Bundesrepublik Deutschland
Federal Republic of Germany

Bundesamt für Seeschifffahrt und Hydrographie
Federal Maritime and Hydrographic Agency

BUNDESAMT FÜR SEESCHIFFFAHRT UND HYDROGRAPHIE

Conformance test report of an

AIS system

Equipment under test: **SRT**

Type: **SRT-MTB-OEM**

Applying test standards: IEC 62287 Sections 10,12,13, Annex C.3

Test Report No.: BSH/46162/4320358/06/S3140

Applicant: Software Radio Technology
Wireless House, First Avenue,
Midsomer Norton, Bath, BA3 ABS
United Kingdom

Hamburg, 08 September 06
Federal Maritime and
Hydrographic Agency

by order

Bartels
Test engineer

by order

Preuss
head of
laboratory

nach DIN EN 17025
akkreditiertes Prüflaboratorium

Deutscher Akkreditierungs Rat
DAR
DAT-P-086/98-01

Federal Maritime and Hydrographic Agency
Bernhard-Nocht-Str. 78
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Germany

Translation

Deutsche Akkreditierungsstelle Technik (DATech) e.V.
Signatory of the Multilateral Agreement of EA and ILAC for the mutual recognition

represented in the

Deutschen AkkreditierungsRat

Akkreditierung

The **German Accreditation Body Technology (DATech) e.V.** confirms that the Testing Laboratory

Federal Maritime and Hydrographic Agency
Department Shipping
Laboratory for Type Approvals
Bernhard-Nocht-Straße 78

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is competent under the terms of DIN EN ISO/IEC 17025 to carry out testing in the fields

Marine Equipment (Navigation Equipment, Radio-Communication Equipment, Life-Saving Appliances)

according to the annexed list of standards and specifications.

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The annex is deemed part of this certificate and comprises **8** pages.

DAR-Registration No.: **DAT-P-086/98-01**

Frankfurt/Main, November 11th, 2004

Dipl.-Ing. (FH) R. Egner
Head of the Accreditation Body

Member in EA, ILAC, IAF

Translation for information purposes only. The German Accreditation Certificate is authoritative. See notes overleaf

General

Applicant:	Software Radio Technology Wireless house, First Avenue, Midsomer Norton, Bath BA3 ABS, UK
Equipment under test:	
Type:	SRT-MTB-OEM
Manufacturer:	Software Radio Technology Wireless house, First Avenue, Midsomer Norton, Bath BA3 ABS, UK
Place of test:	BSH test laboratory Hamburg, Room 916
Start of test:	02 May, 2006
End of test:	05 September, 2006

Test standards[1]:

IEC 62287
Maritime navigation and radiocommunication equipment and systems-
Automatic Identification Systems
Class B shipborne equipment of the Universal Automatic Identification System (AIS) using CSTMA techniques

Summary

Test No.	Reference	Section	Result (passed/ not passed / not applicable / not tested)
2	IEC 62287	10 Operational tests	Passed
3	IEC 62287	11 Physical tests	Not included
4	IEC 62287	12 Specific tests of link layer	Passed
5	IEC 62287	13 Specific tests of network layer	Passed
6	IEC 62287	C.3 DSC functionality tests	Passed

[1] Numbers listed in the titles of the test sections of this report refer to the respective sections of IEC 61993-2 if not stated otherwise.

1 General information

1.1 Equipment history

For each Transponder unit under test an numbered entry is provided here. For the two test environment it is recorded which EUT system is under test in that environment

1.1.1 EUT system no 1

Transponder				
Type	SRT-MTB-OEM	Part No.:	SRT-MTB-OEM	
Delivery date	02.05.2006	Serial number	V2/066	
HW Version:	Delivery date	01.06.2006	Version no	New Board
	Installation date	01.06.2006		
SW Version:	Delivery date	02.05.2006	Version no	00000801 (according to VER sentence output)
	Installation date	02.05.2006		
SW Version:	Delivery date	01.06.2006	Version no	00001001 (VER output)
	Installation date	01.06.2006		
SW Version:	Delivery date		Version no	
	Installation date			
SW Version:	Delivery date		Version no	
	Installation date			

GPS antenna				
Type	Samyung SAN-60	Part No.:		
Delivery date	02.05.2006	Serial number	EVA 0028	
HW Version:	Delivery date	02.05.2006	Version no	---
	Installation date	02.05.2006		

1.1.2 EUT system no 2

Transponder				
Type	SRT-MTB-OEM	Part No.:	---	
Delivery date	03.07.2006	Serial number	0028A	
HW Version:	Delivery date	03.07.2006	Version no	----
	Installation date	03.07.2006		
SW Version:	Delivery date	03.07.2006	Version no	Ver 9.5 Jun 30 2006 FPGA 5
	Installation date	03.07.2006		
SW Version:	Delivery date	27.07.2006	Version no	Ver 9.6 Jul 26 2006
	Installation date	27.07.2006		
SW Version:	Delivery date	01.08.2006	Version no	Ver 9.7 Jul 31 2006
	Installation date	01.08.2006		
SW Version:	Delivery date		Version no	
	Installation date			

GPS antenna				
Type	Samyung SAN-60	Part No.:		
Delivery date	02.05.2006	Serial number	EVA 0028	
HW Version:	Delivery date	02.05.2006	Version no	---
	Installation date	02.05.2006		

1.1.3 EUT system no 3

Transponder				
Type	SRT-MTB-OEM	Part No.:	---	
Delivery date	21.08.2006	Serial number	036	
HW Version:	Delivery date	21.08.2006	Version no	---
	Installation date	21.08.2006		
SW Version:	Delivery date	21.08.2006	Version no	Ver 9.8 Aug 17 2006 FPGA 5
	Installation date	21.08.2006		
SW Version:	Delivery date	25.08.2006	Version no	Ver 9.82 Aug 25 2006 FPGA 5
	Installation date	29.08.2006		
SW Version:	Delivery date	31.08.2006	Version no	Ver 9.9 Aug 31 2006 FPGA 5
	Installation date	01.09.2006		
SW Version:	Delivery date	04.09.2006	Version no	Ver 9.91 Sept 4 2006 FPGA 5
	Installation date	04.09.2006		
SW Version:	Delivery date		Version no	
	Installation date			

GPS antenna				
Type	Samyung SAN-60	Part No.:		
Delivery date	02.05.2006	Serial number	EVA 0028	
HW Version:	Delivery date	02.05.2006	Version no	---
	Installation date	02.05.2006		

1.2 Test environment

Here it is intended to record for which time which EUT system is under test.

1.2.1 Test environment no 1

This Test environment is completely equipped as described in Annex A. Normally mainly VDL related tests and DSC tests are done in this environment

Room	BSH Room 916 (9th floor)
Test engineer	H. Bartels
Location	9°59,103 E 53°32,822 N

Equipment no	Start of test	End of test	Test engineer
1	02.05.06	09.05.06	Bartels
1	06.06.06	14.06.06	Bartels
2	03.07.06	07.07.06	Bartels
2	10.07.06	11.07.06	Bartels
2	27.07.06	28.07.06	Bartels
2	01.08.06	02.08.06	Bartels
3	22.08.06	22.08.06	Bartels
3	29.08.06	29.08.06	Bartels
3	01.09.06	01.09.06	Bartels
3	04.09.06	05.09.06	Bartels

1.2.2 Test environment no 2

This Test environment is completely equipped as described in Annex A except the DSC test box. Mainly operational and interface related tests are done in this environment

Room	BSH Room 632 (6th floor)
Test engineer	K.H. Warnstedt
Location	9°59,103 E 53°32,822 N

Equipment no	Start of test	End of test	Test engineer

1.3 Composition

Display

☐ Internal ☐ Remote ☒ not available

DSC

☐ Dedicated DSC Rx ☒ Time sharing with TDMA Rx

RF Band ability

☐ Only upper band ☒ upper and lower band can be used

Channel management by msg 22

☒ Msg 22 implemented ☐ Only AIS 1 and AIS 2 can be used

Serial Interface

☒ Available ☐ Not available

Standard of serial interface:	2 Interfaces, RS232 and RS422

If not available, a serial test interface is required

Sync signal for Carrier sense test

Required for testing

Parameters	
Polarity:	positive
Level	5 V

1.4 Remarks

Result marking:

Ok	Item is ok, test was successful
	No colour marking
NA	Not applicable
Acc	slight acceptable deviation, no change required
	No colour marking
Nok	Test of a required item was not successful, change required
	Colour marking: yellow
Rec	It is recommended to make a change.
	Colour marking: green
???	temporarily, has to be clarified or discussed
	Colour marking: yellow

Not yet tested items are marked with a blue background.

This table is a template for more general remarks of some test items and should be copied if required

Date	Result	Status

Issue of this template: 02.03.06

1.5 Test notes

Here are some effects noted which are observed during the normal test but independent of the actual test items.

1.5.1 General problems

Here are general problems found in the operation of the EUT, not specific to the actual test point.

General problems			
Date	Item	Remark	Result
02.05.06 Ba	RS422 interface	The A and B lines are reversed Retest 11.07.06 Ba: The A and B lines in the new version of the manual are correct	Ok
02.05.06 Ba	RS422 interface	The RS 422 input did not accept input data. We tried both A and B versions (reversed and not reversed) Retest 03.07.06 Ba: Input data are accepted	Ok
09.05.06 Ba	Storage of static data	After switching off the unit for some time the static data are set to random values and the area settings are deleted. I did not find a requirement for permanent storage in the Class B standard but for practical reasons the static data and area settings have to be stored in a permanent storage. Retest 14.06.06 Ba: The static data are stored now permanently.	Ok
14.06.06 Ba	Area settings deleted at power cycle	The other static data are retained but the area settings are still deleted after switching power off. Retest 04.07.06 Ba: Area settings are still deleted at power cycle Retest 22.08.06 Ba: Test of switching off the unit: After switching off and on the unit the area setting is retained.	Ok

14.06.06 Ba	Area settings deleted at default position	When the internal GPS is disabled and the position is set to default the current area setting is deleted. The reason may be that the default position data (91°and 181°) are used for the calculation of the distance to the area and because of the resulting very large distance (distance < 500 NM) the areas are deleted. This may also be the reason for deleting the area after switch off. After switching on the unit it uses for some time the default position and therefore may delete the area because of the large distance between numeric value of the default position and the area. Retest 22.08.06 Ba: Test of disabling internal GPS position: Now sometimes the area setting is not deleted, but sometimes it is still deleted. In 4 test it was deleted in 2 cases and kept in 2 cases. So one reason for deleting the area has been fixed but there seems to be another reason which is valid only under certain conditions. Retest 29.08.06 Ba: It could be identified that an area setting is deleted if the area has been stored with a valid time. When the EUT switches to default position (by disabling GPS) the area is deleted. It is not deleted if no time was stored e.g. because the area was applied when GPS was not valid. Reason may be that the stored time is compared to some kind of default time resulting in a difference of more than 5 weeks, and the area is deleted because of the rule that it has to be deleted 5 weeks after the last update. In the retest the area is not deleted under this condition	Ok
09.05.06 Ba	Change of MMSI	When switching on the unit in the morning the MMSI was changed from 211 000 001 to 221 645 971. This may be a random value. After the nights before the MMSI was kept. Retest 04.07.06 Ba: Did not happen again, Has to be observed during the current test phase Retest 01.09.06 Ba: The change of MMSI did not happen again. So this problem is assumed as fixed.	Ok
14.06.06 Ba	ROT alarm	There is an active alarm “No valid ROT information” This does not make sense because a class B cannot use the ROT information because there is no ROT in msg 18. I recommend to remove this alarm. Retest 04.07.06 Ba: ROT alarm has been removed	Ok

04.07.06 Ba	Invalid area settings	After switching off the unit for a short time(about 5 s) there are some invalid area settings stored and the previous setting was deleted See PI log file. Retest 28.07.06 Ba: Same problem happened again Retest 22.08.06 Ba: Did not yet observe this problem during current test phase The change of area settings to invalid value did not happen again. So this problem is assumed as fixed	Ok
27.07.06 Ba	Bad GPS	Under very bad GPS conditions (e.g. when trying to inhibit GPS) the EUT has got big problems to recognise that the GPS Data are not valid. There are very large errors in the GPS position, up to 50 min. The positions with these large errors are used for transmission (see log file) We recommend to check this problem and to try to change the level of the GPS receiver for a valid position so that only correct positions are output as valid data Retest 01.09.06 Ba: This is difficult to retest and to reproduce. Please send us a description if means against this problem have been done. Retest 05.09.06 Ba: The manufacturer has described some means which have been done in the software of the transponder unit for better evaluation of the data from the GPS receiver. In a retest there were no large deviations from the correct position.	Ok
02.08.06 Ba	"Noise threshold exceeded" alarm	With the new software version the ALR ID 068 "Noise threshold exceeded Chan B" is always active. This was tested on channels 2087/2088, 2084/2086 and 2060/2062, with the same results. The test environment did not change, compared with the previous software version. Retest 22.08.06 Ba: There are not alarms ALR ID 068 "Noise threshold exceeded Chan B"	Ok
02.08.06 Ba	Output of ALR 067	The ALR sentence ID 068 "Noise threshold exceeded Chan A" is output every second with alarm inactive status. An inactive alarm should not be output more than once per minute This may be an old error which is now initiated by the active alarm ID 068 on the other channel. Retest 22.08.06 Ba:	

		If there is a high background noise on channel A (tested with –74 dBm) there is an active output of ALR sentence ID 067 "Noise threshold exceeded Chan A". This sentence is output every second. The ALR output should be every 30 s (as on channel B) If there is a high background noise on channel B there is an active output of ALR sentence ID 068 "Noise threshold exceeded Chan B" every 30 s In addition there is still an output of ALR sentence ID 067 "Noise threshold exceeded Chan A" every second with alarm inactive status <u>Retest 01.09.06 Ba:</u> After start of the EUT there is an output of ALR ID 067 and 068 every 60 s (together with the other inactive alarms) with status “Inactive” when there is no high background noise. When high background noise is applied there is an is an output of ALR ID 067 or 068, depending on the channel, every 30 s with status “Active”. The Error LED is switched on. When the high background noise is removed the output of the ALR ID 067 or 068, according to the channel, is again every 60 s, together with the other inactive alarms. The Error LED is switched off. But the status of the ALR of the channel with previous high background noise remains on active until the next restart. <u>Retest 04.09.06 Ba:</u> The status in the ALR ID 067 or 068 sentence after removing the background noise is ok now.	Ok Ok Ok Ok

2 4. General requirements

2.1 4.2 Manuals

The manuals shall include:

- *the type of external connectors if applicable;*
- *the required information for correct siting of the antennas;*
- *the required information for compass safe distance.*

It is checked that the required documentation items are available.

14.06.06 Ba	Test details – General documentation		
Test item	Check	Remark	Result
Composition of customer documentation	Check the composition of customer documentation.	The documentation consists of: • Instruction Manual	
Description of AIS	Check that an general function description of AIS as a new system is included. This is not required but recommended in the introduction phase of a new system.	There is a short introduction into the AIS system	Ok
Operating information	Check that an operating manual is included	Included in the Instruction manual	Ok
Technical information	Check that an technical manual is included	Included in the Instruction manual	Ok
Installation information	Check that an installation manual is included	Included in the Instruction manual	Ok
Language	Check that the documentation is written in English		Ok
Some details of installation information			
System overview	Check that an AIS system overview diagram is available		Ok
Mechanical dimensions	Check that mechanical dimension drawings of transponder are available		Ok
	Check that mechanical dimension drawings of GPS antenna are available	The GPS antenna is not part of delivery and therefore there are not drawings of it	Ok
	Check that mechanical dimension drawings of VHF antenna are available	The VHF antenna is not part of delivery and therefore there are not drawings of it	N/A

14.06.06 Ba	Test details – Requirements of IEC 62287		
Test item	Check	Remark	Result
Type of external Connectors	Check that type of external connectors is included		Ok
Siting of antennas	Check that information about siting the GPS antenna is included		Ok
	Check that information about siting the VHF antenna is included		Ok
Compass safety distance	Check that information about the compass safety distance is included	2 m for 0,.3° deviation	Ok

2.2 Marking and identification

Each unit of the equipment shall be marked externally with the following information which, where practicable, shall be clearly visible when the equipment is installed in its recommended position:

- *identification of the manufacturer;*
- *equipment type number or model identification;*
- *serial number of the unit;*
- *power supply requirements; and*
- *compass safe distance.*

Alternatively, the marking may be presented on a display at equipment start-up.

The version of software shall be either marked or displayed on command on the equipment.

When the marking and the title and version of the software are presented only on the display, such information shall also be included in the equipment manual.

14.06.06 Ba	Test details – Marking and identification		
Test item	Check	Remark	Result
Type of marking and identification	Check if the equipment is marked	There is not yet a type label on the prototype units Retest 07.07.06 Ba: There are now preliminary type labels The final type labels have to be presented to BSH when finished Retest 06.07.06 Ba: The manufacturer has provided a drawing of the type label. It is identicel with the type label of equipment no. 3	
	Check if the marking and identification is shown on a display	There is no display	N/A
Marking items	Check that the Identification of the manufacturer is available	"Software Radio Technology"	Ok
	Check that the equipment type number or model identification is available	"SRT-MTB-OEM"	Ok
	Check that the serial number of the unit is available	"0028A"	Ok
	Check that power supply requirements information is available	On a second label: "12 V +30% -10%"	Ok
	Check that the compass safety distance is available	On a second label: "Compass save distance 2m"	Ok
Software version	Check that the software version is displayed	On a second label: "Software version 9.5"	Ok
	Note if the software version is displayed on the equipment or on the display	On a second label There is no display, therefore the software version is displayed on the equipment	Ok
	If displayed only on the display: check that the software version is also included in the manual	There is no display	N/A

3 10 Operational tests

3.1 10.2 Modes of operating

(see 4.1.5)

3.1.1 10.2.1 Autonomous mode

(see 4.1.5.1)

3.1.1.1 10.2.1.1 Transmit Position reports

10.2.1.1.1 Method of measurement

Set up standard test environment. Record the VDL communication and check for messages transmitted by the EUT.

10.2.1.1.2 Required results

Confirm that the EUT transmits Messages 18 and 24 following the nominal schedule and alternates between channel A and channel B.

03.05.06 Ba	Test details – Transmission of Position reports		
Test item	Check	Remark	Result
Set up standard test environment			
Msg 18	Check that message 18 is transmitted continuously		Ok
	Check the transmission schedule of msg 18		Ok
	Check that msg 18 alternates between channel A and B		Ok
Msg 24	Check that message 24 is transmitted continuously		Ok
	Check that msg 24 part A and B are transmitted.		Ok
	Check the transmission schedule of msg 24		Ok
	Check that msg 24 alternates between channel A and B		Ok

3.1.1.2 10.2.1.2 Receive Class A position reports

10.2.1.2.1 Method of measurement

Set up standard test environment.

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

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

c) Transmit test targets using same time periods on channel A and channel B.

Check the VDL communication, test output, and where provided, display or external interface of the EUT.

10.2.1.2.2 Required results

Confirm that EUT receives continuously under conditions 10.2.1.2.1 a), b) and c) and, where provided, outputs the received messages on the external interface or display.

03.05.06 Ba	Test details a)– Receive Position reports, Target started first		
Test item	Check	Remark	Result
Switch on Test targets, then start operation of the EUT Check the following items on external interface and display			
Check for continuos receiving	On test output	RS232 external interface	Ok
	On external interface	RS422 external interface	Ok
	On display	Not implemented	Ok
Channels	Check that the position reports are received on channel A		Ok
	Check that the position reports are received on channel B		Ok

03.05.06 Ba	Test details a)– Receive Position reports, EUT started first		
Test item	Check	Remark	Result
Switch on EUT, then start Test targets Check the following items on external interface and display			
Check for continuous receiving	On test output		Ok
	On external interface	If implemented	Ok
	On display	If implemented	Ok
Channels	Check that the position reports are received on channel A		Ok
	Check that the position reports are received on channel B		Ok

04.05.06 Ba	Test details a)– Receive Position reports in same time periods		
Test item	Check	Remark	Result
Start 2 test targets using the same time slots on channel A and B Check the following items on external interface and display			
Check for continuous receiving	On test output	RS232 interface	Ok
	On external interface	If implemented RS422 interface	Ok
	On display	If implemented Not implemented	Ok
Channels	Check that the position reports of one target are received on channel A		Ok
	Check that the position reports of the other target are received on channel B		Ok
Remark:	This test result has been derived from the Rx performance test (3.1.1.5) because in this test the EUT is receiving in the same time slots on both channels.		

3.1.1.3 10.2.1.3 Receive Class B"CS" position reports

This test is only applicable if a display or display interface for the received messages is provided.

10.2.1.3.1 Method of measurement

Set up standard test environment. Simulate at least one additional Class B"CS" test target (bit stuffing shall not increase 4 bit)

Check the VDL communication, test output, and display or external interface of the EUT.

10.2.1.3.2 Required results

Confirm that EUT receives the Class B"CS" test target continuously and, where provided, outputs the received Messages 18 and 24 on the external interface.

14.06.06 Ba	Test details a)– Receive Class B "CS" position reports		
Test item	Check	Remark	Result
Switch on Test targets, then start operation of the EUT Check the following items on external interface and display			
Check for continuous receiving of msg 18	On test output	On RS232	Ok
	On external interface	On RS422	Ok
	On display	If implemented No display implemented	Ok
Check for continuous receiving of msg 24	On test output	On RS232	Ok
	On external interface	On RS422	Ok
	On display	If implemented No display implemented	Ok
	Check that msg 24 A and B are received		Ok
Channels	Check that the position reports are received on channel A		Ok
	Check that the position reports are received on channel B		Ok

3.1.1.4 10.2.1.4 Receive in adjacent time periods

10.2.1.4.1 Method of measurement

Set up standard test environment. Simulate additional targets so that the first 4 of each 5 time periods are used. The reporting rate may be increased for the purpose of this test.

Check the VDL communication, test output, and where provided, display or external interface of the EUT.

10.2.1.4.2 Required results

Confirm that EUT continuously receives messages in the time periods adjacent to own transmission period with an acceptable loss of 5 %.

05.05.06 Ba	Test details - Receive in adjacent time periods		
Test item	Check	Remark	Result
Simulate targets in 4 of 5 time periods (80 % channel load, VDL tester set "test 80% 4-1") Check the following items on external interface			
Received targets	Check that the targets transmitting in the time periods before the EUT transmission slot are received		Ok
	Check that the targets transmitting in the time periods after the EUT transmission slot are received		Ok
	Check that the Rx loss is < 5 %		Ok

3.1.1.5 10.2.1.5 Rx performance test

10.2.1.5.1 Method of measurement

Set up standard test environment. Simulate additional targets so that 9 of 10 time periods are used.

Check the VDL communication, test output, and where provided, display or external interface of the EUT.

10.2.1.5.2 Required results

Confirm that EUT continuously receives messages and, where provided, outputs the received messages on the external interface with a loss of not more than 5 %.

03.05.06 Ba	Test details - Receive in adjacent time periods		
Test item	Check	Remark	Result
Simulate targets in 9 of 10 time periods (90 % channel load), record the test or external interface			
Rx probability	Check that at least 95 % of the target position reports are received	On both channels 100.0 % of the transmitted messages are received	Ok

3.1.2 10.2.2 Assigned mode

(see 4.1.5.2)

3.1.2.1 10.2.2.1 Group assignment

10.2.2.1.1 Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Transmit a group assignment command Message 23 to the EUT addressing stations by

- *region,*
- *station type and*
- *type of ship*

and commanding for

- *Tx/Rx mode,*
- *reporting rate,*
- *quiet time.*

Record transmitted messages.

10.2.2.1.2 Required results

Confirm that the EUT transmits position reports Message 18 according to the defined parameters and reverts to standard reporting rate after 4 min to 8 min.

Confirm that the operation of the EUT is not affected when not addressed.

