SCO® XENIX® System V Operating System

Release Notes
Release 2.3.4 (386)
Release 2.3.2 (286)

START HERE

1. Read "Before Installing Your Software" in these *Release Notes* for information that you will need before starting the installation process.
2. Examine the appropriate appendix in these *Release Notes* to see if your hardware requires special consideration during installation.
3. Use the instructions in the *Installation Guide* to install your XENIX system. Additional notes for microchannel architecture platforms are provided in these *Release Notes*.

The Santa Cruz Operation, Inc.

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SCO XENIX System V Operating System Release Notes Release 2.3.4 (386) & 2.3.2 (286)

Release Notes
SCO XENIX System V
Operating System
XENIX-286 Release 2.3.2
XENIX-386 Release 2.3.4
12 August 1991

1. Preface

This document contains important information about the SCO XENIX System V Operating System Release 2.3. These notes are divided into three parts: software notes, a hardware appendix for standard architecture machines, and a hardware appendix for microchannel architecture machines.

The software notes are organized into the following sections:

- Documentation Notes
- Before Installing Your Software
- Administering Your System
- Special 386 Microprocessor Notes
- Using the System Console and Terminals
- Using Printers
- Using Floppies and Tapes
- Using a Mouse
- Using MS-DOS and OS/2
- Using Networks
- Using Your System
- Internationalization
- System Configuration and Link Kit Notes
- UNIX System V Applications Compatibility

Note

These notes apply to two releases: XENIX-386 Release 2.3.4 and XENIX-286 Release 2.3.2. Certain parts of the notes apply to specific releases; these are clearly labelled "XENIX-386 Only" or "XENIX-286 Only."

Please read through the "Before Installing Your Software" section of these *Release Notes* before installing the XENIX System V Operating System. In addition, pay particular attention to the sections relating to peripheral devices such as printers, tape drives or other hardware you are installing.

Also, please note that certain hardware configuration information included in Appendix A or Appendix B of these notes may be required for successful XENIX installation. You should refer to those sections of Appendix A or B that apply to the hardware in your configuration, if you have trouble installing XENIX.

We are always pleased to hear of users' experiences with our product, and recommendations of how it can be made even more useful. All written suggestions are given serious consideration.

1.1 Features of the 2.3.4 Release (XENIX-386)

This release includes the following features:

- New Adaptec SCSI driver
- IBM SCSIsupport
- Korn shell
- New Irwin driver
- QIC-80 support

- Revised, 3-volume documentation set
- Hayes V-series 9600 bps modem support
- Keyboard mouse support added to GT platform (previously only MC)
- Support for three button mouse emulation by a two button mouse on MC platforms
- Internationalized utilities
- Selected manual pages provided online
- The **pax**(C), **pcpio**(C), and **ptar**(C) utilities have been added for POSIX compliance (manual pages are not available online at this time)
- Support for mice within **scoterm** ansi console emulator (with SCO Xsight installed)
- **scopatch**(ADM) utility that applies and keeps track of supported kernel patches
- Support for monochrome VGA graphics modes
- Support for COFF binaries that use *cxenix*() system call
- New QIC-02 cartridge tape driver, including support for Wangtec and Tecmar single chip tape controllers
- Logitech C9 Busmouse support
- External IBM floppy drive support for MC platform
- Multiport board support for MC platform (specific board names are given in Appendix B)
- Ability to boot larger kernels
- Screen flicker problem with the IBM PS/2 Model P70 using the Plasma screen, has been corrected

1.2 Contents of the Distribution

The XENIX System V Operating System is distributed on the following 96tpi or 135tpi floppies:

N Volumes
B Volume
X Volumes
Games (Optional)

The software is grouped into packages that are listed in the section, "Packages in This Set."

1.3 Conventions Used in These Notes

Utilities and commands are printed in **boldface** type, with the Reference Guide section in which they appear following in parentheses. Filenames are *italicized.*

1.4 Packages in This Set

The XENIX System V Operating System software is grouped into packages. This makes customizing your system easier, since you can use the **custom**(ADM) utility to add or delete groups of programs that have related functions.

For example, if you do not want to use your system for communications, you would not install the UUCP package. If you install a package, then change your mind later, use **custom** to remove that package. **custom** can locate all the files that belong in a certain package and delete them, thus removing the package.

The packages in the XENIX System V Operating System are listed below. The sizes are in 512 byte blocks. Please note that this is a sample listing only. The sizes of the packages in your set may differ from those shown here. Use **custom**(ADM) to determine the sizes in your set.

XENIX System V Operating System Packages

Package	Size (512 byte blocks)	Use/Contents
ALL	18846	Entire Operating System set
BACKUP	406	System backup and recovery tools
BASE	1550	Basic extended utility set
CSH	138	The C-shell
DOS	410	DOS utilities
GRAF	778	Video graphics description files
IMAGEN*	228	Imagen laser printer support
INTL†	582	International character set support
KSH†	288	The Korn-shell
LINK	2626	The link kit
LPR	790	Multiple line printer spooler
MAIL	808	Electronic mail and micnet
MAN†	1746	Online MAN pages (section C) and HELP utility
MOUSE	172	Mouse and graphic input devices files
RTS	3478	XENIX run time system
SYSADM	1780	System administration tools
UUCP	2338	Uucp and cu communications utilities
VI	1242	The vi and ex editors
VSH	264	The visual shell

† XENIX-386 only.

* XENIX-286 only.

The following packages are valid under XENIX-286, but are incorporated into other packages under XENIX-386:

Package	Size (512 byte blocks)	Use/Contents
FILE	528	File manipulation tools
HELP	520	Help utility and related files
INITTAB	10	Terminal initialization
MAPCHAN	152	International character set mapping
TERMINF	500	Terminfo database

1.4.1 An Explanation of custom(ADM) Packages

This section explains briefly what each package contains.

BACKUP The utilities necessary to make copies of the files on your system. With this package, you can back up everything or just the files that have changed recently. You can also restore any part of these backups.

BASE The basic set of system utilities that are normally installed beyond the runtime system.

CSH The C-shell command interpreter. An alternative to the Bourne shell, **csh** includes extensive command history features.

DOS A set of utilities that allow listing, moving and copying MS-DOS files to or from an MS-DOS diskette or MS-DOS partition.

FILE A number of useful programs for comparing and manipulating files.

GRAF The video graphics description files.

HELP	The help files provide help with the use of SCO XENIX commands and the interpretation of error messages.
IMAGEN	The SCO XENIX System V spooler interface programs that allow IMAGEN printers to be used with XENIX.
INITTAB	Contains initialization information for all the terminals that may be used with SCO XENIX.
INTL	A utility that allows the use of international characters sets.
KSH	The Korn shell, an alternative command interpreter that supports command line editing, and many other advanced features.
LINK	The tools necessary to rebuild the system kernel, which is necessary if you are adding capabilities to your system such as tape drives, multiport serial cards, mice, and third-party device drivers.
LPR	The printer spooler, which allows multiple print jobs to be queued for printing automatically.
MAIL	This includes a number of subsystems that allow the transport of mail within the system and to other systems. The Micnet local network that permits the transfer of files and execution of remote commands is in this package.
MAN	This package includes on-line copies of the Commands (C) manual pages, plus the **help** utility.

MAPCHAN Allows the use of hardware that uses different character sets. For example, a terminal using one character set can send a file to a printer using another character set without jumbling the results.

MOUSE The utilities necessary to use mice, graphics bit pads, and so on with the system. Note that the kernel must be rebuilt using **mkdev mouse** before these utilities work correctly.

RTS The SCO XENIX Run Time System supports the operations of the XENIX utilities and programs in real time (or *run time*), that is, while they are being executed.

SYSADM The **sysadmsh**(ADM) system administrator menu interface and other tools used to administer the system.

TERMINF Contains the terminal capability databases for all terminals that may be used with SCO XENIX.

UUCP Utilities to connect your system locally or to a worldwide network of other systems.

VI The vi(C) screen-oriented text editor that includes the ex(C) editor.

VSH A highly interactive, menu driven visual shell, which supports both standard and customizable XENIX command menus and on-line help.

1.5 Software Support

Software support is available to customers who purchased XENIX for use in the United States and Canada. If you purchased XENIX for use outside the US or Canada, contact your distributor or retailer for support information.

Software support is described on an insert in the back of the XENIX documentation.

2. Documentation Notes

In addition to these *Release Notes*, the new documentation set consists of the following books.

2.1 Installation and System Administrator's Guide

These guides are bound in a single volume and were revised significantly for this release. Both guides include extensive troubleshooting information.

2.2 XENIX Reference

All manual pages are now bound in a single volume. Note that the manual pages for **backup**, **restore**, **dumpdir**, and **sddate** utilities were moved from (C) to the (ADM) section.

2.3 Tutorial and User's Guide

These guides are also bound in a single volume. The *User's Guide* includes a chapter on **ksh**(C).

2.4 Online Manual Pages (XENIX-386 Only)

This release includes online versions of the (C) section manual pages and the **man**(C) utility to display them. In addition, any manual pages from other sections that have been modified for this release are included. This is done to ensure that sites installing the Text Processing System (which includes online man pages) have the latest online pages. However, installing the Text Processing System MAN package will overwrite the updated pages. If you install the MAN package of the Text Processing System, you need to reinstall the OS MAN package to have the current online manual pages.

3. Before Installing Your Software

Please refer to the *Installation Guide* to install the XENIX System V Operating System.

If you have all three systems, (the XENIX Operating System, Development System and Text Processing System) you can use the *XENIX Installation Guide* to install them all at once. If you wish to install the Development System and/or the Text Processing System at a later time, refer to the *Release Notes* at the beginning of the appropriate guide (*XENIX Programmer's Guide Volume I* or *XENIX Text Processing Guide*). Also, see the manual page for **custom**(ADM). With **custom** you can install all or portions of the XENIX System.

This installation is not an update, and it will overwrite the present contents of the hard disk drive 0 (also known as boot drive or DOS C: drive). If you wish to update from an earlier release or version of XENIX, and you have not yet obtained an update, contact your sales/support center.

Read the *Release Notes* and *Installation Guide* and make sure you completely understand the installation process before installing the product. Additional notes for microchannel architecture machines are given in a later section of these notes.

In addition, take note of the following points:

- If you need to stop the installation process because you enter incorrect information or for some other reason, press the computer "reset" button or power cycle your system and start the process again from the beginning rather than trying to proceed from the stopping point. Do not abort the installation process by using the <DEL> or <CTL>-\ keys unless a message appears explicitly telling you to abort in this way.

- XENIX and MS-DOS must boot from the physical drive 0 (hard disk or diskette). Keep this in mind when planning for extra hardware.

- XENIX installs with a minimum of screen prompts and typing, and is set up with suitable defaults for most uses and sites. However, you can customize the operating system during installation to meet a wide variety of needs.

  If you know that you need to customize your installation, look at the following list and decide if any of the items apply to you. If they do, read any suggested sections and make sure you understand the procedures involved before installing XENIX:

  — Install selected parts of the operating system.

    This is described during the installation process, but the section of these *Release Notes* "Contents of the Distribution" can help you decide what software you need, and what software you may not need.

  — Create additional filesystems, besides the *root*.

    This is described in the "Installation Instructions" section of the *Installation and System Administrator's Guide*.

— Choose the appropriate disk configuration for your machine.

  Refer to the sections "SMS-OMTI Notes" and "SCSI Notes" for the appropriate architecture later in these notes.

  Disk controller and host adapter compatibility is described in more detail in Appendix A, "Compatible Hardware for Standard Architecture Platforms", and Appendix B, "Compatible Hardware for Microchannel Architecture Platforms".

— Re-establish a second hard disk that contains filesystems created under XENIX 2.2. You can continue to use the filesystems on a second hard disk that you created under XENIX 2.2 or later.

  This process is explained in the chapter entitled "Reinstalling Your System" in the *Installation Guide*.

— Set up your hard disk to accommodate other operating systems, such as MS-DOS.

  This is discussed in the "Using MS-DOS and OS/2" chapter in the *XENIX System Administrator's Guide*.

Most users and sites do not need to extensively customize their installations, since the defaults satisfy most requirements. However,. if you need to customize your installation, make sure you have a clear idea of what you want before you start the actual installation process.

3.1 Wyse 60 Terminal Screen Corruption

If you have a wyse 60 terminal enabled on one of the COM ports (e.g. *tty1a*), you may see some screen corruption at the top left hand corner of the screen when logging out. Your keyboard input will then be locked for approximately thirty seconds until the login prompt appears again. To correct this problem (if you don't use the modem control port), remove */dev/tty1A*.

3.2 Interrupts on 486 EISA Machines

On 486 EISA machines, interrupts should be edge-triggered rather than level-triggered. Use the EISA configuration disk provided with your system to verify the setting of interrupts on your system.

3.3 If You Plan to Install TCP/IP (XENIX-386 only)

Because of the increased kernel size, systems with TCP/IP installed should create an Emergency Boot Floppy set consisting of separate boot and root disks rather than a single boot-root floppy.

Some third party networking add-on drivers which functioned with SCO XENIX Release 2.2 may not work correctly with SCO XENIX Release 2.3.

If you encounter problems with other existing add-on drivers please contact the driver vendor and mention you are using SCO XENIX Release 2.3.

3.4 If You Plan to Install SCO Xsight (XENIX-386 only)

If you install SCO Xsight, do not install Maintenance Supplements that are included with the product and specified in the SCO Xsight *Release Notes*. These supplements (UFJ and the SCO Xsight Supplement) are only for previous releases of XENIX, although the SCO Xsight *Release Notes* do not specify the releases the supplements are to be installed upon.

3.5 If You Plan to Install XENIX-Net or Office Portfolio

If you specify some number of virtual terminals using **mkdev xnet**, the devices will be created, but the necessary kernel support is not configured properly. To configure the necessary virtual terminals, consult the *XENIX System Administrator's Guide* and follow the instructions for changing the NSPTTYS parameter (**configure** category 6) in the section entitled "Reallocating Kernel Resources with configure" in the "Tuning System Performance" chapter. NSPTTYS should be at least the value requested via **mkdev xnet**. If you also install Office Portfolio, this number might be larger than that needed for XENIX-Net, and may be as large as 256.

3.6 If You Plan to Install SCO VP/ix

SCO VP/ix Release 1.2 runs on SCO XENIX 386 System V Release 2.3.4 without the need for any operating system updates, so you need not install the operating system update files supplied with SCO VP/ix. Refer to the SCO VP/ix Release 1.2 *Release and Installation Notes* for more information.

3.7 If You Plan to Install SCO XENIX System V on a Microchannel Architecture Platform

To install the operating system on a microchannel architecture platform, follow the instructions in the section entitled "Installation Instructions", of the *Installation and System Administrator's Guide*. The menus differ very slightly for a microchannel installation; there are no references to OMTI disk controllers, and you are offered the option of installing either a standard, an Adaptec SCSI or an IBM SCSI disk controller. Both SCSI installation routines are identical to that documented in the *Installation and System Administrator's Guide*.

There are also slight differences to the following routines if you are installing on a microchannel-based machine:

- Installing the Hard Disk (**mkdev hd**)
- Installation and Configuration of Cartridge Tape Drives (**mkdev tape**)

For details, refer to Appendix B, "Compatible Hardware for Microchannel Architecture Platforms".

3.8 If You Plan to Install the XENIX Development System

If you install Release 2.3.1 of the SCO XENIX Development System on Release 2.3.4 of the SCO XENIX 386 System V Operating System, the following message is displayed:

```
fixperm:file not found: /usr/bin/sdb.new
```

This message is of no consequence and may be ignored. It is generated because the development system tries to install a new version of *sdb*, but the new *sdb* binary is already included in this release of the operating system.

3.9 Memory Requirements

Please use the following table to determine the amount of memory you need to run the XENIX System V Operating System and Development System:

System	Requirements
XENIX 286 Operating System	**minimum**: 640K **recommended**: 1MB **multiuser**: 1-2MB, or more for optimum performance
XENIX 386 Operating System	**minimum**: 1MB **recommended**: 2MB **multiuser**: 2MB or more for optimum performance
XENIX 286 Development System	**minimum**: 640K **recommended**: 1MB
XENIX 386 Development System	**minimum**: 1MB **recommended**: 2MB, or more for optimum performance.

Note

On some 386 machines, the XENIX kernel cannot recognize the memory between 640 and 1024K because the hardware manufacturer has mapped this 384K of memory to another location for their firmware to use. Because this location varies, the XENIX kernel does not know where to find it.

When you invoke a utility that needs more memory than is available, the message "Killed" or "too big" is displayed on your screen.

3.10 Allocating Swap Space

If you are calculating your swap space manually rather than using the defaults, be sure to allocate sufficient swap space during installation. The only way to alter your swap space allocation after installing is to re-install XENIX. Refer to "Planning Your Disk Layout" in the "Installation Procedure" chapter of the *XENIX Installation Guide* for a complete discussion of swap space.

On 286 machines, running out of swap space causes an immediate *panic* and total system halt. On 386 machines, if you see the kernel warning: "out of swap," you must kill some processes quickly. A 386 machine will *panic* and halt if it runs out of both memory and swap space. Refer to "Killing a Process" in the "Housekeeping" chapter of the *XENIX Tutorial* for instructions.

3.11 Changes to custom(ADM)

The **custom**(ADM) utility now accepts a device other than */dev/install* when using the **-m** option. This allows installation of applications from floppy drive 1.

3.12 Games Support

Games are supplied for your pleasure and enjoyment. They are not supported. On line documentation is supplied for some of the games in the directory */usr/games/doc*. Use **custom**(ADM) to install the Games floppy:

1. Enter **custom**.
2. Select the option to "Add a Supported Product."
3. Insert Games Volume 1 when prompted, then follow the screen prompts as they appear.

Refer to the **custom** manual page in the *XENIX System Administrator's Guide* for more information on installing packages.

3.12.1 Go Limitation

The Go game requires TCP/IP to run. In addition, the game startup message "Waiting for other player..." can become garbled. If the other player responds, the game continues normally.

3.13 Using DMA Channel 3 (XENIX-386 Standard Architecture Only)

If you install a device that uses DMA channel 3, you must apply the following patch after the kernel has been relinked but prior to booting off the new kernel:

```
/etc/_fst -w /xenix
dma_param+e ?w c033
dma_enable+d ?w c033
dma_resid+d ?w c033
$q
```

To ensure that this patch is reapplied each time you relink the kernel, add the following lines to the bottom of the */usr/sys/conf/hdinstall*:

```
/etc/_fst -w /xenix << EOF
dma_param+e ?w c033
dma_enable+d ?w c033
dma_resid+d ?w c033
\$q
EOF
```

3.14 SMS-OMTI Notes (XENIX-386 Standard Architecture Only)

This section provides general information for SMS OMTI 8620 and 8627 disk drive controllers under SCO XENIX System V Release 2.3 for 386 personal computers. See Appendix A, "Compatible Hardware for Standard Architecture Platforms," for information on installing hardware, configuring software, and performing low-level formats on new disks. This appendix also contains information on badtracking and disk space usage.

This product supports one SMS OMTI 8620 or 8627 controller with up to two drives attached to it. Either or both drives may have an ESDI or ST506 drive interface. This product provides an OMTI-specific device driver to supplement the Western Digital-specific device driver in standard SCO XENIX System V 386 Release 2.3.

For more information on SMS-OMTI controllers, see the following sections in Appendix A, "Compatible Hardware for Standard Architecture Platforms":

- "Supported Standard Architecture 386 and 486-based Machines", which lists the supported machines.
- "SMS-OMTI Disk Controllers," which provides information on hardware configuration.

3.15 SCSI Notes (XENIX-386 Standard Architecture)

The XENIX 386GT Operating System runs on industry standard 386 and 486-based systems with an Adaptec AHA-154x SCSI host adapter instead of, or in addition to, a standard Western Digital (or compatible) disk controller.

If a SCSI disk is going to be your root disk (where XENIX is installed), you must run your computer's **setup** program and set the computer up for operation *without* a hard disk before installing XENIX 386GT. This forces the computer to recognize the AHA-154x.

For more information on SCSI systems, see the following sections in Appendix A, "Compatible Hardware for Standard Architecture Platforms":

- "Supported Standard Architecture 386 and 486-based Machines", which lists the supported machines.
- "SCSI Host Adapters," which provides information on hardware configuration and formatting a SCSI disk.

3.16 SCSI Notes (XENIX-386 Microchannel Architecture)

The XENIX 386MC Operating System runs on industry standard 386 based systems with an Adaptec AHA-1640 SCSI host adapter, or IBM SCSI host adapter.

If a SCSI disk is going to be your primary disk, you must use your computer's Reference Diskette to set up your system. For more information on SCSI systems, see the following sections in Appendix B, "Compatible Hardware for Microchannel Architecture Platforms":

- "Supported Microchannel Architecture 386 and 486-based Machines," which lists the supported machines.
- "SCSI Host Adapters," which provides information on hardware configuration and formatting a SCSI disk.
- "Compatible Hard Disk Controllers", which includes information on primary and secondary disk selection for Microchannel systems.

3.17 Explanation of the Boot Letter Sequence

Each time the system boots, a series of letters is displayed on the console. These letters are usually overwritten too quickly to be seen. When there is a problem and the boot sequence halts, these letters indicate at which stage the problem occurred.

