	5371A	Agilent	2828A00621
10	Crystal Detector	423A	Agilent	1822A09353
11	T-Pad	Z-164A	Anritsu	M63986
12	Attenuator	MN510C	Anritsu	M91740
13	Four Port Junction Pad	MP659A	Anritsu	-----
14	Frequency Counter	TR5823	Advantest	10570407
15	Oscilloscope	DL1200E	Yokogawa	23XF7318
16	Signal generator	8642A	Agilent	2816A01664
17	Signal generator	8665A	Agilent	3438A00747
18	Signal generator	8665B	Agilent	3020A00129
19	Signal generator	8648A	Agilent	3625U00630
20	Signal generator	SMIQ 03B	Rohde & Schwarz	838288/067
21	Signal generator	SMIQ 03B	Rohde & Schwarz	838288/064
22	Signal generator	8664A	Agilent	3744A02544
23	Digital Oscilloscope	DL1640	Yokogawa	12C323883
24	Calibration Kit	85032B	Agilent	2919A03289
25	Four Port Junction Pad	MP659A	Anritsu	-----
26	Spectrum Analyzer	8563A	Agilent	3220A01921
27	Spectrum Analyzer	8595A	Agilent	3039A00123
28	Power Supply Variable ac	PCR 1000	Kikusui	10100831
29	Power Supply 24 V dc	PD35-20	Kenwood	7060016
30	Ship 1 AIS Transponder	NTE-180	JRC	BB32331
31	Ship 2 AIS Transponder	NTE-180	JRC	BB32330
32	Ship 3 AIS Transponder	NTE-180	JRC	BB32334
33	Ship 4 AIS Transponder	NTE-180	JRC	BB32333
34	Ship 5 AIS Transponder	NTE-180	JRC	BB32332
35	Ship 1 AIS Controller	NCM-722	JRC	BB12332
36	Ship 2 AIS Controller	NCM-722	JRC	BB12330
37	Ship 3 AIS Controller	NCM-722	JRC	BB12334
38	Ship 4 AIS Controller	NCM-722	JRC	BB12333
39	Ship 5 AIS Controller	NCM-722	JRC	BB12331
40	Connection Box	NQE-3111	JRC	NONE
41	Connection Box	NQE-3111	JRC	NONE
42	Connection Box	NQE-3111	JRC	NONE
43	Connection Box	NQE-3111	JRC	NONE
44	Connection Box	NQE-3111	JRC	NONE



45	EUT Dummy Load (EUT)	DL-30N	Diamond Antenna	-----
46	Ship 1 Dummy Load	6*330R.PAR	JRC	NONE
47	Ship 2 Dummy Load	6*330R.PAR	JRC	NONE
48	Ship 3 Dummy Load	6*330R.PAR	JRC	NONE
49	Ship 4 Dummy Load	6*330R.PAR	JRC	NONE
50	Ship 5 Dummy Load	6*330R.PAR	JRC	NONE
51	Power Supply Ship 1-5	PAD 35-20LP	Kikusui	14051069
52	GPS Rx Ship 1	JLR-7700 Mk 2	JRC	KD98879
53	PC	PC-7DM08-KFOXB	Hitachi	981005
54	RS422 4ch board	PCI-4147	Interface	-----
55	Sensor Simulator	Software	JRC	Ver. 1.0
56	VDM decoder	Software	JRC	Ver. 107
57	Excel	Software	Microsoft	97 SR2
58	Tera Term Pro	Software	Free	Ver. 2.3
59	Marine VHF Radiophone	JHS-32A	JRC	BH97877
60	DSC Modem	----	JRC	No. 1
61	DSC Modem	----	JRC	No. 2
62	Dummy Load	DL530A	Fujisoku	45286
63	Dummy Load	DL-30N	Diamond Antenna	None
64	PC	PC-A435	Sharp	69039103
65	PC	PC-LC800J54ER	NEC	0Z00311EA
66	AIS Transponder	NTE-180	JRC	BB32050
67	RS422/232 converter	IC952A	Black Box	249004204
68	Power Supply 24 V dc	GP035-5	Takasago	974831
69	Power Supply 5 V dc	523B	Metronix	200695
70	DSC Modem controller	Software	JRC	V 1.05E
71	AIS checker	Software	JRC	V 0.2.2
72	DotERT	Software	JRC	V 0.1.0
73	STS1ERT	Software	JRC	V 0.1.0
74	GMSK PERT	Software	JRC	V 0.1.1
75	AIS generator	Software	JRC	Ver. 1.0
76	3dB coupler	HDH-01703CHD	Hirose	437
77	DC BLOCKER	---	JRC	No.1
78	PC	2621	IBM	AA-FNWBPO0/04
79	PC	A20m	IBM	97-932N7
80	AIS BASE transponder	NTE-180	JRC	BB32052
81	AIS BASE controller	NCM-722	JRC	BB10017
82	AIS BASE connection box	NQE-3111	JRC	NONE
83	Signal generator	MG3633A	Anritsu	MT94470
84	THG	A1	Rotronic	
85	30dB ATT	8498A	Agilent	1801A03283
86	DGPS BEACON RECEIVER	NRB-2J	JRC	BR88179
87	PC	Latitude D600	Dell	19D981X
88	PC	DHS	Dell	37WX51X
89	RS422 8ch Board	PCI-4149C	Interface	NONE
90	RS422/232 converter	IC952A	Black Box	230419666
91	RS422/232 converter	IC952A	Black Box	249004203
92	AIS BASE Power Supply	NBD-577A	JRC	9910249



