Wide (16-bit) Device Configuration Guidelines For PC Networks

StorageW⦿rks™

Application Note

StorageWorks Fast-Wide SCSI-2 products have been developed for system and network environments where a high performance bus and/or a large number of devices are required. The fast/wide synchronous SCSI-2 protocol allows throughputs up to 20 MB/s over a 16-bit wide data path. The specification also permits a maximum of 16 devices to be configured on a wide SCSI bus. Current StorageWorks fast/wide products are:

- SWXSS–22   7-device 16-bit Single-ended Storage Expansion Shelf
- SWXSE–22   7-device 16-bit Single-ended Storage Expansion Pedestal
- SWXD3–WB   2.10 GB 3.5 inch 16-bit Disk Drive
- SWXD3–WC   1.05 GB 3.5 inch 16-bit Disk Drive

Single-ended and Differential SCSI Systems

SCSI subsystems can be configured using either single-ended or differential bus drivers. Traditional SCSI systems utilize single-ended, 8-bit parallel buses that support either slow (less than 5 MB/second) transfers or fast (5 to 10 MB/s) transfers. Fast/wide SCSI-2 increases the transfer speed to 20 MB/second by doubling the bus width from 8- to 16-bits. The length of a fast or fast/wide single-ended SCSI bus is limited to a maximum of three meters (3m).

Differential bus systems provide a higher electrical noise tolerance and permit fast and fast/wide SCSI operation over longer cable lengths (up to 25 meters). When using a SWXSS-22 shelf or SWXSE-22 pedestal, a fast/wide differential configuration requires the use of a SWXA2-BA Differential to Single-ended Bus Signal Converter and a host bus adapter with differential output.

Certain cabling and device configuration guidelines must be followed when installing StorageWorks fast/wide products in single-ended and differential SCSI systems.

Fast-Wide Cable Requirements and Single-ended Configurations

The 16-bit single-ended fast/wide SCSI requires use of a 68-pin high-density shielded P-connector (8-bit buses use a 50-pin high density connector). The additional signal lines in the 68-pin cable provides extra bandwidth for the wider bus. The BN21K-02 cable is a two meter "P" cable providing a right-angle 68-pin connector on one end and a 68-pin straight connector on the other. It is used to connect the host adapter to the storage enclosure's Personality Module.

The single-ended bus length restriction of three meters limits single-ended fast/wide configurations to a single 7-device SWXSE-22 or SWXSS-22 enclosure. When used with the BN21K-02 cable, overall bus length remains within specified limits (one meter of the SCSI bus is contained within the storage enclosure to connect the various storage devices mounted in the enclosure). The Personality Module in the 16-bit Expansion Enclosure provides automatic termination at the end of the bus.

Fast-Wide Cable Requirements and Differential Configurations

Differential fast/wide SCSI systems use the same 68-pin "P" cable as used for single-ended fast/wide SCSI buses. The BN21K "P" cable, available in various lengths, permits location of the first expansion enclosure up to 23 meters from the host adapter.

A differential system can be configured using two wide storage enclosures providing the ability to address up to 13 devices. A one meter BN21K-01 cable is used to interconnect the Personality Modules in the two storage enclosures. The SWXA2-BA SCSI bus signal converter must be installed in the topmost SBB slot of the first storage enclosure immediately below the Personality Module. The SWXA2-BA converts the differential bus signals used between the SCSI host adapter and the converter to the single-ended signals required by devices configured in the storage enclosures.

Complete information for configuring fast/wide dual-enclosure SCSI systems can be found in the following StorageWorks documents:

- EK–SMCPG–UG *16-Bit Shelf and SBB User's Guide*

- EK–SMDZB–UG *Wide Differential to Single-ended Signal Converter User's Guide*

Mixed Width Configurations

8-bit StorageWorks devices (3.5" and 5.25" SBBs) are wide-compatible and can be configured in the SWXSE-22 and SWXSS-22 storage enclosures. An 8-bit wide-compatible device, when configured in a wide storage enclosure, does not effect the performance of any wide-capable devices that are also on the bus.

The 8-bit wide-compatible devices make use of the lower eight signal lines for SCSI transactions and must be configured in a storage enclosure configured for target SCSI IDs 0 through 6.

All 8-bit 3.5" StorageWorks disk drives are fully compatible with the wide storage expansion enclosures. These drives can be configured in the storage enclosure with any wide-capable device without restriction.

