

SFF Committee

**SFF-8500**

Specification for

**Suite of 5.25" Form Factor Specifications**

**Standardized as EIA-741 at Rev 1.1 June 5, 1995**

SFF specifications are available at <http://www.snia.org/sff/specifications>  
or <ftp://ftp.seagate.com/sff>

**This specification was developed by the SFF Committee prior to it becoming the SFF TA (Technology Affiliate) TWG (Technical Working Group) of SNIA (Storage Networking Industry Association).**

The information below should be used instead of the equivalent herein.

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If you are interested in participating in the activities of the SFF TWG, the membership application can be found at:

<http://www.snia.org/sff/join>

The complete list of SFF Specifications which have been completed or are currently being worked on can be found at:

<http://www.snia.org/sff/specifications/SFF-8000.TXT>

The operations which complement the SNIA's TWG Policies & Procedures to guide the SFF TWG can be found at:

<http://www.snia.org/sff/specifications/SFF-8032.PDF>

Suggestions for improvement of this specification will be welcome, they should be submitted to:

<http://www.snia.org/feedback>

SFF Committee documentation may be purchased (see p4).  
SFF Committee documents are available by FaxAccess at 408-741-1600

SFF Committee  
SFF-8500 Specification for  
Suite of 5.25" Form Factor Specifications  
Rev 1.1          June 5, 1995

Secretariat: SFF Committee

Abstract: This document contains the many SFF specifications related to 5.25" form factor devices, which are utilized in a wide variety of cabled and direct attach environments. Specifications which are available individually are included here in a comprehensive set.

This document provides a common specification for systems manufacturers, system integrators, and suppliers of storage devices. 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 the SFF Committee.

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## EXPRESSION OF SUPPORT BY MANUFACTURERS

This document contains all the Specifications in the suite of projects.

The expression of support on this page indicates support of this specification only, even though the following pages include other specifications.

The title line and footer change by page to indicate which specification, and its present status (Development, Published, etc). The information on support for individual Specifications is provided at the beginning of each.

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

AMP  
DEC  
ENDL  
IBM  
Maxtor  
Methode  
Quantum  
Robinson Nugent  
Seagate

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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SFF Committee --

## Suite of 5.25" Form Factor Specifications

### 1. Scope

The 85xx suite of specifications defines the configuration characteristics associated with 5.25" drives.

The purpose of the 85xx suite is to define the external characteristics of drives such that products from different vendors may be used in the same mounting configurations.

The set of specifications provide external dimensions, connectors, connector placement, mounting holes and interface pinouts to assist manufacturers in the systems integration of small form factor disk drives.

- SFF-8500 contains general information regarding connector space, mounting considerations and measurement requirements.
- SFF-8501 defines the dimensions of 5.25" disk drives.
- Other specifications in the 85xx family define the location of connectors on 5.25" drives.

In an effort to broaden the applications for storage products, an ad hoc industry group of companies representing system integrators, peripheral suppliers, and component suppliers decided to address issues which appear in the marketplace that affect many OEMs and vendors.

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 and successive Clauses (if any) contain detailed characteristics.

### 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 many SFF Specifications.

- X3.131R-1994       SCSI-2 Small Computer System Interface
- X3T9.2/0855       SPI (SCSI-3 Parallel Interface)
- X3.221-199x       ATA (AT Attachment)
- X3T10/0948       ATA-2 (ATA Extensions)

## 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 is 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.

Spec #	Rev	List of Specifications as of March 30, 1996
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 1.8" 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 1.8" Drives
SFF-8011i	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	SCA 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-8031		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	1.0	Self-Monitoring, Analysis and Reporting Technology
SFF-8036i	1.1	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-8040	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	3.4	40-pin SCA-2 Connector w/Parallel Selection
SFF-8046	2.4	80-pin SCA-2 Connector for SCSI Disk Drives
SFF-8047	C	40-pin SCA-2 Connector w/Serial Selection
SFF-8048	C	80-pin SCA-2 Connector w/Parallel ESI
SFF-8050	1.0	Bootable CD-ROM
SFF-8055i		SMART Application Guide for ATA Interface
SFF-8065	C	40-pin SCA-2 Connector w/High Voltage
SFF-8066	C	80-pin SCA-2 Connector w/High Voltage
SFF-8067	1.3	40-pin SCA-2 Connector w/Bidirectional ESI
SFF-8080	1.0	Fax-Access Instructions
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	1.3	3 1/2" drive w/Serial Unitized Connector
SFF-8400	0.1	Very High Density Cable Interconnect
SFF-8441	3.0	VHDCI Shielded Configurations
SFF-8500	1.1	5 1/4" drive form factors (all of 85xx family)
SFF-8501	1.1	5 1/4" drive form factor dimensions
SFF-8508	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	408-867-6630x303
Saratoga	408-867-2115Fx
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 application environment for small form factor disks is any computer connecting to one or more disks in a restricted packaging environment.

