

**Implementation of
EN 29318-2:1993**

Information technology — Intelligent Peripheral Interface —

**Part 2: Device specific command set for
magnetic disk drives**

The European Standard EN 29318-2:1993 has the status of a
British Standard

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Committees responsible for this British Standard

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- British Computer Society
- British Telecommunications plc
- Department of Trade and Industry (National Physical Laboratory)
- EEA (the Association of Electronics, Telecommunications and Business Equipment Industries)
- Electricity Supply Industry in United Kingdom
- HM Treasury (Central Computer and Telecommunications Agency)
- Information Technology Users' Standards Association
- Joint Network Team
- National Health Services
- User Standards Forum for Information Technology (Institute of Data Processing Management)

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National foreword

This British Standard reproduces verbatim ISO/IEC 9318-2:1990 and implements it as the UK national standard.

In 1993 the European Committee for Standardization (CEN) accepted ISO/IEC 9318-2:1990 as European Standard EN 29318-2:1993. As a consequence of implementing the European Standard this British Standard is renumbered as BS EN 29318-2 and any reference to BS ISO/IEC 9318-2:1990 should be read as a reference to BS EN 29318-2.

This British Standard is published under the direction of the Information Systems Technology Standards Policy Committee whose Technical Committee IST/6 has the responsibility to:

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

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, page 2, the ISO/IEC title page, pages ii to x, pages 1 to 48 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.

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Descriptors: Data processing, information interchange, network interconnection, computer interfaces, magnetic disks, computer peripheral equipment

English version

Information technology — Intelligent Peripheral Interface — Part 2: Device specific command set for magnetic disk drives

(ISO/IEC 9318-2:1990)

Technologies de l'information — Interface pour les périphériques intelligents —
Partie 2: Jeu de commandes spécifiques
appareil pour les unités disques magnétiques
(ISO/IEC 9318-2:1990)

Informationstechnik — Intelligente
Peripherie- Schnittstelle —
Teil 2: Gerätespezifischer Befehlssatz für
Magnetplattenlaufwerke
(ISO/IEC 9318-2:1990)

This European Standard was approved by CEN on 1993-10-20. CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

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Foreword

On the proposal of the CEN Central Secretariat, the Technical Board decided to submit the International Standard: *Information technology — Intelligent Peripheral Interface — Part 2: Device specific command set for magnetic disk drives* (ISO/IEC 9318-2:1990) to the formal vote.

The result of the formal vote was positive.

For the time being, this document exists only in English.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by April 1994, and conflicting national standards shall be withdrawn at the latest by April 1994.

In accordance with the CEN/CENELEC Internal Regulations, the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

**Information technology — Intelligent Peripheral
Interface**

Part 2:

Device specific command set for magnetic disk drives

Technologies de l'information — Interface pour les périphériques intelligents —

*Partie 2: Jeu de commandes spécifiques appareil pour les unités disques
magnétiques*



Reference number
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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

International Standard ISO/IEC 9318-2 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*.

ISO/IEC 9318 consists of the following parts, under the general title *Information technology — Intelligent Peripheral Interface*:

- *Part 1: Physical level*
- *Part 2: Device specific command set for magnetic disk drives*
- *Part 3: Device generic command set for magnetic and optical disk drives*
- *Part 4: Device generic command set for magnetic tape drives*

Annex A forms an integral part of this part of ISO/IEC 9318. Annex B, Annex C and Annex D are for information only.

Introduction

This part of ISO/IEC 9318 does not replace any existing standard, but it does complement other Intelligent Peripheral Interface (IPI) standards (see clause 2).

This part of ISO/IEC 9318 provides a definition of the device specific interface portion of a series of standards called the Intelligent Peripheral Interface (IPI) ISO/IEC 9318, a high performance, general-purpose parallel peripheral interface. This part of ISO/IEC 9318, responds to an industry market need (expressed both by users and manufacturers) to limit the increasing costs in hosts associated with changes in peripherals.

1 Scope

This part of ISO/IEC 9318 describes the Logical Level 2 (device level) Interface for disk drives. See clause 6 of ISO/IEC 9318-1 for explanation of the levels.

The physical, electrical, and configuration characteristics and the transmission protocol of this interface are in accordance with ISO/IEC 9318-1. The interface is capable of handling data rates from 0 to at least 10 Mbytes/s, depending on driver and receiver classes.

The purpose of this part of ISO/IEC 9318 is to facilitate the development and utilization of a device level interface which permits the interconnection of disk slave peripherals to a controller.

This part of ISO/IEC 9318 does not replace any existing standard, but it does complement other Intelligent Peripheral Interface (IPI) standards (see clause 2).

This part of ISO/IEC 9318 provides a definition of the device specific portion of a family of standards called the Intelligent Peripheral Interface (IPI), a high performance, general-purpose parallel peripheral interface.

The intent of the IPI is to isolate the host (CPU), both hardware and software, from changes in peripherals by providing a “function generic” command set to allow the connection of multiple types of peripherals (disks, printers, tapes, communications). To smooth the transition from the current methods to the generic approach, the IPI supports device — specific command sets, such as this one, to aid in bridging the gap between the two approaches.

To accomplish this set of goals, the design of the IPI includes device-specific and device-generic command sets, both utilizing a common physical bus. The device-specific command set provides:

- Device-oriented control;
- Physical Data Addressing;
- Timing Critical Operations;
- Lower Device Cost.

The device-generic command set provides a higher level of functionality and portability. It includes:

- Host/Device Independence;
- Logical Data Addressing;
- Timing Independence;
- Command Queuing Capability.

