



The Consultative Committee for Space Data Systems

---

# **CONJUNCTION DATA MESSAGE TEST PLAN/REPORT**

**CCSDS RECORD**

**CCSDS 508.0-Y-1.3**

**YELLOW BOOK**

**June 2025**



## FOREWORD

This document records the plans for prototype testing and results of that testing for the Conjunction Data Message, CCSDS 508.0-P-1.2, Pink Book. As a record of prototype testing, it is expected that expansion, deletion, or modification of this document will **not** occur. This document is subject to CCSDS document management and change control procedures, which are defined in the *Organization and Processes for the Consultative Committee for Space Data Systems*. Current versions of CCSDS documents are maintained at the CCSDS Web site:

<http://www.ccsds.org/>

Questions relating to the contents or status of this document should be addressed to the CCSDS Secretariat at the address indicated on page i.

## CCSDS RECORD CONCERNING CONJUNCTION DATA MESSAGE TEST PLAN/REPORT

At time of publication, the active Member and Observer Agencies of the CCSDS were:

### Member Agencies

- Agenzia Spaziale Italiana (ASI)/Italy.
- British National Space Centre (BNSC)/United Kingdom.
- Canadian Space Agency (CSA)/Canada.
- Centre National d'Etudes Spatiales (CNES)/France.
- China National Space Administration (CNSA)/People's Republic of China.
- Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR)/Germany.
- European Space Agency (ESA)/Europe.
- Federal Space Agency (FSA)/Russian Federation.
- Instituto Nacional de Pesquisas Espaciais (INPE)/Brazil.
- Japan Aerospace Exploration Agency (JAXA)/Japan.
- National Aeronautics and Space Administration (NASA)/USA.

### Observer Agencies

- Austrian Space Agency (ASA)/Austria.
- Belgian Federal Science Policy Office (BFSPPO)/Belgium.
- Central Research Institute of Machine Building (TsNIIMash)/Russian Federation.
- Centro Tecnico Aeroespacial (CTA)/Brazil.
- Chinese Academy of Sciences (CAS)/China.
- Chinese Academy of Space Technology (CAST)/China.
- Commonwealth Scientific and Industrial Research Organization (CSIRO)/Australia.
- Danish National Space Center (DNSC)/Denmark.
- European Organization for the Exploitation of Meteorological Satellites (EUMETSAT)/Europe.
- European Telecommunications Satellite Organization (EUTELSAT)/Europe.
- Hellenic National Space Committee (HNSC)/Greece.
- Indian Space Research Organization (ISRO)/India.
- Institute of Space Research (IKI)/Russian Federation.
- KFKI Research Institute for Particle & Nuclear Physics (KFKI)/Hungary.
- Korea Aerospace Research Institute (KARI)/Korea.
- MIKOMTEK: CSIR (CSIR)/Republic of South Africa.
- Ministry of Communications (MOC)/Israel.
- National Institute of Information and Communications Technology (NICT)/Japan.
- National Oceanic and Atmospheric Administration (NOAA)/USA.
- National Space Organization (NSPO)/Chinese Taipei.
- Naval Center for Space Technology (NCST)/USA.
- Space and Upper Atmosphere Research Commission (SUPARCO)/Pakistan.
- Swedish Space Corporation (SSC)/Sweden.
- United States Geological Survey (USGS)/USA.

## DOCUMENT CONTROL

Document	Title and Issue	Date	Status
CCSDS 508.0-Y-1	Conjunction Data Message Test/Plan Report, CCSDS Record, Issue 1	Apr 2013	Previous draft
CCSDS 508.0-Y-1.2	Conjunction Data Message Test/Plan Report, CCSDS Record, Issue 1	Apr 2025	Previous draft
CCSDS 508.0-Y-1.3	Conjunction Data Message Test/Plan Report, CCSDS Record, Issue 1	Jun 2025	Current draft

