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Australian Standard®

# Information processing systems—Small Computer System Interface (SCSI)

This Australian Standard was prepared by Committee IT/10, Information Systems—Equipment. It was approved on behalf of the Council of Standards Australia on 11 October 1989 and published on 16 February 1990.

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The following interests are represented on Committee IT/10:

Australian Information Industry Association

LaTrobe University

Equipment manufacturers

Interface developers

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# Information processing systems—Small Computer System Interface (SCSI)

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# PREFACE

This Standard was prepared by the Standards Australia Committee on Information Systems—Equipment. It is identical with, and has been reproduced from International Standard ISO 9316:1989, *Information processing systems—Small Computer System Interface (SCSI)*.

For the purpose of this Australian Standard, the text of the ISO Standard should be modified as follows:

(a) *Terminology*—The words 'Australian Standard' should replace the words 'International Standard' wherever they apply.

(b) *References*—The references to International Standards should be replaced by references to Australian Standards as follows:

| *International Standard* | | *Australian Standard* | |
|---|---|---|---|
| ISO | | AS | |
| 1863 | Information Processing—9-track, 12.7 mm (0.5 in) wide magnetic tape for information interchange recorded at 32 rpmm (800 rpi) | 1009 | Information processing—9-track, 12.7 mm (0.5 in) wide magnetic tape for information interchange recorded at 32 rpmm (800 rpi) |
| 3788 | Information Processing—9 track, 12.7 mm (0.5 in) wide magnetic tape for information interchange recorded at 63 rpmm (1600 rpi) phase encoded | 3788 | Information processing—9-track, 12.7 mm (0.5 in) wide magnetic tape for information interchange recorded at 63 rpmm (1600 rpi) phase encoded |
| 5652 | Information Processing—9-track, 12.7 mm (0.5 in) wide magnetic tape for information interchange—Format and recording using group coding at 246 cpmm (6250 cpi) | 2750 | Information processing—9-track, 12.7 mm (0.5 in) wide magnetic tape for information interchange—Format and recording using group coding at 246 cpmm (6250 cpi) |
| 5654 | Information Processing—Data interchange on 200 mm (8 in) flexible disk cartridges using two-frequency recording at 1362 ftprad on one side<br>Part 1: Dimensional, physical and magnetic characteristics<br>Part 2: Track format | 2747 | Information processing—Data interchange on 200 mm flexible disk cartridges using two-frequency recording at 1362 ftprad on one side<br>Part 1: Dimensional, physical and magnetic characteristics<br>Part 2: Track format |
| 6596 | Information Processing—Data interchange on 130 mm (5.25 in) flexible disk cartridges using two-frequency recording at 7958 ftprad, 1.9 tpmm (48 tpi) on one side<br>Part 1: Dimensional, physical and magnetic characteristics<br>Part 2: Track format | 2847 | Information processing—Data interchange on 130 mm flexible disk cartridges using two-frequency recording at 7958 ftprad, 1.9 tpmm on one side<br>Part 1: Dimensional, physical and magnetic characteristics<br>Part 2: Track format |
| 7065 | Information Processing—Data interchange on 200 mm (8 in) flexible disk cartridges using modified frequency modulation recording at 13262 ftprad, 1.9 mm (48 tpi) on both sides<br>Part 1: Dimensional, physical and magnetic characteristics<br>Part 2: Track format | 3605 | Information processing—Data interchange on 200 mm (8 in) flexible disk cartridges using modified frequency modulation recording at 13262 ftprad, 1.9 mm (48 tpi) on both sides<br>Part 1: Dimensional, physical and magnetic characteristics<br>Part 2: Track format |

