Excellerator™

Installation and Support Manual

Ver. 90006h

Excellerator Installation and Support Manual ver. 90006h

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Preface

This manual explains how to install, operate, and troubleshoot Solid Data's Excellerator™ on a variety of host computer systems.

Audience

The *Excellerator Installation and Support Manual* is for customers installing the Excellerator and for operators and users testing and operating the Excellerator.

Document Overview

This manual is organized as follows:

- Chapter 1, "Introduction," provides an overview of Solid Data's three models of Excellerators.
- Chapter 2, "Installation," explains how to install the Excellerator's physical hardware.
- Chapter 3, "Operation – describes the controls and explains how to use the Excellerators.
- Chapter 4, "Troubleshooting," gives detailed information on troubleshooting an Excellerator system and running maintenance diagnostics.
- Chapter 5, "Service," gives information on servicing the Excellerator.
- Chapter 6, "Warranty and Service Policies," gives information on maintenance agreements, warranty, and service issues.
- Appendix A, "External SCSI Cables, Slides, and Accessories," describes the various types of external cables used to connect an Excellerator to a host computer system, slides used for rack mounting, and other common accessories.
- Appendix B, "Host Computer Installation," explains how to configure an Excellerator under a number of host computer operating systems.
- Index.

Notation and Syntax Conventions

This manual uses the following notation and syntax conventions:

italics	Indicates arguments in a command line that you must replace with a valid value. In text, it is used to indicate document titles.
`courier`	Indicates computer output and program listings.
`courier bold`	Indicates user input to the computer and nonprinting keys

Figures

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Chapter 1
Introduction

1.1 Overview

Solid Data's Excellerators, shown in Figure 1-1, are ultra-high-performance devices that appear exactly like a magnetic disk drive to a host computer system. While the Solid Data Excellerator is a semiconductor memory device, it provides all the characteristics of a rotating disk to the SCSI interface. However, because of the speeds of the semiconductor storage array, data can be accessed at speeds far greater than those of any magnetic disk.

Figure 1-1. Solid Data Systems Model 600/800 Excellerator

Figure 1-2. Solid Data Systems Model 1000 Excellerator

The Model 600 and 800 Excellerators hold up to five memory arrays per chassis. The arrays are available in capacities of 536 megabytes, and 1.072 gigabytes of formatted data for the Model 600 and in 1.072 and 2.144 gigabytes the Model 800. Storage capacity, therefore, of these chassis range from 536 megabytes to 10.7 gigabytes. The Model 1000 holds up to sixteen 1 gigabyte, or 2 gigabyte memory arrays for a storage capacity from 1.072 to 34.24 gigabytes of memory.

The Solid Data Excellerator is designed to be a plug-and-play performance accelerator. In general, it is only necessary to select a SCSI ID number, connect the SCSI cable(s) and apply power. The Excellerator will then appear to the SCSI host disk controller as a SCSI disk.

NOTE: Various microcode (EEPROM) versions are available for optimizing the Excellerator when used with operating systems requiring other than 512 blocks per sector storage. Please contact the Solid Data Systems Technical Support Group for details.

1.1.1 Excellerator Block Diagram

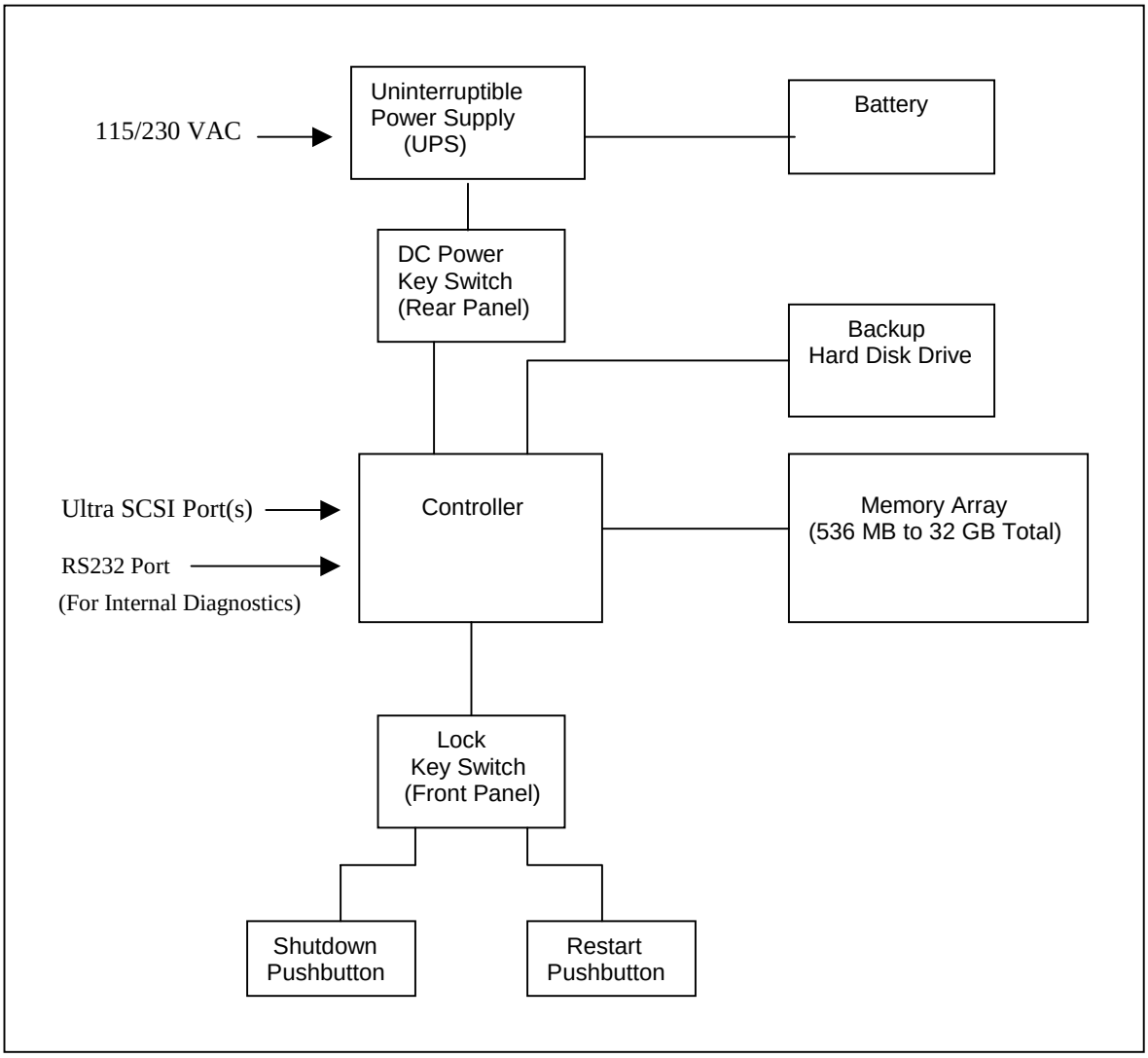

Figure 1.3. Excellerator Block Diagram

1.1.2 Power Consumption

The power consumption of the Solid Data Excellerator varies with the number of memory cards. The maximum power consumption for a fully loaded system is 140 watts for the Model 600/800 chassis and 300 watts for the Model 1000 chassis.

1.1.3 Backup Power

The Solid Data Excellerator uses an on-line uninterruptible power supply (UPS) which supplies all internal power for the memory array controller card, memory array, backup devices, and cooling fans. In the event of a line failure, fully charged internal batteries will supply all required power for a period of up to 2 hours for the Model 1000, and up to 1 hour for the Models 600 and 800.

1.1.4 Backup Disks

The backup disk has enough capacity to backup/restore the full memory array(s) content. The backup process is automatic if line power is absent for a period of time greater than that selected by a switch on the Ultra/Wide SCSI controllers (factory set to 4 minutes). Backup may also be manually initiated by the operator at any time through the front panel SHUTDOWN switches. The Solid Data Excellerator is off-line to the host during the backup/shutdown process. When backup/shutdown is initiated due to power failure, power will automatically be removed from the internal semiconductor memory array after all data has been recorded on the backup device. When power is restored, the Solid Data Excellerator will restore the memory array contents from the backup disk and return to an on-line condition.

1.2 Product Specifications

Table 1-1. Excellerator Specifications

	Model 600	**Model 800**	**Model 1000**
Form Factor	Rackmount	Rackmount	Rackmount
Capacity Range	536MB-5.36GB	1.07GB-10.7GB	1.07GB–34.24GB
Battery Backup	Internal	Internal	Internal
Battery Operation	Approx. 1 hour	Approx. 2 hours	Approx. 2 hours
Battery Charging	12 hours from total discharge	12 hours from total discharge	12 hours from total discharge
Backup/Shutdown Time (approximate)	750MB/mls	750MB/min.	1GB/min.
Restore Time (approximate)	750MB/mls	750MB/min.	1GB/min.
RELIABILITY			
Calculated MTBF	250,000 hours	250,000 hours	250,000 hours
Demonstrated MTBF	>2,000,000 hours	>2,000,000 hours	>2,000,000 hours
Error Rate (per bits transferred) Recoverable Unrecoverable	 <10 errors in 10^{15} <10 errors in 10^{17}	 <10 errors in 10^{15} <10 errors in 10^{17}	 <10 errors in 10^{15} <10 errors in 10^{17}
POWER REQUIREMENTS			
Power Connector (fully loaded)	NEMA 5–15	NEMA 5–15	NEMA 5–15
Voltage	105-128 or 208-250 VAC, 50/60Hz; Single Phase	90-132 or 180-264 VAC, 47-63Hz; Single Phase	90-132 or 180-264 VAC, 47-63Hz; Single Phase
Maximum Power Consumption	140 watts	140 watts	300 watts
OPERATING ENVIRONMENT			
Ambient Temperature	5°–40°C (41°–104°F)	5°–40°C (41°–104°F)	5°–40°C (41°–104°F)
Relative Humidity	0–90% (non-condensing)	0–90% (non-condensing)	0–90% (non-condensing)
Altitude	Up to 15,000' above sea level	Up to 15,000' above sea level	Up to 15,000' above sea level
DIMENSIONS			
Height	5.25 in.	5.25 in.	12.25 in.
Width	19 in.	19 in.	19 in.
Depth	21 in.	21 in.	21 in.
Weight	70 lbs.	70 lbs.	120 lbs.

