

Space data and information transfer systems — Telecommand — Channel service — Architectural specification

ICS 49.140

National foreword

This British Standard reproduces verbatim ISO 12171:1998, including amendment A1:2000, and implements it as the UK national standard.

The UK participation in its preparation was entrusted to Technical Committee ACE/67, Data and information transfer standards for civil space applications, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this committee can be obtained on request to its secretary.

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the BSI Standards Catalogue under the section entitled “International Standards Correspondence Index”, or by using the “Find” facility of the BSI Standards Electronic Catalogue.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct applications.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the ISO title page, pages ii to iv, pages 1 to 43 and a back cover.

The BSI copyright notice displayed in this document indicates when the document was last issued.

Sidelining in this document indicates the most recent changes by amendment.

This British Standard, having been prepared under the direction of the Engineering Sector Committee, was published under the authority of the Standards Committee and comes into effect on 15 November 1998

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INTERNATIONAL STANDARD

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12171

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Space data and information transfer systems — Telecommand — Channel service — Architectural specification

*Systèmes de transfert des informations et données spatiales —
Télécommande — Service codage et liaison physique — Spécification
architecturale*



Reference number
ISO 12171:1998(E)



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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.

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.

International Standard ISO 12171 was prepared by Technical Committee ISO/TC 20, *Aircraft and space vehicles*, Subcommittee SC 13, *Space data and information transfer systems*.

Descriptors: Navigation systems, flight control, space data systems, data processing, information interchange, telecommunications, telecommand, data transfer, communication procedure, system architecture.

1 Scope

This International Standard specifies the common requirements which define the systems architecture of a spacecraft telecommand channel service. This architecture is intended to provide a common framework within which space agencies may implement compatible future spacecraft telecommanding systems.

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 201.0-B-2, November 1995, *Recommendation for space data system standards — Telecommand — Part 1: Channel service — Architectural specification*.

For the purposes of international standardization, the modifications outlined below shall apply to the following pages of publication CCSDS 201.0-B-2.

Pages i to v

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

Page 1-3

Add the following information to the references indicated:

[3] Document CCSDS 203.0-B-1, January 1987, is equivalent to ISO 12174:1998.

[4] Document CCSDS 202.0-B-2, November 1992, is equivalent to ISO 12172:1997.

3 Revision of publication CCSDS 201.0-B-2

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 201.0-B-2. To this end, NASA will act as a liaison body between CCSDS and ISO.

Consultative Committee for Space Data Systems

**RECOMMENDATION FOR SPACE
DATA SYSTEM STANDARDS**

TELECOMMAND

**PART 1
CHANNEL SERVICE
ARCHITECTURAL SPECIFICATION**

**CCSDS 201.0-B-2
BLUE BOOK**

November 1995



CCSDS RECOMMENDATION FOR TELECOMMAND: CHANNEL SERVICE

AUTHORITY

Issue:	Blue Book, Issue 2
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Location:	Toulouse, France

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 reference [1], 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
Program Integration Division (Code OI)
National Aeronautics and Space Administration
Washington, DC 20546, USA

CCSDS RECOMMENDATION FOR TELECOMMAND: CHANNEL SERVICE

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. In as much 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 shall be 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 cancelled.

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 TELECOMMAND: CHANNEL SERVICE

FOREWORD

This document, which is a technical Recommendation prepared by the Consultative Committee for Space Data Systems (CCSDS), is intended for use by participating space Agencies in their development of space telecommand systems.

This Recommendation allows the implementing organizations within each Agency to proceed coherently with the development of compatible Standards for the flight and ground systems that are within their cognizance. Agency Standards derived from this Recommendation may implement only a subset of the optional features allowed herein, or may incorporate features not addressed by the Recommendation.

In order to establish a common framework within which the Agencies may develop standardized telecommand services, the CCSDS advocates adoption of a layered systems architecture. Within this approach, specific layers of service (including their operational protocol and data structuring techniques) may be selected for implementation according to mission requirements.

The current layered set of CCSDS telecommand Recommendations was developed to match the conventional free-flying mission environment, as characterized by the transmission of command data at relatively low uplink data rates to spacecraft of moderate complexity. The CCSDS is currently examining the extension of these Recommendations (perhaps by defining expanded protocols and data structures within some of the layers) to a more complex mission environment, including the transmission of multiple data types at very high data rates to space vehicles which include extensive onboard data networking capability.

This Recommendation for Telecommand Channel Service was developed within the layered architectural framework, and embraces the standard data structures and data communication procedures which may be used by conventional missions within the lowest telecommand system layers.

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 which are defined in Reference [1].

CCSDS RECOMMENDATION FOR TELECOMMAND: CHANNEL SERVICE

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

Member Agencies

- British National Space Centre (BNSC)/United Kingdom.
- Canadian Space Agency (CSA)/Canada.
- Central Research Institute of Machine Building (TsNIIMash)/Russian Federation.
- Centre National d'Etudes Spatiales (CNES)/France.
- Deutsche Forschungsanstalt für Luft- und Raumfahrt e.V. (DLR)/Germany.
- European Space Agency (ESA)/Europe.
- Instituto Nacional de Pesquisas Espaciais (INPE)/Brazil.
- National Aeronautics and Space Administration (NASA HQ)/USA.
- National Space Development Agency of Japan (NASDA)/Japan.

Observer Agencies

- Australian Space Office (ASO)/Australia.
- Austrian Space Agency (ASA)/Austria.
- Belgian Science Policy Office (SPO)/Belgium.
- Centro Tecnico Aeroespacial (CTA)/Brazil.
- Chinese Academy of Space Technology (CAST)/China.
- Communications Research Laboratory (CRL)/Japan.
- Danish Space Research Institute (DSRI)/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.
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- Institute of Space Research (IKI)/Russian Federation.
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- Ministry of Communications (MOC)/Israel.
- National Oceanic & Atmospheric Administration (NOAA)/USA.
- National Space Program Office (NSPO)/Taiwan.
- Swedish Space Corporation (SSC)/Sweden.
- United States Geological Survey (USGS)/USA.

CCSDS RECOMMENDATION FOR TELECOMMAND: CHANNEL SERVICE

DOCUMENT CONTROL

Document	Title	Date	Status
CCSDS 201.0-B-1	Recommendation for Space Data System Standards: Telecommand, Part 1: Channel Service, Architectural Specification, Issue 1	January 1987	Original Issue
CCSDS 201.0-B-2	Recommendation for Space Data System Standards: Telecommand, Part 1: Channel Service, Architectural Specification, Issue 2	November 1995	Current Issue — the Tail Sequence has been replaced with a new, more distinctive pattern, which is more reliably recognized at the end of a CLTU; — an option has been added for randomizing the Telecommand data to increase bit transitions, for those command systems that require frequent bit transitions to maintain reliable bit synchronization; — minor format changes have been made based on specifications of the CCSDS Publications Manual.

NOTE Substantive changes from the previous issue are indicated with change bars in the outside margin.