The XENIX® System V Operating System

Release Notes

Version 2.3.2

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SCO XENIX System V Operating System Release Notes Release 2.3.2

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Release Notes
SCO XENIX System V
Operating System
Release 2.3.2
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1. Preface

This document contains important information about the SCO XENIX System V Operating System Release 2.3. These notes are divided into two parts: software notes and an appendix, "Compatible Hardware."

The software notes are organized into the following sections:

- Notes About Installing Your Software
- Administrating Your System
- Using Your System
- Special 386 Microprocessor Notes
- Using the Console and Terminals
- Using Printers
- Using Floppies and Tapes
- Using Hard Disks
- Using a Mouse
- Using MS-DOS and OS/2
- Using Networks

- System Configuration and Link Kit Notes
- Compatibility and Conformance Notes

Note

Please read through the "Notes about Installing Your Software" section of these *Release Notes* before installing the XENIX System V Operating System. In addition, pay particular attention to the sections pertaining 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 of these notes may be required for successful XENIX installation. Please refer to those sections of Appendix A 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 Contents of the Distribution

The XENIX/UNIX System V Operating System Release 2.3.2 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."

1.2 Conventions Used in These Notes

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

1.3 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 actual sizes of the packages in your set may differ from those shown here. Use **custom**(ADM) to determine the actual sizes in your set.

XENIX System V Operating System Packages

Package	Size (512 byte blocks)	Use/Contents
ALL	16344	Entire Operating System set
LINK	2112	The link kit
RTS	4742	XENIX run time system
BASE	1242	Basic extended utility set
BACKUP	306	System backup and recovery tools
SYSADM	1496	System administration tools
FILE	528	File manipulation tools
LPR	552	Multiple line printer spooler
IMAGEN	228	Imagen laser printer support
MAIL	648	Electronic mail and micnet
CSH	116	The C-shell
DOS	364	MS-DOS utilities
VSH	266	The visual shell
EX	332	The ex and vi editors
UUCP	2008	Uucp and cu communications utilities
INITTAB	10	Terminal initialization
MAPCHAN	152	International character set mapping
TERMINF	500	Terminfo database
HELP	520	Help utility and related files
MOUSE	140	Mouse and graphic input devices files

1.4 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. Notes about Installing Your Software

Please refer to the *Installation Guide* in the binder marked "*XENIX Operating System Installation and Maintenance*" to install the XENIX System V Operating System. Chapter 2, "Installation Procedure," describes the actual installation steps.

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.

2.1 Using the Installation Guide

The *XENIX Installation Guide* has been revised for this release.

1. Introduction
2. Installation Procedure
3. Re-installing and Updating Your System
4. Installation Glossary

Chapter 2, the "Installation Procedure," has been expanded and the steps simplified. A detailed section on "Planning Your Disk Layout" has been added. All procedures relating to re-installing XENIX and performing updates are found in Chapter 3, "Re-installing and Updating Your System." Chapter 4 is an installation glossary that defines the terms used in the *Installation Guide*.

2.2 Before You Start

This installation is not an update, and it will overwrite the present contents of the hard disk drive 0. 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.

If you are upgrading your computer to Release 2.3, you can continue to use a pre-2.3 XENIX filesystem on a second hard disk by following the instructions in the section "Re-establish Your Hard Disk" in the "Re-installing and Updating Your System" chapter of the *Installation Guide*.

Read the *Release Notes* and *Installation Guide* and make sure you completely understand the installation process before installing the product.

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 to explicitly tell 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 ample 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, go over 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 all or only 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*.

— For a 386 standard architecture machine, use an ESDI or SCSI disk as the root hard disk. For a 286 standard architecture machine, use an ST506 disk as the root hard disk. For a microchannel architecture machine, use an ESDI, a SCSI or an ST506 disk as the root hard disk.

  This is described in the sections "ESDI Notes" and "SCSI Notes" later in this chapter.

— 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.

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

  This is discussed in the "Using MS-DOS and XENIX on the Same Disk" 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. If you need to customize your installation, though, make sure you have a clear idea of what you want before you start the actual installation process.

2.3 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 286 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.

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

2.4 Installing the BACKUP Package

If you choose to install ALL or the BACKUP package with **custom**(ADM), you are prompted for information about the filesystems you configured on your system during installation. This information is used to set up a schedule for backing up your system files. (See "sysadmin(ADM): Filesystem Backup Enhancements"

in these *Release Notes* and Chapter 6: "Backing Up Filesystems" in the *XENIX System Administrator's Guide*.) The prompts are displayed after the files are loaded and appear as follows:

```
Does this installation consist of only a root filesystem?
```

If you respond **y**, then the **schedule** file is automatically modified to only back up a root filesystem.

If you respond **n**, you are prompted:

```
Does this installation consist of only the root filesystem
and a user filesystem named /u?
```

If you respond **y**, a message is displayed indicating that the default **schedule** is suitable for your system and need not be altered.

If you respond **n**, you are indicating that you have additional filesystems, which requires manual editing of the **schedule** file. This process is explained in Chapter 6: "Backing Up Filesystems" of the *XENIX System Administrator's Guide*.

In addition to the filesystem question(s), you are prompted to create a password for the **backup** account. When you log in as **backup**, you are taken directly to the **sysadmin** menu.

2.5 If Console Displays Es when Booting from N1

When booting from the N1 floppy, if a number of Es appear on the console and the system refuses to respond, try booting an MS-DOS floppy, or other bootable diskette. If the machine can boot a diskette, then your N1 floppy is corrupted. You are entitled to a free replacement floppy.

2.6 Changes to the Installation Procedure

The installation procedure has several changes so you can select the type of controller that supports the hard disk, and see additional information during the installation. To accommodate these added features, the following sections in the chapter "Installation Procedure" in the *XENIX Installation Guide* have changed.

2.6.1 Starting XENIX from the Boot Floppy Set

For 386 Standard Architecture

For 386 standard architecture machines, step 11 now contains a prompt in addition to the existing message, and step 12 is added.

11. The following message is displayed:

```
XENIX System V Hard Disk Installation

What type of disk controller will be supporting this disk?

  1. ST506 (standard disk support)
  2. OMTI 8620 or OMTI 8627 (ESDI support)
  3. SCSI

Enter 1, 2, 3 or enter q to quit:
```

Enter the number that corresponds to the controller you have.

12. If you enter **2** for ESDI support, an additional prompt appears:

```
What interface will this hard disk use

  1) ESDI
  2) ST506

Enter 1 or 2 or enter q to quit:
```

Enter the number that corresponds to the type of interface the hard disk will use.

For 386 Microchannel Architecture

For 386 microchannel architecture machines, step 11 now contains a prompt and a new message.

11. The following message is displayed:

```
XENIX System V Hard Disk Installation

Is the Primary disk a SCSI Device? (y/n)
```

Enter **y** if you have a SCSI root disk or **n** if you have an ESDI or ST506 root disk. There is no step 12 for microchannel architecture machines.

You are now ready to proceed with "Preparing the Hard Disk."

2.6.2 Preparing the Hard Disk

Some steps have changes, as follows:

1. You see the message:

```
During installation you may choose to overwrite all
or part of the present contents of your hard disk.

Do you wish to continue? (y/n)
```

If you do not have any files you want to save, enter **y** and press <Return>.

See the note in step 1 about saving files on the hard disk.

If you have an ST506, OMTI or ESDI controller, continue with step 2.

If you have a SCSI controller, you see the following message:

```
The hard disk installation program will now invoke
/etc/fdisk.
Entering 'q' at the following menu will exit /etc/fdisk.
and the hard disk installation will continue.

If you wish to exit the entire installation at this
menu, press the <del> key.
```

Skip to step 5.

Note

The SCSI installation does not run **dkinit** (steps 2 - 4).

---

2. The **mkdev** program now invokes **dkinit**, which sets the parameters for the hard disk.

   If you have an ST506 (standard interface) controller running on a 386 standard architecture machine, or **an ST506 or ESDI controller** running on a microchannel architecture machine, you see the following message and prompt:

```
The hard disk installation will now invoke /etc/dkinit.
Entering 'q' at the following menu will exit /etc/dkinit,
and the hard disk installation will continue.

If you wish to exit the entire installation at this menu,
press the <del> key.

Hard Disk Drive 0 Configuration

  1. Display current disk parameters
  2. Modify current disk parameters
  3. Select default disk parameters

Enter an option or 'q' to quit:
```

If you have an ST506 (standard interface) controller running on a 286 standard architecture machine, you see the following message and prompt:

```
Hard Disk Drive 0 Configuration

  1. Display current disk parameters
  2. Modify current disk parameters
  3. Select default disk parameters

Enter an option or 'q' to quit:
```

If you have an OMTI or ESDI controller, running on a standard architecture machine, you see the following message and prompt:

```
The hard disk installation will now invoke /etc/dkinit.
Entering 'q' at the following menu will exit /etc/dkinit,
and the hard disk installation will continue.

If you wish to exit the entire installation at this menu,
press the <del> key.

Caution: Consult the ESDI installation
Release Notes
if you wish to modify the disk parameters the /etc/default
will display.

Hard Disk Drive 0 Configuration

  1. Display current disk parameters
  2. Modify current disk parameters
  3. Select default disk parameters

Enter an option or 'q' to quit:
```

Read the section "ESDI Guidelines" in Appendix A, "Compatible Hardware."

For both controllers, see step 2 for more information on **dkinit**.

If you enter **q**, you see the following message:

```
The hard disk installation program will now invoke
two disk preparation utilities:  fdisk and badtrk.
Selecting 'q' at the main menu for each utility
will exit that utility and continue with the hard
disk installation.

To exit the entire installation at these menus,
press the <del> key.
```

Skip to step 5.

3. – 6. No changes.