Table 1-2. Ultra/Wide or LVD SCSI Controller Specifications

Average Access Time	.014 milliseconds
Maximum Access Time	.020 milliseconds
Seek Time	0
Latency	0
Data Rate	Synchronous 40.0MB/sec.
	Asynchronous 28.0MB/sec.
Maximum Number of Device-Level I/Os Per Sec.	23,060 (1 block I/O, includes access time, data transfer time, and status phase)
Mechanical Connections	Micro D, 68 Pin, Female
Termination	Removable (external)
Supported Hosts	All SCSI: Data General, DEC, Hewlett-Packard, IBM, Silicon Graphics, Sun Microsystems, Altos, Stratus, Concurrent

Table 1-3. Summary of Ultra/Wide Characteristics

Characteristics	**High Voltage Differential Wide Ultra SCSI**	**Low Voltage Differential Wide Ultra2 SCSI**
Data Rate	40 MB/sec.	40 MB/sec.
Data Bus Width	16 bits	16 bits
# Connector Pins	68	68
Max. Cable Length	25 meters	12 meters

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Chapter 2
Installation

This section covers physical installation of the Excellerator. Host-specific hardware and software installation information is covered in Appendix B.

2.1 Installation Procedure

To install a Solid Data Excellerator, complete the following steps:

1. On receipt of the Solid Data Excellerator and before applying power, remove the front panel and examine the controller card and memory arrays. The front panel is mounted with four snap fasteners and is removed by pulling forward on the panel. Verify that all cards are fully seated in their sockets and that no mechanical damage has been sustained during transportation. If there are indications that damage has occurred, remove the top cover and visually examine the batteries and other assemblies before applying line power.
2. Since Solid Data Excellerators are designed to mount in standard ANSI/EIA racks, angle-type mounting brackets can be used to mount the Excellerator in Hewlett-Packard, and some SUN cabinets. The slide piece attached to the Excellerator should be removed when the H-P brackets are used.

   When mounting the Excellerator in a standard cabinet without angle brackets, assemble the slides as shown in Figure 2-1. The front-to-back length should be adjusted as required.

CAUTION: Excellerators can weigh up to 120 pounds when fully configured. Two people are required when slide mounting these units.

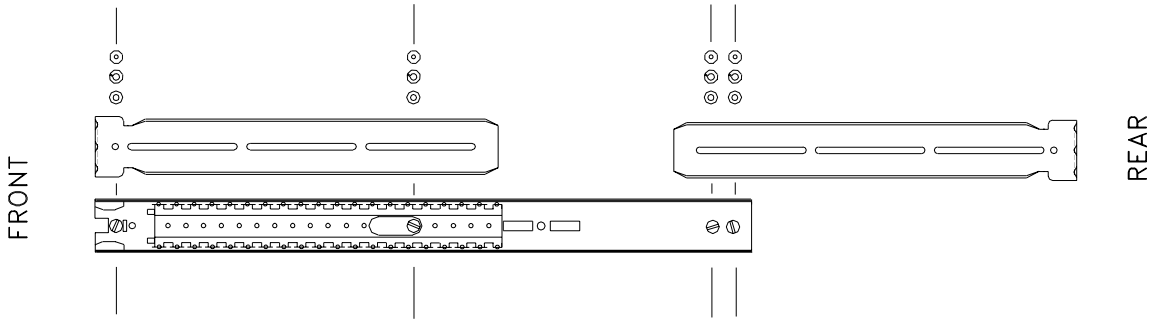

Figure 2-1. Slide Assembly

3. Connect the appropriate SCSI cables from the host system to the Excellerator. See section 2.1.1 for details. See Appendix A for descriptions of the SCSI cables.
4. Insure that the SCSI bus is properly terminated. Excellerators require external termination. Refer to section 2.1.2 for details.
5. Set the SCSI ID for the Excellerator. It is set by rotary switches on the front edge of the controller card. See section 2.1.3 for details.

6. Excellerators come equipped with an auto-sensing power supply, capable of utilizing 90-132 or 180-264 VAC. Connect the AC power cord to the AC power receptacle on the rear panel of the Excellerator. On the models 800 and 1000, the fans should begin to operate.
7. Move the DC POWER key switch on the rear panel to ON.
8. The STARTUP IN PROGRESS and ACTIVITY lamps will light. At this point, the Excellerator is restoring the contents of the backup drive to the memory array(s). While the Excellerator is in a restore mode, it is off-line to the host system. Wait until the STARTUP IN PROGRESS and ACTIVITY lamps extinguish and the SYSTEM READY lamp lights before accessing the drive.

NOTE: It is important to allow the restore operation to complete prior to accessing the device from the host system.

9. Perform the host operating system software configuration. See Appendix B for host-specific installation information.
10. If attaching to a UNIX based host, run IOtest™ to ensure the Excellerator is operating properly and at full speeds. IOtest™ is available via anonymous FTP from ftp.soliddata.com/IOtest or via the Web at **www.solidata.com/products**. Please download and read the README file prior to running IOtest™.

The following sections explain the above steps in greater detail.

2.1.1 SCSI Cable Connections

Single-Port Units:

Single port Excellerators have two 68-pin female micro D connectors on the rear panel. Connect the external SCSI cable to one SCSI port on the rear panel and a SCSI terminator to the other port.

Figure 2-2. Single Port Excellerator Rear Panel

Dual-Port Units:

Excellerators with the dual port modification have four connectors on the rear panel. Each port has two connectors that can be used for SCSI cables or terminators. Refer to Figure 2-3 for the rear panel configuration. If only one port is used for a host connection, it is important that either connector of the unused port be terminated with the proper terminator. Dual-port drives have two separate and distinct SCSI buses with separate SCSI ID's. These SCSI ID's do not have to be identical.

Figure 2-3. Dual Port Excellerator Rear Panel

2.1.2 Controller Terminators

Excellerators are available in HVD or LVD configurations. The terminator type must reflect the configuration of the host adapter and the controller. The terminators for the SCSI controller cards are externally mounted on the rear panel of the unit. The Excellerator can be daisy-chained as long as the last unit is terminated, the maximum SCSI bus length has not been exceeded, and each Excellerator has a distinct SCSI ID number.

2.1.3 Setting SCSI ID

CAUTION: Remember to initiate a proper shutdown prior to turning off DC power to the Excellerator for the purpose of selecting/changing the SCSI ID for the unit. Refer to Section 3.5 for proper shutdown procedures.

The SCSI ID is set with one of two rotary switches on the front edge of the controller card. These switches are accessible by removing the front panel of the Excellerator. Set the SCSI ID with switch S2. Dual port models utilize both switch S2 and S3 and may be set to two different SCSI ID's. See Figure 2-4 for the location of these switches.

Figure 2-4. Controller SCSI switch locations

2.1.4 Applying Line Power

Connect the unit to a 90-132VAC or 180-264VAC 50/60 Hz outlet**.** On the models 800 and 1000, the internal cooling fans will begin to operate. This indicates that the internal batteries are being charged and that the internal UPS is operating.

2.1.5 Battery Charging

Batteries must be sufficiently charged to support full backup operation during a power outage. Operation without fully charged batteries will not damage the unit or extend charging time. In the event of power line failure, however, full backup of stored data cannot be guaranteed. In order to guarantee fully charged batteries, insert the line cord into the appropriate outlet for 24 hours. Battery charging is fully automatic and occurs whenever the unit is connected to the line.

2.1.6 Power On

The Excellerator is powered up by turning on the master DC POWER key switch on the rear panel. Refer to Figure 3-1 for the location of the master DC POWER switch. The POWER LED on the front panel will light, followed by the STARTUP IN PROGRESS and ACTIVITY indicators. Refer to table 1-1 for backup/restore operation times. While the Excellerator is restoring to the memory array from the internal backup device, it is off-line to the operating system.

CAUTION: To power the Excellerator off, make sure the Excellerator is backed up to the host operating system and the memory has been saved to the internal backup drive by pressing the SHUTDOWN button on the front panel. See Chapter 3 for instructions on powering the Excellerator off.

2.1.7 Initial Format

The Solid Data Excellerator does not require a low-level format. Proper parity is written into the memory array(s) as the Excellerator restores from its backup drive.

Each host system has its own set of firmware or operating system utilities to configure, initialize, and high-level format the Excellerator. Refer to the manufacturer’s documentation or to Appendix B for more information.

Chapter 3
Operation

This chapter describes the controls for and explains how to operate Excellerators. The major topics covered are:

- Master DC POWER key switch (rear panel)
- KEY switch (front panel)
- SHUTDOWN switch
- RESTART switch
- SHUTDOWN procedure
- STARTUP procedure
- Power Fail timer
- Internal Hard Drive Diagnostics (SERVICE lamp)

The control switches for the Solid Data Excellerators are located on the front panel or the rear panel of the units.

3.1 Master DC POWER Key Switch

The Master DC POWER key switch is located on the rear panel of the Solid Data Excellerator. This switch controls the power to the memory array, memory array controller card, and backup device. Moving the Master DC POWER key switch to the ON position will cause the backup SCSI device to spin up. In addition, the front panel POWER lamp will illuminate followed shortly by the STARTUP IN PROGRESS and ACTIVITY indicator lights. The internal backup device will then load the memory arrays with the data stored on the backup device during which time the Excellerator is off-line to the host. When complete, the STARTUP IN PROGRESS and ACTIVITY indicators will go out, indicating that the Solid Data Excellerator has performed initial diagnostics and is ready for use. The Solid Data Excellerator does not require a low-level format. Proper parity is written into the memory array(s) as the unit restores from its backup drive.

NOTE: Turning the Master DC POWER key switch OFF will have no effect on the Excellerators. The unit may be powered down only after a successful shutdown sequence has occurred.

Figure 3-1. Excellerator Rear Panel

3.2 KEY Switch (front panel)

The front panel KEY switch is used to prevent the SHUTDOWN and RESTART switches from being activated by unauthorized personnel.

- Vertical position: When the key is in the vertical (LOCK) position the SHUTDOWN and RESTART switches are deactivated.
- Horizontal position: When the key is in the horizontal position the SHUTDOWN and RESTART switches are activated.

The position of the front panel KEY switch does not prevent the automatic saving of memory contents during power line failure.

3.3 SHUTDOWN Switch

The SHUTDOWN switch, located on the front panel of the Excellerator, initiates the shutdown sequence. Pressing the SHUTDOWN switch will copy the entire contents of memory to the internal backup device. When the backup operation has completed, DC power to the drive can be turned off using the rear panel Master DC Power Key Switch.

The shutdown process moves the data on a block-by-block basis to locations in the backup device. All of the data is saved exactly as it existed in memory when the shutdown sequence was initiated. Saving the contents of the memory array to the backup device does not affect the contents of the memory array. During the shutdown process, the Excellerator is off-line to the host.