## CONTENTS

<u>Section</u>	<u>Page</u>
<b>DOCUMENT CONTROL.....</b>	<b>III</b>
<b>CONTENTS.....</b>	<b>IV</b>
<b>1 INTRODUCTION.....</b>	<b>1-1</b>
1.1 PURPOSE.....	1-1
1.2 SCOPE.....	1-1
1.3 APPLICABILITY.....	1-1
1.4 RATIONALE.....	1-1
1.5 DOCUMENT STRUCTURE .....	1-1
1.6 REFERENCES .....	1-1
<b>2 CONCLUSION/RECOMMENDATION.....</b>	<b>2-3</b>
<b>3 CONJUNCTION DATA MESSAGE (CDM) TESTING GOALS.....</b>	<b>3-4</b>
3.1 CDM OVERVIEW .....	3-4
<b>4 TEST PLAN OVERVIEW.....</b>	<b>4-5</b>
4.1 TEST ORGANIZATION .....	4-5
4.2 TEST CASE ELEMENTS.....	4-5
4.2.1 INDEPENDENT KEYWORDS .....	4-5
4.2.2 DEPENDENT KEYWORDS .....	4-7
4.2.3 FORMAT KEYWORDS .....	4-9
4.3 TEST CASE CONSTRUCTION.....	4-10
<b>5 TEST PLAN DETAILS.....</b>	<b>5-11</b>
5.1 TEST CASE #1: CDM BACKWARDS COMPATABILITY .....	5-11
5.1.1 TEST PURPOSE .....	5-11
5.1.2 TEST DESCRIPTION.....	5-11
5.1.3 EXPECTED RESULTS.....	5-11
5.2 TEST CASE #2: INDEPENDENT KEYWORD AND CASE #1 DEPENDENCIES .....	5-11
5.2.1 TEST PURPOSE .....	5-11
5.2.2 TEST DESCRIPTION.....	5-11
5.2.3 EXPECTED RESULTS.....	5-11
5.3 TEST CASE #3: INDEPENDENT KEYWORD AND CASE #2 DEPENDENCIES .....	5-12
5.3.1 TEST PURPOSE .....	5-12
5.3.2 TEST DESCRIPTION.....	5-12
5.3.3 EXPECTED RESULTS.....	5-12
5.4 TEST CASE #4: RELATIVE METADATA FORMAT KEYWORD .....	5-12
5.4.1 TEST PURPOSE .....	5-12
5.4.2 TEST DESCRIPTION.....	5-12
5.4.3 EXPECTED RESULTS.....	5-12
5.5 TEST CASE #5: XML SCHEMA.....	5-13
5.5.1 TEST PURPOSE .....	5-13
5.5.2 TEST DESCRIPTION.....	5-13
5.5.3 EXPECTED RESULTS.....	5-13

<b>6</b>	<b>TEST REPORT OVERVIEW .....</b>	<b>6-1</b>
<b>7</b>	<b>TEST REPORT DETAILS .....</b>	<b>7-1</b>
7.1	TEST CASE #1 CDM BACKWARDS COMPATABILITY .....	7-1
7.2	TEST CASE #2: INDEPENDENT KEYWORD AND CASE #1 DEPENDENCIES .....	7-1
7.3	TEST CASE #3: INDEPENDENT KEYWORD AND CASE #2 DEPENDENCIES .....	7-1
7.4	TEST CASE #4: RELATIVE METADATA FORMAT KEYWORD .....	7-1
7.5	TEST CASE #5: XML SCHEMA .....	7-1





## **1 INTRODUCTION**

### **1.1 PURPOSE**

The purpose of this document is to describe the prototype testing conducted on the CCSDS Conjunction Data Message (CDM), CCSDS 508.0-P-1.2 (reference [2]).

### **1.2 SCOPE**

The scope of this document is testing of the Conjunction Data Message. The CDM is part of the technical program of the CCSDS Navigation Working Group. The CDM document completed a CCSDS Agency Review in May 2024, with revisions following this initial review to apply RIDs from the review and proofreading changes; this process is described in reference [1].

### **1.3 APPLICABILITY**

This document applies to the prototype testing required to advance the CDM from Pink Book to Blue Book status.

