

# **SWXD3-WH**

## **2.10 GB 3.5-Inch**

### **Low Profile**

### **Disk Drive SBB**



## **Product Notes**

EK-SM2DQ-PN. D01

Thank you for purchasing our SWXD3-WH StorageWorks Building Block (SBB), designed and manufactured by Digital Equipment Corporation. This 2.10 GB, 3.5-inch low-profile disk drive is compatible with SCSI-2 single-ended interface standards. This drive has been Novell and Microsoft Windows certified and is supported on all Intel compatible Windows, Windows NT, and Novell Systems. It is also supported for use with IBM RS/6000, Sun SPARC systems, and HP9000 700/800 Series platforms.

#### **These product notes cover the following topics:**

- Overview of SWXD3-WH Drive
- SWXD3-WH Application Notes
- SWXD3-WH Specifications
- Drive Status LEDs
- Notes for SunOS and Solaris Users
- Notes for HP-UX Users
- Notes for IBM AIX RS/6000 Users
- Notes for MS-DOS, Windows, Windows NT, and Netware Users
- StorageWorks Building Block Identification Labels

#### **Overview of SWXD3-WH Drive:**

This 3.5-inch drive has a formatted capacity of 2.10 GB. It features an average read seek time of 10.4 ms and an average latency of 5.5 ms, providing an average data-read access time of 15.9 ms (without cache). Average write seek time is 11.4 ms, yielding

an average data-write access time of 16.9 ms. The drive uses a banded recording technique to maximize storage capacity and obtain media transfer rates as high as 7.8 MB/s. A 512 KB segmented cache buffer maximizes the cache hit rate for sequential reads. The SWXD3-WH drive also offers high data integrity, ensured by a 96-bit Reed-Solomon error correction code (ECC). ECC is performed "on the fly," when data is written to or read from the disk drive; this scheme will detect and correct a single 41-bit burst or two 17-bit bursts of defective data in a single block on the disk.

Other special features of note include:

- Low profile hard drive technology
- Fast Wide SCSI-2 Single-ended interface
- Asynchronous and Synchronous data-transfer protocol
- Downloadable SCSI firmware
- Programmable sector size reallocation
- Tagged command queuing
- Background queue processing
- Staggered disk spin-up
- Self diagnostics
- 5-year warranty
- UL, CSA, and VDE standards
- Interchangeable with RZ28M-VW (Minimum Revision C03)

This drive is supported for use in wide (16-bit) storage enclosures. It can coexist with narrow (8-bit) drives when configured in a wide enclosure.

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#### **SWXD3-WH Application Notes:**

**1.** The SWXD3-WH 3.5-inch disk drive has been designed to be compatible with many data-storage applications. This SBB is ready to be used when attached to qualified Industry-standard SCSI Adapters and corresponding driver software.

**2.** The generic model number of the internal 3.5-inch disk drive is RZ28NW. The drive identifies itself as disk type DEC RZ28M when interrogated by the SCSI driver software.

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#### **CAUTION**

Disk Drives are delicate instruments. Improper handling such as dropping or rough handling can cause damage or reduced reliability.

Proper handling of the SBB when hot swapping is essential. When removing the SBB, partially slide the SBB out to unplug its electrical connector from the backplane. Wait 10 seconds before completely removing the SBB from the enclosure to allow time for the device to spin down.

SBBs are serviced using special equipment and are not field repairable. Opening the SBB will void the Digital warranty.

**3.** The SWXD3-WH has a turn-on circuit that automatically spins up the drive after a delay period. The delay period is 12 seconds times the SCSI address of the drive, e.g., drive in SCSI ID2 delays 24 seconds before spin-up; drive in SCSI ID6 delays 72 seconds before spin-up, etc. This arrangement is required for operating systems that do not have a facility for motor spin-up; it lets successive drives in an array automatically spin up following a staggered delay.

**4.** This sequence avoids excessive loading of the power supply. If your specific operating system is not compatible with this automatic “spin up” feature, please contact your supplier for instructions.

**5.** Some SCSI adapters provide options in the adapter set-up menu to allow automatic spin-up of the disk drive motor. Although not required by the drive, the automatic spin-up feature can be enabled if other disk drive devices sharing the same SCSI adapter require it. SCSI adapters that have jumper or switch options to simultaneously spin up disk drive motors should not have that function enabled. The staggered spin-up feature within the SWXD3-WH sequences power to the disk drive motors one at a time. This sequencing avoids out-of-specification surges of power supply current that, under extreme conditions, could cause the supply to turn off.