3.4 RESTART Switch

The RESTART switch, located on the front panel of the Excellerator, allows the Excellerator to be reactivated after a shutdown sequence without turning off power via the rear panel Master DC Power Switch. Pressing the RESTART switch after a successful shutdown sequence will immediately return the unit to the ready state with the memory array contents intact. When a restart occurs, the SHUTDOWN COMPLETE indicator will extinguish and the SYSTEM READY lamp will illuminate indicating that the Solid Data Excellerator has returned to an on-line condition.

The restart process has no effect on data stored in the memory arrays. Stored data is left exactly as it was prior to the shutdown sequence being initiated.

Figure 3-2. Excellerator Front Panel

3.5 SHUTDOWN Procedure

The following steps should be performed when it is necessary to shutdown the Excellerator (actual order to be determined by individual operating system/backup utility being used):

- Backup all data on the Excellerator to the operating system. This may take the form of database dumps or UNIX backup utilities such as dump or tar.
- Stop all database servers or other jobs using the Excellerator.
- Dismount the Excellerator from the operating system, if it is mounted. This is done to force the buffer cache to flush.
- Unlock the front panel and press the SHUTDOWN switch. The SYSTEM READY lamp will extinguish, the SHUT DOWN IN PROGRESS and ACTIVITY lamps will illuminate, and the Excellerator will start a backup of the memory array(s) to the internal hard disk. Refer to Table 1-1 for backup/restore operation times.

CAUTION: While the Excellerator is backing up to the internal disk, it is off-line to the operating system.

- When the backup has completed, the SHUTDOWN COMPLETE lamp will illuminate. The DC POWER key switch on the rear panel can then be turned off to remove power to the unit.

3.6 STARTUP Procedure

The following steps should be performed when bringing the Excellerator up from a power-off state:

- Connect the Excellerator to an AC power source. On the models 800 and 1000, the fans will come on and the batteries will charge.
- Turn the DC POWER key switch on the rear panel to the “ON” position. The front panel POWER lamp will illuminate, followed shortly by the STARTUP IN PROGRESS and ACTIVITY lamps. The Excellerator will restore the contents of the internal backup device to the memory array(s). Refer to Table 1-1 for backup/restore operation times.

CAUTION: While the Excellerator is restoring data from the internal disk, it is off-line to the operating system.

- When the startup operation has completed, the STARTUP IN PROGRESS and ACTIVITY lamps will go out. At this point the Excellerator goes on-line.
- Boot the host system, and start the database servers or applications which are utilizing the Excellerator.

3.7 Power Fail Timer

A switch on the controller card (S3) controls the time the Solid Data Excellerator will operate on batteries during a power failure before going to an off-line condition and saving the semiconductor memory contents to the backup device. Table 3-1 shows the switch setting and the operation time on batteries.

Table 3-1. Ultra/Wide SCSI Controllers (Switch S4)

	SW1 LSB	**SW2**	**SW3**	**SW4**	**SW5**	**SW6**	**SW7**	**SW8 MSB**
Backup Time (in minutes)	**1**	**2**	**4**	**8**	**16**	**32**	**64**	**128**
Factory setting (4 minutes)	ON	ON	ON	OFF	ON	ON	ON	ON

ON = 0
OFF = 1

Refer to Figure 5-1 for the locations of the backup timer switch packs.

Excellerators are preset to 4 minutes at the factory. This allows for many power failures and reloads before battery depletion. This setting also prevents unnecessary backups due to very short power outages. When selecting longer battery operation times, remember that the battery life is dependent on the amount of memory used and that successive power failures could deplete the batteries of sufficient charge to successfully complete multiple save and restore operations.

When line power is removed from the Solid Data Excellerator, the unit will operate for the time preset by switch S4. If power returns during this interval, operation will continue and the timer will be reset. If power does not return during the preset time, the Solid Data Excellerator will go to an off-line condition. The Solid Data Excellerator will then store the entire contents of the internal semiconductor memory to the backup device. If the power returns during this backup time, the Solid Data Excellerator will continue the backup and, upon completion, will return to an on-line condition. If the line power has not returned by the completion of the backup, the Solid Data Excellerator will remove all power from the internal circuits and fans in order to preserve the remaining charge in the batteries. When the line power returns, the Solid Data Excellerator will automatically reload the internal semiconductor memory and return to an on-line condition. Should the power fail during the restore operation, the Solid Data Excellerator will return to OFF. Data stored on the backup device will be preserved. **Note: During all backup and restore operations, the Excellerator is off-line to the host.**

3.8 Internal Hard Drive Diagnostics (Service Lamp) & Replacement

The Backup Drive (included in Solid Data Systems Excellerator products) sees only occasional use. When the Excellerator is powered up, the content of the backup drive is copied to the Excellerator memory (DRAM) array, and the backup drive is then powered down. Normal read and write activity is then supported by the memory array. However, if a sustained power-failure condition is detected – i.e., if AC power fails for a period of time exceeding four minutes -- the contents of the memory array are copied to the backup drive, after which the Excellerator is powered down.

3.8.1 Automatic Diagnostic Tests

Under normal Excellerator operation the Backup Drive remains powered off most of the time. At approximately a 5-day interval, a diagnostic daemon wakes up. This daemon spins up the backup drive, performs a diagnostic routine on the drive and then spins the drive down.

If the drive fails to spin up, or fails the diagnostic test, then the front panel service light is illuminated.

When the Backup Drive is in this failed condition, the Backup SCSI port periodically resets the SCSI bus and probes for a new Backup Drive.

3.8.2 Reliable Hot-Swap Architecture

The Backup Drive is connected to an internal SCSI port that is only used for backup; no other SCSI devices are connected to this bus, and the bus is inaccessible outside of the Excellerator. This architecture simplifies the hot swap function of the backup drive, because when the backup drive is removed the only SCSI bus activity is the periodic Reset/Probe activity. This eliminates the need for longer ground pins or maintaining termination.

The Backup Drive canister includes circuitry to insure that power is not applied to the Backup Drive until the canister has been connected for a few seconds. The power to the drive is applied slowly to prevent a large transient from disrupting the power to the rest of the Excellerator.

3.8.3 Replacing a Failed Backup Drive

Replacing a failed Backup Drive is a very simple process. The front panel of the Excellerator is removed. The Backup Drive is unlocked using the key that is supplied with the unit. The canister holding the failed drive is then removed. The canister holding the replacement drive is installed and locked using the key supplied with the unit.

When a new Backup Drive is detected (after hot-swap replacement) the diagnostic daemon immediately wakes up and performs the self-test routine. Assuming that the new Backup Drive passes the diagnostic test, the service light is extinguished.

The Backup Drive replacement process has no impact on the operation or performance of the Solid State Disk.

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Chapter 4
Troubleshooting

This chapter gives detailed information on troubleshooting a system and running the Excellerator's firmware-resident maintenance diagnostic. The major topics covered are:

- General troubleshooting procedures
- Running the firmware-resident diagnostics
- Error correction and reporting

4.1 General Troubleshooting

4.1.1 Power

Connect the AC POWER cord to the AC POWER receptacle on the rear panel of the Excellerator and turn the rear panel master DC POWER key switch to the ON position.

The internal cooling fans will begin to operate. This indicates that the internal batteries are being charged and that the internal UPS is operating. If the internal fans do not operate, check the fuse on the rear panel.

When the master DC POWER key switch on the rear panel is turned on, the Excellerator will go into a "Startup in Progress" cycle. During this period of time, the Excellerator will be "off-line" to the operating system. The operating system and controller microcode programs may not recognize the Excellerator when it is in a restore mode.

4.1.2 SCSI Problems

In the event the host system does not see the Excellerator on the SCSI bus, check the following:

- Ensure that the adapter type (ie. "High Voltage Differential" or "Low Voltage Differential") matches the Excellerator.
- Ensure that the Excellerator has completed its restore/startup cycle before the host adapter poles the SCSI bus. Some adapters/host systems will not recognize the Excellerator when it is in restore/startup mode.
- Ensure that the Excellerator has a unique SCSI address on the SCSI bus. Host adapters are typically assigned to SCSI ID 7.
- The SCSI bus must be terminated with the proper type of termination. The overall length of the bus must be less than 25 meters for HVD and 12 meters for LVD models.

4.2 Backup and Restore Errors/ Internal Hard Drive Diagnostics

Internal hard drive diagnostics are included in the Excellerators. Approximately twenty minutes after Startup and every five days thereafter, the Excellerators will automatically run an internal hard drive diagnostics test. This will not affect system operation, however the ACTIVITY lamp will illuminate for approximately one to two minutes during these tests. If a defect is found in the internal hard drive, the SERVICE lamp will illuminate. Replacement of the hot-swappable hard drive will clear the SERVICE lamp within approximately one minute.

In the unlikely event of an uncorrectable error in the Excellerators, indicated by the illumination of the SERVICE lamp during a shutdown or startup sequence, it may be necessary, after internal hard drive replacement, to depress the RESET switch, located inside the front panel on the main board, and then rerunning the shutdown or startup sequence.

The reset switch may clear a SCSI bus hang condition (activity light on solid) or a problem with writing/reading the internal backup device. This is a “last ditch effort” to clear an error condition so that an internal backup of all data in memory can be completed.

NOTE: User data will NOT be lost during this process. The RESET button will cause the Excellerator to reinitialize. This is effectively the same state as a SCSI or HARD reset.

Refer to Figure 2-4 for the location of the RESET switch.

4.3 Error Correction and Reporting

Solid Data Excellerators employ full syndrome error correction/detection to the memory array. This technique allows full correction of all single-bit errors with zero degradation in user performance. Syndrome is applied to every 8 bytes of data stored in the array. The memory array is structured to make multiple-bit error highly improbable from a statistical point of view. Multiple-bit errors are detected but not corrected.

Errors are reported through the SCSI bus according to the ANSI SCSI specification. “Check condition” is issued for any command ending in error. “Sense key 01 sense code 18H” indicates a correctable error, while “Sense key 03 sense code 11H” indicates a non-correctable error.

Errors reported to host computers via the SCSI bus are logged or reported to the console depending on the operating system. These errors will be in the same format as if they had been reported by a mechanical disk drive.

4.4 Firmware Resident Diagnostics

1. The Solid Data Excellerators have a built-in firmware diagnostic test. This test performs a functional check of the controller, memory arrays, and battery backup system, and is run off-line to the host.