### **1.4 RATIONALE**

The CCSDS Procedures Manual states that for a Recommendation to become a Blue Book, the draft standard must be tested in an operational manner. The following requirements for an implementation exercise were excerpted from reference [1]:

“At least two independent and interoperable prototypes or implementations must have been developed and demonstrated in an operationally relevant environment, either real or simulated.”

This document outlines the Navigation Working Group’s approach to meeting this requirement for the CDM 508.0 Pink Book.

### **1.5 DOCUMENT STRUCTURE**

The first sections of this document describe the Test Plan for the prototyping activity; the last sections of the document provide a Test Report of the realized plan. Acronyms are provided in Annex A.

### **1.6 REFERENCES**

The following documents are referenced in this document. At the time of publication, the editions indicated were valid. All documents are subject to revision, and users of this document are encouraged to investigate the possibility of applying the most recent editions of the documents indicated below. The CCSDS Secretariat maintains a register of currently valid CCSDS documents.

## CCSDS RECORD CONCERNING CONJUNCTION DATA MESSAGE TEST PLAN/REPORT

- [1] *Organization and Processes for the Consultative Committee for Space Data Systems.* CCSDS A02.1-Y-4. Yellow Book. Issue 4. Washington, D.C.: CCSDS, April 2014.
- [2] *Conjunction Data Message.* Recommendation for Space Data System Standards, CCSDS 508.0-P-1.2. Pink Book, Washington, D.C.: CCSDS, December 2024.

## 2 CONCLUSION/RECOMMENDATION

The test plan and test reports documented herein substantiate that the organizations participating in the CCSDS Navigation Working Group have successfully conducted prototype testing of the Conjunction Data Message (CDM) document (references [2], [3]). During the testing, CDMs were produced by 4 independent organizations, and the ability to correctly read the messages and utilize the information in analyses was demonstrated by 4 different organizations.

Based on the diversity of organizations able to read/write the messages, and the positive test results, the Navigation Working Group recommends that the CDM Pink Book document be promoted to a Blue Book CCSDS Recommended Standard.

\*\*\* NOTE: The above is the Conclusion the team hopes to reach at the conclusion of the testing described in this document. \*\*\*

### 3 CONJUNCTION DATA MESSAGE (CDM) TESTING GOALS

The test of the CDM described in Section 4 and Section 5 of this plan will be conducted in order to meet the CCSDS requirements described in Section 2. In Section 6 and Section 7, the results of the testing are presented.

#### 3.1 CDM OVERVIEW

The CDM is an ASCII file in “keyword=value notation” (KVN) formatted message as well as an Extensible Markup Language (XML) formatted message. It specifies a standard message format for use in exchanging spacecraft conjunction information between originators of conjunction assessment (CA) data, satellite owner/operators and other authorized parties. The file is organized into 5 sections: a header section, a relative metadata/data section, a metadata section, a data section, and an optional user defined parameter section. The header section contains identification information (version, creation date, originator, etc.). The relative metadata/data section contains metadata/data describing relative relationships between the two conjuncting objects. The metadata section contains information regarding the objects to which the conjunction assessment information applies, operator contact information, applicable reference frames, etc.. The data section contains the Cartesian state vector for the conjuncting objects at the time of closest approach (obligatory), a 6x6 position/velocity covariance matrix (obligatory) for both objects, the 7, 8 and 9 terms for a 9x9 covariance matrix (optional) for both objects, needed for propagation of the covariance to another time point, and information describing the orbit determination used for each object in producing the state vectors and covariance. The final optional user defined parameter section allows users to define implementation specific parameters which are not catered for in the main body of the CDM standard, if used, the keywords and their meanings should be detailed in an Interface Control Document (ICD).

## 4 TEST PLAN OVERVIEW

### 4.1 TEST ORGANIZATION

Prototyping of the CDM will be performed as shown in the following table, which lists the Test Number, participating member agencies of the Navigation Working Group, and direction of message transfer. All CDM optional elements will be exercised in the test cases. In the event of discrepancies, troubleshooting will be conducted by the participants in the test.