Below is a list of the meanings of the kernel startup letters for the SCO XENIX-386 Release 2.3 kernels, for AT class machines. This information is technical in nature and is intended for knowledgeable individuals to help solve obscure boot problems.

A The kernel has just parsed and verified the boot string and is about to enter the function *startup( )*. The kernel then allocates the space for the buffer cache and the message buffers.

B-C The kernel is in *dinit( )*, checking for the 32-bit multiply bug, 10 bits of I/O address decoding, and the A31 bug.

D%d The kernel is in *dinit( )*, calling all the driver *init( )* routines as specified in the **master**(F) file. On a standard system, these drivers are shown in the following table:

Boot Letter	Driver Name	Description
D0	fpuinit	floating point coprocessor init
D1	flinit	floppy driver init (*/dev/[r]fd**)
D2	sioinit	serial I/O driver init (*/dev/tty**)
D3	painit	parallel adapter init (*/dev/lp?*)
D4	errinit	error device init (*/dev/error*)
D5	cninit	console driver init (*/dev/console*)
D6	null	end of init function list

Adding a device driver to the system may change the order or number of the initialization routines.

E The kernel is in *intrinit( )*, initializing the PIC (Programmable Interrupt Controller) chips.

F Interrupts are enabled (*sti( )*).

G About to return from *startup( )*.

H About to set up process 0, the swapper.

I About to allocate and initialize memory for the console Multiscreens, initialize the console device, and initialize the data structures for cached *namei( )*.

J About to set up cached *namei( )* data structures.

K About to go through the *init( )* routines in *init_tbl[]* (see */usr/include/sys/h/init.h* for details).

L%d Prints out a number (starting at L0 and incrementing by one to L1, L2, L3, etc.) as the kernel goes through the table in */usr/include/sys/h/init.h*. The number is printed before the invocation of the associated kernel function. The numbers and their associated functions are:

Boot Letter	Function Name	Description
L0	clkinit	Turn on the clock (8254 counter chip).
L1	cinit	Initialize clists.
L2	binit	Initialize disk buffers (buffer cache).
L3	iinit/srmount	First disk access. Reads in fdisk table, divvy & badtrk tables, opens root, pipe, and swap devices, mounts root filesystem. Notes if root filesystem is clean or not. Prints out rootdev, pipedev, and swapdev. Hangs here are typically due to incorrect disk parameters or some sort of hardware problem (typically disk, controller, or cable problems).
L4	strinit	Streams initialization (stub routine).
L5	meminit	Initialize memory management data structures, and calculates maximum user process size.
L6	dfinit	Initialize swap space management (paging) data structures.

M About to allocate and initialize memory for message queues.

N Not used.

O About to allow all interrupts (*spl0( )*).

P Print out how much memory is being used by system, user, reserved, drivers, buffers, etc.

Q About to initialize semaphores and shared memory.

R About to get the root inode of the root filesystem.

S Load the floating point emulator. Reads */etc/emulator* from disk and into RAM and sets up a GDT entry for it. First usage of *namei( )*; errors here indicate problems reading the disk. This step occurs whether or not a hardware floating point unit has been detected.

T Not used.

U About to create process #1. This process is called **init** if the root filesystem was clean, and **inir** if it was dirty.

V Network initialization (if present).

W Put the word "swapper" into the ps(C) *args* field of process #0 for **ps** to see.

X Begin execution of the scheduler/swapper.

Y Not used.

Z Successful return from creation of process #1. This will return from *main( ) into_start*, which then returns to process #1 and begins execution in the context of the user process.

4. Administering Your System

This section contains information concerning system administration.

4.1 New Adaptec SCSI Driver (XENIX-386 Only)

The following improvements/enhancements have been made to the SCSI driver for this release:

- Dynamic DMA allocation
- Scatter/Gather support
- Full Multi-Threading Support
- Improved Error Handling
- Tape buffering allocation above 80K is allowed
- Substantial performance increase

4.1.1 Dynamic DMA Allocation

The new driver will automatically determine the DMA channel the host adapter is set for, and will self-configure itself for this channel. In the previous driver, this was hard coded with DMA channel 5 for the first adapter and DMA channel 6 for the second host adapter. If these DMA channels conflict with another device installed in the system, you can now change the adapter setting and the system will auto-configure itself. There is no need to run the link kit to build a new kernel. The driver will handle resetting the DMA channel at boot time.

DMA channels should be allocated to added-in hardware on a priority basis, with the host adapter(s) always configured to use the lowest channel number(s) available. Do not, for example, set a network adapter to DMA channel 5 and the host adapter to DMA channel 6, if you can avoid it.

4.1.2 Scatter/Gather Support

The new driver includes the scatter/gather feature. This is a scheme wherein groups of disk I/O requests are gathered together rather than executed singly. This process increases overall disk efficiency. Scatter/gather is described in the "SCSI Scatter/Gather I/O" section of the "Tuning System Performance" chapter of the *System Administrator's Guide*. The scatter/gather feature is only supported with the 154xB and 1640 series adapters.

4.1.3 Full Multi-Threading Support

The code now fully supports multi-threading to one or more devices.

4.1.4 Improved Error Handling

The code will silently do retries on commands that fail. If the retries are exhausted, then an error message along with the explanation of the error is displayed.

4.1.5 Tape buffering allocation above 80K is allowed

In the previous version of the tape driver, the buffer was hard coded to prevent tape buffering above 80K. There are some programs available that allow buffering to be set substantially larger. The code now allows an unlimited amount of buffering based on the user's requested size.

4.1.6 Substantial Performance Increase

Overall improvements allow much higher throughputs in most environments. The code has been designed to balance the I/O in the system, so it performs better under load than when lightly loaded.

You can also affect performance by altering the Bus On Time and Bus Off Time values in the kernel. You must be in single-user mode to apply kernel patches. Note that you must reapply kernel patches if you relink the kernel. The following information is very technical in nature and should not be used by a novice. Usage of this information is at your own risk.

4.1.6.1 Bus On Time

This is a setting that tells the host adapter how long it will stay on the AT bus for data/command transfers. By default, this comes set to 7, but can be changed by patching the kernel. The value may range from 2 to 15, and is measured in microseconds.

Note

If you set the Bus On Time above 9, you may experience problems with floppy operation. It is advisable to keep this value at 8 or below.

Bus On Time can be altered for each adapter board in the system. For the first adapter board in the system, enter the following:

```
/etc/_fst -w xenix
ad_buson/h value
$w
$q
```

where value is a number between 2 and 15. For the second host adapter, enter:

```
/etc/_fst -w xenix
ad_buson+1/h value
$w
$q
```

4.1.6.2 Bus Off Time

This value represents the amount of time the host adapter will stay off the bus after the Bus On Time has expired. The acceptable values are 1 to 64 micro-seconds, and the default is 4. As before, you can cause poor floppy operations by setting this value too low. It is recommended that you do not use less than 4 for proper floppy operation.

Bus Off Time can be altered for each adapter board in the system. For the first adapter board in the system, enter the following:

```
/etc/_fst -w xenix
ad_busoff/h value
$w
$q
```

where value is a number between 1 and 64. For the second host adapter, enter:

```
/etc/_fst -w xenix
ad_busoff+1/h value
$w
$q
```

4.2 Using the 8-Bit Character Set (XENIX-386 Only)

To use 8-bit character sets and have them recognized by XENIX utilities, you must install the INTL package and configure the 8859 character set in the file */etc/default/lang*. The existing line must be changed to appear as follows:

```
LANG=english_us.8859
```

The default setting of ASCII configures the standard 7-bit character set. Individual users can also set the **LANG** variable in their *.profile* or *.cshrc* files. See **locale**(M) and **environ**(M) for more information.

Note

If the SCO TCP/IP Runtime System is installed on a machine running SCO XENIX, you will be unable to send 8-bit characters as part of a mail message.

4.3 uname -X (XENIX-386 Only)

uname(C) has a new option, **-X**, that displays additional information. The following is a sample output:

```
System = XENIX
Node = smfoot
Release = 2.3.4
KernelID = 90/11/12
Machine = i80386
BusType = AT
Serial = sco000000
Users = unlim
OEM# = 3000
Origin# = 3
NumCPU = 1
```

4.4 Making Tape Backups with cpio (XENIX-386 Only)

A **-K** *volumesize* option was added to **cpio**(C) that specifies the size of the media volume. You must provide the size in 1024 (1K) byte blocks. Note that you must provide the appropriate volume size. If you specify an incorrect size, the command executes without error, but **cpio** generates the message "out of sync: bad magic" when the volume is read.

If you wish to use the **cpio** command line, use it in a form similar to this example:

find . -depth -print | cpio -ocvB -C10240 -O/dev/rct0 -K60000

This example is for DC600A tapes. The volume size for a 1.2 Mbyte floppy disk is 1200. You do not need to specify tape length when restoring. This option should not be used with the Irwin mini-cartridge tape driver.

4.5 Multi-volume Backups with cpio

Multi-volume backups do not work correctly with **cpio**(C). When the **-i** option is used, the second volume of the backup cannot be read. If the **-k** option is used in addition to **-i**, all of the second volume except the first and last files can be read. You are recommended to use the **tar**(C) command for backups.

4.6 id(C) and quot(C): Incorrect id Reporting (XENIX-286 Only)

id and **quot** report negative values for user ids greater than or equal to 32768 and less than or equal to 59999.

4.7 cron(C)

After making amendments to crontab files, you are advised to verify that the **cron** daemon is still running. Type **ps -ef** and look for the **cron** process. If it is not running, you can restart the **cron** daemon by rebooting your system or using the **cron** command.

4.8 pg(C)

If you use the $ character to go to the end of a very large file, a memory fault may be generated. Use of the $ character for this purpose is, therefore, not recommended.

4.9 msgctl(S)

The size of the message queue is limited by the values of MSGSSZ and MSGSEG. You should not use the **msgctl** command to reset this.

4.10 mv(C)

If you are logged in as *root*, take great care when using the **mv** command. This command allows the super user to overwrite a directory with a file of the same name. Consider the following example:

```
mkdir /tmp/aa
      touch ./aa
      mv ./aa /tmp
```

Observe how */tmp/aa* has been changed from a directory to a file.

4.11 custom(ADM)

The size reported by **custom** for the *ALL* entry in the Packages menu may not be correct, that is, it may not be the sum of the individual packages.

5. Special 386 Microprocessor Notes

The following notes apply to known problems with 80386 chips.

5.1 Problems on 33MHz 386 Systems

Problems have been observed with certain 33 MHz 386 systems. If you have a 33 MHz 386 computer, and the message "PANIC TRAP 6" is displayed, followed by a system crash, inspect the 386 CPU below the chip designation "386-33" for the alphanumeric "SX211." If this designation is present, you must use another system to run XENIX, or replace the chip.

5.2 80386 32-bit Multiply Bug

There is a serious, but not immediately apparent, problem that affects some 386 CPU chips. Although the computer and operating system may appear to function normally, this hardware problem can cause damage to data and programs.

If you see the following message when you boot your system then your computer has a defective 80386 chip:

```
HARDWARE FAILURE:
386 incorrectly multiplies 32 bit numbers
```

In addition, the system will *panic*. At your own risk, you may override this protection mechanism by adding the keyword **mulbug** to the boot line:

```
Boot
: xenix mulbug
```

We do *not* recommend using a machine with this hardware problem. Systems with this hardware problem are not supported.

Note that 80386 chips marked "16 bit only" might not present the multiply bug problem, but might also fail with XENIX 386. Chips marked "Σ Σ" have been verified by Intel to function correctly.

5.3 Intel 387 Co-Processor Problems

Because of design defects in Intel's 80386 chip (B1 stepping), the Intel 80387 math coprocessor may not operate correctly in some computers. The problem causes the CPU to hang when DMA/paging/coprocessor accesses are occurring. A workaround for this problem has been engineered for standard architecture machines and is engaged by using a special string at boot time:

```
Boot
: xenix a31
```

This workaround may not work on all machines; for example, it does not work on the microchannel architecture machines. If it is successful, the following message is displayed:

```
A31 CPU bug workaround in effect
```

If unsuccessful, the following is displayed:

```
A31 CPU bug workaround not possible for this machine
```

The bootstring may also be added to the end of the default bootstring (DEFBOOTSTR) found in

```
/etc/default/boot
```

If you cannot use this workaround, you have two options. You may replace the 386 chip with a newer release of the 386 chip (a D-step part), or you can bypass the 387 chip by adding the **ignorefpu** keyword in your boot command as follows:

```
Boot
: xenix ignorefpu
```

This means that XENIX will not use the 387 chip, but you need not remove it physically; the coprocessor is still usable from MS-DOS. To automatically bypass the 387 chip every time you boot your system, add the **ignorefpu** keyword to the */etc/default/boot* file. See **boot**(HW) for more information.

5.4 Using an Intel Inboard in High Speed Mode

For standard architecture machines, the Intel Inboard is a plug-in card for a 286 AT that replaces the 286 cpu with a 386 cpu. To utilize the high-speed, cache mode of the Intel Inboard, add the keyword **inboard** to the boot line:

```
Boot
: xenix inboard
```

To automatically use this mode of the inboard every time you boot the system, add the "inboard" keyword to the */etc/default/boot* file. This parameter is passed to the kernel and sets the mode of the board. See **boot**(HW) for more information.

6. Using the System Console and Terminals

This section concerns the use of the system console and terminals.

6.1 Using SCO VP/ix

When exiting the SCO VP/ix program via the "pop-up" menu, the cursor is not always placed at the bottom of the screen. The command-line **exitvpix** command does not exhibit this problem.

6.2 Console Keyboard Type Selection

XENIX supports two keyboard modes: XT and AT. AT mode supports the extended keyset found on an AT 101 or AT 102 keyboard, which includes all the keys on an XT style keyboard in addition to other keys. By default, the system is configured for XT mode. You can use an AT keyboard in XT mode, but you will be unable to use the additional keys present on the AT keyboard. Note that you cannot configure an XT or other non-AT keyboard to work in AT mode.

To change the keyboard mode, use the **kbmode**(ADM) utility to determine whether your keyboard is an AT or XT type. The **kbmode** utility can also be used to set the mode. (Some keyboards have an AT keyboard layout, but do not support AT mode: for example, Wyse and Olivetti keyboards. A new scanner chip can be obtained from Wyse to enable AT mode in Wyse keyboards.)

To change the default mode permanently, an additional parameter category has been added to **configure**(ADM): option 13, "Hardware Dependent Parameters," the KBTYPE parameter. If you change this parameter using **configure**, you must relink the kernel as described in "Tuning System Performance" in the *XENIX System Administrator's Guide*.

6.3 VGA Support

The Release 2.3 screen driver for standard architecture machines includes support for a number of VGA cards. Check Appendix A of these *Release Notes* for a complete list of supported hardware. Note that VGA cards which also have EGA or CGA modes only work in VGA mode.

Under XENIX-386, graphics are supported on VGA adapters attached to monochrome monitors. To use the greyscaling feature you must use the **vidi u80X25** command.

The VGA cards are built in to the microchannel architecture machines.

6.4 setcolor(C): New Escape Sequences

The escape sequences that **setcolor** uses to set the 16 foreground and 16 background colors have been changed to increase compatibility with ANSI.

The old sequences (e.g., ^[[2, c1, c2 m) are present in this release for backward compatibility.

6.5 tput(C): longname Attribute

tput will not accept the "longname" attribute.

tput does not function properly on XENIX-286 distributions.

7. Using Printers

This section discusses issues affecting printers and printer administration.

7.1 Postscript Printer Support (XENIX-386 only)

This release includes a printer interface script, */usr/spool/lp/model/postscript*, that allows the printing of text files on a PostScript printer. You cannot select this interface script using **mkdev lp**. You should add the printer using **mkdev lp** and then use the following command, substituting the name of the printer you wish to configure for *printername*:

/usr/lib/lpshut
/usr/lib/lpadmin -p*printername* **-i/usr/spool/lp/model/postscript**
/usr/lib/lpsched

Note

The postscript spooler interface script uses the **cut** command, but this command is not supported under SCO XENIX System V/386 Release 2.3.4. The postscript spooler interface script will not run until you comment out the **cut** entry in the banner section of the script.

The banner is always printed if the postscript spooler interface is selected; it cannot be disabled.

7.2 Assigning Virtual Printers

The virtual printer feature allows the assignment of virtual printers, for example **normal** and **land**, that access the same physical device. **normal** would print files in portrait mode, and **land** would print files in landscape mode, both using the same printer. Under XENIX-286, you cannot assign different virtual printers to the same device. XENIX-386 supports two virtual printers per device.

7.3 cancel(C)

There is a known (but rarely seen) problem with **cancel**(C) affecting jobs other than those specified on the command line. Before using the **cancel** command, you should disable the destination printer to prevent other jobs being cancelled.

In addition, using the **cancel** *printername* option to stop print jobs can halt the print system. For best results, specify job numbers rather than canceling by printer name (this applies to XENIX-286 only).

7.4 lpmove(ADM)

At this time, before using **lpmove**(ADM) to shift print jobs to another printer, you must shut the print system down using **lpshut**(ADM).

7.5 lpstat(C) Problem (XENIX-286 Only)

The command **lpstat -p** *list* fails to display the status of printers.

7.6 reject(ADM)

Using **reject**(ADM) to reject a class will not stop requests sent directly to printers in that class.

8. Using Floppies and Tapes

This section concerns the use of floppy disks and tape drives.

8.1 IBM External Floppy Drive Support

SCO XENIX System V for microchannel architecture machines supports the IBM 4869 external floppy drive. Installation and removal instructions are given below.

8.1.1 Installing an IBM External Floppy Drive

To add an external floppy drive, proceed as follows:

1. Log in as *root*.

2. Type the following at the prompt:

   mkdev floppy

   and press <RETURN>.

3. The following options are displayed:

```
1. Install 1.2M IBM External 5.25 Floppy Drive
2. Remove 1.2M IBM External 5.25 Floppy Drive

Enter 1 or 2, or press q to quit.
```

   Press 1 to install the floppy drive, then press <RETURN>.

4. Two device nodes are then created. These are:

   - */dev/rfd296ds15*

     a raw node for character devices for a high density floppy drive

   - */dev/fd296ds15*

     for block devices for a high density floppy drive

Note

If you are using the internal rather than the external port, use the **mkdev floppy** command as described above. The nodes created, however, are as follows:

- */dev/rfd396ds15*

  a raw node for high density character devices

- */dev/fd396ds15*

  for high density block devices

5. The following message is then displayed:

```
You must create a new kernel to effect the driver change
    you specified.

Do you wish to create a new kernel now?
```

Type Y to answer "Yes".

The following message is displayed:

```
    Re-linking the kernel...
```

When the installation is complete, the following message is displayed:

```
External floppy drive initialization procedure completed.
```

Note

If you use the **tar**(C) command with the raw device, you must use the **-b** option to specify the block size. A blocking factor of 10 is recommended (refer to */etc/default/tar*).

8.1.2 Removing an External Floppy Drive

To remove an external floppy drive, proceed as follows:

1. Log in as *root*.
2. Type the following at the prompt:

   mkdev floppy

   and press <RETURN>.
3. The following options are displayed:

```
1. Install 1.2M IBM External 5.25 Floppy Drive
2. Remove 1.2M IBM External 5.25 Floppy Drive

Enter 1 or 2, or press q to quit.
```

Press 2, then press <RETURN>.

4. The following message is then displayed:

```
You must create a new kernel to effect the driver change
you specified.

Do you wish to create a new kernel now?
```

Type Y to answer "Yes".

The following message is displayed:

```
Re-linking the kernel...
```

When the removal is complete, the following message is displayed:

```
External floppy drive removal procedure completed.
```

8.2 New Irwin Driver (XENIX-386 Only)

This release includes an enhanced Irwin driver. Several commands were added to the **tape**(C) command. New Irwin tape **ioctl**(S) commands are documented in **tape**(HW). In addition, the **mcconfig**(F) manual page discusses configuration strings that can be used to set certain hardware options. All Irwin features are discussed in the *System Administrator's Guide*.

Note

The use of pre-formatted tapes is recommended with the Irwin driver.

8.3 The tape load and tape unload Commands

The **load** and **unload** options of the **tape**(C) command are used on certain drives to load and unload the tape. Tape drives that support **load** and **unload** include:

- 9-track drives
- DAT drives
- Wangtek 5525ES
- Exabyte 8mm

The Exabyte and most DAT drives perform an automatic load when the tape cartridge is inserted. With 9-track drives and the Wangtek 5525ES, however, a **tape load** command must be issued before any other **tape** commands.

Certain SCSI tapes are easier to use if a **no unload** device is used; the **no unload** device prevents the tape from being automatically unloaded (ejected) after each access.

Some tape drives (such as the Wangtek 5525ES) also require a **load** command after an **unload**, although the unload is not obvious because the tape is not physically ejected.

The **mknod**(C) command is used to add new device nodes. You must supply a major and a minor device number. To create a "no unload" device for your SCSI tape drive, use the major number of your normal tape device and add 32 to the minor device number. Use the **ls -l** command to list the major and minor numbers. For example, to create the "no unload" counterpart to a */dev/rct0* with

a major number of 46 and a minor number of 0, log in as *root* and enter the following command:

mknod /dev/nurct0 c 46 32

This creates a device called */dev/nurct0*. You should use this device explicitly when you access your tape drive, or you can add the "no unload" device name to */etc/default/tar* or */usr/lib/sysadmin/schedule* (for scheduled backups) as desired.