- Connect the RS232 port on the Excellerator to a terminal or the COM port on a PC. A laptop needs to run a communications package such as PCPLUS™ or a Terminal Emulation application. Set the terminal to 9600 baud, 8 bits, no parity, and 1 stop bit.
- Turn on the Master DC POWER Key Switch on the back of the Excellerator. Immediately type the letter “I” repeatedly until the “DES 800S IN HOUSE DIAGNOSTICS V1.00" header appears.
- The diagnostic test will run as shown. Operator intervention is required.

```
SERIAL NUMBER 951200712
FIRMWARE REVISION SD12J
PORT A SCSI ID 0
PORT B SCSI ID 0
RUN MODE
FAST SCSI MODE
PORT B ENABLED
PORT A ENABLED
TOTAL CAPACITY 536 MB

DES 800S IN HOUSE DIAGNOSTICS Vl.00                  *NOTE:
2 CARDS PRESENT                                          1.
CHECKING MODE SWITCH....                                 2.
CHECKING FOR EEC JUMPER                                  3.
TESTING STATIC RAM                                       4.
WRITING DRAM ARRAY CARD # 1                              5.
WRITING DRAM ARRAY CARD # 2
WRITE PASS COMPLETED -- NO ERRORS
READING DRAM ARRAY CARD # 1                              6.
READING DRAM ARRAY CARD # 3
READ SCAN COMPLETED - - NO ERRORS
SENDING UNIT OF CARD...                                  7.
READING DRAM ARRAY CARD # 1                              8.
READING DRAM ARRAY CARD # 2
READ SCAN COMPLETED - - NO ERRORS
PRESS SAVE BUTTON...                                     9.
PRESS RESTORE BUTTON...                                 10.
PULL LINE CORD & HIT ANY KEY                            11.
07:54                                                   12.
REPLACE LINE CORD & HIT ANY KEY                         13.
```

NOTES:

```
1. Number of installed Memory Arrays
2. Check mode switch for "diag" or "narrow” mode
3. Check controller for ECC operation
4. Test SRAM
5. Write Memory Arrays with "FF"
6. Read Memory Arrays and check for good ECC
7. Test failsafe refresh circuit
8. Re-read Memory Arrays and check for good ECC
9. Test "SAVE" button on front panel
10. Test "RESTORE" button on front panel
11. Switch to battery power
12. Measure backup timer
13. Back to AC power and do a restore
```

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Chapter 5
Service

5.1 Controller Configuration

5.1.1 Controller Switch Settings

Set the FUNCTION switch pack on the controller as follows:

Normal operation is S1 = "RUN", S2 = "WIDE", and S3 = "ULTRA". S4 is set to differential.

Table 5-1. Function Switch S5

Switch #	OFF	ON
1	DIAG	RUN
2	NOT USED	WIDE
3	ULTRA	NOT USED
4	B (Differential)	NOT USED

5.1.2 Controller Configuration Blocks and Jumpers

The configuration blocks and jumpers inform the controller the size of the memory arrays installed in the Excellerator. The settings below are irrespective of the actual number of memory arrays being used.

Install configuration blocks and jumpers according to the following chart:

Table 5-2. Configuration Blocks and Jumpers

Controller	Memory Array Size	Configuration Block Part #	Jumper JP1
Ultra/Wide or LVD	536 MB	79052	Pins 1&2
Ultra/Wide or LVD	1 GB	79062	Pins 2&3
Ultra/Wide or LVD	2 GB	79093	Pins 2&3

Refer to Figure 5-1 on the following page for component locations.

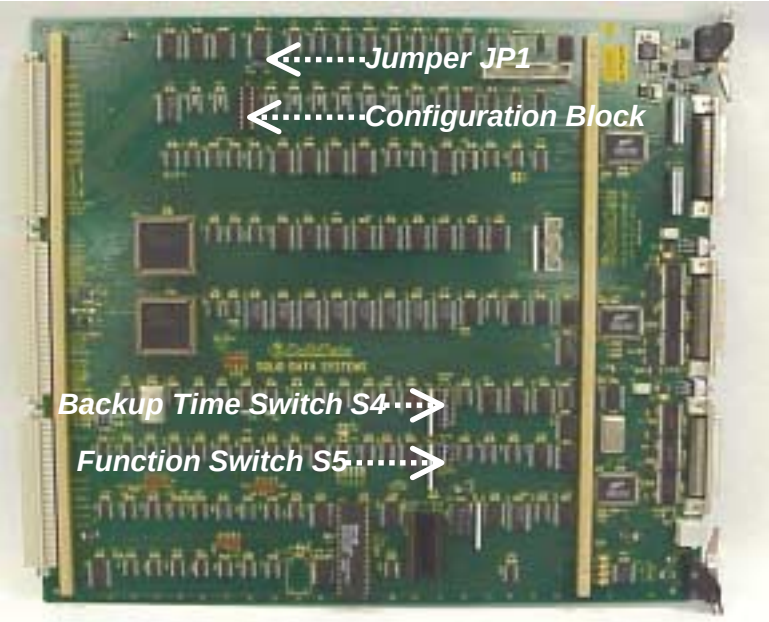

Figure 5-1. Controller Card component locations

5.2 Memory Array Switch Settings

Set the switches/jumpers on the Memory Arrays as follows:

- All switches at location S1 should be set to off (there is only one configuration switch on a Memory Array).
- No jumper is required at JP5 on the 536MB Memory Array.
- A jumper is required at JP5 on the 1GB and 2GB Memory Arrays, on pins 1 and 2.

