



Ambient temperature +25.7 °C Relative humidity 64 %

DSC RECEIVER BLOCKING OR DESENSITISATION

IEC 61993-2, CLAUSE 15.4.7

Normal supply.

Operation on 156.525 MHz

TEST CONDITIONS		Blocking Ratio (dB)					
		SG(A) 156.525	SG(A) 156.525	SG(A) 156.525	SG(A) 156.525	SG(A) 156.525	SG(A) 156.525
		SG(B) 146.525	SG(B) 151.525	SG(B) 155.525	SG(B) 157.525	SG(B) 161.525	SG(B) 166.525
T _{nom} (+25°C)	V _{nom} (220 V, 60 Hz)	>94.0	>94.0	>94.0	>94.0	>94.0	>94.0
Measurement uncertainty (dB)		±1.7					

Required results

The blocking ratio for any frequency within the specified ranges shall not be less than 84 dB, except at frequencies at which the spurious responses are found.
The BER shall not exceed 10⁻².

Remarks

The EUT satisfied the requirements of this test.

Software used: 70, 73

TEST EQUIPMENT USED:
16, 19, 24, 25, 28, 61, 64, 65, 69



Ambient temperature +24.5 °C Relative humidity 58 %

SPURIOUS EMISSIONS FROM THE RECEIVER

IEC 61993-2, CLAUSE 15.5.1

Receiver operating on 156.025 MHz

FREQUENCY (MHz)	SPURIOUS EMISSION LEVEL (dBm)
-	No spurious emissions
Measurement uncertainty (dB)	±2.0

Results Required

Frequency Range	Limit
150 kHz to 1 GHz	-57 dBm (2 nW)
1 GHz to 2 GHz	-47 dBm (20 nW)

Remarks

No emissions were detected at a level greater than 10 dB below the limit.

The EUT satisfied the requirements of this test.

Software used: 71

TEST EQUIPMENT USED:

26, 28, 65

.....



Ambient temperature +24.5 °C Relative humidity 58 %

SPURIOUS EMISSIONS FROM THE TRANSMITTER

IEC 61993-2, CLAUSE 15.5.2

Transmitter operating on 156.025 MHz

FREQUENCY (MHz)	SPURIOUS EMISSION LEVEL (dBm)
-	No spurious emissions
Measurement uncertainty (dB)	±2.0

Results Required:

Frequency Range	Limit
150 kHz to 1 GHz	-36 dBm (0.25 µW)
1 GHz to 2 GHz	-30 dBm (1 µW)

Remarks

No emissions were detected at a level greater than 10 dB below the limit.

The EUT satisfied the requirements of this test.

Software used: 71

TEST EQUIPMENT USED:

26, 28, 65, 85

.....



Ambient temperature +24.5 °C Relative humidity 58 %

SPURIOUS EMISSIONS FROM THE TRANSMITTER

IEC 61993-2, CLAUSE 15.5.2

Transmitter operating on 157.4125 MHz

FREQUENCY (MHz)	SPURIOUS EMISSION LEVEL (dBm)
-	No spurious emissions
Measurement uncertainty (dB)	±2.0

Results Required

Frequency Range	Limit
150 kHz to 1 GHz	-36 dBm (0.25 µW)
1 GHz to 2 GHz	-30 dBm (1 µW)

Remarks

No emissions were detected at a level greater than 10 dB below the limit.

The EUT satisfied the requirements of this test.

Software used: 71

TEST EQUIPMENT USED:

26, 28, 65, 85

.....



Ambient temperature +24.5 °C Relative humidity 58 %

SPURIOUS EMISSIONS FROM THE TRANSMITTER

IEC 61993-2, CLAUSE 15.5.2

Transmitter operating on 160.6375 MHz

FREQUENCY (MHz)	SPURIOUS EMISSION LEVEL (dBm)
-	No spurious emissions
Measurement uncertainty (dB)	±2.0

Results Required

Frequency Range	Limit
150 kHz to 1 GHz	-36 dBm (0.25 µW)
1 GHz to 2 GHz	-30 dBm (1 µW)

Remarks

No emissions were detected at a level greater than 10 dB below the limit.

