2009-05-27 Ba		Test details – Message content of msg 1		
Test item		Check	Remark	Result
Evaluate the data recorded in 8.2.1				
a) Message ID		Check that message ID = 1		Passed
b) Repeat indicator		Check that repeat indicator = 0		Passed
c) User ID		Check that User ID as configured in the AIS-SART	970 000 013	Passed
d) Navigational status		Check that Navigational status = 14		Passed
e) ROT		Check that ROT = default		Passed
f) SOG		Check that SOG = SOG from internal GNSS	= 0.0	Passed
g) Position accuracy flag		Check that Position accuracy flag according to RAIM or 0	= 0	Passed
h) Position		Check that values of lat and lon are according to actual position		Passed
i) Position update		Check that the position is updated once per minute, for each burst		Passed
j) COG		Check that COG = COG from internal GNSS	0.0	Passed
k) Heading		Check that heading = default		Passed
l) Time stamp		Check time stamp = actual UTC second (0...59)		Passed
m) Indication		Verify the correct indication of operation		Passed

4.2.4   8.2.4   Message content of Message 14

a) Message ID = 14.

b) Repeat indicator = 0.

c) Source ID = as configured in the AIS-SART.

d) Text = "SART ACTIVE".

2009-05-26 Ba		Test details: Operational tests		
Test item		Check	Remark	Result
Evaluate the data recorded in 8.2.1				
a) Message ID		Check that message ID = 14		Passed
b) Repeat indicator		Check that repeat indicator = 0		Passed
c) User ID		Check that User ID as configured in the AIS-SART	970000013	Passed
d) Text		Check that text = "SART ACTIVE"		Passed

4.2.5   8.2.5   Transmission schedule for Message 1

For position reports transmitted after 15 minutes and before 40 minutes the following applies:

a) Verify that the AIS-SART has operated in sync mode 0 (UTC direct).

b) The AIS-SART transmits one burst of messages once per minute.

c) The duration of a burst is 14 s.

d) A burst consists of 8 messages.

e) The transmissions in a burst are alternating between AIS 1 and AIS 2.

f) Consecutive messages are 75 slots apart and on the other channel.

g) The same set of slots are used in each burst for 8 minutes

h) A new set of slots is randomly selected after 8 minutes.

i) The first slot of the new set of slots is within the interval of 1 minute +/- 6s from the first slot of the previous set of slots, that is the increment is randomly selected in the range 2025 to 2475 slots.

j) The manufacturer is to provide documentation on how the increment is selected randomly.

2009-05-26 Ba	Test details: Operational tests		
Test item	Check	Remark	Result
Evaluate the data recorded in 8.2.1, minute 15 (GNSS active) to 40			
a) Sync mode	Check sync mode = 0 (UTC direct)		Passed
b) Burst rate	Check burst rate = 1 per minute		Passed
c) Burst duration	Check burst duration = 14 s		Passed
d) Number of message	Check that a burst consists of 8 messages		Passed
e) Channel alternation	Check that the transmissions in a burst are alternating between AIS 1 and AIS 2		Passed
f) Slot distance	Check that the slot distance between two messages in a burst is 75 slots		Passed
g) Burst time-out	Check that the same set of slots are used in each burst for 8 minutes		Passed
h) Random selection	Check that a new set of slots is randomly selected after 8 minutes		Passed
i) Selection range	Check that the new burst is at 1 min +/- 6s (increment = 2025 to 2475 slots, slot distance = 1725 +/- 225 = 1500 ... 1950)		Passed
j) Random selection methode	Verify the manufacturer's documentation on how the increment is selected randomly	Documentation required <u>Retest 2009-10-27 Ba:</u> A description of the random selection methode has been provided. (Jotron "Comments and Clarify- AIS sart test report", 11.Sept 09)	Passed

4.2.6 8.2.6 Communication state of Message 1

For position reports transmitted after 15 minutes and before 40 minutes:

a) The SOTDMA communication state as defined for message 1 is used.

b) The sync state = 0.

c) The time-out starts with 7 for all messages of the first burst after a change in slots.

d) The time-out value is decremented by 1 for each frame.

e) The time-out value is reset to 7 after time-out = 0.

f) The sub message for time-out 3,5,7 = number of received stations (0).

g) The sub message for time-out 2,4,6 = slot number.

h) The sub message for time-out 1 = UTC hour and minute.

i) The sub message for time-out 0 = slot offset to the transmission slot in the next frame.

2009-05-26 Ba	Test details: Operational tests		
Test item	Check	Remark	Result
Evaluate the data recorded in 8.2.1, minute 15 (GNSS active) to 40			
a) Comm state	Check that a SOTDMA comm state as defined for message 1 is used.		Passed
b) Sync state	Check sync state = 0		Passed
c) Time-out start	Check that the time-out starts with 7 for all messages of the first burst after a change in slots.		Passed
d) Time-out decrement	Check that the time-out value is decremented by 1 for each frame		Passed
e) Time-out reset	Check that the time-out value is reset to 7 after time-out = 0		Passed
f) Number of received stations	Check that the sub message for time-out 3,5,7 = number of received stations = 0.		Passed
g) Slot number	Check that sub message for time-out 2,4,6 = actual slot number		Passed
h) UTC	Check that sub message for time-out 1 = UTC hour and minute		Passed
i) Slot offset	Check that sub message for time-out 0 = slot offset to the transmission slot in the next frame (2025 to 2475)		Passed

4.2.7 8.2.7 Transmission schedule of message 14

a) Message 14 is transmitted every 4 minutes

b) The transmissions of Message 14 are alternating between AIS 1 and AIS 2

c) Message 14 is transmitted in a Message 1 slot, replacing the Message 1, on the channel

for which the Message 1 was scheduled.

d) Message 14 did not replace a Message 1 with a time-out value = 0

2009-05-26 Ba	Test details: Operational tests		Result
Test item	Check	Remark	Result
Evaluate the data recorded in 8.2.1			
a) Tx interval	Check that Message 14 is transmitted every 4 minutes		Passed
b) Channel alternating	Check that transmissions of Message 14 are alternating between AIS 1 and AIS 2.		Passed
c) Message 1 slot	Check that Message 14 is transmitted in a Message 1 slot, replacing the Message 1		Passed
	Check that Message 14 is transmitted on the same channel as the replaced Message 1		Passed
d) Time-out 0	Check that Message 14 did not replace a Message 1 with a time-out value = 0 but with time-out 7 and 3 (according to 3.7.2)	Message 14 is replacing Message 1 with time-out 7 and 3	Passed

4.2.8   8.2.8   Transmission with lost GNSS

For position reports transmitted after 45 minutes the following applies:

a) The AIS-SART continues transmission.

b) The same transmission schedule is used as with EPFS data available.

c) Communication State Sync state = 3.

d) SOG = last valid SOG.

e) Position accuracy = low.

f) Position = last valid position.

g) COG = last valid COG.

h) Time stamp = 63.

i) RAIM-flag = 0.

j) Verify correct indication as per manufacturer's documentation.

2009-05-26 Ba	Test details: Operational tests		
Test item	Check	Remark	Result
Evaluate the data recorded in 8.2.1, minute > 45 (GNSS disabled)			
a) Continued transmission	Check that the EUT continues transmission.		Passed
b) Tx schedule	Check that the same transmission schedule is used as with GNSS data available.		Passed
c) Sync state	Check that State Sync state = 3		Passed
d) SOG	Check that SOG = last valid SOG	= 0.0	Passed
e) PA-Flag	Check that Position accuracy = low	= 0	Passed
f) Position	Check that position = last valid position		Passed
g) COG	Check that COG = last valid COG	= 0.0	Passed
h) Time stamp	Check that Time stamp = 63		Passed
i) RAIM flag	Check that RAIM-flag = 0		Passed
j) Indication	Verify correct indication as per manufacturer's documentation	Flashing red	Passed

4.3   8.3   Test mode tests

4.3.1   8.3.1   General

These tests require analysis of the transmissions of the AIS-SART.