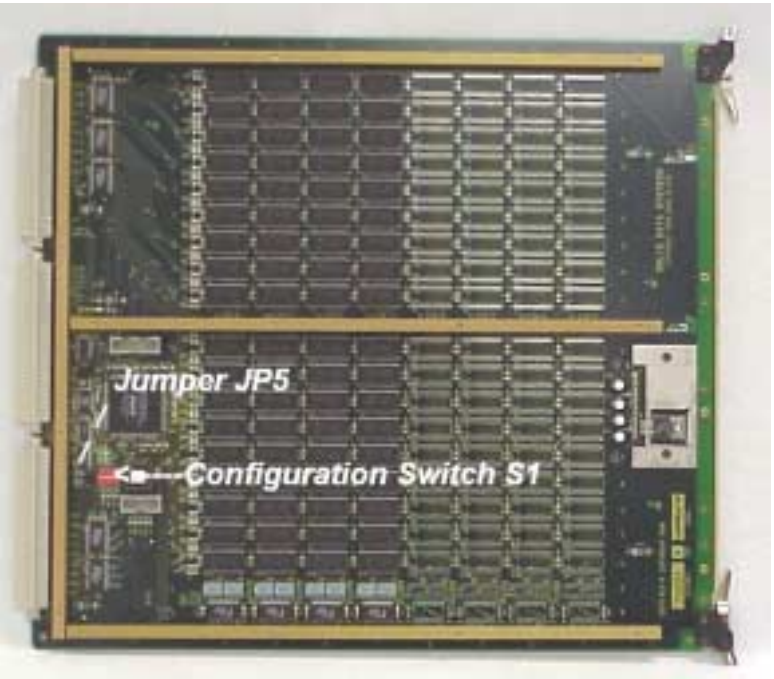

Figure 5-2. Memory Array component locations

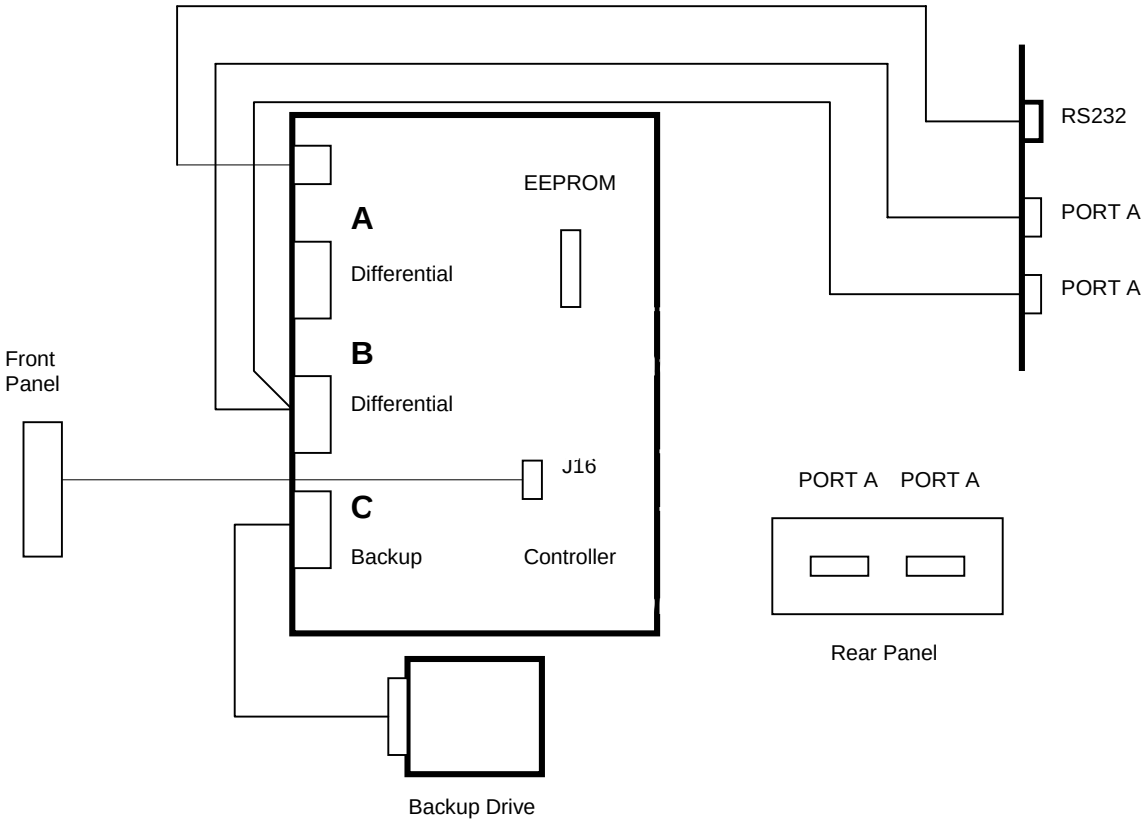

Figure 5-3. Single-Port Differential Configuration

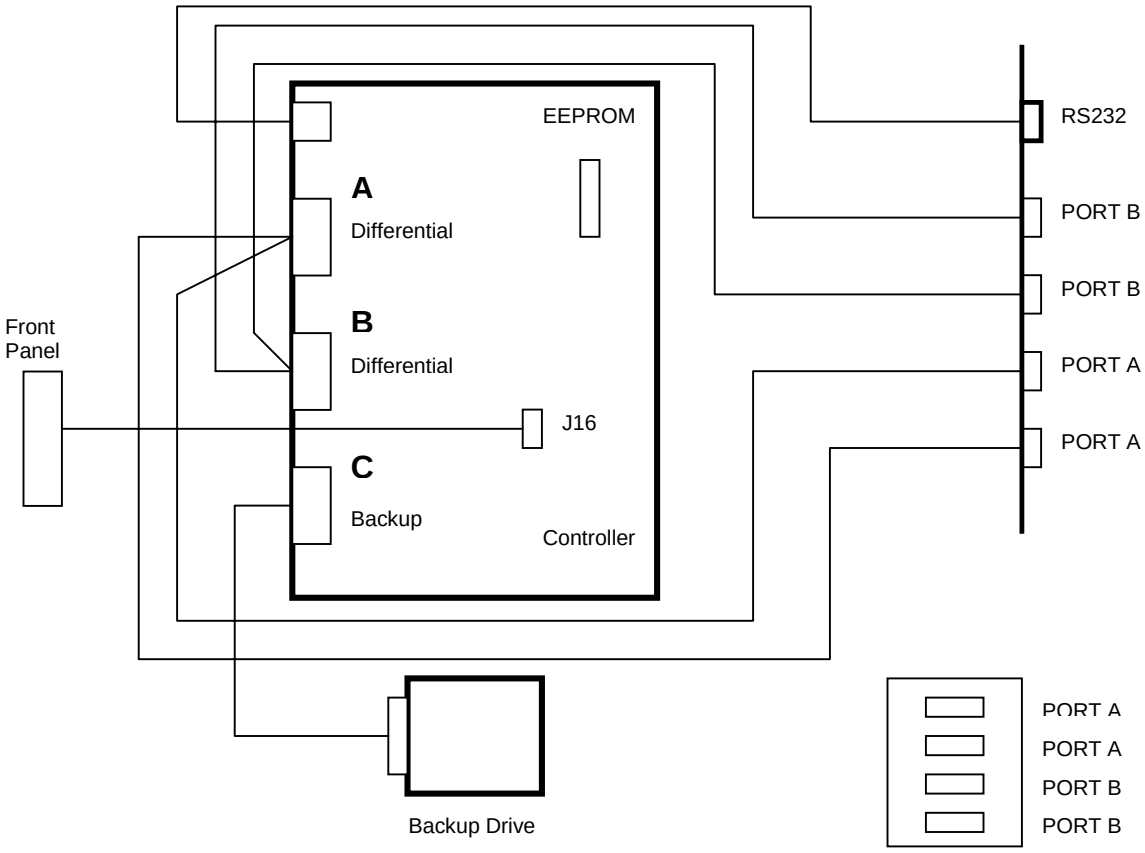

Figure 5-3. Dual-Port Differential Configuration

5.3 EEPROM Replacement

This procedure covers replacing the EEPROM on the controller boards.

CAUTION: Before starting this procedure, insure that all data on the Excellerator is backed up to the operating system. Unlock the front panel and force a backup to the internal disk by pressing the SHUTDOWN button. Shut down the host system and turn off the Excellerator using the master DC POWER key switch on the rear panel.

1. Remove the top cover by removing the 14 flat-head screws. Disconnect the front panel ribbon cable at J16 on the control board.
2. The front panel is removed by pulling it toward the front.
3. Cut the tie wraps on the control module handles (if installed) and slide the control module about two inches out of the chassis. The EEPROM is installed at location U134. Refer to Figure 5-1 for the EEPROM location. Remove the old EEPROM and replace with the new one. Return the control module to its proper position in the backplane.
4. Replace the front panel and the side/top chassis cover.
5. Connect AC power and turn on the master DC POWER key switch on the rear panel. The STARTUP IN PROGRESS lamps will light on the front panel, indicating that the Excellerator is being restored from the backup drive.

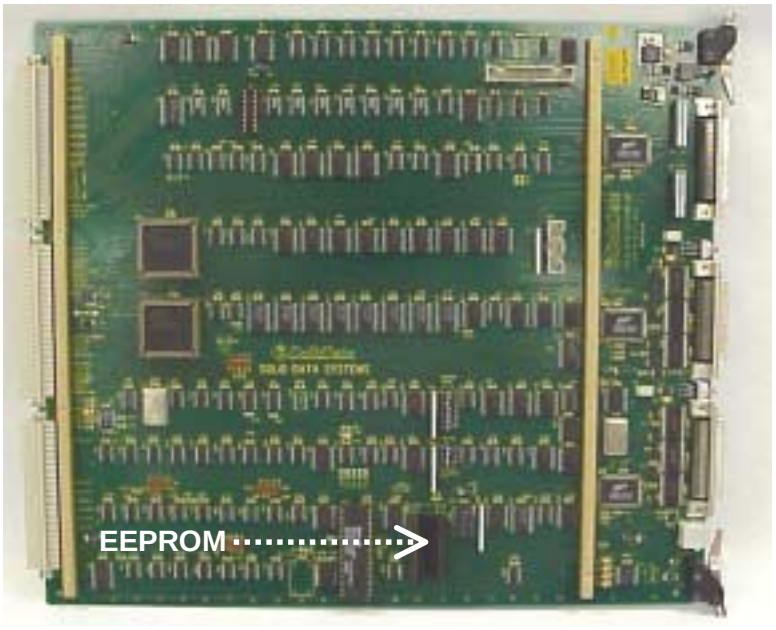

Figure 5-5. EEPROM location

5.4 Spare Parts List

Table 5-4. Spare Parts List

Solid Data Part	Description
44001	Fuse, pico, 5 amp
44003-25	Fuse, 3AG, SLO, 32V, 25 amp
44005	Fuse, pico, 10 amp
44011	Fuse, 5X20MM, 5A, SLO
44010, 44019	Batteries, Model 600
44010	Battery, Model 800
44017	Battery, Model 1000
79069-01	Assy, PCB, SW, Front Panel, Models 800 and 1000
70109	Power Supply, Model 600
70039-01	Power Supply, Model 800
70039-03	Power Supply, Model 1000
70108	Surface Mount Controller, LVD
70107	1 GB Memory Array
70111	2 GB Memory Array
70117	536 MB Memory Array
73034-30	Cable, internal, Dual, Wide, 30”
73040-18	Cable, internal, SCSI68, 18”
70103	Surface Mount Differential Controller, Ultra/Wide SCSI
75025-9100	Drive, HD, SCSI, 9.1GB
79009	Fan Assembly, 120 mm
79010	Fan Assembly, 80 mm
79080-01	Canister assy, Hot Swappable Drive, 9.06GB
79080-02	Canister assy, Hot Swappable Drive, 18.2GB
79080-03	Canister assy, Hot Swappable Drive, 36.4GB
79080-04	Canister assy, Hot Swappable Drive, 72.8GB
79064	FlatPak Assy, 300w
79068	FlatPak Assy, 200w
75012	Terminator, wide, differential
75036	Terminator, wide, dual mode, SE/LVD
73044-xx	Cable, SCSI, 68 Micro”D” (M) to 68 Micro “D” (M), xx=length (“)
73050-xx	Cable, SCSI, 68 Micro”D” (M) to 50 Micro “D” (M), xx=length (“)
73058-xx	Cable, SCSI, 68 Micro”D” (M) to Centronics 50 (M), xx=length (“)
73059-xx	Cable, SCSI, 68 Micro”D” (M) to 68 mini Centronics (M), (for IBM), xx=length (“)
73102-xx	HVD VHDCI to 68 pin Micro “D” cable assembly, xx=length (“)
73103-xx	LVD VHDCI to 68 pin Micro “D” cable assembly, xx=length (“)
54009-18	Slide Set, Standard 18” (2 slides)
54013	Bracket, Standard, 11” (1)
50073	Bracket, Medium, 17” (1)
50073-01	Bracket, Long, 22 5/8”, for 34” deep Sun Enterprise cabinets (1)
54015	Kit, Bracket, (2), (for HP cabinet)
79086	Universal Rails (27”)
79094	Short Universal Rails (17” for Telco Racks)
90006	Manual, Installation & Support
90010	Manual, Service/Repair
94001	CD, IOtest

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Chapter 6
Warranty and Service Policies

6.1 Warranties and Limitations

Solid Data warrants that the products to be delivered thereunder are free from defects in material and workmanship and meet Solid Data's performance specifications; provided, however, that (a) Solid Data's liability under this warranty is limited to repairing or replacing or issuing credit for (in the discretion of Solid Data) any product delivered hereunder not conforming to this warranty; (b) this warranty is limited to a one-year period commencing with the date of shipment of any such product; (c) minor deviations from specifications, which do not affect performance of the products covered hereby, are excluded from this warranty; (d) Solid Data will not be liable under this warranty unless (i) Solid Data is properly notified in writing by Buyer upon discovery of the failure of any product to conform to this warranty, (ii) such product is returned (with Solid Data's written approval) to Solid Data, transportation charges prepaid by Buyer, (iii) such product is received by Solid Data not more than 10 days after the last day of the one-year warranty period, and (iv) Solid Data's examination of such product discloses to Solid Data's reasonable satisfaction that such defects or failures have not been caused by misuse, neglect, improper installation, repair, alteration, or accident; (e) THE FOREGOING CONSTITUTES Solid Data's ENTIRE LIABILITY IMPLIED AND/OR STATUTORY (EXCEPT AS TO TITLE), AND STATES THE FULL EXTENT OF Solid Data's LIABILITY TO BUYER OR TO ANY OTHER PARTY FOR ANY BREACH OF SUCH WARRANTY AND FOR DAMAGES, WHETHER DIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL, RESULTING FROM ANY SUCH BREACH; and (f) OTHER THAN AS EXPRESSLY PROVIDED IN THIS DOCUMENT, NO WARRANTY IS MADE AS TO THE MERCHANTABILITY OF THE GOODS TO BE DELIVERED, NOR IS ANY WARRANTY MADE AS TO THE FITNESS OF SUCH GOODS FOR ANY PARTICULAR PURPOSE.

6.2 Service Policies

Before reporting a service problem, run all of the troubleshooting tests to determine that there is an actual problem and to isolate the problem. If, after running the troubleshooting tests, you determine that there is a service problem, please contact us at:

Solid Data Systems
ATTN: Customer Support
2945 Oakmead Village Court
Santa Clara, CA 95051
TEL: 408/727-5497
FAX: 408/727-5496

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Appendix A
External SCSI Cables, Slides, and Accessories

Figure A-1. 73044 68 pin Micro “D” (M) to 68 pin Micro “D” (M) cable assy.