7. Press <Return>, and you see the main **fdisk** menu. You have now set up the partition(s) to use XENIX on your hard disk. To continue with the next step in the installation procedure, enter **q** and press <Return>.

   If you have an ST506, OMTI or ESDI controller, continue with step 8.

   If you have a SCSI controller, skip to step 19.

Note

The SCSI installation does not run **badtrk** (steps 8 - 18).

---

8. – 24. No changes.

2.7 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.

2.8 Emergency Boot Floppy

There is now a provision for creating an "Emergency Boot Floppy" used to recover a corrupted root filesystem. It is recommended that this floppy be created as directed in the "Installation Procedure" of the *XENIX Installation Guide.* The complete procedure for using the Emergency Boot Floppy is documented in the "Solving System Problems" chapter of the *XENIX System Administrator's Guide* under "Restoring a Corrupted root Filesystem." This procedure is followed when the system cannot be started or "booted" after a crash or a panic message is displayed on the console.

2.9 Changes to custom(ADM)

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

2.10 Games Support

Games are supplied, as is, 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.

2.11 ESDI Notes for Standard Architecture Machines

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 installing hardware, configuring software, and performing low-level formats on new disks and discussion 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 ESDI systems, see the following sections in these *Release Notes:*

- "Starting XENIX from the Boot Floppy Set," which describes the installation procedure.
- "Adding Another Hard Disk," which discusses the numbering scheme in **mkdev hd**.
- "Adding ESDI Disks," which describes the number of Host Adapters and ESDI hard disks that are supported.

In addition, see the following sections in Appendix A, "Compatible Hardware":

- "386GT Operating System," which lists the supported machines.

- "ESDI Guidelines," which provides information on hardware configuration.

2.12 Disk Notes for Microchannel Architecture Machines

This section provides general information for disk drive controllers under SCO XENIX System V Release 2.3 for 286 and 386 microchannel architecture machines. See Appendix A, "Compatible Hardware," for installing hardware, configuring software, and performing low-level formats on new disks and discussion on badtracking and disk space usage.

This product supports one controller with up to two drives attached to it.

For more information on ESDI systems, see the following sections in these *Release Notes:*

- "Starting XENIX from the Boot Floppy Set," which describes the installation procedure.

- "Adding Another Hard Disk," which discusses the numbering scheme in **mkdev hd**.

- "Adding ESDI Disks," which describes the number of Host Adapters and ESDI hard disks that are supported.

In addition, see the following sections in Appendix A, "Compatible Hardware":

- "Microchannel Architecture 286-based Machines," which lists the supported 286 machines.

- "Microchannel Architecture 386-based Machines," which lists the supported 386 machines.

- "ESDI Guidelines," which provides information on hardware configuration.

2.13 SCSI Notes

2.13.1 SCSI Notes for Standard Architecture Machines

The XENIX 386GT Operating System runs on industry standard 386 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 primary disk, 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 these *Release Notes*:

- "Starting XENIX from the Boot Floppy Set," which describes the installation procedure.

- "Adding Another Hard Disk," which discusses the numbering scheme in **mkdev hd**.

- "Adding SCSI Disks," which describes the number of SCSI Host Adapters and SCSI hard disks that are supported.

In addition, see the following sections in Appendix A, "Compatible Hardware":

- "386GT Operating System," which lists the supported machines.

- "SCSI Guidelines," which provides information on hardware configuration and formatting a SCSI disk.

2.13.2 SCSI Notes for 386 Microchannel Architecture Machines

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

If a SCSI disk is going to be your primary disk, you must run your computer's **setup** program.

For more information on SCSI systems, see the following sections in these *Release Notes*:

- "Starting XENIX from the Boot Floppy Set," which describes the installation procedure.
- "Adding Another Hard Disk," which discusses the numbering scheme in **mkdev hd**.
- "Adding SCSI Disks," which describes the number of SCSI Host Adapters and SCSI hard disks that are supported.

In addition, see the following sections in Appendix A, "Compatible Hardware":

- "386MC Operating System," which lists the supported machines.
- "SCSI Guidelines," which provides information on hardware configuration and formatting a SCSI disk.

3. Administering Your System

3.1 The System Administrator's Guide

Formerly the *Operations Guide*, this manual discusses all aspects of system administration, including maintaining filesystems, hardware configuration, adding printers, terminals, modems and other devices. The following chapters are in the *XENIX System Administrator's Guide*:

1. Introduction
2. sysadmsh: Using the System Administration Shell
3. Starting and Stopping the System
4. Using Filesystems
5. Maintaining System Security
6. Backing Up Filesystems
7. Adding Device Drivers With the Link Kit
8. Tuning System Performance
9. Using MS-DOS and XENIX On the Same Disk
10. Preparing XENIX for Users
11. Building a Remote Network with UUCP
12. Building a Local Network With Micnet
13. XENIX Directories and Special Device Files
14. Using Terminals and Modems
15. Using Printers
16. Using Floppy Disks and Tape Drives
17. Using Bus Cards
18. Using a Mouse With XENIX
19. Solving System Problems

For those who are familiar with pre-2.3 documentation, the following subsections summarize the changes for this release. Some of the chapters are new, and many have been extensively rewritten. These are described below:

Chapter 2: "sysadmsh: Using the System Administration Shell"
(New for Release 2.3.) This is a tutorial that demonstrates how to use the **sysadmsh**(ADM). It includes a full discussion of the displays, keystrokes and function keys. Most of the *System Administrator's Guide* chapters have embedded references to **sysadmsh** menu selections. For example, where the user is told to use the **custom**(ADM) command, directly below it is a **sysadmsh** menu selection.

Chapter 4: "Using Filesystems"
(Revised for Release 2.3.) This is consolidated information on filesystems, including adding hard disk filesystems. A discussion of filesystem integrity and how **fsck**(ADM) works has been added. (In addition, a complete list of **fsck** error messages, what they mean, and what can be done has been added to the **fsck** manual page.) Information on permissions and system security has been moved to the "Maintaining System Security" chapter.

Chapter 5: "Maintaining System Security"
(New for Release 2.3.) A comprehensive guide to XENIX security. All material relating to changing and aging passwords, making filesystems mountable by users, adding dialup passwords, and using accounting features has been added or moved here.

Chapter 6: "Backing Up Filesystems"
(Revised for Release 2.3.) **sysadmin**(ADM) has been changed and now uses **fsphoto**(ADM), **fsave**(ADM) and **schedule**(ADM). This chapter explains how to create a backup schedule, perform backups and restore them.

Chapter 7: "Adding Device Drivers With the Link Kit"
(Revised for Release 2.3.) This chapter explains how to install third-party device drivers. It was moved from the *Installation*

Guide and split into two chapters; the second is "Tuning System Performance."

Chapter 8: "Tuning System Performance"
(New for Release 2.3.) Expanded information on tunable kernel parameters. All aspects of performance are discussed, from simple matters such as reorganizing the free list, to deallocating unused resources and checking for inefficient disk activity. The last half of the chapter is a complete list of all tunable parameters, including their value ranges and how they are used. See the section on "Near Data Considerations for 286 Machines" of these *Release Notes* for extra information on tunable kernel parameters specific to the 286 machine.

Chapter 9: "Using MS-DOS and XENIX On the Same Disk"
(Revised for Release 2.3.) This explains how to install MS-DOS on your system so that your system can be shared between MS-DOS and XENIX. It was moved from the *Installation Guide*.

Chapter 11: "Building a Remote Network with UUCP"
(New for Release 2.3.) Moved from the *User's Guide*. Completely rewritten for HoneyDanBer UUCP. UUCP is explained in detail, as well as the basic principles of remote network communications. Extensive troubleshooting sections are also included.

Chapter 14: "Using Terminals and Modems"
Chapter 15: "Using Printers"
Chapter 16: "Using Bus Cards"
(New for Release 2.3.) These three chapters are expanded sections of the old "Using Peripheral Devices" chapter. They explain how to add and use each type of device.

Chapter 17: "Using Floppy Disks and Tape Drives"
(New for Release 2.3.) This chapter explains how to use floppies and tapes, including how to install and configure tape drives. Creating floppy filesystems is discussed, including the creation of an "Emergency Boot Floppy."

Chapter 18: "Using a Mouse With XENIX
(New for Release 2.3.) The 2.3 Release includes mouse support.

This chapter explains how to configure mice. The mouse can also be used with programs that accept only keyboard input; the **usemouse**(C) page describes this capability.

Chapter 19: "Solving System Problems"
(Revised for Release 2.3.) This has been expanded for the 2.3 release. The chapter contains the most common maintenance difficulties and how to deal with them.

3.1.1 The (ADM) Section

Many commands in the pre-2.3 User's Reference are root-only, meaning that they are system administration commands executable only by the super user. These commands have been moved to a new section (ADM) in the *XENIX System Administrator's Guide*.

The following pages have been moved to the ADM section and/or added for Release 2.3:

acctcom	**divvy**	**install**	**ncheck**
accton	**dmesg**	**ipcrm**	**netutil**
adfmt	**dparam**	**ipcs**	**pwadmin**
aliashash	**fdisk**	**ips**	**rmuser**
asktime	**fdswap**	**kbmode***	**runbig**
autoboot	**fixperm**	**lpadmin**	**schedule***
badtrk	**fsave***	**lpinit**	**setclock**
chroot	**fsck**	**lpsched**	**setmnt**
clri	**fsdb***	**makekey**	**settime**
config	**fsname**	**mkdev**	**shutdown**
configure	**fsphoto***	**mkfs**	**sync**
cprint*	**haltsys**	**mkuser**	**sysadmin**
custom	**hdinstall**	**mount**	
dial	**idleout***	**mvdir**	

* New pages for Release 2.3

3.1.2 The (HW) Section

The (HW) section is also located in the *XENIX System Administrator's Guide*. These pages contain hardware-specific information about device names and other information that varies with machine architecture.