The EUT satisfied the requirements of this test.

Software used: 71

TEST EQUIPMENT USED:

26, 28, 65, 85

.....



Ambient temperature +24.5 °C Relative humidity 58 %

SPURIOUS EMISSIONS FROM THE TRANSMITTER

IEC 61993-2, CLAUSE 15.5.2

Transmitter operating on 162.025 MHz

FREQUENCY (MHz)	SPURIOUS EMISSION LEVEL (dBm)
-	No spurious emissions
Measurement uncertainty (dB)	±2.0

Results Required

Frequency Range	Limit
150 kHz to 1 GHz	-36 dBm (0.25 µW)
1 GHz to 2 GHz	-30 dBm (1 µW)

Remarks

No emissions were detected at a level greater than 10 dB below the limit.

The EUT satisfied the requirements of this test.

Software used: 71

TEST EQUIPMENT USED:

26, 28, 65, 85

.....



Ambient temperature +25.5 °C Relative humidity 71 %

SPECIFIC TESTS OF LINK LAYER
TDMA SYNCHRONISATION
SYNCHRONISATION TEST USING UTC

IEC 61993-2, CLAUSE 16 (7.3)
IEC 61993-2, CLAUSE 16.1 (M.1371-1 A2/3.1.1)
IEC 61993-2, CLAUSE 16.1.1 (M.1371-1 A2/3.1.3.4.1)

(1) Method of measurement

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

- UTC direct*
 - UTC indirect (internal GNSS receiver disabled; at least one other station UTC direct synchronized)*
 - BASE direct (internal GNSS disabled; base station with UTC direct synchronisation within range)*
- Check CommState Parameter SyncState in position report and reporting rate.*

(2) Required result

Transmitted Communication state shall fit the synchronisation mode.

(3) Test results

Conditions	Results
UTC direct	√
UTC indirect	√
BASE direct	√

The EUT satisfied the requirements of this test.

Software used: 55 to 58

TEST EQUIPMENT USED:
4, 28, 30 to 52, 63, 79-82, 88-92

.....



Ambient temperature +25.5 °C Relative humidity 71 %

SYNCHRONISATION TEST WITHOUT UTC, SEMAPHORE IEC 61993-2, CLAUSE 16.1.2 (M.1371-1 A2/3.1.1.4)

(1) Method of measurement

Set up standard test environment without UTC available.

Let EUT operate as a sync source (semaphore) for other stations.

Check CommState Parameter SyncState in position report and reporting rate.

(2) Required results

Transmitted CommState shall fit the Synchronisation mode.

The EUT shall increase reporting rate to 2 s when acting as a semaphore.

(3) Test results

Conditions	Results
Without UTC available, operate EUT as a semaphore	√

The EUT satisfied the requirements of this test.

Software used: 55 to 58

TEST EQUIPMENT USED:

4, 28, 30 to 52, 88 to 90

.....



Ambient temperature +25.5 °C Relative humidity 71 %

SYNCHRONISATION TEST WITHOUT UTC

IEC 61993-2, CLAUSE 16.1.3 (M.1371-1 A2/3.1.1)

(1) Method of measurement

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

- a) BASE indirect (internal GNSS disabled; no station with UTC direct synchronisation or Base station within range),
- b) mobile indirect (internal GNSS disabled; other station with UTC direct synchronisation or Base station without range),
- c) Enable internal GNSS in synchronisation modes other than UTC direct
Check CommState Parameter SyncState in position report and reporting rate.

(2) Required results

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

(3) Test results

Conditions	Results
BASE indirect (internal GNSS disabled; no station with UTC direct synchronisation or Base station within range)	√
mobile indirect (internal GNSS disabled; other station with UTC direct synchronisation or Base station without range)	√
Enable internal GNSS in synchronisation modes other than UTC direct	√

The EUT satisfied the requirements of this test.

Software used: 55 to 58

TEST EQUIPMENT USED:
4, 28, 30 to 52, 63, 79-82, 88 to 92

.....