Note

You need not use a "no unload" device if you are already using a "no rewind" device, because this device does not automatically unload the tape.

With a "no rewind" device, a file marker is placed automatically at the end of the file. Do not use **tape wfm** , because this will result in two end-of-file markers.

8.4 /dev/install: Formatting

The device */dev/install* is used only for installing XENIX and reading floppies. Attempts made to format this device may result in an error. When the system accesses this device, it does so by switching through the various densities until it matches the proper format. This is inappropriate for formatting floppies.

8.5 dtype(C): Incorrect Filesystem Reporting

The **dtype**(C) utility reports incorrect filesystem versions (e.g., System 3.x versus System V).

In addition, XENIX-386 **dtype** reports UNIX filesystems as "UNIX 1K filesystem--needs cleaning" regardless of whether it is clean or not.

8.6 tar(C), dd(C) and Blocking Factors

Certain tape drives (notably Irwin and the SCSI tape drives for Compaq EISA machines, and the Exabyte and IBM SCSI external floppy drives) require the inclusion of a blocking factor in **tar** and **dd** commands. The simplest way to do this for **tar** is to use an entry from */etc/default/tar*, as in the following example that uses the */dev/rctmini* device with a blocking factor of 20:

```
tar cv9 *
```

The blocking factor must be an even number; 20 is a good choice.

Note

When using **dd** on a binary file, set *conv=sync*. Consult the *SCO XENIX System V User's Reference* for details. In addition, you should use blocking factors of less than 46K. Failure to do so will result in a "not enough memory" or "out of range" error message.

8.7 The tape(C) Command with SCSI Drives

You must use the **-s** option with the **tape** command when you are using a SCSI drive.

8.7.1 tape(C) rfm and rewind Options for SCSI Drives

In order to use the **rfm** and **rewind** options of the **tape** command with SCSI drives, you must enter the following commands while logged in as *root* after running **mkdev tape**:

```
rm /dev/xct0
ln /dev/rct0 /dev/xct0
```

Note that this does not apply to 386 Microchannel machines.

8.7.2 tape(C) reset and status Options

The **tape reset** and **status** commands do not work with SCSI drives at this time.

9. Using a Mouse

9.1 Installing a Keyboard Mouse

A keyboard mouse is a mouse that connects to a special port found on some new AT-type and EISA machines, and all Microchannel machines. When installing a mouse using **mkdev mouse**, choose the keyboard mouse option only if you have a machine and mouse capable of using this port. On some AT-type machines that do not have a keyboard mouse port, installing a keyboard mouse may cause the keyboard to lock up after booting. If this happens, boot the previous kernel (**xenix.old**) and remove the keyboard mouse driver from the system using the remove option of **mkdev mouse**. This problem does not occur on systems with keyboard mouse ports.

9.2 Three Button Mouse Emulation

Microchannel platforms support emulation of a three button mouse using a two button mouse. Press both buttons simultaneously on a two button mouse to achieve the same result as a third mouse button.

9.3 Poor Keyboard Mouse Response

On some machines, keyboard mouse performance will be poor, with cursor movements tracking the mouse sluggishly. This can be improved by tuning an internal kernel parameter called *kbm_poll*. To do this, follow these steps:

Note

This procedure involves manipulating kernel values and should be performed by an experienced system administrator.

---

1. Log in as *root* and enter the following command:

   /etc/_fst /xenix

   The prompt changes to an asterisk (*).

2. Now enter:

   $d
   kbm_poll=D

   Write down the number displayed. This is the address of *kbm_poll*.

3. Quit by entering the following:

   $q

4. Now that you have determined the address of the *kbm_poll* kernel variable, you need to tune its value on your running kernel (*/dev/kmem*, **not** */xenix*). This allows you to interactively determine the best value for *kbm_poll*. First, switch to another multiscreen and start up a mouse-based application (for example, X-Sight).

5. Return to the first multiscreen and enter:
   /etc/_fst -w /dev/kmem

6. Enter the following command when the asterisk prompt appears:

   $d

7. Now you must tune the value of *kbm_poll* by changing it and observing the results on the multiscreen that is running the mouse. Enter the following, substituting the address you wrote down in step 2 for *address*:

   address/W80

   80 is the first value for *kbm_poll* that you are testing. This represents an approximate midpoint of the range of permissible values for *kbm_poll* (1-174).

8. Switch to the other multiscreen and test the mouse response. As the value of *kbm_poll* is reduced, mouse performance should improve, but if it is set too low, the mouse will stop working entirely.

9. Return to the other multiscreen and change the value of *kbm_poll* again. If the mouse stopped working, increase the value to 120. If it is still functioning (but sluggish), reduce it to 40. In this way you should repeat the process of switching screens and testing the mouse, then decreasing or increasing the value of *kbm_poll* by half until you obtain the best performance.

10. When the optimum value for *kbm_poll* is found, write it down, terminate the mouse-based application and return to the first multiscreen. Enter:

    $q

11. Now you need to change the value in the kernel that is stored on the hard disk. Enter the following, substituting the tuned *kbm_poll* number for *value*:

    /etc/_fst -w /xenix
    $d
    kbm_poll/W*value*
    $q

12. Use the **shutdown** command to reboot your system.

13. Now add the following lines to the end of the */usr/sys/conf/hdinstall* file, again substituting the tuned *kbm_poll* as you did earlier:

    ```
    /etc/_fst -w /xenix << EOF
    \$d
    kbm_poll/Wvalue
    \$q
    EOF
    ```

    This will make the necessary modification automatically each time you relink the kernel. If you do not do this, the keyboard mouse will revert to its former behavior the next time you relink.

9.4 Using mscreen(M) and usemouse(C)

If you are using **mscreen**(M) and **usemouse**(C) simultaneously, these two programs compete for the same pseudo-tty devices. To avoid potential conflicts, use the *.mscreenrc* file documented in the **mscreen** manual page. The *.mscreenrc* file allows you to assign a specific set of pseudo-tty devices to individual users. Each user using **mscreen** should have an *.mscreenrc* file in their home directory.

10. Using MS-DOS and OS/2

10.1 DOS Transfer Scripts (XENIX-386 Only)

Some handy new scripts for transferring multiple DOS files to and from XENIX are located in */usr/bin*:

fromdos transfers multiple files from DOS to XENIX

todos transfers multiple files from XENIX to DOS

lcase converts filenames from uppercase to lowercase

ucase converts filenames from lowercase to uppercase

10.2 MS-DOS and XENIX Partition Coexistence

XENIX supports the coexistence of MS-DOS™ in a separate partition on the same hard disk. The "Before You Start" chapter of the *Installation Guide* describes the restrictions and considerations that apply to installing on your XENIX system.

10.3 OS/2-XENIX Coexistence

Although it may install successfully, OS/2 may not be bootable on your machine, regardless of whether a XENIX partition is present or not; we cannot guarantee that OS/2 will work with XENIX. Contact your sales representative to determine if your machine should be able to run OS/2. If you wish to use OS/2 and XENIX or MS-DOS on the same disk, you must load them in the following order:

1. MS-DOS (partition must be 32MB or less)
2. XENIX
3. OS/2

There are no OS/2 tools available (such as the MS-DOS utilities that run under XENIX). In addition, you must use **fdisk**(ADM) to switch to or from OS/2.

Under XENIX, the OS/2 partition is displayed by **fdisk**(ADM) as MS-DOS.

10.4 dosdir(C)

The **dosdir** command under SCO XENIX does not have the same effect as the **dir** command in DOS. If you use **dosdir** on a directory name, the contents of the directory are listed, rather than the directory details.

10.5 dosformat(C): Formatting A:

You cannot use the **dosformat** command to format device A: because it is aliased to */dev/install* (see the section "/dev/install: Formatting" in these *Release Notes*). Use */dev/fd0* instead.

10.6 Bad Tracks in MS-DOS Area

XENIX does not record bad tracks in the MS-DOS area of the hard disk. If a bad track develops in the MS-DOS area, an operation such as **doscp** that attempts to access the affected area may fail. The message "Error on fixed disk" will result. For smaller files, it may be possible to copy the files to another location under MS-DOS and then transfer the copied version of the file.

11. Using Networks

The following notes apply to networked systems.

11.1 tar(C) and SCO TCP/IP or SCO Xsight

If you install SCO TCP/IP Release 1.0.1 or the SCO Xsight Supplement on SCO XENIX System V/386 Release 2.3.4, the application installs its own version of **tar** and moves the XENIX version to */usr/lib/custom/save*.

The TCP/IP and Xsight versions of **tar** do not recognize compressed files, so you are strongly advised to retrieve the XENIX version from */usr/lib/custom/save* immediately after installing either of these products.

This problem does not arise when installing the SCO TCP/IP Release 1.2.0 Runtime System (for SCO XENIX).

11.2 Third Party Modem Communications Programs and UUCP

The UUCP package (which includes **cu**(C)) must have ownership and exclusive write permission on ttys. Because the UUCP package sets permissions on tty devices used with modems, any changes made to accommodate other communications programs (such as **kermit**) will be altered by UUCP communications that access the same tty. For example, if tty1A is changed to include group write (664) permissions for use with another communications program, UUCP will restore the permissions to exclusive write (644). The solution is to change the binaries for other communications programs to be setuid *uucp*. To change the permissions on other programs, log in as *root* and enter the following commands (substituting the actual program name for *program*):

chown uucp *program*
chmod u+s *program*

11.3 RTS/CTS Flow Control Support

XENIX supports the 9 pin RS232 specification, and RTS/CTS flow control is only supported on writes and not reads.

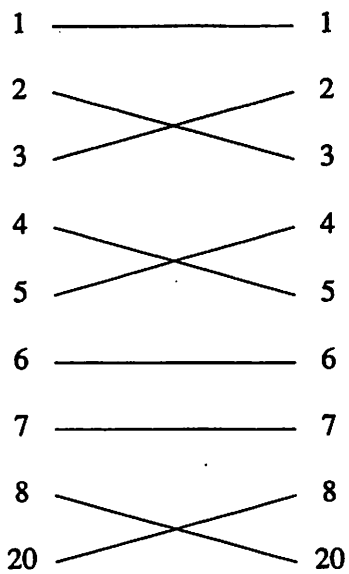
11.4 Hardware Flow Control on Serial Modem Lines (XENIX-286 Only)

CRTSFL is a new *c_cflag*. CRTSFL controls the flow of data along the modem line using hardware signals. The RTS and CTS lines can be used to transfer binary files in raw mode if required.

CRTSFL is defined in the file *termio.h*. The *termio.h* file is found in the directory */usr/include/sys*. CRTSFL is set to 0100000.

Before setting CRTSFL check that:

- you are using a modem line that is not attached to a modem. CRTSFL does not work with any other arrangement.
- the RS232C line has the following connections:



- CTSFLOW and RTSFLOW are not set. If either CTSFLOW or RTSFLOW is set, CRTSFL is disabled.

The following example shows a way of setting CRTSFL for the *c_cflag*:

```
#include <termio.h>

struct termio port;

setterm(dp)
{
if (ioctl (dp, TCGETA, &port) == -1)
      perror("ioctl GET"), exit(1);

port.c_cflag &= ~(CLOCAL | CBAUD);
port.c_cflag |=  (B9600 | HUPCL | CRTSFL);
port.c_oflag &= ~OPOST;
port.c_iflag &= ~(IXON | IXOFF);
port.c_lflag &= ~(ICANON | ECHO);
port.c_cc[VMIN]] = 1;
port.c_cc[VTIME] = 0;

if (ioctl(DP,TCSETA,&port) == -1;
      perror("ioctl SET"), exit(1);
```

For more information, see the **termio**(M) manual page in the *XENIX Reference.*

12. Using Your System

This section contains information of interest to XENIX users.

12.1 crypt(C): Availability

The **crypt**(C) command is not distributed with the XENIX System V Operating System. If you live in the United States, you can obtain the **crypt**(C) utility and associated **crypt**(S) libraries by contacting the support center listed on the support information card included with your software.

12.2 The Korn Shell: ksh(C) (XENIX-386 only)

ksh is the most recent version of the Korn Shell programming language, which is upward compatible with the Bourne Shell (with some exceptions; see "ksh and sh Incompatibilities") and has many added features. (The *XENIX User's Guide* contains "Using the Korn Shell (ksh).") **ksh** provides an enhanced programming environment in addition to the major command-entry features of the **csh**. With **ksh**, medium-sized programming tasks can be performed at shell level without a significant loss in performance. In addition, **sh** scripts can be run on **ksh** without modification. **ksh** also accepts 8-bit character sets.

ksh provides the following features:

- Enhanced command re-entry capability. The **ksh** history function records commands entered at any shell level and stores them, up to a user-specified limit, even after you log off. This allows you to re-enter long commands with a few keystrokes - even commands entered yesterday. The history file allows for 8-bit characters in commands and supports essentially unlimited size histories.

- In-line editing. In **sh**, the only way to fix mistyped commands is to backspace or retype the line. **ksh** allows you to edit a command line using a choice of EMACS-TC or **vi**(C) functions. You can use the in-line editors to complete filenames as you type them. You may also use this editing feature when entering command lines from your history file.

- Extended I/O capabilities. **ksh** provides several I/O capabilities not available in **sh**, including the ability to:
  - specify a file descriptor for input
  - produce a prompt at the terminal before a read
  - format and interpret responses to a menu easily
  - echo lines exactly as input without escape processing
  - read and echo lines ending in \.
- Improved performance. **ksh** executes many scripts faster than the System V Bourne shell. A major reason for this is that many of the functions provided by **echo** and **expr** are built in.
- Integer arithmetic. A built-in command in **ksh** allows you to do integer arithmetic in any base from 2 to 36. Almost the complete set of C language operators are available. Further, variables in arithmetic expressions may include one-dimensional arrays. Arithmetic expressions can be used to form arguments to commands.
- Shell functions and aliases. Two mechanisms, functions and aliases, can be used to assign a user-selected identifier to an existing command or shell script. Functions allow local variables and provide scoping for exception handling. Functions can be searched for and loaded on first reference as with scripts.
- Substring capabilities. **ksh** allows you to create a substring of any given string directly by stripping off leading or trailing substrings during parameter substitution. You can also specify attributes, such as upper- and lowercase, field width, and justification, to shell variables.

- More pattern matching capabilities. **ksh** allows you to specify regular expressions for file and string matches.

- Improved debugging. **ksh** can generate line numbers on execution traces. Also, I/O redirections are now traced. There is a DEBUG trap that gets evaluated after each command so that errors can be localized.

12.2.1 ksh and shutdown(ADM)

If you attempt to run **shutdown su** from within **ksh**, the system will hang (freeze). The workaround is to start a Bourne shell first and then run the command.

12.2.2 ksh and sh Incompatibilities

The following is a list of known incompatibilities between **ksh** and **sh**:

- If an environment parameter is modified by **ksh**, the new value is passed to the children. In **sh**, you must export the parameter for this to happen.

- **time** is a reserved word in **ksh**. Thus **time a | b** times the pipeline in **ksh** while only **a** is timed with **sh**. Unlike **sh**, you can also time built-in commands and functions with **ksh**.

- **select** and **function** are reserved words in **ksh**.

- Parameter assignments only have scope for the command or function they precede in **ksh**. Only a subset of built-in commands in **ksh** treat parameter assignments globally. In **sh**, all built-in commands and functions treat parameter assignments as globals.

- The output of some built-in commands and error messages is different in a few cases; for example, **times** produces two lines of output in **ksh** and only one line of output in **sh**.

- While loops with redirection are not executed in a separate process in **ksh**, so assignments made within loops remain in effect after the loop completes.

- The semantics of functions are somewhat different. **ksh** can have local variables and allows recursive functions. Errors in functions abort the function but not the script that they are in. The parameter **$0** is the name of the function in **ksh**.

- The name space for functions and variables is separate in **ksh**. In **sh** they share the same space. The built-in **unset** requires a **-f** flag to unset a function in **ksh**.

- Words that begin with ~ can be expanded in **ksh**. **sh** does not have this feature.

- The character ^ is not special in **ksh**. In **sh** it is an archaic synonym for |.

- Whenever a command is surrounded by ((and)), **ksh** assumes that an arithmetic expression follows. In **sh** this means a subshell inside a subshell.

- Non-blank contiguous IFS delimiters generate a null input argument. Therefore, you can use IFS=: and correctly read the */etc/passwd* file even when fields are omitted. In **sh**, multiple delimiters count as a single delimiter.

- Arithmetic test comparison operators (**-eq**, **-lt**, ...) allow any arithmetic expressions. **sh** allows only constants. If you say **test x -eq 0** in **sh**, which is meaningless, it returns true, but in **ksh** it depends on the value of the variable **x**. If there is no variable **x**, then **ksh** produces an error message.

- The environment handed down to a program is not sorted in **ksh**. (Sorted environments are a quirk of **sh**. This should not be relied upon because any user program can provide an environment list which does not have to be sorted.)

- The expansion of **$@** with no arguments produces the null string in the Bourne shell and produces nothing with **ksh** when there are no arguments. Setting **--** with no arguments unsets the positional parameter list in **ksh**. Thus, scripts that use set **--** **$@** when there are no positional parameters do not break.

- **ksh** accepts options of the form **-x -v** as well as **-xv** both for invocation and for the **set** built-in. The Bourne shell only allows one option parameter.

- **ksh** does not allow unbalanced quotes with any script. If the end of file is reached before a balancing quote in **sh**, it quietly inserts the balancing quote. **ksh** behaves like **sh** for **eval** statements.

- Failures of any built-in command cause a script to abort in **sh**. **ksh** scripts will only abort on errors in certain documented built-ins. In this respect **ksh** treats most built-in commands semantically the same as non-built-in commands.

- The sequence **$(** is special in **ksh**. In **sh** the sequence is illegal unless quoted. **"$("** must be preceded by a **** in **ksh** to remove its special meaning.

- The built-in command **exec**, when used without arguments (for I/O redirection), closes on execution each file unit greater than 2.

13. Internationalization

XENIX-386 includes support for internationalization, including the handling of international character sets, collation sequences, monetary symbols, and so forth. In addition, the following utilities now handle 8-bit characters:

backup(ADM)	fgrep(C)	netutil(ADM)	rmuser(ADM)
cat(C)	file(C)	passwd(C)	sddate(ADM)
cmp(C)	find(C)	pg(C)	sed(C)
date(C)	finger(C)	pr(C)	sort(C)
dd(C)	grep(C)	pwadmin(ADM)	tail(C)
dos(C)	head(C)	rcp(C)	tr(C)
dumpdir(ADM)	ls(C)	red(C)	translate(C)
echo(C)	mail(C)	remote(C)	wc(C)
ed(C)	mapscrn(M)	restore(ADM)	who(C)
egrep(C)	more(C)	rm(C)	
expr(C)	ncheck(ADM)	rmdir(C)	

The following manual pages describe the internationalization features:

montbl(M)	coltbl(M)	numtbl(M)	chrtbl(M)
timtbl(M)	environ(M)	mestbl(M)	locale(M)

13.1 mapchan(M) -a Option

There is a known problem with the **-a** option of the **mapchan**(M) utility. If the */etc/default/mapchan* file contains more than 2 entries, **mapchan -a** displays an "out of memory" message and will not map any of the ports listed in */etc/default/mapchan*. A simple workaround is to map each port individually with the **mapchan -f** command.

14. System Configuration and Link Kit Notes

14.1 Applying Kernel Patches with scopatch(ADM) (XENIX-386 Only)

The **scopatch**(ADM) utility is used to install kernel patches stored in */usr/lib/scopatch*. At this time the following patches are available:

parallel	Slow parallel printer patch
pktime	Change **uucico** pktime parameter
window	Change **uucico** windows parameter

The parallel printer patch can be used if the fix described in "Slow Parallel Printers" in the "Troubleshooting Your System" chapter of the *System Administrator's Guide* has no effect.

In order to use these patches, you must first do this:

1. Enter the following command while logged in as *root*:

   ln /etc/_fst /etc/adb

2. If you plan to apply the window patch, first edit the */usr/lib/scopatch/window* file and change lines 46-48 to read like this:

   ```
   \$d
   _windows/w ${WS}
   \$q
   ```

3. If you plan to apply the pktime patch, first edit the */usr/lib/scopatch/window* file and change lines 47-49 to read like this:

   ```
   \$d
   _pktime/w ${PT}
   \$q
   ```

4. The parallel patch should work correctly without modifications.

The *pktime* and *windows* parameters are described in the **uucico**(ADM) manual page.

See the **scopatch**(ADM) manual page for instructions.

14.2 hwconfig(C): System Configuration Information

The system configuration messages displayed at boot time are now captured and stored in the file */usr/adm/hwconfig*. The **hwconfig**(C) utility is used to retrieve this information as needed. Refer to the **hwconfig**(C) manual page for details. This is intended to assist in support and problem diagnosis.

The **-c** and **-q** options to **hwconfig** are only valid on XENIX-386 distributions.