3.2 messages(M): System Error Messages

The organization and presentation of error messages in XENIX has been standardized and expanded. System messages now conform to a common message and error reporting scheme defined in the SVID, indicating level of severity. In addition, configuration announcement messages, (e.g. from I/O devices) are presented in a standard way. All system and driver error messages are documented in the **messages**(M) manual page in the *User's Reference*. In addition, certain messages and their remedies are documented in the "Solving System Problems" chapter in the *XENIX System Administrator's Guide*.

Take note of the following error in the **messages**(M) page: at the bottom of page 8, all instances of *cmn_err* should read *xcmn_err*.

3.3 sysadmsh(ADM): Enhancements

The functions of the **sysadmsh**(ADM) has been expanded. It now includes access to many more system administration functions. Context-sensitive help is also available. See the "sysadmsh: Using the System Administration Menu Shell" in the *XENIX System Administrator's Guide*.

3.3.1 Limitations

At this time, the following **sysadmsh** functions are not available:

Filesystem→Create	Add a filesystem
System→Delete→HardDisk	Eliminate a hard disk

The User→Communicate selection simply returns without result if there is no mail.

In addition, follow these guidelines regarding keystrokes:

- Do not use <CTL>-g to execute a Form.
- The F2 key can be used to exit quickly from **sysadmsh**.

3.3.2 Environment Variables

The **sysadmsh** now uses the following environment variables that can be defined in user *.login* or *.profile* files:

SA_EDITOR	If not set, the default editor is Lyrix if installed, or **vi**(C) if Lyrix is not available.
SA_MAIL	If not set, the default mailer is SCO Portfolio **email** if installed, or regular XENIX **mail**(C) if not.
SA_PRINT	If not set, the default printer device is **/dev/lp**.
SYSADMSH	If not set, the default location of **sysadmsh** files is **/usr/lib/sysadmsh**.

3.4 sysadmin(ADM): Filesystem Backup Features

The **sysadmin**(ADM) program (also accessible through the **sysadmsh**) has been expanded to create scheduled backups. Although the underlying utilities are new additions to XENIX (**fsphoto**(ADM), **fsave**(ADM), and **schedule**(ADM)), it is not necessary to understand them; the basic design of the **sysadmin** interface has been preserved. Refer to the "Backing Up Filesystems" chapter in the *XENIX System Administrator's Guide* for complete details.

sysadmin is part of the BACKUP package. When the BACKUP package is installed with **custom**(ADM), a series of prompts is displayed to establish the type of filesystems configured on your system; see "Installing the BACKUP Package" section in "Notes about Installing Your Software" of these *Release Notes* for a complete description of these prompts.

3.5 autoboot(ADM): Reboot TIMEOUT Feature

You can now control the length of time your system waits before rebooting. The TIMEOUT variable can be defined in */etc/default/boot*. If LOADXENIX=YES is defined, TIMEOUT can be defined as the number of seconds **boot** should wait before timing out and booting automatically. See the **autoboot**(ADM) manual page for details.

3.6 mkuser(ADM): Enhancements

The **mkuser**(ADM) utility has been enhanced to create complete home directories, mailboxes and appropriate shell files when invoked, according to the defaults set up by the system administrator. See the **mkuser**(ADM) manual page, and "Creating User Accounts" in the "Preparing XENIX for Users" chapter of the *System Administrator's Guide*.

The new default for directory permissions created by **mkuser** is 750 instead of 755. This can be altered by editing */etc/default/mkuser* .

3.7 login(M): Dial-in Passwords

The option of having passwords for dial-in lines has been added. See the section on "Adding Dial-in Password Protection" in the "Maintaining System Security" chapter of the *System Administrator's Guide*.

3.8 last(C): Last User Login

The **last** command allows you to check the last date when a user was logged in and what tty was used. Refer to the **last**(C) manual page in the *XENIX User's Reference*.

3.9 id(C) and quot(C): Incorrect id Reporting

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

3.10 Restoring Lost Files with custom(ADM)

If you accidentally erase one or more of the files included with the distribution after you have installed the XENIX System V Operating System, you can use **custom**(ADM) to restore the file or files. The **custom** utility can list, install, or remove individual files, sets within the XENIX System packages, or entire packages of the XENIX System V complete system.

Refer to **custom** in the *XENIX Reference* for information on using **custom**. You cannot use **custom** to restore any special modifications you made to a file between the time when you first installed it and the time when the file is lost. It is wise to perform regular backups of your system to prevent such losses.

3.11 restore(C): -x Option

The **–x** option of the **restore**(C) command now properly restores individual directories without leaving off the beginning slash (/). The command still restores files according to inode number, but note that the command must be executed from the proper directory location to restore the files to their proper locations within the filesystem. If the directories do not exist, **restore** creates them.

3.12 NDISK Discrepancy

The configurable parameter NDISK is the number of hard disk drives attached to the system, not the number of floppy drives as described in the section, "Summary of Tunable Parameters" in the chapter "Tuning System Performance" in the *XENIX System Administrator's Guide*. For 386 machines, the NDISK parameter is set to 6, but you can raise this number to 18. For 286 machines, the NDISK parameter is set to 2, but you can raise this number to 4. When you change NDISK, you may want to change other configurable parameters described in "Summary of Tunable Parameters."

3.13 Near Data Considerations for 286 Machines

The **configure** utility is used to alter parameters that effect 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.

3.13.1 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.**

3.13.2 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 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).

3.13.3 Modifications to the *link_xenix* file

It is possible to edit the *link_xenix* file to maximise the use of near and far kernel data. (Note 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 -Mn -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:

```
[ -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).

3.13.4 Multiscreens

The default number of screens available when the system has booted up is now 4. If you want to change this number, up to a value of 12, select the MultiScreens category from the **configure** menu and choose the number of screens you want to display.

4. Using Your System

4.1 User Documentation

The following explains the documentation available for the new and experienced XENIX user.

4.1.1 XENIX Tutorial

The *Introduction to XENIX* is now called the *XENIX Tutorial*. It has been completely reorganized and rewritten. Those who are new to XENIX should depend on this manual to learn the basics of working in the XENIX environment. This manual is spiral bound so that it can be carried easily and kept separate from the other reference documentation.

The *XENIX Tutorial* contains the following chapters:

1. Introduction
2. Basic Concepts
3. Logging In
4. Working with Files and Directories
5. Housekeeping
6. XENIX Desktop Utilities

4.1.2 User's Guide

Novice users can use this guide to learn more about the XENIX system after becoming familiar with the *XENIX Tutorial*. This guide has been extensively edited and rewritten for ease of use, with more examples added. In particular, Chapter 5 explains how to use UUCP from a user's point of view, including **uucp**(C), **uuto**(C), and **uupick**(C). The remote terminal utilities **cu**(C) and **ct**(C) are also discussed.

The *XENIX User's Guide* contains the following chapters:

1. Introduction
2. vi: A Text Editor
3. ed
4. mail
5. Communicating with Other Sites
6. bc: A Calculator
7. The Shell
8. The C-Shell
9. Using The Visual Shell

4.1.3 User's Reference

The size of the *User's Reference* has been reduced, as many commands have been moved to the new (ADM) section. The Permuted Index references have been updated. Some pages that were located in the (M) section and were concerned with file formats have been moved to the (F) section.

The following new pages have been added to the (C) section:

compress	**lock**	**usemouse**
ct	**lprint**	**uuencode**
hello	**mnt**	**vidi**
help	**tapedump**	**vmstat**
hwconfig	**translate**	**w**
last	**uptime**	

The following pages have been moved to the (F) section:

clock	**micnet**	**top**
default	**null**	**ttys**
group	**passwd**	**utmp**
mem	**systemid**	

The following new pages have been added to the (M) section:

coffconv **mscreen** **trchan**

4.2 hello(C) Manual Page

When an interrupt is sent, **hello** prints "(end of message)" and not "EOT" as stated on the manual page. In addition, you cannot perform shell escapes (using "!").

4.3 help(C): General Help Facility

The **help**(C) facility (formerly **help**(CP)), which was part of the XENIX Development System and was used to explain SCCS (Source Code Control System) error messages, now works for most standard XENIX commands as well. The HELP package can be loaded using **custom**(ADM).

4.4 csh(C): Spelling Correction, PATH Use, and nice

A spelling corrector similar to that used with the Bourne shell has been added to **csh**. If you make an error entering a directory pathname when changing directories, **csh** displays the proper spelling and asks for confirmation.

csh does not set PATH according to the path variable information.

The built-in **nice** does not change job priority.

4.5 who(C): -Hu Options

Comments cannot be added to the *comments* field displayed by the **who** **–Hu** command.

4.6 vi(C): LINES Variable

XENIX **vi** does not yet support the LINES variable.

4.7 assign(C): Device Mode

assign does not change the mode (permissions) of the device file (*/dev*) associated with a device.

4.8 awk(C): New Version

A more advanced version of **awk**, the pattern scanning command, has been added to the 2.3 release. This is the **awk** described in *The AWK Programming Language* (Aho, Kernighan, and Weinberger, Addison-Wesley, 1988). This new **awk** has several features not present in the old **awk**, including:

- user-defined functions;
- dynamic regular expressions;
- multiple input streams;
- additional built-in variables, including ARGC, ARGV, and FNR;
- additional built-in functions, including *gsub()*, *match()*, and *close()*, and
- additional operators, including ^ and delete.

Most programs written for the old **awk** will work with the new **awk**. However, there are some constructions which behave differently with the new **awk**. These include:

- The definition of "what constitutes a number" is slightly different. In the old **awk**, a string had a numeric value only if the entire string looked numeric. But in the new **awk**, a string has a numeric value if a prefix of the string looks numeric, and the numeric value is the value of the longest such prefix.

For example, the string:

```
123foo
```

does not have a numeric value in the old **awk** (and is treated as 0), but has the value 123 in the new **awk**.

- Assigning to a nonexistent field in the new **awk** changes $0 to include that field, whereas in the old **awk** $0 did not change. Thus, the program:

  ```
  { $2 = $1; print }
  ```

  produces different output if the input has only one field.

- There are several new reserved words in the new **awk** which could be used as variable names in the old **awk**. In addition, the parsing has changed, which may result in some ambiguous-looking expressions that were legal in the old **awk** to fail with the new **awk**.

  For example, in regular expressions, the character class:

  ```
  [/]
  ```

  is not legal in the new **awk**, but was in the old. The equivalent character class for the new **awk** is:

  ```
  [\/]
  ```

  However, this character class, when used with the old **awk**, is not equivalent to the original expression.

Very few **awk** scripts should need changing, and for those that do, the changes should be quite minor. The improved error messages in the new **awk** should help to quickly isolate any syntactic problems.

See the **awk**(C) manual page in the *XENIX User's Reference* for more details.

4.9 crypt(C): Availability

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

4.10 termio(M) Manual Page

CTSFLOW and RTSFLOW exist in the *c_cflag* field of the *termio.h* file and not in the *c_iflag* field as stated on the manual page. The manual page then states that IXON and IXANY should be set with CTSFLOW and RTSFLOW so that these two types of flow control do not interfere with each other. This is incorrect. CTRSFLOW and RTSFLOW do not interfere with each other. Setting IXON IXANY and IXOFF with CTSFLOW and RTSFLOW ensures better flow control of characters.

5. Special 386 Microprocessor Notes

The following notes apply to known problems with 80386 chips.

5.1 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.

5.2 Intel 387 Co-Processor Problems

Because of design defects in Intel's 80386 chip (B1 stepping), the Intel 80387 math co-processor may not operate correctly in some computers. The problem causes the CPU to hang when DMA/paging/co-processor 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 machi
```

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 co-processor 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.

5.3 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

6.1 Console Display Problems When Booting

When booting up, if the console screen blanks, the cursor is gone, or the display is garbled, you may have an incompatible monitor card. Check "Video Adapters and Monitors" in Appendix A of these *Release Notes* for a list of supported video cards and monitors. If yours is not listed but compatible with one on the list, it should work. If not, check your card's hardware manual to see if there are ways to configure the switch settings so the card is in an IBM-compatible emulation mode and that it is addressing the kind of monitor attached. If changing the switch settings fails, then your monitor card is incompatible and should be replaced with a compatible card.

6.2 Running mkdev serial

Chapter 14: "Using Terminals and Modems" of the *XENIX System Administrator's Guide* contains an incorrect description of the main menu displayed by **mkdev serial**, the command used to add a serial card to your system. On page 14-3, under item 3, the following is the menu actually displayed by the system:

```
You would like to install a:

    1. 1 port card
    2. 2 port card
    3. 4 port card
    4. 5 port card
    5. 8 port card

Select an option or enter 'q' to quit:
```

6.3 Console Keyboard Type Selection

XENIX supports two keyboard modes: AT and XT. By default, the system is configured for use with an XT keyboard. AT mode supports the extended keyset found on an AT 101 or 102 key keyboard. An AT keyboard will work properly in XT mode, but the extended keyset is not accessible. You cannot configure an XT or other non-AT keyboard to work in AT mode. The system will not recognize keyboard input if this is done.

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 "Adding Device Drivers with the Link Kit" in the *XENIX System Administrator's Guide*.

6.4 multiscreen(M): Changing Multiscreens

Note that you can use <CTL>-<ALT> *function-key* combinations in addition to <ALT> *function-key* combinations to change multiscreens. This is especially useful in applications that reserve the <ALT> *function-key* combinations for their own use. This can be configured using the **mapkey**(ADM) utility.

6.5 mscreen(M): Serial Multiscreens

Similar in function to **multiscreen**(M), the new **mscreen**(M) program allows multiple login screens on ordinary serial terminals. Although this program can be configured to work on any terminal, only terminals with screen memory will retain the existing screen display when toggling back and forth between screens. In addition, the pseudo-tty (*/dev/ttyp**) devices must be enabled by the system administrator before they can be used by **mscreen**.

The following example from a *.cshrc* file is suggested for users of **mscreen** or **multiscreen**. It will cause **csh** (C-Shell) to display the current tty as part of the prompt. This makes it easier to remember which screen you are currently on. Insert the following at the top of your *.cshrc* file:

```
if ($?prompt) then
        set var=`tty`                   # find current tty
        set prompt ="'expr $var : '/dev/)'`%" # display current tty
endif
```

To prevent multiple login screens erasing each other make sure the **tset** command in the *.login* file is called with the **-I** flag. For example:

```
set term =(`tset -m ansi -m :?wy60 -r -S -Q -I')
```

For more information, refer to the **mscreen**(M) manual page in the *XENIX User's Reference*.

6.6 Hardware Flow Control on Serial Modem Lines for 286AT Machines

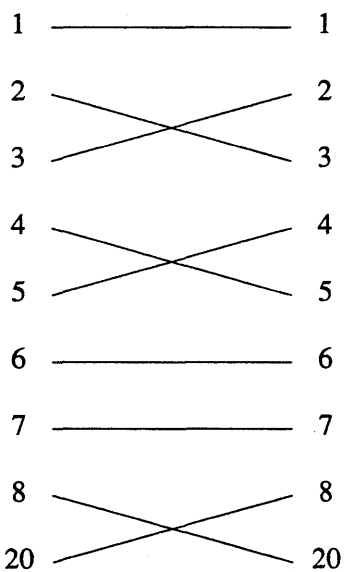
CRTSFL is a new *c_cflag*. CRTSFL controls the flow of data along the modem line using hardware s ignals. The RTS and CTS lines can be used to transfer binary files in raw mode if required.

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);
```

Please read the section on "termio(M) Manual Page" in these *Release Notes*. to ensure the CTRSFL *c_cflag* is used correctly. For more information, see the **termio**(M) manual page in the *User's Reference Guide.*

6.7 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.

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

6.7.1 Using CGI 1.0 with a VGA

If you are running the CGI 1.0 EGA interface when your system has a Video Graphics Adapter (VGA), you will see the following error message:

```
error code -3000: opening device display
```

You must log in as root and enter the following commands to use the existing CGI user agent with Release 2.3:

rm /dev/ega
ln /dev/vga /dev/ega

6.8 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.

6.9 vidi(C) and stty(HW)

You can now set video modes and load screen fonts with the **vidi**(C) utility. All video display functionality in the **stty**(HW) command is no longer documented or supported. The old functionality remains in this release for backward compatibility. The **vidi** utility supports the modes of the video display device. For more information, see the **vidi**(C) manual page in the *XENIX User's Reference*.

6.10 mapchan(F,M) and trchan(M): Enhancements

mapchan(M) now provides context-sensitive mapping to eliminate the problem of mapping terminal control sequences. For example, mapping the left bracket ([) to ü (u-umlaut) and retaining escape sequences such as ESC[is now possible. Reversible compose sequences have also been added, as well as the ability to specify dead keys within dead key sequences. The buffer size is now configurable to support larger maps. **trchan** now allows for separate input and output sides for file translation (used in the **translate**(C) utility).

6.11 tput(C): longname Attribute

tput will not accept the "longname" attribute.

7. Using Printers

7.1 lprint(C): Local Printing

lprint(C) is a new utility that makes it possible to connect and use a local printer attached to a terminal AUX or PRINTER port. Refer to "Adding a Local Printer" in Chapter 15: "Using Printers" of the *XENIX System Administrator's Guide*.

7.2 lpstat(C): -p Option

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

7.3 Slow Parallel Printers

For 386 standard architecture machines, if you have a parallel printer that prints abnormally slowly check that your configuration matches the section "Installing a Printer" in the chapter "Using Printers" in the *XENIX System Administrator's Guide*.

If your printer is still slow, that is, in the order of four seconds per line, your printer may be deselecting itself after receiving a line of text. An **adb**(CP) patch is provided to adapt your printer driver to this type of printer. You can load **adb** without having the XENIX Development System on your machine by following the

instructions in the section "Loading adb without the Development System" in the *XENIX System Administrator's Guide*. Note that future releases of XENIX may not require this patch.

Note

The application of these patches can cause other classes of parallel printers to hang.

Before using a patch, make a copy of your original kernel. Enter single-user mode and type in the following commands:

```
# cd /
# mv xenix xenix.00
# cp xenix.00 xenix
```

You can use this patch with either polled or standard lp devices.

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