4.3.2   8.3.1   Transmission with EPFS data available

8.3.1.1 Method of measurement

Activate the AIS-SART in test mode with EPFS data available and record transmissions.

8.3.1.2 Required results

a) The AIS-SART starts transmission once valid GNSS data is available.

b) A single burst of 8 messages in the correct order and correctly populated as per 3.7.2

c) User ID as configured in the AIS-SART

d) Navigational status = 15 (not defined).

e) SOG = actual SOG from GNSS receiver.

f) Position accuracy = according to the RAIM result if provided otherwise 0.

g) Position = actual position from internal GNSS receiver.

h) COG = actual COG from internal GNSS receiver.

i) Time stamp = actual UTC second (0...59).

j) The communication state time-out always = 0 with sub message = 0.

k) The transmission of Messages 1 and 14 stops after one burst of 8 messages.

l) The text message in Message 14 is "SART TEST".

m) Verify correct indication as per manufacturer's documentation.

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2009-05-27 Ba	Test details: Operational tests		
Test item	Check	Remark	Result
Activate the AIS-SART in test mode with EPFS data available and record transmissions			
a) Start of transmission	Check that the EUT starts transmission when valid GNSS is available		Passed
b) Single burst	Check that one burst is transmitted		Passed
	Check that the burst consists of 8 messages		Passed
	Check that messages according to 3.7.2 are transmitted (1 msg 14, 6 msg 1, 1 msg 14.)		Passed
c) User ID	Check that User ID as configured in the AIS-SART	970000013	Passed
d) Navigational status	Check that Navigational status = 15		Passed
e) SOG	Check that SOG = SOG from internal GNSS	= 0.0	Passed
f) Position accuracy flag	Check that Position accuracy flag according to RAIM or 0	= 0	Passed
g) Position	Check that values of lat and lon are according to actual position		Passed
h) COG	Check that COG = COG from internal GNSS	= 0.0	Passed
i) Time stamp	Check time stamp = actual UTC second (0...59)		Passed
j) Comm state	Check that time-out = 0		Passed
	Check that sub message = 0		Passed
k) Stop of transmission	Check that transmission stops after one burst		Passed
l) Msg 14 text	Check that the text in msg 14 is "SART TEST"		Passed
m) Indication	Verify the correct indication according to manufacturers documentation		Passed

4.3.3 8.3.2 Transmission without EPFS data available

8.3.2.1 Method of measurement

Activate the AIS-SART in test mode with no EPFS data available and record transmissions.

8.3.2.2 Required Results

a) The AIS-SART starts transmission within 15 minutes.

b) A single burst of 8 messages in the correct order and correctly populated as per 3.7.2

c) User ID as configured in the AIS-SART.

d) Navigational status = 15 (not defined).

e) SOG = default value.

f) Position accuracy = low.

g) Position = default values.

h) COG = default value.

i) Time stamp = 63.

j) The communication state time-out always = 0 with sub message = 0.

k) RAIM-flag = 0.

l) The transmission of Messages 1 and 14 stops after one burst of 8 messages.

m) The text message in Message 14 is "SART TEST".

n) Verify correct indication as per manufacturer's documentation.

2009-05-26 Ba	Test details: Operational tests		
Test item	Check	Remark	Result
Activate the AIS-SART in test mode with no EPFS data available and record transmissions			
a) Start of transmission	Check that the EUT starts transmission within 15 minutes	EUT starts test after 15 min. <u>Retest 2009-09-09 Ba:</u> We assume that 15 min is the correct value. See Note)	Passed
b) Single burst	Check that one burst is transmitted		Passed
	Check that the burst consists of 8 messages		Passed
	Check that messages according to 3.7.1 are transmitted (1 msg 14, 6 msg 1, 1 msg 14.)		Passed
c) User ID	Check that User ID as configured in the AIS-SART	970000013	Passed
d) Navigational status	Check that Navigational status = 15		Passed
e) SOG	Check that SOG = default		Passed
f) Position accuracy flag	Check that Position accuracy flag = 0		Passed
g) Position	Check that position values = default		Passed
h) COG	Check that COG = default		Passed

i) Time stamp	Check time stamp = 63	Time stamp = 60 (60 means that time stamp is not available, 63 also says that no position is available <u>Retest 2009-09-10 Ba:</u> A log file has been provided that the the time stamp has been changed to 63	Passed
j) Comm state	Check that time-out = 0		Passed
	Check that sub message = 0		Passed
k) RAIM flag	Check that RAIM flag = 0		Passed
k) Stop of transmission	Check that transmission stops after one burst		Passed
l) Msg 14 text	Check that the text in msg 14 is "SART TEST"		Passed
m) Indication	Verify the correct indication according to manufacturers documentation	According to manufacturers documentation the selftest terminates with a long **<u>red</u>** flash and a buzzer signal for 15 s. In the test there were some short red flashes during transmission of the burst, then the test terminated with a long **<u>green</u>** flash and a buzzer signal <u>Retest 2009-09-09 Ba:</u> The test finished with a long green flash. This test repetion was performed by Jotron and documented with the video "Successful test.wmv"	Passed

Annex A Test equipment

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:
- <u>receives</u> 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).
- <u>transmits</u> 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.
- <u>records</u> all data contained in the received radio telegrams and radio parameters in a data base for offline evaluation and documentation purposes.
- <u>simulates</u> 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.

A.2   Test environment overview

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Federal Maritime and Hydrographic Agency
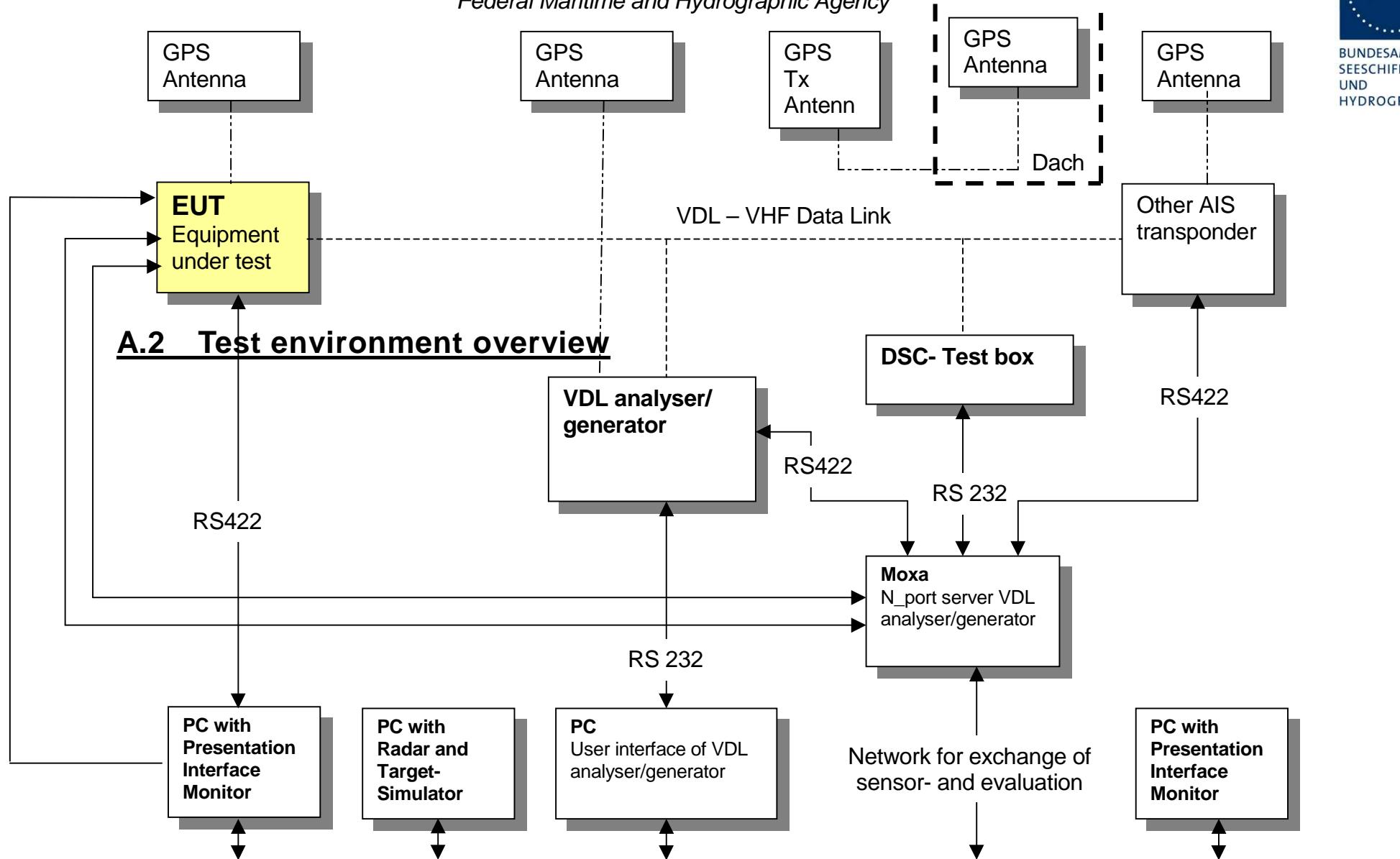
Annex B Test diagrams