14.3 10-bit I/O Addressing Check

XENIX detects machines that have only 10-bit I/O addressing. The message:

```
kernel: INFO: 10 bits of I/O address decoding
```

is displayed at boot time. Such machines cannot use cards configured at addresses above 0400H. Cards must all be configured below 0400H on machines with only 10 bits of I/O address decoding.

14.4 Wyse Panic Message on Non-Wyse Machines

Non-Wyse machines running a kernel serialized with a WYSE serial number will panic with the following message:

```
kernel: PANIC: ** WYSE/SCO XENIX
only operates on WYSE PC systems **
```

14.5 Near Data Considerations (XENIX-286 Only)

The **configure** utility is used to alter parameters that affect system performance. This allows you to maximize the use of the resources on your system through kernel tuning. 286 machines require special consideration because of the distinction made between near and far kernel data. The **configure** utility now provides facilities to move data between the near and far kernel data. These facilities can be accessed through the **configure** menu. Refer to the "Tuning System Performance" chapter in the *System Administrator's Guide* for details about the existing **configure** utility.

14.5.1 BDEVSWFAR and CDEVSWFAR

bdevsw and **cdevsw** are tables of information which are stored in the near data segment. Moving **bdevsw** and **cdevsw** to a far data segment allows you to free about 2K memory in near data. **BDEVSWFAR** is an option available to allow you to keep **bdevsw** in near data or move it to a far data segment. Similarly, **CDEVSWFAR** is an option to allow you to keep **cdevsw** in near data or move it to a far data segment. **BDEVSWFAR** and **CDEVSWFAR** can be accessed in the following way:

BDEVSWFAR	select the "Disks and Buffers" category from the **configure** menu. The default value of **BDEVSWFAR** is 0, storing the table in near data. Changing the value to 1 results in the table being stored in far data.
CDEVSWFAR	select the "Character Buffers" category from the **configure** menu. The default value of **CDEVSWFAR** is 0, storing the table in near data. Changing the value to 1 results in the table being stored in far data.

Note

Some packages require these tables to be stored in near data. If the following message appears:

```
ld: Unresolved externals:
        _bdevsw in file(s):
            xxx.o (xxx.c)
```

the file xxx.o is the file needing **bdevsw** to be found in near data. Change the value of **BDEVSWFAR** to 0 to move **bdevsw** back into near data. A corresponding message would appear for **cdevsw.**

14.5.2 Buffer Headers and Character Lists

When the system is booted the buffer headers and character lists are stored in any remaining space in near data, and in far data if necessary. When the **configure** utility is called the following information is displayed:

```
Kernel: drivers = 0k, msg bufs = 8k, 4 screens = 19k,
        xxx block i/o bufs = xxxk,
        xxx character lists
```

where xxx is the number of buffer headers and character lists the system has allocated.

A single figure means the system has stored all the buffer headers and/or character lists in near data. For example:

```
265 block i/o bufs = 265k, 100 character lists
```

means the system has stored all 265 buffer headers and 100 character lists in near data.

If a pair of numbers is displayed, for example:

```
78+187 block i/o bufs = 265k, 34+66 character lists
```

this means the buffer headers are stored in near and far data: 78 buffer headers in near data and 187 buffer headers in far data. Similarly, 34 character lists are stored in near data and 66 character lists are stored in far data.

If the system cannot allocate an adequate proportion of buffer headers and character lists in near data, for example :

```
6+259 block i/o bufs = 265k,16+84 character list
```

the system displays either or both of the following messages:

```
cbinit: WARNING: Can't allocate xxx
i/o buf headers near
cbinit: WARNING: Can't allocate xxx
character lists near
```

where xxx is the number of near buffer headers or near character lists that the system tried to allocate unsuccessfully. The system can continue running but there may be problems when programs start accessing information from the buffer headers and/or character lists. Return to the **configure** utility to examine the system parameters for ways to free more near data space.

The levels at which these warnings appear can be adjusted using the **configure** utility. The **NNEARBUFHD** option in the "Disks and Buffers" category of the **configure** menu sets the minimum number of near buffer headers the system should try for. The **NNEARCLIST** option in the "Character Buffers" category of the **configure** menu sets the minimum number of near character lists the system should try for. If you do not set **NNEARBUFHD** and **NNEARCLIST** the system estimates how many near buffer headers and near character lists to try for: depending on the way your system is actually used, these estimates may be too high or too low.

If the following message appears after booting:

```
cbinit: PANIC:at least xxx bytes
of near data must be freed
```

this indicates that the system cannot store enough buffer headers or character lists in near data and the system cannot continue running. Return to the **configure** utility to examine the system parameters for ways to free more near data space. If this is not possible you need to look at the combination of packages installed on your system as these packages are occupying too much space in near data for the system to run efficiently (if at all).

14.5.3 Modifications to the *link_xenix* file

It is possible to edit the *link_xenix* file to maximize the use of near and far kernel data. (Note that this file cannot be changed through the **configure** utility but can be edited directly). Typically, the *link_xenix* file looks like this:

```
[ -f xenix ] && mv xenix xenix-
ld -Mm -D 18 -B 30 -A 800 -S 512 -o xenix /
KMses.o oemsup.o oem.o tab.o c.o space.o uts.o kid.o /
../mdep/libmdep.a ../sys/libsys.a ../xnet/libxnstub.a /
../io/libio.a ../io/libiostub.a /
  Klibc.a
exit $?
```

Adding the object file:

```
../sys/prim2.o
```

into the *link_xenix* file just before

```
../sys/libsys.a
```

allows the kernel to make better use of character lists in far data, therefore requiring fewer character lists to be stored in near data.

The *link_xenix* file now looks like this:

```
[ strapped -f xenix ] && mv xenix xenix-
ld -Mm -D 18 -B 30 -A 800 -S 512 -o xenix /
KMses.o oemsup.o oem.o tab.o c.o space.o uts.o kid.o /
../mdep/libmdep.a ../sys/prim2.o ../sys/libsys.a ../xnet/libxnstub.a/
../io/libio.a ../io/libiostub.a /
    Klibc.a
exit $?
```

Please note that some packages do not work when this change is made: for example, SCO MultiView 1.5. In these cases, edit the change out of the *link_xenix* file and return to the **configure** utility to examine the system parameters for ways to free more near data space. If this is not possible you need to look at the combination of packages installed on your system as these packages are occupying too much space in near data for your system to run efficiently (if at all).

15. UNIX System V Applications Compatibility

15.1 Binary Compatibility with UNIX COFF Files (XENIX-386 Only)

XENIX-386 now supports the runtime execution of AT&T UNIX V/386 COFF format binaries (including those that make use of shared libraries).

A version of the UNIX Shared C library (*/shlib/libc_s*) is supplied with XENIX-386.

In addition, XENIX-386 now supports the **cxenix**( ) system call.

15.2 Other COFF Compatibility Features (XENIX-386 only)

In addition to direct binary compatibility there is compatibility within the linker, to link both COFF and OMF format object modules and libraries into a XENIX format *x.out* executable file.

The **coffconv**(M) utility converts 386 Common Object Format Files (COFF) to XENIX OMF file format. The **coffconv**(M) manual page states that if it is run on an executable binary, it is converted to *x.out* format. Note that this is unnecessary and should be avoided. In addition, **coffconv** cannot be used to convert files that make use of shared libraries.

15.3 UNIX System Call Compatibility (XENIX-386 only)

XENIX now supports the following AT&T UNIX System V/386 Release 3.1 system calls:

mkdir(S) **rmdir**(S) **getdirents**(S) **searchdir**(S)
sysi86(S) **eaccess**(S)

15.4 Advisory File and Record Locking Support

XENIX now supports advisory locking of records and files. Prior to the 2.3 release, only mandatory locking was supported. Mandatory locking means that a process attempting to read or write a section of a file that is locked by another process either has to go to sleep waiting for it to be unlocked, or accept the failure of the system call. Under advisory locking, processes are expected to cooperate by not reading or writing sections of a file unless a lock can be obtained. The system will not prevent processes from violating these cooperative procedures as it does with mandatory locking.

The AT&T default is advisory locking. The default for new binaries created with the Release 2.3 XENIX Development System using the SVID-defined system calls **fcntl**(S) or **lockf**(S) and running on Release 2.3 (or later) is also advisory. Usage of **locking**(S) will create locks that have the mandatory attribute for backwards compatibility.

The following guidelines should be used:

- Advisory locking only takes place on XENIX Release 2.3 (or later) systems when a binary with the "advisory locking" flag set in the **x.out** header uses either **lockf**(S) or **fcntl**(S) system calls to lock a file whose access mode does not require mandatory locking to be enforced (see **chmod**(C)).
  (The advisory locking flag is set by default in binaries developed on the XENIX Release 2.3 Development System or later.)

- Mandatory locking takes place in all other cases. That is:
  - — On all XENIX systems prior to Release 2.3.
  - — On XENIX Release 2.3 if:
    a) the **locking**(S) call is used.
    b) the "advisory locking" flag in the **x.out** header is *not* set.
    c) the "advisory locking" flag in the **x.out** header is set, but the access mode of the file requires mandatory locking to be enforced (see **chmod**(C)).

New linker options **–La** and **–Lm** to the **ld** command allow selection of advisory or mandatory for new binaries. These options have also been added to **fixhdr**(C) and are reported by **hdr**(CP).

15.5 UNIX Device Naming Conventions

AT&T conventions for device names are now supported to ensure code portability. The XENIX conventions are still supported. The directories and naming schemes are discussed in the "XENIX Directories and Special Device Files" chapter of the *XENIX System Administrator's Guide*.

15.6 Streams Support

Streams support, which AT&T licenses under a separate Network Services Extension schedule, includes system call and library Streams support. The *SCO Streams Runtime*, or the complete *SCO Streams System*, adds this facility to SCO XENIX System V.

15.7 Floating Point Compatibility

The floating point emulator supplied with this release does not fully emulate all of the 80287/80387 floating point instructions that are used by the AT&T C compiler and math libraries. If you intend to run COFF binaries that use floating point arithmetic, you should ensure that you have an 80287 or 80387 coprocessor installed.

However, both the software emulation and hardware interface conform to the "IEEE P754 Standard for Floating Point Arithmetic".

15.8 Limitations of UNIX binary Compatibility (XENIX-386 only)

There are several restrictions that apply to the execution of COFF binaries:

- Only AT&T UNIX System V Release 3 COFF binaries are supported.

- COFF binaries that do any of the following are **not** supported:

  — Make use of device-specific **ioctl**(S) calls (for example, floppy disk formatting utilities).

  — Use the **ptrace**(S) system call, such as **adb**.

  — Rely on specific details of the UNIX environment (for example, the absolute address at which the stack begins).

  — Rely on the layout of kernel data structures (for example, system utilities such as **ps**(C)).

  — Know about the filesystem structure (such as **fsck**).

15.9 AT&T System V Interface Definition Conformance

The AT&T SVID System V Interface Definition is a 3 volume set of books published by AT&T (select code 307-127).

SCO XENIX System V has been tested against the AT&T SVVS3 tests, and the conformance has been verified.

15.9.1 Areas of Conformance to the SVID

SCO XENIX System V Operating System Exceptions

BASE	**OS**
COMPLIANT	all
BASE	**LIB**
COMPLIANT	all
KERNEL EXTENSION	**OS**
COMPLIANT	all
BASE UTILITIES	**CMD**
COMPLIANT	all
ADVANCED UTILITIES	**CMD**
COMPLIANT	all
ADMINISTER SYSTEM	**CMD**
FUSER (AS_CMD)	fuser
FWTMP (AS_CMD)	fwtmp, wtmpfix
SA1 (AS_CMD)	sa1, sa2, sadc
SADP (AS_CMD)	sadp
SAR (AS_CMD)	sar
SYSDEF (AS_CMD)	sysdef
TIMEX (AS_CMD)	timex
ACCTCMS (AS_CMD)	acctcms
ACCTCON (AS_CMD)	acctcon1, acctcon2, prctmp
ACCTMERG (AS_CMD)	acctmerg
ACCTPRC (AS_CMD)	acctprc1, acctprc2
DISKUSG (AS_CMD)	diskusg, acctdisk
KILLALL (AS_CMD)	killall
RUNACCT (AS_CMD)	runacct
VOLCOPY (AS_CMD)	volcopy, labelit
MAILX (AU_CMD)	mailx
TABS (AU_CMD)	tabs
SOFTWARE DEVELOPMENT	**LIB**
DIS (SD_CMD)	dis
MARK (SD_LIB)	MARK
SOFTWARE DEVELOPMENT	**CMD**
COMPLIANT	all

SCO XENIX System V Operating System Exceptions *(Continued)*

TERMINAL INTERFACE	**LIB**
COMPLIANT	all
TERMINAL INTERFACE	**DATA**
COMPLIANT	all
TERMINAL INTERFACE	**CMD**
COMPLIANT	all
TERMINFO COMPATIBILITY	**OPTION**
COMPLIANT	all
TERMCAP COMPATIBILITY	**OPTION**
COMPLIANT	all

15.9.2 SCO XENIX System V Streams (Separate Product)

NETWORK SERVICES (streams)	**OS**
COMPLIANT	all
NETWORK SERVICES (TLI)	**LIB**
COMPLIANT	all
NETWORK SERVICES (RFS)	**CMD**
ADV (NS_CMD)	adve
DNAME (NS_CMD)	dname
FUSAGE (NS_CMD)	fusage
IDLOAD (NS_CMD)	idload
FSTOP (NS_CMD)	rfstop
UNADV (NS_CMD)	unadv
FUMOUNT (NS_CMD)	fumount
NSQUERY (NS_CMD)	nsquery
RFADMIN (NS_CMD)	rfadmin
RFPASSWD (NS_CMD)	rfpasswd
RFSTART (NS_CMD)	rfstart
RMNSTAT (NS_CMD)	rmnstat

15.9.3 Differences in Default Terminal Settings

The SCO XENIX System V Operating System Release 2.3 conforms with the following exceptions found on the **termio** manual pages (**termio**(dev) for SVID and **termio**(M) for XENIX System V:

Termio Characters/values	SVID Specification	SCO XENIX V Implementation
QUIT	<CTL>-|	<CTL>-\
ERASE	#	<CTL>-H
KILL	@	<CTL>-U
38400 baud	B38400	not included
default initial baud rate	B300	B9600

15.10 4BSD/SunOS Compatibility

15.10.1 select(S) System Call (XENIX-386 only)

XENIX now supports the use of the 4.2 BSD **select**(S) call, which allows programmers to block on reading from multiple devices or files and pipes.

There are many other commands and library functions derived directly from releases of UNIX from UC Berkeley. The "BSD" extensions in SCO XENIX makes it easy to port and run applications from those environments.

15.10.2 Inode Name Caching

This release includes inode caching. The names (namei) of recently used files are stored in a cache. This can reduce the time the system spends connecting a file name with its contents. (Executables and data files are treated equally.) If files are accessed multiple times, this increases the efficiency of your system.

15.11 POSIX P1003 Conformance

The referenced standard is published by the IEEE. SCO XENIX largely conforms to the POSIX P1003.1 Operating System Interface Specification.

These changes are minor, as POSIX P1003.1 and SVID Volume 1 (for example, BASE and KERNEL EXTENSION) sections are almost identical. The **pax**(C) command (POSIX archive command) has been added to this release.

15.12 The ISO 8859 Character Set

The operating system can handle all programs using the ISO 8859 character sets providing full 8 bit support and configurable for 7 and 8 bit peripherals with different character sets, including mapping files and conversion tools.

15.13 X/Open CAE Conformance

The X/Open specification is defined in the X/Open Common Applications Environment (CAE) "X/Open Portability Guide," published by X/Open, Ltd. This specification includes systems and applications software, including languages and database systems. SCO offers a full X/Open CAE compatible product line.

The Operating System portion is defined by the X/Open XVS. This specification is 99% identical to the SVID and the stated direction of the XVS is towards POSIX P1003.1 after approval.

.In addition the XVS specifies 8-bit libraries and 8-bit versions of commands for the International market. These features have been added to the SCO XENIX Operating System and Development System.

Appendix A

SCO XENIX System V

Release 2.3.4 (386) & 2.3.2 (286)

Compatible Hardware for Standard Architecture Platforms

A.1 Using This Appendix

The SCO XENIX System V Operating System is available for many configurations of Personal Computer hardware on the following platforms:

- Extended Industry Standard Architecture (EISA)
- Industry Standard Architecture
- Microchannel Architecture

This appendix contains information about hardware that is compatible with standard architecture platforms. If you are using a microchannel architecture machine, go to Appendix B. ("Microchannel architecture" refers to computers that are compatible with the IBM PS/2 computers.)

This appendix is divided into several sections. The first two sections list the supported machines by microprocessor type. The remaining sections cover specific configuration details, including charts of compatible peripherals, and provide guidelines for using serial cards, video adapters, monitors, hard disks and controllers. System parameters necessary for these devices are also described. These guidelines must be followed to ensure satisfactory system performance.

Your hardware configuration must have the original settings and boards before you install the SCO XENIX System V Operating System. If you have added any boards, make sure that all switches are set as recommended in the manufacturer's hardware manual for that board.

Note

The specific hardware listed in these *Notes* has been used with the SCO XENIX System V Operating System. However, because compatible machine or add-on peripheral manufacturers may change configuration, functionality, or firmware at any time, no guarantee is implied. Please write to us with accurate hardware information for possible inclusion on our lists.

To find a listing of compatible hardware for your machine, you must know the processor your machine uses. You should also know if there are enhancements to your system, such as a non-ST506 AT disk controller. To find the available classifications of machines, refer to the section entitled "Supported Hardware Configurations", which follows this introduction. Find your hardware configuration in the right hand column and match it with the corresponding version of XENIX in the left hand column. This appendix contains specific references to compatible hardware for each version of XENIX.

A.1.1 Supported Hardware Configurations

The SCO XENIX System V Operating System Release 2.3 is available for several machine configurations. The XENIX kernel runs in one of two modes:

Processor	Mode
80286	Segmented mode (protected)
80386	Demand paged virtual memory mode (protected)

Your version of XENIX is for one of the following machines:

XENIX version	Hardware Configuration
286AT	Standard 286-based personal computer
386GT	Standard 386-based personal computer with support for Adaptec AHA-154x SCSI Host Adapter, SMS/OMTI 862x Direct ESDI disk controller, and a standard (WD1010 style) interface

---

Note

For standard architecture machines with bus speeds greater than 6 MHz, check with your peripheral vendor to verify that their hardware will run under your configuration. Malfunctions with slow hardware are especially noticeable in a 386 environment.

Some standard architecture computers arrive with the hard disk only partially formatted. If you have such a machine, use the MS-DOS hard disk format command or Diagnostics diskette to format the entire disk before installing the SCO XENIX System V Operating System.

Some computers require specific switch settings to run the SCO XENIX System V Operating System. If your computer does not run the SCO XENIX System V Operating System with the settings as shipped, contact your computer hardware representative for the correct settings.

The following sections describe the hardware that can be used with the standard XENIX Operating System Release 2.3 distribution on standard architecture platforms. There are many other devices that you can use, which require additional vendor supplied software. These are available from independent hardware vendors. Call your dealer or SCO sales representative and ask for the SCO System V Directory.

If your computer is listed as a supported machine in this appendix, it should run XENIX without adding any hardware or changing any jumper or switch settings. This appendix is provided as a reference so that you can check the compatibility of any piece of hardware you own or may wish to buy in the future.

Note

The machines supported are not always supplied with video cards from the same manufacturer. Please check the video card for compatibility.

A.2 Supported Standard Architecture 286-based Machines

The following machines are supported under the SCO XENIX 286 Operating System:

- ACER 900
- ACS ET-286
- American Research Corporation (ARC-AT)
- AST Premium 286
- AT&T 6310
- Basic Time BT/AT
- Compaq Portable, Portable II, DESKPRO 286, 386* and DESKPRO II
- Compuadd 286 16Mhz
- Compuadd 286 20Mhz
- Contel/CADO AT/4
- CSS 286

CSS 286
Data General DASHER/286
Data Storage 286-12
Epson Equity III and Equity III+
GRIDCase 1520
Hewlett-Packard 286/12
Hewlett-Packard Vectra ES/12 PC
IBM PC AT (6Mhz or 8Mhz version)
IBM XT/286
ITT XTRA XL
MAD 286 AT
Memorex 7045
Mitsubishi MP 286
NCR PC-8 †
NCR PC 810 286
NEC APC IV
NEC PowerMate 286
NEC BusinessMate 286
Nixdorf M45
Nixdorf M55
Olivetti M28
Olivetti M280
Olivetti M290
Olivetti PCS 286
PC's LIMITED AT™
Philips 386 P3371
Philips P3400
Sharp PC 7511
Tandy 3000
Texas Instruments Business Pro
Texas Instruments System 1100
Tomcat 3200-AT
UNISYS PC/IT
Victor V286
Wang PC-280 286
WYSEpc 286 WY-2200
Zenith SuperSport 286

Zenith z200 series
Zenith z286
Zenith z286-LP
Zenith z241
Zenith z248
Zenith z248/12

* Run in 286 Mode.

† Configure the CMOS database for color monitor, regardless of the type of monitor used.