Test#	From	To
1	CNES	NASA JSC
2	DLR	ESA/ESOC
3	TraCSS	NASA CARA
4	GMV	TraCSS
5	Messages from Tests 1, 2, 3 & 4	NASA JPL

### 4.2 TEST CASE ELEMENTS

For the purposes of testing there are considered to be three types of keyword within the CDM. These being independent keywords which do not have complex conditions which can be tested in a single test, conditional keywords which require two tests to test their functionality, and format keywords which indicate control the structure of the CDM. These will be referred to as independent keywords, dependent keywords, and format keywords. All new or modified keywords associated with CDM V2 are listed below to indicate which type they are considered to be. Dependent keywords will include the two states, referred to as cases, which need to be tested.

#### 4.2.1 INDEPENDENT KEYWORDS

The following keywords are considered independent and therefore do not require multiple tests to test their functionality:

General keywords:

- CLASSIFICATION
- CONJUNCTION\_ID
- MAHALANOBIS\_DISTANCE
- APPROACH\_ANGLE
- EFFECTIVE\_COMBINED\_HBR
- PREVIOUS\_MESSAGE\_ID
- PREVIOUS\_MESSAGE\_EPOCH
- NEXT\_MESSAGE\_EPOCH
- OPS\_STATUS
- ODM\_MSG\_LINK
- ADM\_MSG\_LINK
- OBS\_BEFORE\_NEXT\_MESSAGE

## CCSDS RECORD CONCERNING CONJUNCTION DATA MESSAGE TEST PLAN/REPORT

- COVARIANCE\_SOURCE
- OD\_EPOCH
- MIN\_MEDIAN\_MAX\_UPDATE\_INTERVAL
- AREA\_PC\_MIN
- AREA\_PC\_MAX
- HBR
- MIN\_DV
- MAX\_DV
- LEAD\_TIME\_REQD\_BEFORE\_TCA
- APOAPSIS\_ALTITUDE
- PERIAPSIS\_ALTITUDE
- INCLINATION
- DENSITY\_FORECAST\_UNCERTAINTY
- SCREENING\_DATA\_SOURCE
- DCP\_SENSITIVITY\_VECTOR\_POSITION
- DCP\_SENSITIVITY\_VECTOR\_VELOCITY

Collision probability keywords:

- COLLISION\_MAX\_PROBABILITY
- COLLISION\_MAX\_PC\_METHOD

Space environment burden keywords:

- SEB\_FACTOR
- SEB\_MODEL

RCS keywords:

- RCS
- RCS\_MIN
- RCS\_MAX

Visual magnitude keywords:

- VM\_ABSOLUTE
- VM\_APPARENT\_MIN
- VM\_APPARENT
- VM\_APPARENT\_MAX
- REFLECTANCE

Covariance confidence keywords:

- COV\_CONFIDENCE
- COV\_CONFIDENCE\_METHOD

Covariance scale factor keywords:

- CSCALE\_FACTOR\_MIN
- CSCALE\_FACTOR
- CSCALE\_FACTOR\_MAX

User defined parameters:

- USER\_DEFINED\_x

#### **4.2.2 DEPENDENT KEYWORDS**

The following keywords are considered dependent and therefore require multiple tests to test their functionality. In each instance the keyword details the cases that require testing.

Collision percentile keywords:

- COLLISION\_PERCENTILE
- COLLISION\_PROBABILITY

Two cases will be performed as follows:

- Case #1: This test will contain the COLLISION\_PERCENTILE keyword with 5 elements, this will mean that the COLLISION\_PROBABILITY keyword shall also contain 5 corresponding elements.
- Case #2: This test will not contain the COLLISION\_PERCENTILE keyword, this will mean that the COLLISION\_PROBABILITY keyword will just contain one value.

Screening parameter keywords:

- SCREEN\_TYPE
- SCREEN\_VOLUME\_SHAPE
- SCREEN\_VOLUME\_RADIUS
- SCREEN\_PC\_THRESHOLD

Two cases will be performed as follows.

