SFF Committee

SFF-8040 Specification for

25-pin Asynchronous SCSI External Connector

Rev 1.2   May 24, 1995

Secretariat: SFF Committee

Abstract: This document defines a 25-pin connector and cable assembly for use in applications that need a low-cost asynchronous connection for the parallel SCSI bus.

This document provides a common specification for systems manufacturers system integrators and suppliers of magnetic disk drives. This is an internal working document of the SFF Committee an industry ad hoc group.

This document is made available for public review and written comments are solicited from readers. Comments received by the members will be considered for inclusion in future revisions of this document.

Support: This document is supported by the identified member companies of SFF Committee.

Documentation: This document has been prepared in a similar style to that the ISO (International Organization of Standards).

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EXPRESSION OF SUPPORT BY MANUFACTURERS

The following member companies of the SFF Committee voted in favor of this
industry specification.

                    3M
                    Adaptec
                    AMP
                    Cirrus Logic
                    ENDL
                    Hewlett Packard
                    Honda Connector
                    IBM
                    Madison Cable
                    Maxtor
                    Methode
                    Quantum
                    Robinson Nugent
                    Sigmax
                    Sony

The following member companies of the SFF Committee voted to forward this industry specification to an
accredited standards body.

                    Cirrus Logic
                    Hewlett Packard
                    IBM
                    Robinson Nugent

To save space for SFF Specifications being reviewed the information on the principles of the SFF
Committee and how to join has not been printed.

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25-pin Asynchronous SCSI External Connector

1.   Scope

The purpose of this SFF Specification is to define the use of a 25-pin DB connector as an external narrow single-ended SCSI alternative. The purpose is the need to address a market force that has existed without acknowledgment for 10 years. Apple Computer deserves recognition as the first implementor of this design in mass production. This implementation is so widespread that it has become the de facto standard for low-cost SCSI connection.

This specification acknowledges the acceptance of this connector within the industry and defines an implementation for its continued use. There are certain ramifications associated with using this connector. The specification clarifies the criteria for using these connectors with SCSI and how the connector can be used to comply with the large installed base.

The SFF Committee was formed in August 1990 and the first working document was introduced in January 1991.

1.1   Description of Clauses

Clause 1 contains the Scope and Purpose.

Clause 2 contains Referenced and Related Standards and SFF Specifications.

Clause 3 contains the General Description.

Clause 4 contains the Glossary.

Clause 5 contains the physical positioning requirements.

Clause 6 contains the signal assignments.

2.   References

The SFF Committee
activities support the requirements of the storage industry
and it is involved with several standards.

2.1   Industry Documents

The following interface standards are relevant to this Specification.

-       X3.131R-1994   SCSI-2 Small Computer System Interface
-       X3T9.2/0855   SPI (SCSI-S Parallel Interface)
-       IEEE 1284   Parallel Interface

2.2   SFF Specifications

There are several projects active within the SFF Committee. At the date of printing document numbers had been assigned to the following projects. The status of Specifications is dependent on committee activities.

F = Forwarded   The document has been approved by the members for forwarding to a formal
                   standards body.
P = Published   The document has been balloted by members and is available as a published SFF
                   Specification.
A = Approved   The document has been approved by ballot of the members and 15 in preparation as
                   an SFF Specification.
C = Canceled   The project was canceled and no Specification was Published.
D = Development   The document is under development at SFF.
E = Expired   The document has been published as an SFF Specification and the members voted
                   against re-publishing it when it came up for annual review.
i = Information   The document has no SFF project activity in progress but it defines features in
                   developing industry standards. The document was provided by a company editor of
                   an accredited standard in development or an individual. It is provided for broad
                   review (comments to the author are encouraged).
s = submitted   The document is a proposal to the members for consideration to become an SFF
                   Specification.