```
# adb -w /xenix
* patime+ad?xxx
_patime+0xad: 0x45f6  0x10f8  0xe74
* patime+ad?w 9090 9090 9090
_patime+0xad: 0x45f6=          0x9090
_patime+0xaf:  0x10f8=         0x9090
_patime+0xb1: 0xe74= 0x9090
* $q
#
```

Note that **adb** is not supported for general use without the purchase of the XENIX Development System. For instructions that explain how to load **adb**, see "Loading adb Without the Development System" in the *XENIX System Administrator's Guide*.

8. Using Floppies and Tapes

8.1 Tape Driver Error Correction Code (ECC) Support

Tape ECC is now supported in XENIX Release 2.3. The ECC tape device node, */dev/erct0*, is automatically created when you choose to add a QIC-02 tape via **mkdev tape**. In order to use ECC, you must read and write from this device, not the normal */dev/rct0*. Users with tape drives that support cartridges larger than 60 MB should consider editing the */etc/default/tar* file and substituting */dev/erct0* for their normal tape device.

The error recovery scheme is 2/64, which means that two 512-byte blocks out of every 64 blocks can go bad and the driver will correct them. The probability of error with ECC is $1:10^{14}$. Standard drives have a error probability of $1:10^{9}$.

Be sure to label tapes that are created with the ECC device; these tapes cannot be read by standard devices. In addition, if transporting data from one machine to another, it is advisable to use the ECC device only if the target machine supports the ECC scheme.

8.2 format(C): Verify Option

The **–v** (verification) option has been added to verify that the disk is readable. Refer to the **format**(C) manual page in the *User's Reference* for more details. The file */etc/default/format* contains the name of the default device and indicates whether the verify option is defined. The default entry for VERIFY is YES. Note that verification is time-consuming; you can abort it if desired or edit */etc/default/format*.

8.3 /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.

8.4 dtype(C): Incorrect Filesystem Reporting

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

8.5 tape(C) and tape(HW): Additional Support

The **tape**(C) and **tape**(HW) utilities now support a second cartridge tape drive or a second reel-to-reel tape drive.

9. Using Hard Disks

9.1 Second ST506 Hard Disk Controller Support

For standard architecture machines, support for a second standard interface (ST506) hard disk controller has been added. To configure a hard disk on a second disk controller, syntax extensions have been made to the **mkdev hd** command. The command line can include the drive and controller numbers, as in the following example:

mkdev hd 0 1

This syntax specifies the first hard disk (0) on the second controller (1). (The normal **mkdev hd** syntax for the primary controller is still valid.) For another example:

mkdev hd 1 1

This specifies the second hard disk (1) on the second controller (1).

The device names follow the SCO XENIX V 2.3 device naming conventions as described in Chapter 13: "XENIX Directories and Special Device Files" in the *XENIX System Administrator's Guide*. The devices on the second controller are found in the */dev/dsk* and */dev/rdsk* directory. The notation is **/dev/[r]dsk/***x*s*y* instead of the **/dev/[r]hd***xy* notation for disks and partitions on the primary hard disk controller. In addition, the first and second disks on the second controller have *x* values of 4 and 5, respectively.

For example, the following device name refers to the active partition of the first drive on the second controller:

/dev/dsk/4sa

Please note that to add a second ST506 disk controller to your system, the controller must be jumpered for alternate address and alternate interrupt. Many controllers do not have the capability to set these jumpers.

9.2 Adding Another Hard Disk

Three different types of hard disk controllers are supported in 386GT:

- standard disk type (ST506 interface)
- ESDI disks
- SCSI disks

For 386MC, only a SCSI controller is supported as a second hard disk controller. For 286MC, there is no support for a second hard disk controller. For 286AT, only an ST506 controller is supported as a second hard disk controller.

Hard disks are added via the **mkdev hd** script.

Software support is now provided for hard disks that do not have matching entries in the ROM tables. Switch settings on the disk controller card may need to be changed. Check your hardware manual for the hard disk drive and the computer for this information.

Before adding the new disk, you must know how to connect it to the computer. Connecting the hard disk is explained in the hardware manual provided with the disk.

Make sure the additional drive is formatted and passes the manufacturer diagnostics before running XENIX. If it does not pass the diagnostic tests, you cannot use it with XENIX.

This procedure describes how to add another hard disk with one XENIX filesystem and no MS-DOS area. This procedure is similar to the section "Adding a Second Hard Disk," in Chapter 4, "Using Filesystems," in the *System Administrator's Guide*, which this procedure references. Following this procedure, the remainder of this section provides notes that are specific to the different types of disks.

1. Connect the hard disk, then boot the system and enter system maintenance mode.

2. When you are in system maintenance mode, enter:

   mkdev hd *x y*

   Δ **sysadmsh** users select: System→Add→HardDisk

   For standard architecture machines with ST506 and ESDI disks, *x* and *y* specify the hard disk and controller, respectively, as described in a previous section, "Second Hard Disk Controller Support." For example, to add a second disk on the first controller, enter:

   mkdev hd 1 0

   SCSI hard disks may be added to systems with a SCSI root disk or to systems with an ST506 (standard interface) root disk. SCSI hard disks may also be added to microchannel architecture machines with an ESDI root disk. When a SCSI hard disk is added to a system with a SCSI root disk, *x* can specify a disk number from 0 to 7; *y* specifies the controller (0 or 1). When a SCSI hard disk is added to a system with an ST506 (standard interface) root disk or an ESDI root disk, *x* specifies the disk number from (0-7). To add a disk to the first Host Adapter, *y* must be "2"; to add a disk to the second Host Adapter, *y* must be "3". (In this configuration, "0" and "1" are reserved for the ST506 controllers for systems with an ST506 root disk, or the ESDI

controllers for systems with an ESDI root disk). For example, to add the first SCSI disk to the first Host Adapter, enter:

mkdev hd 0 2

3. If you have a 286 standard architecture machine go to step 6.
   If you have a 386 standard architecture machine, you see the message:

```
XENIX System V Hard Disk Installation

What type of disk controller will be supporting
this disk?

  1. ST506 (standard disk support)
  2. OMTI 8620 or OMTI 8627 (ESDI support)
  3. SCSI

Enter 1, 2, 3, or enter q to quit:
```

If this installation is taking place before the system has been brought up in multiuser mode, then you will also see the message:

```
What type of disk controller supports the root disk?

  1. ST506 (standard disk support)
  2. OMTI 8620 or OMTI 8627 (ESDI support)
  3. SCSI

Enter 1, 2, 3, or enter q to quit:
```

4. If you have a 386 microchannel architecture machine, you see the following message:

```
XENIX System V Hard Disk Installation

Note: This kernel is configured to support n hard disks.
If your system will have more than n disks, the kernel
must be re-configured.

[Where n is the number of disks supported by this kernel.]

Is the Secondary disk a SCSI Device? (y/n)
```

Enter **y** if you have a SCSI secondary disk or **n** if you have an ESDI or ST506 secondary disk. If you see the following message:

```
Is the Primary (ROOT) disk a SCSI Device? (y/n)
```

Enter **y** if you have a SCSI root disk or **n** if you have a ESDI or ST506 root disk.

5. If you are installing SCSI as the second hard disk, you see the following message:

```
What ID is this disk? Choose a number between 0 and 7:
```

Please enter the target value for this disk.

6. You see the message:

```
During installation you may choose to overwrite all
or part of the present contents of your hard disk.