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|---|---|
| 7487 Information Processing—Data interchange on 130 mm (5.25 in) flexible disk cartridges using modified frequency modulation at 7958 ftprad, 1.9 mm (48 tpi) on both sides<br>Part 1: Dimensional, physical and magnetic characteristics | 2910 Information processing—Data interchange on 130 mm (5.25 in) flexible disk cartridges using modified frequency modulation recording at 7958 ftprad, 1.9 mm (48 tpi) on both sides |
| 8462 Information Processing—Data interchange on 6.30 mm (0.25 in) magnetic tape cartridge using GCR recording at 394 ftpmm (10000 ftpi), 39 cpmm (1000 cpi)<br>Part 1: Mechanical, physical and magnetic properties<br>Part 2: Streaming mode | 3606 Information processing—Data interchange on 6.30 mm (0.25 in) magnetic tape cartridge using GCR recording at 394 ftpmm (10000 ftpi), 39 cpmm (1000 cpi)<br>Part 1: Mechanical, physical and magnetic properties<br>Part 2: Streaming mode |
| 8630 Information Processing—Data interchange on 130 mm (5.25 in) flexible disk cartridges using modified frequency modulation at 13262 ftprad, on 80 tracks on each side<br>Part 1: Dimensional, physical and magnetic characteristics<br>Part 3: Track format B for 80 tracks | 3630 Information processing—Data interchange on 130 mm (5.25 in) flexible disk cartridges using modified frequency at 13262 ftprad, on 80 tracks on each side<br>Part 1: Dimensional, physical and magnetic characteristics<br>Part 2: Track format B for 80 tracks |
| 8861 Information Processing—Data interchange on 90 mm (3.5 in) flexible disk cartridges using modified frequency modulatien recording at 7958 ftprad on 80 tracks on each side<br>Part 1: Dimensional, physical and magnetic characteristics<br>Part 2: Track format | 3631 Information processing—Data interchange on 90 mm (3.5 in) flexible disk cartridges using modified frequency modulation recording at 7958 ftprad on 80 tracks on each side<br>Part 1: Dimensional, physical and magnetic characteristics<br>Part 2: Track format |

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# Information processing systems—Small Computer System Interface (SCSI)

## 1 Scope

This International Standard provides the mechanical, electrical, and functional requirements for a small computer input/output bus and command sets for peripheral device types commonly used with small computers.

The small computer system interface, described in this International Standard, is a local I/O bus that can be operated at data rates up to 4 Mbytes/s depending upon circuit implementation choices. The primary objective of the interface is to provide host computers with device independence within a class of devices. Thus, different disk drives, tape drives, printers, and even communication devices can be added to the host computer(s) without requiring modifications to generic system hardware or software. Provision is made for the addition of nongeneric features and functions through vendor unique fields and codes.

The interface uses logical rather than physical addressing for all data blocks. For direct access devices, each logical unit may be interrogated to determine how many blocks it contains. A logical unit may coincide with all or part of a peripheral device.

Provision is made for cable lengths up to 25 m using differential drivers and receivers. A single-ended driver and receiver configuration is defined for cable lengths of up to 6 m and is primarily intended for applications within a cabinet.

The interface protocol includes provision for the connection of multiple initiators (SCSI devices capable of initiating an operation) and multiple targets (SCSI devices capable of responding to a request to perform an operation). Optional distributed arbitration (i.e., bus-contention logic) is built into the architecture of SCSI. A priority system awards interface control to the highest priority SCSI device that is contending for use of the bus. The time to complete arbitration is independent of the number of devices that are contending and can be completed in less than 10 μs.

The physical characteristics are described in clause 4. There are two electrical alternatives: single-ended and differential. Single-ended and differential devices are electrically different and shall not be mixed on the same bus. In addition, there are several options: shielded or unshielded connectors may be used and parity may or may not be implemented.

Clause 5 describes the logical characteristics of the interface. An arbitration option is defined to permit multiple initiators and to permit concurrent I/O operations. All SCSI devices are required to be capable of operating with the defined asynchronous transfer protocol. In addition, an optional synchronous transfer protocol is defined. Clause 5 also specifies a message protocol for control of the interface. In most cases, messages are not directly apparent to the host computer software. Only one message, COMMAND COMPLETE, is mandatory; all others are optional and are not necessarily implemented. Note that some options (e.g., synchronous transfer) require the implementation of certain messages.

The SCSI command structure is specified in clause 6. Commands are classified as mandatory (M), extended (E), optional (O), or vendor unique (V). SCSI devices shall implement all mandatory commands defined for the appropriate device type and may implement other commands as well. Extended SCSI devices shall implement all extended plus all mandatory commands and may implement other commands as well. Extended SCSI devices contain commands that facilitate the writing of self-configuring software drivers that can "discover" all necessary attributes without prior knowledge of specific peripheral characteristics (such as storage capacity). Extended commands for direct access devices also implement a very large logical block address space ($2^{32}$ blocks), although mandatory commands for direct access devices implement a somewhat smaller logical block address space ($2^{21}$ blocks).