- Case #1: This test will contain SCREEN\_TYPE set to SHAPE. This will mean that SCREEN\_VOLUME\_SHAPE must be present and shall be set to SPHERE, and keyword SCREEN\_VOLUME\_RADIUS must be present and set accordingly.
- Case #2: This test will contain SCREEN\_TYPE set to PC. This will mean that SCREEN\_PC\_THRESHOLD must be present and set accordingly.

Optimally enclosing box keywords:

- OEB\_PARENT\_FRAME
- OEB\_PARENT\_FRAME\_EPOCH
- OEB\_Q1
- OEB\_Q2
- OEB\_Q3
- OEB\_QC
- OEB\_MAX
- OEB\_INT
- OEB\_MIN
- AREA\_ALONG\_OEB\_MAX
- AREA\_ALONG\_OEB\_INT
- AREA\_ALONG\_OEB\_MIN

Two cases will be performed as follows.

- Case #1: OEB\_PARENT\_FRAME set to UNKNOWN. This will mean that all other OEB keywords shall not be present.
- Case #2: OEB\_PARENT\_FRAME set to a value from the SANA registry ([https://sanaregistry.org/r/orbit\\_relative\\_reference\\_frames/](https://sanaregistry.org/r/orbit_relative_reference_frames/)). This will mean that all other OEB keywords shall be present.

Alternate covariance keywords:

- ALT\_COV\_TYPE
- ALT\_COV\_REF\_FRAME
- CX\_X
- CY\_X
- CY\_Y
- CZ\_X
- CZ\_Y
- CZ\_Z
- CXDOT\_X
- CXDOT\_Y
- CXDOT\_Z
- CXDOT\_XDOT
- CYDOT\_X
- CYDOT\_Y
- CYDOT\_Z
- CYDOT\_XDOT
- CYDOT\_YDOT



- CZDOT\_X
- CZDOT\_Y
- CZDOT\_Z
- CZDOT\_XDOT
- CZDOT\_YDOT
- CZDOT\_ZDOT
- CDRG\_X
- CDRG\_Y
- CDRG\_Z
- CDRG\_XDOT
- CDRG\_YDOT
- CDRG\_ZDOT
- CDRG\_DRG
- CSRP\_X
- CSRP\_Y
- CSRP\_Z
- CSRP\_XDOT
- CSRP\_YDOT
- CSRP\_ZDOT
- CSRP\_DRG
- CSRP\_SRP
- CTHR\_X
- CTHR\_Y
- CTHR\_Z
- CTHR\_XDOT
- CTHR\_YDOT
- CTHR\_ZDOT
- CTHR\_DRG
- CTHR\_SRP
- CTHR\_THR
- CSIG3EIGVEC3 (C on ALT\_COV\_TYPE)

Two cases will be performed as follows.

- Case #1: ALT\_COV\_TYPE set to XYZ. This will mean that all alternate covariance keywords shall be present except CSIG3EIGVEC3.
- Case #2: ALT\_COV\_TYPE set to CSIG3EIGVEC3. This will mean only ALT\_COV\_FRAME and CSIG3EIGVEC3 shall be present.

#### **4.2.3 FORMAT KEYWORDS**

The following format keyword has been created in CDM V2 and requires an independent test in order to test correct functionality:

- `RELATIVE_DATA_WRT`

### 4.3 TEST CASE CONSTRUCTION

The tests detailed in this document shall be constructed to test all of the parameters detailed in Section 4.2 and CDM functionality.

Test 1 will be constructed to test that CDM V2 is backwards compatible with CDM V1 from a Keyword perspective. It should be noted that the only discrepancy acceptable may be that if a CDM V1 reader checks the `CCSDS_CDM_VERS` keyword, it may not accept a value of 2.0. This is something that can be overridden if an organization does not chose to update their readers. A list of compatible CDM V1 keywords is provided in Annex B.