08.05.06 Ba	Test details - Group assignment, addressed		
Test item	Check	Remark	Result
Test 1: Send a msg 23 with the following parameters: speed = 10 kn			
Region: inside Station type: 0 = all types Type of ship: 0 = all types Tx/ Rx mode = 0: Tx A and B Reporting interval: 8 = 5 s Quiet time: 0 = no quiet time Msg "B Msg 23 Test 10.2.2.1 T1"	check that the reporting rate = 5 s		Ok
	Check that EUT reverts to standard reporting rate after 4...8 min	Reverts to standard reporting rate after 5 min.	Ok
Test 2: Send a msg 23 with the following parameters:			
Region: inside Station type: 2 = all class B Type of ship: 37 = pleasure craft Tx/ Rx mode = 0: Tx A and B Reporting interval: 9 = next shorter Quiet time: 0 = no quiet time Msg "B Msg 23 Test 10.2.2.1 T2"	check that the reporting rate = 15 s	Reporting rate = 5 s The EUT was in autonomous reporting interval of 30 s at beginning of the test. Some minutes before there was an assignment of 8 = 5 s which may be the reason for the reporting interval of 5 s instead of 15s <u>Retest 14.06.06 Ba:</u> No change <u>Retest 04.07.06 Ba:</u> Reporting interval = 15 s	Ok
	Check that EUT reverts to standard reporting rate after 4...8 min		Ok
Test 3: Send a msg 23 with the following parameters:			
Region: inside Station type: 5 = all class B CS Type of ship: 37 = pleasure craft Tx/ Rx mode = 0: Tx A and B Reporting interval: 7 = 10 s Quiet time: 0 = no quiet time Msg "B Msg 23 Test 10.2.2.1 T3"	check that the reporting rate = 10 s		Ok
After 2 minutes send the same msg 23 but Reporting interval: 10 = next longer interval Msg "B Msg 23 Test 10.2.2.1 T3", manually change reporting interval to 10	check that the reporting rate = 15 s		Ok
	Check that EUT reverts to standard reporting rate after 4...8 min		Ok
Test 4: Send a msg 23 with the following parameters:			
Region: inside Station type: 5 = all class B CS Type of ship: 37 = pleasure craft Tx/ Rx mode = 1: Tx A Reporting interval: 6 = 15 s Quiet time: 0 = no quiet time Msg "B Msg 23 Test 10.2.2.1 T4"	check that the reporting rate = 30 s		Ok
	Check that all transmissions are on channel A		Ok

After 3 minutes send the same msg 23 but Tx/ Rx mode = 2: Tx B Msg "B Msg 23 Test 10.2.2.1 T4", manually change Tx/Rx mode to 2	check that the reporting rate = 20 s		Ok
	Check that all transmissions are on channel B		Ok
Test 5: Send a msg 23 with the following parameters:			
Region: inside Station type: 5 = all class B CS Type of ship: 37 = pleasure craft Tx/ Rx mode = 0: Tx A and B Reporting interval: 0 = auto. Quiet time: 8 = 8 min Msg "B Msg 23 Test 10.2.2.1 T5"	Check that EUT stops transmission for 8 min		Ok
	Check that the EUT reverts to 30 s reporting rate after 8 min.		Ok

08.05.06 Ba	Test details - Group assignment, not addressed		
Test item	Check	Remark	Result
Send a msg 23 with the following parameters: speed = 10 kn, EUT ship type = 0 Tx/ Rx mode = 0: Tx A and B Reporting interval: 8 = 5 s Quiet time: 0 = no quiet time			
Test 6: Region: outside Station type: 0 = all types Type of ship: 0 = all types Msg "B Msg 23 Test 10.2.2.1 T6"	check that the reporting interval = 30 s	VDM output ok, reporting interval = 30 s	Ok
Test 7: Region: inside Station type: 4 = AtoN Type of ship: 0 = all types Msg "B Msg 23 Test 10.2.2.1 T7"	check that the reporting interval = 30 s		Ok
Test 8: Region: inside Station type: 0 = all types Type of ship: 70 = cargo vessel Msg "B Msg 23 Test 10.2.2.1 T8"	check that the reporting interval = 30 s		Ok

3.1.2.2 10.2.2.2 Base station reservations

10.2.2.2.1 Method of measurement

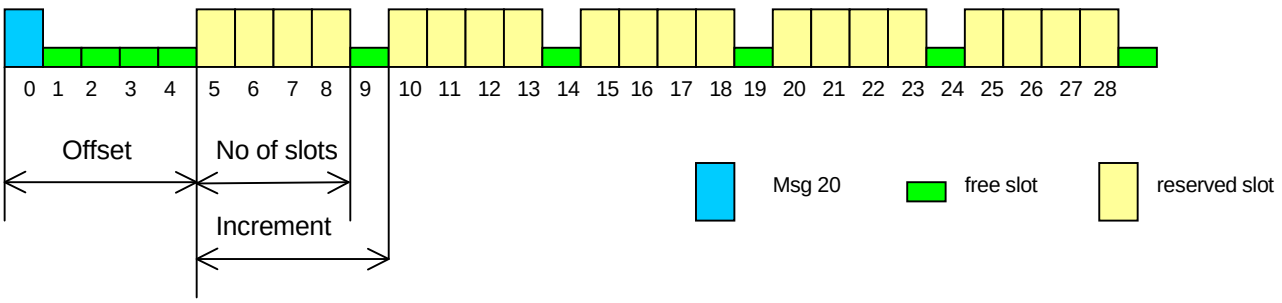
Set up standard test environment and operate EUT in autonomous mode. Transmit a reservation Message 20 to the EUT specifying reserved time periods.

Record transmitted messages.

10.2.2.2.2 Required results

Confirm that the EUT transmits position reports Message 18 without using reserved time periods.

08.05 06 Ba	Test details - Base station reservations		
Test item	Check	Remark	Result
Test 1: Send a msg 20 with the following parameters: Msg: "B Msg 20 Test 10.2.2.2"			
Tx-slot: 0 offset number: 5 number of slots: 4 slot increment: 5 time-out = 7 Repetition of msg 20: 10 times	Check that only the time periods 0,1..4, 9, 14, 19 ... are used for transmissions	• If offset = 5 only slots xx3 and xx8 are used (should be xx4 and xx9 because 5...8 are reserved • If offset = 6 only slots xx4 and xx9 are used (should be xx5 and xx0 because 6...8 are reserved So there is an error of 1 slot in the handling of reserved slots <u>Retest 04.07.06 Ba:</u> No change, Slot xxx3 and xxx8 are used <u>Retest 27.07.06 Ba:</u> Slots xxx4 and xxx9 are used only during the reservation time	Ok
	check that after 18 minutes (Tx of msg 20 + time-out) all time periods are used for transmissions		Ok



3.1.3 10.2.3 Polled mode/interrogation response

(see 4.1.5.3)

3.1.3.1 10.2.3.1 Interrogation for Messages 18 and 24

10.2.3.1.1 Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Apply an interrogation message (Message 15; EUT as destination) to the VDL according to message table (ITU-R M.1371 table13) for responses with Message 18, Message 24:

a) with transmission offset = 0,

b) with transmission offset = defined value,

c) with a Message 23 "quiet time" command transmitted before the interrogation.

Record transmitted messages and frame structure.

10.2.3.1.2 Required results

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

08.05.06 Ba	Test details - Interrogation for msg 18, 20		
Test item	Check	Remark	Result
a) Test 1: Send a msg 15 transmission offset = 0:			
Interrogation for msg 18 and 24 for destination 1, on channel A Msg: "B Msg15 Test 10.2.3.1 T1",	Check that msg 18 is responded		Ok
	Check that the response was within 30 s	After about 15 s	Ok
	Check that the response is transmitted on channel A		Ok
	Check that msg 24 A is responded within 60 s	After about 20 s	Ok
	Check that msg 24 B is responded within 90 s	After about 20 s	Ok
b) Test 2: Send a msg 15 transmission offset = 10:			
Interrogation for 24 for destination 1, offset = 20, 30 and for msg 18, destination 2, offset = 10 Request on channel B Msg: "B Msg15 Test 10.2.3.1 T2",	Check that msg 18 is responded with the defined offset	Offset = 10	Ok
	Check that msg 24 A is responded with the defined offset	Offset = 21 (should be 20) Retest 14.06.06 Ba: No change With different offset values the used offset is always (offset of msg 15 + 1) Retest 04.07.06 Ba: Response slot offset = 20	Ok
	Check that msg 24 B is responded with the defined offset	Offset = 24 (should be 30) Retest 14.06.06 Ba: No Tx of msg 24 B Retest 04.07.06 Ba: Response slot offset = 20	Ok

	Check that the responses are transmitted on channel B		Ok
c) Test 3: Send a msg 23 commanding quiet time for 8 min, (setting “B Msg23 Test 10.2.2.1 T5”) Send a msg 15 with transmission offset = 10: (setting “B Msg15 Test 10.2.3.1 T2”, same as Test 2)			
Interrogation for msg 18 for destination 2	Check that msg 18 is responded with the defined offset		Ok

3.1.3.2 10.2.3.2 Interrogation for Message 19

10.2.3.2.1 Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Apply an interrogation message (Message 15; EUT as destination) to the VDL according to message table (M.1371 Table13) for responses with Message 19:

a) with transmission offset = 0,

b) with transmission offset = defined value.

Record transmitted messages and frame structure.

10.2.3.2.1 Required results

Check that

a) the EUT does not respond,

b) the EUT transmits the appropriate interrogation response message as requested after defined transmission offset.

Confirm that the EUT transmits the response on the same channel as that received and the data content is identical with that in Message 24.

08.05.06 Ba	Test details - Interrogation for msg 19		
Test item	Check	Remark	Result
Test 1: Send a msg 15 transmission with interrogation for msg 19: (setting “B Msg 15 Test 10.2.3.2”);			
Offset = 0, destination 1	Check that msg 19 is not responded		Ok
Offset = 15, destination 1 channel = B	Check that msg 19 is responded		Ok
	Check that msg 19 is responded with the defined offset		Ok
	Check that the response is transmitted on channel B		Ok

3.2 10.3 Messages extending one time period

(see 4.1.5)

10.3.1 Method of measurement

Check the documentation for a possibility to initiate transmission of messages longer than one time period.

10.3.2 Required results

It shall not be possible for the user to initiate the transmission of messages longer than one time period.

11.07.06 Ba	Test details - Tx of msg with more than 1 slot		
Test item	Check	Remark	Result
Check documentation	Check that there is no way to initiate the transmission of message longer than 1 time period	Only a predefined short (1 slot) safety related message can be sent.	Ok

3.3 10.4 Channel selection

(see 6.2)

3.3.1 10.4.1 Valid channels

10.4.1.1 Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Switch the EUT to different channels within the operating band as specified in 6.2 by transmission of channel management message (Message 22) broadcast and addressed to EUT,

Record the VDL messages on the designated channels and check "band flag" and "Message 22 flag" in Message 18. (note that DSC command is covered in Annex C)

10.4.1.2 Required results

Confirm that the EUT switches to the required channel accordingly.

08.05.06 Ba	Test details - Channel selection by msg 22		
Test item	Check	Remark	Result
Test 1: Send a msg 22 broadcast, EUT inside the area			
Channels 2060, 2062 (msg "B Msg 22 Test 10.4.1 a")	Check that EUT transmits on the assigned channels		Ok
	Check that EUT receives on the assigned channels		Ok
	Check and note the band flag	Band-Flag = 1	Ok
	Check that the Msg 22 flag = 1	MSG 22 flag = 0 0 indicates that the unit cannot handle msg 22, but the EUT can handle msg 22 frequency management Retest 14.06.06 Ba: Msg 22 flag = 1	Ok
Send an addressed msg 22 to the EUT, channels 2084, 2086 (msg "B Msg 22 Test 10.4.1 b")	Check that EUT transmits on the assigned channels		Ok
	Check that EUT receives on the assigned channels		Ok

3.3.2 10.4.2 Invalid channels

10.4.2.1 Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Check units capability on the "band flag" and "Message 22 flag" in Message 18. Switch the EUT to channels outside the operating band as specified in 6.2..

Record the VDL messages on the designated channels.

10.4.2.2 Required results

Confirm that the EUT does not switch to the respective channels and stops transmissions.

08.05.06 Ba	Test details - Channel selection by msg 22		
Test item	Check	Remark	Result
Test 1: Send a msg 22 broadcast, EUT inside the area			
If the EUT is able to operate in the lower band: Channels 1084, 2084 (msg "B Msg 22 Test 10.4.1 a"), modify channels manually	Check that EUT transmits on the assigned channels	The EUT is not able to transmit on the lower band frequency. It always detects a busy channel and therefore does not transmit <u>Retest 04.07.06 Ba:</u> Now more than 50 % of all transmissions fail on both channels (Msg 18 CP busy). The reason may be that the transmitter now has to change frequency over a wide range <u>Retest 27.07.06 Ba:</u> The messages on both channels are transmitted and received by the VDL analyser	Ok
	Check that EUT receives on the assigned channels		Ok
	Check the band flag = 1		Ok
	Check that the Msg 22 flag = 1		Ok
If the EUT is not able to operate in the lower band: Channels 1084, 2084 (msg "B Msg 22 Test 10.4.1 a"), modify channels manually	Check that EUT stops transmission		N/A
	Check that EUT receives on AIS 1 and AIS 2 (default)		N/A
	Check the band flag = 0		N/A
	Check that the Msg 22 flag = 1		N/A
Send a msg 22 broadcast with invalid channels (msg "B Msg 22 Test 10.4.1 a"), modify channels manually	Check that EUT stops transmission	There is an VDM output. The EUT completely ignores the command with invalid channels	Acc
	Check that EUT receives on AIS 1 and AIS 2 (default)	The EUT ignores the command and therefore receives on the previous channels	Ok

3.4 10.5 Internal GNSS receiver

(see 6.3)

Relevant tests according to IEC 61108-1shall be performed with regard to

- *position accuracy, static;*
- *position accuracy, dynamic;*
- *COG/SOG accuracy;*
- *position update;*
- *status indications (including RAIM, where fitted).*

Note: The GNSS receiver test is not part of this test report. The GNSS receiver is tested in a separate test with a separate test report.

3.5 10.6 AIS information

(see 6.5)

3.5.1 10.6.1 Information content

(see 6.5.1)

3.5.1.1 10.6.1.1 Defaults

10.6.1.1.1 Method of measurement

Set up the standard test environment and reset the equipment to enable the manufacturers static data delivery defaults. Attempt to set the equipment to operate in autonomous mode.

10.6.1.1.2 Required results

Confirm that the default MMSI is set at 000000000 and that other static data defaults unambiguously identify that the equipment has been properly initialised. Confirm that the transmissions are inhibited and that an indication is given that transmissions are inhibited.

28.07.06 Ba	Test details - Defaults		
Test item	Check	Remark	Result
Reset the EUT to the default settings			
Default settings	Check that the MMSI is 00000000	Information required how to set the EUT to the default values Retest 28.07.06 Ba: There is a proprietary, password protected, sentence to set the static data to the defaults. The MMSI is set to 000000000 (query by $xxAIQ,010)	Ok
	Check that the other static data are set to default values	The other static data are set to the default value as defined in the standard for default. (Query by $xxAIQ,SSD)	Ok
	Check that the EUT does not transmit	The transmissions is inhibited.	Ok
	Check that the transmission stop is indicated on the EUT	The Tx Timeout LED (and the Error LED) are off. I have waited for at least 2 Tx schedules but Tx Timeout LED was not switched on. After a start with MMSI 0 the Tx Timeout LED was switched off as soon as the position from the internal GNSS receiver was available Retest 02.06.06 Ba: The Tx Timeout LED is switched on as soon as the MMSI is set to default.	Ok

3.5.1.2 10.6.1.2 Required information

10.6.1.2.1 Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Apply all static data to the EUT.

Record all messages on VDL and check the contents of position report Message 18 and static data report Messages 24 A and B.

10.6.1.2.2 Required results

Confirm that data transmitted by the EUT complies with static data and position sensor data.

08.05.06 Ba	Test details - Required information		
Test item	Check	Remark	Result
Apply all necessary data to the EUT			
Required information of msg 18	Check the MMSI		Ok
	Check the SOG		Ok
	Check the PA-flag		Ok
	Check the Longitude		Ok
	Check the Latitude		Ok
	Check the COG		Ok
	Check the Heading		Ok
	Check the Time stamp		Ok
	Check the class B unit flag		Ok
	Check the Display flag		Ok
	Check the DSC flag		Ok
	Check the band flag		Ok
	Check the msg 22 flag	The msg 22 flag is 0 (indicating no channel management by msg 22) but channel management by msg 22 is implemented Retest 13.06.06 Ba: The msg 22 flag is 1	Ok
	Check the Mode flag		Ok
	Check the RAIM flag		Ok
Required information of msg 24A	Check the MMSI		Ok
	Check the Part number = 0		Ok
	Check the Name		Ok
Required information of msg 24B	Check the MMSI		Ok
	Check the Part number = 1		Ok
	Check the Type of ship and cargo		Ok
	Check the Vendor ID		Ok
	Check the Call Sign		Ok
	Check the Dimension of ship/ reference for position (A, B, C, D)		Ok

3.5.1.3 10.6.1.3 External sensor information

(see 6.3, 6.6.3)

*This test is applicable if an **optional** interface for external sensors is provided.*

10.6.1.3.1 Method of measurement

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

a) Apply external position data with expected error <10m (from GBS sentence) and within 26 m of internal position.

b) Simulate unavailable/invalid external sensor data and missing/incorrect checksum.

c) Apply a non-WGS-84 or unspecified (no DTM) position input.

d) Apply a low accuracy position input with expected error >10m or without RAIM information (no GBS).

e) Apply position data with more than 26 m apart from internal position

Record all messages on VDL and check the contents of position report Message 18 for position and COG/SOG.

10.6.1.3.2 Required results

a) Confirm that data transmitted by the EUT complies with external sensor inputs.

b), c), d), e) Confirm that external data is not used.

Confirm that accuracy and RAIM flags are set accordingly; confirm that position and COG/SOG are of the same source.

08.05.06 Ba	Test details - Check for implementation		
Test item	Check	Remark	Result
Check the manufacturers documentation			
Implementation of optional function	Check if the input of external sensor data is implemented	External sensor data are not implemented	Ok

08.05.06 Ba	Test details - External sensor input not implemented		
Test item	Check	Remark	Result
This test is applicable only if external sensor input is not implemented Apply Position sentences, GBS and DTM sentence to the EUT: • Valid position data, • Position within 26 m from internal GPS • GBS < 10 m • GBS = WGS 84			
Apply GLL sentence	Check that external position is not used	External sensor data are used Retest 27.07.06 Ba: External position sensor data are still used, see PI log file Tested for both serial interfaces with the same result. Log is from RS 232 interface Retest 02.08.06 Ba: External position sensor data are still used, see PI log file Tested for both serial interfaces with the same result. Log is from RS 232 interface Retest 22.08.06 Ba: External sensor data are not used	Ok
	Check that external speed is not used	External sensor data are used Same as position	Ok
	Check that external heading is not used	External sensor data are used Same as position	Ok
Apply GGA sentence	Check that external position is not used		Ok
	Check that external speed is not used		Ok
Apply GNS sentence	Check that external position is not used		Ok
	Check that external speed is not used		Ok
Apply RMC sentence	Check that external position is not used		Ok
	Check that external speed is not used		Ok

22.08.06 Ba	Test details - External GNSS data		
Test item	Check	Remark	Result
This test is applicable only if external sensor input is implemented. Apply a GLL, GBS and DTM sentence to the EUT, if not other specified: • Valid GLL data, • Position within 26 m from internal GPS • GBS < 10 m • GBS = WGS 84			
Valid data as above	Check that external Lat is used	Not applicable because external sensor data are not used	N/A
	Check that external LON is used		N/A
	Check that external SOG is used		N/A
	Check that external COG is used		N/A
Set GLL status flag to invalid	Check that internal Lat is used		N/A
	Check that internal LON is used		N/A
	Check that internal SOG is used		N/A
	Check that internal COG is used		N/A
Checksum incorrect	Check that internal Lat is used		N/A
	Check that internal LON is used		N/A
	Check that internal SOG is used		N/A
	Check that internal COG is used		N/A
DTM not WGS 84	Check that internal Lat is used		N/A
	Check that internal LON is used		N/A
	Check that internal SOG is used		N/A
	Check that internal COG is used		N/A
Remove DTM	Check that internal Lat is used		N/A
	Check that internal LON is used		N/A
	Check that internal SOG is used		N/A
	Check that internal COG is used		N/A
Set GBS > 10 m	Check that internal Lat is used		N/A
	Check that internal LON is used		N/A
	Check that internal SOG is used		N/A
	Check that internal COG is used		N/A
Remove GBS	Check that internal Lat is used		N/A
	Check that internal LON is used		N/A
	Check that internal SOG is used		N/A
	Check that internal COG is used		N/A
Set external position more than 26 m from the internal position	Check that internal Lat is used		N/A
	Check that internal LON is used		N/A
	Check that internal SOG is used		N/A
	Check that internal COG is used		N/A

For the following test information about supported sensor sentences is required.

22.08.06 Ba	Test details - External GNSS sentences		
Test item	Check	Remark	Result
This test is applicable only if external sensor input is implemented Apply other Position sentences, GBS and DTM sentence to the EUT, if not other specified: • Valid position data, • Position within 26 m from internal GPS • GBS < 10 m • GBS = WGS 84			
Apply GGA sentence	Check that external Lat is correct	Not applicable because external sensor data are not used	N/A
	Check that external LON is correct		N/A
	Check that external SOG is correct		N/A
	Check that external COG is correct		N/A
Apply GNS sentence	Check that external Lat is correct		N/A
	Check that external LON is correct		N/A
	Check that external SOG is correct		N/A
	Check that external COG is correct		N/A
Apply RMC sentence	Check that external Lat is correct		N/A
	Check that external LON is correct		N/A
	Check that external SOG is correct		N/A
	Check that external COG is correct		N/A

3.5.2 10.6.2 Information update rates

(see 6.5.2)

3.5.2.1 10.6.2.1 Nominal reporting interval

10.6.2.1.1 Method of measurement

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

a) Start with own SOG of 1 kn; record all messages on VDL for 10 min and evaluate reporting rate for position report of EUT by calculating average transmission offset over test period.

b) Increase speed to 10 kn.

c) Reduce speed to 1 kn.

Record all messages on VDL and check transmission offset between two consecutive transmissions.

10.6.2.1.2 Required results

a) Reporting interval shall be 3 min (±10 s).

b) Confirm that the reporting interval of 30 s (±5 s) has been established after the next transmission in the old schedule at the latest. The average reporting interval calculated over at least 25 transmissions shall be 30 s (±2 s).

c) Confirm that the reporting rate is reduced after 3 min (speed reduction).

06.06.06 Ba	Test details - Autonomous reporting rate		
Test item	Check	Remark	Result
Apply SOG according to the test items and check the reporting rate			
a) SOG = 1 kn for 10 min	Check that the reporting rate = 3 min +/- 10s		OK
b) Change SOG to 10 kn for 15 min	Check that the reporting rate = 30 s +/- 5s		OK
	Check that the reporting rate is established after the next transmission of the old schedule		Ok
	Change of reporting rate	At change of reporting interval from 3 min to 30 s there are 2 transmissions within 1 s Retest 04.07.06 Ba: There is only 1 transmission at transition from 3 min to 30 s reporting interval	Ok
	Check that the average reporting rate of 25 Tx = 30 s +/- 2s	30.0 s	OK
c) SOG = 1 kn for 10 min	Check that the reporting rate = 3 min +/- 10s		Ok
	Check that the reporting rate is reduced after 3 min		Ok

3.5.2.2 10.6.2.2 Assigned reporting interval

10.6.2.2.1 Method of measurement

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

a) Transmit an assigned mode command Message 23 to the EUT with designated reporting intervals of 5 s to 3 min according to Table 17.

b) Transmit an assigned mode command Message 23 to the EUT with designated reporting interval of 10 min.

c) Transmit Messages 23 with a refresh rate of 1 min with designated reporting intervals of 6 min and 10 min.

d) Transmit Messages 23 designated reporting interval field settings of 11-15

e) Change course, speed. Record transmitted messages.