B.1 8.1   Synchronisation accuracy

2009-05-25 Ba   Jotron AIS-SART   -   8.1 - Synchronisation accuracy

**2009-05-25 Ba   Jotron AIS-SART   -   8.1 - Synchronisation accuracy**

Minute 30 - 40
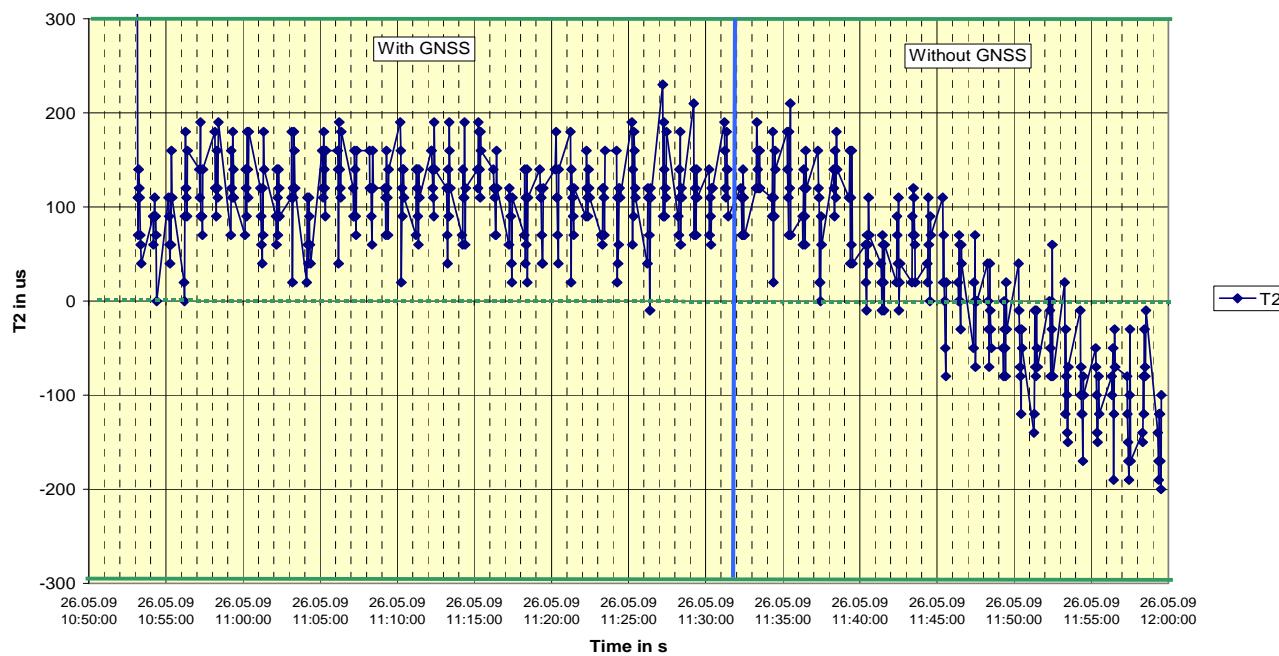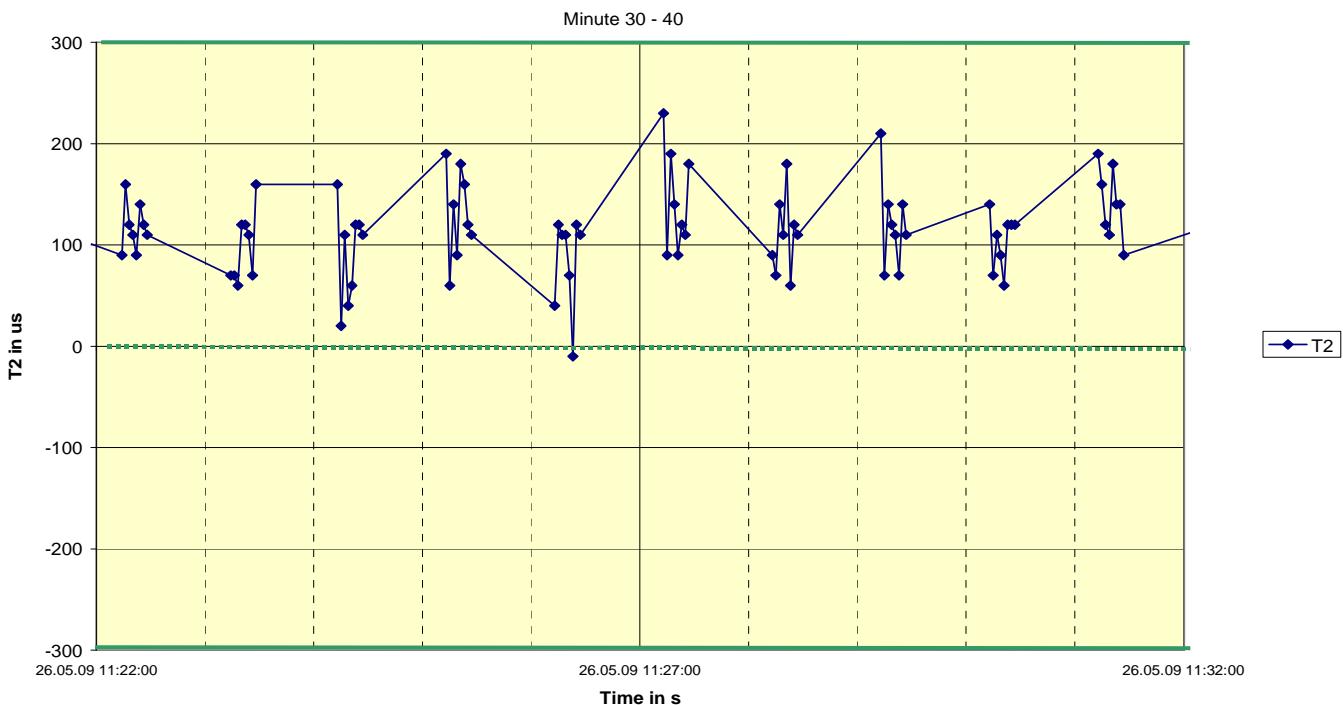
B.2 8.2.5   Active mode, Transmission schedule