Test 2 shall be constructed to test all or a subset of the independent keywords detailed in Section 4.2 along with all dependent keywords using their Case #1 configurations.

Test 3 shall be constructed to test all or a subset or all of the independent keywords detailed in Section 4.2 along with all dependent keywords using their Case #2 configurations.

Test 4 shall be constructed to test the format keyword introduced in CDM V2 detailed in Section 4.2.

Test 2 and Test 3 shall be constructed such that, if each test contains a subset of independent keywords, combined they shall test all independent keywords in across both test.

Test 5 shall test that the CDM messages used for tests 1, 2, 3, and 4 in this document, when converted to XML, validate against the CDM XML schema.

## **5 TEST PLAN DETAILS**

### **5.1 TEST CASE #1: CDM BACKWARDS COMPATABILITY**

#### **5.1.1 TEST PURPOSE**

This tests the ability of CDM V2 to support CDM messages containing just CDM V1 keywords. The assignments to "Organisation1" and "Organisation2" are as indicated in Section 4.1 above.

#### **5.1.2 TEST DESCRIPTION**

For this test, Organisation1 will send a CDM using just CDM V1 keywords to Organisation2. Organisation2 will ingest this message and determine if the message was correctly processed. A list of compatible CDM V1 keywords is provided in Annex B.

#### **5.1.3 EXPECTED RESULTS**

It is anticipated that Organisation1 will successfully write a CDM message containing just CDM V1 keywords and that Organisation2 will successfully read the CDM message. Assuming that these criteria are met, the test will be considered successful. In the event of discrepancies, troubleshooting will be conducted by the participants in the test.

NOTE: The message should specify that "CCSDS\_CDM\_VERS = 2.0", this could cause an error in the receiver's processing that would need to be addressed by the receiver.

### **5.2 TEST CASE #2: INDEPENDENT KEYWORD AND CASE #1 DEPENDENCIES**

#### **5.2.1 TEST PURPOSE**

This test demonstrates the processing of a CDM message containing optional keywords which have conditional dependencies.

#### **5.2.2 TEST DESCRIPTION**

For this test Organisation1 will write the CDM test message including all or a subset of independent keywords plus dependent keywords in Case #1 configuration as defined in Section 4.2. Organisation2 will read the provided message and determine if the message was successfully processed.

#### **5.2.3 EXPECTED RESULTS**

It is anticipated that Organisation1 will successfully write a CDM message and that Organisation2 will successfully read the CDM message. Assuming that these criteria are met, the test will be considered successful. In the event of discrepancies, troubleshooting will be conducted by the participants in the test.

### **5.3 TEST CASE #3: INDEPENDENT KEYWORD AND CASE #2 DEPENDENCIES**

#### **5.3.1 TEST PURPOSE**

This test demonstrates the processing of a CDM message containing optional keywords which have conditional dependencies.

#### **5.3.2 TEST DESCRIPTION**

For this test Organisation1 will write the CDM test message including all or a subset of independent keywords plus dependent keywords in Case #2 configuration as defined in Section 4.2. Organisation2 will read the provided message and determine if the message was successfully processed.

#### **5.3.3 EXPECTED RESULTS**

It is anticipated that Organisation1 will successfully write a CDM message and that Organisation2 will successfully read the CDM message. Assuming that these criteria are met, the test will be considered successful. In the event of discrepancies, troubleshooting will be conducted by the participants in the test.

### **5.4 TEST CASE #4: RELATIVE METADATA FORMAT KEYWORD**

#### **5.4.1 TEST PURPOSE**

This test demonstrates the processing of a CDM message containing the format keyword introduced in CDM V2 in order to allow 2 relative metadata/data sections within a single CDM message.

#### **5.4.2 TEST DESCRIPTION**

For this test Organisation1 will write the CDM test message including two relative metadata/data sections. Organisation2 will read the provided message and determine if the message was successfully processed.