10.6.2.2.2 Required results

a) Confirm that the EUT transmits position reports Message 18 according to the parameters defined by Message 23. The EUT shall revert to autonomous mode with nominal reporting interval after 4 min to 8 min.

b) Confirm that the EUT reverts to autonomous mode with nominal reporting interval after 4 min to 8 min.

c) Confirm that the EUT transmits position reports Message 18 according to the parameters defined by Message 23.

d) Confirm that the EUT does not change its nominal behaviour.

e) The reporting interval shall not be affected by course or speed.

Remark: Reporting rates 5, 10, 15 s are tested in 10.2.2.1

07.06.06 Ba	Test details - Assigned reporting interval		
Test item	Check	Remark	Result
Test a: Send a msg 23 with the following parameters: speed = 1 kn			
Region: inside Reporting interval: 5 = 30 s Msg "B Msg 23 Test 10.6.2.2. Ta1"	Check that the reporting interval = 30 s		Ok
	Check that EUT reverts to standard reporting rate after 4...8 min		Ok
Test a: Send a msg 23 with the following parameters: speed = 10 kn			
Region: inside Reporting interval: 3 = 3 min Msg "B Msg 23 Test 10.6.2.2. Ta2"	check that the reporting interval = 3 min		Ok
	Check that EUT reverts to standard reporting rate after 4...8 min	After 7 min	Ok
Test b: Send a msg 23 with the following parameters:			
Reporting interval: 1 = 10 min Msg "B Msg 23 Test 10.6.2.2. Tb"	Check that EUT reverts to standard reporting rate after 4...8 min	After 4 min	Ok
Test c1: Send a msg 23 with the following parameters and repeat it every minute for at least 15minutes			

Reporting interval: 2 = 6 min Msg "B Msg 23 Test 10.6.2.2. Tc1"	check that the reporting rate = 6 min		Ok
	Check that EUT reverts to standard reporting rate 4...8 min after last msg 23	After 4 min	Ok
Test c2: Send a msg 23 with the following parameters and repeat it every minute for at least 22 minutes			
Reporting interval: 1 = 10 min Msg "B Msg 23 Test 10.6.2.2. Tc2"	check that the reporting rate = 10 min		Ok
	Check that EUT reverts to standard reporting rate 4...8 min after last msg 23	7 min after last msg 23	Ok
Test d: Send a msg 23 with the following parameters:			
Reporting interval:11 Msg "B Msg 23 Test 10.6.2.2. Td1"	check that the reporting rate is not affected		Ok
Reporting interval:15 Msg "B Msg 23 Test 10.6.2.2. Td2"	check that the reporting rate is not affected		Ok
Test e: Send a msg 23 with the following parameters: Reporting rate: 4 = 1 min, Msg "B Msg 23 Test 10.6.2.2. Te"			
Speed = 1 kn	Check that the reporting rate is 1 min		Ok
Change speed to 15 kn	check that the reporting rate is not affected		Ok
Change heading with 20 deg/min	check that the reporting rate is not affected		Ok

3.5.2.3 10.6.2.3 Static data reporting interval

10.6.2.3.1 Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Record the transmitted messages and check for static data (Message 24).

Repeat the test at an assigned reporting interval of 5 s.

10.6.2.3.2 Required results

Confirm that the EUT transmits submessages 24A and 24B every 6 min (24B following 24A within 1 min). Transmission shall alternate between channel A and channel B and be independent of the Message 18 reporting interval.

*

07.06.06 Ba	Test details - Static data reporting interval		
Test item	Check	Remark	Result
Speed = 1 kn			
Msg 18 reporting rate	check that the msg 18 reporting rate = 3 min		Ok
Msg 24 reporting rate	check that the reporting rate of msg 24 A and B is 6 min		Ok
	Check that the distance between msg 24 A and B is < 1 min		Ok
	Check that 24 A/B alternate between channel A and B	A and B are on the same channel, the A+B packet is alternating between channel A and B	Ok
Speed = 10 kn			
Msg 18 reporting rate	check that the msg 18 reporting rate = 30 s		Ok
Msg 24 reporting rate	check that the reporting rate of msg 24 A and B is 6 min		Ok
	Check that the distance between msg 24 A and B is < 1 min		Ok
	Check that 24 A/B alternate between channel A and B	A and B are on the same channel, the A+B packet is alternating between channel A and B	Ok
Send a msg 23 with the reporting interval: 8 = 5s. Msg “B Msg 23 Test 10.2.2.1 T1”			
Msg 18 reporting rate	check that the msg 18 reporting rate = 5 s		Ok
Msg 24 reporting rate	check that the reporting rate of msg 24 A and B is 6 min		Ok
	Check that the distance between msg 24 A and B is < 1 min		Ok
	Check that 24 A/B alternate between channel A and B	A and B are on the same channel, the A+B packet is alternating between channel A and B	Ok

3.6 10.7 Initialisation period

(see 6.5.3)

10.7.1 Method of measurement

Set up standard test environment with SOG>2 kn.

a) Switch on the EUT from cold (off-time minimum 1 h) with EUT operating in autonomous mode.

b) Switch off the EUT for a period of time between 15 min to 60 min and switch on again.

c) Make the GNSS sensor unavailable for a period of time between 1 min to 5 min

Record transmitted messages.

10.7.2 Required results

Confirm that the EUT starts regular transmission of Message 18 including valid position:

a) within 30 min after switch on;

b) within 5 min;

c) stops transmitting after the next transmission and resumes within 1 min after enabling the position source.

08.06.06 Ba	Test details - Initialisation period		
Test item	Check	Remark	Result
Switch the On and Off according to the test items			
a) Switch the EUT on in the morning (> 1 h off)	Check that the EUT starts msg 18 within 30 min	EUT starts transmission after 10 min	Ok
b) Switch the unit of for 15 ... 60 min and on again	Check that the EUT starts msg 18 within 5 min		Ok
c) Disable GNSS for 1 ... 5 min	Check that the EUT stops transmission		Ok
Enable GNSS again	Check that the EUT starts msg 18 within 30 s		Ok

3.7 10.8 Alarms and indications, fall-back arrangements

(see 6.6)

3.7.1 10.8.1 Built in integrity test

(see 6.6.1)

10.8.1.1 Method of measurement

Check manufacturer's documentation on built-in integrity test.

10.8.1.2 Required result

Verify that an indication is provided if a malfunction is detected.

28.07.06 Ba	Test details - Built in integrity test		
Test item	Check	Remark	Result
Check manufacturer's documentation			
Malfunction detection	Check that the EUT indicates the detection of a malfunction		Ok
	Note the kind of indication	Indication by 4 LED with different colours	Ok

3.7.2 10.8.2 Transceiver protection

10.8.2.1 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 5 min each.

10.8.2.2 Required results

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

14.06.06 Ba	Test details - Transceiver protection		
Test item	Check	Remark	Result
Open circuit of VHF antenna terminal for > 5 min	Check that the EUT generates an antenna VSWR exceeded alarm	No alarm, and differing to the manual the transmission is not stopped <u>Retest 04.07.06 Ba:</u> There is an ALR output 002 (VSWR exceeded), and the error LED is blinking.. The VDO output is stopped, so it seems the Tx is also stopped. After about 5 min the VDO output starts again The “Tx timeout” LED is not activated. It should be activated because the EUT is not able to transmit successfully <u>Retest 27.07.06 Ba:</u> The VDO is not stopped and Tx is not stopped – to be able to check the antenna connection. - There is an ALR output 002 (VSWR exceeded), and the error LED is activated (not blinking). <u>Retest 02.08.06 Ba:</u> The ALR output ID 002 is not activated, it seem that the antenna disconnection is not detected - The Tx timeout LED is not activated – different to the description in the “Technical note – BIIT & LED sequencing on SRT-MTB”. Remark: this is not a requirement but the function should match the description. <u>Retest 02.08.06 Ba:</u> Could not be retested because the antenna disconnection was not detected <u>Retest 22.08.06 Ba:</u> There is an ALR 002 output every 30 s, the ERROR LED and the TX TIMEOUT LED are on	Ok Ok Ok

Continued: Open circuit of VHF antenna terminal for > 5 min	Check that EUT starts transmission within 2 min after refitting the antenna	The next scheduled transmission is received Retest 27.07.06 Ba: After reconnection of the antenna the Error LED remains on for most of the time (see commented PI log file) but there is no active alarm according to ALR output. After restart of the unit the Error LED is off again. Retest 02.08.06 Ba: Could not be retested because the Error LED was always on because of the problem with the "Noise threshold exceeded.." alarm (see 1.5.1) Retest 22.08.06 Ba: After reconnection of the antenna the Error LED and the TX TIMEOUT LED are switched off	Ok Ok
Short circuit of VHF antenna terminal for > 5 min	Check that the EUT generates an antenna VSWR exceeded alarm	Same as open circuit Retest 02.08.06 Ba: Same as open circuit Retest 22.08.06 Ba: Same as open circuit	Ok
	Check that EUT starts transmission within 2 min after refitting the antenna		Ok

3.7.3 10.8.3 Transmitter shutdown procedure

(see 6.6.2)

10.8.3.1 Method of measurement

Check manufacturer's documentation on transmitter shutdown procedure.

10.8.3.2 Required result

Verify that a transmitter shutdown procedure independent of the operating software is provided.

28.07.06 Ba	Test details - Transmitter shutdown procedure		
Test item	Check	Remark	Result
Check manufacturer's documentation			
Malfunction detection	Check that the transmitter shutdown procedure is described		Ok
	Check that the transmitter shutdown procedure is independent of the software		Ok

3.7.4 10.8.3.4 Position sensor fallback conditions

(see 6.6.3)

10.8.3.1 Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Where an option for an external GNSS sensor is not provided, then the respective tests shall be omitted.

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

a) external DGNSS in use if implemented;

b) internal DGNSS in use (corrected by Message 17) if implemented;

c) internal DGNSS in use (corrected by a beacon) if implemented;

d) external GNSS in use if implemented;

e) internal GNSS in use ;

f) no sensor position in use.

Check the position accuracy and RAIM flag in the VDL Message 18 and, where provided, the ALR sentence.

10.8.4.2 Required result

Verify that the use of position source, position accuracy flag, RAIM flag and position information complies with Table 1

Verify that the position sensor status is maintained for the next scheduled report and changed after that.

	Test details - Position priority – Position sensor fallback with external sensor input		
Test item	Check	Remark	Result
Connect sensor inputs and correction data according to the test items. Sensor input file name: AIS01_gll_vtg_hdt_near.sst Internal GPS: RAIM expected, external: RAIM.			
Changing downwards			
a) Set: • Internal GNSS available • External DGNSS	Check that external position is used	Not applicable, external sensor input is not implemented	N/A
	Check that position accuracy flag = 1		
	Check that the RAIM flag = 1		
b) Change from a: • Internal DGNSS available msg 17 • External GNSS	Check that internal position is used	If implemented	
	Check that position accuracy flag = 1		
	Check that RAIM flag = 1		
	Check that sensor source is changed after the next scheduled position report		
c) Change from a: • Internal DGNSS available beacon input • External GNSS	Check that internal position is used	If implemented	
	Check that position accuracy flag = 1		
	Check that RAIM flag = 1		
	Check that sensor source is changed after the next scheduled position report		
d) Change from b: • Internal GNSS • External GNSS	Check that external position is used		
	Check that position accuracy flag = 0		
	Check that RAIM flag = 1		
	Check that sensor source is changed after the next scheduled position report		
e) Change from d: • Internal GNSS • Remove external GNSS	Check that internal position is used		
	Check that position accuracy flag = 0		
	Check that RAIM flag = 1		
	Check that there is an ALR output ID 025 (External EPFS lost)		
	Check that sensor source is changed after the next scheduled position report		
f) Change from e: • Inhibit internal GNSS • No external GNSS	Check that there is an ALR output ID 026 (no sensor position in use) - optional		
	Check that EUT stops transmission of position report after the next scheduled position report		

Changing upwards			
e) Change from f: • Internal GNSS • No external GNSS	Check that the EUT starts transmission		
	Check that internal position is used		
	Check that position accuracy flag = 0		
	Check that RAIM flag = 1		
	Check that the ALR output ID 025 (External EPFS lost) is updated - optional		
d) Change from e: • Internal GNSS • External GNSS	Check that external position is used		
	Check that position accuracy flag = 0		
	Check that RAIM flag = 1		
	Check if there is an indacation of the source change - optional		
c) Change from d: • Internal DGNSS available beacon input • External GNSS	Check that internal position is used	If implemented	
	Check that position accuracy flag = 1		
	Check that RAIM flag = 1		
	Check if there is an indacation of the source change - optional		
b) Change from d: • Internal DGNSS available msg 17 • External GNSS	Check that internal position is used	If implemented	
	Check that position accuracy flag = 1		
	Check that RAIM flag = 1		
	Check if there is an indacation of the source change - optional		
a) change from b: • DGNSS available • External DGNSS	Check that external position is used		
	Check that position accuracy flag = 1		
	Check that the RAIM flag = 1		
	Check if there is an indacation of the source change - optional		

05.09.06 Ba	Test details - Position priority – Position sensor fallback without external sensor input		
Test item	Check	Remark	Result
Connect sensor inputs and correction data according to the test items. Sensor input file name: AIS01_gll_vtg_hdt_near.sst Internal GPS: RAIM expected, external: RAIM.			
Changing downwards			
b) Internal DGNSS available msg 17	Check that the internal position is used		Ok
	Check that position accuracy flag = 1		Ok
	Check that RAIM flag = 1	RAIM flag = 0	Ok
c) Internal DGNSS available beacon input	Check that the internal position is used	Not implemented	N/A
	Check that position accuracy flag = 1		N/A
	Check that RAIM flag = 1		N/A
d) Change from b: • Internal GNSS	Check that the internal position is used		
	Check that position accuracy flag = 0 (Depending on the RAIM result it can also be 1)	Because of small estimated error in GBS sentence	Ok
	Check if there is an source change indication – optional	TXT ID 025 Internal GNSS in use	Ok
	Check that RAIM flag = 0	RAIM = 0	Ok
f) Change from e: • Inhibit internal GNSS	Check that there is an ALR output ID 026 (no sensor position in use)	If implemented There is also a TXT ID 60 output: “Internal GNSS not in use”	Ok
	Check that EUT stops transmission of position report after the next scheduled position report		Ok
Changing upwardswards			
d) Change from f: • Internal GNSS	Check that the EUT starts transmission		Ok
	Check that the ALR output is updated	If implemented The ALR ID 25 is updated	Ok
	Check if there is a source change indication - optional	There is a TXT output: ID 25: Internal GNSS in use	Ok
	Check that position accuracy flag = 0 (Depending on the RAIM result it can also be 1)		Ok
	Check that RAIM flag = 1	RAIM = 0	Ok
b) Change from d) Internal DGNSS available msg 17	Check that the internal position is used		Ok
	Check if there is a source change indication - optional	There is a TXT output: ID 24: Internal DGNSS in use (msg 17)	Ok
	Check that position accuracy flag = 1		Ok
	Check that RAIM flag = 1	RAIM flag = 0	Ok

c) Change from d) Internal DGNSS available beacon input	Check that the internal position is used	If implemented Not implemented	N/A
	Check if there is a source change indication - optional		N/A
	Check that position accuracy flag = 1		N/A
	Check that RAIM flag = 1	RAIM flag = 0	N/A

3.7.5 10.8.5 Speed sensors

(see 6.6.4)

10.8.5.1 Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Where an option for an external GNSS sensor is not provided, this test shall be omitted.

Apply valid external DGNSS position and speed data.

Make external DGNSS position invalid (for example. by wrong checksum, "valid/invalid" flag) .

10.8.5.1 Required result

Check that the external data for SOG/COG is transmitted in Message 18.

Check that the internal data for SOG/COG is transmitted in Message 18.

14.06.06 Ba	Test details - Speed sensors		
Test item	Check	Remark	Result
Connect sensor inputs and correction data according to the test items. Sensor input file name: AIS01_gll_vtg_hdt_near.sst Internal GPS: RAIM expected, external: RAIM active.			
Set:	Check that external SOG is used		Ok
• Internal GNSS available • External DGNSS	Check that external COG is used		Ok
Change to:	Check that internal SOG is used		Ok
• Internal GNSS available • External DGNSS invalid	Check that internal COG is used		Ok

3.8 10.9 User interface

(see 6.7)

3.8.1 10.9.1 Display

(see 6.7.1)

10.9.1.1 Method of measurement

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

a) Check status indications for power, Tx timeout, Error.

b) Apply Message 23 "quiet time" of >7 min.

c) Simulate VDL load in order to make it impossible for the EUT to find free candidate periods.

10.9.1.2 Required results

a) Indicators shall be available and working correctly according to manufacturer's documentation.

b) Check that the Tx timeout indication is activated.

c) Check that the Tx timeout indication is activated.

08.06.06 Ba	Test details - Display		
Test item	Check	Remark	Result
Operate EUT in autonomous mode			
a) Check for indicators	Check that a power indicator is available		Ok
	Check that the power indicator is on		Ok
	Check that a TX timeout indicator is available		Ok
	Check that an error indicator is available.		Ok
b) Apply msg 23 for quiet time > 7 min Msg "B Msg 23 Test 10.2.2.1 T5"	Check that the Tx indicator is on	After second failed Tx	Ok
c) Simulate high channel load to disable transmission	Check that the Tx indicator is on		Ok
Disable position	Check that the Tx indicator is on		Ok
Simulate an error according to documentation, if possible	Check that the error indicator is on	The Error LED can be activated e.g. by disconnection of the VHF antenna.	Ok

3.8.2 10.9.2 Message display

This test is only applicable if a message display is provided.

10.9.2.1 Method of measurement

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

Transmit a Message 14.

10.9.2.2 Required results

Verify that the EUT displays the message.

08.06.06 Ba	Test details - Message display		
Test item	Check	Remark	Result
Only applicable if a message display is provided			
Send a msg 14 from another station	Check that the msg 14 is correctly displayed	A message display is not implemented	N/A

3.8.3 10.9.3 Static data input

(see 6.7.2)

10.9.3.1 Method of measurement

Verify that static data can be input to the unit according to the manufacturer's documentation. Set up standard test environment and operate EUT in autonomous mode.

10.9.3.2 Required results

Check that static data are transmitted correctly by the EUT and that the MMSI cannot be altered by the user.

08.06.06 Ba	Test details - Static data input		
Test item	Check	Remark	Result
Input static data according to manufacturers documentation, as far as not yet set by the manufacturer			
Check the static data transmitted in msg 18 and 24	Check the User ID (MMSI)		Ok
	Check the Name		Ok
	Check the Type of ship and cargo		Ok
	Check the Vendor ID		Ok
	Check the call sign	The first character of call sign in msg 24 (VDO and VDL transmission) is always "?" Retest 04.07.06 Ba: The call sign in msg 24 is ok	Ok

	Check the dimension of ship/reference for position	The C,D values of the external position is always identical to the A,B values of the internal position. See note1) Retest 08.06.06 Ba: • The SSD input with source "GP" is stored in the setting for external position and internal position. The SSD input with source "AI" is correctly stored in the setting for internal position only. • When using internal position sometimes the Dimension for internal is used in msg 24, sometimes the dimension for external position is used. See note2) Note 07.07.06 Ba: No retest because it has been announced that the external position sensor input will be removed. In this case there should be only one dimension setting stored. Has to be retested when external sensor input has been removed. Retest 22.08.06 Ba: The behaviour is still very confusing. See note 3) This should be cleared and made consistent in any way. Retest 29.08.06 Ba: Now there is only one set of reference dimensions. This can be set only with source "AI" and it is used for the internal GPS position source.	Ok
Input protection	Check that the MMSI cannot be altered by the user	The proprietary sentence to change the MMSI is password protected	Ok
	Check that the Vendor ID cannot be changed by the user		Ok

Note 1) If the dimension values of the external position are set by SSD sentence (source GP) the external values are correct but the A and B values of the internal position get the C,D values of the external position.

If the dimension values of the internal position are set by SSD sentence (source AI) the internal values are correct but the C and D values of the external position get the A,B values of the internal position.

Note 2)
If the external position sensor is not implemented only the Dimension of SSD sentence with source "AI" should be accepted, and this setting should be used in any case for msg 24.

Note 3)
On query there a 2 sets of dimension settings output,

- First setting with source ",GP"
- Second setting with source ",AI"

A SSD input with source ",GP" changes both dimension settings
A SSD input with source ",AI" changes the second dimension setting only

For msg 24 always the first sentence is used, independent of the used position source.

3.8.4 10.9.4 External interfaces

(see 6.7.3)

3.8.4.1 10.9.4.1 Display interface

This test only applies if a display interface is provided.

10.9.4.1.1 Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Apply a safety related broadcast Message 14 through the VDL to the EUT.

Check the output on the display interface.

10.9.4.1.2 Required results

The interface shall be compliant with IEC 61162 series protocol and the manufacturer's documentation of interface hardware.

08.06.06 Ba	Test details - Display interface		
Test item	Check	Remark	Result
Only applicable if a display interface is provided			
Send a msg 14 from another station	Check that the msg 14 is correctly output on the display interface		Ok
	Check that the format is according to IEC 61162		Ok

4 11 Physical tests

Physical test are not part of this test document.

The physical tests are covered by the notification according to R&TTE

5 12 Specific tests of Link Layer

(see 7.3)

5.1 12.1 TDMA synchronisation

5.1.1 12.1.1 Synchronisation test sync mode 1

12.1.1.1 Definition

Synchronisation jitter (transmission timing error) is the time between nominal start of the transmission time period as determined by a UTC synchronisation source ($T_{\circ\ ref}$) and $T_\circ$ of the EUT ($T_{\circ\ EUT}$).

12.1.1.2 Method of measurement

Set up standard test environment and set the EUT to assigned mode for a reporting rate of 5 s. Enable test conditions for the following:

a) station transmitting Message 1 or 2, 3, 4, 18, 19 not subject to a CS-delay, with repeat indicator = 0, with no propagation delay and with position available is received by the EUT;

b) no sync source (switched off);

c) with the internal clock of the EUT out of sync (sync jitter > 1000 µs), transmit messages not to be used as sync source (see 7.3.1.1) to the EUT;

d) repeat test a) using a sync source transmitting Message 4; simulate the position of the station providing the sync source (for example a base station 60 NM = 416 µs away from EUT position) in order to simulate a propagation delay;

e) Repeat test d) with an additional source transmitting Message 1 or 2, 3, 4, 18 not subject to a CS-delay, with repeat indicator = 0, with no propagation delay and with position available is received by the EUT.

Record VDL messages and measure the time between $T_{\circ\ ref}$ of the synchronisation source and the initiation of the "transmitter on" function T_A and calculate back to $T_{\circ\ EUT}$ (a sync output may be used for the purpose of this test). Alternative methods, for example by evaluating the start flag are allowed.

12.1.1.3 Required results

a) The EUT shall synchronise on the received source and the synchronisation jitter shall not exceed ±312 µs (sync mode 1).

b) The synchronisation jitter shall not exceed ±312 µs during a 30 s period from the time a proper sync source was last received.

c) The EUT shall not synchronise on these received messages.

d) The synchronisation jitter of the EUT shall be within –416 µs ±312 µs .

e) The synchronisation jitter of the EUT shall be –208 µs ±312 µs within 60 s.

04.05.06 Ba	Test details - Synchronisation test sync mode 1		
Test item	Check	Remark	Result
Setup an assigned reporting rate of 5 s The correct timing is T_{classA}+ 1568 µs			
a) Transmit an appropriate position report as sync source Msg "B Msg 23 Test 10.2.2.1 T1"	Check that the EUT does synchronise to the sync source		Ok
	Check that the sync jitter does not exceed ±312 µs from the sync source	Test 05.07.06 Ba: See sync diagram	Ok
	Check that the sync mode value in the comm state is 3	Sync mode in comm state is 3	Ok
b) Remove sync source	Check that the sync jitter does not exceed ±312 µs for the next 30 s after last received sync msg	In the first the drift was less than 0.2 ms for the next 20 min In a second test the drift was 0.2 ms for the next 60 s	Ok
	Check that the sync mode value in the comm state is 3	Sync mode in comm state is 3	Ok
c) Restart the EUT to get it out of sync (>1000µs) Transmit a position report with repeat indicator not 0. Msg "B Msg 1 Test 12.1.1 c"	Check that EUT does not synchronise to the msg	Test 12.06.06 11:00 UTC	Ok
d) Transmit msg 4, range to EUT = 60 NM Msg "B Msg 4 Test 12.1.1 d"	Check that the sync jitter of the EUT is within –416 µs ±312 µs from the msg 4	Test 06.07.06 Ba:	Ok
e) Transmit msg 4, range to EUT = 60 NM, and msg 1/3, range = 0 Msg "B Msg 1 Test 12.1.1 d"	Check that the sync jitter of the EUT is within –208 µs ±312 µs from the msg 1, after 60 s	The behaviour is not really as expected. See note) Retest 22.06.08 Ba: The sync jitter is within the limits but it could be improved. See diagram	Ok

Note)
To make the behaviour clearer I performed test e) in 3 phases:

- Phase 1: Msg 4 with 60 NM distance only, like in test d)
- Phase 2: Msg 4 with 60 NM distance + Msg 1 with 0 NM distance, as e) requirement
- Phase 3: Msg 1 with 0 NM distance only, like in test a)

The sync jitter in phase 1 and 3 is generally correct.
In phase 2 the standard expects that the EUT synchronises to the average timing of the 2 sync sources, resulting in a timing centre at – 208 µs, after an averaging period of 60 s.