Do you wish to continue? (y/n)
```

Enter **y** and press <Return>.

7. Follow the procedure in "Adding a Second Hard Disk," starting at step 3. If you enter **3**, (for a SCSI hard disk), skip steps 7 through 16, since you do not use **badtrk** to scan the disk for defective tracks.

9.2.1 Adding Standard Interface Hard Disks

For standard architecture machines, up to three additional ST506 (standard interface) disks may be added to a system that has the root hard disk attached to a standard interface controller. For microchannel architecture machines, one additional ST506 (standard interface) disk may be added to a system that has the root hard disk attached to a standard interface controller. Addition of the third and fourth disks requires installation of a second standard interface controller. Review the section "Second Hard Disk Controller Support" before proceeding with adding a hard disk.

9.2.2 Adding ESDI Disks

One additional disk may be added to a system that has the root hard disk installed on an ESDI controller (SMS OMTI 8620 or 8627 on standard architecture machines). Before adding a second ESDI disk, read the "ESDI Notes " section in these *Release Notes*. This section provides ESDI information about standard architecture machines and references other sections that include ESDI information.

9.2.3 Adding SCSI Disks

With the exception of 286MC, this release of the operating system supports two SCSI Host Adapter cards. Each Host Adapter may have up to 7 SCSI hard disks attached. When installing a SCSI hard disk, you must know the ID of the disk, and which Host Adapter (first or second) will interface with it. Review the "SCSI Guidelines" section in Appendix A, "Compatible Hardware" for more information.

If the total number of installed disks on your system exceeds six, the kernel parameter NDISK will need to be modified. See the section "NDISK Discrepancy" in these *Release Notes* and the chapter "Tuning System Performance" in the *XENIX System Administrator's Guide*.

For a complete list of SCSI information, see the section "SCSI Notes " in these *Release Notes*.

9.3 mnt(C): Mounting Filesystems

The **mnt**(C) command can be used to allow users to mount filesystems. The command has a variety of options that permit the system administrator specific types of control over how the filesystems are checked, mounted and used. See the **mnt**(C) page in the *User's Reference* and the section on "Allowing Users to Mount Filesystems" in the "Maintaining System Security" chapter of the *System Administrator's Guide*. In addition, this command is located in */usr/bin* rather than */etc*, as documented on the **mnt**(C) manual page.

9.4 fsdb(ADM): Filesystem Debugger

fsdb is used to repair damaged filesystems. Used in connection with **fsck**(ADM), **fsdb** can reconstruct severed directory tree structures that would otherwise be truncated by **fsck. fsdb** is intended for use by experienced programmers.

10. Using a Mouse

XENIX now includes mouse support. Several mice (both bus and serial) are supported; see Appendix A for details. Installation and mouse usage are described in the **mouse**(HW) page and the "Using a Mouse with XENIX" chapter of the *XENIX System Administrator's Guide*. In addition, the **usemouse** utility makes it possible to use a mouse with text-based programs. (See the **usemouse**(C) manual page in the *XENIX User's Reference* for complete instructions.) Please note the following minor restrictions regarding mouse usage:

- The Microsoft Bus mouse cannot be configured using interrupt vector 2; use 3, 4 or 5 instead.
- Do not use the **usemouse** utility while in single-user (maintenance) mode.
- You cannot invoke the System→Halt option (**shutdown**) using the **usemouse** utility.

11. Using MS-DOS and OS/2

11.1 MS-DOS-XENIX Coexistence

The XENIX System V Operating System supports the coexistence of MS-DOS™ and XENIX on the same hard disk. Some versions of MS-DOS have restrictions, for example, ITT DOS releases previous to 3.10 cannot share the disk with XENIX or MS-DOS. For these releases, XENIX must occupy the whole disk.

As another example, an ITT MS-DOS+ Release 3.20 hard disk partition should not be made larger than 32 Mbytes. Activating a larger partition will corrupt the MS-DOS+ ending cylinder. XENIX **dos**(C) commands may not work when accessing an ITT MS-DOS+ Release 3.20 hard disk partition that is 32 Mbytes or larger.

Likewise, some versions of NCR DOS only recognizes 32MB partitions, you see the message "No operating system on fixed disk" when attempting to boot an MS-DOS partition larger than 32MB.

Whenever you use MS-DOS and XENIX on the same disk, if in doubt, install MS-DOS first, then install XENIX.

11.2 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 is supposed 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.

11.3 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/rfd0* instead.

11.4 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.

12. Using Networks

12.1 Using TCP/IP Ethernet With XENIX Release 2.3

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.

The Excelan Release V9 TCP/IP Ethernet driver requires a fix disk for SCO XENIX Release 2.3. Contact your Software Support Center to obtain this fix.

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.

12.2 New Version of UUCP: HoneyDanBer

With previous releases, a version of UUCP known as Version 2 has been included with XENIX. Release 2.3 includes a new version of UUCP, commonly known as HoneyDanBer UUCP. HoneyDanBer is a more robust implementation, providing greater security and support for a wider variety of modems, dialers and network protocols. At the same time, HD UUCP is completely compatible with Version 2 and sites running different versions will perceive no difference.

To convert Version 2 UUCP files to HoneyDanBer format, the **uuinstall**(ADM) utility includes a conversion option. **uuinstall** will also aid you in creating the proper file entries to configure your UUCP system. Refer to "Building a Remote Network with UUCP" in the *System Administrator's Guide* for complete details.

12.2.1 HoneyDanBer UUCP Features

- Supports Hayes-compatible modems, 801-type dialers, and dialers attached to LANs.
- Supports network protocols such as TCP/IP.
- Automatic maintenance scripts.
- Remotely executable commands can be specified on a system-by-system basis.
- Incoming and outgoing file transfer can be separately controlled.

12.2.2 HD UUCP versus Version 2 UUCP

There are several important structural differences between the two UUCP versions:

- Instead of a single *LOGFILE*, HD UUCP maintains a separate directory structure for each remote site.
- The *L.sys* file is called *Systems* in HD UUCP.
- The *USERFILE* and *L.cmds* files are combined into a single file called *Permissions* in HD UUCP.
- The *L-devices* file is called *Devices* in HD UUCP.
- **uucico**(ADM) does not scan for work in HD UUCP; the **uusched**(ADM) daemon schedules jobs and calls **uucico** when a call needs to be made.

- HD UUCP includes four maintenance scripts that clean the UUCP directory, check for work, and contact systems that do not initiate calls themselves. These are: *uudemon.hour*, *uudemon.admin*, *uudemon.clean* and *uudemon.poll*.

- Prior to Release 2.3, a program called **ungetty** was used to reinitialize a port after being used for dialing out. The functionality of this program is now built into the new **getty**(M). There is an **ungetty** in the HoneyDanBer UUCP package, but it is supplied only to enable old dialer binaries to run without error, and does not actually perform any functions. (Other versions of HD UUCP included a similar program called **uugetty**, which is also unnecessary with the new version of **getty**.)

12.2.3 Other HoneyDanBer Features

Permissions File: LOGNAME=OTHER

In most implementations of HD UUCP, the *Permissions* file must specify each login name that will be used as a dial-in **uucp** login. This can lead to an unmanageable number of logins. A LOGNAME=OTHER entry has been added that can be used to specify a set of permissions that apply to any login that isn't explicitly listed elsewhere. (This is similar to the functionality of the MACHINE=OTHER entry.)

Changing uucico Packet Parameters

An added feature is the ability to change two specialized parameters contained in the **uucico** program without having to recompile the source. (The **uucico** binary is provided unstripped so that patches can be applied using **adb**.) The first is a parameter called **windows**, which specifies the size of window that the sliding-window protocol should use (how many packets it can send before getting any ack/nack's from the remote site). **windows** can be changed using a variation of the following **adb** lines, which set the value of **windows** to 7:

```
adb -w uucico << ADB_EOF
$d
_windows/w 7
$q
ADB_EOF
```

In addition, the parameter **pktime** can be altered. This is the number of seconds **uucico** should wait before giving up and re-transmitting the packet being sent sent. This interval can be as long as 35 seconds, which can be costly with overseas phone connections. **pktime** can be changed using a variation of the following **adb** lines. In this example, **pktime** is set to 5:

```
adb -w uucico << ADB_EOF
$d
_pktime/w 5
$q
ADB_EOF
```

Note that **adb** is not supported for general use without the purchase of the XENIX Development System. For instructions that explain how to load **adb**, see "Loading adb Without the Development System" in the *XENIX System Administrator's Guide*.

13. System Configuration and Link Kit Notes

13.1 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.

13.2 Large Kernel Support

It is now possible to link and boot kernels larger than base memory (640K). This makes it possible for a number of device drivers to be linked into the kernel. The ability to boot pre-2.3 Release kernels is maintained.

13.3 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 serial boards strapped at addresses above 0400H. Serial boards must all be strapped below 0400H on machines with only 10 bits of I/O address decoding.

13.4 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. UNIX System V Applications Compatibility

14.1 Binary Compatibility with UNIX COFF Files

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.

14.2 Other COFF Compatibility Features

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.

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.

14.3 UNIX System Call Compatibility

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)

14.4 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).

14.5 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*.

14.6 Streams Support

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

14.7 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 co-processor installed.

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

14.8 Limitations of UNIX binary Compatibility

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. 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.

15.1 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

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

15.1.1 SCO XENIX System V Streams

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

15.2 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

16. 4BSD/SunOS Compatibility

16.1 select(S) System Call

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.

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.

16.2 inode Cacheing

This release includes inode cacheing.

17. POSIX P1003 Conformance

The referenced standard is published by the IEEE. SCO XENIX largely conforms to the POSIX P1003.1 Operating System Interface Specification, and will be made to fully conform with the next release.

These changes are of a small nature as POSIX P1003.1 and SVID Volume 1 (for example, BASE and KERNEL EXTENSION) sections are 99% identical.

18. 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.

19. 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 International versions of the SCO XENIX Operating System and Development System.

20. Additional Software Problems

20.1 Floppy Controller

If an error is encountered during the simultaneous use of the floppy drive and the QIC-40 tape drive (floppy tape device), it may hang the floppy controller. If the floppy controller goes into this state it may produce an unkillable process which could render the floppy controller unusable. To reinstate the functionality of the floppy controller and its related devices, follow these steps:

1. If the error was encountered on the floppy drive, close the floppy drive door with a correctly formatted floppy. This will allow the driver to time-out and recover.

2. Enter the command:

   tape reset

   This may be able to reset the tape and floppy hardware.

3. If either of the two above methods fail, shutdown and reboot the system.

Please note that there are no floppy controller hang problems with tape hardware which have their own tape controller. Floppy controller hang problems will not occur when either the floppy or QIC-40 tape unit is being used alone.

20.2 uucp

It has been found that during heavy bidirectional transfer across a single serial line, **uucico** or **uusched** will leave "core" files in */usr/spool/uucp*.

Appendix A
Compatible Hardware

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A.1 Compatible Hardware

The XENIX System V Operating System is available for many configurations of Personal Computer hardware, for both Industry Standard and Microchannel architectures. Your hardware configuration must have the original settings and boards before you install the 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.

This Appendix is divided into several sections. The first few sections list the supported machines by microprocessor and architecture type. "General Compatibility Guidelines" contains general guidelines for hardware compatibility that apply to both architectures.

The rest of the appendix is divided into the "Standard Architecture" and "Microchannel Architecture Hardware Notes." Each covers specific configuration details, including charts of compatible peripherals, serial cards, video adapters monitors, hard disks and controllers. System parameters necessary for these devices also appear in this section. These guidelines must be followed to ensure proper system performance.

Note

The specific hardware listed in these *Notes* has been used with the 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 us with accurate hardware information for possible inclusion on our lists.

A.2 Using This Appendix

To find a listing of compatible hardware for your machine, you must know your machine's classification. You must know the processor your machine uses and whether it uses Standard or Microchannel bus architecture. (Microchannel architecture refers to computers that are compatible with the IBM PS/2 computers.) 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, check the section titled "Supported Hardware Configurations" that follows this introduction. Find your hardware configuration in the right hand column and match it with the corresponding version of SCO XENIX in the left hand column. There is a specific section of compatible hardware in this appendix for each version of SCO XENIX. There is also a section called "General Compatibility Guidelines" that discusses general compatibility issues with SCO XENIX. Read through this section before you install any extra hardware on your system.

A.3 Supported Hardware Configurations

The 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
386AT	Standard 386-based personal computer
286GT	Standard 286-based personal computer with support for Adaptec AHA-154x SCSI Host Adapter and SMS/OMTI 862x Direct ESDI disk controller
386GT	Standard 386-based personal computer with support for Adaptec AHA-154x SCSI Host Adapter and SMS/OMTI 862x Direct ESDI disk controller
286MC	IBM Personal System/2 Model 50, 60 and compatibles
386MC	IBM Personal System/2 Model 70, 80 and compatibles; Olivetti P500, Tandy 5000MC, and Apricot Qi

---

Note

For standard architecture machines with bus or processor 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 XENIX System V Operating System.

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

A.4 Standard Architecture 286-based Machines

The following machines are supported under the 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
Data General DASHER/286
Data Storage 286-12
Epson Equity III and Equity III+
GRIDCase 1520
Hewlett-Packard Vectra ES/12 PC
IBM PC AT (6Mhz or 8Mhz version)
IBM 286/XT
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
PC's LIMITED.AT™
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 z248/12
Zenith z241
Zenith z248
Zenith z286-LP

* 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.5 Standard Architecture 386-based Machines

A.5.1 386AT Operating System

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

ACER 1100/20
ACER System 32/20
ALR FlexCache 20386
ALR FlexCache 25386
AST Premium 386/20
AST Premium 386/33
BBC 386 20Mhz
Cheetah CAT-386
Corvus 331
Compaq 386
Compaq Portable III 386
Compaq DESKPRO 386/20
Compaq DESKPRO 386/25
Dell System 310 386
Everex 386/20
GRiDCase 1530
Hertz 386/25
Hewlett-Packard Vectra RS/16 PC
Hewlett-Packard Vectra RS/20 PC
Hewlett-Packard QS/20 386
Intel 302
ITT 386
Laguna Systems PDQ386
Leading Edge model D3 386
Mitsuba 386
Mitsubishi PC-386
NCR 3386
NCR 316
NCR 316SX
NEC BusinessMate 386
NEC PowerMate 386

Noble 386 from PC Discount
Olivetti M380
Tandon 386/20 model 110
Tandy 4000
Televideo Tele/OAS 386
Texas Instruments System 1300
Toshiba T5100 386
UNISYS PW2 Series 800/20
Wang PC 380
Wyse 386
Zenith TurboSport 386 portable
Zenith z386/16
Zenith z386/25
Zenith z386/33
Zenith TurbosPORT 386

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

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

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

The NCR PC916 has been reported to run XENIX 386, but we have not tested it. Note that the personality card supplied by NCR must be configured so that the Video Adapter auto-switch feature is disabled.

A.5.2 386GT Operating System

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

ACER 1100/20
ACER/Counterpoint Sys15
ALR FlexCache 25386
ALR FlexCache 25386x
ALR Microflex 7000 386
Compaq 386

Compuadd 386
CSS 386
DEC 386 model 320
Hewlett-Packard RS/25c 386
Laguna Systems PDQ386
Mitac 386
Mitac MC3100E-02
NEC 386 20 20Mhz
Olivetti M380
Tandy 4000
Tatung 386 16Mhz
Zenith 386 25Mhz
Zenith 386 33Mhz

A.6 Microchannel Architecture 286-based Machines

The following machines are supported under the 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 XENIX 286MC Operating System on the IBM Personal System/2 Model 70 or 80. Use only the SCO XENIX 386MC Operating System.

A.7 Microchannel Architecture 386-based Machines

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

IBM Personal System/2 Model 55-061
IBM Personal System/2 Model 70-E61
IBM Personal System/2 Model 70-121
IBM Personal System/2 Model 70-A21
IBM Personal System/2 Model 80-041
IBM Personal System/2 Model 80-071
IBM Personal System/2 Model 80-111

IBM Personal System/2 Model 80-311
Apricot Qi
Olivetti P500
Tandy 5000MC

A.8 General Compatibility Guidelines

This section describes what hardware can be used with the standard XENIX Operating System Release 2.3 distribution. It contains hardware information that is generic to Standard and Microchannel Architectures. There are many other devices that you can use, which require additional vendor supplied software, that are available from independent hardware vendors. Call your dealer or SCO sales representative and ask for the third-party IHV/ISV catalogue.

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 by the same manufacturer. Please check the video card for compatibility.

A.8.1 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 or cards. This problem is especially prevalent with the 32-bit static RAM chips used in 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 XENIX 286 and 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 (e.g. Zenith). When in doubt, consult the hardware manufacturer.

Most extended memory cards use 16-bit memory chips with a speed of about 150ns. This memory is about 8 times as slow as static RAM, and so performance may be noticeably slower. We recommend using only 32-bit memory from your computer's manufacturer. If you must use 16-bit memory, at least use memory with fast (90ns) chips. In general, you must fully populate the memory board that comes with the machine with column static RAM chips before you can add extended memory.

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 must 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 is memory chips that are slower than factory-recommended chips.

Note

Memory parity errors seem to be much more prevalent with 32-bit memory, causing the system to panic. Replacing the defective memory is the only way to solve this problem.

A.8.2 Multi-Function Cards

The serial ports on many multi-function cards function as expected if COM1 and COM2 are fully compatible with the standard specifications for these serial ports. These parameters are explained in the "Serial I/O Boards" section of these *Notes*.

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

A.8.3 Serial I/O Boards

This section describes the conditions and results of using various serial I/O boards with the XENIX System V Operating System. Standard single port serial I/O boards function as expected if COM1 and COM2 are fully compatible with the standard specifications for these serial ports.

To configure the Operating System for the serial board you are installing, you must run the **mkdev serial** command. See the "Using Bus Cards" and "Using Terminals and Modems" chapters (particularly "Adding and Configuring Serial Ports" in the latter) of the *XENIX System Administrator's Guide* for more information on */usr/lib/mkdev/serial*, the script called by **mkdev serial**.

Each multiport serial I/O board is unique; the XENIX System V Operating System has 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.

Serial I/O Chip Notes

Some computers or add-on serial I/O cards use the 8250a serial I/O chip. (16450 chips are strongly recommended for 386 machines; 8250 chips can be used on 286 machines.) 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. The XENIX System V Operating System does make use of interrupts, as it is a multi-tasking 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.

A.8.4 Tape Drives and Controllers

Refer to "Using a Cartridge Tape Drive" in the "Using Storage Media" chapter of the *System Administrator's Guide* for more information on the Irwin drive.

Note that these drives 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 an Irwin drive configured on a system.) QIC24 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, retensioning, etc. **tape** does not work with the Irwin drive at this time.

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 will be used. (This information is found in "Tape Drive/Controller Combinations" of these Notes in the section that applies to your machine architecture.) Note that most addresses are specified in hexadecimal, indicated with a trailing "H". If you do not use the default settings, watch for possible interrupt conflicts with other installed devices. The "Tape Drive/Controller Combinations" section indicates what 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" units. The Irwin units are not configurable.

A.8.5 Add-On Hard Disks

Many hard disks, both standard and nonstandard, can be used by the XENIX System V Operating System as long as the disk controller supports the drive. The disk must interface electrically with the disk controller (usually "ST506"). Controllers supporting other drive interfaces such as RLL or ESDI will work as long as the controller presents a compatible interface to the bus.

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

Some hard disks come from the factory only partially formatted (e.g. the Maxtor 1140 140MB). 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 will format hard disks.

Compatible hard disk controllers are discussed in the next section.

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 nonstandard disks: The user may type in information that overrides the ROM disk configuration information during installation.

If you are unsure of what parameters to enter for your non-standard disk, contact your disk manufacturer for this information. The **dkinit** program (called during installation) uses parameters as defined in the "Fixed Disk BIOS Parameter Table" in Section 5 of the IBM Technical Reference (AT).

SCO supports XENIX on hard disks with up to 1024 cylinders. SCO also supports XENIX on disks with more than 1024 cylinders, **but only on controllers which support such disks**. Be sure that your controller will support the appropriate number of cylinders before trying to use the disk. For example, with the DPT PM3011 controller, XENIX works with disks containing 2048 cylinders, 16 heads, and 63 sectors, for a total maximum disk capacity of 1 gigabyte.

A.8.6 Compatible Hard Disk Controllers

Many hard disks will work with the XENIX System V Operating System. Whether or not a disk works depends upon the controller board. Here are two tests the controller must meet:

1. The disk controller is 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.8.7 Mice and Other Graphic Input Devices

The following graphic input devices are supported:

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

Note

The 386 MC Operating System supports the Apricot Qi mouse when used with the Apricot Qi computer only.

A.8.8 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. An autodial program is also supplied for the Racal Vadic 3451, the 212, and the Hayes Smartmodem 2400. Other autodialing modems can be supported by writing a dialer program, or modifying the existing one in */usr/lib/uucp/dial*.

In addition, the new HoneyDanBer UUCP package includes a large number of dialers in the *Dialers* file.

See the "Building a Remote Network with UUCP" chapter of the *System Administrator's Guide* for more information on writing other dialer programs.

A.9 Standard Architecture Hardware Notes

The following sections explain what hardware can be used with 286 and 386 machines based on Standard Architecture.

A.9.1 Math Chips

Your personal computer may include the 80287 or 80387 math co-processor, which is automatically detected and supported by XENIX 386 System V Operating System. The XENIX 286 System V Operating System supports the 80287 math co-processor. These co-processors will improve floating point efficiency.

Use math co-processors matching your machine's CPU speed. Follow the manufacturer's recommendations.

At boot time, the 386 XENIX System V Operating System announces the presence of a math co-processor with the message

```
math co-processor present
```

if an 80287 or 80387 is detected.

At boot time, the 286 XENIX System V Operating System announces the presence of a math co-processor with the message

```
%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 co-processor 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 co-processor 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 co-processors.

Some 80287 and 80387 exceptions have been masked. Refer to the manual page for **8087**(HW).

A.9.2 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.9.3 Serial Cards

The following serial I/O boards are supported by the XENIX System V Operating System for Standard Computers:

AMI lamb 4 and 8 port
Arnet Controls 2, 4 and 8 port (clock option not supported)
Arnet Twin port
AST FourPORT/XN
Control 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™
Stargate Technologies OC4400 (4 port) and
OC8000 (8 port) versions
Tandon Quad Serial Card
UNISYS 4 port

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

It is also strongly recommended that multiport cards utilize 16450 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	0x540-0x17F	n/a	0x210	n/a
	AMI lamb**	4	0x540-0x15F	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	0x28F	n/a
	CTC†	8	0x160-0x19F	n/a	n/a	n/a
	CTC†	4	0x160-0x17F	n/a	n/a	n/a
COM1	Digiboard††	8	0x110-0x14F	n/a	0x151	n/a
	Digiboard††	4	0x110-0x12F	n/a	0x151	n/a
	Hostess	8	0x100-0x13F	0x280-0x2BF	0x507	n/a
	Hostess	4	0x100-0x11F	0x280-0x29F	0x507	n/a
	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	n/a	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	n/a	n/a
	CTC†	4	0x218-0x237	n/a	n/a	n/a
COM2	Digiboard††	8	0x210-0x24F	n/a	0x250	n/a
	Digiboard††	4	0x210-0x22F	n/a	0x250	n/a
	Hostess	8	0x180-0x1BF	0x300-0x33F	0x587	0x707
	Hostess	4	0x180-0x19F	0x300-0x31F	0x587	0x707
	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	n/a	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 *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 "Adding Device Drivers with the Link Kit" in the *System Administrator's Guide* for information on the Link Kit. Use **config -i**.

