AT&T 3B2 Computer

SCSI Release 3

Release Notes

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Issue 2

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Preface

The Small Computer System Interface (SCSI) is an industry standard interface for connecting host computers and intelligent peripherals. AT&T 3B2 computers support this interface.

A wide variety of SCSI-based peripherals are already available for 3B2 computers. A new SCSI-based peripheral is being introduced to the line of available 3B2 SCSI products; the AT&T Rewritable Optical Disk Drive.

These *Release Notes* contain information about the SCSI Release 3 products—information that supplements existing SCSI documentation. This document is intended for administrators, as well as users, of SCSI-based peripherals.

The first part of the *Release Notes* describes the new SCSI-based peripheral and the utilities that support the SCSI feature. The second part of the document identifies problems that you may encounter when using a SCSI device and suggests solutions to the problems.

SCSI-based products can be added to any Version 2 or Version 3 computer that is operating with UNIX® System V Release 2.0.5, Release 3.0, or a later release. (Version 2 computers are the 3B2/300, 3B2/310, and 3B2/400; Version 3 computers are the 3B2/500, 3B2/600, 3B2/700, and 3B2/1000 series.) Instructions for installing the SCSI feature and/or any SCSI-based peripheral are covered in the *AT&T 3B2 Computer SCSI Installation Manual.* Information on the administration and operation of the SCSI-based peripherals is found in the *AT&T 3B2 Computer SCSI Operations Manual.*

SCSI Release 3—New Products

The SCSI Rewritable Optical Disk Drive is being introduced as an add-on product to SCSI Release 3. The SCSI Rewritable Optical Disk is a mass storage SCSI device which provides 588 megabytes of removable storage and the same features and functionality as either the 3B2 SCSI hard disks or 3B2 removable media disks, depending on how it is formatted.

A 600-megabyte hard disk drive is also being added to the list of products for SCSI Release 3. This hard disk is similar to the previous hard disk drives except for the increased storage space.

Other SCSI Products

The following products introduced with earlier SCSI releases are still available and are fully compatible with SCSI Release 3.0:

- Single-ended Host Adapter card—A feature card that provides the 3B2 computer with a single-ended interface to the SCSI bus. It can be installed in all versions of 3B2 computers.
- Differential Host Adapter card—A feature card that provides the 3B2 computer with a differential interface to the SCSI bus. Some of its advantages over the single-ended interface are: increased cable lengths (up to 25 meters), improved resistance to electrical noise, and faster data transfer rates (up to 4 megabytes per second).
- DCM/4E—The Disk Controller Module bridges the SCSI interface presented by the Host Adapter and the Enhanced Small Disk Interface (ESDI) of the disk drives.
- DM/147E—An ESDI disk drive that provides 147 megabytes of storage.
- DM/300E—An ESDI disk drive that provides 300 megabytes of storage.
- XM/900S—This Expansion Module houses three 300-megabyte ESDI disk drives and a bridge controller.
- TM/60S—A cartridge tape drive that can store 60 megabytes of data on a removable cartridge tape.
- TM/120S—A larger capacity cartridge tape drive that can store up to 120 megabytes of data on a removable cartridge tape.
- 1600-BPI 9-Track Tape Drive—A 9-track tape drive capable of reading and writing 1600-BPI data density reel tapes. Tapes written on this tape drive can store up to 40 megabytes of data.
- Autoload 9-Track Tape Drive—A moderately sized tape drive that can be set on a table or desk top. The autoloading feature automatically threads the tape onto the takeup reel and positions it at the beginning of the tape. The tape drive is available in either single-ended interface or differential interface. It can be operated in a 1600-BPI mode or a 6250-BPI mode.

- Embedded SCSI Controller Disk Drive—The disk drives made available with SCSI Release 3.0 have embedded SCSI controllers, thus eliminating the need for a physically separate bridge controller.
- Peripheral Power Control Unit (PPCU)—A power control unit that provides the power control signals for powering up peripherals that are shared by several computers. With a PPCU, one or more computers can be powered down and the shared peripheral will stay powered up.

Conventions

Typesetting Conventions

The following typesetting conventions are followed when describing command names, command line formats, files, and directory names:

- Enter words that are in **bold** type exactly as they appear.
- Words in *italics* are variables; substitute the appropriate values. These values may be file names or data values.
- Screen displays and examples of source code are presented in `constant-width` font.
- Characters or words in square brackets, [ ], are optional. (Do not type the brackets.)

Naming Conventions for SCSI Device Files

The naming convention for non-SCSI device files has the following form:

/dev/rdsk/c#d#s#

where:

c# = Controller designator
d# = Device designator
s# = Section or partition on the device.

The device file name for SCSI devices is very similar; however, another designator is added, **t#**. SCSI device files have the following form:

/dev/rdsk/c#t#d#s#

The **t#** designator identifies the target controller for the SCSI device.

The device file names for each SCSI-based peripheral are as follows:

SCSI Disk Drives

The device file name for a SCSI disk drive (hard disk or optical disk) has the following form:

/dev/dsk/c#t#d#s#

or

/dev/rdsk/c#t#d#s#

where:

c# = Slot number for Host Adapter
t# = Target controller SCSI ID
d# = Disk drive logical unit ID
s# = Partition number.

SCSI 9-Track Tape Drives

The device file name for a SCSI 9-Track Tape Drive has the following form:

/dev/mt/c#t#d0&n

or

/dev/rmt/c#t#d0&n

where:

c# = Slot number for Host Adapter
t# = Target controller SCSI ID
d0 = Logical unit number
& = m, h (tape density, medium or high)
n = No rewind (optional).

SCSI Cartridge Tape Drives

The device file name for a SCSI cartridge tape drive has the following form:

/dev/rmt/c#t#d0s#n

where:

c# = Slot number for Host Adapter
t# = Target controller SCSI ID
d0 = Logical unit number
s# = s0 for 60 MB, s1 for 120 MB
n = No rewind (optional).

Utilities Description

The complete SCSI software package consists of the following floppy disks:

AT&T 3B2 Extended Core Upgrade Utilities
AT&T 3B2 SCSI Host Adapter Utilities Release 3.0
AT&T 3B2 SCSI Disk Controller Utilities Release 3.0
AT&T 3B2 SCSI Cartridge Tape Utilities Release 3.0
AT&T 3B2 SCSI 9-Track Tape Utilities Release 3.0
AT&T 3B2 SCSI Rewritable Optical Disk Utilities Release 1.0.