Figure A-2. 73050 68 pin Micro “D” (M) to 50 pin Micro “D” (M) cable assy.

Figure A-3. 73058 68 pin Micro “D” (M) to Centronics 50(M) cable assy.

Figure A-4. 73059 68 Micro “D” to 68 mini Centronics (M) cable assy (IBM).

Figure A-5. 73102 HVD, & 73103 LVD VHDCI to 68 pin Micro "D" cable assy.

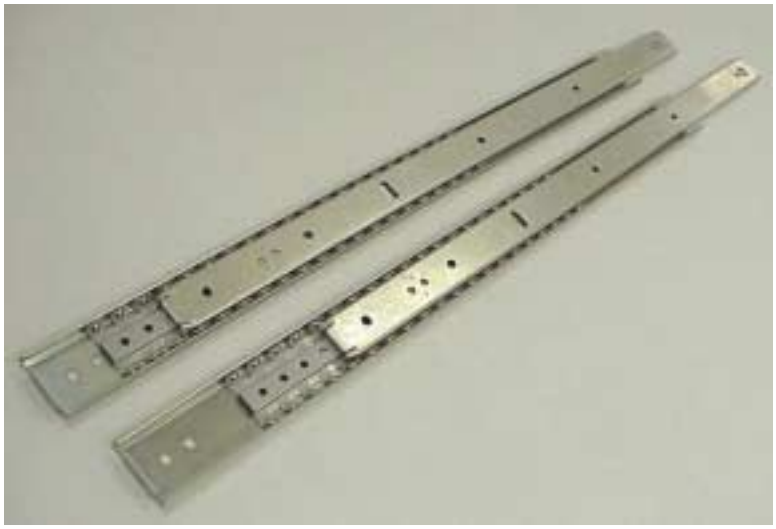

Figure A-6. 54009-18 Standard Slide Kit

Figure A-7. 54013 Standard 11” Brackets for 22” to 28 ½” Deep Racks

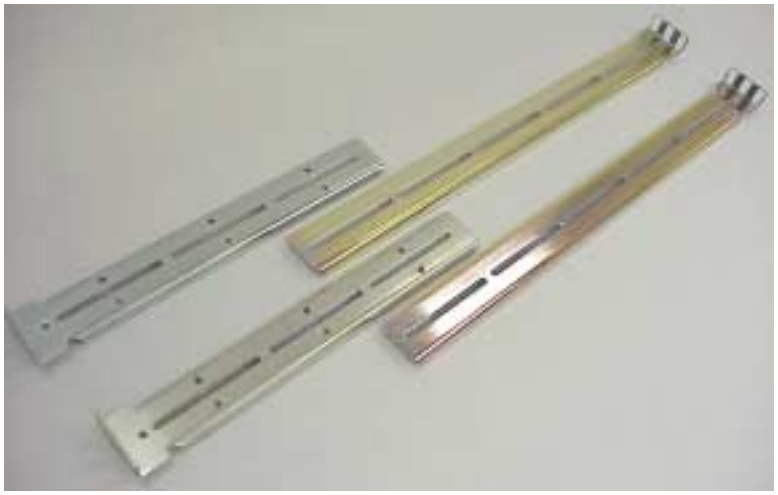

Figure A-8. 50073 17” Brackets for 28 5/8” to 33 5/8” Deep Racks

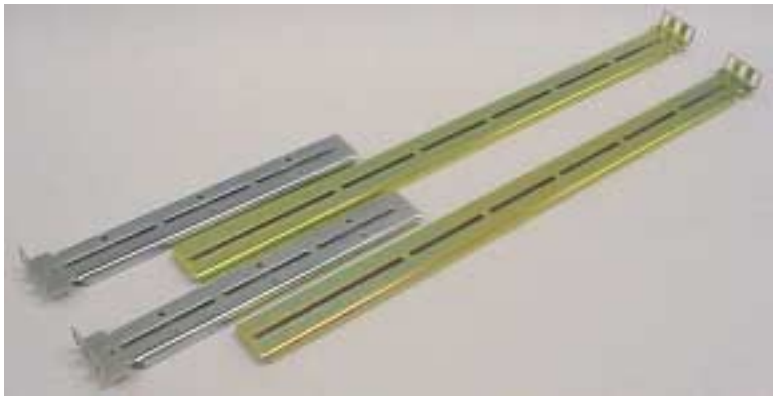

Figure A-9. 50073-01 22 5/8” Brackets for 33 ¾” to 34 ¾” Deep Racks Fits 34” Sun Enterprise Cabinets

Figure A-10. 54015 Slide Kit (brackets for HP cabinets)

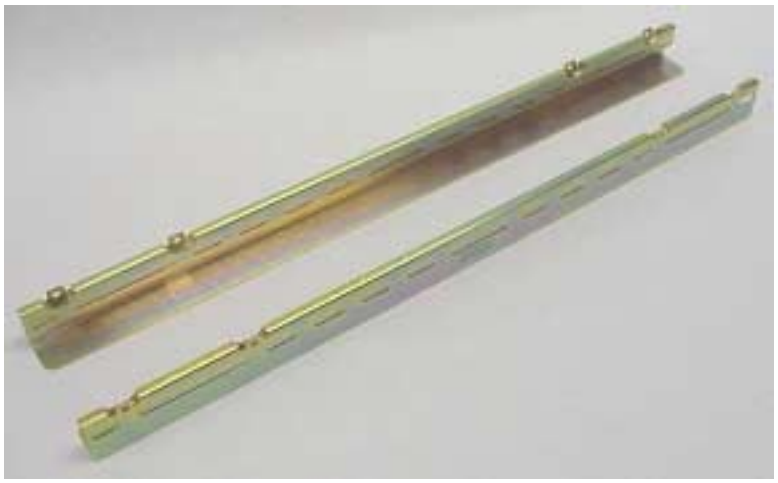

Figure A-11. 79086 Universal Rails (27”)

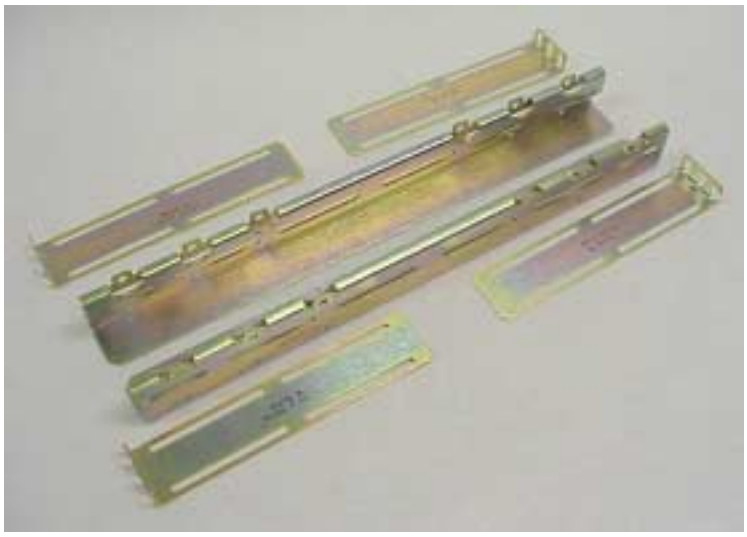

Figure A-12. 79094 Short Universal Rails (for Telco Racks)

Figure A-13. 43008 (Standard) Power Cord

Figure A-14. 43009 Power Cord

Figure A-15. 43014 3’ Power Cord or 43021 6’ Power Cord

Figure A-16. 75012 Terminator for HVD Applications

Figure A-17. 75036 Terminator for LVD Applications

Appendix B
Host Computer Installation/Drive Geometry

This appendix explains how to install an Excellerator on host computer systems operating under:

- HP UNIX (HPUX)
- Solaris

B.1 HP UNIX (HPUX) Installation

B.1.1 HP UNIX (HPUX) Hardware Installation

Differential Mode

The Excellerator with the Ultra/Wide differential controller works on the 28696A PB Host Adapter and 2969A HSC HP controller. The 28696A is a double high card that supports 15 peripherals and a 20 Mb/second burst speed. The LVD Excellerator models work with the A5149A and A5150A controllers. The maximum length of the external SCSI cable is 25 meters.

Follow the steps below to install the hardware:

1. Set the SCSI ID # on the Ultra/Wide controller card using rotary switch S2 next to the "B" port connector on the controller card. Each device must have its own distinct ID. SCSI ID "7" is reserved for the controller.
2. Connect a 68-pin P cable between the controller and the back of the Excellerator. The second back panel connector must be terminated with the appropriate HVD or LVD terminator.

B.1.2 Software Installation (HPUX Versions 10.X/11.X)

Boot HPUX

Boot HPUX and use `/etc/ioscan` to make sure the system sees the drive. Device special files should be created automatically.

```
ISL>HPUX
       :disc3(52.6.0;0)/hp-ux

       ..............................
       ..............................

:/>/etc/ioscan -fn

Class       I  H/W Path             Driver      S/W State   H/W Type    Description
===========================================================================================
bc          0                       root        CLAIMED     BUS_NEXUS
ba          0  0                    epic        CLAIMED     BUS_NEXUS    PCI Bus Bridge -
epic
ext_bus     0  0/0/0                c720        CLAIMED     INTERFACE    Ultra SCSI
target      0  0/0/0.0               tgt         CLAIMED     DEVICE
disk        0  0/0/0.0.0            sdisk       CLAIMED     DEVICE       DES     800
FAST/WIDE
                                   /dev/dsk/c0t0d0   /dev/rdsk/c0t0d0
target      1  0/0/0.7               tgt         CLAIMED     DEVICE
ctl         0  0/0/0.7.0            sctl        CLAIMED     DEVICE       Initiator
                                   /dev/rscsi/c0t7d0
lan         0  0/1/0                btlan6      CLAIMED     INTERFACE    PCI(10110019)
                                   /dev/diag/lan0  /dev/ether0     /dev/lan0
ba          1  1                    epic        CLAIMED     BUS_NEXUS    PCI Bus Bridge -
epic
ext_bus     1  1/0/0                c720        CLAIMED     INTERFACE    Ultra SCSI
target      2  1/0/0.1               tgt         CLAIMED     DEVICE
disk        1  1/0/0.1.0            sdisk       CLAIMED     DEVICE       DES     800
FAST/WIDE
                                   /dev/dsk/c1t1d0   /dev/rdsk/c1t1d0
target      3  1/0/0.7               tgt         CLAIMED     DEVICE
ctl         1  1/0/0.7.0            sctl        CLAIMED     DEVICE       Initiator
                                   /dev/rscsi/c1t7d0
.
.
.
.
#
```

If necessary, create the device special files as follows:

```
:/>insf -e
:/>
```

Read Drive Description

Use /etc/diskinfo to read back basic drive description:

```
   :/>/etc/diskinfo /dev/rdsk/c22t0d0
      SCSI describe of /dev/rdsk/c12t0d0

            vendor:  DES INC
        product id:  800 ULTRA/WIDE
              type:  direct access
              size:  523776 Kbytes
 bytes per sector:  512
```

Initialize the Drive

Initialize the drive using `/etc/mediainit`:

```
:/>mediainit -v /dev/rdsk/c22t0d0

       mediainit: Initialization process started
       mediainit: Locking disk3 device
       mediainit: Initializing media
:/>
```

NOTE: /etc/mediainit should take about 2 seconds to complete.