B.2.1 Minute 1 to 10

2009-05-26 Ba: Jotron AIS SART Test 8.2 Active mode, Minute 1-20

| Frame 1	Frame 2	Frame 3	Frame 4	Frame 5
2009-05-26 10:52:12	2009-05-26 10:53:10	2009-05-26 10:54:10	2009-05-26 10:55:10	2009-05-26 10:56:10
Channel A Channel B	Channel A Channel B	Channel A Channel B	Channel A Channel B	Channel A Channel B

!-- Start of SART in active mode
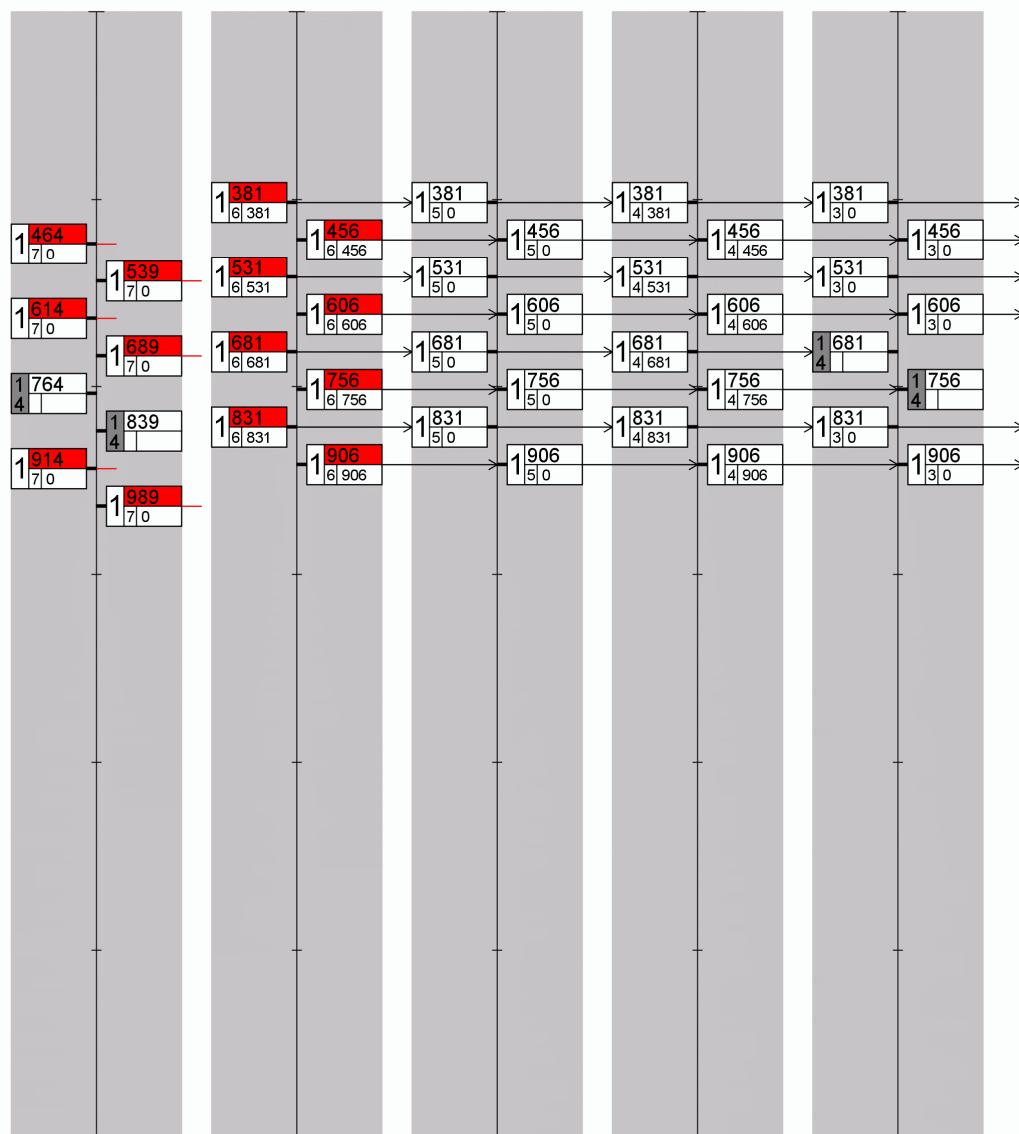
2009-05-26 Ba: Jotron AIS SART Test 8.2 Active mode, Minute 1-20

Frame 6	Frame 7	Frame 8	Frame 9	Frame 10
2009-05-26 10:57:10	2009-05-26 10:58:10	2009-05-26 10:59:12	2009-05-26 11:00:08	2009-05-26 11:01:08
Channel A Channel B	Channel A Channel B	Channel A Channel B	Channel A Channel B	Channel A Channel B
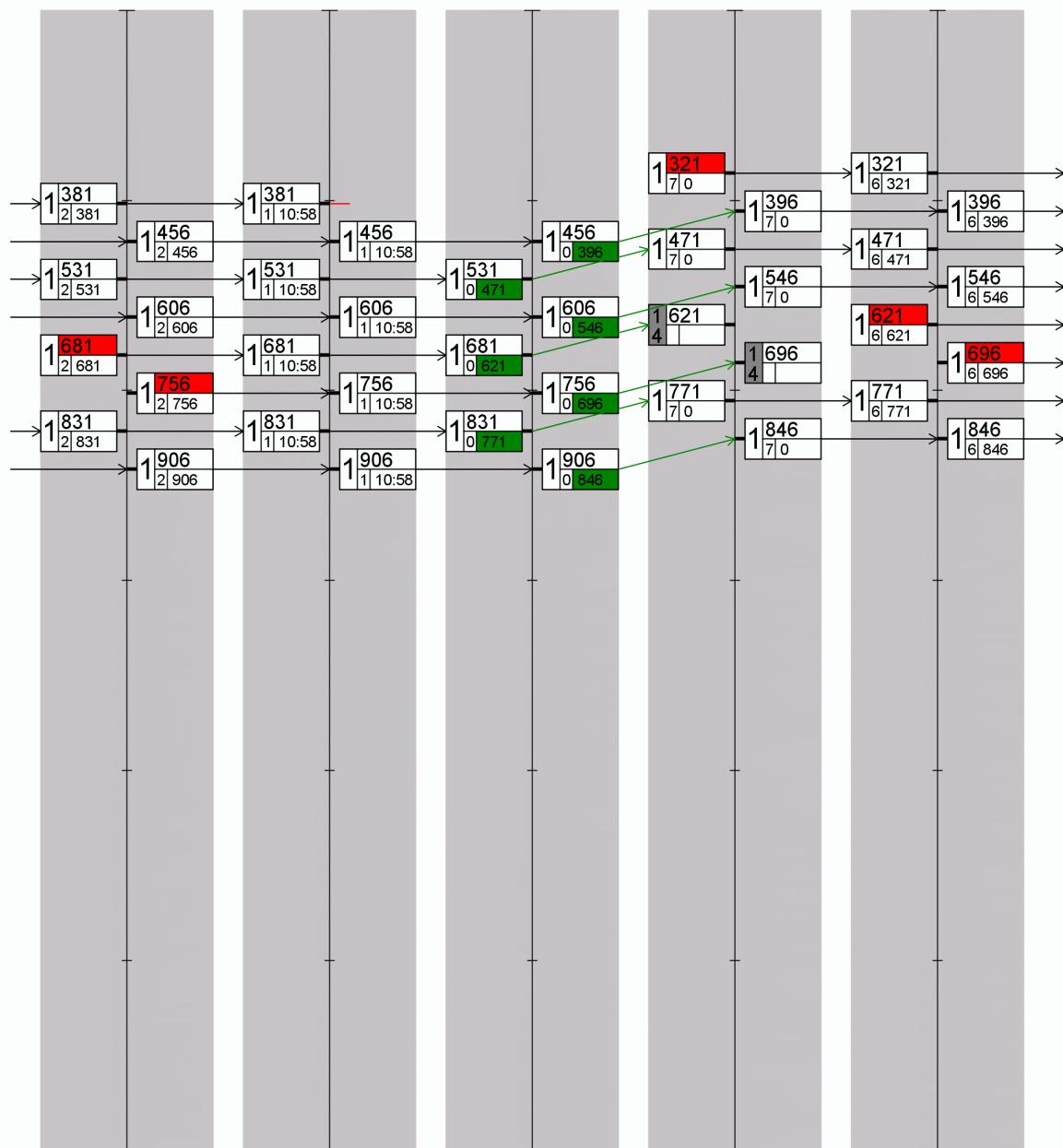
B.2.2 Minute 30-40