## SWXD3-WH Specifications:

Logical Configuration	
# of disks (platters) <sup>1</sup>	8
# of read/write heads <sup>2</sup>	16
Servo	Dedicated
Formatted capacity	2.10 GB
Number of cylinders	3,045
Tracks per surface	3,045
Track capacity (bytes)	44,000
Bytes/sector	512
Sectors/drive	4,189,920

Recording	
Track density	4,200 tpi
Bit density	64,000 bpi
Areal density <sup>3</sup>	191-200 MB/in <sup>2</sup>
Recording method	RLL (1,7)

Environmental	
Non-Operating:	
Temperature	-40 <sup>o</sup> C to +70 <sup>o</sup> C
Humidity (RH)	5% to 95%, noncondensing
Operating:	
Temperature	+5 <sup>o</sup> C to +55 <sup>o</sup> C
Humidity (RH)	8% to 80%, noncondensing
Shock	10 G peak half-sine 11 ms duration
Vibration	22–400 Hz @ 0.5 G

<sup>1</sup> The drive contains 5 physical platters.

<sup>2</sup> The drive contains 9 physical heads.

<sup>3</sup> Areal density varies according to disk band.

Performance	
Interface transfer rate:	
Synchronous (8-bit)	10 MB/s
Synchronous (16-bit)	20 MB/s
Asynchronous (8-bit)	5 MB/s
Asynchronous (16-bit)	10 MB/s
Media transfer rate (≤ 1 sector)	4.48-7.78 MB/s
Cache buffer	512 KB
Track-to-track read seek: (typical)	2.1 ms
Rotational Speed	5411 rpm

SBB Physical Data	
Height	51 mm/2.0 inches
Width	121 mm/4.8 inches
Length	216 mm/8.5 inches
Weight	0.95 kg/2.1 lbs

Power Requirements	
Seeking current (maximum):	
+5 Vdc +/-5%	0.85 A
+12 Vdc +/-5%	0.42 A
Power consumption (typical):	
Active	9.0 W
Idle	6.0 W

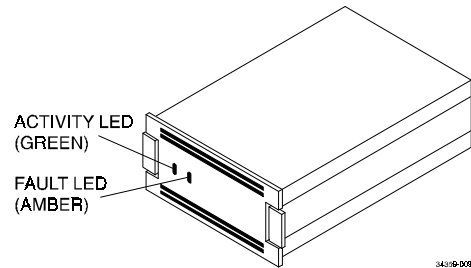
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## Drive Status LEDs:

Disk drive status is displayed by LEDs on the front of the storage device (Figure 1). Each LED has three states: *on*, *off*, and *flashing*. When the drive is powered on, verify the following normal operating LED status activity.

- The left LED (green) is the device-controlled activity LED and is on or flashing when the drive is active.
- The right LED (amber) is the drive-associated fault LED and indicates an error condition when either on or flashing. This LED is controlled by some adapters or RAID controllers.

**Figure 1 Disk Drive Status LEDs**



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## Notes for SunOS and Solaris Users

*/etc/format.dat information:* Note that we designated a fixed *nsect* value, even though this banded drive allows a different number of sectors/track, depending on the radius of a given track. We determined this value by dividing the total number of blocks by the total number of heads, dividing that result by the total number of cylinders, and then rounding down the result to the next whole number. Some partition sizes also were selected to be consistent with the *newfs* command. (For example, we reduced the “g” partition to avoid truncation of the last cylinder group.) We recommend that you enter this information into your */etc/format.dat* file so that the data will be readily available for any possible future use:

```
disk_type = "DEC_RZ28M" \  
: ctlr = SCSI : fmt_time = 5 \  
: nctl = 3043 : acyl = 2 : pctl = 3045 : nhead = 16 : nsect = 84 \  
: rpm = 5400 : bpt = 43008
```

For SunOS systems, the partition data is as follows:

```
partition = "DEC_RZ28M" \  
: disk = "DEC_RZ28M" : ctlr = SCSI \  
: a = 0, 64512 : b = 48, 196224 : c = 0, 4089792 : g = 194, 3827712
```

For Solaris systems, the partition data is as follows:

```
partition = "DEC_RZ28M" \  
: disk = "DEC_RZ28M" : ctlr = SCSI \  
: 0 = 0, 64512 : 1 = 48, 196224 : 2 = 0, 4089792 : 6 = 194, 3827712
```

For Solaris systems, when the format utility’s is run, it automatically configures the disks by reading the disk firmware. However, it does not write this label information onto the disk and the autoconfig label is slightly different from the label provided here.