The purpose of an SFF Specification is to provide information that will assist vendors to design products that can fit the same packaging envelope.

Small form factor disks are widely-used where low power and small size are important configuration parameters.

### 4. Definitions and Conventions

#### 4.1 Definitions

For the purpose of SFF Specifications, the following definitions apply:

4.1.1 ATA (AT Attachment): This term defines the signal and logical protocol described in X3.221 for IDE (Integrated Drive Electronics) peripherals.

4.1.2 IDE (Integrated Drive Electronics): IDE describes a device with built in ATA protocol electronics.

4.1.3 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.

4.1.4 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.

4.1.5 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.

4.1.6 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 lower-case 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:	0.6	ISO:	0,6
	1,000		1 000
	1,323,462.9		1 323 462,9

## 5. 5.25" Physical Configuration

### 5.1 Connectors

There are several connector choices that can be used with 5.25" disk drives, both for cabled environments and direct attachment to a backplane.

A clear out zone inside the drive form factor provides room for the system connector.

### 5.2 Mounting Considerations

Except at the attachment points, 0.75mm clearance around the drive is recommended for cooling airflow. Requirements of additional clearance and/or minimum airflow is vendor specific.

### 5.3 Physical Dimensions

SFF-8501 defines general drive dimensional information which applies to magnetic disk drives.

SFF-8551 defines general drive dimensional information which applies to optical CD-ROM drives.

The drive shall be measured at 20 +/- 2 degrees C.

The drive shall not be exposed to any conditions (transit temperatures, shock, etc.) beyond the manufacturer's specified limits before measurement.

## 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  
Honda Connector  
IBM  
Madison Cable  
Maxtor  
Methode  
Quantum  
Robinson Nugent  
Seagate  
Sigmax

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

Methode

## 6. 5.25" Magnetic Disk Drives Form Factors

This specification defines the configuration characteristics associated with 5.25" magnetic disk drives.

Table 6-1 defines the dimensions of the drive represented in Figure 6-1. References offset to the left in the dimensions column are variables, and those to the right are tolerances.

EDITORS NOTE: The figure needs to be modified to be in line with SFF labeling practices i.e. labeling Different heights as A1 and A2 and A3 deviates from SFF Style because the table clearly shows that A1 is a variable. If the other dimensions are renamed, the table will be adjusted accordingly.

TABLE 6-1 5.25" DISK DRIVE DIMENSIONS

Dimension	Millimeters	Inches
A 1	82.55 *	3.250 *
A 1	*	.000 *
A 1	*	.000 *
A 4	204.72	8.060
A 5	146.05	5.750
A 6	139.70	5.500
A 7	3.05	.120
A 8	79.24	3.120
A 9	80.30	3.161
A10	80.20	3.157
A11	79.24	3.120
A12		.000
A13	9.91	.390
A14	21.84	.860

\* = maximum

NOTE: Tolerances are +/-0.25mm (0.010").

In Specifications under review, the figures are not integrated with the text but follow behind its transmittal. Space has been left here so the figure can be pasted in the proper position.

FIGURE 6-1 FORM FACTOR OF 5.25" DISK DRIVE

## 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  
Honda Connector  
IBM  
Madison Cable  
Maxtor  
Methode  
Quantum  
Robinson Nugent  
Sigmax  
Western Digital

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

Methode

## 7. Location of Cabled Connectors on ATAPI CD-ROMs

This specification defines the configuration characteristics associated with the location of connectors on ATAPI (ATA Packet Interface) CD-ROMs.

The connectors, including audio, are located in the same relative position.

The connectors are located at the rear of the drive, as specified in SFF-8551. Retaining the same relative location simplifies cabling for the integrator.

