

**Space data and information transfer systems –  
TM (telemetry) synchronization and channel  
coding (ISO 22641-2005, IDT)**

ICS 49.140

Språk: engelska

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Den internationella standarden ISO 22641:2005 gäller som svensk standard. Detta dokument innehåller den officiella engelska versionen av ISO 22641:2005.

The International Standard ISO 22641:2005 has the status of a Swedish Standard. This document contains the official English version of ISO 22641:2005.

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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 22641 was prepared by the Consultative Committee for Space Data Systems (CCSDS) (as CCSDS 131.0-B-1, September 2003) and was adopted (without modifications except those stated in Clause 2 of this International Standard) by Technical Committee ISO/TC 20, *Aircraft and space vehicles*, Subcommittee SC 13, *Space data and information transfer systems*.



# Space data and information transfer systems — TM (telemetry) synchronization and channel coding

## 1 Scope

This International Standard specifies synchronization and channel coding schemes used in conjunction with the telemetry (TM) space data link protocol as defined by ISO 22645 or the advanced orbiting systems (AOS) space data link protocol defined by ISO 22666. These schemes are to be used over space-to-ground or space-to-space communications links by space missions.

The scope and field of application are furthermore detailed in subclauses 1.1 and 1.2 of the enclosed CCSDS publication.

## 2 Requirements

Requirements are the technical recommendations made in the following publication (reproduced on the following pages), which is adopted as an International Standard:

CCSDS 131.0-B-1, September 2003, *TM synchronization and channel coding*.

For the purposes of international standardization, the modifications outlined below shall apply to the specific clauses and paragraphs of publication CCSDS 131.0-B-1.

*Pages i to v*

This part is information which is relevant to the CCSDS publication only.

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Add the following information to the references indicated:

[1] Document CCSDS 132.0-B-1, September 2003, is equivalent to ISO 22645:2005.

[2] Document CCSDS 732.0-B-1, September 2003, is equivalent to ISO 22666:2005.

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Add the following information to the references indicated:

[B2] Document CCSDS 101.0-B-6, October 2002, is equivalent to ISO 11754:—<sup>1)</sup>.

It has been agreed with the Consultative Committee for Space Data Systems that Subcommittee ISO/TC 20/SC 13 will be consulted in the event of any revision or amendment of publication CCSDS 131.0-B-1. To this end, NASA will act as a liaison body between CCSDS and ISO.

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1) To be published. (Revision of ISO 11754:2003)

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**RECOMMENDATION FOR SPACE  
DATA SYSTEM STANDARDS**

**TM SYNCHRONIZATION  
AND CHANNEL CODING**

**CCSDS 131.0-B-1**

**BLUE BOOK**

September 2003



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## CCSDS RECOMMENDATION FOR TM SYNCHRONIZATION AND CHANNEL CODING

**AUTHORITY**

Issue:	Blue Book, Issue 1
Date:	September 2003
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This document has been approved for publication by the Management Council of the Consultative Committee for Space Data Systems (CCSDS) and represents the consensus technical agreement of the participating CCSDS Member Agencies. The procedure for review and authorization of CCSDS Recommendations is detailed in the *Procedures Manual for the Consultative Committee for Space Data Systems* (reference [B1]), and the record of Agency participation in the authorization of this document can be obtained from the CCSDS Secretariat at the address below.

This Recommendation is published and maintained by:

CCSDS Secretariat  
Office of Space Communication (Code M-3)  
National Aeronautics and Space Administration  
Washington, DC 20546, USA

## CCSDS RECOMMENDATION FOR TM SYNCHRONIZATION AND CHANNEL CODING

**STATEMENT OF INTENT**

The Consultative Committee for Space Data Systems (CCSDS) is an organization officially established by the management of member space Agencies. The Committee meets periodically to address data systems problems that are common to all participants, and to formulate sound technical solutions to these problems. Inasmuch as participation in the CCSDS is completely voluntary, the results of Committee actions are termed **Recommendations** and are not considered binding on any Agency.

This **Recommendation** is issued by, and represents the consensus of, the CCSDS Plenary body. Agency endorsement of this **Recommendation** is entirely voluntary. Endorsement, however, indicates the following understandings:

- Whenever an Agency establishes a CCSDS-related **standard**, this **standard** will be in accord with the relevant **Recommendation**. Establishing such a **standard** does not preclude other provisions which an Agency may develop.
- Whenever an Agency establishes a CCSDS-related standard, the Agency will provide other CCSDS member Agencies with the following information:
  - The **standard** itself.
  - The anticipated date of initial operational capability.
  - The anticipated duration of operational service.
- Specific service arrangements are made via memoranda of agreement. Neither this Recommendation nor any ensuing standard is a substitute for a memorandum of agreement.

No later than five years from its date of issuance, this **Recommendation** will be reviewed by the CCSDS to determine whether it should: (1) remain in effect without change; (2) be changed to reflect the impact of new technologies, new requirements, or new directions; or, (3) be retired or canceled.

In those instances when a new version of a **Recommendation** is issued, existing CCSDS-related Agency standards and implementations are not negated or deemed to be non-CCSDS compatible. It is the responsibility of each Agency to determine when such standards or implementations are to be modified. Each Agency is, however, strongly encouraged to direct planning for its new standards and implementations towards the later version of the Recommendation.

## CCSDS RECOMMENDATION FOR TM SYNCHRONIZATION AND CHANNEL CODING

**FOREWORD**

This document is a technical Recommendation for use in developing synchronization and channel coding systems and has been prepared by the Consultative Committee for Space Data Systems (CCSDS). The synchronization and channel coding concept described herein is intended for missions that are cross-supported between Agencies of the CCSDS.

This Recommendation establishes a common framework and provides a common basis for the synchronization and channel coding schemes to be used by space missions with the TM or AOS Space Data Link Protocol (references [1] or [2]) over space-to-ground and space-to-space communications links. This Recommendation was developed by consolidating the specifications regarding synchronization and channel coding in older CCSDS Recommendations [B2] and [B3].

This Recommendation does not change the major technical contents defined in [B2] and [B3], but the presentation of the specification has been changed so that:

- a) these schemes can be used to transfer any data over any space link in either direction;
- b) all CCSDS space link protocols are specified in a unified manner;
- c) the layered model matches the Open Systems Interconnection (OSI) Basic Reference Model (reference [3]).

Together with the change in presentation, a few technical specifications in [B2] and [B3] have been changed in order to define all Space Data Link Protocols in a unified way. Also, some technical terms in references [B2] and [B3] have been changed in order to unify the terminology used in all the CCSDS Recommendations that define space link protocols and to define these schemes as general communications schemes. These changes are listed in annex E of this Recommendation.

Through the process of normal evolution, it is expected that expansion, deletion or modification to this document may occur. This Recommendation is therefore subject to CCSDS document management and change control procedures, as defined in the *Procedures Manual 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.