In the test it seems that the EUT uses the timing of phase 1 (centre at 416 µs) during the first 10 min of phase 2, then it jumps to a timing according to phase 3 (centre at 0 µs).

5.1.2 12.1.2 Synchronisation test sync mode 2

12.1.2.1 Method of measurement

Set up standard test environment and enable test conditions for the following:

a) operate EUT in sync mode 2 for more than 5 min.

b) Switch on sync source immediately after scheduled transmission of EUT. Sync source shall be a station transmitting Message 1 or 2,3,4,18,19 not subject to a CS-delay, with repeat indicator = 0 and with position available with a reporting rate of 10 s.

Record VDL messages and measure the time between $T_{o\ ref}$ of the synchronisation source and the initiation of the "transmitter on" function T_A and calculate back to $T_{o\ EUT}$ (a sync output may be used for the purpose of this test). Alternative methods, for example by evaluating the start flag are allowed.

12.1.2.2 Required results

Verify that the EUT synchronises its next scheduled transmission on the sync source. The synchronisation jitter shall not exceed ±312 µs.

08.06.06 Ba	Test details - Synchronisation test sync mode 1		
Test item	Check	Remark	Result
Operate in autonomous mode The correct timing is T_{classA}+ 1568 µs			
a) Operate in sync mode 2 for more than 5 min	Check that the EUT is not synchronised		Ok
b) After scheduled transmission start appropriate sync source	Check that the sync jitter of the next transmission does not exceed ±312 µs from the sync source	The timing error of the next transmissions is about –0.4 ms Retest 07.07.06 Ba: Jitter value before start of sync source was –2120 µs. The jitter value of the first Tx after start of sync source was +30 µs.	Ok

5.1.3 12.1.3 Synchronisation test with UTC

This test is only relevant if optional synchronisation sources providing UTC are implemented.

12.1.3.1 Method of measurement

Set up standard test environment and enable test conditions in a way that EUT operates in UTC synchronised mode.

12.1.3.2 Required results

The synchronisation jitter shall not exceed ±312 µs.

08.06.06 Ba	Test details - Synchronisation test sync mode 1		
Test item	Check	Remark	Result
Connect the optional synchronisation source The correct timing is T_{classA}+ 20 bit (2083µs)			
Optional synchronisation	Check that the sync does not exceed ±312 µs from the correct UTC timing	Not implemented	N/A

5.2 12.2 Carrier-Sense tests

5.2.1 12.2.1 Threshold level

12.2.1.1 Definition

Carrier-Sense threshold is the signal level below that which a time period shall be regarded as unused and a transmission may take place.

12.2.1.2 Method of measurement

The test configuration is described here in its most basic form, using three signal sources with RF (PIN) switches selecting when each signal is applied to the EUT. Other equipment configurations may be used if they fulfil the same requirements (for example a single RF source fed via a switched attenuator, which is controlled by a timing circuit).

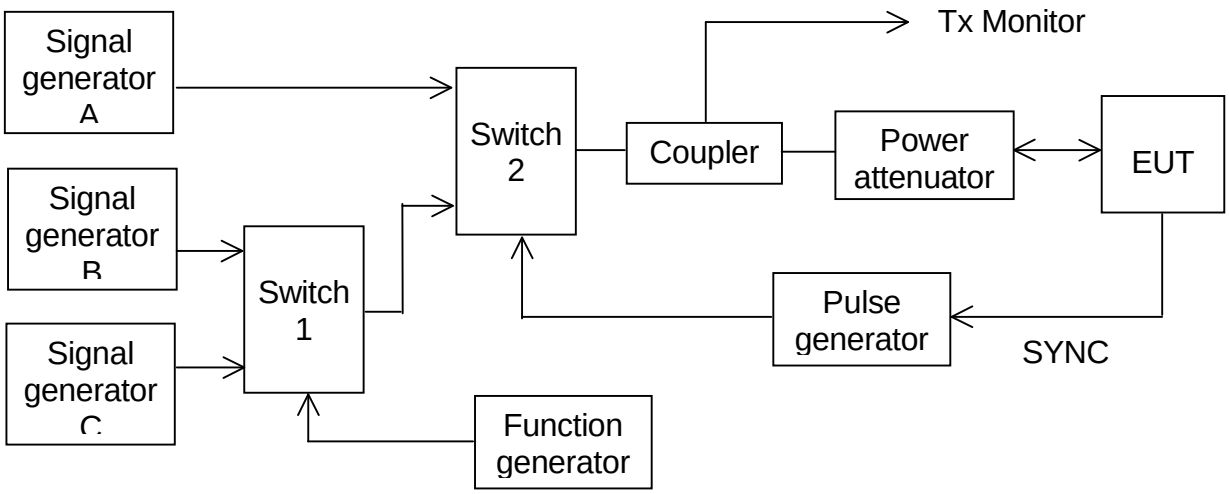


Figure 1 – Configuration for Carrier-Sense threshold test

a) Signal C is a carrier modulated with a 400 Hz FM signal with a deviation of 3 kHz equivalent to –60 dBm at the EUT. The switches connect this signal to the EUT most of the time to mimic 100 % channel loading with strong traffic.

b) Signal B is a carrier modulated with a 400 Hz FM signal with a deviation of 3 kHz equivalent to –87 dBm at the EUT. Switch 1 replaces signal C with signal B for 26,67 ms. The function generator makes this happen once every 2 s. This imitates one vacant time period in a 99 % loaded channel. The level of Signal B can be manually switched between –87 dBm and OFF to mimic high and low background levels (resulting in a threshold level of –77 dBm and –107 dBm).

c) Signal A is a carrier modulated with a 400 Hz FM signal with a deviation of 3 kHz equivalent to –104 dBm at the EUT. When the EUT attempts a transmission, switch 2 replaces the 'background traffic' with signal A to imitate an incoming message intended to inhibit the transmission attempt. The level of signal A can be manually set to –74 dBm, –104 dBm and OFF (defined as less than –117 dBm).

d) *All three signal generators are tuned to the same frequency. The test shall be carried out on the lowest frequency declared by the manufacturer and AIS 2 (162,025 MHz).*

e) *For the purposes of this test, the EUT will be equipped with a test signal (SYNC) indicating the start of each time period that it intends to transmit into. This is used to trigger the pulse generator which after a delay of 0,8 ms (8 bits) generates a 23,3 ms (224 bits) pulse for switch 2.*

f) *With the signal levels set to the levels shown in the first row of the following table, the EUT shall be observed making routine scheduled position reports. Levels shall then be adjusted as per subsequent steps and the EUT monitored for 10 min (or at least 20 reporting attempts) to confirm if transmission has ceased.*

12.2.1.3 Required results

Table 24 – Required threshold test results

Step	Description	Signal A (dBm)	Signal B (dBm)	EUT transmission
1	Time period free	OFF	OFF	Yes
2	Time period used	–104	OFF	Ceased
3	Recovery	OFF	OFF	Yes
4	Raised background	OFF	–87	Yes
5	Time period used	–74	–87	Ceased
6	Recovery	OFF	–87	Yes

04.05.06 Ba	Test details - Threshold level		
Test item	Check	Remark	Result
Run the test automatically with all steps, using the automatic test adapter. Record the transmissions of the EUT and the step information output of the test adapter			
Step 1	Check that the EUT has transmitted		Ok
Step 2	Check that the EUT has not transmitted	EUT continues transmission <u>Retest 01.06.06 Ba:</u> EUT does not transmit	Ok
Step 3	Check that the EUT has transmitted		Ok
Step 4	Check that the EUT has transmitted		Ok
Step 5	Check that the EUT has not transmitted	EUT continues transmission <u>Retest 01.06.06 Ba:</u> EUT sometimes transmit, sometimes does not transmit. If the CS level (level A) is increased by 3 dB the transmission stops. <u>Retest 07.07.06 Ba:</u> No transmission	Ok
Step 6	Check that the EUT has transmitted		Ok

5.2.2 12.2.2 Carrier sense timing

12.2.2.1 Definition

This test is to verify that signals that are received before the CS detection window starts are not used for the detection of used time periods.

12.2.2.2 Method of measurement

Use the test configuration and signals of test 12.2.1.

Signal B is switched off, signal A can be manually set to -74 dBm, -104 dBm and OFF.

The SYNC signal of the EUT indicating the start of each time period that it intends to transmit into is used to trigger the pulse generator to generate a 0,7 ms (7 bits) pulse for switch 2 starting at the SYNC signal (this pulse ends 1 bit before start of the CS detection window of the EUT)

f) Levels shall be adjusted as per the steps given in Table 25 and the EUT monitored for 10 min (or at least 20 reporting attempts) to confirm if EUT transmits.

12.2.2.3 Required results

Table 25 Required carrier sense timing results

Step	Description	Signal A (dBm)	Signal B (dBm)	EUT transmission
1	Time period free	OFF	OFF	Yes
2	Time period free	-104	OFF	Yes
3	Time period free	-74	OFF	Yes

01.06.06 Ba	Test details - Carrier sense timing		
Test item	Check	Remark	Result
Run the test automatically with all steps, using the automatic test adapter. Record the transmissions of the EUT and the step information output of the test adapter			
Step 1	Check that the EUT has transmitted		Ok
Step 2	Check that the EUT has transmitted		Ok
Step 3	Check that the EUT has transmitted		Ok

5.3 12.3 VDL state/reservations

12.3.1 Method of measurement

Set up standard test environment and operate EUT with assigned reporting interval of 10 s. Record transmitted scheduled position reports Message 18 and check time periods used for transmission.

a) Transmit a Message 20 to the EUT reserving a block of time periods including timeout.

b) Transmit a Message 20 to the EUT reserving a block of time periods without timeout.

12.3.2 Required results

a) Verify that the reserved block is not used and used again after the timeout specified in Message 20.

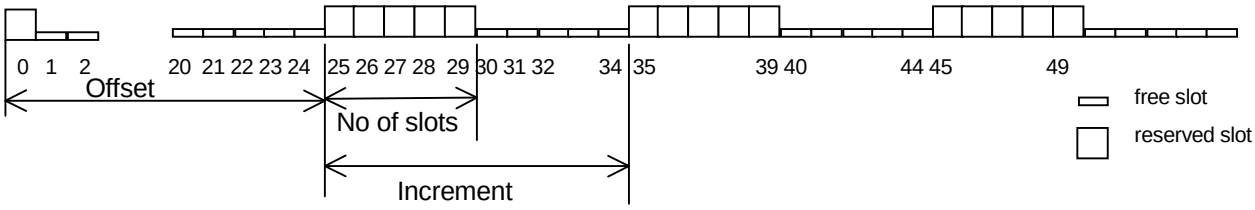
b) Verify that the reserved block is not used and used again after a timeout of 3 min.

08.06.06	Test details – VDL state/ reservations		
Test item	Check	Remark	Result
Send a message 20 from VDL Generator with slot offset and increment for slot reservation according to the description below. Set time-out according to the test item. Set assigned reporting interval of 10 s.			
a) Timeout = 6 Msg "B Msg 20 Test 12.3 a" Msg "B Msg 23 Test 12.3"	Check that the reserved slots are not used by the EUT within the time-out	The slots x5...x9 are reserved, but the slotx x4...x8 are not used, the slots x9....x3 are used There seems to be a shift by 1 slot in the calculation of the slot offset. <u>Note 07.07.06 Ba:</u> No retest, because of the result of test 10.2.2.2 no change is expected <u>Retest 27.07.06 Ba:</u> The slots xxx5 to xxx9 are not used during the reservation time	Ok
	Check that after end of reservation all slots are used again.		Ok
b) Timeout = 0 (not available) Msg "B Msg 20 Test 12.3 b" Msg "B Msg 23 Test 12.3"	Check that the reserved slots are not used by the EUT within 3 min	<u>Retest 27.07.06 Ba:</u>	Ok
	Check that after end of reservation all slots are used again.	Remark: after 5 min the previously reserved slots are used again.	Ok

<u>Test scenario:</u> Msg 20 transmission by test system.
Msg 20 reserves slots which should not be used by mobile stations.
Msg 20 parameters:

- Msg 20 is transmitted in slot 0 in each frame
- Offset number 1: 25
- Number of slots: 5
- Time out 1: 6 / 0 depending on test item
- Increment: 10

FATDMA reservation



5.4 12.4 Data encoding (bit stuffing)

12.4.1 Method of measurement

Set up standard test environment.

Set ships name to a value that requires bit-stuffing for example "wwwww" and check the VDL (note that this might require that the manufacturer provides means to input this data).

12.4.2 Required results

Confirm that transmitted VDL Message 24 conforms to data input.

09.08.06 Ba	Test details - Data encoding (bit stuffing)		
Test item	Check	Remark	Result
Set ships name to a value requiring bit stuffing			
Msg 24 content	Check that the ships name in msg 24 on VDL is correct		Ok

5.5 12.5 Frame check sequence

12.5.1 Method of measurement

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

a) Check test output; if a display interface is provided, check this.

b) Repeat test 12.1.1 and check that a station transmitting messages with wrong CRC are not used for synchronisation.

12.5.2 Required results

Confirm that messages with invalid CRC are not accepted by the EUT in cases a) and b).

09.08.06 Ba	Test details - Frame check sequence		
Test item	Check	Remark	Result
Transmit position report message from VDL generator			
Set CRC bit sequence to ok Msg "B Msg 1"	Check that position report is received from EUT (VDO output)		Ok
a) Set CRC bit sequence to false	Check that position report is not received from EUT (VDO output)		Ok
	Check that the target is not displayed on the display	If implemented No display implemented	N/A
b) Disable GPS, apply external position. Transmit position report with wrong CRC	Check that the EUT does not synchronise to the incorrect message	Test 07:15 UTC	Ok

5.6 12.6 Slot allocation (channel access protocol)

5.6.1 12.6.1 Autonomous mode allocation

12.6.1.1 Method of measurement

Set up standard test environment and operate EUT with assigned reporting interval of 10 s. Record transmitted scheduled position reports Message 18 and check time periods used for transmission. Check the Communication State of transmitted messages.

Repeat the test with additional simulated channel load of 80 % (4 time periods used, 1 time period unused).

12.6.1.2 Required results

The time periods used for transmission shall in both tests

- *not exceed the transmission interval TI;*
- *not always use the same time period;*
- *not always use the first unused time period.*

Check that the Communication state of Message 18 is the default value as defined in 7.3.3.5.

09.06.06 Ba	Test details - Autonomous mode allocation		
Test item	Check	Remark	Result
Set assigned reporting rate of 10 s (Msg "B Msg 23 Test 12.3") Record the transmission slots for at least 30 min and evaluate the used slots			
Test 1: No channel load	Check that the slots do not exceed the TI		Ok
	Check that the EUT does not always use the same time period		Ok
	Check that the EUT not always uses the first unused time period		Ok
Test 1: 80% channel load	Check that the slots do not exceed the TI		Ok
	Check that the EUT does not always use the same time period		Ok
	Check that the EUT does not always use the first unused time period		Ok
	Check that the EUT does not use slot used by the received targets		Ok
Communication state	Check that the com state of msg 18 is always as defined in 7.3.3.5		Ok

5.6.2 12.6.2 DSC listening periods

12.6.2.1 Method of measurement

This test is applicable only if DSC functionality is implemented.

Set up standard test environment and operate EUT with assigned reporting interval of 10 s. Enable DSC functionality. Record transmitted scheduled position reports Message 18 and check time periods used for transmission.

12.6.2.2 Required results

During the DSC monitoring times, scheduled transmissions of Message 18 shall continue.

10.07.06 Ba	Test details - DSC listening periods		
Test item	Check	Remark	Result
Set assigned reporting rate of 10 s Enable DSC functionality			
Tx of msg 18	Check that the scheduled Tx of msg 18 continues		Ok

5.7 12.7 Assigned operation

5.7.1 12.7.1 Assignment priority

12.7.1.2 Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Transmit an Assigned mode command (Message 23) to the EUT with TX/RX mode 1.

a) Transmit a Message 22 defining a region with the EUT inside that region. Transmit a Message 22 to the EUT individually addressed and specifying Tx/Rx mode 2.

b) Repeat the test, clear the region defined by Message 22 under a) [2]. Transmit Message 22 to the EUT with regional settings specifying Tx/Rx mode 2.

Record transmitted messages.

12.7.1.2 Required results

a) The Tx/Rx mode field setting of Message 22 shall take precedence over the Tx/Rx mode field setting of Message 23.

b) The Tx/Rx mode field setting of Message 23 shall take precedence over the Tx/Rx mode field setting of Message 22. The receiving station shall revert to its previous Tx/Rx mode after a timeout value randomly chosen between 240 s and 480 s.

Remark for b)
In my opinion the time to revert to its previous (by msg 22 defined) Tx/Rx mode is defined by the time-out of msg 23, not by a random value of 240 to 480 s.

[2] This can be carried out using the method used in 13.3.1 b) step 2 or by assigning a new simulated position to the EUT.

09.06.06 Ba	Test details - Autonomous mode allocation		
Test item	Check	Remark	Result
Send a msg 23 with Tx/Rx mode = 1 Msg "B Msg 23 Test 10.2.2.1 T4"			
a) Send a msg 22 defining a region with EUT inside (Tx/Rx mode = 2) Msg "B Msg 22 Test 12.7.1 a1"	Check that the EUT uses Tx/Rx mode 1 as defined by msg 23 (Tx on channel A)		Ok
Send an addressed msg 22 to EUT with Tx/Rx mode = 2 Msg "B Msg 22 Test 12.7.1 a2"	Check that the EUT uses Tx/Rx mode 2 as defined by msg 22 (Tx on channel B)		Ok
Clear the region defined in test a)			
b) Send a msg 22 defining a *region with EUT inside, Tx/Rx mode = 2 Msg "B Msg 22 Test 12.7.1 b1"	Check that the EUT uses Tx/Rx mode 2 (Tx on channel B)		Ok
Send one msg 23 to the EUT with Tx/Rx mode = 1 Msg "B Msg 23 Test 10.2.2.1 T4"	Check that the EUT uses Tx/Rx mode 1 as defined by msg 23 (Tx on channel A)		Ok
	Check that the EUT reverts to Tx/Rx mode 2 after 6 min (time-out of msg 23)	EUT reverts to Tx/Rx mode 2 after 6 min, according to the time-out in msg 23	Ok

5.7.2 12.7.2 Entering rate assignment

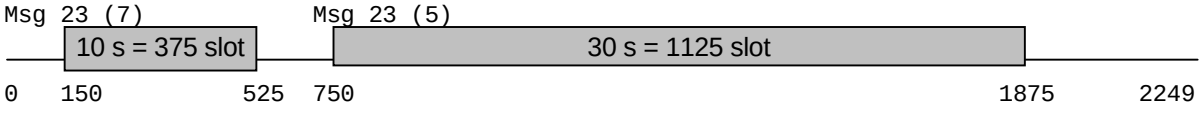
12.7.2.1 Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Transmit a Group Assignment command (Message 23) to the EUT with a reporting interval of 10 s assigned, monitor the VDL, reset by assigning 30 s rate; repeat 10 times.

12.7.2.2 Required result

Verify that the first transmission after receiving the Message 23 is within a time randomly selected between the time the Message 23 has been received and the assigned interval.

12.06.06 Ba	Test details - Entering rate assignment		
Test item	Check	Remark	Result
Send 10 times: Msg 23 with 10 s reporting interval (Msg "B Msg 23 Test 12.7.2 10s") After 20 s: Msg 23 with 30 s reporting interval. (Msg "B Msg 23 Test 12.7.2 30s") Repeat after 45 s			
10 s reporting interval	Check that the first Tx is randomly selected in 0 ...10 s after msg 23		Ok
30 s reporting interval	Check that the first Tx is randomly selected in 0 ...30 s after msg 23		Ok



5.7.3 12.7.3 Reverting from rate assignment

12.7.3.1 Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Transmit a Group Assignment command (Message 23) to the EUT with a reporting interval of 10 s assigned, monitor the VDL until at least 1 min after timeout occurred; repeat 10 times (transmissions of Message 23 shall not be synchronised to the initial transmission schedule of the EUT).

Measure the time T_{rev} between the reception of Message 23 and first transmission after timeout.

12.7.3.2 Required result

T_{rev} shall be randomly distributed between 240 s and 480 s.

12.06.06 Ba	Test details - Reverting from rate assignment		
Test item	Check	Remark	Result
Send 10 times: Msg 23 with 10 s reporting interval, Msg "B Msg 23 Test 10.2.2.1 T3" Wait until time-out + 1 min.			
Measure time T_{rev}	Check that T_{rev} is randomly distributed between 4 and 8 min	T_{rev} = 5,5,6,7,7,6,6,7,6,6 min	Ok

5.7.4 12.7.4 Reverting from quiet mode

12.7.4.1 Method of measurement

Set up standard test environment and operate EUT with a reporting interval of 10 s assigned. Transmit a Group Assignment command (Message 23) to the EUT with quiet time = 1 min.

12.7.4.2 Required results

Verify that the first transmission after the quiet period is within the schedule that was in place before the quiet period.

12.06.06 Ba	Test details - Reverting from mode		
Test item	Check	Remark	Result
Send Msg 23 with 10 s reporting interval Msg "B Msg 23 Test 10.2.2.1 T3"			
Reporting rate	Check reporting interval = 10 s		Ok
Send msg 23 with quiet time = 1 min	Check that EUT does not transmit during quiet time	Test 12.06.06 12:38 UTC	Ok
	Check that the transmissions after end of quiet time matches the previous schedule.	Reporting interval = 10s	Ok

5.7.5 12.7.5 Retry of interrogation response

12.7.5.1 Method of measurement

Set up standard test environment. Interrogate the EUT by Message 15 for a response with Message 18.

a) Simulate full VDL load for the following 30 s.

b) Simulate full VDL load for the following 60 s

12.7.5.2 Required result

a) Verify that a response is transmitted between 30 s and 60 s after the transmission of Message 15.

b) Verify that no response is transmitted.

12.06.06 Ba	Test details - Retry of interrogation response		
Test item	Check	Remark	Result
Send an interrogation for msg 18			
Apply full channel load for 30s Target simulation: "50_slotsVer2"	Check that a response is transmitted within 30 ... 60 s after msg 15	Test 14:47 UTC	Ok
Send an interrogation for msg 18			
Apply full channel load for 60s Target simulation: "50_slotsVer2"	Check that no response is transmitted (because retry is inhibited)	Test 15:00 UTC	Ok

5.8 12.8 Message formats

5.8.1 12.8.1 Received messages

12.8.1.1 Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Apply messages according to Table 11 to the VDL. Record messages output by the PI of EUT where provided.

12.8.1.2 Required results

Confirm that EUT responds as appropriate. Check that EUT outputs the corresponding sentences with correct field contents and format via the PI where provided.

Verify that the EUT does not process addressed messages.