Version 3 computers are delivered with the capability of supporting SCSI devices. Version 2 computers (with the exception of some 3B2/400 computers) require the installation of a Host Adapter card, the Extended Core Upgrade Utilities, and the Host Adapter Utilities before they can support SCSI devices.

The other utilities in the SCSI software package are installed to support a particular SCSI-based peripheral. For example, if you add a SCSI Cartridge Tape Module, you need to install the SCSI Cartridge Tape Utilities. Each SCSI peripheral package contains the software utility package (or packages) required to support that peripheral.

The following paragraphs describe each of the utilities and also identify dependencies, that is, other utilities that must be installed before the package can be installed.

Extended Core Upgrade Utilities

The Extended Core Upgrade Utilities add components to the UNIX operating system that are required to support SCSI-based peripherals. The major components of the Extended Core Upgrade Utilities are self-configuration enhancements and enhanced system administration.

Self-configuration allows a user to install new hardware and software on a 3B2 computer without having to manually rebuild the UNIX operating system with the necessary device drivers. Self-configuration determines what type of hardware has been added in the Input/Output (I/O) slots and then generates a new "unix" that contains the appropriate device drivers required to interface the hardware to the UNIX operating system kernel.

Enhanced system administration makes the changes to the system administration menus that are required to support the new SCSI devices.

Dependencies: System Administration Utilities.

SCSI Host Adapter Utilities Release 3.0

The SCSI Host Adapter Utilities install a driver that creates and maintains a communication path between the UNIX system kernel and the 3B2 SCSI Host Adapter card.

Dependencies: Extended Core Upgrade Utilities (only on Version 2 computers).

SCSI Disk Controller Utilities Release 3.0

The SCSI Disk Controller Utilities are required when adding a Disk Controller Module or SCSI Expansion Module to the SCSI bus. This utility package provides the mechanism for communicating between the 3B2 computer and the specific Disk Controller Module or the SCSI Expansion Modules connected on the SCSI bus.

Dependencies: SCSI Host Adapter Utilities Release 3.0.

SCSI Cartridge Tape Utilities Release 3.0

The SCSI Cartridge Tape Utilities are required when adding a SCSI Cartridge Tape Module to the SCSI bus. This utility package provides the specific functions required by the SCSI Cartridge Tape Module and integrated SCSI controller. The SCSI Cartridge Tape Utilities provide the mechanism for communicating between the 3B2 computer and the specific SCSI Cartridge Tape Module.

Dependencies: SCSI Host Adapter Utilities Release 3.0.

SCSI 9-Track Tape Utilities Release 3.0

The SCSI 9-Track Tape Utilities are required when adding a SCSI 9-Track Tape Drive to the SCSI bus. This utility package provides the unique functions required by the tape drive and the integrated SCSI controller. The SCSI 9-Track Tape Utilities provide the mechanism for communications between the 3B2 computer and the specific 9-track tape drive connected on the SCSI bus.

Dependencies: SCSI Host Adapter Utilities Release 3.0.

SCSI Rewritable Optical Disk Utilities Release 1.0

The SCSI Rewritable Optical Disk Utilities are required when adding a Rewritable Optical Disk Module to the SCSI bus. This utility package provides the mechanism for communicating between the 3B2 computer and the SCSI Rewritable Optical Disk Module.

Dependencies: SCSI Host Adapter Utilities Release 3.0.

Contents of SCSI Utilities

Extended Core Upgrade Utilities

The Extended Core Upgrade Utilities are on one floppy disk. The release of the UNIX operating system on your computer dictates which files will be installed from this floppy. If you are installing the utility package on a computer operating with Release 2.0.5 or 3.0, all the files listed below are installed. If you are installing the utility package on Release 3.1, the files marked with an asterisk (*) or a dagger (†) are installed. If you are installing the utility package on a release later than Release 3.1, only those files marked with a dagger (†) are installed.

/usr/lbin/selpattern
/usr/lbin/selectdevice
/usr/admin/menu/diskmgmt/harddisk/display
/usr/admin/menu/diskmgmt/harddisk/rmdisk
/etc/savecpio
/etc/fltboot

/filledt*
/etc/drvinstall*
/etc/edittbl*
/etc/fmthard*
/etc/format*
/etc/getmajor*
/etc/gettype*
/etc/hdefix*
/etc/mkboot*
/etc/prtconf*
/etc/prtvtoc*
/lib/lboot*
/lib/olboot*
/usr/bin/dsconfig*
/usr/include/sys/boothdr.h*
/usr/include/sys/edt.h*
/usr/include/sys/extbus.h*

/usr/include/sys/libxedt.h*
/usr/include/sys/vtoc.h*
/usr/lbin/vmkfs*
/usr/options/ecu.name*

/boot/pdi_†
/etc/master.d/pdi_†
/usr/include/sys/pdi.h†
/usr/admin/menu/diskmgmt/harddisk/format†
/usr/admin/menu/diskmgmt/harddisk/format.d/disk†
/usr/admin/menu/filemgmt/backup.d/9track†
/usr/admin/menu/filemgmt/hsbackup†
/usr/admin/menu/filemgmt/hsbackup.d/9track†
/usr/admin/menu/filemgmt/hsbackup.d/disk†
/usr/admin/menu/filemgmt/hsrestore†
/usr/admin/menu/filemgmt/hsrestore.d/disk†
/usr/admin/menu/filemgmt/hsrestore.d/9track†
/usr/admin/menu/filemgmt/restore.d/9track†
/usr/admin/menu/filemgmt/store.d/9track†
/usr/admin/menu/tapemgmt/DESC†
/usr/admin/menu/tapemgmt/rmtape†
/usr/admin/menu/tapemgmt/rmtape.d/9track†
/usr/lib/scsi/labelfsname†
/usr/lib/scsi/selectscsi†

SCSI Host Adapter Utilities Release 3.0

The SCSI Host Adapter Utilities are on one floppy disk. The files that are installed depend on the release of the UNIX operating system on the computer to which the utility package is being added. If you are installing the utility package on a Version 2 computer, the files listed below marked with an asterisk (*) are not installed. These files are only installed on computers operating with Release 3.2.1.