Ambient temperature +25.5 °C Relative humidity 71 %

TIME DIVISION (FRAME FORMAT)

IEC 61993-2, CLAUSE 16.2 (M.1371-1 A2/3.1.2)

(1) Method of measurement

Set the EUT to max reporting rate of 2 s by applying a speed of >23 knots and a ROT of >20°/s.

Record VDL messages and check for used slots.

Check parameter slot number in CommState of position report.

Check slot length (transmission time)

(2) Required results

Slot number used and slot number indicated in CommState shall match.

Slot number shall not exceed 2249. Slot length shall not exceed 26.67 ms.

(3) Test results

Conditions	Results
SOG > 23 knots, ROT > 20°/s	√

The EUT satisfied the requirements of this test.

Software used: 55 to 58

TEST EQUIPMENT USED:

4, 28, 30 to 52, 88 to 90

.....



Ambient temperature +25.5 °C Relative humidity 71 %

SYNCHRONISATION JITTER

IEC 61993-2, CLAUSE 16.3 (M.1371-1 A2/3.2.2.8.4)

Definition

Synchronisation jitter (transmission timing error) is the time between nominal slot start as determined by the UTC synchronisation source and the initiation of the "transmitter on" function (T_o see figure 3.2.2.10 in Rec. ITU-R M.1371-1).

(1) Method of measurement

Set up standard test environment.

Set the EUT to 25 kHz bandwidth, max reporting rate of 2 s and using

a) UTC direct synchronisation

b) UTC indirect synchronisation by disconnecting the GNSS antenna of the EUT.

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

Repeat the test for 12.5 kHz bandwidth.

(2) Required results

The synchronisation jitter shall not exceed

a) ±104 µs using UTC direct synchronisation

b) ±312 µs using UTC indirect synchronisation.

(3) Test results

Conditions	Results: 25 kHz bandwidth	Results: 12.5 kHz bandwidth
UTC direct	+86µs	+86 µs
UTC indirect	+138µs	+113 µs

The EUT satisfied the requirements of this test.

Software used: 55 to 58

TEST EQUIPMENT USED:

4, 28, 30 to 52, 88 to 90

.....



Ambient temperature +25.5 °C Relative humidity 71 %

DATA ENCODING (BIT STUFFING)

IEC 61993-2, CLAUSE 16.4

(1) Method of measurement

Set up standard test environment.

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

(2) Required results

Confirm that

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

(3) Test results

Conditions	Results
Apply msg 8 to the VDL, “7E 3B 3C 3E 7E” in the data portion	√
Apply BBM message to the PI, “7E 3B 3C 3E 7E” in the data portion	√

The EUT satisfied the requirements of this test.

Software used: 55 to 58, 75

TEST EQUIPMENT USED:

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

.....



Ambient temperature +25.5 °C Relative humidity 71 %

FRAME CHECK SEQUENCE

IEC 61993-2, CLAUSE 16.5 (M.1371-1 A2/3.2.3)

(1) Method of measurement

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

(2) Required results

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

(3) Test results

Conditions	Results
Apply msg 3 with wrong CRC to the VDL	√

The EUT satisfied the requirements of this test.

Software used: 55 to 58, 75

TEST EQUIPMENT USED:

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

.....



Ambient temperature +25.5 °C Relative humidity 71 %

SLOT ALLOCATION (CHANNEL ACCESS PROTOCOLS)
NETWORK ENTRY

IEC 61993-2, CLAUSE 16.6 (M.1371-1 A2/3.3.1)
IEC 61993-2, CLAUSE 16.6.1

(1) Method of measurement

Set up standard test environment; switch on EUT.

Record transmitted scheduled position reports for the first 3 frames after initialisation period. Check CommState for channel access mode.

(2) Required results

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

(3) Test results

Conditions	Results
The first frame after initialisation period	√
Consecutive frames	√

The EUT satisfied the requirements of this test.

Software used: 55 to 58

TEST EQUIPMENT USED:

4, 28, 30 to 52, 88 to 90

.....



Ambient temperature +25.5 °C Relative humidity 71 %

AUTONOMOUS SCHEDULED TRANSMISSIONS (SOTDMA) IEC 61993-2, CLAUSE 16.6.2 (M.1371-1 A2/3.3.2)

(1) Method of measurement

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

Record transmitted scheduled position reports msg 1 and check frame structure.