13.06.06 Ba	Test details - Received messages		
Test item	Check	Remark	Result
Send all message to the EUT and check PI output			
Msg 1,2,3 Position report	Check that message is output	Optional	Ok
	Check format and content		Ok
Msg 4 base station report	Check that message is output	Optional	Ok
	Check format and content		Ok
Msg 5 Static and voyage related data	Check that message is output	Optional	Ok
	Check format and content Fill bits: ,2		Ok
Msg 6 Addressed binary message	Check that message is not output		Ok
Msg 7 Binary acknowledgement	Check that message is not output		Ok
Msg 8 Binary broadcast message	Check that message is output	Optional	Ok
	Check format and content Fill bits: ,4		Ok
Msg 9 SAR Aircraft position report	Check that message is output	Optional	Ok
	Check format and content		Ok
Msg 10 UTC and date inquiry	Check that message is not output		Ok
Msg 11 UTC/Date response	Check that message is output	Optional	Ok
	Check format and content		Ok
Msg 12 Safety related addressed message, addressed to EUT	Check that message is output	Optional No output Remark: This is the only optional msg which is not output. Is this intended? Retest 11.07.06 Ba: No Rx	Ok
	Check format and content		N/A
Msg 12 Safety related addressed message, not addressed to EUT	Check that message is not output		Ok
Msg 13 Safety related acknowledge	Check that message is not output		Ok
Msg 14 Safety related broadcast message	Check that message is output	Optional	Ok
	Check format and content		Ok
Msg 15 Interrogation	Check that message is output	required	Ok
	Check format and content Fill bits: 2		Ok
Msg 16 Assigned mode command	Check that message is not output		Ok
Msg 17 DGNSS broadcast binary message	Check that message is output	Optional	Ok
	Check format and content		Ok
Msg 18 Class B equipment position report	Check that message is output	Optional	Ok
	Check format and content		Ok

Msg 19 Extended Class B equipment position report	Check that message is output	Optional	Ok
	Check format and content		Ok
Msg 20 Data link management message	Check that message is output	Required	Ok
	Check format and content		Ok
Msg 21 Aids to navigation report	Check that message is output	Optional	Ok
	Check format and content		Ok
Msg 22 Channel management message	Check that message is output	Required	Ok
	Check format and content		Ok
Msg 23 Group assignment	Check that message is output	Required	Ok
	Check format and content		Ok
Msg 24 Class B “CS” static data, Part A	Check that message is output	Optional	Ok
	Check format and content		Ok
Msg 24 Class B “CS” static data, Part B	Check that message is output	Optional	Ok
	Check format and content		Ok

5.8.2 12.8.2 Transmitted messages

12.8.2.1 Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Initiate the transmission of messages relevant for a Class B mobile station according to Table 11 by the EUT. Record transmitted messages.

12.8.2.2 Required results

Confirm that only messages as allowed by Table 11 are transmitted by the EUT.

13.06.06 Ba	Test details - Transmitted messages		
Test item	Check	Remark	Result
Initiate transmission of the messages according to table 11 by interrogation with msg 15			
Msg 1,2,3 Position report	Check that message is not transmitted	Not transmitted	Ok
Msg 4 base station report	Check that message is not transmitted	Not transmitted	Ok
Msg 5 Static and voyage related data	Check that message is not transmitted	Not transmitted	Ok
Msg 6 Addressed binary message	Check that message is not transmitted	Not transmitted	Ok
Msg 7 Binary acknowledgement	Check that message is not transmitted	Not transmitted	Ok
Msg 8 Binary broadcast message	Check that message is not transmitted	Not transmitted	Ok
Msg 9 SAR Aircraft position report	Check that message is not transmitted	Not transmitted	Ok
Msg 10 UTC and date inquiry	Check that message is not transmitted	Not transmitted	Ok
Msg 11 UTC/Date response	Check that message is not transmitted	Not transmitted	Ok
Msg 12 Safety related addressed message, addressed to EUT	Check that message is not transmitted	Not transmitted	Ok
Msg 12 Safety related addressed message, not addressed to EUT	Check that message is not transmitted	Not transmitted	Ok
Msg 13 Safety related acknowledge	Check that message is transmitted when msg 12 is processed (Response on msg 12)	Optional Msg 12 is not received	Ok
Msg 14 Safety related broadcast message	Check that message is not transmitted (Manually initiated)	Optional No Tx of msg 14	Ok
Msg 15 Interrogation	Check that message is not transmitted	Not transmitted	Ok
Msg 16 Assigned mode command	Check that message is not transmitted	Not transmitted	Ok
Msg 17 DGNSS broadcast binary message	Check that message is not transmitted	Not transmitted	Ok
Msg 18 Class B equipment position report	Check that message is transmitted (Interrogation and automatically)		Ok
Msg 19 Extended Class B equipment position report	Check that message is transmitted (Interrogation with offset)		Ok
Msg 20 Data link management message	Check that message is not transmitted	Not transmitted	Ok
Msg 21 Aids to navigation report	Check that message is not transmitted	Not transmitted	Ok

Msg 22 Channel management message	Check that message is not transmitted	Msg 22 is transmitted, with the current area in use. According to table 11 of IEC 62287 this message should not be transmitted Retest 04.07.06 Ba: No Tx of msg 22	Ok
Msg 23 Group assignment	Check that message is not transmitted		Ok
Msg 24 Class B "CS" static data, Part A	Check that message is transmitted (Interrogation and automatically)		Ok
Msg 24 Class B "CS" static data, Part B	Check that message is transmitted (Interrogation and automatically)		Ok

5.8.3 12.8.3 Use of safety related Message 14

This test is only applicable if Message 14 is implemented.

12.8.3.1 Method of measurement

Check manufacturer's documentation.

a) Initiate transmission of Message 14 as specified by the manufacturer.

b) Repeat initiation twice a minute

12.8.3.2 Required results

a) Verify that the data content of Message 14 is predefined and the transmission cannot exceed one time period (see Table 12).

b) Verify that the EUT only accepts the initiation of a Message 14 once a minute without automatic repetition.

13.06.06 Ba	Test details - Use of safety related message 14			
Test item	Check		Remark	Result
Check manufacturers documentation				
a) Send msg 14	Check that the content of msg 14 is predefined	Message content cannot be changed.		Ok
	Check that msg 14 cannot exceed one time period	Message content cannot be changed and therefore cannot exceed one slot		Ok
	Check content of msg 14 on VDL	Currently the text "MAYDAY@@@@@@@@@@" is transmitted I recommend to remove the "@@@@@@@@@@" <u>Retest 02.08.06 Ba:</u> Could not be retested because EUT did not transmit a msg 14. The setting was according to the SRM request as shown in the attached log file. I pressed the SRM button up to 10 s <u>Retest 04.09.06 Ba:</u> The text content has been changed to "MAYDAY MAYDAY", without and additional "@"		Ok
b) Repeat initiation of msg 14 twice a minute	Check that msg 14 is transmitted only once	After transmission a blue LED indicates for one minute that no further transmission is possible		Ok

6 13 Specific tests of network layer

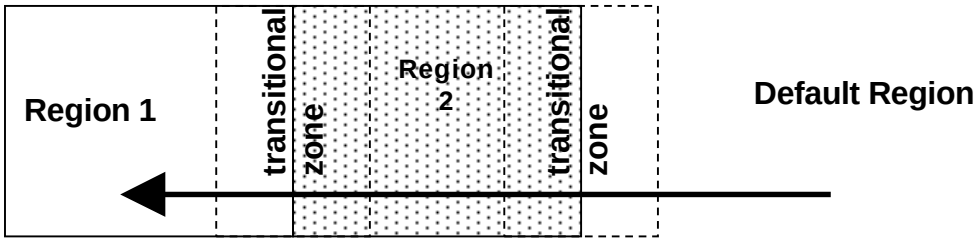
(see 7.4)

6.1 13.1 Regional area designation by VDL message

13.1.1 Method of measurement

Set up standard test environment. Apply channel management messages (Message 22) to the VDL defining two adjacent regional areas 1 and 2 with different channel assignments for both regions and a transitional zone extending 4 NM either side of the regional boundary

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. This can be accomplished by either using a dedicated test input for simulated position information or a GNSS simulator.



	Primary channel	Secondary channel
Region 1	CH A 1	CH B 1
Region 2	CH A 2	CH B 2
Default region	AIS 1	AIS 2

Figure 2 – Regional area scenario

13.1.2 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 (see Table 26). EUT shall revert to default autonomous operation on the regional channels after leaving the transitional zones.

Table 26 – Required channels in use

	Area	Channels in use
1	Default region	AIS 1, AIS 2
2	First transitional zone	AIS 1, CH A 2
3	Region 2	CH A 2, CH B 2
4	Second transitional zone	CH A 2, CH A 1
5	Region 1	CH A 1, CH B 1

13.06.06 Ba	Test details part 1 – Channel management by VDL msg 22		
Test item	Check	Remark	Result
Set-up EUT in autonomous mode transmitting on channel AIS 1/AIS 2, send 2 Msg 22 by VDL generator, defining 2 adjacent areas with channels A1, B1 and A2, B2. Use external sensor input to simulate a voyage through both areas. Set transitional zone to 4nm. Set the position outside the areas. "TZ" is used for "transitional zone" Set the positions near the limits of the transitional zones to check the dimensions Msg: "B Msg 22 Test 13.1 Area1" and " B Msg 22 Test 13.1 Area2"			
Area 1: In high sea area	Check that channels AIS 1 and AIS 2 are in use		Ok
Area 2: Move position into outer TZ of region 2	Check the limit of the TZ (5 NM = 8.8 minutes)		Ok
	Check that channel AIS 1 and A2 are used		Ok
	Check that reporting rate is doubled		Ok
Crossing the area border	Check the border of area	Indicated by ACA output	Ok
Area 3: Move position into region 2 (out of TZ)	Check the limit of the TZ (4 NM = 7 minutes)		Ok
	Check that channel A2 and B2 are used		Ok
	Check that reporting rate is changed back to normal reporting rate		Ok
Area 4: Move position into TZ between region 1 and 2, inside area 2	Check that channels A2 and A1 are used		Ok
	Check that reporting rate is doubled		Ok
crossing the area border	Check the border of area	Indicated by ACA output	Ok
Area 5: Move position into region 1 (out of TZ)	Check that channels A1 and B1 are used		Ok
	Check the limit of the TZ (4 NM = 7 minutes)		Ok
	Check that reporting rate is changed back to normal reporting rate		Ok
Item 6: Move position into TZ of region 1 to high sea	Check that channels A1 and AIS 1 are used		Ok
	Check that reporting rate is doubled		Ok
Area 7: Move position out of the TZ of region 1, into high sea	Check that channels AIS 1 and AIS 2 are used		Ok
	Check that reporting rate is changed back to normal reporting rate		Ok

6.2 13.2 Regional area designation by serial message or manually

13.2.1 Method of measurement

Check documentation.

13.1.2 Required result

Verify that the user cannot allocate channels (directly or by ACA sentence).

13.06.06 Ba	Test details - Regional area designation		
Test item	Check	Remark	Result
Check documentation			
Serial message or manual input	Check that the user cannot enter area settings	No device to enter area settings (no display)	Ok
	Check that the user cannot change the channels on another way	According to the manual area setting can only be entered by msg 22 and DSC. ACA inputs to the serial port are ignored	Ok

6.3 13.3 Management of received regional operating settings

6.3.1 13.3.1 Replacement or erasure of dated or remote regional operating settings

13.3.1.1 Method of measurement

Set up standard test environment. Send a valid regional operating setting to the EUT by Message 22 with the regional operating area including the own position of the EUT. Consecutively send a total of seven valid regional operating settings to EUT, using Message 22, with regional operating areas not overlapping to the first and to each other. Perform the following in the order shown:

a) send a ninth Message 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 Message 22 sent to the EUT previously;

Step 2: send a tenth Message 22 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 Message 22.

This test can be accomplished by either using the test input for simulated position information or a GNSS simulator (see also Annex D).

13.3.2 Required results

After the initialisation, the EUT shall operate according to the regional operating settings defined by the first Message 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 are erased due to Step 2, and since there is no other regional operating setting due to their non-overlapping definition, the EUT returns 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.

13.06.06 Ba	Test details – Test of replacement or erasure of dated or remote regional operating settings		
Test item	Check	Remark	Result
Send by msg 22 • 1 area including own position • 7 areas not overlapping, not including own position Msg: "B Msg 22 Test 13.3.1 Area1... Area8"			
Check active area	Check that EUT uses the channels of area 1		Ok
a) Send a 9. msg 22 to the EUT not overlapping the previous areas Msg: "B Msg 22 Test 13.3.1 Area9"	Check that the EUT returns to the default operating settings (the area is deleted)		Ok
b) step 1: Set own position to any of the 7 areas	Check channels of area 2		Ok
	Check channels of area 3		Ok
	Check channels of area 4		Ok
	Check channels of area 5		Ok
	Check channels of area 6		Ok
	Check channels of area 7		Ok
	Check channels of area 8		Ok
	Check channels of area 9		Ok
b) step 2: Send an area 10, overlapping the area of step 1 not including own position Msg: "B Msg 22 Test 13.3.1 Area10"	Check that the EUT returns to the default operating settings (the area is deleted)		Ok
c) Step 1: Erasure by distance: Move own position of EUT to a distance of more than 500 miles from all regions defined by previous commands	Check that the EUT operates with the default settings		Ok
Step 2: Check of erasure: Set own position of EUT to within all regions defined by the previous telecommands. b) step 1: Set own position to any of the 7 areas	Check area 2 = default		Ok
	Check area 3 = default		Ok
	Check area 4 = default		Ok
	Check area 5 = default		Ok
	Check area 6 = default		Ok
	Check area 7 = default		Ok
	Check area 8 = default		Ok
	Check area 10 = default		Ok

6.3.2 13.3.2 Channel management by addressed Message 22

13.3.2.1 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 Message 22 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 Message 22 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 command into an area without regional operating settings.

13.3.2.2 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.

13.06.06 Ba	Test details – Test of addressed message 22		
Test item	Check	Remark	Result
All areas are erased by the previous test			
a) Send msg 22 with a new area, position inside Msg: "B Msg 22 Test 10.4.1"	Check, that the EUT uses the regional operating settings		Ok
b) Send an addressed msg 22 to the EUT with different regional operating settings Msg: "B Msg 22 Test 13.3.2 b"	Check, that the EUT uses the settings of the new message		Ok
c) Move the position out of the area	Check, that the EUT uses the default channels		Ok

6.3.3 13.3.3 Invalid regional operating areas

This test is to check the rejection of invalid regional operating areas (three regional operating areas with same corner).

13.3.3.1 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:

a) send three different valid regional operating settings with adjacent regional operating areas, their corners within eight miles of each other, to the EUT by Message 22. The current own position of the EUT shall be within the regional operating area of the third regional operating setting;

b) move current own position of the EUT consecutively to the regional operating areas of the first two valid regional operating settings.

13.3.3.2 Required test results

c) Check, that the EUT uses the operating settings that were in use prior to receiving the third regional operating setting.

d) Check, that the EUT consecutively uses the regional operating settings of the first two received regional operating areas.

13.06.06 Ba	Test details – Test for invalid regional operating areas		
Test item	Check	Remark	Result
a) Send three different valid regional with adjacent corners by msg 22, Position inside 3rd area. Msg: "B Msg 22 Test 13.3.1 Area6" Msg: "B Msg 22 Test 13.3.1 Area7" Msg: "B Msg 22 Test 13.3.3"	Check, that the default channels are used		Ok
b) Move own position to the first area	Check, that the EUT uses the operational settings of the first area		Ok
Move own position to the second area	Check, that the EUT uses the operational settings of the second area		Ok

6.3.4 13.3.4 Continuation of autonomous mode reporting rate

13.3.4.1 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 interval.

13.3.4.2 Required result

Ensure that the autonomous reporting interval is maintained.

13.06.06 Ba	Test details – Continuation of autonomous mode reporting rate		
Test item	Check	Remark	Result
Set the EUT into a transitional zone Send an assignment command using msg 23 to the EUT with a different reporting interval Area setting msg Msg: "B Msg 22 Test 10.4.1" Reporting interval: Msg: "B Msg 23 Test 10.2.2.1 T1"			
Assignment command in a transitional zone	Check that an rate assignment command is ignored in a transitional zone		Ok

6.3.5 13.3.5 Other conditions

The fulfilment of all other conditions of 7.4.2 shall be self-certified by the manufacturer.

Date	**Result**	**Status**
13.06.06 Ba	No self-certification required	Ok

7 C.3 DSC functionality tests

7.1 C.3.1 General

For the tests in this clause (see also IEC 61993-1), set the EUT into assigned mode using channels AIS 1 and AIS 2 with a reporting interval of 10 s.

Check with a sequence of valid calls consisting of a DSC channel management 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's AIS operation is not affected by the interleaved calls.

10.07.06 Ba	Test details– Sequence of 5 calls		
Test item	Check	Remark	Result
Activate DSC function Set reporting interval to 10 s and record VDL			
Start DSC transmission of test sentence File: sequence_C3_1.sst" Delay between the calls is 5 s	Check that the schedule of the AIS position reports is not affected by the transmission of the DSC calls		Ok

7.2 C.3.2 Regional area designation

Perform the following tests using the DSC channel management test signal number 1.

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.

10.07.06 Ba	Test details - Regional area designation		
Test item	Check	Remark	Result
Activate DSC function			
Start DSC transmission of test sentence	Check that the area setting of the DSC command is correctly stored		Ok
File: area_set_region_2084_2086.sst"	Check that the transitional zone size is 5 NM		Ok

7.3 C.3.3 Scheduling

Check that the EUT's AIS reporting is not affected during the DSC monitoring times.

Send a valid geographical call to the EUT. Check that a response is not transmitted.

10.07.06 Ba	Test details (b) – Sequence of 5 calls		
Test item	Check	Remark	Result
Set reporting interval to 10 s and record VDL Msg: B Msg 23 Test 10.2.2.1 T3			
DSC monitoring times	Check that the AIS reporting is not affected during the DSC monitoring times		Ok
File: area_set_region_2084_2086.sst"	Check that not response is transmitted		Ok

7.4 C.3.4 DSC flag in Message 18

Check that the DSC flag is set properly when DSC functionality is available.

10.07.06 Ba	Test details – DSC flag		
Test item	Check	Remark	Result
Record VDL			
DSC activated	Check that the DSC flag is set		Ok
DSC inactivated	Check that the DSC flag is not set	DSC flag is set See Note) Retest 22.08.06 Ba: The DSC flag is cleared if DSC is inactivated	Ok

Note:
The standard is not very clear regarding the DSC flag. It only says: "(not) equipped with DSC function.

I think the main purpose of the DSC flag is to indicate mainly to the base station if it can be controlled by DSC channel management. Therefore I think if the DSC function is disabled by configuration for the other stations it is identical to "not equipped with DSC function", and the DSC flag should not be set.

7.5 C.3.5 DSC monitoring time plan

Check that DSC commands are received during DSC monitoring times and, if time-sharing is used, are not received outside those times.

10.07.06 Ba	Test details (b) – DSC monitoring time plan		
Test item	Check	Remark	Result
Delete all area settings			
Send a DSC area setting outside the monitoring time	If time-sharing is used: Check that the channels are not changed		Ok
	If time-sharing is **not** used: Check that the channels are changed according to the area setting		N/A
Send a DSC area setting inside the monitoring time	Check that the channels are changed according to the area setting		Ok

7.6 C.3.6 Replacement or erasure of dated or remote regional operating settings

Method of measurement

Set up standard test environment. Send a valid regional operating setting to the EUT by Message 22 with the regional operating area including the own position of the EUT. Consecutively send a further seven (7) valid regional operating settings to EUT, using both Message 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 Message 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 NM 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 initialisation, the EUT shall operate according to the regional operating settings defined by the first Message 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 are erased due to Step 2, and since there is no other regional operating setting due to their non-overlapping definition, the EUT returns 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.

10.07.06 Ba	Test details – Test of replacement or erasure of dated or remote regional operating settings		
Test item	Check	Remark	Result
Send by DSC and msg 22 • 1 area including own position by MSG 22 (Msg: B Msg 22 Test 13.3.1 Area 1...4) • 7 areas not overlapping, not including own position, first 3 by msg 22, last 4 by DSC			
Check active area	Check that EUT uses the channels of area 1		Ok
a) Send a 9. msg 22 to the EUT not overlapping the previous areas	Check that the EUT returns to the default operating settings (the area is deleted)		Ok
b) step 1: Set own position to any of the 7 areas	Check channels of area 2	Check by evaluation of ACA output on request	Ok
	Check channels of area 3		Ok
	Check channels of area 4		Ok
	Check channels of area 5		Ok
	Check channels of area 6		Ok
	Check channels of area 7		Ok
	Check channels of area 8		Ok
	Check channels of area 9		Ok
b) step 2: Send an area 10 by DSC, overlapping the area 2 of step 1 not including own position	Check that the EUT returns to the default operating settings (the area is deleted)		Ok
c) Step 1: Erasure by distance: Move own position of EUT to a distance of more than 500 miles from all regions defined by previous commands	Check that the EUT operates with the default settings		Ok
<u>Step 2: Check of erasure</u>: Set own position of EUT to within all regions defined by the previous telecommands. b) step 1: Set own position to any of the 7 areas	Check area 2 = default	Check by evaluation of ACA output on request	Ok
	Check area 3 = default		Ok
	Check area 4 = default		Ok
	Check area 5 = default		Ok
	Check area 6 = default		Ok
	Check area 7 = default		Ok
	Check area 8 = default		Ok
	Check area 10 = default	Was not stored	Ok

7.7 C.3.7 Test of addressed telecommand

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 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 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.

10.07.06 Ba	Test details – Test of addressed telecommand		
Test item	Check	Remark	Result
All areas are erased by the previous test			
a) Send a DSC call with a new area, position inside	Check, that the EUT uses the regional operating settings		Ok
b) Send an addressed DSC call to the EUT with different regional operating settings	Check, that the EUT uses the settings of the new message		Ok
c) Move the position out of the area	Check, that the EUT uses the default channels		Ok

7.8 C.3.8 Invalid regional operating areas

Test for invalid regional operating areas (three regional operating areas with same corner).

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:

a) send three different valid regional operating settings with adjacent regional operating areas, their corners within eight miles of each other, to the EUT by 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 setting;

b) move current own position of the EUT consecutively to the regional operating areas of the first two valid regional operating settings.

This test can be accomplished by either using a dedicated test input for simulated position information or a GNSS simulator.

Required test 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.

10.07.06 Ba	Test details – Test for invalid regional operating areas		
Test item	Check	Remark	Result
a) Send three different valid regional with adjacent corners by DSC area call, Position inside 3rd area.	Check, that the default channels are used	Check by evaluation of ACA output on request	Ok
b) Move own position to the first area	Check, that the EUT uses the operational settings of the first area	Check by evaluation of ACA output on request	Ok
Move own position to the second area	Check, that the EUT uses the operational settings of the second area	Check by evaluation of ACA output on request	Ok

Annex A Test equipmen t

A.1 Test equipment summary

#	description	type	identification
1	VDL analyser / Generator	Attingimus UAIS Test unit	S/N 001 BSH PC5593 SW AISterm V1.0rev47 AISmain V1.47011120R
2	Target simulator	Simutech	BSH PC3007 SW BSHSIM7T
3	Presentation Interface Monitor	BSH	BSH PC 3481 BSH PC 5508 SW NewMoni V2.1
4	DSC Test box	DEBEG 3817 DEBEG 6348	S/N 475533
	Auxiliaries:		
5	Digital Multimeter	Voltcraft	S/N 1010365036
6	Oscilloscope	Le Croy Wavesurver 422	BSH 106106/2005
7	5 Converters RS 422 to RS 232		
8	1 fixed voltage power supply (24 V/10A)		
9	3 adjustable power supplies (30 V/5 A)		
10	active retransmitting GPS antenna		

for a description of pos. 1-4 see below

A.1.1 VDL analyser / generator

The VDL analyser/generator:

- receives the radio data telegrams transmitted by the AIS under test, slotwise evaluates their radio parameters (field strength, SNR, etc.) and provides a transparent display of the decoded radio data telegrams (VDL messages).
- transmits radio data telegrams which have been entered/edited via a control panel. The AIS under test receives these messages and either passes the received data to it's presentation interface and/or responds as appropriate.
- records all data contained in the received radio telegrams and radio parameters in a data base for offline evaluation and documentation purposes.
- simulates AIS targets by transmitting position reports of virtual targets up to the maximum channel capacity.