Other files that are conditionally installed are */bin/cpio* and */etc/volcopy*. The */bin/cpio* file is not installed on Release 3.1 or any later releases; */etc/volcopy* is not installed on any releases later than Release 3.1.

/bin/cpio
/boot/scsi
/boot/sh00
/dev/scsi
/dgn/SCSI
/dgn/X.SCSI
/edt/SCSI/edtgen
/etc/init.d/lock*
/etc/init.d/unlock*
/etc/master.d/scsi
/etc/master.d/sh00
/etc/prtconf.d/scsi
/etc/scsi/edittbl
/etc/scsi/haversion
/etc/scsi/mkdev
/etc/scsi/mkdev.d/9track1
/etc/scsi/mkdev.d/disk1
/etc/scsi/mkdev.d/host1
/etc/scsi/mkdev.d/qtape1
/etc/scsi/rc.scsi
/etc/scsi/sbusclr*
/etc/scsi/sdevlock*
/etc/scsi/tc.index
/etc/volcopy

/lib/pump/scsi1
/lib/pump/scsi2
/usr/admin/menu/diskmgmt/sharedmgmt/DESC*
/usr/admin/menu/diskmgmt/sharedmgmt/lock*
/usr/admin/menu/diskmgmt/sharedmgmt/lock.d/disk*
/usr/admin/menu/diskmgmt/sharedmgmt/lockdisp*
/usr/admin/menu/diskmgmt/sharedmgmt/reset*
/usr/admin/menu/diskmgmt/sharedmgmt/reset.d/disk*
/usr/admin/menu/diskmgmt/sharedmgmt/unlock*
/usr/admin/menu/diskmgmt/sharedmgmt/unlock.d/disk*
/usr/include/sys/scsi.h
/usr/include/sys/scsi_edt.h
/usr/include/sys/sdi.h
/usr/lib/scsi/format
/usr/lib/scsi/format.d/DISK
/usr/lib/scsi/hdefix
/usr/lib/scsi/sd00.0
/usr/lib/scsi/tc.index
/usr/options/scsi.name

SCSI Disk Controller Utilities Release 3.0

The SCSI Disk Controller Utilities are on the same floppy disk as the SCSI Disk Mirroring Utilities. The files in the SCSI Disk Controller Utilities are listed below. Only two files are conditionally installed, and they are marked with an asterisk (*). The **/etc/mountall** command is only installed on Releases 2.0.5, 3.0, or 3.1. The **/usr/lib/scsi/scsivolcopy** command is installed only if it is NOT previously installed, or if the ST00 or ST01 package is earlier than Release 3.0. All the other files are installed regardless of the release of the operating system.

/boot/sd01
/etc/master.d/sd01
/etc/mountall*
/usr/admin/menu/filemgmt/hsbackup.d/disk
/usr/lib/scsi/scsivolcopy*
/usr/lib/scsi/sd01.1
/usr/lib/scsi/sd01.2
/usr/options/sd01.name

SCSI Disk Mirroring Utilities Release 1.0

The SCSI Disk Mirroring Utilities are on the same floppy disk as the SCSI Disk Controller Utilities. These utilities can only be installed on computers operating with UNIX System Release 3.2 or a later release. The files in the SCSI Disk Mirroring Utilities are listed below:

/boot/mirror
/etc/init.d/mirdisk
/etc/master.d/mirror
/etc/rc2.d/S80restore
/etc/scsi/mirrestore
/etc/scsi/mirror
/etc/scsi/mverify
/etc/scsi/setmirror
/etc/scsi/umirror
/usr/admin/menu/disk/mgmt/mirrormgmt/mirverify
/usr/admin/menu/diskmgmt/mirrormgmt/DESC
/usr/admin/menu/diskmgmt/mirrormgmt/mirdisp
/usr/admin/menu/diskmgmt/mirrormgmt/mirpartition
/usr/admin/menu/diskmgmt/mirrormgmt/mirpartition.d/disk
/usr/admin/menu/diskmgmt/mirrormgmt/mirremove
/usr/admin/menu/diskmgmt/mirrormgmt/mirrestore
/usr/admin/menu/diskmgmt/mirrormgmt/mirror
/usr/admin/menu/diskmgmt/mirrormgmt/mirror.d/disk
/usr/admin/menu/diskmgmt/mirrormgmt/mirsetup
/usr/admin/menu/diskmgmt/mirrormgmt/rootremove
/usr/admin/menu/diskmgmt/mirrormgmt/rootsetup
/usr/admin/menu/diskmgmt/mirrormgmt/unmirror
/usr/lbin/findparts
/usr/lib/scsi/findmir
/usr/options/mirror.name

Additional files may also be installed. The installation program checks for the */etc/scsi/mirlist* file.

If this file is already installed, the installed version is compared with the version included in this utility package. If this installed version is populated (not empty), the utility package version will not be installed.

SCSI Cartridge Tape Utilities Release 3.0

The SCSI Cartridge Tape Utilities are on one floppy disk. The files installed from that floppy are listed below:

/boot/st01
/etc/master.d/st01
/etc/scsi/compress
/etc/scsi/compress.d/qtape
/etc/scsi/mkdev.d/qtape1
/etc/scsi/mkdev.d/qtape2
/usr/admin/menu/filemgmt/backup.d/qtape
/usr/admin/menu/filemgmt/hsbackup.d/qtape
/usr/admin/menu/filemgmt/hsrestore.d/qtape
/usr/admin/menu/filemgmt/restore.d/qtape
/usr/admin/menu/filemgmt/store.d/qtape
/usr/admin/menu/tapemgmt/DESC
/usr/admin/menu/tapemgmt/compress
/usr/admin/menu/tapemgmt/compress.d/qtape
/usr/admin/menu/tapemgmt/rmtape.d/qtape
/usr/include/sys/st01_ioctl.h
/usr/lib/scsi/scsivolcopy
/usr/lib/scsi/scsivolcopy.d/qtape
/usr/lib/scsi/tapecntl
/usr/lib/scsi/tapecntl.d/qtape
/usr/options/st01.name

Additional files may also be installed. The installation program checks for the following files:

/usr/admin/menu/filemgmt/hsrestore
/etc/finc
/etc/frec

If these files are already installed, the installed versions are compared with the versions included in this utility package. If this utility package contains newer versions, the installed files will be overwritten.