Select the disk, then select the “type” option from the format command. Select the label number for the DEC\_RZ28M. Finally, use the “label” option to write the label information onto the disk

For SunOS systems, after running the format utility, it does not auto-configure the disks. The unlabelled disks are tagged with “<drive type unknown>”.

Select the disk. The system prompts you to select one of the labels. Select disk label for DEC\_RZ28M and then use the “label” option to write the label information onto the disk.

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## Notes for HP-UX Users

### Model HP 9000 Series 700 */etc/disktab* Information (HP-UX V9.05 and 9.07):

This disk has been formatted and is ready for a file system. For the convenience of HP 9000 Series 700 users, we have provided a few suggested *disktab* entries, as listed below, that you can use with the *newfs* command. We recommend that you enter this information into your */etc/disktab* file at your earliest convenience so that the data will be readily available for future use.

```
DEC_RZ28M|DEC_RZ28M_noswap:\
:ty=direct access:ns#84:nt#16:nc#1529:\
:s0#2054976:b0#8192:f0#1024:\
:se#512:rm#5400:
DEC_RZ28M|DEC_RZ28M_100MB:\
:100 MB reserved for swap & root:ns#84:nt#16:nc#1453:\
:s0#1952832:b0#8192:f0#1024:\
:se#512:rm#5400:
DEC_RZ28M|DEC_RZ28M_200MB:\
:200 MB reserved for swap & root:ns#84:nt#16:nc#1376:\
:s0#1849344:b0#8192:f0#1024:\
:se#512:rm#5400:
DEC_RZ28M|DEC_RZ28M_300MB:\
:300 MB reserved for swap & root:ns#84:nt#16:nc#1300:\
:s0#1747200:b0#8192:f0#1024:\
:se#512:rm#5400:
```

Note: If you use SAM to add this device (*newfs*) to your system, you must also put the following entry in */usr/sam/lib/C/pd\_devinfo.tx*:

```
DISK::scsi:::DEC_RZ28M.*;.*:.....:SCSI DEC_RZ28M Disk Drive:.....:DEC_RZ28M
```

If HP-UX V9.07 is being used, you must comment out calls to */etc/newdisk* and */etc/newdisk\_scan* in */etc/rc* to prevent unwanted and incorrect *disktab* entries from being created at boot time. See the HP-UX V9.07 Release Notes (SRL950710001), Chapter 1 for more information

### Model HP 9000 Series 800 */etc/disktab* and LVM Information (HP-UX V9.04):

We recommend that HP 9000 Series 800 users use the *disksecn* command to create a *disktab* entry. This must be done before creating partitions or logical volumes. To do this, as superuser, issue the following HP-UX command:

```
disksecn -dn RZ28M >> /etc/disktab
```

and supply the following values as answers for the questions asked by the program during the process:

```
Disk type:           Winchester
Sector size:        1024
Number of sectors/track: 84
Number of tracks/cylinder: 16
Number of cylinders: 1529
Revolutions per minute: 5400
```

If you wish to use partitions, only segment 2 can work with this drive under the HP-UX operating system. We therefore suggest that you use the Logical Volume Manager (LVM) to allocate disk space in accordance with the sizes of your file systems or raw data instead of a single partition. You can do this from the command line or by using the System Administration Manager (SAM) utility. For more information on LVM, refer to *How HP-UX Works: Concepts for the System Administrator* (B2355-90029), Chapter 9. After creating logical volumes and file systems, you will have more control over the disk than you would have with traditional partitions.

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## Model HP 9000 Series 700/800 /etc/disktab and LVM Information (HP-UX V10.x):

Although a disktab table is currently present in HP-UX V10.x, it is present mainly for reference. The V10 newfs command uses default disk geometry values to create a filesystem. For most users this method is sufficient, but some users may notice a slight decrease in the filesystem size as compared to the same filesystem in V9.0x. To optimize the filesystem size, it will be necessary to create a disktab entry for slice 0. Use the geometry information given above for this drive and use information in the /etc/disktab table as a guide for creating the entry for this drive. You must use minus 1 (-1) as a value for s0 (e.g., :s0#-1) instead of the actual value. Then execute the newfs command with the -O option (e.g., newfs -O RZ28M /dev/vg01/rlvo11).