Create Physical Volume

Initialize the Solid State Disk for LVM

```
:/>pvcreate /dev/rdsk/c22t0d0
```

Create File System

Create the file system using `/etc/newfs:`

```
   :/>/etc/newfs -v /dev/rdsk/c22t0d0
/etc/mkfs -L /dev/rdsk/c22t0d0 2096640 64 8 8192 1024 16 10 60 2048
/dev/rdsk/c22t0d0:    2096640 sectors in 4095 cylinders of 8 tracks,
64 sectors
        2147.0Mb in 256 cyl` groups (16 c/g, 8.39Mb/g, 2048 i/g)
super-block backups (for fsck -b#) at:
16, 8272, 16528, 24784, 33040,
.....................
.....................
.....................
2048144, 2056400, 2064656, 2072912, 2081168, 2089424,
```

Create Mount Point and Mount Excellerator

```
:/>mkdir /RAMDSK
:/>mount /dev/dsk/c22t0d0 /RAMDSK
```

Check Mounted File Systems

```
   :/>bdf
  Filesystem       Kbytes   used  avail  capacity  mounted on
/dev/dsk/c4t0d0    506344     9   455200    0%      /RAMDSK


   :/>df
   /RAMDSK(/dev/dsk/c4t0d0    ):   911400 Blocks   131068 i-nodes
```

B.1.3 Changing Memory Configuration (HPUX)

This is a generalized procedure covering changing the memory configuration in the Models 600, 800, and 1000. Memory cards can be added or removed as required, to meet operational requirements, or in case of RAM card failure.

1. Backup all data on the EXCELLERATOR to the operating system. This can be done using a system utility such as dump, tar, or dd, or by using a utility built-in to a database. This step is important, and the procedure should not be continued unless a successful backup is done. The Solid State Disk will need to be re-initialized using pvcreate or mediainit following the upgrade procedure.

2. Stop the application currently accessing the solid state disk, or dismount it. This will prevent any application from attempting to change data on the solid state disk while it's offline.

3. If the EXCELLERATOR is under LVM control, it must be completely removed from the LVM configuration. This step may include reducing logical volumes, reducing mirrors, and removing the physical volume from the volume group. Since data reflecting the LVM configuration is stored on the physical volume, it's important that the device be removed from LVM control since the size of device will be changing.

4. Backup the data on the solid state disk to its internal backup drive by unlocking the front panel and pressing the SHUTDOWN (BACKUP) button. The internal backup operation will take approximately one minute for each 750 mb of installed RAM.

5. When the internal backup operation has completed, the host system should be shutdown. The solid state disk can then be turned off using the key switch on the rear panel.

6. Remove the front panel and install or remove RAM cards. Additional memory must be the same as what's currently installed. Ram cards of different sizes can not be mixed. Cards are installed from top to bottom in the Models 600 and 800. Memory cards must be contiguous. There should be no empty slots between RAM cards, or between the controller and the first RAM card.

7. Follow the procedure in Chapter 4 of the Excellerator Installation and Support Manual to run the Firmware Resident Diagnostics. This test will verify the new memory configuration and test the new RAM cards. The EXCELLERATOR should not be returned to on-line status unless the Firmware Resident test runs successfully. After the Firmware test has run, cycle power on the EXCELLERATOR and allow it to restore from its internal backup disk.

8. When the restore process has completed, the host system should be powered on and booted. Verify that the EXCELLERATOR is on-line by using ioscan.

```
#ioscan -fn
.
ext_bus     1  1/0/0              c720        CLAIMED     INTERFACE    Ultra Wide SCSI
target      2  1/0/0.1            tgt         CLAIMED     DEVICE
disk        1  1/0/0.1.0          sdisk       CLAIMED     DEVICE       DES     800S
FAST/WIDE
                            /dev/dsk/c1t1d0   /dev/rdsk/c1t1d0
.
```

9. Check the memory capacity of the EXCELLERATOR using diskinfo:

```
/>/etc/diskinfo /dev/rdsk/c1t1d0
       SCSI describe of /dev/rdsk/c1t1d0
              vendor:  DES INC
          product id:  800S FAST/WIDE
                type:  direct access
                size:  523776 Kbytes
     bytes per sector:  512
```

10. The IOtest program can be used to exercise the new memory configuration. Refer to the IOtest Users Manual for information on loading and running the IOtest program.

11. If the EXCELLERATOR was under LVM control, it must be re-configured using LVM commands or SAM. If not under LVM, re-initialize the EXCELLERATOR using mediainit, re-create the file system, and mount it. Data on the internal backup disk is not valid if the RAM configuration of the EXCELLERATOR has changed. Data must be restored to the EXCELLERATOR from the operating system. The backup to the internal drive done in step 4 is done in case the memory upgrade procedure is not completed, and the drive needs to be restored on-line in it's original configuration.

B.2 SUN Solaris Installation

This appendix explains how to install an Excellerator on a Solaris host computer system.

B.2.1 SUN (Solaris) Hardware Installation

1. Connect the SCSI cable between the controller on the SUN host and the back of the Excellerator. Check the setting of the AC VOLTAGE SELECT switch on the rear panel of the Excellerator. Apply AC power to the Excellerator, and turn on the MASTER DC POWER Switch on the rear panel. After the unit has completed its restore cycle, power on the SUN host. Do a "probe-scsi" or "probe-scsi-all" at the "OK" prompt to verify SCSI ID and cable connections. The "probe-scsi" will not report the Excellerator when it is in a "restore" or "save".

```
<#1> ok probe-scsi
/io-unit@f,e0200000/sbi@0,0/QLGC,isp@2,10000
Target 2
  Unit 0   Disk       DES     800 ULTRA\WIDE  SD02408332909345098092353
      00022255 825     844860      55f5965     844834
ok
```

B.2.2 SUN (Solaris) Software Installation

Boot Solaris

2. Boot Solaris by typing "boot -r" at the "ok" prompt. This will cause Solaris to re-configure the device special files for the new configuration.

Configuration Information

3. Configuration information is placed in /var/adm/messages as the system boots. Sample entries from messages.0 file...

```
Nov 11 10:42:03 DES unix: sd2 at esp0: target 2 lun 0
Nov 11 10:42:03 DES unix: sd2 is
/io-unit@f,e0200000/sbi@0,0/dma@0,81000/esp@0,80000/sd@2,0
Nov 11 10:42:03 DES unix: WARNING:
/io-unit@f,e0200000/sbi@0,0/dma@0,81000/esp@0,80000/sd@2,0 (sd2):
Nov 11 10:42:03 DES unix:  corrupt label - wrong magic number
Nov 11 10:42:03 DES unix:  Vendor 'DES', product '800', 261121 512 byte blocks
```

This is normal output for an un-formatted Excellerator.

Format Drive

4. Format the Excellerator. Log in as "root" and run "format" from the "#" prompt.

```
#
# format
```

```
Searching for disks...done
AVAILABLE DISK SELECTIONS:
       0. c0t0d0 <SUN1.05 cyl 2036 alt 2 hd 14 sec 72>
          /io-unit@f,e0200000/sbi@0,0/dma@0,81000/esp@0,80000/sd@0,0
       1. c0t1d0 <SUN1.05 cyl 2036 alt 2 hd 14 sec 72>
          /io-unit@f,e0200000/sbi@0,0/dma@0,81000/esp@0,80000/sd@1,0
       2. c0t2d0 <DES800-536MB cyl 254 alt 2 hd 8 sec 128>
          /io-unit@f,e0200000/sbi@0,0/dma@0,81000/esp@0,80000/sd@2,0
Specify disk (enter its number): 2
selecting c0t2d0
[disk formatted]

FORMAT MENU:
        disk       - select a disk
        type       - select (define) a disk type
        partition  - select (define) a partition table
        current    - describe the current disk
        format     - format and analyze the disk
        repair     - repair a defective sector
        label      - write label to the disk
        analyze    - surface analysis
        defect     - defect list management
        backup     - search for backup labels
        verify     - read and display labels
        save       - save new disk/partition definitions
        inquiry    - show vendor, product and revision
        volname    - set 8-character volume name
        quit
format> inquiry
Vendor:   DES
Product:  800 ULTRA/WIDE
Revision: SD43A
format> format
Ready to format.  Formatting cannot be interrupted.
Continue? yes
Beginning format. The current time is Mon Sept 20 16:55:29 1999

Formatting...
done

Verifying media...
        pass 0 - pattern = 0xc6dec6de
        253/7/96

        pass 1 - pattern = 0x6db6db6d
        253/7/96

Total of 0 defective blocks repaired.
format> partition

PARTITION MENU:
        0      - change `0' partition
        1      - change `1' partition
        2      - change `2' partition
        3      - change `3' partition
```

```
        4      - change `4' partition
        5      - change `5' partition
        6      - change `6' partition
        7      - change `7' partition
        select - select a predefined table
        modify - modify a predefined partition table
        name   - name the current table
        print  - display the current table
        label  - write partition map and label to the disk
        quit
partition> print
Current partition table (original):
Part      Tag    Flag     Cylinders      Size       Blocks
  0 unassigned    wm       0            0        (0/0/0)
  1 unassigned    wm       0            0        (0/0/0)
  2 unassigned    wm       0 - 253      536.00MB    (254/0/0)
  3 unassigned    wm       0            0        (0/0/0)
  4 unassigned    wm       0            0        (0/0/0)
  5 unassigned    wm       0            0        (0/0/0)
  6 unassigned    wm       0            0        (0/0/0)
  7 unassigned    wm       0            0        (0/0/0)

partition> label
Ready to label disk, continue? yes

partition> quit


FORMAT MENU:
        disk       - select a disk
        type       - select (define) a disk type
        partition  - select (define) a partition table
        current    - describe the current disk
        format     - format and analyze the disk
        repair     - repair a defective sector
        label      - write label to the disk
        analyze    - surface analysis
        defect     - defect list management
        backup     - search for backup labels
        verify     - read and display labels
        save       - save new disk/partition definitions
        inquiry    - show vendor, product and revision
        volname    - set 8-character volume name
        quit
format> label
Ready to label disk, continue? y

format> quit
#
```