SCSI 9-Track Tape Utilities Release 3.0

The SCSI 9-Track Tape Utilities are on one floppy disk. The files installed from that floppy are listed below:

/boot/st00
/etc/master.d/st00
/etc/scsi/compress
/etc/scsi/compress.d/9track
/etc/scsi/mkdev.d/9track1
/etc/scsi/mkdev.d/9track2
/usr/admin/menu/filemgmt/backup.d/9track
/usr/admin/menu/filemgmt/hsbackup.d/9track
/usr/admin/menu/filemgmt/hsrestore.d/9track
/usr/admin/menu/filemgmt/restore.d/9track
/usr/admin/menu/filemgmt/store.d/9track
/usr/admin/menu/softwaremgmt/installpkg.d/9track
/usr/admin/menu/softwaremgmt/removepkg.d/9track
/usr/admin/menu/tapemgmt/DESC
/usr/admin/menu/tapemgmt/compress
/usr/admin/menu/tapemgmt/compress.d/9track
/usr/admin/menu/tapemgmt/rmtape.d/9track
/usr/include/sys/st00_ioctl.h
/usr/lib/scsi/scsivolcopy
/usr/lib/scsi/scsivolcopy.d/9track
/usr/lib/scsi/tapecntl
/usr/lib/scsi/tapecntl.d/9track
/usr/options/st00.name

Additional files may also be installed. The installation program checks for the following files:

/usr/admin/menu/filemgmt/hsrestore
/etc/finc
/etc/frec
/etc/ff
/etc/tar

If these files are already installed, the installed versions are compared with the versions included in this utility package. If this utility package contains newer versions, the installed files will be overwritten.

SCSI Rewritable Optical Disk Utilities

The SCSI Rewritable Optical Disk Utilities are on one floppy disk. The files that are installed depend on the release of the UNIX operating system on the computer to which the utility package is being added. If you are installing the utility package on a Version 2 computer, or a computer operating with a release earlier than Release 3.2.1 (that is, 2.0.5, 3.0, etc.), the files listed below marked with an asterisk (*) are not installed. These files are only installed on computers operating with Release 3.2.1.

The */dgn/SCSI* and */dgn/X.SCSI* files are installed on any computer with SCSI Host Adapter Utilities Release 3.0 or earlier.

/boot/so00
/dgn/SCSI
/dgn/X.SCSI
/etc/master.d/so00
/etc/scsi/mkdev.d/odisk1
/usr/options/so00.name
/usr/lib/scsi/format.d/ODISK
/usr/lib/scsi/so00.0
/usr/lib/scsi/scsivolcopy.d/odisk
/usr/lib/scsi/optcntl
/usr/admin/menu/diskmgmt/checkfsys.d/odisk
/usr/admin/checkfsys.d/odisk
/usr/admin/menu/diskmgmt/erase.d/odisk
/usr/admin/menu/diskmgmt/format.d/odisk
/usr/admin/menu/diskmgmt/makefsys.d/odisk
/usr/admin/makefsys.d/odisk
/usr/admin/menu/diskmgmt/mountfsys.d/odisk
/usr/admin/mountfsys.d/odisk
/usr/admin/menu/diskmgmt/sharedmgmt/lock.d/odisk*
/usr/admin/menu/diskmgmt/sharedmgmt/reset.d/odisk*
/usr/admin/menu/diskmgmt/sharedmgmt/unlock.d/odisk*
/usr/admin/menu/diskmgmt/umountfsys.d/odisk
/usr/admin/umountfsys.d/odisk

/usr/admin/menu/diskmgmt/harddisk/display.d/odisk
/usr/admin/menu/diskmgmt/harddisk/format.d/odisk
/usr/admin/menu/diskmgmt/harddisk/partitioning.d/odisk
/usr/admin/menu/diskmgmt/harddisk/rmdisk.d/odisk
/usr/admin/menu/filemgmt/hsbackup.d/odisk
/usr/admin/menu/filemgmt/hsrestore.d/odisk
/usr/admin/menu/filemgmt/backup.d/odisk
/usr/admin/menu/filemgmt/restore.d/odisk
/usr/admin/menu/filemgmt/store.d/odisk
/usr/admin/menu/softwaremgmt/installpkg.d/odisk
/usr/admin/menu/softwaremgmt/removepkg.d/odisk
/usr/admin/menu/softwaremgmt/runpkg.d/odisk
/usr/include/sys/so00_ioctl.h

- **Note:** The shared management (**sharedmgmt**) function is not supported on a single-ended optical device. See the *AT&T 3B2 Computer SCSI Operations Manual* for more details.

Using SCSI Hard Disks

Formatting Remote Hard Disks

The optional Remote File Sharing package allows you to share files and directories with other computers on your network. Only those files that are "advertised," however, can be shared. If a SCSI raw disk device name is advertised, it is possible for a super user to invoke the **format** command to format a SCSI hard disk on a remote computer. Since no check is made to determine whether the remote device has a mounted file system, there is a possibility of losing data and a possible panic on the remote computer. To prevent this from happening, use only remote command execution or login to the other host to format remote hard disks.

Repartitioning More Than One Disk

When a SCSI device is added to the SCSI bus, system administration assigns a name to the device; for example, **disk1**, **odisk1**, **qtape1**, or **9track1**. The *3B2 Computer SCSI Installation Manual* directs you to place the number that system administration assigns to the device on the front of the cabinet. If you have several hard disks and remove some of them for repartitioning, system administration may not assign the same names to the disks when the system is rebooted. Therefore, if you repartition more than one disk at a time, pay close attention to the names that system administration assigns. If the names were changed, be sure to change the system administration ID labels on the front of the cabinets. Also, add the new names to the Configuration Chart in the *3B2 Computer SCSI Installation Manual.*

Using SCSI Tape Drives

Improving Performance When Copying Files to SCSI Tape Drives

The time required to copy files to a 9-track tape or cartridge tape can be improved by using the following options with the **tar**, **cpio**, and **dd** commands:

tar — Use the **b** option and specify a raw device name.

cpio — Use the **B** option and specify a raw device name. Also, for computers running operating system Release 3.2 or later, use the **-C 65536** option for cartridge tape or the **-C 32768** option for 9-track tape.