A.1.2 Target simulator

The target simulator consists of a standard PC with

- special Radar and Target Simulator software
- extension boards for generation of Radar signals and RS422 serial output signals

Connection of AIS Test system
For tests of AIS transponders the data of 60 moving targets defined in the Radar Simulator are transferred to the VDL Generator and transmitted on VHF. Thus the AIS VHF data link is loaded with simulated AIS targets.
Connection of display systems
Radar systems as well as ECDIS systems will have the ability to receive, process and display AIS information in the near future. In order to test this feature the data of moving targets defined in the Radar Simulator are transferred to the RADAR (together with video, sensor data etc as known).
Connection of AIS under Test
The AIS under test can be connected to the own ship sensor outputs in order to provide full control over own ships dynamic data (for tests of reporting rates, channel management...).

A.1.3 Presentation Interface Monitor

The Presentation Interface Monitor is a PC software running on two standard PCs.
It is used to

- simulate Sensor inputs
- analyse the AIS high speed input / output
- analyse the AIS long range function
- generate DSC calls for the DSC test box and to display, log and evaluate the received DSC calls from EUT.

For that purpose it includes the functions:

- coding / decoding of NMEA 6-bit data fields
- online AIS message filtering
- online AIS message editing
- load and transmit predefined sequences
- online modification of transmitted sequences

A.1.4 DSC Test box

The DSC test box includes:

- A standard VHF DSC controller DEBEG 3817 with open interface
- A standard VHF radiotelephone DEBEG 6348

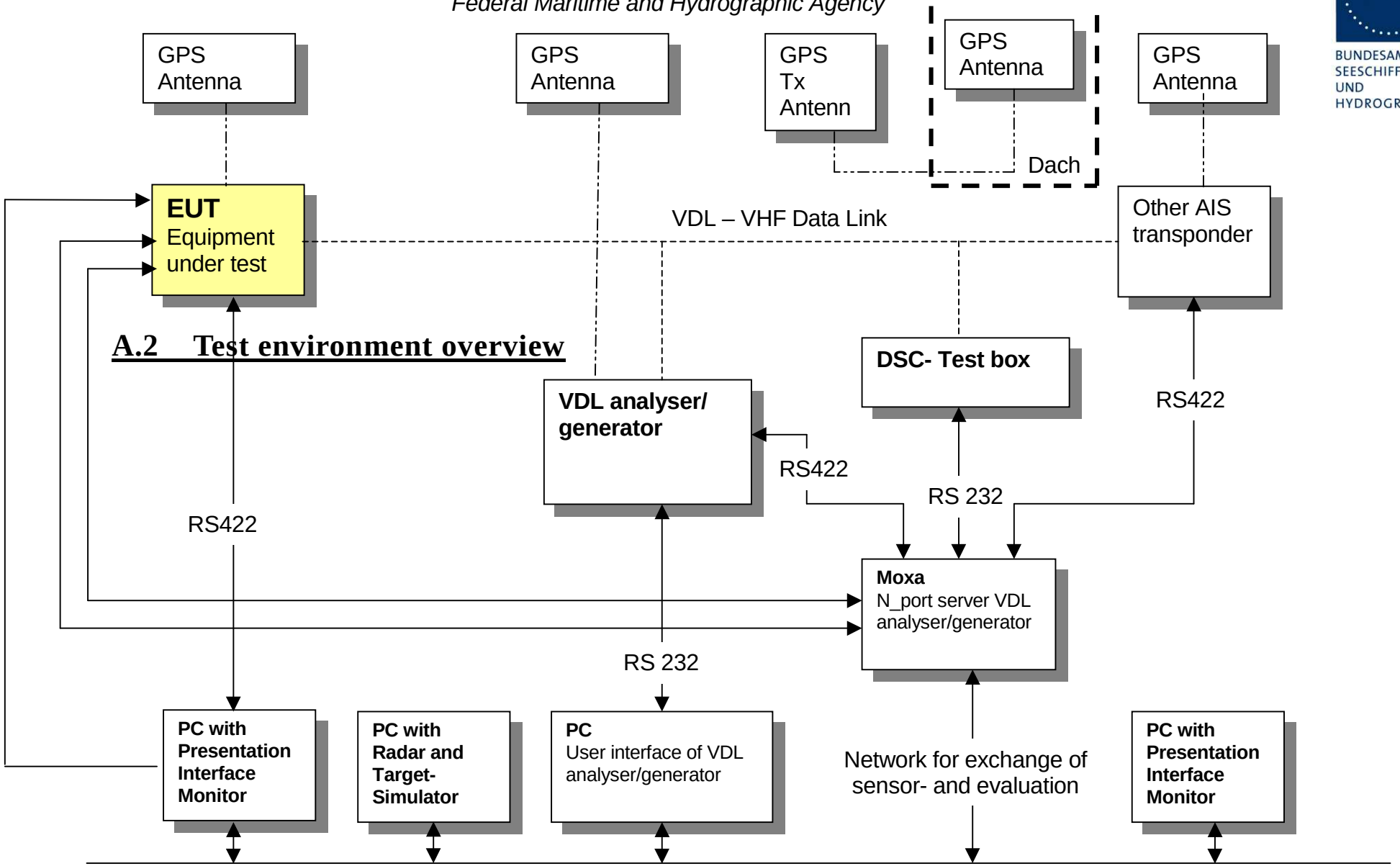
The software modification of the DSC controller comprises a remote control input/output facility

- to transmit DSC calls according to ITU 825-3 generated in an external device on DSC channel 70 and
- to output received DSC calls from the EUT to the external device.

The Presentation Interface Monitor is used to generate the DSC calls and to display, log and evaluate the received DSC calls.

BUNDESAMT FÜR SEESCHIFFFAHRT UND HYDROGRAPHIE

A.2 Test environment overview



Annex B Test sentences

B.1 IEC 61162 test sentences

Many of the test sentences are modified manually during the test according to the requirements of the actual test items.
Mainly the MMSI in all addressed sentences are adapted to the actual MMSI of the EUT or of the unit the EUT communicates with.
In addition the files containing these sentences contain also some control information used by the monitor program like:

<UTC> is replaced by the actual UTC time at time of output
<WAIT EVENT> waiting for user action before next output
<WAIT xxxx> waiting xxx ms before next output

This control information is not shown in the following sentence examples because it is not sent to the EUT.

B.1.1 Sensor input

Sensor input sentences	
File name	Description
Sentences	
AIS01_gll_vtg_hdt_rot.sst	Standard sensor input sentences

`$GPGLL,5330.1234,N,01001.2345,E,141800.00,A,A`
`$GPVTG,350.0,T,,M,10.0,N,,K,A`
`$TIHDT,359.9,T`
`$TIROT,0.0,A`	

B.2 DSC sentences

The sentences are listed as they are applied to the DSC Testbox for transmission of DSC test calls. There is a special format used based on an earlier definition of NMEA private sentences.

The frame for transmitting a DSC call is:
`$PDEBT,CCDSC,T,00014600<call content>FF`

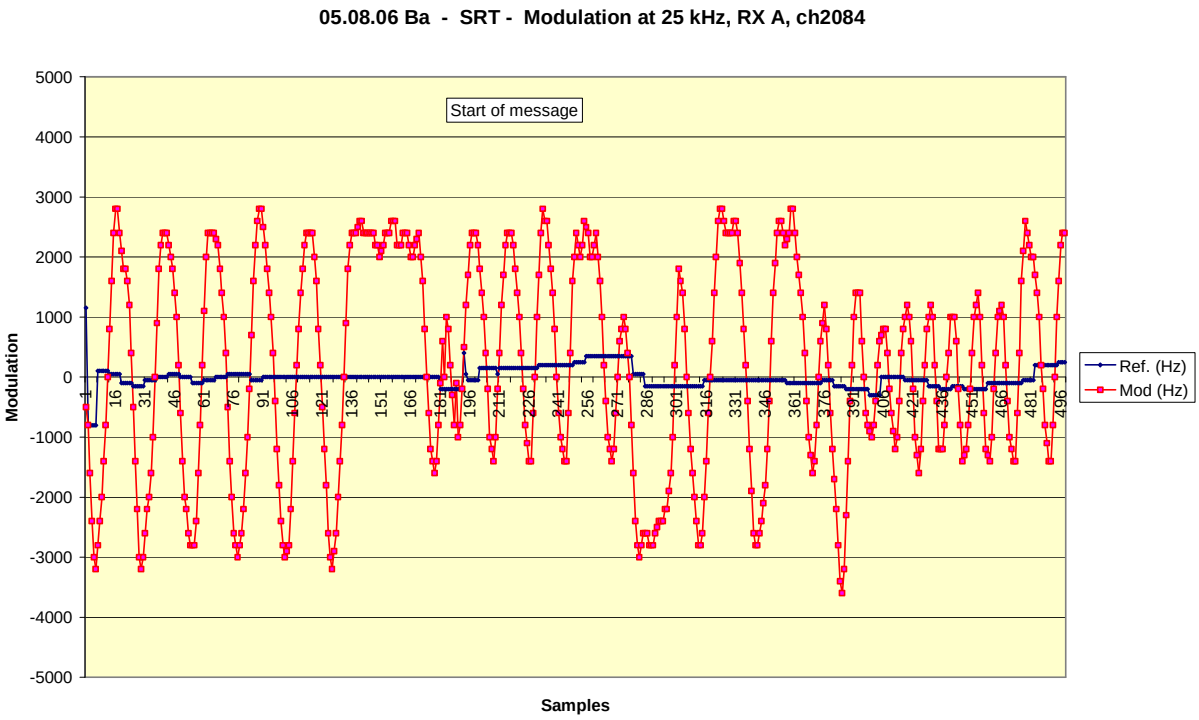
The <call content> has to be entered in Hex code, 2 hex numbers for each 7 bit DSC symbol, without spaces, beginning with the format specifier which included only ones. The DSC coding and addition of redundancy (3 bit symbol redundancy and symbol repetition) are done by the test box. The content description of the calls is available on request.

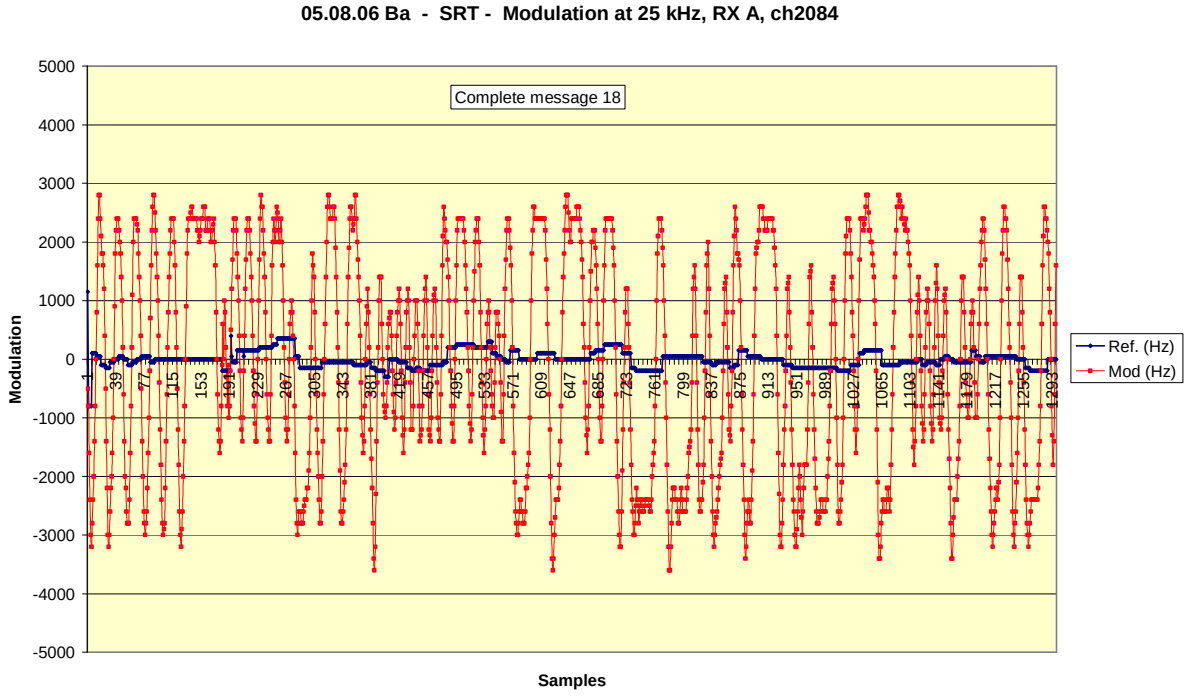
The DSC sentences include MMSI number which is changed according to the actual MMSI number the EUT

DSC Sentences	
File name	Description
Sentences	
sel_set_region.sst	Selective regional setting by DSC, standard pos. outside, channel 61
$PDEBT,CCDSC,T,0001460078000001005067150A27271E68090A3D00680A143D00680C053C00011400680D053200010A0075FF	
sel_set_region_in.sst	Selective regional setting, standard position inside, channel 72, 73, 12.5 kHz
$PDEBT,CCDSC,T,0001460078000001005067150A27271E680900480A680A00490A680C05280001030068 0D051E00005D0075FF	
sel_set_ais_channel_ch65.sst	Setting AIS channel to 65
$PDEBT,CCDSC,T,0001460078000001005067150A27271E68090A4100680A14410075FF	
sel_check_channel.sst	Test of channel use in 20.4
$PDEBT,CCDSC,T,0001460078000001010067150A27271E654875FF $PDEBT,CCDSC,T,0001460067052800000091E003C003C0067150A27271E676F75FF	
area_set_region.sst	Area addressed regional setting, standard position inside address, but not inside area, Ch 60
$PDEBT,CCDSC,T,0001460067052800000091E003C003C0067150A27271E68090A3C00680A143C00680C05 1400005A00680D050A0000500075FF	
area_set_region_20_2.sst	Area addressed regional setting for test 20.2
$PDEBT,CCDSC,T,00014600670F3200000E00005A005A0067150A27271E6809145200680A0A5200680C0F 1E00011E00680D0F140001280075FF $PDEBT,CCDSC,T,00014600670F3200000E00005A005A0067150A27271E6809145100680A0A5100680C0F 1400011E00680D0F0A0001280075FF	
Sequence_20_1sst	Area addressed regional setting, standard position inside address, but not inside area, Ch 60
$PDEBT,CCDSC,T,0001460078000001010067150A27271E676F75FF $PDEBT,CCDSC,T,0001460066060050A0A64150A27271E646E5A00487E7E7E7FFF $PDEBT,CCDSC,T,0001460078000001010067150A27271E676F75FF $PDEBT,CCDSC,T,0001460078000001010067150A27271E646E5A00487E7E7E75FF $PDEBT,CCDSC,T,0001460078000001010067150A27271E676F75FF	
Test_sequence_20_3.sst	Sequence of an area addressed call and continues transmission of other call for test of free channel check
$PDEBT,CCDSC,T,0001460067053200000091E003C003C0067150A27271E676F75FF $PDEBT,CCDSC,T,0008460078000000010167150A27271E676F75FF	

Annex C Test diagrams

C.1 GMSK modulation



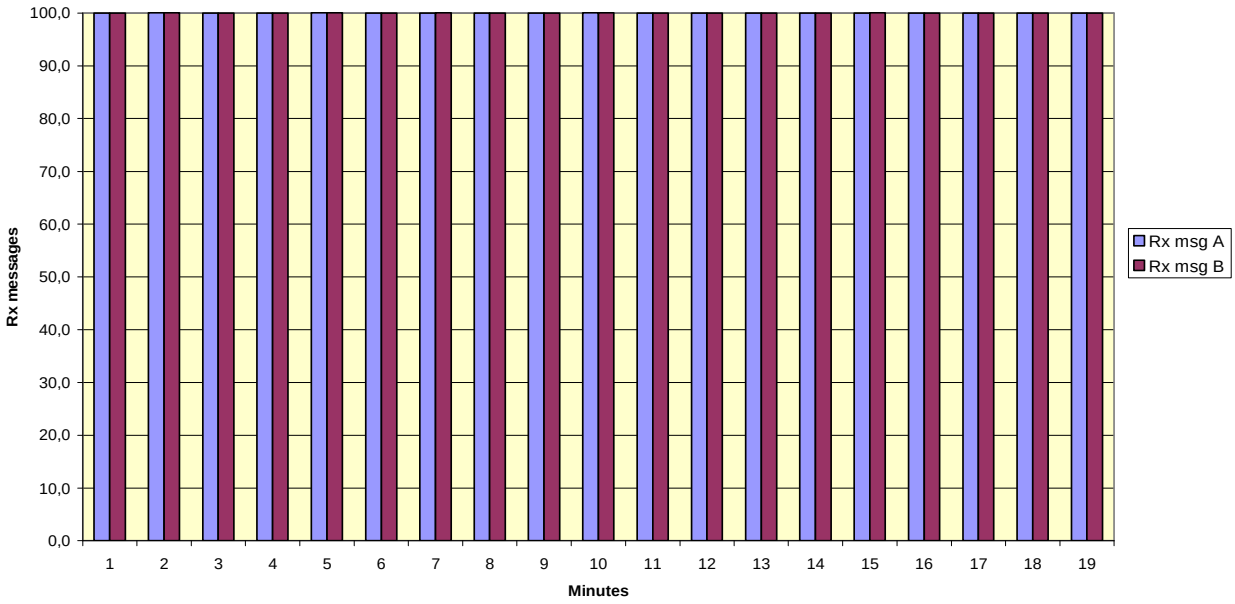


C.2 10.2.5.1 Rx performance test

03.05.06 - SRT - 10.2.1.5 PI output performance, RS232 output

Result: Average = A= 100 %, B=100%

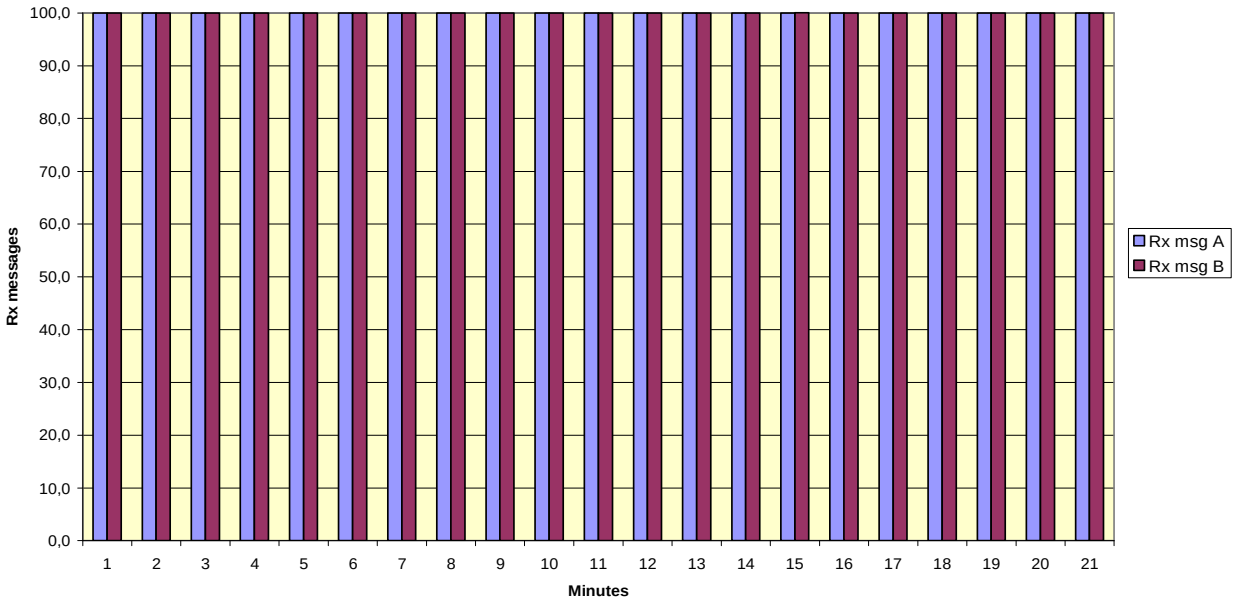
Ch A: 2087 Ch B: 2088



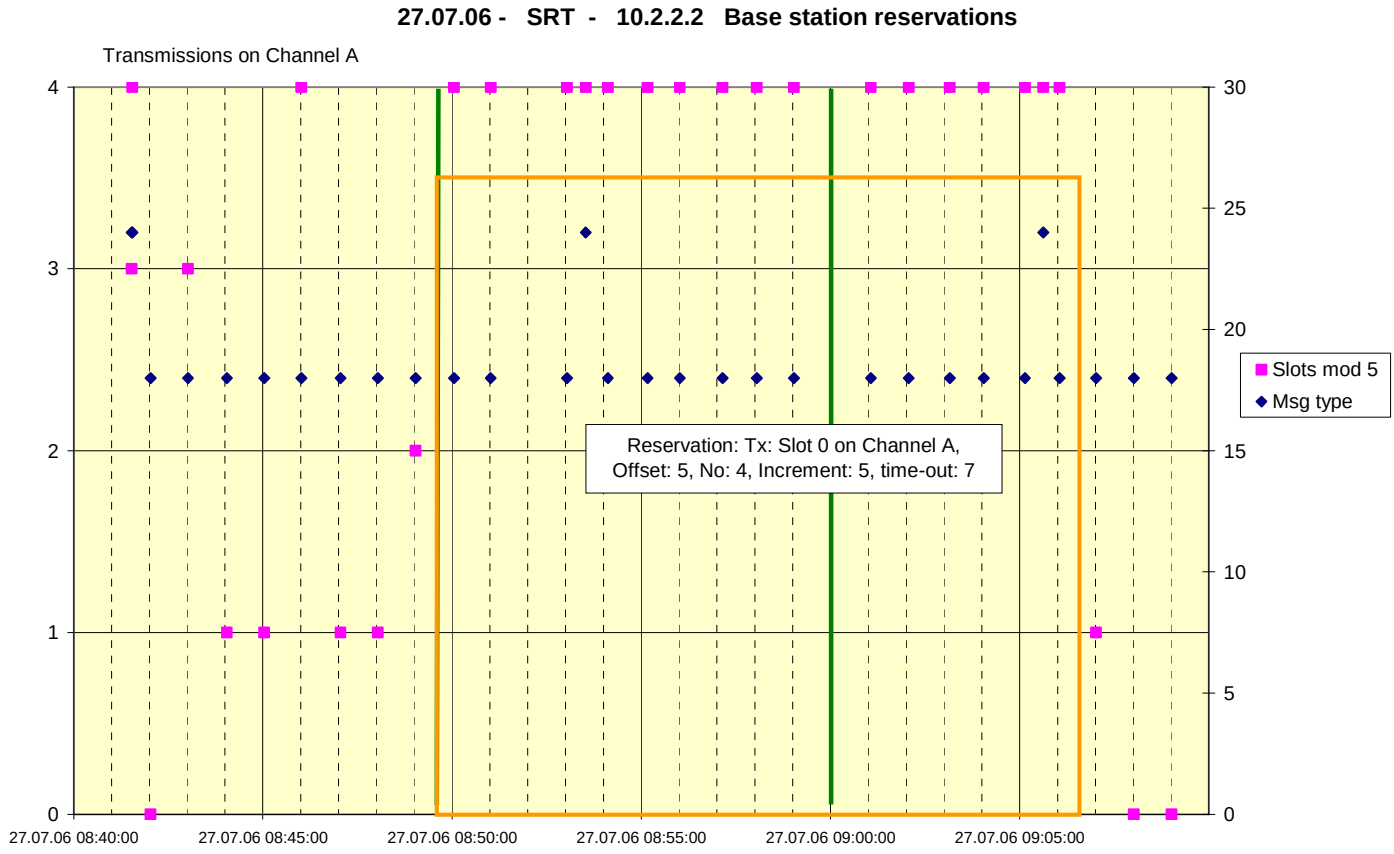
03.05.06 - SRT - 10.2.1.5 PI output performance, RS422 output