These machines have been reported to run XENIX-286, but we have not tested them:

Corona ATP
Kaypro 286i

A.3 Supported Standard Architecture 386 and 486-based Machines

The following machines are supported under the XENIX 386GT Operating System:

ALR FlexCache 20/386
ALR FlexCache 25/386
ALR FlexCache 33/386 Model 150
ALR Microflex 7000
ALR PowerCache 486e
Apricot XEN-S 386
Apricot LS 386SX
AST Premium 386
AST Premium 386/33
AST Premium 486/25T
AT&T 6386e/33
AT&T PC6386/25
Laguna Systems PDQ386
Mitac 386
ACER 1100SX
ACER 1100/20†

ACER 1100/33‡
ACER 1170
ACER Acerframe 3000 (aka 3235)
ACER System 32/20
Compaq 386
Compaq 386 33 Mhz
Compaq Portable III 386
Compaq DESKPRO 386/20
Compaq DESKPRO 386/25
Compuadd 386
CSS 386
DECstation 316+
DECstation 320
DECstation 325
DECstation 325c
DECstation 333c
DECstation 425
EasyData 386 model 333
Epson Equity 386SX
Epson Equity 386SX/20 Plus
Epson Equity 386/25Δ
Epson Equity 386/25 Plus
Epson Equity 386/20ΔΔ
Everex 386/20
Everex 486/33
Goupil uniprocessor 25MHz Tower
GRiDCase 1530
Hertz 386/25
Hewlett-Packard Vectra 386/25
Hewlett-Packard Vectra QS/16S
Hewlett-Packard Vectra QS/20
Hewlett-Packard Vectra RS/16 PC
Hewlett-Packard Vectra RS/20 PC
Hewlett-Packard Vectra RS/20C
Hewlett-Packard Vectra RS/25C
HP 486/25T
HP 486/33T

Intel 302
ITT 386
Legacy 386/33
Microflex 3300
Mitsuba 386
Mitsubishi PC-386
NCR 316
NCR 316SX
NCR 3386
NEC BusinessMate 386
NEC BusinessMate 386/33
NEC Businessmate 486/25e
NEC PowerMate 386
NEC PowerMate 386/25
NEC 386 20 Mhz
Noble 386 from PC Discount
Nokia Alfaskop System 10 m52
Nokia Alfaskop System 10 m54/m55
Northgate 386/33 Elegance
Olivetti M380
Olivetti M380 XP3
Olivetti M380 XP5
Olivetti M380 XP7*
Olivetti M380 XP9*
Olivetti M386/25
Olivetti CP486 (aka LSX5010)
Olivetti M486
Olivetti/Triumph Adler M316
Olivetti/Triumph Adler PCS 386 SX
Olivetti/Triumph Adler Walkstation 386 33
PC Craft PCC 2400 386
SNI PCD 3M
SNI PCD 3M SX
SNI PCD 4M
SNI PCD 3T
SNI PCD 3T SX
SNI PCD 4T

Tandy 4000
Tatung Force 386X
Tatung TCS-8000 386
Tatung TCS-8600 386
Televideo 386/25
Texas Instruments System 1300
Toshiba T3100SX
Toshiba T3200SX
Toshiba T5100
Toshiba T5200
Toshiba T8500
UNISYS PW2 Series 800/20
Victor 386 25 MHz
Victor 486 25 MHz (V486T)
Wang PC 380
Wyse 386
Zenith SuperSport 386sx
Zenith 386/20 model ZVB 3524ED
Zenith Z-386/16
Zenith Z-386/25
Zenith Z-386/33
Zenith TurbosPORT

* On the XP7 and XP9, XENIX does not boot from the floppy drive if the Floppy Disk Access Speed Option is set in slow mode. The slow mode option is provided for the MS-DOS environment, and is not intended to be used in the XENIX environment. To boot your system from the floppy disk, ensure that this option is set to fast mode.

† The ACER System 15 Model 10 is equivalent to the ACER 1100/20.

‡ The ACER System 15 Model 20 is equivalent to the ACER 1100/33.

Δ The Epson PC AX3/25 is equivalent to the Epson Equity 386/25.

ΔΔ The Epson PC AX3 is equivalent to the Epson Equity 386/20.

The Intel Inboard in an IBM PC/AT or Intel-supported 286AT compatible is also supported.

The Orchid JET 386 in an IBM PC/AT or Orchid-supported 286AT compatible has also been reported to run XENIX-386.

The AOX Master 386 in an IBM PC/AT or AOX-supported 286AT compatible has also been reported to run XENIX-386.

These machines have been reported to run XENIX, but we have not tested them:

Cheetah CAT-386
Corvus 331
Arnet Multiuser 386
NCR PC916

Note that the personality card supplied by NCR must be configured so that the Video Adapter auto-switch feature is disabled.

A.4 Math Co-processor Chips

Your personal computer may include the 80287 or 80387 math coprocessor, which is automatically detected and supported by SCO XENIX System V. These coprocessors improve floating point efficiency. The 80486 DX CPU includes an on-chip coprocessor that is also recognized and used as an 80387.

Use math coprocessors matching your machine's CPU speed. Follow the manufacturer's recommendations.

At boot time, the XENIX System V Operating System announces the presence of a math coprocessor with the message:

```
%fpu  - 35 - TYPE=80387
```

if an 80387 is detected:

```
%fpu - 35 - TYPE=80287
```

if an 80287 is detected. Please note that switches on the main system board must be set properly to enable 80287 or 80387 interrupts or your system must be set up with the manufacturer's setup disk to expect the chip. Ensure that the system diagnostics recognize the coprocessor presence and check your hardware manual for the proper switch settings.

expect the chip. Ensure that the system diagnostics recognize the coprocessor presence and check your hardware manual for the proper switch settings.

Please note that on some motherboards, XENIX 386 incorrectly recognizes the presence of an 80387 coprocessor even if the chip is not installed. This problem is prevalent on machines that use the Intel motherboard. If your computer incorrectly recognizes the presence of an 80387 chip, make sure that blocks E48 and E49 are not connected with a jumper connection.

XENIX 386 supports both the 287 and 387 math coprocessors and the 486 DX, which has a built-in coprocessor.

A.5 Memory Cards

In general, most memory cards work with XENIX. If you experience "panic: parity" errors it is often because of low quality memory chips, cards or SIMMs. This problem is especially prevalent with the 32-bit static RAM chips used in older 386 machines.

With memory cards, check the switch settings on both the card and motherboard. Refer to the hardware manuals for your computer and for the memory card to find the correct switch settings. The SCO XENIX 286 and SCO XENIX 386 Operating Systems support up to 16MB of main memory.

32-bit Memory and 386 Machines

In the case of 386 machines, it is *strongly* recommended that you use 32-bit memory from your machine manufacturer. 16-bit memory is much slower, and may actually degrade overall machine performance. Several manufacturers have not resolved DMA issues relating to 16-bit memory, and such machines will not recognize 16-bit memory. When in doubt, consult the hardware manufacturer.

Remember: Certain manufacturers reserve the upper 384K of the first megabyte for MS-DOS. On some machines, this "shadow" RAM cannot be accessed by XENIX. You may need to install additional memory in order to run XENIX.

If you see this message:

```
panic: memory failure -- parity error
```

some part of your hardware is sending a "non-maskable memory error interrupt" (a signal sent by the hardware that halts the operating system). You should run your system's hardware diagnostics tests if available. In addition, physically re-seat your memory cards and chips, and check for bent pins, etc. If these measures fail to correct the problem, or you don't feel comfortable in checking your hardware yourself, seek assistance from professional hardware experts. One frequent cause of problems is memory chips that are slower than factory-recommended chips.

In addition, you should disable the autoswitch feature on VGA and EGA cards.

A.5.1 Supported Memory Cards

We have used the following memory cards:

AMI SMART PACK 2
AST
JustRAM/AT 8MB Card (Monolithic Systems)
Quadram
Tecmar
Talltree Systems
Silicon Valley Systems
STB Rio Grande
Micron Chessmate

A.6 Serial I/O Boards

This section describes the conditions and results of using various serial I/O boards with XENIX. Standard single port serial I/O boards, and the serial ports on many multi-function boards, function as expected if COM1 and COM2 are fully compatible with the standard specifications for these serial ports. These parameters are explained later in this section.

Memory, parallel ports or other hardware will usually also function as expected.

To configure the system for the serial board you are installing, you must run the **mkdev serial** command. See the chapter of the *System Administrator's Guide* entitled "Adding Multiport Cards, Memory, and Other Bus Cards", for more information on **mkdev serial.**

Note

If you are installing a "smart" multiport card (such as the Arnet Smartport card), do not use **mkdev serial** to configure your card. The manufacturer provides configuration software that is **custom**(ADM)-installable. Consult your hardware documentation for additional information.

Some 16-port cards have full modem control signals on the first four ports only. This means a modem will only function properly on the first four ports.

Each multiport serial I/O board is unique; XENIX has a special driver code for each card listed. Only those with status poll registers can work with the high performance driver scheme chosen, and new boards require additional driver support.

Refer to the **serial**(HW) and **mkdev**(ADM) manual pages for more information on compatible serial I/O cards and on adding and enabling serial lines.

A.6.1 Supported Serial Cards

The following serial I/O boards are supported by the SCO XENIX System V Operating System for standard architecture computers:

AMI lamb 4 and 8 port
Arnet Twinport, Multiport-4 and -8 (clock option not supported)
AST FourPORT/XN
Comtrol Systems Hostess 4 and 8 port versions
CTC Versanet 4AT (4 port) and 8AT (8 port)
Digiboard 4 and 8 port
IBM standard COM1 and COM2
Kimtron Quartet 4 port*
Olivetti RS232C Multiport Board
Quadram QuadPort™ 1 and 5 port
Stargate Technologies OC4400 (4 port) and OC8000 (8 port)
Tandon Quad Serial Card
UNISYS 4 port

* The Kimtron board does not work with all 386 machines.

** The boot display information and **hwconfig**(C) command report incorrect address ranges for Arnet cards, but this does not affect their operation.

It is also strongly recommended that multiport cards utilize 16450 or 16550 serial I/O chips instead of the slower 8250 chips. If you see a "double echo" problem, particularly on multiport cards, it is due to slow serial I/O hardware.

Serial Card Addresses and Notes

Serial Card Addresses						
Physical Port	Board Type	No. of ports	Primary Address Range	Alternate Address Range	Primary Status Address	Alternate Status Address
	AMI lamb**	8	0x540-0x57F	n/a	0x210	n/a
	AMI lamb**	4	0x540-0x55F	n/a	0x210	n/a
	Arnet	8	0x100-0x13F	0x280-0x2BF	0x142	0x2C2
	Arnet	4	0x100-0x11F	0x280-0x29F	0x142	0x2C2
	Arnet	2	0x100-0x10F	0x280-0x28F	0x142	0x2C2
	AST*	4	0x2A0-0x2BF	n/a	0x2BF	n/a
	CTC†	8	0x160-0x19F	n/a	167	n/a
	CTC†	4	0x160-0x17F	n/a	167	n/a
COM1	Digiboard††	8	0x110-0x14F	n/a	0x151	n/a
	Digiboard††	4	0x110-0x12F	n/a	0x151	n/a
	Hostess	8	0x140-0x17F	0x500-0x53F	0x147	0x507
	Hostess	4	0x140-0x15F	0x500-0x51F	0x147	0x507
	Kimtron	4	0x120-0x13F	n/a	0x8120	n/a
	Olivetti†††	4	0x2A0-0x2BF	n/a	0x2BF	n/a
	Quadram***	5	0x280-0x2CF	n/a	0x2D3	n/a
	Quadram***	1	0x280-0x28F	n/a	0x2D3	n/a
	Stargate	8	0x290-0x2CF	n/a	0x2D0	n/a
	Stargate	4	0x290-0x2AF	n/a	0x2D0	n/a
	Tandon***	4	0x2A0-0x2BF	n/a	2A2	n/a
	AMI lamb**	8	0x2C0-0x2FF	n/a	0x212	n/a
	AMI lamb**	4	0x2C0-0x2DF	n/a	0x212	n/a
	Arnet	8	0x180-0x1BF	0x300-0x33F	0x1C2	0x342
	Arnet	4	0x180-0x19F	0x300-0x31F	0x1C2	0x342
	Arnet	2	0x180-0x18F	0x300-0x30F	0x1C2	0x342
	AST*	4	0x1A0-0x1BF	n/a	0x1BF	n/a
	CTC†	8	0x218-0x257	n/a	21F	n/a
	CTC†	4	0x218-0x237	n/a	21F	n/a
COM2	Digiboard††	8	0x210-0x24F	n/a	0x250	n/a
	Digiboard††	4	0x210-0x22F	n/a	0x250	n/a
	Hostess	8	0x200-0x23F	0x580-0x5BF	0x207	0x587
	Hostess	4	0x200-0x23F	0x580-0x5BF	0x207	0x587
	Kimtron	4	0x2E0-0x2FF	n/a	0x82E0	n/a
	Olivetti†††	4	0x1A0-0x1BF	n/a	0x1BF	n/a
	Quadram***	5	0x288-0x2D7	n/a	0x2DB	n/a
	Quadram***	1	0x288-0x297	n/a	0x2DB	n/a
	Stargate	8	0x190-0x1CF	n/a	0x1D0	n/a
	Stargate	4	0x190-0x1AF	n/a	0x1D0	n/a
	Tandon***	4	0x280-0x29F	n/a	282	n/a
OTHER1	UNISYS****	4	0x000-0x03F	n/a	n/a	n/a
OTHER2	UNISYS****	4	0x008-0x047	n/a	n/a	n/a

* Only enhanced mode is supported. Do not use the AST driver.

** Only continuous mode is supported.

*** Tandon is the only card whose I/O addresses are potentially identical with other supported cards, such as the AST and Quadram serial cards.

Since card addresses must not overlap in the same systems, if you have both a Tandon and a Quadram, the Tandon must be on COM1 and the Quadram must be on COM2.

You can use the following Quadram serial expansion cards in these configurations under the standard XENIX Operating System:

COM1	COM2
5-port	—
1-port	—
—	5-port
—	1-port
5-port	1-port

If you need to use any other configuration of Quadram cards, you must relink the kernel using the Link Kit. You also need the SCO XENIX "Software Development System" to recompile */usr/sys/conf/sioconf.c*. Edit *sioconf.c* as follows:

1. This file contains several groupings of serial card descriptions. Each group is identified by the first number on the description line.

   Find the descriptions for the Quadram cards in each group and move that descriptor line to the front of the group.

2. Remake and boot the new kernel. Refer to "Tuning System Performance" in the *System Administrator's Guide* for information on relinking the kernel.

**** These serial cards only work on the UNISYS PC/IT.

† Notes for the CTC Versanet serial cards:

1. The correct switch settings for the 8AT and 4AT are:

   As a COM1 (strapped at addr 0x160, using irq4) the 8AT has:

   switches 33, 35, 36, 38, 39 & 40 OFF
   switches 34, 37 ON (i.e.: shunted)

   on the DIPSWITCH selection:

   5, 6 & 8 should be OFF
   all the others should be ON

   As a COM2 (strapped at addr 0x218, using irq3) the 8AT has:

   switches 33, 35-40 OFF
   switch 34 ON (i.e.: shunted)

   on the DIPSWITCH selection:

   1, 2 & 7 should be OFF
   all the others should be ON

   The 4AT is the same as the 8AT in both the above cases, with the following common exception:

   switches 39 & 40 *must be on* (shunted)

2. These boards come in both 8250 and 16450 versions. You must have the 16450 version if you intend to run on 386. The 8250 should run on the 286.

3. The original CTC Versanet boards used different addresses. Please ask your hardware vendor for versanet boards strapping at the above addresses (0x160 and 0x218).

4. The CTC "Maomao-4" serial board is not supported.

†† Notes on the Digiboard serial card:

1. Ports for switches DS2 to DS5 (DS9 for 8 port version) must be strapped starting at the board's base address as given in the table and incrementing by 8 for each port.

   The following example is for COM1 at 110:

DS2	110
DS3	118
DS4	120
DS5	128
DS6	130
DS7	138
DS8	140
DS9	148
DS1	150

2. If COM1 is used, then all the ports must be strapped as "EVEN" to interrupt request line 4 (see Digiboard documentation). If COM2 is used, then all the ports must be strapped as "ODD" to interrupt request line 3 (same notation).

3. Only revision C and later boards are supported.

††† Notes for the Olivetti RS232C Multiport board:

1. The factory settings will not function properly – you must alter the existing switch positions to reflect those listed in Item 4 below.

2. If you are using a single Olivetti board, you must configure it as COM2.

3. If you are using two Olivetti boards, one must be configured as COM2 and the other configured as COM1, with the COM1 port built into the M380 disabled. To disable the COM1 port built into the M380, refer to the section on "Setting Up the System" in your Olivetti *Installation and Operations Guide.*

4. The correct switch settings:

   As a COM1 (strapped at addr 0x2A0):

IRQ2	IRQ3	IRQ4	IRQ5	IRQ6	IRQ7	XA1	XA0	INT	SHR
off	off	on	off	off	off	off	on	on	off

   As a COM2 (strapped at addr 0x1A0):

IRQ2	IRQ3	IRQ4	IRQ5	IRQ6	IRQ7	XA1	XA0	INT	SHR
off	on	off	off	off	off	off	off	on	off

A.6.2 Serial I/O Chip Notes

Some computers or add-on serial I/O cards use the 8250a serial I/O chip. (16450 or 16550 chips are strongly recommended for 386 machines. The 16550 chip has FIFO support.) Some revisions of this chip do not handle interrupts properly. MS-DOS does not use interrupts, so the use of this chip with MS-DOS causes no problems. XENIX makes use of interrupts, as it is a multitasking operating system.

The problem with the serial I/O chip shows up when using **uucp**(C) or **cu**(C). Indications that your computer contains a bad revision 8250a chip are that **uucp**(C) may lose characters constantly and generate unkillable **uucico** processes, and that **cu**(C) at high baud rates stops executing and does not exit.

The problem is rarely seen when using the serial port with a terminal. It is associated with high-speed serial input. If you want to use **uucp**(C) or **cu**(C) and your computer has one of these chips, we recommend you replace the 8250a chip with an 8250b serial I/O chip or use a multi-function card containing a serial port and configure it as COM1 or COM2.

Disable the built-in serial port or avoid high-speed input on that port. All COM1 boards should be strapped at Interrupt Vector 4. All COM2 boards should be strapped at Interrupt Vector 3. Check your serial card hardware manual or call the hardware manufacturer for the switch settings that implement these addresses.

Note

SCO uniPATH SNA-3270 uses Interrupt Vector 3, which can interfere with the use of a serial card on COM2.

A.7 Disk Controllers and Host Adapters

XENIX supports the use of one or two ST506/ESDI hard disk controllers on 286-based machines.

On 386-based machines, XENIX supports the use of ST506/ESDI hard disk controllers (refered to henceforth as "standard"), and SCSI host adapters in the following combinations:

- one or two standard controllers
- one SMS-OMTI controller
- one or two SCSI host adapters
- one standard controller with a single SCSI host adapter

Note that when using both a SCSI host adapter and any other disk controller (ST506, ESDI, or SMS-OMTI), XENIX must be installed on the non-SCSI controller. This means if you start with XENIX installed on a SCSI disk and you want to add a non-SCSI disk, you must reinstall XENIX using the non-SCSI disk as the root disk.

If you have only SCSI disks installed on your system, you must run your computer's setup program and set the computer up for operation *without* a hard disk before installing the operating system. This forces the computer to recognize the SCSI host adapter.

The following table summarizes the number of devices supported per controller/adapter:

Controller or Adapter	Maximum Number of Devices Supported
Standard	2 disks per controller
SMS-OMTI	2 disks per controller
SCSI	7 devices per adapter

On a system with both ST506 and SCSI disks, the four supported ST506 disks are hd0 (the boot drive), hd1, hd4, and hd5. The SCSI disks are hd2, hd3, and hd6 through hd17. If the only disk drives in the system are SCSI, the SCSI drives are hd0 through hd13.

A.7.1 ST506/ESDI Controllers

Many ST506 and ESDI hard disks work with XENIX. Whether or not a disk works depends upon the disk controller board used. For the disk to work, the controller must meet two tests:

1. The disk controller must be fully compatible with the standard controller for that configuration.

2. No special vendor software is needed to make the controller work under MS-DOS.

If a controller meets these tests, it should work, but if it fails these tests, it will not work.

A.7.2 SCSI Host Adapters (XENIX-386 only)

SCSI host adapters accept devices with SCSI drivers, including hard disks and tape drives. Each device on the SCSI bus must have an ID. The ID number corresponds to the jumper or switch settings on the disk, so care must be taken that hard disk settings are correct. Additional disks may be any other ID between 1-7. Note that the host adapter uses one of the ID numbers (typically number 7). The LUN number is always 0.

Note

Only the devices listed in this appendix as tested or reported to work with SCSI host adapters can be relied upon to work properly with XENIX. The fact that a given device uses a SCSI interface is no indication that it will work properly.

A.7.2.1 The Adaptec SCSI Host Adapter

The Adaptec SCSI host adapter should run correctly with the manufacturer's default settings. It should be configured at base address 0x330, IRQ 11, and DMA channel 5. However, on some computers, such as the Tandy 4000, you must remove jumper J5. For more information, refer to your Adaptec documentation.