2009-05-26 Ba: Jotron AIS SART Test 8.2 Active mode, Minute 30-40

Frame 1	Frame 2	Frame 3	Frame 4	Frame 5
2009-05-26 11:22:14	2009-05-26 11:23:14	2009-05-26 11:24:13	2009-05-26 11:25:13	2009-05-26 11:26:13
Channel A Channel B	Channel A Channel B	Channel A Channel B	Channel A Channel B	Channel A Channel B

2009-05-26 Ba: Jotron AIS SART Test 8.2 Active mode, Minute 30-40

Frame 6	Frame 7	Frame 8	Frame 9	Frame 10
2009-05-26 11:27:13	2009-05-26 11:28:13	2009-05-26 11:29:13	2009-05-26 11:30:13	2009-05-26 11:31:13
Channel A Channel B	Channel A Channel B	Channel A Channel B	Channel A Channel B	Channel A Channel B
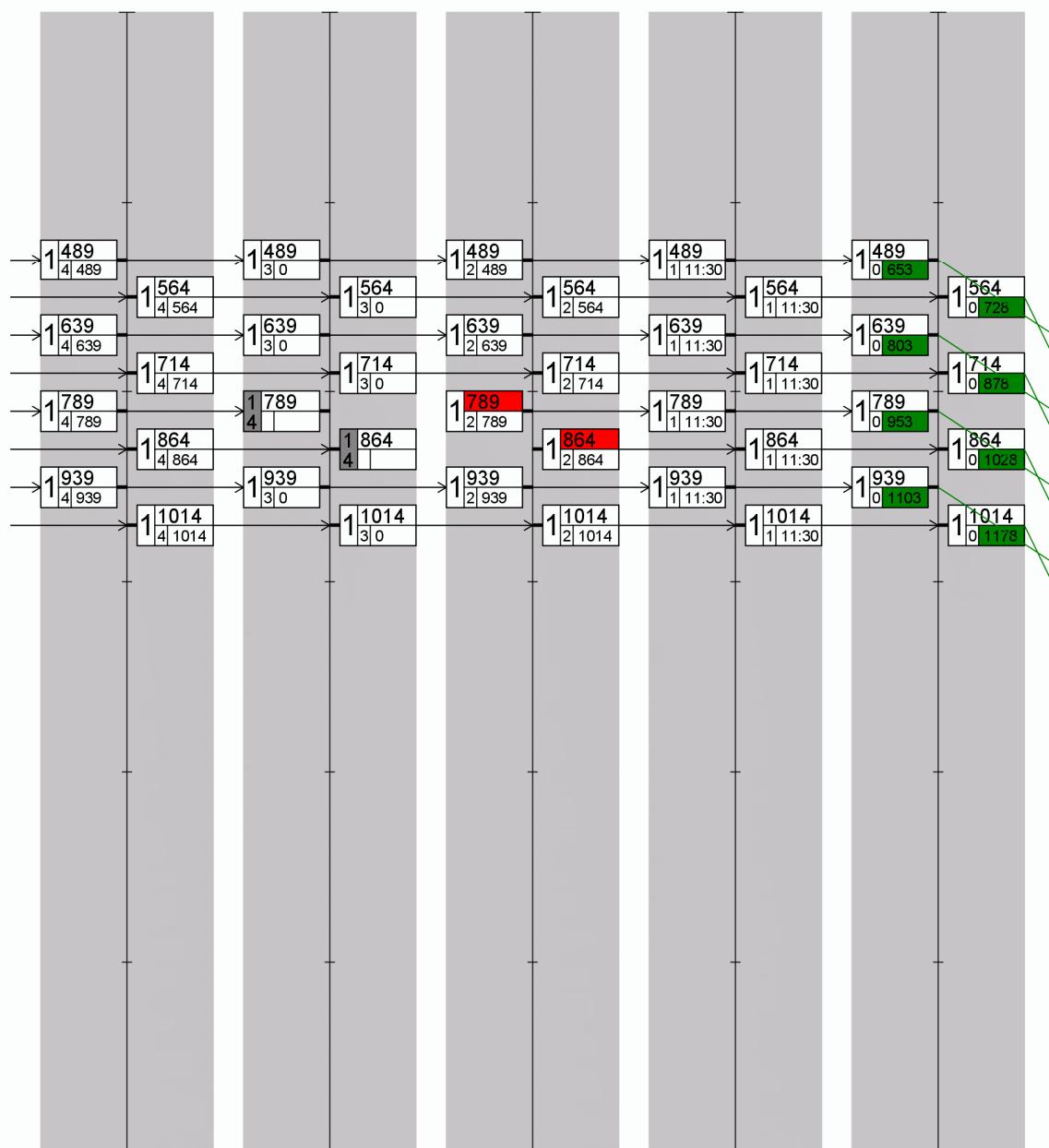
B.2.3 Slot distance
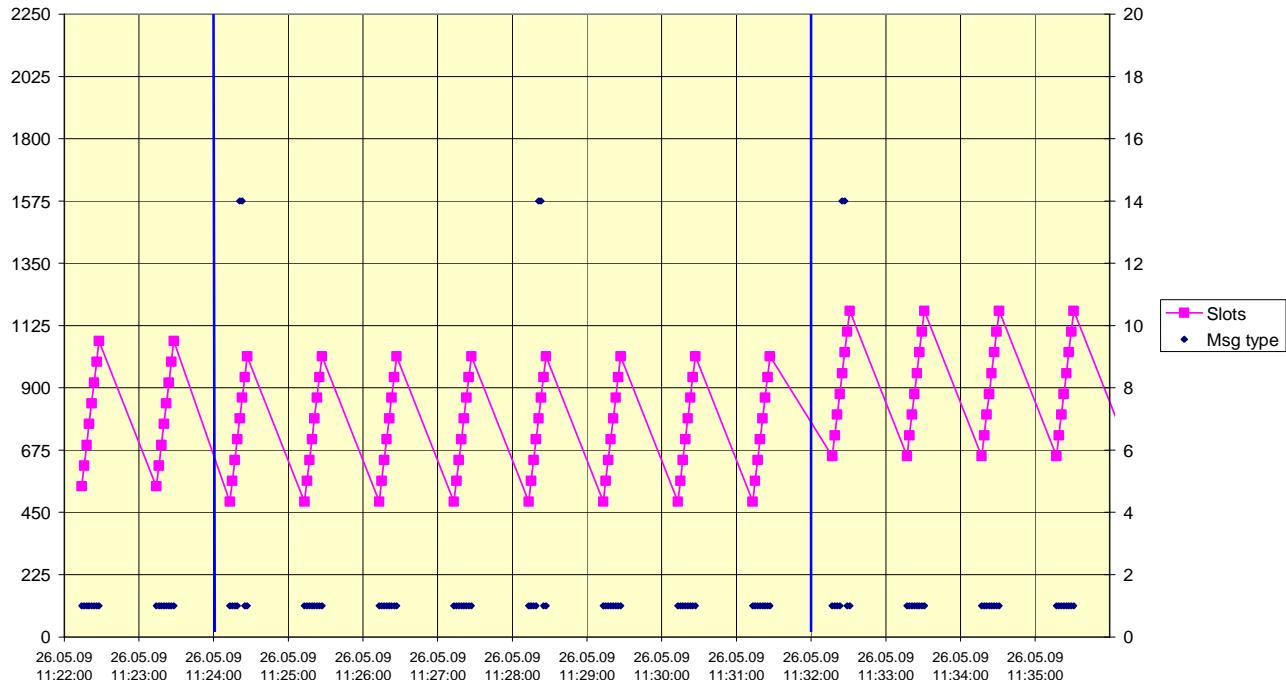
**2009-05-26 - Jotron AIS SART - 8.2.5 - Transmission schedule for message 1**