#### **5.4.3 EXPECTED RESULTS**

It is anticipated that Organisation1 will successfully write a CDM message and that Organisation2 will successfully read the CDM message. Assuming that these criteria are met, the test will be considered successful. In the event of discrepancies, troubleshooting will be conducted by the participants in the test.

## **5.5 TEST CASE #5: XML SCHEMA**

### **5.5.1 TEST PURPOSE**

This test demonstrates that the CDM messages used for tests 1, 2, and 3 in this document, when converted to XML, validate correctly against the CDM V2 XML schema.

### **5.5.2 TEST DESCRIPTION**

For this test this test messages written for test 1, 2, and 3 will be converted to XML and validated against the CDM V2 XML schema.

### **5.5.3 EXPECTED RESULTS**

If the test messages validate correctly against the CDM V2 XML schema, the test will be considered successful. In the event of discrepancies, troubleshooting will be conducted by the participants in the test.



## **6 TEST REPORT OVERVIEW**

CDM participants will prepare test data sheets as applicable, and send them to the Navigation Working Group via email.

The test report details will be consolidated in Section 7 of this document. A summarization of the test process and the recommendation of the NavWG may be found in Section 2 of the report. The report will be submitted to the CCSDS Engineering Steering Group (CESG) and CCSDS Management Council (CMC), along with results of the agency reviews. At that time, a formal request will be submitted to the CMC for progression of the CDM to CCSDS Blue Book status.

The next page contains a format for the test data sheets that will be used to report the results of individual tests. The form includes sections for the originator of the message and the recipient of the message as well as sections to document the test results.

**SAMPLE**



### Conjunction Data Message (CDM) Prototype Test Data Sheet

1	Report Date:	
2	Program Under Test:	Conjunction Data Message (CDM) Prototype
3	Test Case Number:	
4	Agencies Participating in this Test Case:	
5	Agency Responsible for Producing Test Message	
6	Producing Test Engineer:	
7	Agency Responsible for Consuming Test Message	
8	Consuming Test Engineer:	
9	Spacecraft:	
10	Results (Pass, Partial Pass, Fail):	
11	Variances from Expected Result:	
12	Comments:	



## **7 TEST REPORT DETAILS**

### **7.1 TEST CASE #1 CDM BACKWARDS COMPATABILITY**

### **7.2 TEST CASE #2: INDEPENDENT KEYWORD AND CASE #1 DEPENDENCIES**

### **7.3 TEST CASE #3: INDEPENDENT KEYWORD AND CASE #2 DEPENDENCIES**

### **7.4 TEST CASE #4: RELATIVE METADATA FORMAT KEYWORD**

### **7.5 TEST CASE #5: XML SCHEMA**



## **ANNEX A**

### **ABBREVIATIONS AND ACRONYMS (INFORMATIVE)**

ASCII	American Standard Code for Information Interchange
CA	Conjunction Assessment
CCSDS	Consultative Committee for Space Data Systems
CDM	Conjunction Data Message
CNES	Centre National d'Etudes Spatiales
CSM	Conjunction Summary Message
DLR/GSOC	Deutsches Zentrum für Luft und Raumfahrt (German Aerospace Center)/German Space Operations Center
ESA/ESOC	European Space Agency/European Space Operations Center
ITRF	International Terrestrial Reference Frame
JAXA	Japan Aerospace Exploration Agency
KVN	Keyword = Value Notation
NASA/GSFC	National Aeronautics and Space Administration/Goddard Space Flight Center
NASA/JPL	National Aeronautics and Space Administration/Jet Propulsion Laboratory
NASA/JSC	National Aeronautics and Space Administration/Johnson Space Flight Center
NavWG	CCSDS Navigation Working Group
OCM	Orbit Conjunction Message
SANA	Space Assigned Numbers Authority
TCA	Time of Closest Approach
XML	Extensible Markup Language



## **ANNEX B**

### **CONJUNCTION DATA MESSAGE V1 KEYWORDS (INFORMATIVE)**

This Annex lists all keywords included in CDM V1.