If you are installing a second Adaptec AHA-1540 board, you must reset several jumpers to be configured at base address 0x230, IRQ 12, and DMA channel 6. Some computers, such as the Tandy 4000, require you to remove jumper J8. For two AHA adapters to coexist, the BIOS must be disabled on the second adapter. This can be done with the newer AHA boards (1540a, 1542a, 154xb) by removing a jumper, but not with the older 1540 boards. You will not be able to use two 1540 boards in one machine. For more information, refer to your Adaptec documentation.

Not all manufacturer's computer systems are compatible with the Adaptec host adapters. If you are unable to get the host adapter to function or experience file corruption, please contact your manufacturer or Adaptec to determine if your hardware is compatible.

A.7.2.2 Formatting and Verifying Devices

The Adaptec 154x series of controllers have a set of BIOS routines to maintain and debug SCSI devices.

First you will need to know what BIOS address is on the Adaptec controller. This information can be found in the Adaptec manual. The default address is 0DC000H. Once you have this number you can perform a number of tasks. One such task is the formatting and verifying of SCSI devices. All SCSI devices (hard disks) should be formatted prior to installing SCO XENIX System V. To format your devices you will need to do the following:

1. Boot from an MS-DOS floppy

2. Run the DEBUG program

3. At the "-" prompt enter: **g=dc00:6** (notice how the BIOS address is truncated). A menu is displayed.

4. Select the format option on the drive specified. (Note that this destroys all data on that disk.)

5. When the format is complete, select the verify option on the drive specified.

6. Exit the menu.

A.7.2.3 Hardware Incompatibilities

There is an option that will allow you to test the interface between the Adaptec controller and motherboard. To run this test, do the following:

1. Boot DOS
2. Run the DEBUG program
3. At the "-" prompt enter: **g=dc00:9** (notice how the BIOS address is truncated).

You should see a set of diagnostic messages displayed as the tests are run. If you see a fail message, or no diagnostic messages are displayed, a hardware incompatibility exists. Your system may have trouble loading and running SCO XENIX System V. Since this is a hardware level inconsistency, there is no software patch available.

A.7.3 Add-On Hard Disks

Many hard disks can be used with XENIX. In the case of ST506/ESDI drives, the drive must be supported by the ROM BIOS, or the ROM parameters must be entered at installation time. Consult your computer hardware reference manual for the appropriate ROM table entries for your computer.

Note

This section applies only to ST506 and ESDI hard disks. SCSI disks are preformatted and use a different cylinder/head/sector translation logic, thus the considerations for ST506 and ESDI disks do not apply. Use **mkdev hd** to add hard drives to the system, regardless of whether they are SCSI or standard.

MS-DOS generally does not support non-standard disks (that is, those not defined in the ROM Fixed Disk BIOS).

Some hard disks come from the factory only partially formatted (for example, the Maxtor 1140 140 Mbyte). This problem may become evident during installation, when **badtrk**(ADM) indicates that every sector past a certain cylinder/head location is bad. You should contact the manufacturer to determine whether or not the disk is completely formatted. There are several products available that format hard disks.

Compatible hard disk controllers are discussed in a later section of this appendix.

- For a standard disk

  the motherboard ROM must have an entry for the disk (type) determined by the number of heads, cylinders, tracks per cylinder (heads), sectors per track, and other characteristic information.

  Follow the manufacturer's instructions to set switches or configuration.

- For a nonstandard disk

  the user can type in information that overrides the ROM disk configuration information during installation.

  If you are unsure of what parameters to enter for your nonstandard disk, contact your disk manufacturer for this information. The **dkinit** program (called during installation) allows you to input the disk parameters.

We have used the following hard disks with XENIX-286AT:

Emerald 50, 70, 140
Maxtor 140
CDC 20, 30, 40, 70
Core

The following hard disk drives have been tested and found to work correctly with XENIX-386GT:

CDC Wren IV
CDC Wren V
Conner CP-340
Conner CP-3100
Quantum Q250
Quantum Q280
Quantum P40S
Quantum P80S
Seagate 157A
Syquest SQ555
Storage Dimension External Hard Drive sub-system model XS2-660s2 (660 Mbyte storage capacity)

The following hard disk drives are reported to work with XENIX 386GT:

Maxtor XT-4380S
Maxtor LXT-100S

The following IDE drives have been tested with XENIX-386:

Seagate 157A
Seagate ST1144A
Hewlett-Packard DI666A Quantum 84Mb

In addition, the following IDE drives have been reported to work with XENIX-386:

Conner CP3104/CP204F
Rodime RO 3000A series
Rodime RO 3000AP series
Microscience 7070 series
Microscience 7100 series
Plus Development 120-AT

A.7.3.1 Disks Larger than 1024 Cylinders

If you are installing a disk with more than 1024 cylinders, consult the restrictions in the "Before You Start" chapter of the *Installation Guide*.

A.7.4 Compatible Hard Disk Controllers

We have used the following controllers on the 286AT and 386GT operating systems:

Adaptec ACB-2320
Adaptec ACB-2322*
Adaptec ACB-2370 RLL
Adaptec ACB-2372 RLL*
Western Digital WD 1003†
Western Digital WD 1003-WA2†
Western Digital WD 1005
Western Digital WD 1007
DPT PM3011‡
DPT MX3011‡
DTC WD1010 compatible
DTC WD2010 compatible

* These models are hard disk and floppy disk controllers.

† The Western Digital controller cards use either WD1010, WD2010, or WD2020 controller chips.

‡ The DPT controller cards must have EPROM 2E or later to run XENIX on a Compaq.

The following controller cards have been reported to run with XENIX 286, but we have not tested them:

DTC 5287 (using the PAR83A Controller chip) RLL

Note

Using an RLL controller on an MFM certified drive may cause an increase in the number of bad tracks.

The following additional controllers are supported for the 386GT operating system:

Adaptec AHA-154x SCSI Host Adapter
Adaptec 4525 SCSI ESDI Disk Controller
SMS OMTI 8620
SMS OMTI 8627

The following drives have been reported to work with the 386GT operating system and the Adaptec 154x Host Adapter.

Drives Reported to Work with Adaptec 154x

Manufacturer	Model	Size	Specifications
Quantum		Q250S	40MB
	Q280S	80MB	5 1/4" HH (discontinued)
	PRO40S	40MB	3 1/2" HH
	PRO80S	80MB	3 1/2" HH
	PRO105S	105MB	3 1/2" HH
	PD120S	120MB	3 1/2" HH
	PD170S	170MB	3 1/2" HH
CDC/Imprimis/	94211-xxx	100MB	5 1/4" HH Wren III

Drives Reported to Work with Adaptec 154x *(continued)*

Manufacturer	Model	Size	Specifications
Seagate	94161-xxx	101MB	5 1/4" FH Wren III
		141MB	5 1/4" FH Wren III
		182MB	5 1/4" FH Wren III
	94171-xxx	350MB	5 1/4" FH Wren IV
		376MB	5 1/4" FH Wren IV
	94221-xxx	184MB	5 1/4" HH Wren V
		209MB	5 1/4" HH Wren V
	94181-xxx	385MB	5 1/4" FH Wren V
		702MB	5 1/4" FH Wren V
	xxxxx-xxx	383MB	5 1/4" HH Wren VI
	94191-xxx	766MB	5 1/4" FH Wren VI
	94601-xxx	1200MB	5 1/4" FH Wren VII
Rigidyne	94351-xxx	138MB	3 1/2" HH
			172MB
Maxtor	LXT-100S	100MB	3 1/2" HH
	LXT-200S	200MB	3 1/2" HH
	XT-4380S	380MB	5 1/4" FH
	XT-8760S	760MB	5 1/4" FH
Conner	CP-340	40MB	3 1/2" HH
	CP-3100	100MB	3 1/2" HH
HP	xxxxxxx	xxxMB	5 1/4" FH (All HP SCSI drives)
Fujitsu	2611SA	45MB	3 1/2" HH
	2612SA	90MB	3 1/2" HH
	2613SA	136MB	3 1/2" HH
	2614SA	182MB	3 1/2" HH

A.7.5 SMS-OMTI Controllers

You must know what BIOS is in use on your controller card before you install the disk system. To check your BIOS type, find the BIOS chip on the controller card. Most manufacturers' BIOS chips are found near the bus connectors in space U37. Do not confuse this

chip with the OMTI firmware chip which resides near it on the board in space U31. Read and note the model number on the BIOS chip. You need to know this number to accurately set the jumpers on your controller card. Tables are provided later in this section that specify the jumper settings for each different kind of BIOS.

Before XENIX can be installed on a system equipped with an 8620 or 8627 disk controller, you must run your manufacturer's **setup** program and set the computer up for operation without a hard disk. This is because the OMTI firmware supercedes the instructions on the normal CMOS systems for hard disks. After you run the setup utility, the installed disk(s) may need to be formatted with the **sfmt** low-level formatting routine, which resides in the OMTI firmware. Low-level disk formatting is usually performed on bundled systems before delivery. If this formatting has not been done, you must format the disk before installing XENIX.

A.7.5.1 Standard SMS-OMTI Installation

XENIX cannot be installed if the disk is in need of low-level formatting or if defective tracks have not been accounted for. Check to see if XENIX 386GT displays a message similar to this when you boot XENIX:

```
%disk  0x320-0x324  36  -  type=E  unit=0 ...
```

The "E" label indicates that you can use the **sfmt** utility to format your disk, if it is not formatted already. (If you do not see this label, do not use **sfmt** to format your disk.) You are redirected to **sfmt** if you attempt to modify disk parameters through **dkinit** at installation time. You will see:

```
Please use sfmt to modify disk parameters
```

Reboot, then invoke **sfmt** at the "Boot :" prompt to do low-level formatting, non-standard disk parameter initialization, and initial processing of manufacturer-supplied defect lists. If you do not run **sfmt** at this time, you will have to restart your installation procedure and run it before you can successfully install XENIX. **sfmt** should also be used for non-standard disk support.

The defect-processing algorithm reduces the total number of disk cylinders available for use by XENIX. **dkinit** will display the new total.

If the "type=E" banner is not displayed, do not use **sfmt** to format your disk. Instead, please contact your controller's vendor for low-level formatting information if you need to format your disk(s).

Enter **sfmt** at the boot prompt if your disk requires low-level formatting:

```
Boot
: sfmt
```

You see:

```
This FORMAT routine will DESTROY ALL data
on your disk!

Press <RET> to proceed or <ESC> to cancel...
```

Next you are prompted to enter the number of the drive you are formatting. You see:

```
Enter drive # (0 or 1):
```

If there is only one hard disk, enter 0. Next you see:

```
Use default parameters (Y/N)?
```

If your disk is non-standard, answer **n**. You must now know the parameters for your disk. If you answered **n** you are prompted to enter the total number of cylinders and heads for your disk. You see:

```
Total CYLS:
Total HEADS:
```

Next you see:

```
Write Precomp CYL CONTROL BYTE: 2
```

sfmt supplies "2" as a default but you can overwrite this answer. Check your manufacturer's specification for the correct value.

Next you see:

```
Press <RET> to proceed or <ESC> to cancel...
```

If you wish to proceed, press <RETURN>. Next you see:

```
Logical partitioning desired (Y/N)?
```

Enter **n**. Next you see:

```
Any defects (Y/N)?
```

Enter **y**. You see:

```
(Press <RET> to end defect list)
CYLINDER:
HEAD:
```

When you have entered all known defects in the hard disk by cylinder and head numbers, press <RETURN> at the "CYLINDER:" prompt. You see:

```
More entries (Y/N)?
```

Enter **n**. Next you see:

```
Press <RET> to proceed or <ESC> to cancel...
```

Now you are prompted to set the interleave factor for your hard disk. Disk speed performance may be severely reduced if your interleave factor is set incorrectly. Check your manufacturer's documentation carefully for the correct interleave factor. You see:

```
Interleave (1-15):
```

Note that if your disk supports 35 sectors per track, you should not use an interleave value of 5 or 7.

Next you see:

```
Are you SURE you want to format (Y/N)?
```

Enter y if you are satisfied that all your answers are correct.
You see:

```
Formatting.....
```

When **sfmt** has finished formatting the disk, you see:

```
Formatting complete,
params saved,
Hit any key to reboot
```

Press any key and you see the XENIX boot prompt again:

```
Boot
:
```

Press <RETURN> to begin installation.

A.7.5.2 dkinit(ADM) and SMS-OMTI

dkinit is primarily for unusual or non-standard disks. Unless you know your disk is non-standard, assume that it is standard. When **dkinit** is run during XENIX installation, choose option 1 to display the current disk parameters. If these parameters do not correspond to the hard disk you have, you must modify the current parameters. If the "type=E" banner was displayed at power-up, please use **sfmt** to modify these parameters. Otherwise, follow the instructions provided in the *XENIX Installation Guide*.

A.7.5.3 SMS-OMTI Badtracking

The number of cylinders used for bad track alteration will be subtracted from the total number of cylinders available to the user.

After you have finished scanning for badtracks during the installation process, examine the badtrack table. If the "type=E" banner was displayed at power-up and you ran **sfmt**, check to see if any of the flaws in the manufacturer's disk flaw map are displayed in the XENIX badtrack table. If no bad tracks are shown, **sfmt** located all the bad tracks in the flaw map and you do not need to enter them from the list supplied with the disk. If all the bad tracks from the supplied list appear, XENIX **badtrack** located the flaws and you do not need to enter them from the supplied list. If, however, only some of the listed bad tracks are displayed, you must enter any bad tracks that are listed on the supplied badtrack list but *not* displayed on the screen. If the "type=E" banner was not displayed, you must enter all of the flaws in the manufacturer's supplied list that are not already displayed in the badtrack table. The following table outlines all possible options and the appropriate actions:

Display	Action
No bad tracks displayed	Do not enter any bad tracks
All bad tracks displayed	Do not enter any bad tracks
Some bad tracks displayed	Enter any bad tracks not displayed
You did not run **sfmt**	Enter all bad tracks on the supplied list

Use XENIX badtracking to process defects that need to be added to the badtrack table at a later date. Allocate space for future bad tracks even if none are found during the initial scan. Keep in mind that if you do not allocate enough space now, and your table fills up later, you must re-install to add additional bad tracks.

A.7.5.4 SMS-OMTI Hardware Installation and Initialization

The next few sections are for those system integrators and experienced users who are assembling a computer system from scratch, and who are installing disks themselves.

DMA/Programmed I/O Considerations

The disk controller supports three different I/O modes: DMA, simple programmed I/O and optimized programmed I/O. DMA is the default mode, simple programmed I/O is slow but will work on virtually all machines, and optimized programmed I/O is fast but may not work on all machines. After you install XENIX, you may switch between the different modes by patching the kernel in single-user mode using **adb** (**adbL** if your machine is a 286):

```
# adb -w /xenix
* dkio_type /w n
* $q
#
```

The cross hatch signs (#) are prompts from the system shell and the asterisks are prompts from **adb**; do not type them in.

In the patch above, *n* is 1 for the default DMA mode, 2 for simple programmed I/O mode, and 3 for optimized programmed mode.

The default for XENIX-386GT is programmed I/O.

Standard personal computers that support I/O channel ready will work with the 386GT configuration of XENIX System V Release 2.3 in the optimized programmed I/O mode with no problems. Machines that do not support I/O channel ready will invariably crash, with a high probability of data corruption. If you are unsure whether your machine supports I/O channel ready, consult your computer's manufacturer.

SMS-OMTI Interleave

A 1:1 interleave factor is supported. To change interleave factors, refer to the **sfmt** instructions.

SMS-OMTI Physical Limitation

The physical limitations for attached disks are 1024 cylinders (10 bits of cylinder addressing) and 16 heads, due to the **fdisk** structure shared by all operating systems. You can attach larger disks, but you cannot use more than 1024 cylinders, even with multiple **fdisk** partitions; the excess storage space is unaddressable.

Setting Up a One-Drive SMS-OMTI System

1. Cabling Requirements: One (1) 34-pin straight-through cable. One (1) 20-pin straight-through cable.

2. On the hard disk: Install drive select jumper to lowest Drive Select (DS0 or DS1).

3. On the controller: Install jumpers W20 to W23 according to the information in the "Drive Jumper Settings" in a later section. To find the correct drive table for your hardware, note your board type and BIOS type and find them on the following table. The BIOS types are listed across the top of the table and the board types are listed down the left side. To find the correct table to use, check the listing at the intersection of your BIOS and board types. For example, if your BIOS type is 1002579 and your board type is 8620, you can find your correct board settings in Table A.

Board Types	BIOS Types			
	1002579	1002580	1002661	1002662
8620	Table A	‡	Table C	‡
8627	‡	Table B	‡	Table D

‡ *indicates a drive/BIOS combination that does not exist.*

If your drive is a non-ESDI drive type and it does not correspond to the default ST506 drive type(s), enter disk characteristics as in step 8. Note that if you are adding an ST506 interface disk, jumpers W22 and W23 must be out (0) for any ST506 disk.

4. If you have an existing controller in place, remove it and unplug the connecting cables.
   If a separate floppy drive controller is being used, remove it and connect the 34 pin floppy cable to the J1 connector on the SMS-OMTI controller.

5. The number of hard disks in the system must be reported as zero (0) when initializing the system configuration parameters using the setup utility provided by your computer's manufacturer.

6. Install the 34-pin drive interface cable to the J2 connector. Install the 20-pin data cable to either the J3 or J4 connector.

7. Install the SMS-OMTI controller in any available slot on the motherboard. *Caution*: Power must be off!

8. If you need to format your disk, type **sfmt** at the

   ```
   Boot
   :
   ```

   prompt. You must know the hard disk parameters before you invoke **sfmt**.

9. Answer all questions as prompted. Note: if your drive is not listed in the BIOS drive table answer **n** to the

```
Use defaults (Y/N)?
```

prompt. Then, enter the correct drive characteristics. If your drive is a non-ESDI drive type and it does not correspond to the default ST506 drive type(s), you are prompted to enter disk characteristics.

10. At the completion of this installation procedure, you will be directed to reboot the system. After doing so, continue with normal XENIX installation procedure.

Setting Up a Two-Drive SMS-OMTI System

1. Cabling Requirements: One (1) 34-pin daisy-chain straight-through cable. One (1) 20-pin straight-through cable.

2. On hard disks: set *Drive Select* to DS0 (or DS1) on the first drive, and *Drive Select* to DS1 (or DS2) on the second drive. Install termination resistor on drive at end of daisy-chain cable. Remove termination resistor on drive in the middle of daisy-chain cable.

3. Follow steps 3-9 above.

SMS-OMTI User-Configurable Jumpers

W20	W21	W22	W23	Refer to Drive Tables
W17	**W18**	**W19**		**Winchester I/0 Port Base Address**
0*	0*	0*		320H
0	0	1		324H
0	1	0		328H
0	1	1		32CH
1	0	0		1A0H
1	0	1		1A4H
1	1	0		1A8H
1	1	1		1ACH
W16				**BIOS EPROM Control**
0*				Enable BIOS
1				Disable BIOS
W15				**BIOS Base Address**
0*				C8000H
1				CA000H
W14				**Floppy Disk I/O Port Base Address**
0*				03F0H
1				0370H

W10	W11	Bytes/Sector	Sectors/Track (ST506) 8620	8627
0*	0*	512	17	26
0	1	512	18	
1	0	1024	9	
1	1	1056	9	

0=Jumper not installed
1=Jumper installed
*=Jumper as shipped

OMTI LUN 0		OMTI LUN 1	
W9	Sector Type	W6	Sector Type
0*	Soft sectored	0*	Soft sectored
1	Hard sectored	1	Hard sectored
W8	**Drive Class**	**W5**	**Drive Class**
0*	ST506 Compatible	0*	ST506 Compatible
1	ESDI Compatible	1	ESDI Compatible
W7	**Drive Type**	**W4**	**Drive Type**
0*	Fixed	0*	Fixed
1	Removable	1	Removable

0=Jumper not installed
1=Jumper installed
*=Jumper as shipped
LUN=Logical Unit Number

SMS-OMTI Drive Jumper Settings

BIOS #1002579, #1002580:

W20-W23: Hard disk drive jumpers

BIOS #1002661, #1002662:

W20	Reserved	
W21	I/O Speed Option:	
	0*	High Performance (not supported by all computers)
	1	Normal
W22, W23	Hard disk drive jumpers	

Drive Tables

Table A
8620 Drive Table
BIOS #1002579, AT3

W20	W21	Drive/Model or Compatibles	Cyl.	Heads	Write Precomp.
LUN 0					
1	1	ESDI Drives			
0	1	Vertex/Priam V170	987	7	–
1	0	Maxtor XT1140	918	15	–
0	0	Miniscribe 3425	612	4	–
W22	**W23**				
LUN 1					
1	1	ESDI Drives			
0	1	Vertex/Priam V170	987	7	–
1	0	Maxtor XT1140	918	15	–
0	0	Miniscribe 3425	612	4	–

Table B
8627 Drive Table
BIOS #1002580, BIOS AT4

W20	W21	Drive/Model or Compatibles	Cyl.	Heads	Write Precomp.
LUN 0					
1	1	ESDI Drives			
0	1	Seagate ST277R	820	6	–
1	0	Seagate ST4144R	1024	9	–
0	0	Seagate ST238R	615	4	–
W22	**W23**				
LUN 1					
1	1	ESDI Drives			
0	1	Seagate ST277R	820	6	–
1	0	Seagate ST4144R	1024	9	–
0	0	Seagate ST238R	615	4	–

Table C
8620 Drive Table *
BIOS #1002661, AT5

W23	Drive Type	Cyl.	Heads	Write Precomp.
LUN 0				
0	Seagate ST225	612	4	–
1	ESDI Drive			
W22				
LUN 1				
0	Seagate ST225	612	4	–
1	ESDI Drive			

* If you are adding an ST506 interface disk, jumpers W22 and W23 must be out (0) for any ST506 disk.