* Item 84 is owned by BABT, all other items were supplied by JRC.

Remarks

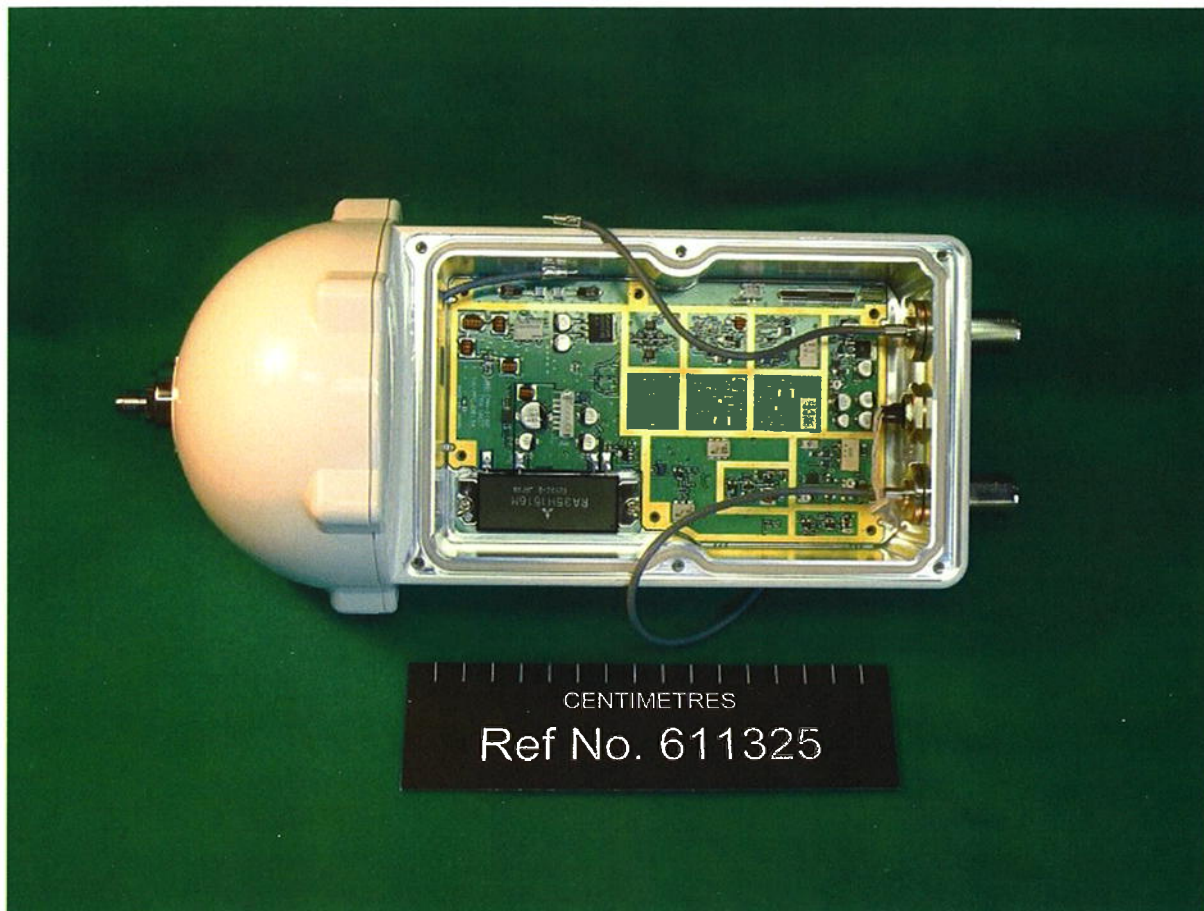
For the test equipment listed above which was supplied by JRC Limited, the calibration certificates have been checked by BABT to ensure they meet UKAS requirements. Copies are held at BABT, Fareham.
Where test equipment is owned by BABT the calibration records are held at BABT, Fareham.