A system is not restricted to the use of one level of command set or the other. It is possible that both levels of command sets will be utilized with a given system's architecture to balance such parameters as system performance, cost, and peripheral availability. It is also possible for the host to provide for migration from device-specific to device-generic levels while still retaining the same physical interface.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO/IEC 9318. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO/IEC 9318 are encouraged to investigate the possibility of applying the most recent editions of the standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 646:1983, *Information processing — ISO 7-bit coded character set for information interchange*.

ISO/IEC 9318-1:—, *Information technology — Intelligent Peripheral Interface — Part 1: Physical Level*¹⁾.

3 Definitions and conventions

3.1 Definitions

For the purpose of this part of ISO/IEC 9318, the following definitions apply:

3.1.1

bus control

the physical-level octet placed on BUS A by the master during the Bus Control sequence. It is used to define the bus configuration and information type for the subsequent Information Transfer. The three Bus Control types are: Command Control, Response Control, and Data Control

3.1.2

bus exchange

the Bus Control sequence (initiated by the master) and the Ending Status sequence (initiated by the slave), which are used to frame an Information Transfer

3.1.3

busy

busy indicates that the slave is unable to respond to the master's request and may be reported at either the Physical Interface (Selection Sequence) or at the Logical Interface (Ending Status Sequence)

3.1.4

command

the information transferred from the master to the slave following a Command Control. The information contains command-specific parameters

3.1.5

command control

a Bus Control that specifies that command information is to be transferred from the master to the slave during the Information Transfer and identifies the command type

3.1.6

data control

a Bus Control that specifies that data information is to be transferred during the Information Transfer, and specifies various data transfer requirements, including the orientation of the data on the disk

3.1.7

defect map

a list of the defects recorded by the drive manufacturer on the slave

3.1.8

format specification

an ordered list of parameters that specify the format of the tracks and sectors on the disk

3.1.9

information transfer

the Physical Interface transfer of commands, responses, and data that are framed by a Bus Exchange

¹⁾ To be published.

3.1.10**level 2**

a device-level-protocol interface in which the master is aware of the specific characteristics of the device under its control

3.1.11**level 3**

an intelligent interface oriented to the generic characteristics of devices, but not the characteristics unique to the device

3.1.12**logical interface**

all operations above the Physical Interface

3.1.13**master status**

the status placed on BUS A by the master during the Ending Status sequence after the Information Transfer

3.1.14**parameter**

the information octets transferred after a Command or Response Bus Control. Command parameters further define a command or contain specific information about a command, such as head number, cylinder number, etc. Response parameters contain information on the state of the slave, such as status, current head, current cylinder, etc.

3.1.15**physical interface**

the mechanical, electrical, and bus protocol characteristics specified in ISO/IEC 9318

3.1.16**physical sector**

this term refers to the sectors identified by the disk drive, relative to index, with zero as the first

3.1.17**response**

the information transferred from the slave to the master following a Response Control. The information contains parameters specific to the response type

3.1.18**response control**

a Bus Control which specifies that information about a response type is to be transferred from the slave to the master during the Information Transfer and identifies the type of response

3.1.19**RPS**

this is an abbreviation for Rotational Position Sensing, a means for the slave to notify the master of the relative head position with respect to index

3.1.20**RPS pulse**

the time defined by the master on Load Position and Load RPS Target Sector Address commands during which the Class 2 RPS Interrupt shall be asserted

3.1.21**slave status**

the status placed on the BUS B by the slave during the Ending Status sequence after an Information Transfer

3.1.22

status response

the status supplied to the master when executing a Read Status Response that contains the exception status bits

3.1.23

target sector

the physical sector designated by the master during the Load Position command or Load RPS Target Sector Address command using the RPS Target Sector Address parameter

3.2 Conventions

Certain terms used herein are the proper names of signals. These are printed in uppercase to avoid possible confusion with other uses of the same words (e.g., ATTENTION IN). Any lowercase uses of these words have the normal American-English meaning.

A number of conditions, sequence parameters, events, English text, states or similar terms are printed with the first letter of each word in uppercase and the rest lowercase (e.g., In, Out, Selective Reset, Bi-directional, Bus Control, Operation Response). Any lowercase uses of these words have the normal American-English meaning.

4 General description

4.1 Application environment

The master (controller) provides control of one to eight slaves (disk drives) with a device level set of commands and data transfers. The master and slave of a level 2 environment are the slave and facility of a level 3 environment. There are no facilities in the level 2 environment.

4.2 Logical Interface characteristics

4.2.1 *Slave Control*

Control of a slave is exerted by the master through the Bus Controls that initiate the Bus Exchanges for command, response, and data transfers. The Bus Controls incorporate coding that identifies the particular command, response, or data type. The Command Control codes specify the command type being sent to the slave, whereas the Response Control codes specify the response to be read from the slave. The Data Control codes specify the operation on fields of a disk sector and their orientation with respect to the start of a sector.

4.2.2 *Information transfer*

The interface uses the Double Octet mode to transfer 16-bit information. Data is transferred in the Data Streaming mode; Commands and Response are transferred in the Interlocked mode.

4.2.3 *Data transfers*

The master reads and writes on the disk by issuing Data Controls while staying oriented with the rotation of the disk. No addresses or octet counts are involved with the Data Controls. Operations are on whole fields and include field read, write, and skip operations. Field sizes include any master-managed Error Correcting Codes (ECC) and Cyclic Redundancy Codes (CRC).

4.2.4 *Format Control*

The organization of sectors and the number of sectors per track is controlled by a Format Specification, which may be mutually derived by both the slave and the master. This specification dictates the number of fields per sector, the length of each field, and the number of sectors per track.

4.3 Responsibility

4.3.1 *Master*

The master performs the following functions:

- Data buffering;
- Data management — Interleaving;
- Header management;
- Defect management — defect skipping, revectoring, spare sectors;