Table D
8627 Drive Table *
BIOS #1002662, BIOS AT6

W23	Drive Type	Cyl.	Heads	Write Precomp.
LUN 0				
0	Seagate ST238R	615	4	–
1	ESDI Drive			
W22				
LUN 1				
0	Seagate ST238R	615	4	–
1	ESDI Drive			

* If you are adding an ST506 interface disk, jumpers W22 and W23 must be out (0) for any ST506 disk.

Drive Characteristics Reference Guide

Drive Characteristics Reference Guide MFM Hard Disk Drives

Drive/Model	Cyl.	Heads	Write Precomp.
Maxtor XT1140	918	15	—
CMI 6426	640	4	256
Rodime 352	306	4	—
Microscience HH312	306	4	—
Seagate ST4026	615	4	300
Cynthia 570	987	7	—
Vertex V170	987	7	—
DMA/RICOH (Removable 10MB)	612	2	400
Seagate ST4038	733	5	300
Seagate ST213	612	2	256
Miniscribe 3425	612	4	128
Quantum Q540	512	8	256
Seagate ST4051	977	5	300
CDC 3212	612	2	128
Miniscribe 3012/3212	612	2	128
CMI 6640	640	6	256
Tulin 240	640	6	256
Seagate ST225	615	4	256
CMI 3426	615	4	256
CMI 5412	306	4	128
Lapine 3522	306	4	128
Otari 514	306	4	128
Seagate ST412/ST212	306	4	128
Shugart 712	306	4	128

Note: This is a list of some MFM drives. It is not a comprehensive list.

Drive Characteristics Reference Guide RLL Vendor Certified Hard Disk Drives

Drive/Model	Cyl.	Heads	Write Precomp.
Atasi 3085	1024	8	—
Miniscribe 8438	612	4	—
Microscience HH330	612	4	—
Microscience HH738	612	4	—
Peripheral Tech 357R	615	6	—
Lapine LT300	616	4	—
Priam V170	987	7	—
Priam V185	1024	7	—
Priam 514	1024	11	—
Priam 519	1024	15	—
Seagate ST251R	820	4	—
Seagate ST277R	820	6	—
Seagate ST4077R	1024	5	—
Seagate ST4144R	1024	9	—
Toshiba MK53FB	830	5	—
Toshiba MK54FB	830	7	—
Seagate ST238R	615	4	—
Miniscribe 3438	615	4	—

Note: This is a list of some RLL drives. It is not a comprehensive list.

A.8 Tape Drives and Controllers

Note that the tape drives described in these notes are sometimes sold under other brand names. Only one cartridge tape subsystem is supported per computer. (It is possible to have one cartridge tape drive plus a minicartridge or QIC-40 drive configured on a system.)

One SCSI tape drive is supported on the SCSI bus. The standard QIC02 cartridge tape controller is also supported, but only one tape drive, either SCSI or QIC02, can be present on the system. The SCSI tape can be configured at any ID on either Host Adapter.

QIC-24 format is supported on the full size cartridges. Tape support is raw (character) only, no block device. A no-rewind device exists for writing multiple tape files on a single tape. A tape utility, **tape**(C), is provided for rewinding, erasing, format, retensioning, and so on.

To configure your system for a tape unit, run **mkdev tape**. If you do not choose specific values for the DMA channel, interrupt, and base address, the default values are used. (This information is found in the section entitled "Supported Tape Drives and Controllers".) Note that most addresses are specified in hexadecimal. If you do not use the default settings, watch for possible interrupt conflicts with other installed devices. The section entitled "Supported Tape Drives and Controllers" indicates which interrupts may be in use on your system. You should not use interrupts 0, 1, or 6, as these are already in use regardless of additional devices. The **mkdev tape** menu indicates the Irwin units as "Mini-Cartridge," and all other units are indicated as "Cartridge," "QIC-40/QIC-80," and "SCSI" units. The Irwin units are not configurable using **mkdev tape**, but certain hardware parameters can be defined in a file */etc/default/mcconfig*. (XENIX-386 only; see **mcconfig**(F) for details.) Refer to the "Using Floppy Disks and Tape Drives" chapter of the *System Administrator's Guide*.

A.8.1 Supported Tape Drives and Controllers

The tape drivers included in this release work with the drive/controller combinations described in this section, for 286 and 386 standard architecture machines.

A.8.1.1 Supported QIC-02 Tape Controllers and Cartridge Drives

Supported QIC-02 Tape Controllers and Cartridge Drives

Manufacturer	Controller	Drive	Type	Notes
Archive	SC400	Scorpion 5945	A	
Archive	SC402	Viper QIC-02/60MB	A	(4,5)
Archive	SC402	Viper QIC-02/150MB	A	(4,5)
Archive	SC499r	Scorpion 5945	A	
Bell Technologies	PC-36	XTC-60	W	
Cipher	QIC-02	CP-60B	W	
Cipher	QIC-02	CP-125B	W	
Cipher	Cipher 811/817	5400/plus	E	
Computone	SC400	Scorpion 5945/60MB	A	
COREtape	PC-36	5000(E)	W	
Emerald	xnx-50-2012	Cassette	E	(3)
Emerald	xnx-60-2002	Cartridge	E	(3)
Everex	PC-36	60MB Internal	X	
ITT	PC-36	5000(E)	W	
Mountain	QIC-02	60MB Filesafe	M	
Mountain	QIC-02	150MB Filesafe	M	(5)
Mountain	QIC-02	300MB Filesafe	M	(5)
Mountain	PC-36	60MB Internal	W	
Mountain	PC-36	150MB Internal		(5)

(Continued on next page)

Supported QIC-02 Tape Controllers and Cartridge Drives *(Continued)*

Manufacturer	Controller	Drive	Type	Notes
Olivetti	PC-36	5000(E)	W	(1)
Tecmar	PC-36	QIC-60AT	T	
Tecmar	PC-36	QT-60I	T	
Tecmar	PC-36	QT-90I	T	
Tecmar	PC-36	QT-125I	T	
Tecmar	PC-36	QT-150I	T	(5)
Tecmar	PC Bus Host Adapter	QT-60E	T	
Tecmar	PC Bus Host Adapter	QT-90E	T	
Tecmar	PC Bus Host Adapter	QT-122E	T	
Tecmar	PC Bus Host Adapter	QT-150E	T	(5)
TI	SC400	Scorpion 5945/60MB	A	
Wangtek	PC-36	5000(E)	W	
Wangtek	PC-36	5xxxPK/125,150MB	W	(5)
Wangtek	PC-36	5xxxEK/60,125,150MB	W	(5)

Most controllers that conform to the QIC-02 standard should work, but only the units listed above have been tested.

A.8.1.2 Supported Floppy Tape Controllers and Cartridge Drives

The following floppy tape controllers are supported:

Primary floppy disk controller
Irwin 4251 drive multiplexor board
Irwin 4100 bus controller card (for 787 and 2120 drives)

In addition, the following floppy tape drives are supported:

Supported Floppy Tape Cartridge Drives

Manufacturer	Drive	Notes
Alloy	APT-40/Q (40 Mbyte)	
Archive	XL5580	
Irwin	110 (10 Mbyte)	(2,3)
Irwin	125 (20 Mbyte)	(2,3)
Irwin	145 (40 Mbyte)	(2,3)
Irwin	185 (80 Mbyte)	(2,3)
Irwin	225 (20 Mbyte)	(2,3)
Irwin	245 (40 Mbyte)	(2,3)
Irwin	285 (80 Mbyte)	(2,3)
Irwin	787	
Irwin	2020 (20 Mbyte)	(2,3)
Irwin	2040 (40 Mbyte)	(2,3)
Irwin	2080 (80 Mbyte)	(2,3)
Irwin	2120	
Mountain	TD44-40 (40 Mbyte)	
Mountain	TD8000	
Wangtek	FAD 3500 (40 Mbyte)	
Tecmar	QT-40i (40 Mbyte)	

Default Settings

Manufacturer	Base Address	DMA Channel	Interrupt	Type
Archive	0x220	3	3	A
Compaq	0x300	1	5	W
Computone	0x200	1	4	A
Emerald	0x300	3	2*	E
Everex	0x2C0	1	5	X
ITT	0x338	1	5	W
Mountain	0x28C	1	3	M
Tecmar	0x330	1	5	T
TI	0x220	3	3	A
Wangtek	0x338	1	5	W

* When installing a tape drive using interrupt vector 2, set the hardware for IRQ2 and supply interrupt vector 25 when running **mkdev tape**.

The following SCSI tape drives are supported for 386GT machines:

Archive SCSI 60MB
Archive SCSI 150MB
Wangtek SCSI 60MB
Wangtek SCSI 150MB
Tecmar SCSI 60MB
Tecmar SCSI 150MB

Notes on Tape Controllers and Drives

1. The Olivetti tape controller's factory jumper settings do not match the type W drive default values. To use the Olivetti drive without changing the controller card's jumper settings, use the **mkdev tape** command to select all four of the following settings:

Type	DMA	Interrupt	Base Address (hex)
W	1	25	0x288

2. The Irwin 40 Mbyte drive can use either DC2000 or DC1000 tape cartridges and the 10 and 20 Mbyte drives use a DC1000 tape cartridge. A DC1000 tape written on a 125 or 145 model drive can be read by either drive.

3. Irwin and Emerald drives now function properly on 20-MHz 386 machines.

4. Archive drives using the SC402 controller do not use the default type A interrupt 4. Use the **mkdev tape** command to change the interrupt or restrap the controller card.

5. High density 150 Mbyte drives require DC6150 or DC600XTD tapes for writing. Low density tapes can be read but not written.

A.9 Video Adapters and Monitors

Any video adapter/monitor combination which runs with an adapter that is a true equivalent of a standard adapter should run under the XENIX System V Operating System.

The XENIX System V Operating System supports the use of two video adapters and two monitors, one of type mono and the other of type color. Use of only a single VGA adapter is supported.

Adapters which come as the default adapter in supported computers (monochrome or color monitor) will work with the XENIX System V Operating System.

A.9.1 Supported Video Adapters

This section concerns video adapters supported under XENIX for Industry Standard Architecture machines. To configure graphics support (such as with SCO Xsight), you should run the **mkdev graphics** command and select the adapter you have installed.

The following table lists tested graphics adapters.

Tested Graphics Adapters

Card	Resolution	Type
Compaq Plasma	640x400	2-color
Compaq VGC	640x350	16-color
Compaq VGC	640x480	16-color
Genoa SuperVGA (5000 series)†‡	640x350	16-color
Genoa SuperVGA (5000 series)†‡	640x480	16-color
Genoa SuperVGA (5000 series)†‡	800x600	16-color
Genoa SuperVGA (5000 series)†‡	1024x768	16-color and interlaced mode
Hercules Monochrome	720x350	Monochrome
IBM EGA	640x350	16-color
IBM VGA	640x350	16-color

IBM VGA	640x480	16-color
Orchid Designer*‡	640x350	16-color
Orchid Designer*‡	640x480	16-color
Orchid Designer*‡	800x600	16-color
Orchid Designer*‡	1024x768	16-color and interlaced mode
Paradise VGA Plus**	640x350	16-color
Paradise VGA Plus**	640x480	16-color
Paradise VGA Plus**	800x600	16-color
STB Extra-EM†	640x350	16-color
STB Extra-EM†	640x480	16-color
STB Extra-EM†	800x600	16-color
STB Extra-EM†	1024x768	16-color and interlaced mode
Trident TVGA 8900	640x480	16-color
Trident TVGA 8900	800x600	16-color
Trident TVGA 8900	1024x768	16-color and interlaced mode
Video Seven VEGA/Deluxe	640x350	16-color
Video Seven VEGA/Deluxe	640x480	16-color
Vidéo 7 Fastwrite VGA	640x350	16-color
Video 7 Fastwrite VGA	640x480	16-color
Video 7 Fastwrite VGA	800x600	16 color
Video 7 VEGA (EGA)	640x380	16-color
Video 7 VRAM VGA	640x350	16-color
Video 7 VRAM VGA	640x480	16-color
Video 7 VRAM VGA	800x600	16 color
Video 7 VGA 1024i	640x350	16-color
Video 7 VGA 1024i	640x480	16-color
Video 7 VGA 1024i	800x600	16-color
Video 7 VGA 1024i	1024x768	16-color††

* The Orchid graphics adapter card does not work in extended mode on a 20 megahertz or faster bus. In addition, the Orchid uses IRQ2 during certain refresh operations in particular video modes.

** The Paradise VGA Plus/16 and VGA Professional, and other 16-bit VGA adapters based on the Paradise or Western Digital chipset must be installed in an 8-bit bus slot. Call your hardware vendor to find out if your 16-bit adapter uses the Paradise or Western Digital chipset and ask for a hardware fix. A design flaw affects memory addressing and DMA transfers over one megabyte. You may experience intermittent problems with floppy disk, tape, or hard disk writes. One way of identifying this problem is by reading a hexadecimal dump of a file. A normal file looks like this:

```
$ cat testfile
this is a test!
only a test.
```

A hexadecimal dump looks like this:

```
$ hd testfile

0000 74 68 69 73 20 69 73 20 61 20 74 65 73 74 21 this is a test!.
0010 6f 6e 6c 79 20 61 20 74 65 73 74 2e 0a          only a test..
```

If your VGA adapter has this problem, every other character in the file is replaced with a hexadecimal 0xff. It looks like this:

```
$ hd testfile

0000 74 ff 69 ff 20 ff 73 ff 61 ff 74 ff 73 ff 21 t.i. .s.a.t.s.!.
0010 6f ff 6c ff 20 ff 20 ff 65 ff 74 ff 0a          o.l. . .e.t..
```

Because the problem is intermittent, not all files are affected. All data written to floppies, tapes, or SCSI devices is potentially damaged. Examine hex dumps of floppy or tape backups if you suspect this problem.

† If you are using STB VGA/EM or Genoa Super VGA graphics boards, character mode is not properly restored to the console when exiting. Certain characters are followed by vertical bars when you terminate graphics programs.

‡ The Orchid Designer and Genoa SuperVGA boards conflict with the addresses used by the 3c503 and WD80003E network cards. Refer to the section entitled "Graphics-Network Card Conflicts" for details.

†† The Video 7 1024i 1024x768 has 4 horizontal scan modes:

40 Mhz
44 MHz
48 MHz
65 MHz

When you choose to install a Video 7 adapter with **mkdev graphics**, the 4 1024x768 choices correspond to these 4 scan modes.

The following table includes graphics adapters that are untested but reported to work:

Untested Graphics Adapters

Card	Resolution	Type
EIZO MD-B07	640x350	16-color
EIZO MD-B07	640x480	16-color
EIZO MD-B07	800x600	16-color
EIZO MD-B10	640x350	16-color and 4 more modes
EIZO Extra/EM	640x480	16-color
EIZO Extra/EM	800x600	16-color
EIZO Extra/EM	1024x768	16-color
Quadram QuadVGA	640x350	16-color
Quadram QuadVGA	640x480	16-color
Quadram QuadVGA	800x600	16-color
Quadram QuadVGA	1024x768	16-color

Untested Graphics Adapters *(Continued)*

Card	Resolution	Type
Tecmar VGA/AD	640x350	16-color
Tecmar VGA/AD	640x480	16-color
Tecmar VGA/AD	800x600	16-color
Tecmar VGA/AD	1024x768	16-color
Toshiba Grid 758 Display	640x400	Monochrome
Toshiba Grid Plasma Display	640x400	Monochrome

Note that graphics adapter cards that are not listed in the previous tables but are identical to cards listed above should work as well.

A.9.2 Graphics-Network Card Conflicts

Certain video cards have been observed to conflict with the 3c503 and WD8003E network cards. The result is that attempts to send or receive data from the network card are blocked. (In particular, this problem has been observed with the Orchid Designer and Genoa Super VGA graphics cards.) This problem can be resolved if you avoid using IRQ2 (interrupt vector 2) for your network card. In some cases, the video card uses IRQ2 for the vertical retrace interrupt, causing the conflict to occur. Some video cards have a jumper that allows you to disable the use of IRQ2, but this has not been tested. It is also rumored that it is possible to physically alter the video card by cutting the trace that leads to the B4 bus contact, but this will void your hardware warranty and is not recommended.

The WD8003E card uses memory mapped I/O in the 0xC0000 to 0xD0000 range. This range may overlap with the display memory address of some VGA cards, especially Super VGA cards. Refer to the accompanying hardware documentation. If there is a possible memory address conflict, set the WD8003E memory mapped I/O address to start at 0xD0000.

A.10 Typical Device Interrupts

Interrupt	Device
0*	Clock
1*	Console
2	Networks, Tapes and others
3	Serial COM2
4	Serial COM1
5	Alternate Parallel Port (lp2)
6*	Floppy Disk
7	Main Parallel Port (lp0 or lp1)

*Do not use these interrupts.

A.11 Modems and Autodialing

Any 100% Hayes-compatible modem works using **uucp**(C) and **cu**(C). The default autodialer is for the Hayes Smartmodem 1200. We strongly recommend external modems. Dialer programs are listed in the "Adding Terminals and Modems" chapter of the *XENIX System Administrator's Guide*. Additional modems can be supported by writing a dialer program, or modifying an existing one in */usr/lib/uucp*.

If you are using UUCP with an error correcting modem and you observe errors in file transfers, disable the error correcting feature. UUCP does its own error correction and the redundancy can cause problems.

In addition, the new Honey DanBer UUCP package includes a large number of dialer scripts in the *Dialers* file. However, dialer binaries are preferred for greater reliability.

A.12 Mice and Other Graphic Input Devices

The following graphic input devices are supported:

Logitech Serial Mouse
Microsoft Serial Mouse
Mouse Systems PC Mouse
Mouse Systems PC Mouse II
Microsoft Busmouse or InPort Mouse
Logitech Bus Mouse
Olivetti Bus Mouse
IBM Personal System/2 Mouse
Summagraphics Bitpad*

* The Summagraphics bitpad is not supported for use under SCO Xsight or with the **usemouse**(C) utility at this time. This is because the bitpad is an absolute locator device and mouse-based applications expect a relative locator device. Applications designed to use a bitpad work as expected.

Appendix B

SCO XENIX System V

Release 2.3.4 (386) & 2.3.2 (286)

Compatible Hardware for Microchannel Architecture Platforms

B.1 Using This Appendix

The SCO XENIX System V Operating System is available for many configurations of Personal Computer hardware on the following platforms:

- Extended Industry Standard Architecture (EISA)
- Industry Standard Architecture
- Microchannel Architecture

This appendix contains information about hardware that is compatible with microchannel architecture platforms. If you are using a standard architecture machine, go to Appendix A.

This appendix is divided into several sections. The first two sections list the supported machines by microprocessor type. The remaining sections cover specific configuration details, including charts of compatible peripherals, and provide guidelines for using serial cards, video adapters, monitors, hard disks and controllers. System parameters necessary for these devices are also described. These guidelines must be followed to ensure satisfactory system performance.

Your hardware configuration must have the original settings and boards before you install the SCO XENIX System V Operating System. If you have added any boards, make sure that all switches are set as recommended in the manufacturer's hardware manual for that board.

Note

The specific hardware listed in these *Notes* has been used with the SCO XENIX System V Operating System. However, because compatible machine or add-on peripheral manufacturers may change configuration, functionality, or firmware at any time, no guarantee is implied. Please write to us with accurate hardware information for possible inclusion on our lists.

To find a listing of compatible hardware for your machine, you must know the processor your machine uses You should also know if there are enhancements to your system.

To find the available classifications of machines, refer to the section entitled "Supported Hardware Configurations", which follows this introduction. Find your hardware configuration in the right hand column and match it with the corresponding version of XENIX in the left hand column. This appendix contains specific references to compatible hardware for each version of XENIX.

B.1.1 Supported Hardware Configurations

The SCO XENIX System V Operating System Release 2.3 is available for several machine configurations. The XENIX kernel runs in one of two modes:

Processor	Mode
80286	Segmented mode (protected)
80386	Demand paged virtual memory mode (protected)

Your version of XENIX is for one of the following types of machine:

XENIX version	Hardware Configuration
286MC	IBM Personal System/2 Model 50, 60 and compatibles
386MC	IBM Personal System/2 Model 55, 65, 70, 80, 90, 95 and compatibles; Olivetti P500, Tandy 5000MC, ALR 386MC, ALR486MC, and Apricot Qi

Some computers require specific switch settings to run the SCO XENIX System V Operating System. If your computer does not run the SCO XENIX System V Operating System with the settings as shipped, contact your computer hardware representative for the proper settings.

The following sections describe the hardware that can be used with the standard SCO XENIX Operating System Release 2.3 distribution on microchannel architecture platforms. There are many other devices that you can use, which require additional vendor supplied software. These are available from independent hardware vendors. Call your dealer or SCO sales representative and ask for the SCO System V Directory.