No matter whether the unpolarized connectors are located on the top as in Figure 7-1, or bottom as in Figure 7-2, of the circuit board, they always have the same orientation. This is not required for the polarized connectors.

FIGURE 7-1 CONNECTORS MOUNTED ON TOP OF PCB

FIGURE 7-2 CONNECTORS MOUNTED ON BOTTOM OF PCB



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  
Honda Connector  
IBM  
Madison Cable  
Maxtor  
Methode  
Quantum  
Robinson Nugent  
Sigmax

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

Compaq

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

Robinson Nugent

## 8. 5.25" CD-ROM Drive Form Factor

This specification defines the configuration characteristics associated with 5.25" CD-ROM drives.

Table 8-1 defines the dimensions of the drive represented in Figure 8-1. References offset to the left in the dimensions column are variables, and those to the right are tolerances.

Figure 8-1 is a detail of the form factor.

TABLE 8-1 5.25" CD-ROM DRIVE DIMENSIONS

Dimension	Millimeters	Inches
A 1	84.00 *	3.307 *
A 1	41.50 *	1.634 *
A 1	25.90 *	1.020 *
A 4	206.00	8.110
A 5	146.00	5.748
A 6	139.70	5.500
A 7	3.15	.124
A 8	79.20	3.118
A 9	52.40	2.063
A10	52.40	2.063
A11	79.20	3.118
A12		.000
A13	10.00	.394
A14	21.80	.858

\* = maximum

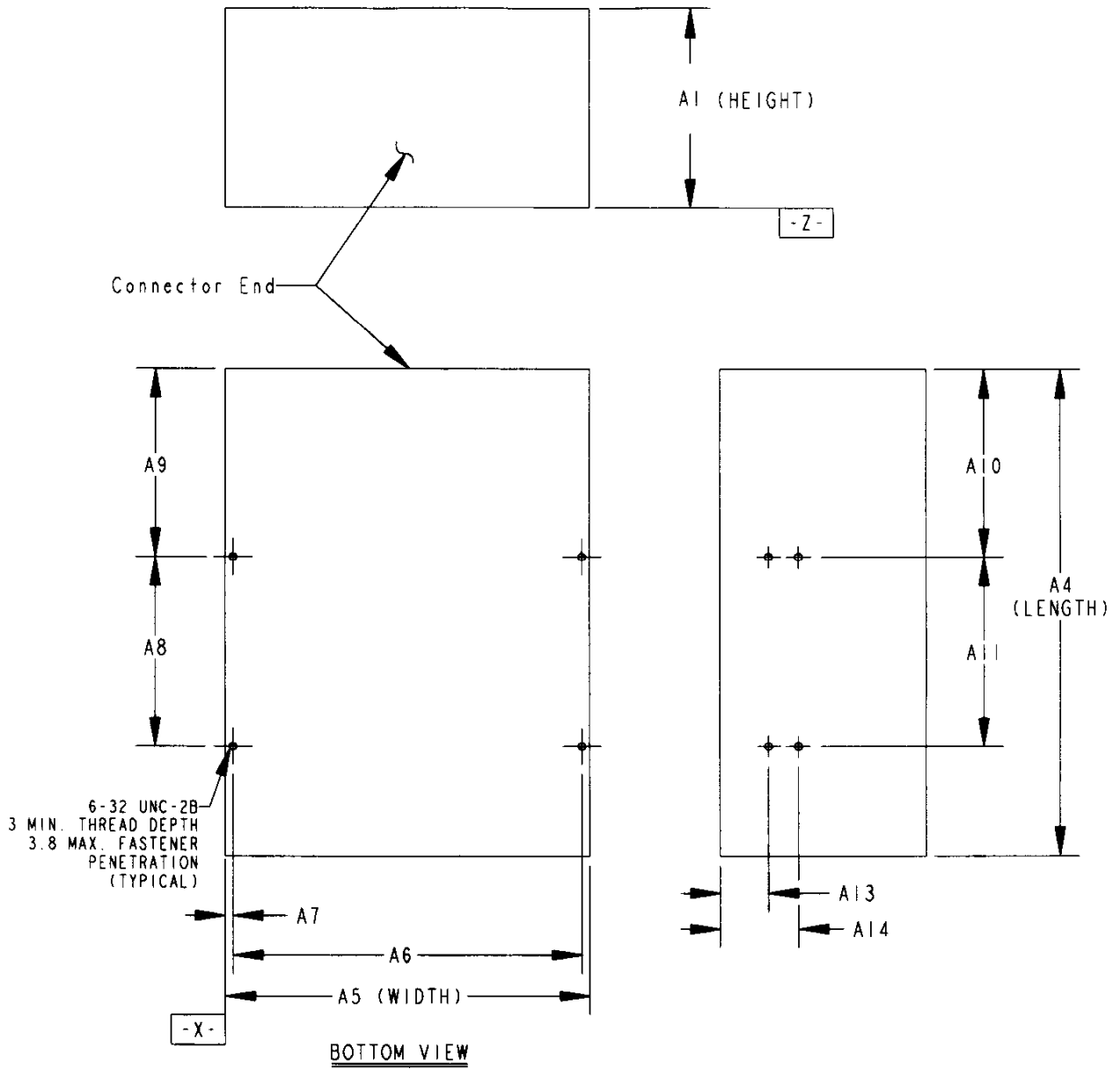
NOTE: Tolerances are +/-0.25mm (0.010").