Header:

- CCSDS\_CDM\_VERS
- CREATION\_DATE
- ORIGINATOR
- MESSAGE\_FOR
- MESSAGE\_ID

Relative Metadata:

- TCA
- MISS\_DISTANCE
- RELATIVE\_SPEED
- RELATIVE\_POSITION\_R
- RELATIVE\_POSITION\_T
- RELATIVE\_POSITION\_N
- RELATIVE\_VELOCITY\_R
- RELATIVE\_VELOCITY\_T
- RELATIVE\_VELOCITY\_N
- START\_SCREEN\_PERIOD
- STOP\_SCREEN\_PERIOD
- SCREEN\_VOLUME\_FRAME
- SCREEN\_VOLUME\_SHAPE
- SCREEN\_VOLUME\_X
- SCREEN\_VOLUME\_Y
- SCREEN\_VOLUME\_Z
- SCREEN\_ENTRY\_TIME
- SCREEN\_EXIT\_TIME
- COLLISION\_PROBABILITY
- COLLISION\_PROBABILITY\_METHOD

Object Metadata:

- OBJECT
- OBJECT\_DESIGNATOR
- CATALOG\_NAME

## CCSDS RECORD CONCERNING CONJUNCTION DATA MESSAGE TEST PLAN/REPORT

- OBJECT\_NAME
- INTERNATIONAL\_DESIGNATOR
- OBJECT\_TYPE
- OPERATOR\_CONTACT\_POSITION
- OPERATOR\_ORGANIZATION
- OPERATOR\_PHONE
- OPERATOR\_EMAIL
- EPHEMERIS\_NAME
- COVARIANCE\_METHOD
- MANEUVERABLE
- ORBIT\_CENTER
- REF\_FRAME
- GRAVITY\_MODEL
- ATMOSPHERIC\_MODEL
- N\_BODY\_PERTURBATIONS
- SOLAR\_RAD\_PRESSURE
- EARTH\_TIDES
- INTRACK\_THRUST

### Object Data:

- TIME\_LASTOB\_START
- TIME\_LASTOB\_END
- RECOMMENDED\_OD\_SPAN
- ACTUAL\_OD\_SPAN
- OBS\_AVAILABLE
- OBS\_USED
- TRACKS\_AVAILABLE
- TRACKS\_USED
- RESIDUALS\_ACCEPTED
- WEIGHTED\_RMS
- AREA\_PC
- AREA\_DRG
- AREA\_SRP
- MASS
- CD\_AREA\_OVER\_MASS
- CR\_AREA\_OVER\_MASS
- THRUST\_ACCELERATION
- SEDR
- X
- Y
- Z
- X\_DOT
- Y\_DOT

## CCSDS RECORD CONCERNING CONJUNCTION DATA MESSAGE TEST PLAN/REPORT

- Z\_DOT
- CR\_R
- CT\_R
- CT\_T
- CN\_R
- CN\_T
- CN\_N
- CRDOT\_R
- CRDOT\_T
- CRDOT\_N
- CRDOT\_RDOT
- CTDOT\_R
- CTDOT\_T
- CTDOT\_N
- CTDOT\_RDOT
- CTDOT\_TDOT
- CNDOT\_R
- CNDOT\_T
- CNDOT\_N
- CNDOT\_RDOT
- CNDOT\_TDOT
- CNDOT\_NDOT
- CDRG\_R
- CDRG\_T
- CDRG\_N
- CDRG\_RDOT
- CDRG\_TDOT
- CDRG\_NDOT
- CDRG\_DRG
- CSRP\_R
- CSRP\_T
- CSRP\_N
- CSRP\_RDOT
- CSRP\_TDOT
- CSRP\_NDOT
- CSRP\_DRG
- CSRP\_SRP
- CTHR\_R
- CTHR\_T
- CTHR\_N
- CTHR\_RDOT
- CTHR\_TDOT
- CTHR\_NDOT
- CTHR\_DRG

## CCSDS RECORD CONCERNING CONJUNCTION DATA MESSAGE TEST PLAN/REPORT

- CTHR\_SRP
- CTHR\_THR