If your computer is listed as a supported machine in this appendix, it should run XENIX without adding any hardware or changing any jumper or switch settings. This appendix is provided as a reference so that you can check the compatibility of any piece of hardware you own or may wish to buy in the future.

B.2 Supported Microchannel Architecture 286-based Machines

The following machines are supported under the SCO XENIX 286MC Operating System:

IBM Personal System/2 Model 50-021
IBM Personal System/2 Model 50-031
IBM Personal System/2 Model 50-061
IBM Personal System/2 Model 60-041
IBM Personal System/2 Model 60-071

Note that you should not use the SCO XENIX 286MC Operating System on the IBM Personal System/2 Model 70 or 80. Use only the SCO XENIX 386MC Operating System.

B.3 Supported Microchannel Architecture 386 and 486-based Machines

The following machines are supported under the SCO XENIX 386MC Operating System:

Apricot Qi 386 SX (was Qi 300)
Apricot Qi 386 (was Qi 600)
Apricot Qi 486 (was Qi 900)
Apricot FTs 386
Apricot FTs 486 (were Vx Ft Server Range)
ALR 386MC

ALR 486MC Model 150
IBM PS/2 Models
55-031
55-061
65 SX-061
65 SX-121
70-E61
70-121
70-A21
80-041
80-071
80-111
80-311
80-X21
80-M21
80-A21
80-A31
8590-OJ5
8590-OKD
8595-OJ5
8595-OKD
Tandy 5000MC
Olivetti P800
Olivetti P500
Olivetti P750

B.4 Math Co-processor Chips

Your personal computer may include the 80287 or 80387 math coprocessor, which is automatically detected and supported by SCO XENIX System V. These coprocessors improve floating point efficiency. The 80486 DX CPU includes an on-chip coprocessor that is also recognized and used as an 80387.

You should use math coprocessors matching your machine's CPU speed. Follow the manufacturer's recommendations.

At boot time, the SCO XENIX System V Operating System announces the presence of a math coprocessor with the message:

```
%fpu  - 35 - TYPE=80387
```

if an 80387 is detected;

```
%fpu - 35 - TYPE=80287
```

if an 80287 is detected. Please note that switches on the main system board must be set properly to enable 80287 or 80387 interrupts or your system must be set up with the manufacturer's setup disk to expect the chip. Ensure that the system diagnostics recognize the coprocessor presence and check your hardware manual for the proper switch settings.

B.4.1 Supported Math Chips

The following math coprocessors are supported for 386 microchannel architecture:

80387SX IBM order number 4676
80387 IBM order number 3002
80387 IBM order number 8720
80387 IBM order number 6320

The following math coprocessor is supported for 286 microchannel architecture:

80287 IBM order number 3001

B.5 Memory Cards

In general, most memory cards work with XENIX. If you experience "panic: parity" errors it is often because of low quality memory chips, cards, or SIMMs. This problem is especially prevalent with the 32-bit static RAM chips used in older 386 machines.

With memory cards, check the switch settings on both the card and motherboard. Refer to the hardware manuals for your computer and for the memory card to find the correct switch settings. The SCO XENIX 286 and SCO XENIX 386 Operating Systems support up to 16MB of main memory.

32-bit Memory and 386 Machines

In the case of 386 machines, it is *strongly* recommended that you use 32-bit memory from your machine manufacturer. 16-bit memory is much slower, and may actually degrade overall machine performance. Several manufacturers have not resolved DMA issues relating to 16-bit memory, and such machines will not recognize 16-bit memory. When in doubt, consult the hardware manufacturer.

Remember: Certain manufacturers reserve the upper 384K of the first megabyte for MS-DOS. On some machines, this "shadow" RAM cannot be accessed by XENIX. You may need to install additional memory in order to run XENIX.

If you see the message:

```
NMI:ERROR: Memory failure - parity error
```

wait while the system attempts to locate the cause of the problem. If the cause remains unknown, the system panics and the following message is displayed:

```
panic: memory failure -- parity error
```

Some part of your hardware is sending a "non-maskable memory error interrupt" (a signal sent by the hardware that halts the operating system). You should run your system's hardware diagnostics tests if available. In addition, physically re-seat your memory cards and chips, and check for bent pins, etc. If these measures fail to correct the problem, or you don't feel comfortable in checking your hardware yourself, seek assistance from professional hardware experts. One frequent cause of problems is memory chips that are slower than factory-recommended chips.

B.6 Serial I/O Boards

This section describes the conditions and results of using various serial I/O boards with XENIX.

Standard single port serial I/O boards, and the serial ports on many multi-function boards, function as expected if COM1 and COM2 are fully compatible with the standard specifications for these serial ports. These parameters are explained later in this section.

Memory, parallel ports or other hardware will usually also function as expected.

To configure the system for the serial board you are installing, you must run the **mkdev serial** command. See the chapter of the *System Administrator's Guide* entitled "Adding Multiport Cards, Memory, and Other Bus Cards", for more information on **mkdev serial**.

Note

If you are installing a "smart" multiport card (such as the Arnet Smartport card), do not use **mkdev serial** to configure your card. The manufacturer provides configuration software that is **custom**(ADM)-installable. Consult your hardware documentation for additional information.

Some 16-port cards have full modem control signals on the first four ports only. This means that a modem will only function properly on the first four ports.

Each multiport serial I/O board is unique; XENIX has a special driver code for each card listed. Only those with status poll registers can work with the high performance driver scheme chosen, and new boards require additional driver support.

Refer to the **serial**(HW) and **mkdev**(ADM) manual pages for more information on compatible serial I/O cards and on adding and enabling serial lines.

B.6.1 Supported Serial Cards

The following serial cards are supported under the SCO XENIX System V Operating System for microchannel computers:

IBM PS/2 model 1014 dual async adaptor (up to 3 per system)
Stargate PLUS 8 MC
AST 4 port
Digiboard PS-COM/4 port, 8 port, or 16 port
Comtrol Hostess/MC 8 port
Arnet Multiport/2 8 port - 1 or 2 cards

Note

When installing Arnet Multiport/2 8 port boards, it is important to set the base address to 0x140, *and* the option i/o to 0x180, so that intelligent polling can operate.

Serial Card Addresses and Notes

Serial Card Addresses			
Physical Port	**Board Type**	**Base Number of ports**	**Address**
COM1	Motherboard	1	0x3F8
COM2	Arnet	16, 8, 4, 2	0x140
	AST	4	0x1A0
	Stargate	8, 4	0x400
	Digiboard	16, 8, 4	0x3000
	Digiboard	8	0xDB80
	HostessMC	4	0x500
	HostessMC	8	0x500
	HostessMC	4	0x540
	HostessMC	8	0x540
	HostessMC	4	0x580
	HostessMC	8	0x580

Hostess
AST 4 port
IBM Dual Async

occupy the following addresses:

Port Number	Address
1	0x2F8
2	0x3220
3	0x3228
4	0x4220
5	0x4228
6	0x5220
7	0x5228
8	0x2F0

B.6.2 Serial I/O Chip Notes

Some computers or add-on serial I/O cards use the 8250a serial I/O chip. (16450 or 16550 chips are strongly recommended for 386 machines. The 16550 chip has FIFO support.) Some revisions of this chip do not handle interrupts properly. MS-DOS does not use interrupts, so the use of this chip with MS-DOS causes no problems. XENIX makes use of interrupts, as it is a multitasking operating system.

The problem with the serial I/O chip shows up when using **uucp**(C) or **cu**(C). Indications that your computer contains a bad revision 8250a chip are that **uucp**(C) may lose characters constantly and generate unkillable **uucico** processes, and that **cu**(C) at high baud rates stops executing and does not exit.

The problem rarely shows up when using the serial port with a terminal. It is associated with high-speed serial input. If you want to use **uucp**(C) or **cu**(C) and your computer has one of these chips, we recommend you replace the 8250a chip with an 8250b serial I/O chip or use a multi-function card containing a serial port and configure it as COM1 or COM2. Disable the built-in serial port or avoid high-speed input on that port.

All COM1 boards should be strapped at Interrupt Vector 4. All COM2 boards should be strapped at Interrupt Vector 3. Check your serial card hardware manual or call the hardware manufacturer for the switch settings that implement these addresses.

Note

SCO uniPATH SNA-3270 uses Interrupt Vector 3, which can interfere with the use of a serial card on COM2.

B.7 Disk Controllers and Host Adapters

XENIX supports a single ST506/ESDI hard disk controller on 286-based machines.

On 386 machines, XENIX supports the use of ST506/ESDI hard disk controllers (referred to henceforth as "standard"), and SCSI host adapters in the following combinations:

- one standard controller, which must be the root disk
- one or two SCSI host adapters
- one standard controller with a single SCSI host adapter

Note that when using both a SCSI host adapter and an ST506/ESDI disk controller, XENIX must be installed on the non-SCSI controller. This means if you start with XENIX installed on a SCSI disk and you want to add a non-SCSI disk, you must reinstall XENIX using the non-SCSI disk as the root disk.

The following table summarizes the number of devices supported per controller/adapter:

Controller or Adapter	Maximum Number of Devices Supported
Standard	2 disks per controller
SCSI	7 devices per adapter

On a system with both ST506 and SCSI disks, the four supported ST506 disks are hd0 (the boot drive), hd1, hd4, and hd5. The SCSI disks are hd2, hd3, and hd6 through hd17. If the only disk drives in the system are SCSI, the SCSI drives are hd0 through hd13.

B.7.1 Installing a Hard Disk (mkdev hd)

To install a hard disk, use the command **mkdev hd** and follow the installation instructions in the "Adding Hard Disks" chapter of the *Installation and System Administrator's Guide*. The menus differ very slightly for microchannel installations; there are no references to OMTI controllers, and you are offered the option of using either a standard, an Adaptec SCSI, or an IBM SCSI disk controller. Both SCSI installation routines are identical to that documented in the *Installation and System Administrator's Guide*.

Note

If you choose a SCSI disk controller, you are then asked what type of controller supports the *root* hard disk.

B.7.2 ST506/ESDI Controllers

Many ST506 and ESDI hard disks work with XENIX. Whether or not a disk works depends upon the disk controller board used. For the disk to work, the controller must meet two tests:

1. The disk controller must be fully compatible with the standard controller for that configuration.

2. No special vendor software is needed to make the controller work under MS-DOS.

If a controller meets these tests, it should work, but if it fails these tests, it will not work.

B.7.3 SCSI Host Adapters (XENIX-386 only)

SCSI host adapters accept devices with SCSI drivers, including hard disks and tape drives. Each device on the SCSI bus must have an ID. The ID number corresponds to the jumper or switch settings on the disk, so care must be taken that hard disk settings are correct. Additional disks may be any other ID between 1-7. Note that the host adapter uses one of the ID numbers (typically number 7). The LUN number is always 0.

Only the devices listed in this appendix as tested or reported to work with SCSI host adapters can be relied upon to work properly with XENIX. The fact that a given device uses a SCSI interface is no indication that it will work properly.

B.7.3.1 Adaptec SCSI Host Adapters

The Adaptec SCSI host adapter should run correctly with the manufacturer's default settings. It should be configured at base address 0x330, IRQ=15. If you are installing a second Adaptec 1640, disable the BIOS on the second board, and set the board's base address to 0x230, and IRQ to 10. Note that DMA arbitration is configurable for both primary and secondary adapters.

Note

When installing an Adaptec 1640 and an ST506, it is advisable to install the ST506 card first, on its own, and then install the Adaptec 1640 card.

B.7.4 Add-On Hard Disks

Many hard disks can be used by XENIX. In the case of ST506/ESDI drives, the drive must be supported by the ROM BIOS, or the ROM parameters must be entered at installation time. Consult your computer hardware reference manual for the appropriate ROM table entries for your computer.

Note

This section applies only to ST506 and ESDI hard disks. SCSI disks are preformatted and use a different cylinder/head/sector translation logic, thus the considerations for ST506 and ESDI disks do not apply. Use **mkdev hd** to add hard drives to the system, regardless of whether they are SCSI or standard.

MS-DOS generally does not support non-standard disks (that is, those not defined in the ROM Fixed Disk BIOS).

Some hard disks come from the factory only partially formatted (for example, the Maxtor 1140 140 Mbyte). This problem may become evident during installation, when **badtrk**(ADM) indicates that every sector past a certain cylinder/head location is bad. You should contact the manufacturer to determine whether or not the disk is completely formatted. There are several products available that format hard disks.

Compatible hard disk controllers are discussed in a later section of this appendix.

- For a standard disk

  the motherboard ROM must have an entry for the disk (type) determined by the number of heads, cylinders, tracks per cylinder (heads), sectors per track, and other characteristic information.

  Follow the manufacturer's instructions to set switches or configuration.

- For a nonstandard disk
  the user can type in information that overrides the ROM disk configuration information during installation.

  If you are unsure of what parameters to enter for your nonstandard disk, contact your disk manufacturer for this information. The **dkinit** program (called during installation) allows you to input the disk parameters.

B.7.4.1 Disks Larger than 1024 Cylinders

If you are installing a disk with more than 1024 cylinders, consult the restrictions in the "Before You Start" chapter.

B.7.5 Compatible Hard Disk Controllers

The following controllers are supported for the 386 Microchannel Architecture:

Adaptec AHA-1640 (SCSI host adapter)
Adaptec 2610 (ESDI disk controller)
Adaptec 2620 (ST506 disk controller)
IBM (ESDI disk controller)
IBM (ST506 disk controller)
IBM (SCSI host adapter)
Western Digital 1006V-MCI (ST506 disk controller)
Western Digital 1007V-MCI (ESDI disk controller)

The following controllers are supported for the 286 Microchannel Architecture:

IBM (ESDI disk controller)
IBM (ST506 disk controller)

B.7.5.1 Primary and Secondary Disk Selection

The following combinations of ESDI, ST506, and SCSI disks may be used on microchannel systems:

Primary	Secondary
ESDI	any SCSI
ST506	any SCSI
IBM SCSI	IBM SCSI
Adaptec SCSI	Adaptec SCSI

B.8 Tape Drives and Controllers

Note that the tape drives described in these notes are sometimes sold under other brand names. Only one cartridge tape subsystem is supported per computer. (It is possible to have one cartridge tape drive plus a minicartridge or QIC-40 drive configured on a system.)

One SCSI tape drive is supported on the SCSI bus. The standard QIC02 cartridge tape controller is also supported, but only one tape drive, either SCSI or QIC02, can be present on the system. The SCSI tape can be configured at any ID on either Host Adapter.

QIC-24 format is supported on the full size cartridges. Tape support is raw (character) only, no block device. A no-rewind device exists for writing multiple tape files on a single tape. A tape utility, **tape**(C), is provided for rewinding, erasing, format, retensioning, and so on.

B.8.1 Installing a Tape Drive (mkdev tape)

To configure your system for a tape unit, run **mkdev tape** and follow the instructions in the "Using Cartridge Tape Drives" chapter of the *Installation and System Administrator's Guide*". For installation on a microchannel architecture machine, you are offered the additional option of installing an IBM SCSI tape drive.

If you do not choose specific values for the DMA channel, interrupt, and base address, the default values are used. (This information is found in the section entitled "Supported Tape Drives and Controllers".) Note that most addresses are specified in hexadecimal. If you do not use the default settings, watch for possible interrupt conflicts with other installed devices. The section entitled "Supported Tape Drives and Controllers" indicates which interrupts may be in use on your system. You should not use interrupts 0, 1, or 6, as these are already in use regardless of additional devices. The **mkdev tape** menu indicates the Irwin units as "Mini-Cartridge," and all other units are indicated as "Cartridge," "QIC-40/QIC-80," and "SCSI" units. The Irwin units are not configurable using **mkdev tape**, but certain hardware parameters can be defined in a file */etc/default/mcconfig*. (XENIX-386 only; see

mcconfig(F) for details). Refer to the "Using Floppy Disks and Tape Drives" chapter of the *System Administrator's Guide*.

B.8.2 Supported Tape Drives and Controllers

Supported tape drives and controllers for microchannel architecture machines are described in the table below.

Supported Tape Controllers and Cartridge Drives

Manufacturer	Controller	Drive	Type
Archive	QIC-02	2150L	E
Archive	SCSI	2060S	A
Archive	SCSI	2150S	A
IBM	QIC-02	6157-001	X
IBM	QIC-02	6157-002	X
IBM	floppy	5279 80MB	N/A
Irwin	floppy	245	N/A
Irwin	floppy	285	N/A
Mountain 7060	QIC-02	60MB Filesafe	M
Mountain 7120	QIC-02	150MB Filesafe	M
Tecmar	QIC-02	QT-60E	T
Tecmar	QIC-02	QT-150E	T

Default Settings

Manufacturer	Base Address	DMA Channel	Interrupt	Type
IBM 6157	0x3120	2	6	X
Mountain	0x200	1	5	M
Archive	0x300	1	3	E
Tecmar/Wangtek	0x300	3	5	T

Installation of IBM 6157 Tapes

Although your IBM 6157 tape installs successfully, you may see the following error message when your system boots up:

```
ct:WARNING: first reset no good
ct:ERROR: tape controller (type X) not found
```

To correct this error, you need to inspect the DOS reference file *@DFBF.ABF*. This file is found on the IBM reference diskette, and contains configuration details for microchannel tape controllers. The file should read as follows:

```
AdapterId 0DFBFh
AdapterName "Streaming Tape Adapter Card"
NumBytes 2
FixedResources
POS[0]=0000010Xb
POS[1]=00000010b
        io  3120h-312fh
        int 6
```

If your file differs in any way from the above, modify it accordingly.

B.8.3 The Exabyte Tape Driver

The EXB-8200 8mm cartridge tape system is supported for this release of SCO XENIX. The following points should be noted:

- Exabyte has a default block size of 1Kbyte rather than 512byte. Therefore, when you use the **tar**(C) command with the **b** option (to specify block size), ensure that the value you use is a multiple of 1Kbyte. If, for example, you type *tar cvfb /dev/rct0 3*, the following error message is displayed:

```
SCSI: ERROR: on tape ha=0 id=2 lun=0
      hst 12 ust 00
      AHA-1640 cmd: 0A 01 0 00 01 00
      AHA-1640 sense: 00 00 00 00 00 00 00
      CDB opcode=0 CMD length=6
SCSI: WARNING: Host Adapter Detected Error
      SCSI Bus Data Over/Under Run

      tar: tape write error
```

You must perform a **tape -s** rewind to ensure that the tape is rewound to the beginning and reset correctly.

Note also that the "tape write error" message is displayed when you use a block size of less than 1Kbyte with the **tar** command.

- You are advised to ensure that the Exabyte device is ready (that is, wait for the tape drive light to come on), before accessing the tape. Failure to do this may result in an error message stating that the device is not ready.

B.9 Video Adapters and Monitors

Microchannel architecture machines have the VGA built into the mother board: therefore, no options are available. Adapters which come as the default adapter in supported computers (monochrome or color monitor) will work with the XENIX System V Operating System.

The IBM 8514/A and IBM XGA (models 90, 95) are supported as a VGA.

B.9.1 Supported Video Cards

The following video cards are supported under the XENIX 286/386MC Operating System:

IBM Personal System/2 Integral VGA adapter and the 8503, 8512,
8513, and 8514 monitors
Olivetti P500, Integral VGA
Tandy 5000MC, Integral VGA
Apricot Qi, Integral VGA

B.10 Modems and Autodialing

Any 100% Hayes-compatible modem works using **uucp**(C) and **cu**(C). The default autodialer is for the Hayes Smartmodem 1200. We strongly recommend external modems. Dialer programs are listed in the "Adding Terminals and Modems" chapter of the *XENIX System Administrator's Guide*. Additional modems can be supported by writing a dialer program, or modifying an existing one in */usr/lib/uucp*.

If you are using UUCP with an error correcting modem and you observe errors in file transfers, disable the error correcting feature. UUCP does its own error correction and the redundancy can cause problems.

In addition, the new Honey DanBer UUCP package includes a large number of dialer scripts in the *Dialers* file. However, dialer binaries are preferred for greater reliability.

B.10.1 Supported Modems

The following modems are supported for 386 microchannel architecture:

IBM PS/2 Internal Modem (300-1200) model 0349
IBM PS/2 External Modem (2400) model 1755

B.11 Compatible Printers

The following printers are supported for 386 microchannel architecture:

IBM Pageprinter
IBM PagePrinter 2
IBM Proprinter 2
IBM QuietWriter 2
IBM QuietWriter 3
IBM QuickWriter

B.12 Mice and Other Graphic Input Devices

The following graphic input devices are supported:

Logitech Serial Mouse
Microsoft Serial Mouse
Mouse Systems PC Mouse
Mouse Systems PC Mouse II
Microsoft Busmouse or InPort Mouse
Logitech Bus Mouse
Olivetti Bus Mouse
IBM Personal System/2 Mouse
Summagraphics Bitpad*

* The Summagraphics bitpad is not supported for use under SCO Xsight or with the **usemouse**(C) utility at this time. This is because the bitpad is an absolute locator device and mouse-based applications expect a relative locator device. Applications designed to use a bitpad work as expected.

Note

The 386 MC Operating System supports the Apricot Qi mouse when used with the Apricot Qi computer only.