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## Notes for IBM AIX RS/6000 Users

After you have appropriately connected the drive to the SCSI bus, you can install the SWXD3-WH drive from the root account by using SMIT, as follows:

Enter: **# smit dev**

and then perform the following two steps:

1. Choose “**Configure Devices Added After IPL**” from the menu and then exit.
2. Execute either of the following selections, as applicable:
  - a. If you want to add the disk to a new volume group, enter **# smit vg**, choose “**Add a Volume Group**” from the menu, and follow normal procedures.
  - b. If you want to add the disk to an already existing volume group, enter **# smit lv**, choose “**Add a Logical Volume**” from the menu, and follow normal procedures.

As an alternative to using SMIT, use the following commands while logged into the root account:

1. **# cfmgr**
2. **# lsdev -Cc disk**

*Example:*

```
# lsdev -Cc disk
```

```
hdisk1 Available 00-03-00-20 Other SCSI Disk Drive
```

3. Depending on whether :
  - a. A new volume group is to be added:
    - i. **# mkvg -f -y<newvg> -s<size> <new-disk>**
    - ii. **# varyonvg <newvg>**
  - or
  - b. The drive is added to an existing volume group.  
**#extendvg -f <oldvg> <new-disk>**

where the angle-bracketed options are:

<newvg> is the volume group name to be added.

<oldvg> is an existing volume group.

<size> is the physical partition size (normally 4).

<new-disk> is the disk added, as identified by the *lsdev* command.

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## Notes for MS-DOS, Windows, Windows NT, and Netware Users

MS-DOS has some internal limitations as to how large a disk it can work with. Because of this, the disk controller provides a physical to logical mapping of the disks head/sector geometry. Most controllers allow the mapping to be set for disks less than 1 gigabyte or greater than 1 gigabyte. For this drive, the mapping should be for a disk greater than 1 gigabyte.

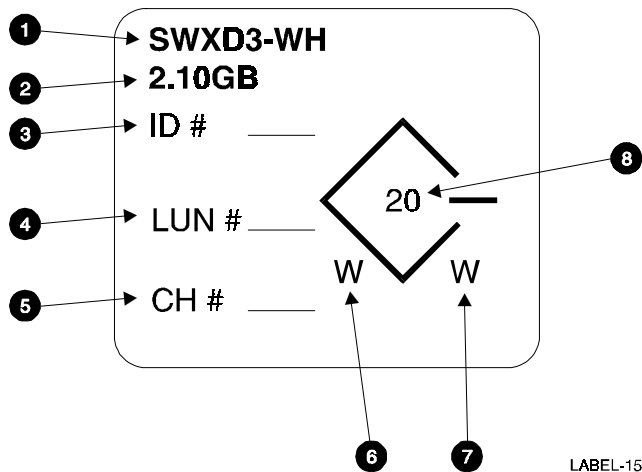
Additionally, MS-DOS limits a primary partition or logical drive to 2.047 gigabytes or less. Windows NT doesn't have this limitation. If compatibility with MS-DOS is a consideration, partitions should be kept to 2.047 gigabytes or less and formatted for the FAT file system. If MS-DOS compatibility is not important, partitions can be any size and should be formatted for the NT File System.

There are no known special limitations applicable to installing this unit into a Novell system.

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## StorageWorks Building Block Identification Labels

Each StorageWorks Building Block (SBB) contains an identification label that shows the SBB device type, capacity, and user specific information. The 16-bit label that appears on the front of the SWXD3-WH is shown below.



- 1 Device type.
- 2 Device capacity.
- 3 The SCSI ID assigned to the device<sup>1</sup>.
- 4 The SCSI Logical Unit Number assigned to the device<sup>1</sup>.
- 5 The RAID Controller Number assigned to the device<sup>1</sup>.
- 6 The device bus width. For the SWXD3-WH, this value is N.
- 7 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 compatible.
  - N/W – The device is compatible with either shelf.
- 8 The data transfer rate in MB per second.

<sup>1</sup> These values are assigned by the user.

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