Check CommState of transmitted messages for channel access mode and parameters slot timeout, slot number and slot offset.

(2) Required results

Check that nominal reporting rate is achieved ± 20 % (allocating slots in selection interval SI).

Confirm that the EUT allocates new slots NTS within SI after 3 min to 8 min.

Check that slot offset indicated in CommState matches slots used for transmission.

(3) Test results

Conditions	Results
Under consecutive operation	√

The EUT satisfied the requirements of this test.

Software used: 55 to 58

TEST EQUIPMENT USED:

4, 28, 30 to 52, 88 to 90

.....



Ambient temperature +25.5 °C Relative humidity 71 %

SAFETY RELATED/BINARY MESSAGE TRANSMISSION (RATDMA)

IEC 61993-2, CLAUSE 16.6.3 (M.1371-1 A2/3.3.2)

(1) Method of measurement

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

- a) Apply a 1 slot Binary Broadcast message (msg 8) to the PI of the EUT. Record transmitted messages.*
- b) Apply combinations of Binary Broadcast message (msg 8), Addressed Binary message (msg 14), Broadcast Safety Related message (msg 6) and Addressed Safety Related message (msg 12) to the PI of the EUT. Record transmitted messages and output of the PI of the EUT.*

(2) Required results

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

(3) Test results

Conditions	Results
Apply BBM message to the PI for 1 slot message	√
Apply BBM message to the PI for 1 slot message with 90% channel load.	√
Apply combinations of Binary Broadcast message (msg 8), Addressed Binary message (msg 14), Broadcast Safety Related message (msg 6) and Addressed Safety Related message (msg 12) to the PI of the EUT	√

The EUT satisfied the requirements of this test.

Software used: 55 to 58

TEST EQUIPMENT USED:

4, 28, 30 to 52, 88 to 90

.....



Ambient temperature +25.0 °C Relative humidity 59 %

ASSIGNED OPERATION	IEC 61993-2, CLAUSE 16.6.4 (M.1371-1 A2/3.3.6)
ASSIGNED MODE USING REPORTING RATES	IEC 61993-2, CLAUSE 16.6.4.1

(1) Method of measurement

*Operate standard test environment and EUT in autonomous mode.
Transmit an Assigned mode command message msg16 to the EUT with:
a) the number of reports per 10 min which is not a multiple of 20
b) the number of reports per 10 min which is higher than 600*

(2) Required results:

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

(3) Test results

Conditions	Results
Set NavStatus to "at anchor" Transmit msg 16 with the number of reports 25 per 10 min to EUT. (Slot offset: 25, Increment: 0)	√
Set NavStatus to "at anchor" Transmit msg 16 with the number of reports 1000 per 10 min to EUT. (Slot offset: 1000, Increment: 0)	√

The EUT satisfied the requirements of this test.

Software used: 55 to 58, 75

TEST EQUIPMENT USED:
4, 28, 30 to 52, 63, 66, 67, 79, 88 to 90
.....



Ambient temperature +27.3 °C Relative humidity 72 %

RECEIVING TEST

IEC 61993-2, CLAUSE 16.6.4.2

(1) Method of measurement

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

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

– slot offset and increment

– designated reporting rate.

Record transmitted messages.

(2) Required results

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

(3) Test results

Conditions	Results
Same as clause 14.1.2	Same as clause 14.1.2

The EUT satisfied the requirements of this test.

Software used: 55 to 58, 75

TEST EQUIPMENT USED:

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

.....



Ambient temperature +25.5 °C Relative humidity 71 %

ASSIGNMENT SELECTIVITY

IEC 61993-2, CLAUSE 16.6.4.3 (M.1371-1 A2/3.3.6)

(1) Method of measurement

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

Check frame structure.

Transmit an Assigned mode command (msg 16) to another AIS with a slot offset and increment pointing to a slot used by the EUT.

Record transmitted messages.

(2) Required results

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

(3) Test results

Conditions	Results
Transmit an Assigned mode command (msg 16) to another AIS with a slot offset and increment pointing to a slot used by the EUT.	√

The EUT satisfied the requirements of this test.