Result: Average = A= 100 %, B=100%

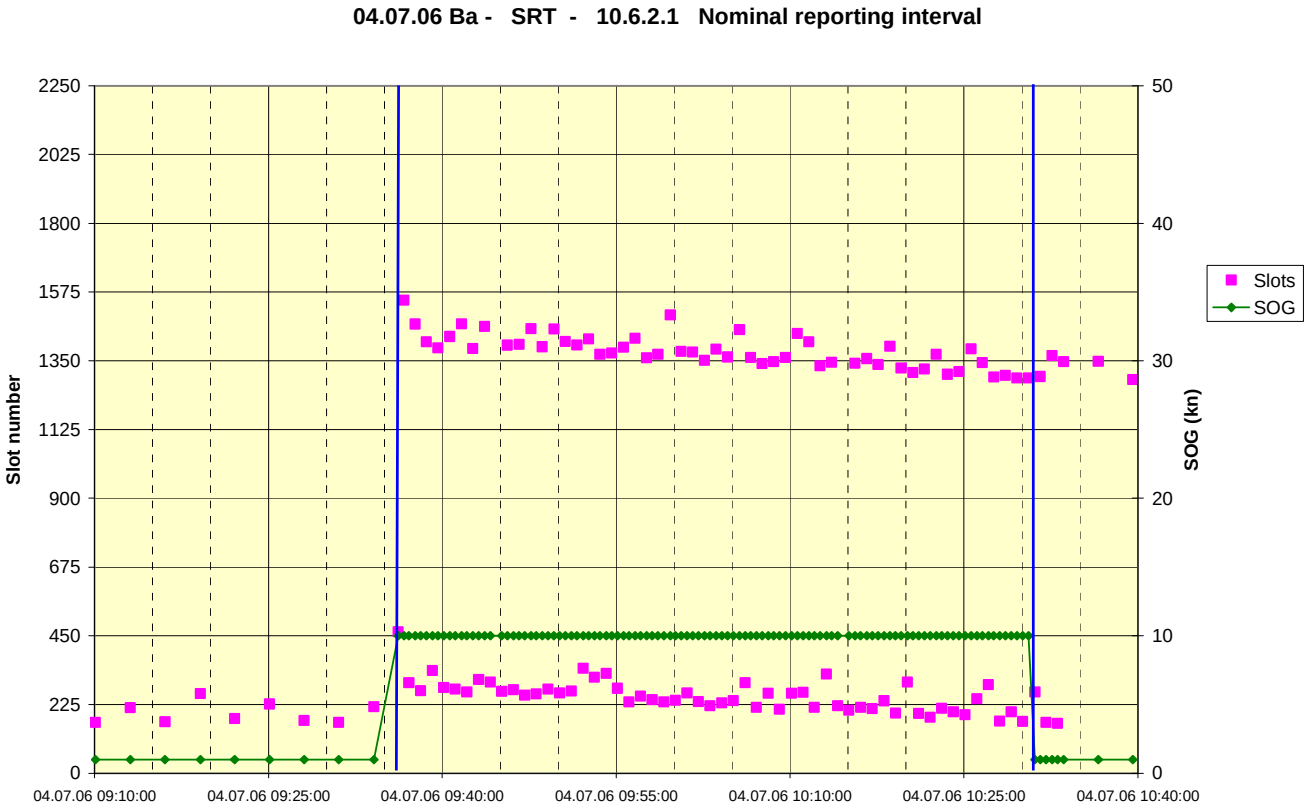
Ch A: 2087 Ch B: 2088

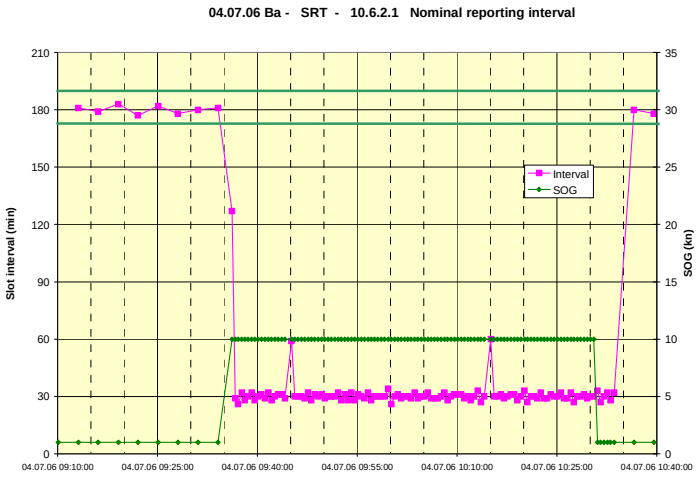


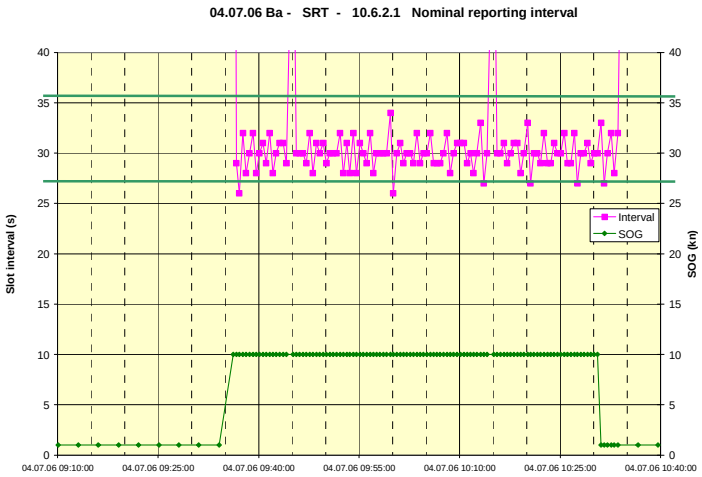
C.3 10.2.2.2 VDL state/reservations



C.4 10.6.2.1 Nominal reporting interval

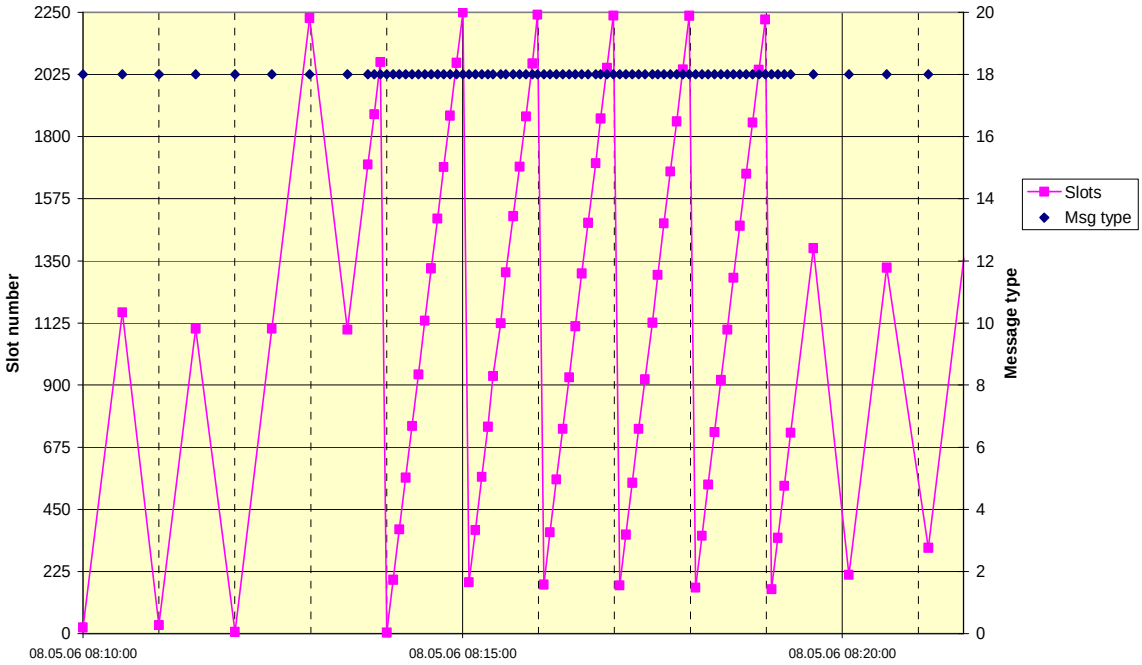




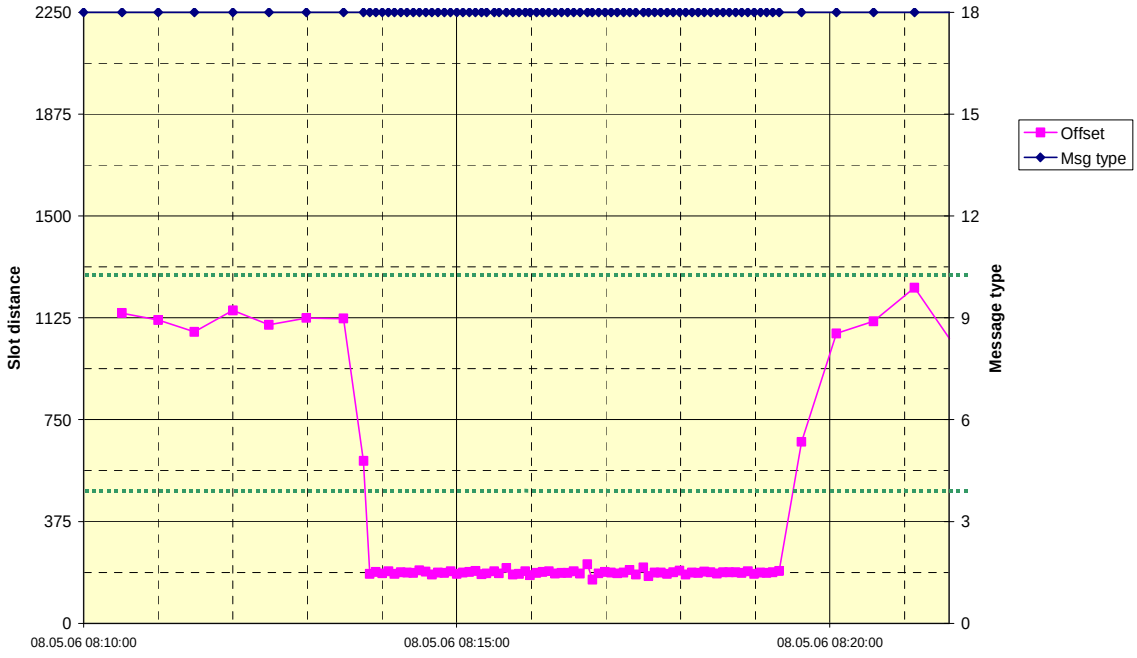


C.5 10.6.2.2 Assigned reporting interval

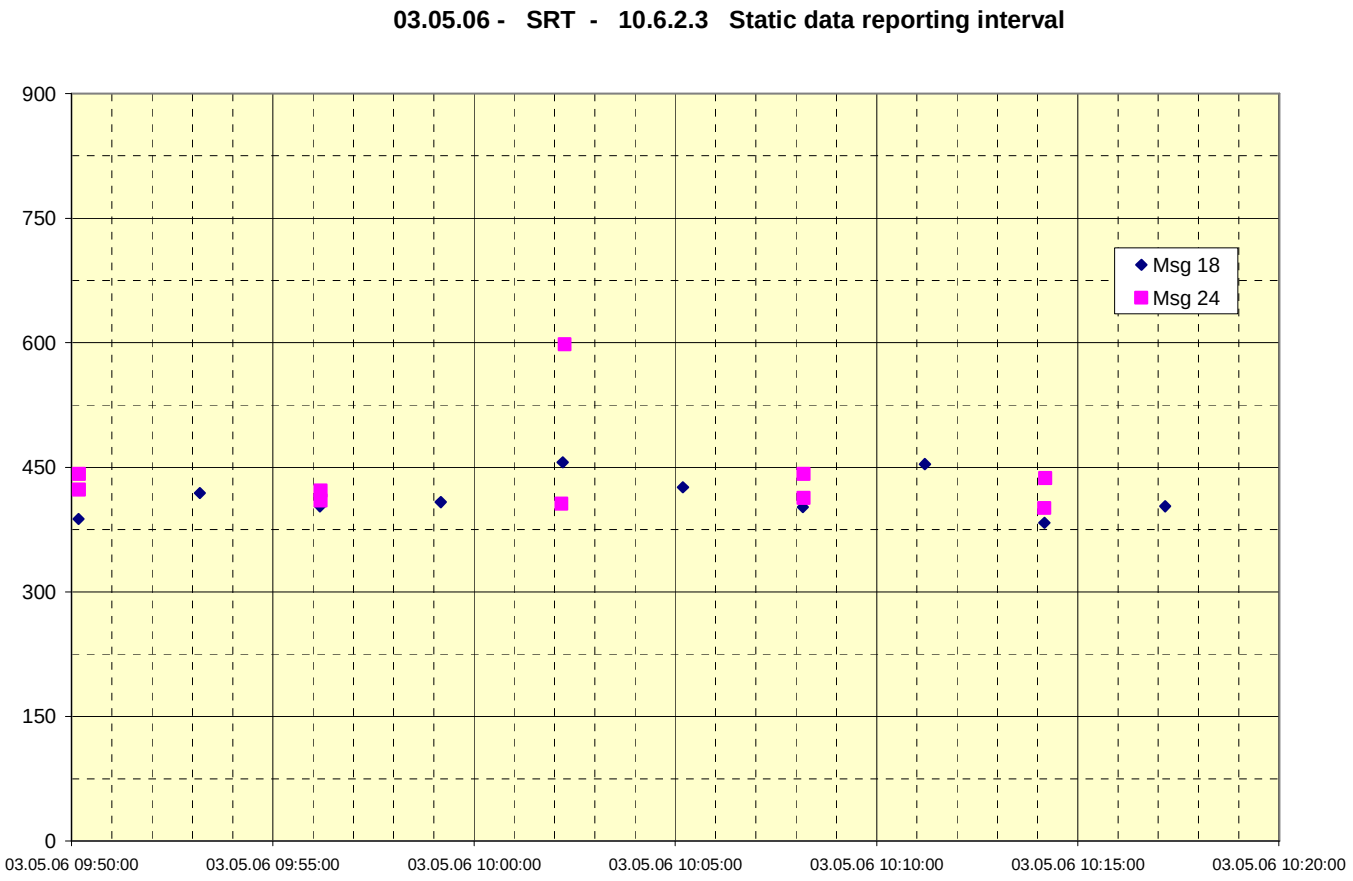
08.05.06 - SRT - 10.6.2.2 Assigned reporting interval, interval: 8 = 5 s



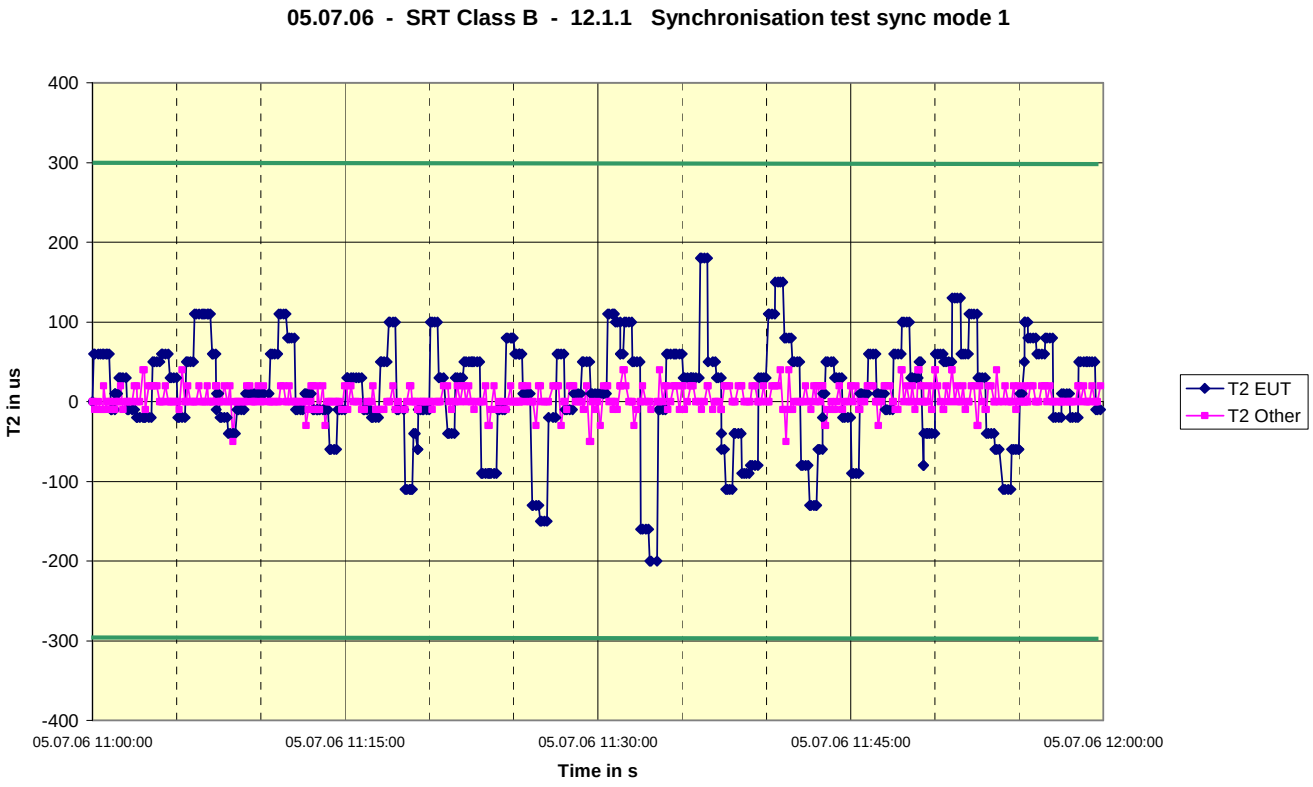
08.05.06 - SRT - 10.6.2.2 Assigned reporting interval, interval: 8 = 5 s, Slot offset