View Volume Table

5. To view the volume table on the Excellerator:

```
# prtvtoc /dev/rdsk/c0t2d0s2
* /dev/rdsk/c0t2d0s2 partition map
*
* Dimensions:
*     512 bytes/sector
*     128 sectors/track
*       8 tracks/cylinder
*    1024 sectors/cylinder
*     255 cylinders
*     253 accessible cylinders
*
* Flags:
*   1: unmountable
*  10: read-only
*
*                          First     Sector    Last
* Partition  Tag  Flags    Sector     Count    Sector  Mount Directory
       0      2    00          0     32768     32767
       1      3    01      32768     32768     65535
       2      5    01          0    259072    259071
       6      4    00      65536    193536    259071
#
```

B.2.3 Changing Memory Configuration (SUN)

1. Backup all data on the EXCELLERATOR to the operating system. This can be done using a system utility such as dump, tar, or dd, or by using a utility built-in to a database. This step is important, and the procedure should not be continued unless a successful backup is done. The Solid State Disk will need to be re-initialized using pvcreate or mediainit following the upgrade procedure.

2. Stop the application currently accessing the solid state disk, or dismount it. This will prevent any application from attempting to change data on the solid state disk while it's offline.

3. If the EXCELLERATOR is under volume control, it must be completely removed from the volume configuration. This step may include reducing logical volumes, reducing mirrors, and removing the physical volume from the volume group.

4. Backup the data on the solid state disk to its internal backup drive by unlocking the front panel and pressing the SHUTDOWN (BACKUP) button. The internal backup operation will take approximately one minute for each 750 mb of installed RAM.

5. When the internal backup operation has completed, the host system should be shutdown. The solid state disk can then be turned off using the key switch on the rear panel.

6. Remove the front panel and install or remove RAM cards. Additional memory must be the same as what's currently installed. Ram cards of different sizes can not be mixed. Cards are installed from top to bottom in the Models 600 and 800. Memory cards must be contiguous. There should be no empty slots between RAM cards, or between the controller and the first RAM card.

7. Follow the procedure in Chapter 4 of the Excellerator Installation and Support Manual to run the Firmware Resident Diagnostics. This test will verify the new memory configuration and test the new RAM cards. The EXCELLERATOR should not be returned to on-line status unless the Firmware Resident test runs successfully. After the Firmware test has run, cycle power on the EXCELLERATOR and allow it to restore from its internal backup disk.

8. When the restore process has completed, the host system should be powered on. Verify that the EXCELLERATOR is on-line by using probe-scsi-all.

```
 ok probe-scsi-all
/io-unit@f,e0200000/sbi@0,0/QLGC,isp@2,10000
Target 2
  Unit 0   Disk       DES     800S FAST\WIDE  SD02408332909345098092353
       00022255 825     844860      55f5965     844834
ok
```

As the system boots, the driver will probe the EXCELLERATOR and report a "corrupt label - wrong magic number". This indicated that the EXCELLERATOR needs to be labeled using the format utility.

```
Nov 11 10:42:03 DES unix: sd2 at esp0: target 2 lun 0
Nov 11 10:42:03 DES unix: sd2 is
/io-unit@f,e0200000/sbi@0,0/dma@0,81000/esp@0,80000/sd@2,0
Nov 11 10:42:03 DES unix: WARNING:
/io-unit@f,e0200000/sbi@0,0/dma@0,81000/esp@0,80000/sd@2, (sd2):
Nov 11 10:42:03 DES unix:  corrupt label - wrong magic number
Nov 11 10:42:03 DES unix:  Vendor 'DES', product '800S', 261121 512 byte blocks
```

```
# format
Searching for disks...done
AVAILABLE DISK SELECTIONS:
       0. c0t0d0 <SUN1.05 cyl 2036 alt 2 hd 14 sec 72>
      /io-unit@f,e0200000/sbi@0,0/dma@0,81000/esp@0,80000/sd@0,0
       1. c0t1d0 <SUN1.05 cyl 2036 alt 2 hd 14 sec 72>
      /io-unit@f,e0200000/sbi@0,0/dma@0,81000/esp@0,80000/sd@1,0
       2. c0t2d0 <DES800-134MB cyl 254 alt 2 hd 8 sec 128>
      /io-unit@f,e0200000/sbi@0,0/dma@0,81000/esp@0,80000/sd@2,0
Specify disk (enter its number): 2
selecting c0t2d0
[disk formatted]
```

9. Verify the memory capacity of the EXCELLERATOR using the partition menu under format.

If the driver reports "corrupt label - bad geometry", refer to the following section “Description of “Bad Geometry” Problem”.

```
WARNING: /io-unit@f,e0200000/sbi@0,0/QLGC,isp@2,10000/sd@0,0 (sd7):
                corrupt label - bad geometry
               Label says 261121 blocks, Drive says 784384 blocks
```

10. The IOtest program can be used to exercise the new memory configuration. Refer to the IOtest Users Manual for information on loading and running the IOtest program.

11. If the EXCELLERATOR was under volume control, it must be re-configured. If not under volume control, re-initialize the EXCELLERATOR using format, re-create the file system, and mount it. Data on the internal backup disk is not valid if the RAM configuration of the EXCELLERATOR has changed. Data must be restored to the EXCELLERATOR from the operating system. The backup to the internal drive done in step 4 is done in case the memory upgrade procedure is not completed, and the drive needs to be restored on-line in it's original configuration.

B.2.4 Description of SUN OS v4.1.3 and Solaris v2.X "Bad Geometry" problem

When RAM cards are added to or removed from the Solid State Disk, a problem can occur when trying to re-format the unit. After the memory configuration has changed, and the unit has restored from the backup drive, information recorded in the volume label or VTOC will not accurately reflect the size of the unit. As the system boots, the driver will do a read capacity command to determine the unit size, and compare that to the VTOC or volume label. This problem will only occur if the internal backup drive in the Solid State Disk has been written since the Solid State Disk was formatted and partitioned.

When booting, you get a message similar to what follows:

WARNING: /io-unit@f,e0200000/sbi@0,0/QLGC,isp@2,10000/sd@0,0

(sd7):

corrupt label - bad geometry

Label says 261121 blocks, Drive says 784384 blocks

In this case, two 134MB RAM cards were added to a Solid State Disk that had been running with one 134Mb card.

When you re-format, the format program will read the partition table or VTOC information. The format program then does a "sanity check" by comparing the results of a read capacity command to the partition or VTOC info. If the numbers don't match, the drive will not format correctly. Although the actual "format" command will work, any attempt to read or the write the unit will fail.

To get around this issue.... After the system boots, write the first few blocks of the drive with zeros to wipe out the partition or VTOC info. Double check the device name before doing the "dd"!

#dd if=/dev/zero of=/dev/rdsk/cXtXdXs0 count=2

1+0 records in

1+0 records out

Re-boot the host. Do not cycle power on the Solid State Disk! You will get a "corrupt label - wrong magic number" message as the driver starts:

/io-unit@f,e0200000/sbi@0,0/dma@0,81000/esp@0,80000/sd@2,0 (sd2):
Nov 11 10:42:03 DES unix: corrupt label - wrong magic number
Nov 11 10:42:03 DES unix: Vendor 'DES', product '800S', 784384 512 byte blocks

This is a normal message for a unit that is not formatted. When the system is up, run /etc/format. After the drive has been correctly formatted and the partition information written, it is important to press the BACKUP (SHUTDOWN) button on the Solid State Disk front panel. This will cause the new format and partition information currently in Solid State Disk memory to be written to the backup drive.

NOTE: When the Solid State Disk is doing an internal backup, it is off-line to the host.

After the BACKUP operation is complete, the partition and format information on the internal backup drive will match that in Solid State Disk memory.

B.3. Drive Geometry

Table B-1. Drive Geometry Based on 512 Byte/sectors

# 134's	# 268's	# 536's	# 1GB's	#2GB's	# Sectors	# Tracks	# Cylinders	Blocks	MB's
1					128	8	255	261120	134
2	1				128	8	511	523264	268
3					128	8	767	785408	402
4	2	1			128	8	1023	1047552	536
5					128	8	1279	1309696	671
6	3				128	8	1535	1571840	805
7					128	8	1791	1833984	939
8	4	2	1		128	8	2047	2096128	1073
9					128	8	2303	2358272	1207
10	5				128	8	2559	2620416	1342
11					128	8	2815	2882560	1476
12	6	3			128	8	3071	3144704	1610
13					128	8	3327	3406848	1744
14	7				128	8	3583	3668992	1879
15					128	8	3839	3931136	2013
16	8	4	2	1	128	8	4095	4193280	2147
	9				128	8	4607	4717568	2415
	10	5			128	8	5119	5241856	2684
	11				128	8	5631	5766144	2952
	12	6	3		128	8	6143	6290432	3221
	13				128	8	6655	6814720	3489
	14	7			128	8	7167	7339008	3758
	15				128	8	7679	7863296	4026
	16	8	4	2	128	8	8191	8387584	4294
		9			128	8	9215	9436160	4831
		10	5		128	8	10239	10484736	5368
		11			128	8	11263	11533312	5905
		12	6	3	128	8	12287	12581888	6442
		13			128	8	13311	13630464	6979
		14	7		128	8	14335	14679040	7516
		15			128	8	15359	15727616	8053
		16	8	4	128	8	16383	16776192	8589
			9		128	8	18431	18873344	9663
			10	5	128	8	20479	20970496	10737
			11		128	8	22527	23067648	11811
			12	6	128	8	24575	25164800	12884
			13		128	8	26623	27261952	13958
			14	7	128	8	28671	29359104	15032
			15		128	8	30719	31456256	16106
			16	8	128	8	32767	33553408	17179
				9	128	8	36863	37747712	19327
				10	128	8	40959	41942016	21474
				11	128	8	45055	46136320	23622
				12	128	8	49151	50330624	25769
				13	128	8	53247	54524928	27917
				14	128	8	57343	58719232	30064
				15	128	8	61436	62913536	32212
				16	128	8	65535	67107840	34359

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