Software used: 55 to 58, 75

TEST EQUIPMENT USED:

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

.....



Ambient temperature +25.0 °C Relative humidity 59 %

SLOT ASSIGNMENT TO FATDMA RESERVED SLOTS IEC 61993-2, CLAUSE 16.6.4.4 (M.1371-1 A2/3.3.6)
A test to check the combined operation of msg16 assignment to slots reserved by msg 20.

(1) Method of measurement

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

(2) Required results

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

(3) Test results

Conditions	Results
Transmit a Data Link Management message (msg 20) to the EUT with slot offset and increment. Transmit an Assigned Mode Command (msg 16) to the EUT and command it to use one or more of those FATDMA allocated slots.	√

The EUT satisfied the requirements of this test.

Software used: 55 to 58, 75

TEST EQUIPMENT USED:

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



Ambient temperature +25.0 °C Relative humidity 59 %

FIXED ALLOCATED TRANSMISSIONS (FATDMA)

IEC 61993-2, CLAUSE 16.6.5 (M.1371-1 A2/3.3.6)

(1) Method of measurement

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

Transmit a Data Link Management message (msg 20) to the EUT with slot offset and increment.

Record transmitted messages.

(2) Required results

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

(3) Test results

Conditions	Results
Transmit a Data Link Management message (msg 20) to the EUT with slot offset and increment.	√

The EUT satisfied the requirements of this test.

Software used: 55 to 58, 75

TEST EQUIPMENT USED:

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

.....



Ambient temperature +25.5 °C Relative humidity 71 %

MESSAGE FORMATS
RECEIVED MESSAGES

IEC 61993-2, CLAUSE 16.7 (M.1371-1 A2/3.3.7)
IEC 61993-2, CLAUSE 16.7.1

(1) Method of measurement

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

Apply messages according to table 7 to the VDL.

Record messages output by the PI of EUT.

(2) Required results

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

(3) Test results

Conditions	Results
msg1	√
msg2	√
msg3	√
msg4	√
msg5	√
msg6 already tested, see 14.1.4.2	√
msg7	√
msg8 already tested, see 16.4	√
msg9	√
msg10	√
msg11	√
msg12	√
msg13	√
msg14	√
msg15 already tested, see 14.1.3.2	√
msg16 already tested, see 14.4.3	√
msg17 already tested, see 14.9.3.1	√
msg18	√
msg19	√
msg20 already tested, see 16.6.4.4	√
msg21	√
msg22 already tested, see 14.7	√

The EUT satisfied the requirements of this test.

Software used: 55 to 58, 75

TEST EQUIPMENT USED:

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

.....



Ambient temperature +25.5 °C Relative humidity 71 %

TRANSMITTED MESSAGES

IEC 61993-2, CLAUSE 16.7.2 (M.1371-1 A2/3.3.7)

(1) Method of measurement

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

(2) Required results

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

(3) Test results

Table with 2 columns: Conditions, Results. Rows list messages from msg1 to msg22 (NO) with checkmarks or 'NO' in the results column.

The EUT satisfied the requirements of this test.

Software used: 55 to 58, 75

TEST EQUIPMENT USED:

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

.....



Ambient temperature +25.0 °C Relative humidity 59 %

SPECIFIC TESTS OF NETWORK LAYER
DUAL CHANNEL OPERATION
ALTERNATE TRANSMISSIONS

IEC 61993-2, CLAUSE 17 (7.4)
IEC 61993-2, CLAUSE 17.1 (M.1371-1 A2/4.1)
IEC 61993-2, CLAUSE 17.1.1

(1) Method of measurement

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

(2) Required results

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

(3) Test results

Conditions	Results
Under normal operation	√

The EUT satisfied the requirements of this test.

Software used: 55 to 58

TEST EQUIPMENT USED:

4, 28, 30 to 52, 88 to 90

.....



Ambient temperature +25.0 °C Relative humidity 59 %

REGIONAL AREA DESIGNATION BY VDL MESSAGE

IEC 61993-2, CLAUSE 17.2 (M.1371-1 A2/4.1)

(1) Method of measurement

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

Apply Channel management messages (msg 22) to the VDL defining two adjacent regional areas 1 and 2 with different channel assignments for both regions and a transitional zone extending 4 nautical miles either side of the regional boundary.