2009-05-26 - Jotron AIS SART - 8.2.5 - Transmission schedule for message 1

Slot distance

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2009-05-26 - Jotron AIS SART - 8.2.5 - Transmission schedule for message 1

Slot distance - From message to message inside a burst

2009-05-26 - Jotron AIS SART - 8.2.5 - Transmission schedule for message 1

Slot distance - burst to burst
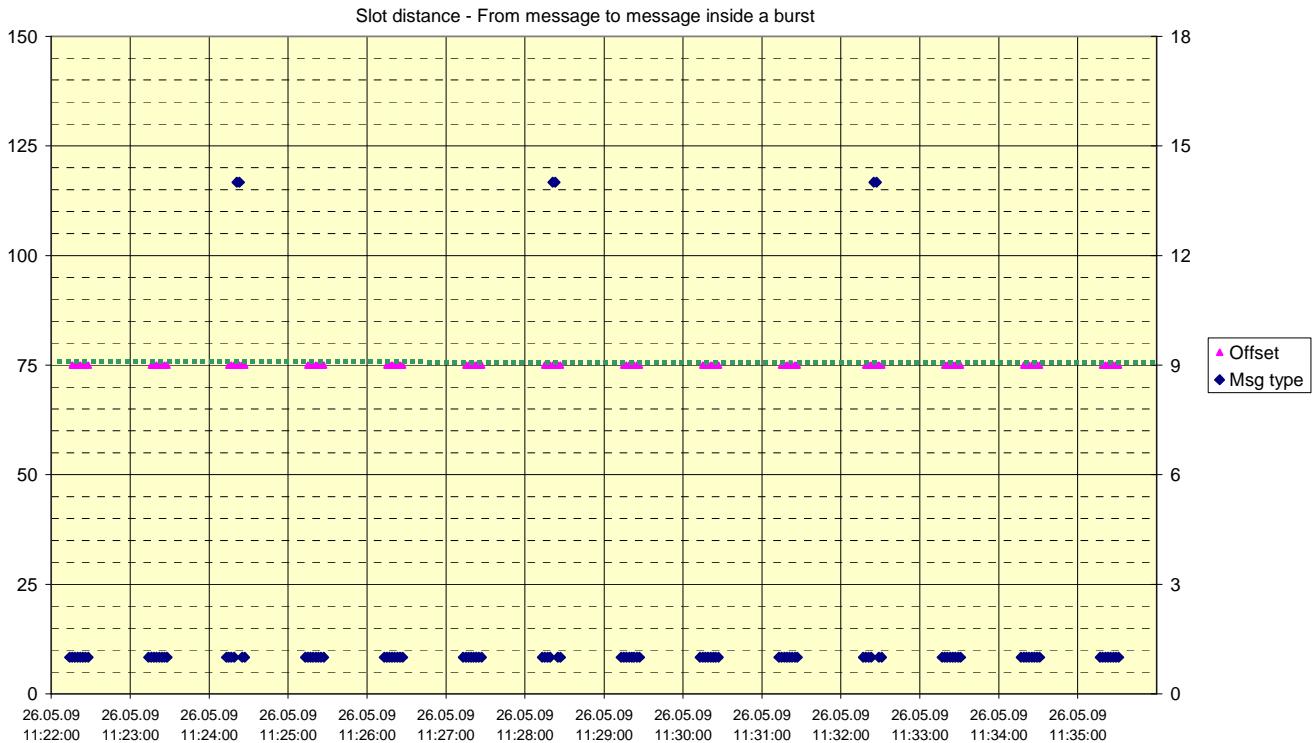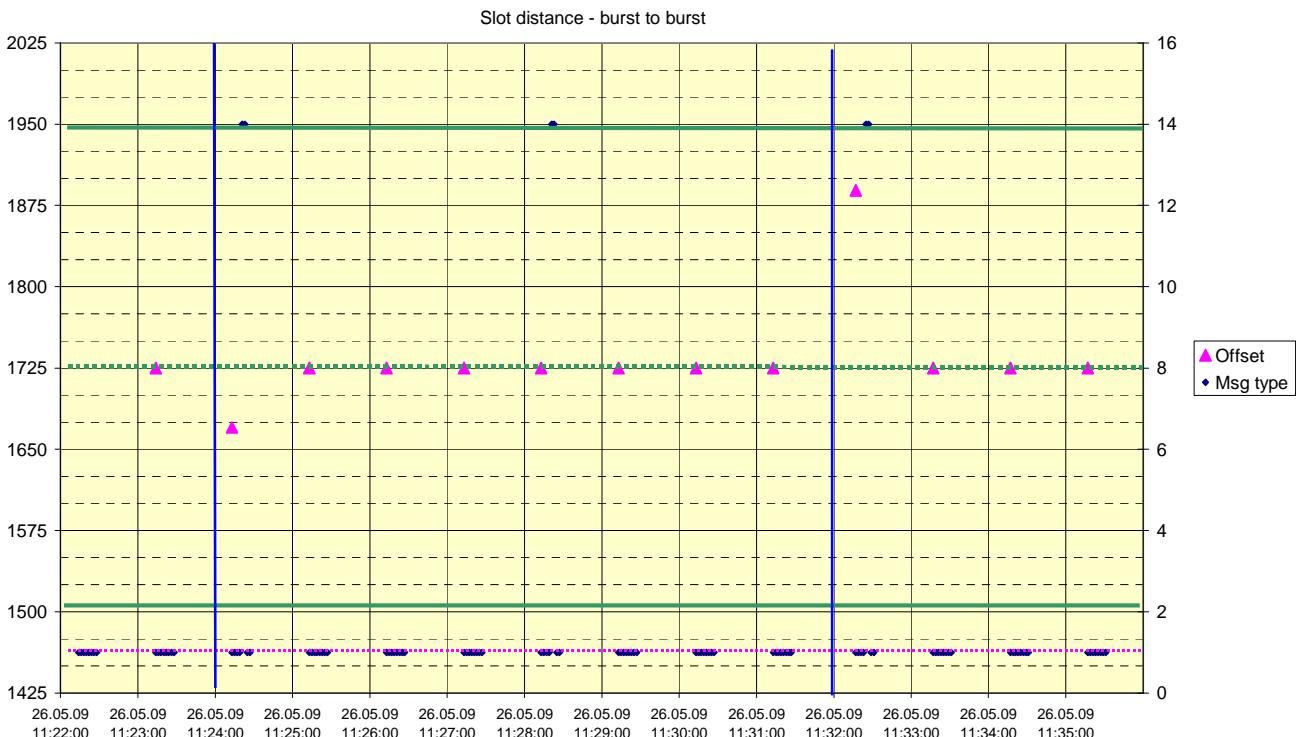
B.2.4 Minute 45-55 (no GNSS)