Note: For a cartridge tape, smaller block sizes can cause excessive tape repositioning resulting in an inability to read data from the tape.

dd — Use the **bs** option, set the block size equal to 32 kilobytes (32,768 bytes) for "9track" and 64 kilobytes (65,536 bytes) for "qtape," and specify a raw device name.

Reading From a Raw Tape Device (fread and read)

Using the C library function **fread**(3S) to read from a raw device may cause data errors.

The **fread**(3S) library function uses a default block size of 1024 bytes. If **fread(3S)** is used to read a raw I/O device which supports block sizes other than 1024 bytes (such as a 9-track tape written in 65,536 byte blocks), **fread**(3S) will not return the expected data. (This is a consequence of the way **fread**(3S) buffers its data.)

The **setvbuf**(3S) function is intended to be used to change the size of the buffer used by **fread**(3S). These functions, however, do not work correctly for raw devices, and their use may result in the loss of data. This can occur any time that the **setvbuf**(3S) function is used.

To prevent the loss of data, use **read**(2) instead of **fread**(3S) to recover data written to the raw device. The **fread**(3S) function, with default buffering, may be used if the device being read was written in 1024-byte blocks. Do NOT use the **setvbuf**(3S) function since this function can cause data loss.

Permission Bits on Tape Device Files

The permission bits on tape device files are set to 666 by default; that is, all users have read and write permission. To prevent an unauthorized user from writing to a tape left in or on a tape drive, make sure the write protection media is in place, or change the permission bits on the tape device file.

Access Mode for SCSI Tape Drives

SCSI cartridge tape drives are only accessible in raw mode. The 9-track tape drives can be accessed in either raw mode or block mode, however, for the best performance and more efficient use of the tape, it is recommended that the tape drives only be accessed in raw mode.

Using Multiple Tapes for Backups

The commands **sysadm backup** and **sysadm hsbackup** (commands from the System Administration Menu) will span across multiple tapes. The **cpio** or the **volcopy** command will also span across multiple tapes if you specify a raw device; for example, */dev/rmt/c1t7d0m*. The **finc** and **tar** commands, however, do not span across multiple tapes.

Tape Drive Data Transfer Block Sizes

The maximum block size for transferring data to or from any SCSI tape drive is 64 kilobytes. Recommended block sizes are 64 kilobytes for cartridge tape drives and 32 kilobytes for 9-track tape drives.

Reading Different Density 9-Track Tapes

SCSI Release 3.0 offers a 9-track tape drive that allows you to write tapes at either medium density (1600 BPI) or high density (6250 BPI). Since tapes can be written at different densities, a feature of this tape drive is the ability to detect the density at which a tape was written and, if necessary, automatically change to the correct read mode. For example, if you write a tape at 1600 BPI and try to read it at 6250 BPI, the drive recognizes the disparity, makes the mode change, and reads the tape. This automatic mode selection, however, is only made when the tape is completely rewound and at the Beginning of Tape (BOT).

Attempts to read a tape that is not at BOT will fail if the correct density is not selected. For this reason, it is a good idea to label tapes after you write them so you know the density to select when you want to read a tape.

Electrostatic Discharge Problems With SCSI Cartridge Tapes

SCSI cartridge tape drives are more sensitive to Electrostatic Discharge (ESD) than other 3B2 computer storage devices, including Cartridge Tape Controller (CTC) tape drives. Error messages, similar to the following two error messages, may result from ESD interference:

```
HA FW WARNING: Select failed for qtape

HA FW WARNING: Received a SCSI bus reset
```

The first message (`Select failed for qtape`) indicates that the cartridge tape target controller is no longer operating normally. To clear the problem, run SCSI diagnostic Phase 17. This will reset the SCSI bus, forcing the controller back to a normal operating state.

The second message (`Received a SCSI bus reset`) informs you that the controller reset itself. After the reset, the controller may have regained operational status with the only impact being the failure of some "qtape" jobs. To see if the problem has been cleared, retry the failed "qtape" jobs.

Relative humidity outside the AT&T specified limits is a probable cause of ESD problems. Determine if the relative humidity in the computer environment is within limits (20% to 80%); if it is not, adjust the humidity.

Loading Tapes in Autoload 9-Track Tape Drive

After inserting a tape in an autoload 9-track tape drive, do not attempt to access the tape drive until BOT appears on the display panel. Normal commands or attempts to access the tape drive while the tape is loading, that is, before BOT is located, will fail or be denied.

Multiple Save Set Backups

If a Multiple Save Set (MSS) incremental backup or store operation is attempted to a non-MSS cartridge (any cartridge tape not written with MSS software), a message similar to the following is displayed:

```
ERROR: Unable to read the tape in the qtapel drive.
Check the drive and tape before trying again.
```

This message does not clearly define the problem and may lead you to think you have a cartridge tape drive or tape problem. To avoid using the wrong tape, get in the habit of labeling tapes after doing backups. Place a label on the tape that identifies it as a standard backup or an MSS backup.

MSS Restore

If the **list** option of MSS is selected, the user is prompted to make another selection at the end of that list. Because of the limitations of the cartridge tape drive, it is impossible to back up and restore the files that were just displayed. Do not select the **restore** option immediately after the **list** option if trying to **restore** the same save set that was listed. Instead, rewind the tape and select the **restore** option for the desired save set.

Using SCSI Rewritable Optical Disks

Improving Performance When Copying Files to Optical Devices

The time required to copy files to an optical device can be improved by using the optimum block sizes with the following options for the **cpio**, **dd**, and **volcopy** commands. The numbers used with these options are for buffering 128-kilobyte blocks.

cpio — Use the **-C 131072** option and specify a raw device name.

dd — Use the **bs=128k** option and specify a raw device name.

volcopy — Use the **-block256** option and specify a raw device name.

Permission Bits on Optical Device Files

The optical device permissions for partition 6 are set to 666 by default. This provides all users with access to the medium (read and write permission) when the medium contains an optical disk layout. To protect your data, write protect the medium for reading (see the *AT&T 3B2 SCSI Operations Manual* for more information) and/or change the permissions on the device nodes to meet your needs.