Recent revisions to StorageWorks 8-bit tape and optical devices make them fully compatible with the wide enclosures. They can be configured along with other wide-compatible *and/or* wide-capable devices (refer to table A). Wide-compatible 8-bit devices can be identified by the presence of a SCSI identification label located on the side of the SBB.

A sample SCSI identification symbol is illustrated below. The sample shown below identifies an 8-bit, wide-compatible, 10 MB/sec, fast SCSI hard disk drive.
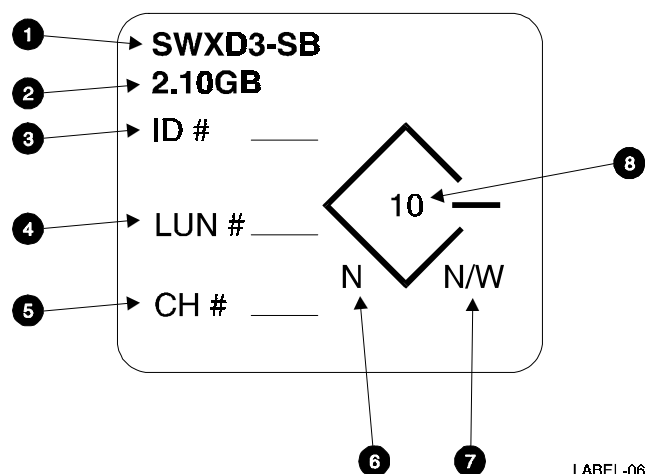
❶ The type of device.

❷ The total amount of data that the device can store.

❸ The SCSI ID assigned to the the device[1].

❹ The SCSI Logical Unit Number assigned to the device[1].

❺ The RAID Channel Number assigned to the device[1].

❻ The device bus width. For the SWXD3-SC this value is N.

❼ Indicates the type of shelf in which the drive can function:

N – the device is 8-bit shelf compatible.

W – The device is 16-bit shelf compatible.

N/W – The device is compatible with either shelf.

❽ The data transfer rate in MB per second (hard disk drives only.

[1] These values are assigned by the user for RAID configurations. The others are assigned when the device is assembled.

Current revision wide compatible 8-bit devices are listed in Table A.

Table A Wide Compatible 8-bit Devices

StorageWorks Part Number	Description	Revision Level
SWXD3-SB	2.10 GB 3.5" Disk Drive	ALL
SWXD3-SC	1.05 GB 3.5" Disk Drive	ALL
SWXD3-SE	4.29 GB 3.5" Disk Drive	ALL
SWXTL-BA	20 GB DLT	ALL
SWXTA-AA	4 GB 4mm DAT	Rev B05 and higher
SWXTA-BA	8 GB 4mm DAT	Rev B03 and higher
SWXTA-LA	16 G 4mm DAT Loader	Rev B04 and higher
SWXOR-CA	Hi Performance CD-ROM	Rev B03 and higher
SWXOR-CB	Hi Performance CD-ROM (add-on)	Rev B03 and higher
SWXOR-BA	CD-ROM 2-speed	Rev C03 and higher
SWXOR-BB	CD-ROM 2-speed (add-on)	Rev C03 and higher
SWXOR-BD	CD-ROM 2-speed (2-pack)	Rev C03 and higher
SWXTE-AA	5 GB 8mm 8505	Rev B03 and higher
SWXTE-AB	5 GB 8mm 8505 (add-on)	Rev B03 and higher
SWIOW-AA	1.3 GB Removable Optical Disk	Rev TBD

Configuration Restrictions

8-bit StorageWorks devices not listed in Table A should **not** be configured in the wide enclosures. Wide-capable devices will not function if these non-compatible SBBs are configured on the same bus. Non-compatible 8-bit devices are identified by the absence of a SCSI identification symbol on the product label.

> **CAUTION**
>
> Wide-capable devices are not compatible with the 8-Bit Storage Expansion enclosures. Wide-capable devices will not function if configured in the following Pedestal or Shelf enclosures:
>
> - SWXSE-01 7-device 8-bit Expansion Storage Pedestal
> - SWXSE-02 7-device 8-bit Expansion Storage Pedestal
> - SWXSE-03 3-device 8-bit Desktop Expansion Unit
> - SWXSE-06 7-device 8-bit Storage Expansion Pedestal
> - SWXSS-02 7-device 8-bit Storage Expansion Shelf
> - SWXSS-06 7-device 8-bit Storage Expansion Shelf