EDITORS NOTE: Labeling different heights as A1 and A2 and A3 deviates from SFF Style because the table clearly shows that A1 is a variable (see text in dimensions para above).

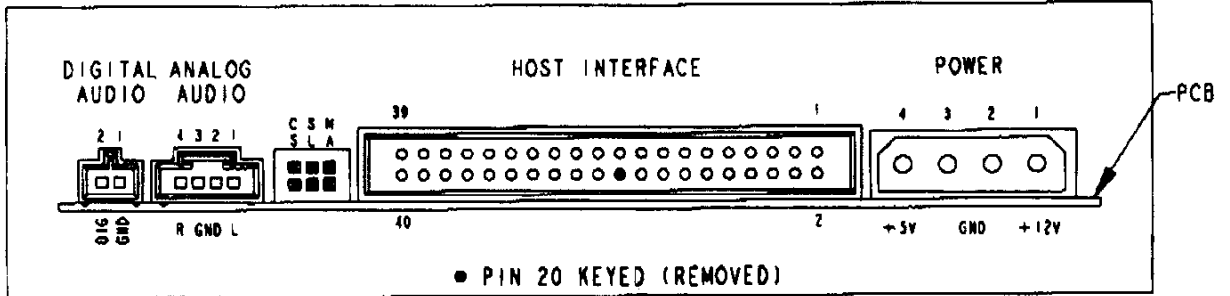
- This table style supports showing dimensions and tolerances individually.
- Is a global note about tolerances being +/-0.25mm adequate for this form factor over time? We would be better off to specify individual tolerances now rather than have to come back and change the figure at some time in the future.

In Specifications under review, the figures are not integrated with the text but follow behind its transmittal. Space has been left here so the figure can be pasted in the proper position.

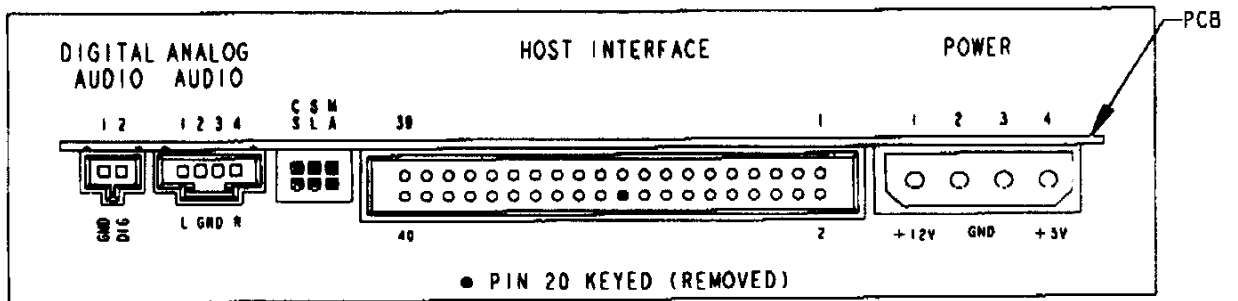
FIGURE 8-1 FORM FACTOR OF 5.25" CD-ROM DRIVE



SFF-8501 Form Factor of 5 1/4" Disk Drive



CONNECTORS ON TOP OF PCB



CONNECTORS ON BOTTOM OF PCB

CONNECTOR END

SFF-8508 ATAPI CD-ROM Connectors