At least one channel shall be 12.5 kHz channel.

Let the EUT approach region 1 from outside region 2 more than 5 nautical miles away from region boundary transmitting on default channels.

Record transmitted messages on all 6 channels.

(2) Required results

Check that the EUT transmits and receives on the primary channels assigned for each region alternating channels and doubling reporting rate when passing through the transitional zones.

EUT shall revert to default autonomous operation on the regional channels after leaving the transitional zones.

(3) Test results

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

The EUT satisfied the requirements of this test.

Software used: 55 to 58, 75

TEST EQUIPMENT USED:

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

.....



Ambient temperature +25.0 °C Relative humidity 59 %

REGIONAL AREA DESIGNATION BY SERIAL MESSAGE IEC 61993-2, CLAUSE 17.3 (M.1371-1 A2/4.1.3)

(1) Method of measurement

Repeat test 17.2 using ACA serial message for channel assignment.

(2) Required results

Same as test 17.2

(3) Test results

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

The EUT satisfied the requirements of this test.

Software used: 55 to 58

TEST EQUIPMENT USED:

4, 28, 30 to 52, 88 to 90

.....



Ambient temperature +25.0 °C Relative humidity 59 %

POWER SETTING

IEC 61993-2, CLAUSE 17.4

(1) Method of measurement

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

(2) Required result

Check that EUT sets output power as defined.

(3) Test results

Conditions	Results
msg22	√
ACA sentence	√
manual input	√

The EUT satisfied the requirements of this test.

Software used: 55 to 58, 75

TEST EQUIPMENT USED:

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

.....



Ambient temperature + 25.0 °C Relative humidity 59 %

MESSAGE PRIORITY HANDLING

IEC 61993-2, CLAUSE 17.5 (M.1371-1 A2/4.1.8)

(1) Method of measurement

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

(2) Required results

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

(3) Test results

Conditions	Results
90 % channel load. Applying a speed of >23 knots and a ROT of >20 °/s. Initiate the transmission of two 5 slot messages (msg 12 and msg 8) by the EUT.	√

. The EUT satisfied the requirements of this test

Software used: 55 to 58, 75

TEST EQUIPMENT USED:

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

.....



Ambient temperature + 25.0 °C Relative humidity 59 %

SLOT REUSE (LINK CONGESTION)

IEC 61993-2, CLAUSE 17.6 (M.1371-1 A2/4.4)

(1) Method of measurement

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

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

(2) Required results

Check that the nominal reporting rate for Position Report msg 1 is achieved ± 10 % (allocating slots in selection interval SI) under link congestion conditions.

Confirm that the slot occupied by the most distant station (within selection interval) is used by the slot reuse algorithm.

Check that a station is not subject to slot reuse more than once a frame.

Check that slots allocated by a local base station are not subject to slot reuse.

(3) Test results

Conditions	Results
Msg20 & >90% VDL load	√

The EUT satisfied the requirements of this test.

Software used: 55 to 58, 75

TEST EQUIPMENT USED:

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

.....



Ambient temperature +25.0 °C Relative humidity 59 %

MANAGEMENT OF RECEIVED REGIONAL OPERATING SETTINGS IEC 61993-2, CLAUSE 17.7 (7.4.1)

TEST FOR REPLACEMENT OR ERASURE OF DATED OR REMOTE REGIONAL OPERATING SETTINGS IEC 61993-2, CLAUSE 17.7.1 (7.4.1)

(1) Method of measurement

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

Send a valid regional operating setting to the EUT by msg 22 with the regional operating area including the own position of the EUT.

Consecutively send a total of seven (7) valid regional operating settings to EUT, using both msg 22 and DSC telecommands, with regional operating areas not overlapping to the first and to each other.

Perform the following in the order shown:

a) Send a ninth msg 22 to the EUT with valid regional operating areas not overlapping with the previous eight regional operating areas.

b) Step 1: Set own position of EUT into any of the regional operating areas defined by the second to the ninth telecommands sent to the EUT previously.