2009-05-26 Ba: Jotron AIS SART Test 8.2 Active mode, Minute 45-54, No GNSS

Frame 1		Frame 2		Frame 3		Frame 4		Frame 5	
2009-05-26 11:45:22		2009-05-26 11:46:22		2009-05-26 11:47:22		2009-05-26 11:48:17		2009-05-26 11:49:17	
Channel A	Channel B	Channel A	Channel B	Channel A	Channel B	Channel A	Channel B	Channel A	Channel B

2009-05-26 Ba: Jotron AIS SART Test 8.2 Active mode, Minute 45-54, No GNSS

Frame 6	Frame 7	Frame 8	Frame 9	Frame 10
2009-05-26 11:50:17	2009-05-26 11:51:17	2009-05-26 11:52:17	2009-05-26 11:53:17	2009-05-26 11:54:17
Channel A Channel B	Channel A Channel B	Channel A Channel B	Channel A Channel B	Channel A Channel B
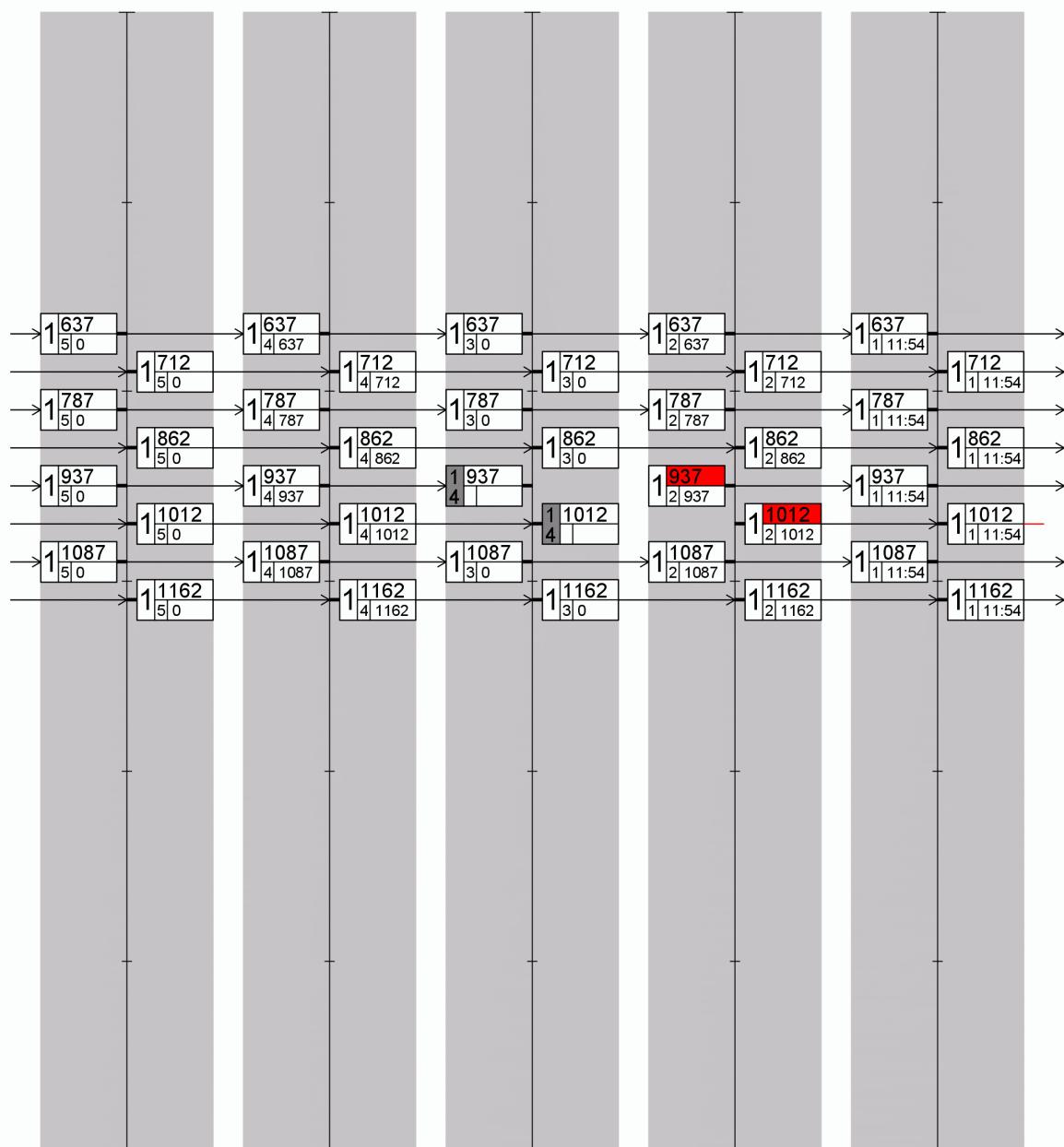
B.3 8.3   Test mode tests

B.3.1 8.3.1   Test with GNSS available

2009-05-26 Ba: Jotron AIS SART Test 8.3.1 Test mode with GNSS

Frame 1	Frame 2	Frame 3	Frame 4	Frame 5
2009-05-26 09:01:49	2009-05-26 09:02:01			
Channel A Channel B	Channel A Channel B	Channel A Channel B	Channel A Channel B	Channel A Channel B