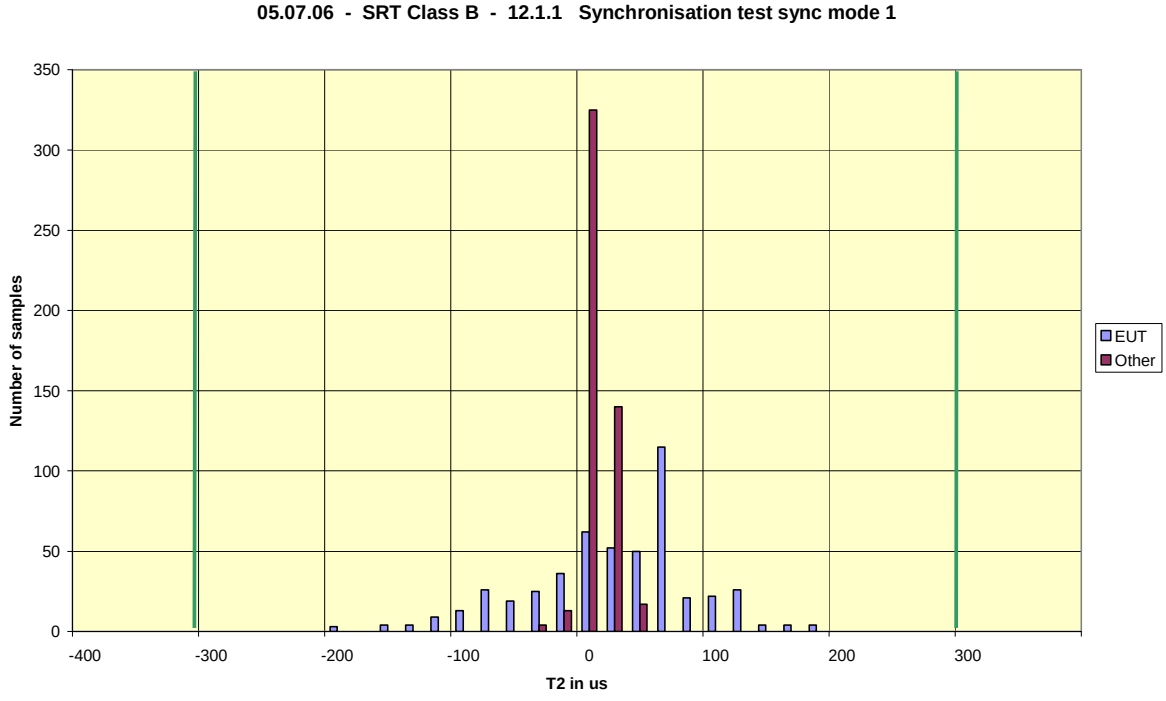


C.6 10.6.2.3 Static data reporting interval

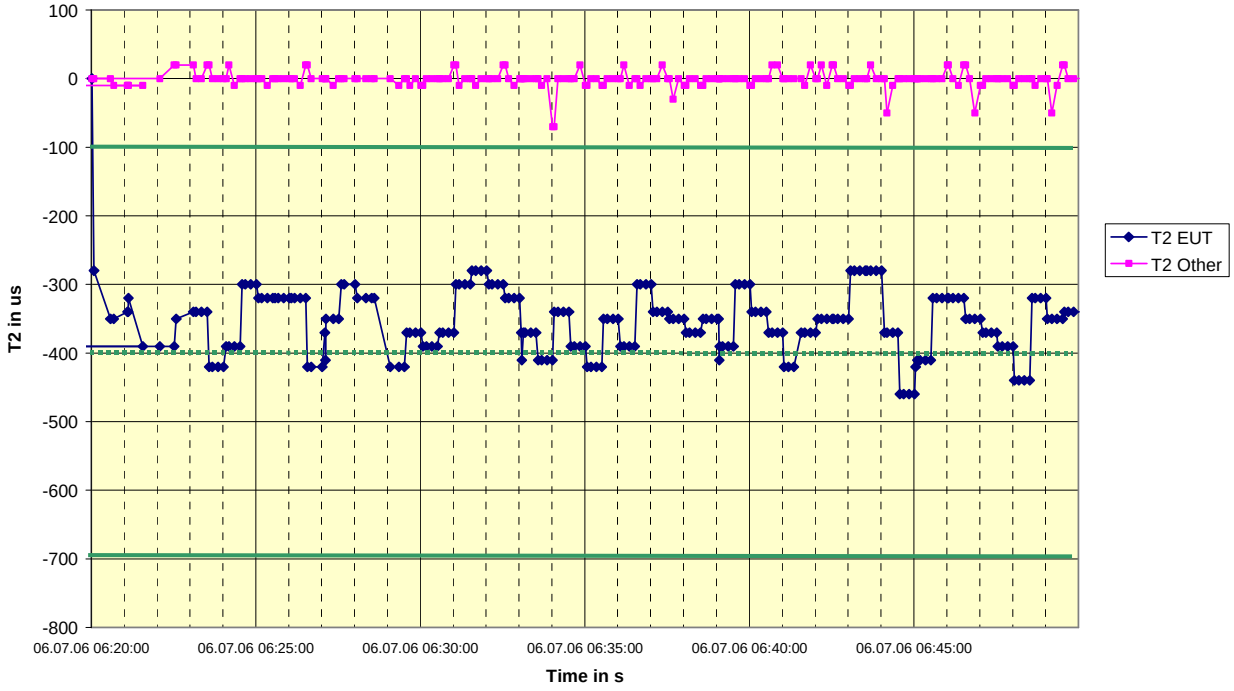


C.7 12.1.1 Synchronisation test sync mode 1

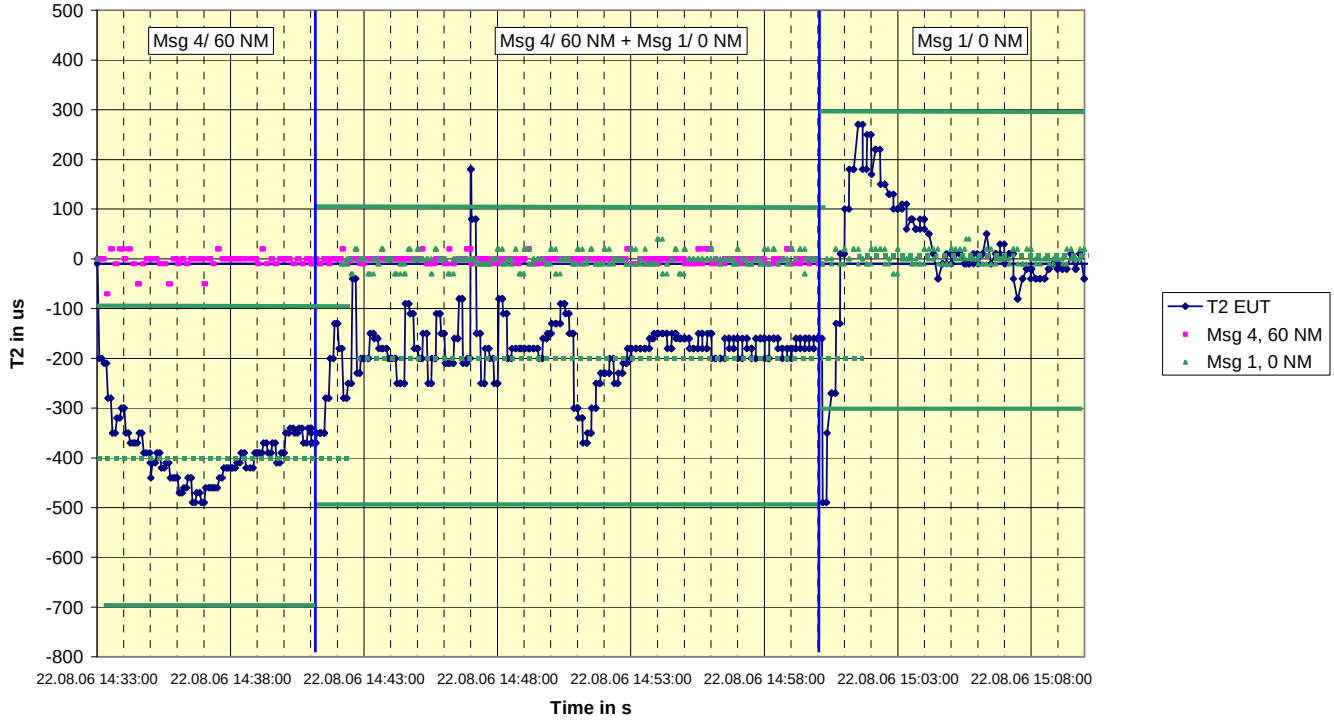




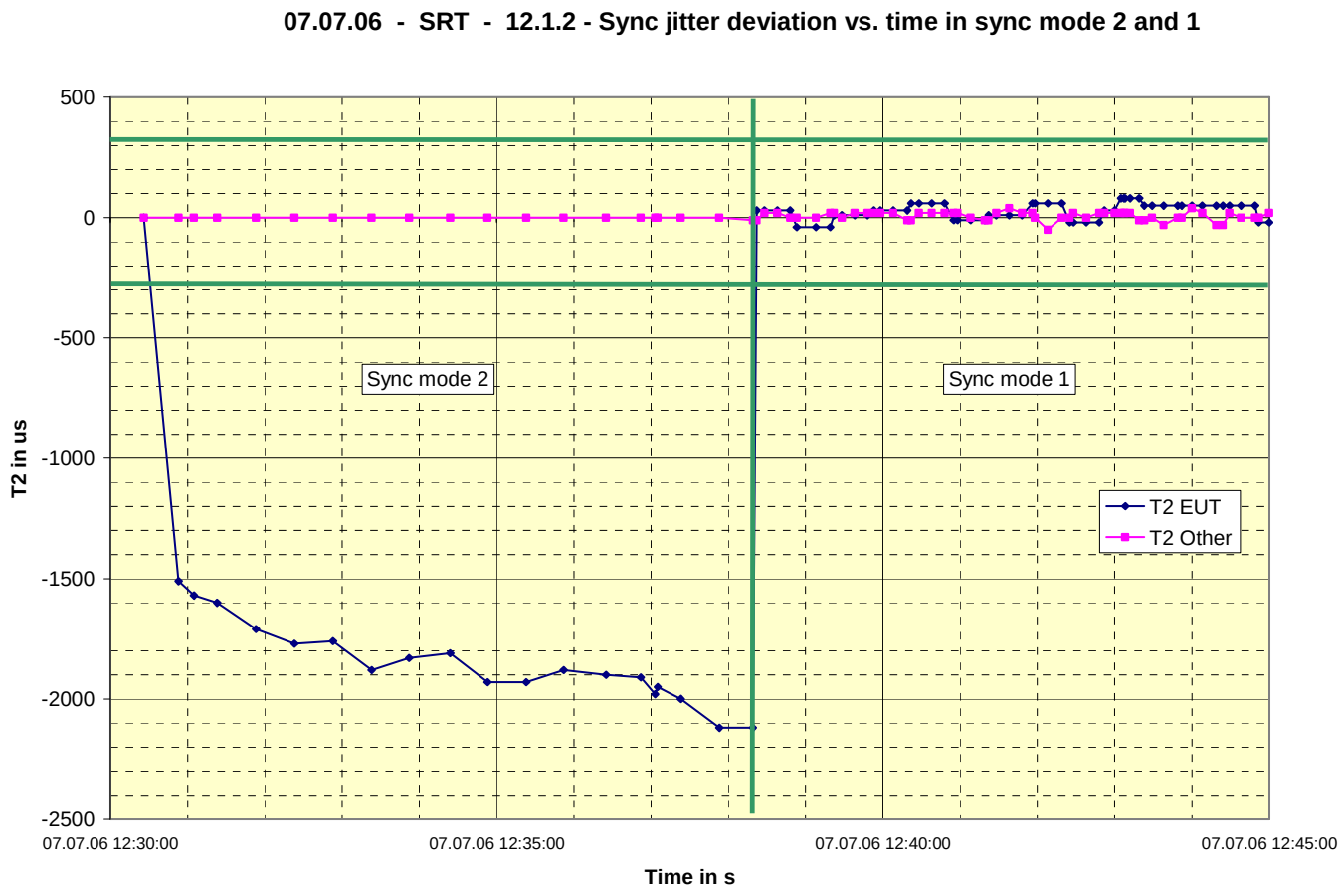
06.07.06 - SRT Class B - 12.1.1d Synchronisation test sync mode 1



07.07.06 - SRT Class B - 12.1.1e Synchronisation test sync mode 1

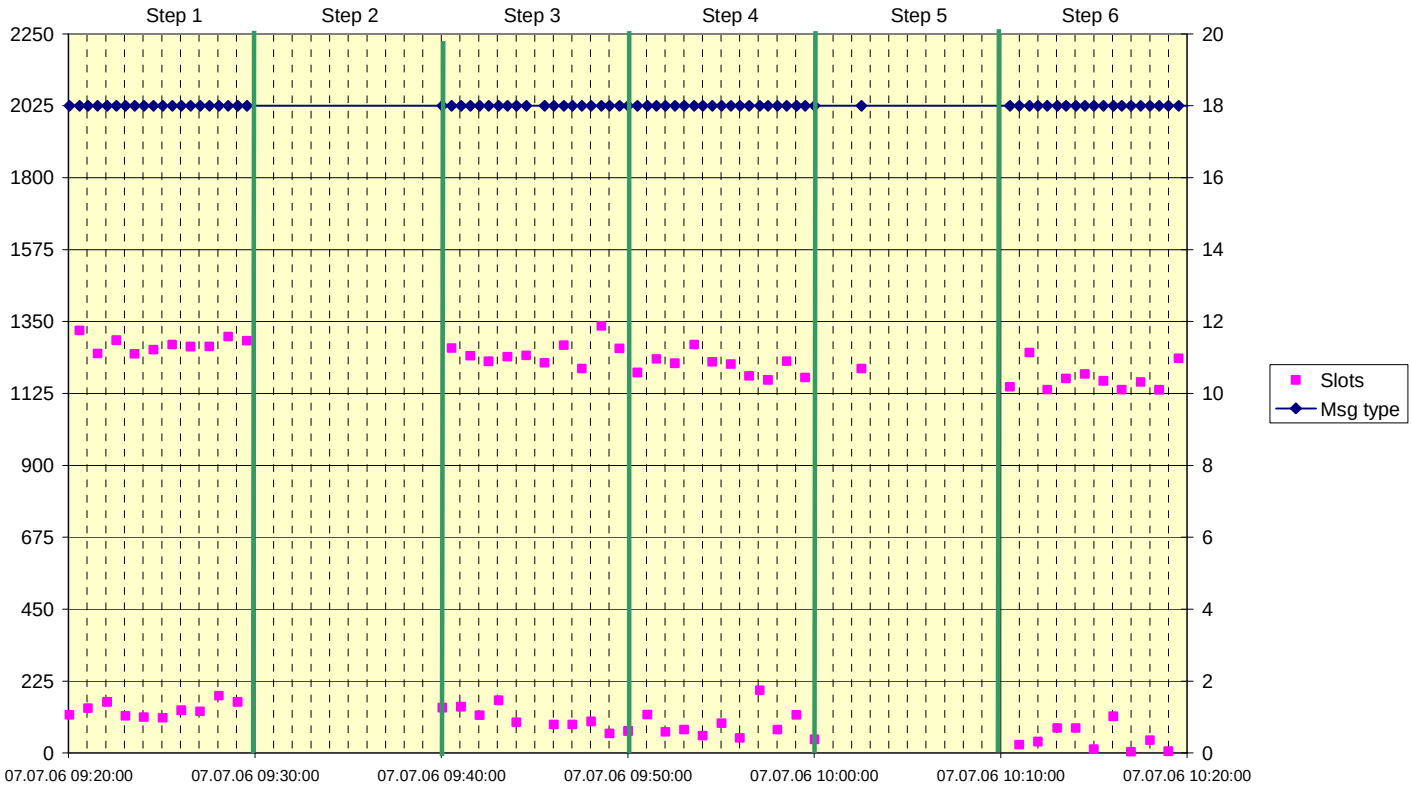


C.8 12.1.2 Synchronisation test sync mode 2

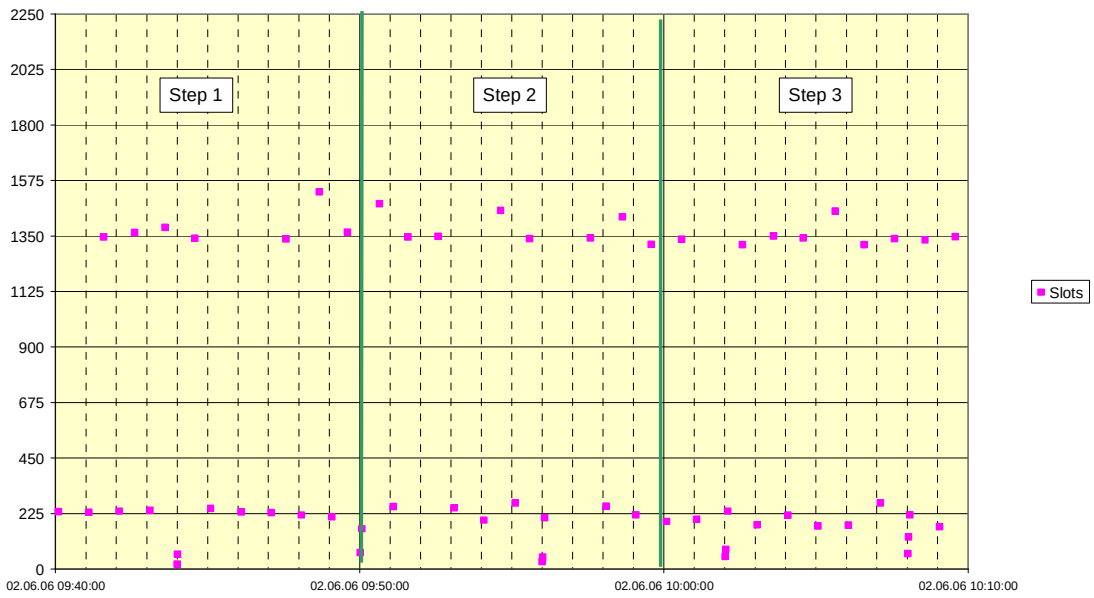


C.9 12.2 Carrier sense test

07.07.06 - SRT - 12.2.1 Carrier sense tests - Threshold level

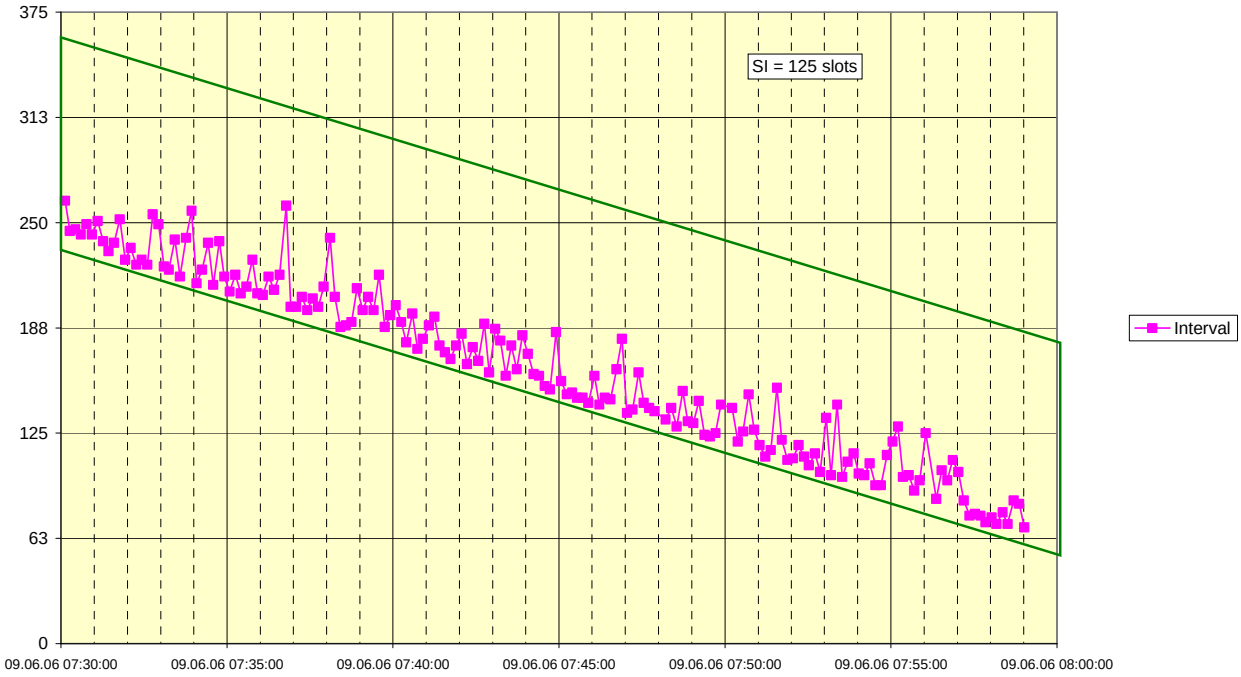


02.06.06 - SRT - 12.2.2 Carrier sense tests - CS timing

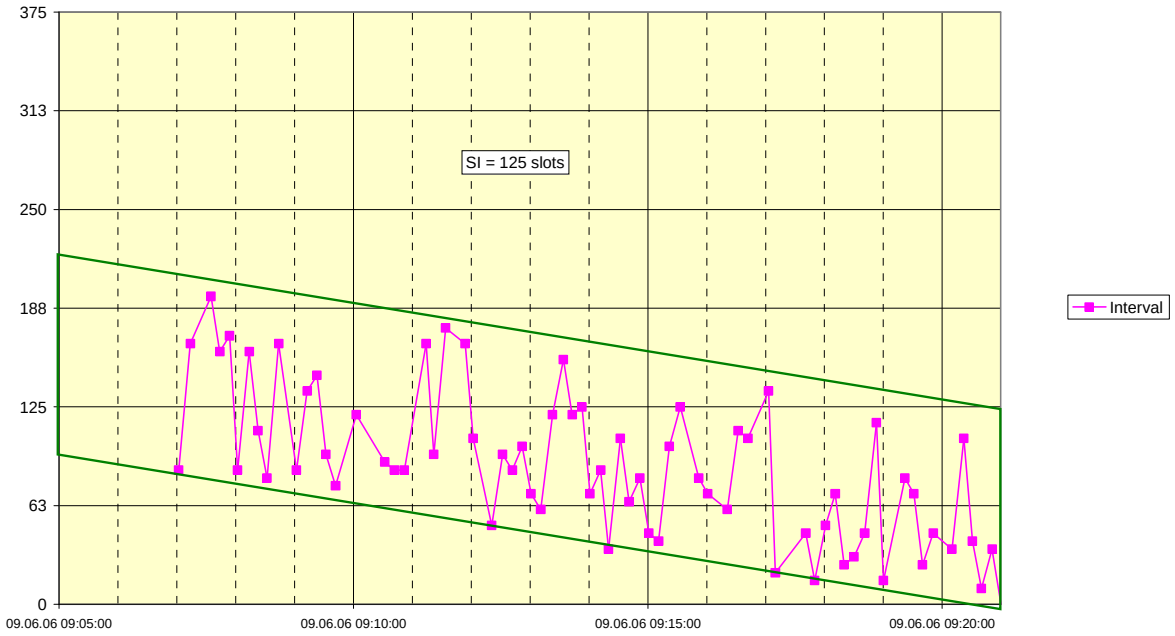


C.10 12.6.1 Autonomous mode allocation

09.06.06 Ba - SRT Class B - 12.6.1 Autonomous mode allocation - low channel load



09.06.06 Ba - SRT Class B - 12.6.1 Autonomous mode allocation - high channel load

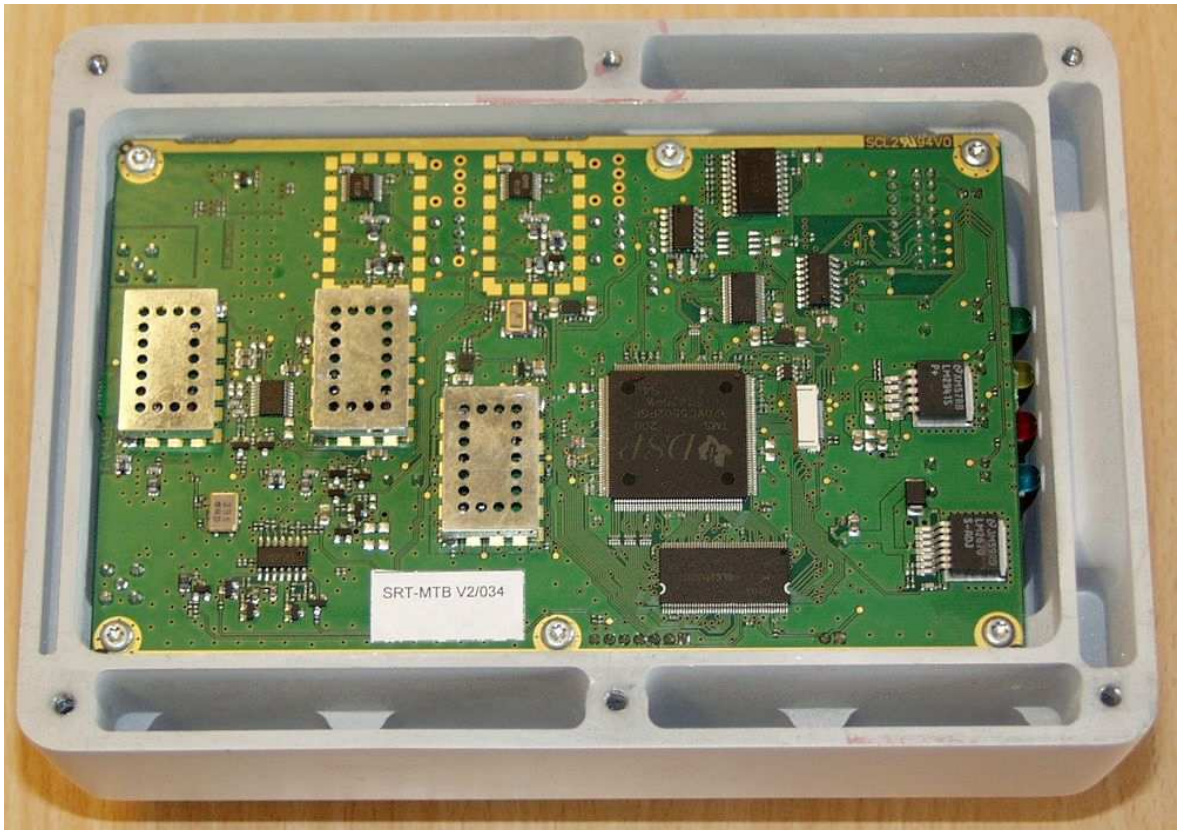


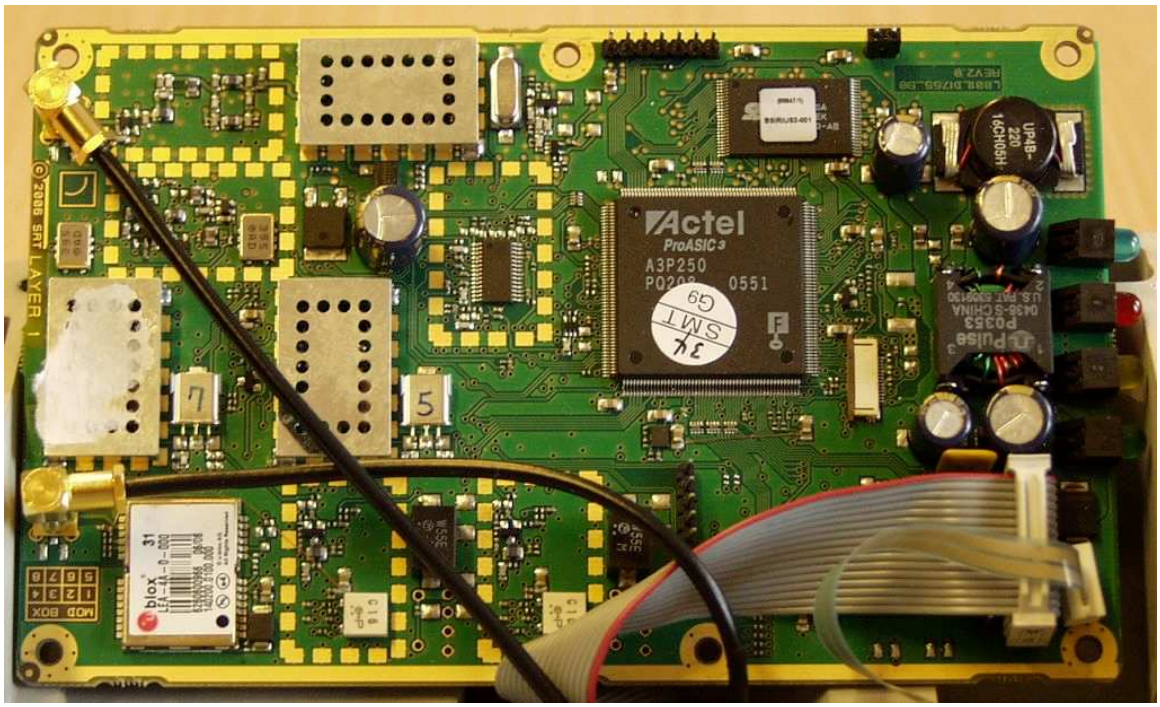
Annex D Photos of equipment under test

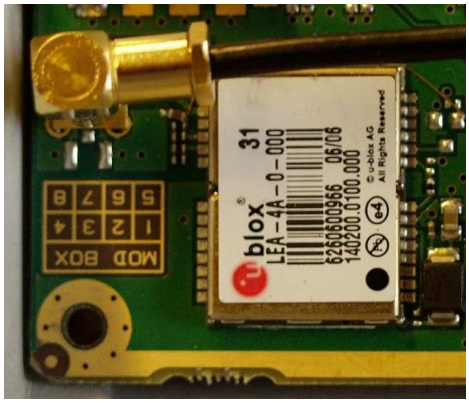
D.1 Transponder Unit


VHF GPS
SOFTWARE RADIO TECHNOLOGY plc
AIS CLASS B TRANSPONDER
SERIAL No. 036
CE


SRM
SAFETY RELATED MESSAGE
POWER
TX TIMEOUT
ERROR
SRM STATUS


SRT-MTB V2/034


Actel
ProASIC3
A3P250
0551



D.2 GPS antenna