PHOTOGRAPHS



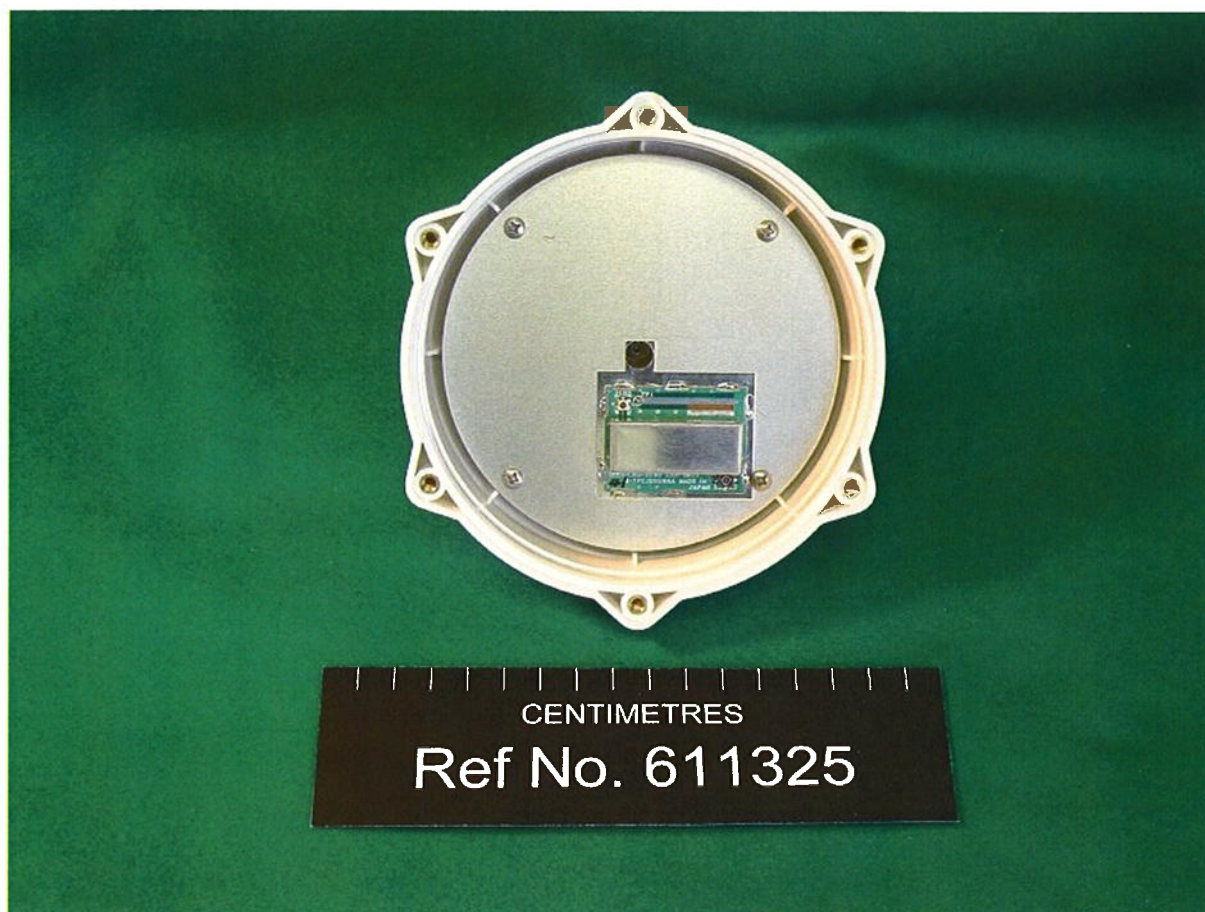
NTE-182 Transponder with Antenna – Front View

PHOTOGRAPHS (continued)



NTE-182 Transponder – Internal View 1

PHOTOGRAPHS (continued)



NTE-182 Transponder – Internal View 2

PHOTOGRAPHS (continued)



NTE-182 Transponder – Label View

PHOTOGRAPHS (continued)



NQD-4382 Junction Box – Front View