Warning Messages Are Generated When Erased Media Is Used

Some vendors may package media that has been formatted and erased. When formatting previously erased media for the first time, the following messages are displayed. These messages can be ignored.

```
WARNING: unreadable ECC hard disk error: maj/min=119/6
     block # = 0

WARNING: SOOO: I/O error. SLOT 6, TC 6, Unit=0, Err: 6ED0E001
```

/etc/format Command Does Not Recognize Optical Disk Options

The **-e** and **-x** options, for use with the optical disk, are not recognized by the **/etc/format** command. Use either the **sysadm format** command or the **/usr/lib/scsi/format** command when using the **-e** or **-x** options. See the **format**(1M) manual page for more information.

/etc/prtvtoc and sysadm display Commands Show Logical Disk Geometry Information

The **/etc/prtvtoc** command normally displays information about the physical geometry of disk devices (for example, number of cylinders, heads, tracks, etc.). The SCSI Rewritable Optical Disk does not have all of these characteristics. A set of logical parameters have been selected to allow the device to be used as a logical hard disk unit. These parameters are what is displayed by the **/etc/prtvtoc** and **sysadm display** commands.

sadp Command Does Not Support Optical Devices

The **sadp** command does not support the SCSI Rewritable Optical Disk.

Hard Disk Error Logger May Display Warnings on Shutdown

The hard disk error logger (**hdelogger**) may display warning messages during shutdown when using both layouts of the rewritable optical disks. These messages can occur whenever the disk in the optical drive has an optical layout, and errors have occurred since the last system restart on any optical medium containing a hard disk layout. These messages are a result of the **hdelogger** process and can be ignored.

The **hdelogger** maintains a record of disk errors, which is kept in a reserved area of hard disks. During the shutdown procedure, the operating system examines this area and displays any errors. The location of the reserved area is kept in the Physical Descriptor (PD) sector. The optical disk

layout does not have a PD sector, therefore the **hdelogger** will report that it cannot access this area. These messages can be ignored.

Hard Disk Error Commands With Optical Disk

The **hdefix**, **hdeadd**, and **hdelogger** commands need some special explanation when used with optical disks. If the media is write protected or there is no media in the device, then the commands will fail and issue error messages that will not be logged. If the media is not write protected, and the media is changed before the **hdeadd** or **hdelogger** commands have completed their operation, then error messages could be logged on the wrong media disks.

For write protected media, you can move the write protect switch on the media and allow defect mapping to take place. Otherwise, the messages can be ignored (with the understanding that the errors have not been logged or mapped).

To avoid the problem with errors being logged on the wrong media, perform the **hdeadd** and **hdelogger** operations while in single-user mode and do not remove the media for about 2 seconds after the completion of the command. This should allow adequate time to permit the actual write operation to take place, updating the disk.

Diagnostics Fail if Optical Disk Software Is Not Installed

When installing the optical disk, the diagnostics which run on system boot will fail if the optical disk is added to the SCSI bus before the software is installed. To avoid this problem, install the optical disk software before installing the hardware. If you have installed the hardware before installing the software, manually boot the system, install the software, and reboot the system as instructed. See your System Administrator's Guide for information on how to manually boot the system.

Notes on Disk Mirroring

This section contains information that you need to be aware of when using the mirroring feature.

Keeping Track of Mirrored Partitions

The **sysadm display** command, on the **harddisk** submenu, shows the Volume Table of Contents (VTOC) of the selected device. This includes the mounted file system names of any partitions containing valid file systems. When two partitions are mirrored, however, they can no longer be individually mounted; consequently, no mounted file system names show up for these partitions in the VTOC.

When executing **sysadm display**, do not be mistaken by what appears to be an empty partition. Use the **sysadm mirdisp** command to identify and keep track of mirrored partitions.

Formatting Hard Disks That Contain Mirrored Partitions

When you format a hard disk, the data on the disk will be lost. To prevent accidental data loss, the **sysadm format** command identifies the file systems that will be destroyed and gives you an opportunity to stop the formatting procedure. The **sysadm format** command, however, does not recognize or list mirrored file systems. This presents a problem if the mirrored file system happens to be root. Proceeding with the format will hang the system and it will have to be cleared by a hard reset. (No data loss should occur.) For this reason, do not execute **sysadm format** on ANY active root device! If you really need to format the root device, use the full restore procedure.

If you attempt to execute **sysadm format** on a nonroot disk device that contains one or more mirrored partitions, the command will fail with a message similar to the following:

```
ADMIN COMMAND ERROR:   Call Customer Service.
menu/diskmgmt/harddisk/format: Format failed for the disk.
```

If you get this type of error message, execute the **sysadm mirdisp** command to check for mirrored partitions. If there are mirrored partitions, the command failure is normal and there is no need to call "customer service." Before the disk device can be reformatted, the mirrored partitions must be unmirrored (**sysadm unmirror**). Note that if both halves of a mirrored pair of partitions are on the same disk device and the device is reformatted, the contents of that mirrored file system will be destroyed!

Removing Disks With Mirrored *root/usr* File Systems

When using the **sysadm harddisk rmdisk** subcommand, it is possible to remove the device nodes of disks containing partitions that are mirroring the *root* and/or */usr* file systems.

If the **rmdisk** subcommand is used on disk(s) containing only one partition of mirrored pair(s) that support either *root* or */usr* and the system is then rebooted, the system will come up properly with the mirror node(s) for *root* and/or */usr* ACTIVE on the other partition(s) of the mirrored pair(s).

If the **rmdisk** subcommand is used on disk(s) containing both partitions of mirrored pair(s) that support either *root* or */usr* and the system is then rebooted, the system will come up with the mirror node for *root* ACTIVE on one of the partitions of its mirrored pair. The */usr* file system, however, will not be mounted, and any scripts or packages needing access to it will fail.

To remove a hard disk that contains mirrored partitions, perform the following steps:

1. Mount the */usr* file system if it is not mounted.
2. Execute the **sysadm mirrormgmt rootremove** subcommand to unmirror the *root*, */usr*, and/or *swap* partitions.
3. Execute the **sysadm harddisk rmdisk** subcommand.
4. Reboot the system.