Step 2: Send a tenth telecommand to the EUT, with a regional operating area which partly overlaps the regional operating area to which the EUT was set by Step 1 but which does not include the own position of the EUT.

c) Step 1: Move own position of EUT to a distance of more than 500 miles from all regions defined by previous commands.

Step 2: Consecutively set own position of EUT to within all regions defined by the previous telecommands.

(2) Required results

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

a) The EUT shall return to the default operating settings.

b) Step 1: Check that the EUT changes its operating settings to those of that region which includes own position of the EUT.

Step 2: Check that the EUT reverts to the default operating settings.

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

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

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

(3) Test results

Conditions	Results
a) Send ninth msg 22, not overlapping with the previous eight areas	√
b-1) Set own position into any of the regional areas	√
b-2) Send a tenth telecommand, partly overlaps the regional operating area, not include the own position	√
c-1) Move own position to a distance of more than 500 miles from all regions	√
c-2) Set own position to within all regions defined by the previous telecommands	√

The EUT satisfied the requirements of this test.

Software used: 55 to 58, 75

TEST EQUIPMENT USED:

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

.....



Ambient temperature +25.0 °C Relative humidity 59 %

TEST OF CORRECT INPUT VIA PRESENTATION INTERFACE OR MKD

IEC 61993-2, CLAUSE 17.7.2 (7.4.1)

(1) Method of measurement

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

Perform the following tests in the following order:

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

(2) Required results

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

(3) Test results

Table with 2 columns: Conditions, Results. Rows include test steps a) through f) with corresponding results (checkmarks).



Ambient temperature +25.0 °C Relative humidity 59 %

TEST OF CORRECT INPUT VIA PRESENTATION INTERFACE OR MKD

IEC 61993-2, CLAUSE 17.7.2 (7.4.1)

(Continued)

Conditions	Results
d) Input the default operating settings via the MKD for the regional operating area	√
e) Send msg 22 or a DSC telecommand	√
f) Send a different regional operating setting via Presentation Interface, overlapping the regional operating area by msg 22 or a DSC telecommand.	√

The EUT satisfied the requirements of this test.

Software used: 55 to 58, 75, 79

TEST EQUIPMENT USED:

4, 28, 30 to 52, 59, 60, 62, 63, 64, 66, 67, 79, 88 to 90

.....



Ambient temperature +25.0 °C Relative humidity 59 %

TEST OF ADDRESSED TELECOMMAND

IEC 61993-2, CLAUSE 17.7.3 (7.4.1)

(1) Method of measurement

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

Perform the following tests in the following order:

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

(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.*

(3) Test results

Conditions	Results
a) Send msg 22 or a DSC telecommand	√
b) Send an addressed msg 22 or an addressed DSC telecommand	√
c) Move the EUT out of the regional operating area	√

The EUT satisfied the requirements of this test.

Software used: 55 to 58, 75, 79

TEST EQUIPMENT USED:

4, 28, 30 to 52, 59, 60, 62, 63, 64, 66, 67, 79, 88 to 90

.....



Ambient temperature +25.0 °C Relative humidity 59 %

TEST FOR INVALID REGIONAL OPERATING AREAS
(three regional operating areas with same corner)

IEC 61993-2, CLAUSE 17.7.4 (7.4.1)

(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 msg 22 or DSC telecommand, Presentation Interface input and manual input via MKD. The current own position of the EUT shall be within the regional operating area of the third regional operating setting.*
- b) Move current own position of the EUT consecutively to the regional operating areas of the first two valid regional operating settings.*

(2) 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.*

(3) Test results

Conditions	Results
a) Send three different valid regional operating settings	√
b) Move current own position of the EUT	√

The EUT satisfied the requirements of this test.

Software used: 55 to 58, 75, 79

TEST EQUIPMENT USED:

4, 28, 30 to 52, 59, 60, 62, 63, 64, 66, 67, 79, 88 to 90

.....



SELF CERTIFICATION OF OTHER CONDITIONS

IEC 61993-2, CLAUSE 17.7.5 (7.4.1)

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

A signed and dated certificate/declaration covering the requirements of this clause has been provided by Japan Radio Company Limited.

See Annex A