Specification	Rev	List of Specifications as of December 3, 1995
SFF-8000		SFF Committee Information
SFF-8001i	E	44-pin ATA (AT Attachment) Pinouts for SFF Drives
SFF-8002i	2.1	68-pin ATA (AT Attachment) for SFF Drives
SFF-8003	1.1	SCSI Pinouts for SFF Drives
SFF-8004	1.1	Small Form Factor 2.5 Drives
SFF-8005	2.5	Small Form Factor 1.5" Drives
SFF-8006	2.0	Small Form Factor 1.3" Drives
SFF-8007	0.1	2mm Connector Alternatives
SFF-8008	2.3	68-pin Embedded Interface for SFF Drives
SFF-8009	3.1	Unitized Connector for Cabled Drives
SFF-8010	1.0	Small Form Factor 15mm 1.5" Drives
SFF-8011	2.0	ATA Timing Extensions for Local Bus
SFF-8012	1.0	Power Connector Pin Dimensions
SFF-8013	0.1	ATA Download Microcode Command
SFF-8014	C	Unitized Connector for Rack Mounted Drives
SFF-8015	3.7	SAC Connector for Rack Mounted SFF SCSI Drives
SFF-8016	C	Small Form Factor 10mm 2.5" Drives
SFF-8017	1.7	SCSI Wiring Rules for Mixed Cable Plants
SFF-8018	0.1	ATA Low Power Modes
SFF-8019	2.0	Identify Drive Data for ATA Disks up to 8 GB
SFF-8020i	2.5	ATA Packet Interface for CD-ROMs
SFF-8028i		- Errata to SFF-8020 Rev 2.5
SFF-8029	1.4	- Errata to SFF-8020 Rev 1.2
SFF-8030	1.7	SFF Committee Charter
SFF-8031i		Named Representatives of SFF Committee Members
SFF-8032	1.2	SFF Committee Principles of Operation
SFF-8033i	1.0	Improved ATA Timing Extensions to 16.6 MBs
SFF-8034i	3.0	High Speed Local Bus ATA Line Termination Issues
SFF-8035i	2.0	Self-Monitoring, Analysis and Reporting Technology
SFF-8036i	E	ATA Signal Integrity Issues
SFF-8037i	1.0	Intel Small PCI SIG
SFF-8038i	1.0	Intel Bus Master IDE ATA Specification
SFF-8039i	1.1	Phoenix EDD (Enhanced Disk Drive) Specification

SFF-040   1.2   25-pin Asynchronous SCSI External Connector
SFF-8041   C   SCA-2 Connector Backend Configurations
SFF-8042   C   VHDCI Connector Backend Configurations
SFF-8045   3.5   40-pin SCA-2 Connector with Parallel Selection
SFF-8046   2.5   8O-pin SCA-2 Connector for SCSI Disk Drives
SFF-8047   C   40-pin SCA-2 Connector with Serial Selection
SFF-8048   C   80-pin SCA-2 Connector with Parallel ESI

SFF-8065   x.x   40-pin SCA-2 Connector with High Voltage
SFF-8066   x.x   80-pin SCA-2 Connector with High Voltage

SFF-8200   1.1   2 1/2" drive form factors (all of 82xx family)
SFF-8201   1.2   2 1/2" drive form factor dimensions
SFF-8212   1.2   2 1/2" drive w/SFF-8001 44-pin ATA Connector

SFF-8300   1.1   3 1/2" drive form factors (all of 83xx family)
SFF-8301   1.2   3 1/2" drive form factor dimensions
SFF-8302   1.1   3 1/2" Cabled Connector locations
SFF-8332   1.2   3 1/2" drive w/80-pin SFF-8015 SCA Connector
SFF-8337   1.2   3 1/2" drive w/SCA-2 Connector
SFF-8342   1.2   3 1/2" drive w/Serial Unitized Connector

SFF-8400   0.1   Very High Density Cable Interconnect
SFF-8500   1.1   5 1/4" drive form factors (all of 85xx family)
SFF-85O1   1.1   5 1/4" drive form factor dimensions
SFF-85O2   1.1   5 1/4" ATAPI CD-ROM w/audio connectors
SFF-8551   1.2   5 1/4" CD-ROM 1" High form factor

2.3   Sources

Copies of ANSI standards or proposed ANSI standards may be purchased from Global Engineering.

          15 Inverness Way East   800-854-7179   or 303-792-2181
          Englewood   303-792-2192Fx
          CO 80112-5704

Copies of SFF Specifications are available by FaxAccess or by joining the SFF Committee as an Observer or Member.

          14426 Black Walnut Ct   405-567-6630x303
          Saratoga   405-567-2115Fx
          CA 95070   FaxAccess: 408-741-1600

FaxAccess is a computer-operated service capable of faxing copies of documents selected from a menu. Anyone ordering documents over FaxAccess must be using the handset of a fax machine, as the documents are transmitted over the same line as the caller dialed in on to make the selection(s).

3.   General Description

The environment for this Specification is a desktop computer or portable notebook to which SCSI peripherals are attached in a low-cost manner. There are a large number of internal specifications used by companies for this connector application, but none of them are generally available.

This specification documents current industry practice.

4.   Definitions and Conventions

4.1   Definitions

For the purpose of SFF Specifications the following definitions apply:

4.1.1 Optional: This term describes features which are not required by the SFF Specification. However, if any feature defined by the SFF Specification is implemented, it shall be done in the same way as defined by the Specification. Describing a feature as optional in the text is done to assist the reader. If there is a conflict between text and tables on a feature described as optional, the table shall be accepted as being correct.

4.1.2 Reserved: Where this term is used for bits, bytes, fields and code values; the bits, bytes, fields and code values are set aside for future standardization. The default value shall be zero. The originator is required to define a Reserved field or bit as zero, but the receiver should not check Reserved fields or bits for zero.

4.1.3 VU (Vendor Unique): This term is used to describe bits, bytes, fields, pins, signals, code values and features which are not described in this SFF Specification, and may be used in a way that varies between vendors.