Mirroring and Remote File Sharing

Remote File Sharing allows different computers (host computers) to share devices across a network. Although it is not recommended (for performance reasons), it is possible for one host computer to mirror remote device nodes on another host computer.

If you do try to use mirroring on remote devices, you need to be aware that the mirror table information will not be complete on both host computers. For example, if Host A mirrors remote device nodes of Host B, the mirrored relationship shows up in the mirror table on Host A but not on Host B, where the mirrored relationship actually exists. This presents no problem to Host A, but may cause confusion on Host B when disk partitions that appear to be accessible are not because of their hidden mirrored activity.

The solution to this problem is to execute the **setmirror**(1M) command on all involved host computers. This will refresh the mirror table information on each host computer.

Software Notes

This section contains information that you need to be aware of when using certain commands with a SCSI-based peripheral. The commands are arranged in alphabetical order.

Backup and Restore on Nested File Systems

When creating files systems, mount all file systems at the *root* (/) directory, thereby eliminating nested file systems. If nested file systems exist, unmount them before doing a backup of the parent file system to avoid problems when performing a restore.

If nested file systems are backed up during a backup of the parent directory, and the nested file systems are mounted when a restore is performed from this backup, then the files on the nested file systems will be overwritten. This could possibly destroy data that was not backed up previously. If nested file systems are backed up during a backup of the parent directory, and the nested file systems are not mounted when a restore is performed from this backup, then the files will be written at the directory at which the file system was mounted. This may create problems by not fitting within the parent directory.

cpio Command on 9-Track Tapes

Accessing a 9-track tape with the **cpio** command is much more efficient in the raw mode. You can use the block mode, but the copy may fail; especially if you are using the default block size and the high density option 6250 BPI. Using the block mode and the high density option causes an excessive amount of tape repositioning that may result in media errors. Therefore, it is recommended that the tapes only be accessed in raw mode.

cpio Command Spanning Multiple Tapes in No Rewind Mode

Using the **cpio** command to access multiple tapes in a "no rewind" mode results in the tape being left at the End of Tape (EOT) position. The user is then prompted for a new tape. When the new tape is mounted and the command resumed, only a few blocks are written to the tape and the user is prompted that EOT has been reached again.

To avoid this, do not use the **-O** option. Instead, redirect the output to the intended device using the "no rewind" device name. (For example, **cpio** *options* > **/dev/rmt/c1t7d0hn**.) When the EOT is reached and the user prompted for a device name, do NOT manually rewind or remove the tape. Enter the "rewind" device name which corresponds to the "no rewind" device given to the **cpio** command. (For example, **/dev/rmt/c1t7d0h** instead of **/dev/rmt/c1t7d0hn**.)

A few blocks will be appended to the end of the data on the current tape. The tape will automatically rewind and the user will be prompted to change the medium.

When the tape has finished rewinding, change tapes and re-enter the "no rewind" device name. This process should be repeated as often as required. The same type process is also needed when reading from multiple tapes.

finc Command on Tape Device

An attempt to back up data to a tape device, using the **finc** command, may intermittently fail. The following is an example of the error message that is displayed:

```
/etc/finc: /dev/rdsk/c1t1d0s2 -> /dev/rmt/c1t2d0s0: i/o failed.
block: 795029810 err=Invalid Argument
```

The chances of the **finc** command failing are greater if the system is very busy. If the attempt fails the first time, try again.

format Command Requires Exclusive Access to Devices

Execute the **format** command in single-user mode. If the **format** command is run as a background process, do not issue any other commands that will access the device being formatted.

In a shared peripheral environment, other hosts trying to access the device that is being formatted, will experience failures, and may issue bus resets which will interrupt the **format** command. To recover, reissue the **format** command. If you have a hung process, execute the **sync** command and reboot the system.

hdefix Command Information

The **hdefix** command attempts to provide information to the user about the location of any bad blocks that are thought to be in a file system. The file system block number returned by the **hdefix** command is incorrect in SCSI Release 3 for operating systems earlier than Release 3.2.3.

hsbackup Command Fails With Partitions Larger Than 488 Megabytes

For computers running Release 3.2.2 or an earlier operating system, the **hsbackup** command fails when copying partitions larger than 488 megabytes to another disk. To eliminate this problem, avoid making partitions larger than 488 megabytes. If this cannot be avoided, use the **dd**(1) command to perform the copy operation.

hsbackup Command Does Not Recognize 2K File System

For computers running a Release 3.2.1 operating system, the **hsbackup** command does not recognize the 2K file system as a valid file system. Therefore, the 2K file system will not be offered as an option for backup when **sysadm hsbackup** is executed.

Use the **/etc/volcopy** command to back up a 2K file system for Release 3.2.1.

hsbackup Command Does Not Recognize Nonalphanumeric File System Names

The **hsbackup** command does not recognize file system names that contain nonalphanumeric characters. Label your file systems with the **labelit**(1M) command using names that contain only alphanumeric characters. (The dot "." and underscore "_" are not considered to be alphanumeric characters, and cannot be included in the file system name.)

hsbackup Command Errors Occur When Changing Drives

While transferring data between a disk and a 9-track tape drive, you will be asked if you want to change drives when multiple reels are required. Do not change to a drive that is on a different bus than the disk. If you do, errors may occur.

