

Space data and information transfer systems — Telecommand — Data routing service

ICS 49.140

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National foreword

This British Standard reproduces verbatim ISO 12172:1998 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 application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

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

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

Amendments issued since publication

Amd. No.	Date	Comments

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 December 1998

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INTERNATIONAL STANDARD

**ISO
12172**

First edition
1998-09-15

Space data and information transfer systems — Telecommand — Data routing service

*Systèmes de transfert des informations et données spatiales —
Télécommande — Service acheminement des données*



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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 12172 was prepared by Technical Committee ISO/TC 20, *Aircraft and space vehicles*, Subcommittee SC 13, *Space data and information transfer systems*.

Descriptors: Navigation systems, space craft, space data systems, data processing, information interchange, telecommunications, telecommand, data transfer, communication procedure.

1 Scope

This International Standard lays down the common requirements which define the data routing service of a spacecraft telecommand. The intent of this document is 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 202.0-B-2, November 1992, *Recommendation for space data systems standards — Telecommand — Part 2: Data routing service*.

For the purposes of international standardization, the modification outlined below shall apply to the following pages of publication CCSDS 202.0-B-2.

Pages i to vi

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

Page vi

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 201.0-B-1, January 1987 is equivalent to ISO 12171:1998.
- [5] Document CCSDS 102.0-B-3, November 1992 is equivalent to ISO 13419:1997.
- [6] Document CCSDS 101.0-B-3, May 1992 is equivalent to ISO 11754:1994.
- [7] Document CCSDS 202.1-B-1, October 1991 is equivalent to ISO 12173:1998.
- [8] Document CCSDS 701.0-B-2, November 1992 is equivalent to ISO 13420:1997.

3 Revision of publication CCSDS 202.0-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 202.0-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 SYSTEMS STANDARDS**

TELECOMMAND

**PART 2
DATA ROUTING SERVICE**

**CCSDS 202.0-B-2
BLUE BOOK**

NOVEMBER 1992



CCSDS RECOMMENDATION FOR TELECOMMAND: DATA ROUTING SERVICE

Authority

Issue:	Blue Book, Issue 2
Date:	November 1992
Location:	CCSDS Meeting November 1992 Greenbelt, MD, USA

This Recommendation reflects the consensus technical agreement of the following member Agencies of the Consultative Committee for Space Data Systems (CCSDS):

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

The following observer Agencies also concur with this Recommendation:

- o Chinese Academy of Space Technology (CAST)/People's Republic of China.
- o Central Research Institute of Physics (CRIP)/Hungary.
- o Department of Communications, Communications Research Centre (DOC-CRC)/Canada.
- o Institute of Space and Astronautical Science (ISAS)/Japan.

This Recommendation is published and maintained by:

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Washington, DC 20546, USA

CCSDS RECOMMENDATION FOR TELECOMMAND: DATA ROUTING 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. 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:

- o 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.
- o 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.
- o 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 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 TELECOMMAND: DATA ROUTING 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. Advanced Orbiting Systems (AOS), which are characterized by 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, may choose to use the AOS protocols and data structures defined in Reference [8] for both uplink and downlink or they may use the telecommand data structures and protocols defined here for uplink.

This Recommendation for Telecommand Data Routing 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 intermediate 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: DATA ROUTING SERVICE

Document control

Document	Title	Date	Status and Substantive Changes
CCSDS 202.0-B-1	Recommendation for Space Data System Standards. Telecommand, Part 2 Data Routing Service, Issue 1	January 1987	Original Issue
CCSDS 202.0-B-2	Recommendation for Space Data System Standards Telecommand, Part 2 Data Routing Service, Issue 2	November 1992	Supersedes Issue 1 Removal of COP-0 & COP-2 Longer Frame length Multiple Packets per Frame Single Virtual Channel not required to have Identifier set to “all zeros” Use of AOS downlink Full definition of Frame Error Control algorithm Removal of mandatory performance requirements Correction of error in maximum Packet length specification [B-2.1 1)a] Segment layer not optional (Segment Header is still optional) Consistency with part 2.1 (Reference [7])

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