4.1.4 VU Mode: A mode of execution by the drive in which its use is not defined by this SFF Specification. The means by which a vendor invokes vendor unique operations within a drive is defined by this SFF Specification.

4.2   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. Any lower-case uses of these words have the normal American English meaning.

A number of conditions, commands, sequence parameters, events, English text, states or similar terms are printed with the first letter of each word in uppercase and the rest lower-case; e.g., In, Out, Request Status. Any lowercase uses of these words have the normal American-English meaning.

The American convention of numbering is used i.e., the thousands and higher multiples are separated by a comma and a period is used as the decimal point. This is equivalent to the ISO convention of a space and comma.

American:	ISO:
0.6	0,6
1,000	1 000
1,323,462.9	1 323 462,9

5.   Draft EIA Specification

To accelerate the processing of this specification through the standards process, the document has been created in the style and format of an EIA draft.

6.   Signals

6.1   Signal Conventions

Signal names are shown in all upper case letters. Signals can be asserted (active, true) in either a high (more positive voltage) or low (less positive voltage) state. A dash character (-) at the beginning or end of a signal name indicates it is asserted at the low level (active low). No dash or a plus character (+) at the beginning or end of a signal name indicates it is asserted high (active high). An asserted signal may be

driven high or low by an active circuit, or it may be allowed to be pulled to the correct state by the bias circuitry. Details of the requirements are included in the signal definitions.

Unless noted otherwise, tables of signal characteristics specify the voltage and/or current requirements at the drive connector. Current flow into the drive is positive and current flow out of the drive is negative.

6.2   Signal Assignments

The signals for 5O-pin connectors are not defined in this clause, but are as defined in X3.131R (SCSI-2).

The signal pinout shown in Table 6-1 incorporates all 15 control and signal lines for S-bit single-ended SCSI. This design does not use all the Ground lines, and eliminates some Reserved and open (not connected) lines from the Alternative 1 single-ended pinout of SCSI-2.

TABLE 6-1 25-pin ASYNCHRONOUS SCSI SIGNAL ASSIGNMENTS

Connector Contact	Signal Name	Cable Conductor numbers are not applicable	Signal Name	Connector Contact
1	-REQ		GND	14
2	-MSG		-C/D	15
3	-I/O		GND	16
4	-RST		-ATN	17
S	-ACK		GND	15
6	-BSY		-SEL	19
7	GND		-DBP	20
S	-DB0		-DB1	21
9	GND		-DB2	22
10	-DB3		-DB4	23
11	-DB5		GND	24
12	-DB6		TERMPWR	25
13	-DB7			

6.3   Design Considerations

6.3.1   Cable

No deviation is allowed from the 50-conductor specification for cable in the SCSI-2 standard i.e.
-       twisted pair
-       28 AWG minimum
-       90 ohms characteristic impedance

The ground lines defined for a 50-conductor SCSI-2 cable but not connected to the GND pins on the DB 25 connector shall be connected internally to the GND lines, to provide each of the 18 SCSI signals with a ground on each twisted pair.

This is equally applicable whether the other end of the cable has another DB25 or a 50-pin connector attached.

6.3.2   Transfer protocol

Current implementations of these connectors are for applications of limited transfer rates and where the mode of operation is asynchronous.

No efforts have been made to rate cables which use this pinout for synchronous transfers.

Given the lack of unique signal and ground twisted pair sets in this implementation it is suggested that the maximum transfer be 5 Mbytes/sec. It is recommended that only asynchronous transfers be used.

Using asynchronous transfers and the defined cables, a bus length of 6 meters can be realized.

6.3.3   Termination

Termination should remain the same as currently suggested in the SCSI-2 standard for single-ended narrow SCSI. Passive or Active Termination does not matter. The only requirement is the use of 25-pin plug style terminators. DB25 terminators should bus all the GND lines together to provide the GND signal for the termination circuit internal to the plug. TERMPWR can be used from pin 25 at the same SCSI specification rating as defined in SCSI-2.

6.3.4   Identification

The DB25 external connector resembles the parallel printer interface used on PCs and implementations of this cable should designate the connector receptacle and the cable with the recognized SCSI single-ended icon.

-          Host adapters and external peripherals should place the acronym SCSI SE near the icon.
-          Cables should be marked to distinguish them from parallel interface cables.

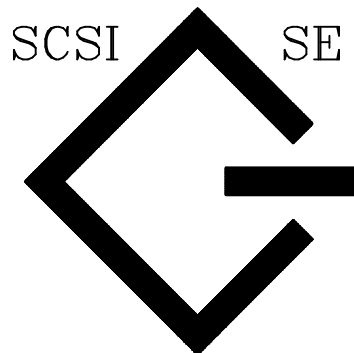An example of the icon and marking is shown in Figure 6-1.

FIGURE 6-1 SCSI ICON