If you must change drives, select an initial target drive that is on a different bus than the disk when the **hsbackup** command is initiated. This forces the transfers to go through the host system. When the change to the second drive (located on the same bus as the disk) takes place, the command will not change modes and will continue to transfer the data through the host system.

sysadm compress Command Will Not Span Multiple Tapes

The **sysadm compress** command will not notify you to change tapes when you are compressing a file system that is larger than the capacity of your storage device. Compressing a file system that is larger than your storage device needs to be done manually. When you access the tape device manually you will be asked to change tapes. The command line to compress a file system onto "qtape1" is shown next. First, change directories to the current directory of the file system that you want to compress (for example, **cd /usr4** to compress */usr4*). Then execute the following command:

```
find . -print | cpio -ocv -C65536 >/dev/rSA/qtape1
```

Check the backup to make sure that it is good. Remove the data from under the file system that you have compressed and unmount that file system. Use the **fsck -s /dev/rdsk/***partition* command to reconstruct the free list for the file system that you have compressed (*partition* is the device name for the partition your file system was mounted on). Mount the file system, change directories to it, and re-create the properly sized *lost+found* directory with the following command:

```
/usr/lbin/mklost+found /filesystem name/lost+found /dev/dsk/partition
```

Once this is done, read the files back into the directory using the following command:

```
cpio -icdumv -C65536 < /dev/rSA/qtape1
```

sysadm compress Command Does Not Properly Re-Create *lost+found* Directory

The **sysadm compress** command does not restore the *lost+found* directory to its proper size. Therefore, when the **sysadm compress** has completed, re-create the properly sized *lost+found* directory with the following command:

```
/usr/lbin/mklost+found /filesystem name/lost+found /dev/dsk/partition
```

sysadm compress Command on Large Files May Require a Temporary File Name

When executing the **sysadm compress** command, the **fsck** command for large file systems will prompt the user for a name of a temporary file. Enter a name for a temporary file; for example, */usr/tmp/fsck.name*.

sysadm restore Command—Modification Times

File modification times are not retained when you use **sysadm restore**; all the times are reset. This will cause problems with data that needs to be restored with the original modification times; for example, SCCS files.

If you have files that need to retain their modification times, do not use **sysadm backup** or **restore**. Use administrative commands such as **cpio**(1) (with the **-m** option) for these files.

sysadm restore Command—Interruptions

If the BREAK key is pressed during a **sysadm restore**, the **restore** command may be interrupted without rewinding the tape (9-track or cartridge). A message will be printed to that effect, along with a reminder not to remove the tape while it is still in motion. In the case of a "qtape" drive, it may be difficult to determine if the tape has stopped moving, since the light remains on even if the tape has stopped in the middle.

Rewinding the tape, for both the 9-track and cartridge, will allow removal of the tape and further use of the device. To rewind the tape, execute the **sysadm restore** command once more, quitting the menu when the numbered list of action choices is displayed. Wait until the tape motion ceases or the "qtape" drive light goes out and a prompt returns to the screen before removing the tape.

tar Command Options

In order for the **tar** command to execute properly, the options and arguments must be in a particular order. The following example command line shows the proper order:

tar [-]{txruc}[vwfblm][0-7[lmh]][tapefile][blocksize] file1 file2

Note: The **u** and **r** options are not functional.

The **tar** command does not work across multiple tapes.

volcopy Command Options

-buf Option

Because of the multiple processes involved in writing to or reading from a tape when double buffering is used, tapes written using the **-buf** option (**volcopy -buf**) can only be read with the **-buf** option.

-reel Option

The **volcopy -reel** option does not work. If an error occurs while reading a tape, the command sequence must be restarted beginning with the first tape.

Miscellaneous

Labeling File Systems on Remote Computers

The **labelit** command is used to provide initial labels for unmounted file systems. The **labelit** command checks for an argument beginning with **/dev**. If the advertised resource you are trying to label is in a directory that does not begin with **/dev**, the **labelit** command will fail.

Use remote command execution to label the media on the remote computer.

Note: This is no longer a problem in UNIX System V Release 3.2 or later releases.

Assigning File System Names

When you mount a file system, the mount directory path name is truncated to 14 characters, which is the maximum number of characters that **sysadm backup** recognizes. If the mount directory path name exceeds 14 characters, **sysadm backup** will not be able to access the file system. To ensure that **sysadm backup** can access your file systems, use short path names when defining mount directories.

SCSI Tape Utilities and Cartridge Tape Utilities

The following information is important to you if you plan to have the SCSI Tape Utilities (SCSI Cartridge Tape Utilities or SCSI 9-Track Tape Utilities) and the Cartridge Tape Utilities installed at the same time.

- The SCSI Tape Utilities and the Cartridge Tape Utilities have several commands in common.
- If either of the SCSI Tape Utilities is installed and you subsequently install the Cartridge Tape Utilities, the common commands are overwritten with older versions of the commands.
- Always reinstall the SCSI Tape Utilities after installing the Cartridge Tape Utilities.

Error Messages From Shared Peripherals

When using device locking arrangements in a shared peripheral environment, there are many user and administrative commands that may fail when they encounter a SCSI device that is locked to a different host. Different commands may display different error messages. These error messages may not explicitly identify the problem because the device is locked to a different host.

If you are confronted with an error message for a device on a shared SCSI bus, use the **sdevlock** command to determine the status of all locked devices on the bus. Retry the failed command when the resource is unlocked or locked to the local host.

Device Locking Through Remote File Sharing Files

In a shared peripheral environment where the device nodes of one host are available to the other hosts via Remote File Sharing, the lock status information will be inaccurate on a host if that host issues locking commands using a remote device node. To check the lock status of a disk device, use the **prtconf**(1M) command.

To restore the sanity of the lock status information and to free the resource from whatever host has it locked, use the **sdevfree**(1M) command.

Inode Limit Causes File System to Run Out of Inodes

The maximum number of inodes is limited to 64K (65,536). The default value for inodes is approximately one inode for every 16 disk blocks. With a 600-megabyte disk partition, the 64K limit prevents this ratio (the ratio is 1:20). This means that unless the average file size (including directories) is greater than 10 kilobytes, the file system will run out of inodes before the entire disk capacity can be used. See the *SCSI Operations Manual* for recommended file system sizes that correspond to the capacity of the backup device. Divide the disk into smaller partitions prior to making file systems [refer to the **fmthard**(1M) command].

Partition Sizes on Different Vendor Disks

You may not be able to create the same partition sizes on different vendor disks with the **sysadm partition** command. This is due to the different cylinder sizes of different vendor disks. The **sysadm partition** command rounds up a partition size to the next cylinder boundary. If the cylinder sizes are different, then the partition sizes will not be the same.

To avoid this problem, use the **sysadm mirpartition** command to create the VTOC on a different vendor drive. This command does not round up the partition size. See the "Mirroring SCSI Hard Disks" section of the *SCSI Operations Manual*.

Documentation

The following documents also support SCSI products:

- *AT&T 3B2 Computer and 6386 Work Group System SCSI Installation Manual* (305-011)
- *AT&T 3B2 Computer SCSI Operations Manual* (305-012).

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