!-- Start of test mode with GNSS
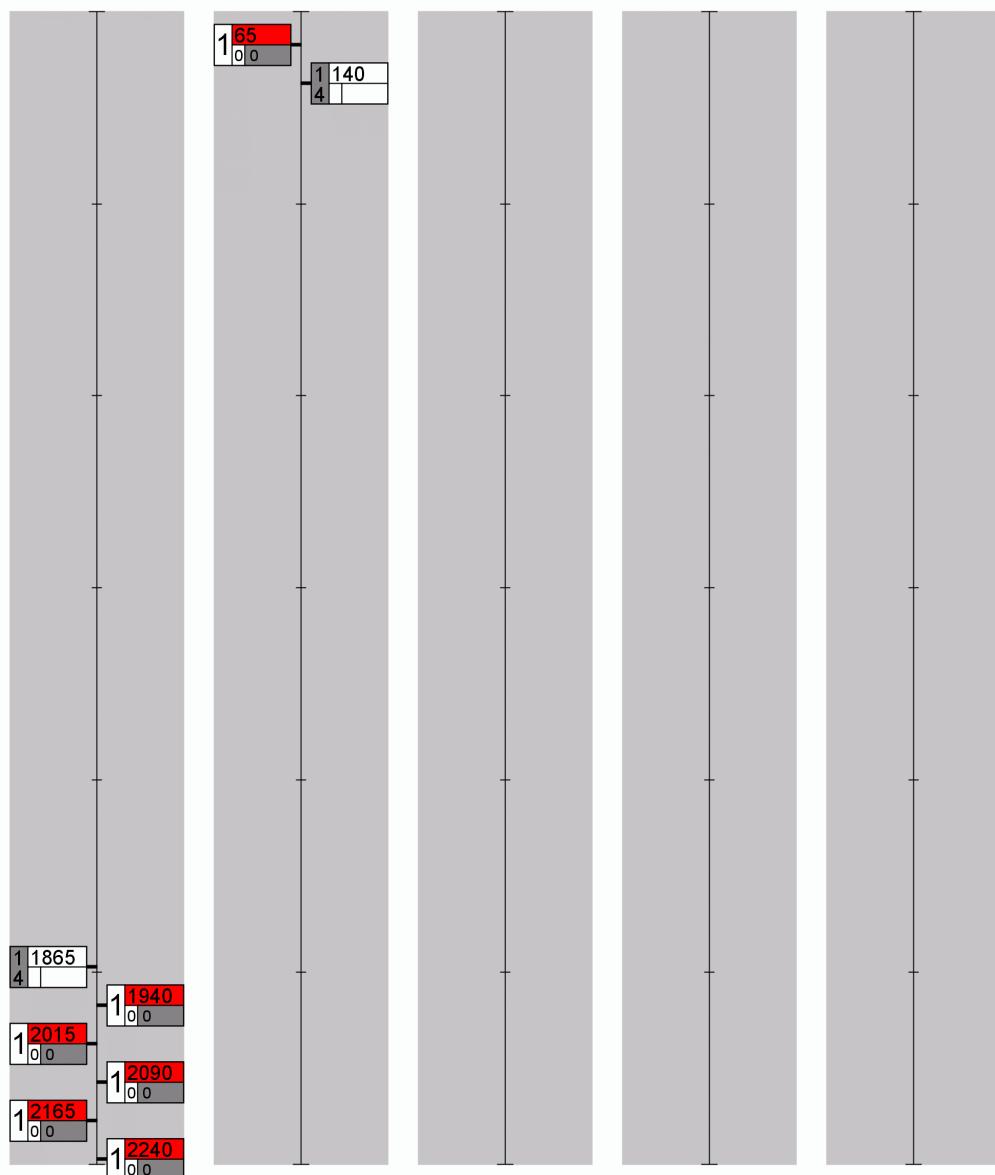
B.3.2 8.3.1   Test without GNSS available

2009-05-26 Ba: Jotron AIS SART Test 8.3.2 Test mode without GNSS

Frame 1	Frame 2	Frame 3	Frame 4	Frame 5
2009-05-26 13:07:02				
Channel A Channel B	Channel A Channel B	Channel A Channel B	Channel A Channel B	Channel A Channel B

<-- Start of test mode UTC 12:52
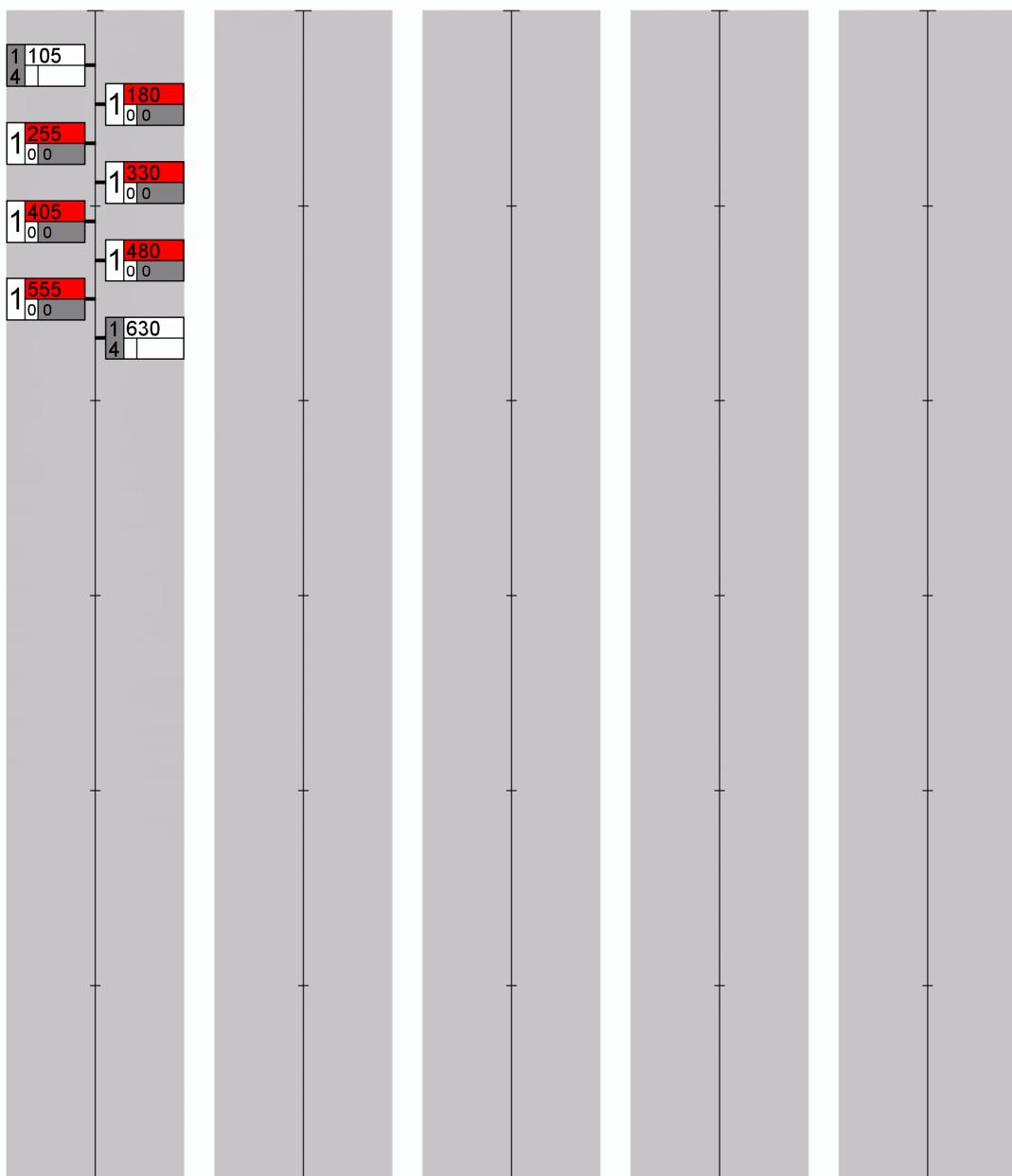
Annex C Photos of equipment under test

C.1 SART Unit

Tron AIS-SART
Search and Rescue Transmitter

CE ⓘ
0735/09

Test Instructions
1. Test unit outdoor
2. Push Switch to TEST and release when indicators start
3. Test OK is indicated by a beep and a steady green light for 15 sec. Test may last up to 15 min.
3. Check successful operation with the ships AIS
4. Refer to the Users Manual for fault indications

This device complies with GMDSS provision of part 80 of the FCC rules.

FCC ID:

USER ID: 9700

Vessel:

JOTRON

Jotron AS
P.O. Box 54
NO - 3280 Tjodalyng
Norway
Tel: +47 33 13 97 00
www.jotron.com

AIS-SART
Search and Rescue Transmitter
Operating Instructions
– Use ONLY in emergency

1. ⊙─ Pull to Activate   **ON**

2. (A) (B)   **OFF**
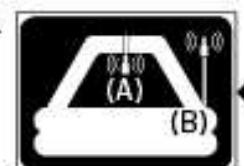
Wait 15 min

Mounting position A or B

3. 🟢🔴 Position search   Relocate unit   **TEST**
🟢🔴 Position OK
🔴 No Position

JOTRON Compass safe distance 0,6m

Lights
🟢🔴
⬇ ⬇

Year					
2013	2014	2015	2016	2017	2018
1	Battery Expiry				12
2	Jotron Battery Type:				11
3	X-8261.5				10
3	4	5	6	7	8	9	10
Month					