**** 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 boards 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 3 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.9.4 Add-On Hard Disks

Many hard disks can be used as long as the motherboard supports the drive, or the ROM parameters are entered at installation time. ROM entries for the IBM PC AT are listed here. Refer to your computer hardware manual for the disk types supported by other computers.

IBM PC AT/0 Disk Types Entries on Motherboard ROM

Type	Cyls.	Hds.	Size	
1	306	4	10 MB	
2	615	4	20 MB	
3	615	6	30 MB	
4	940	8	60 MB	
5	940	6	45 MB	
6	615	4	20 MB	no precompensation
7	462	8	30 MB	
8	733	5	30 MB	
9	900	15	110 MB	
10	820	3	20 MB	
11	855	5	35 MB	
12	855	7	50 MB	
13	306	8	20 MB	
14	733	7	40 MB	
15	0	0	Reserved	
16	612	4	20 MB	
17	977	5	40 MB	
18	977	7	55 MB	
19	1024	7	60 MB	
20	733	5	30 MB	
21	733	7	40 MB	
22	733	5	30 MB	
23	306	4	10 MB	

Note that other compatible machines often have different ROM tables. Check your computer hardware reference manual for the appropriate ROM table entries for your computer.

We have used the following hard disks under the 286AT configuration:

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:

Adaptec 4525 SCSI/ESDI Controller
CDC Wren IV
CDC Wren V
Conner CP-340
Conner CP-3100
Quantum Q250
Quantum Q280
Quantum P40S
Quantum P80S
Syquest SQ555

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

Maxtor XT-4380S
Maxtor LXT-100S

The first disk drive (ID-0:LUN-0) should have no jumpers on A0, A1 and A2. The second disk drive (ID-1:LUN-0) should have a jumper on A0 and no jumpers on A1 and A2.

A.9.5 Compatible Hard Disk Controllers

We have used the following controllers on the 286/386AT operating system:

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 controllers are supported for the 386GT operating system:

Adaptec AHA-154x SCSI Host Adapter
SMS OMTI 8620
SMS OMTI 8627 (ESDI controller)
Western Digital WD1010 or compatible

A.9.6 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.9.7 Video Cards

We have used the following video adapters and monitors under the XENIX System V 286/386AT Operating System. Although many standard emulating cards work, these are some specific examples.

Video Cards and Monitors	
Card	Monitor
Mono	
IBM Mono Card	standard monochrome
Hercules mono	WY-530 (monochrome)
Hercules+ mono (text mode only)	AST mono
Persyst mono	Basic Time
CGA	
IBM CGA	standard RGB (red green
Paradise Modular Graphics Card	blue) or composite color
Everex Graphics Edge	Wyse WY-630 (color)
AST CGA	
Plantronics Color-Plus	
	Wyse 700 (in CGA mode, 80x25 text only)
EGA	
IBM EGA	IBM EGA
	standard RGB color
	standard monochrome
Compaq EGA	Multisync
Tandy EGA	
ATI EGA Wondercard* (EGA only)	
Olivetti OEC	
AST 3G	
Wyse WY-440 (EGA card)	WY-640 (color EGA)
NEC APC-H431	
VGA	
IBM VGA	Model 8503(mono)
	Model 8512(color)
	Model 8513(color)
	Model 8514(color)
Compaq Diamond	Compaq mono VGA
	Compaq color VGA
HP Video Graphics Adaptor	HP Video Graphics Color Display
VEGA Video 7 (in VGA mode)	
Olivetti VGA	
Paradise VGA	
Wyse VGA†	
Tandy VGA	

* EGA Wondercard Advanced Features Switch (DIP switch 8) must be OFF

† CGA-emulation mode is not supported.

Compaq Display Adapter Note

CMOS location 0x2d is read at boot time to initialize the display adapter. If that register is non-zero, the adapter will be initialized in a manner specific to the Compaq VDV. Be sure CMOS location 0x2d is set to zero unless you are using a Compaq VDV.

Wyse WY-700 High Resolution Mono Monitor. There is a known problem with the screen display going blank temporarily. This can occur on any Wyse pc286, IBM PC/AT, or AT compatible with this monitor installed. This problem occurs with REV D of the WY-700 mother and/or daughter board. See ASSY # on lower left edge of board for REV level. You should replace the board with a more recent revision; request return merchandise authorization (RMA) from Wyse Technology.

External RGB Monitor on Compaq Portables. The external RGB monitor is supported on Compaq portable III systems via the **vidi cpq0** and **vidi cpq1** commands.

VGA cards that have alternate modes (EGA or CGA mode) only work in VGA mode.

The Tandy DDGA model 25-3047 video card runs correctly in this release. The following Video Adapters are supported in 386GT:

Tandy 3045A DDGA
Tandy 4037 EGA

The following Monitors are supported in 386GT:

Tandy 3011 VM-5 Monitor
Tandy 1020 VM-4 Monitor
Tandy 1043 CM-5 Monitor
Tandy 1024 CM-11 Monitor
Tandy 4035 EGM-1 Monitor

A.9.8 Tape Drive/Controller Combinations

The tape driver included in this release work with the following drive/controller combinations for 286 and 386 machines.

Supported QIC-02 Tape Controllers and Cartridge Drives

Manufacturer	Controller Model No.	Drive	Type	Note
Archive	SC400	Scorpion 5945	A	
Archive	SC402	Viper QIC-02/60MB	A	(4)
Archive	SC402	Viper QIC-02/150MB	A	(4)
Archive	SC499r	Scorpion 5945	A	
Computone	SC400	Scorpion 5945	A	
TI	SC400	Scorpion 5945	A	
ITT	PC-36	5000(E)	W	
COREtape	PC-36	5000(E)	W	
Olivetti	PC-36	5000(E)	W	(1)
Wangtek	PC-36	5000(E)	W	
Tecmar	PC-36	QIC-60AT	W	
Tecmar	PC Bus Host Adapter	QT-60E	T	
Tecmar	PC Bus Host Adapter	QT-90E	T	
Tecmar	PC Bus Host Adapter	QT-125E	T	
Emerald	xnx-50-2012	Cassette	E	(3)
Emerald	xnx-60-2002	Cartridge	E	(3)
Cipher	QIC-02	CP-60B	W	
Cipher	QIC-02	CP-125B	W	
Mountain	QIC-02	60MB Filesafe	M	
Mountain	QIC-02	150MB Filesafe	M	
Mountain	QIC-02	300MB Filesafe	M	
Mountain	PC-36	60MB Internal	W	
Everex	PC-36	60MB Internal	X	
Bell Technologies	PC-36	XTC-60	W	

Most controllers that conform to the QIC-02 standard will work with this release, but only the units listed have been tested.

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

Archive SCSI 60MB
Archive SCSI 150MB

In addition, the following floppy drive/controller combinations will work for the XENIX Operating System listed:

Supported Floppy Tape Controllers and Cartridge Drives

Manufacturer	Drive	XENIX Version	Notes
Alloy	APT-40/Q	GT	
Irwin	145 (40 MB)	AT	(2,3)
Irwin	125 (20 MB)	AT	(2,3)
Irwin	110 (10 MB)	AT	(2,3)
Mountain	TD44-40	GT	
Wangtek	FAD 3500	GT	
Tecmar	QT-40i	GT	

Default Settings

Manufacturer	Base Address	DMA Channel	Interrupt	Type
Computone	0x200	1	4	A
Archive	0x220	3	3	A
TI	0x220	3	3	A
Mountain	0x28C	1	3	M
Everex	0x2C0	1	5	X
Compaq	0x300	1	5	W
Emerald	0x300	3	25	E
Tecmar	0x330	1	5	T
Wangtek	0x338	1	5	W
ITT	0x338	1	5	W

Notes

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	0288H

2. The Irwin 40-megabyte drive can use either DC2000 or DC1000 tape cartridges and the 10- and 20-megabyte 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 20MHz 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.

A.9.9 Typical Device Interrupts

Interrupt	Device
0*	Clock
1*	Console
2	Networks 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.9.10 SCSI Guidelines

The SCSI bus consists of a 50 conductor flat cable which connects SCSI devices together in a daisy-chained configuration. There are two types of devices that can be hooked onto the SCSI bus: host adapters and controllers. The host adapter is a card that plugs into the computer. Controllers are used to connect different kinds of SCSI devices to the SCSI bus.

The 50 conductor flat cable has a minimum of two connectors and a maximum of eight. This cable can be up to 20 feet long. Care should be taken to ensure that the connectors are plugged into the 50-pin sockets in the correct direction. No electrical damage will result from incorrect orientation, but none of the devices on the bus will work.

The SCSI bus needs electrical termination at both ends of the cable. Host adapters and controllers normally have termination capability built onto their circuit boards. Setting termination on usually involves inserting or removing several resistor-packs from the circuit board, although this can vary from manufacturer to manufacturer. The AHA-154x is shipped from the factory with termination set on.

If you accidentally terminate a device in the middle of the bus (i.e. not on the end of the cable), the remaining SCSI devices "below"

the terminated device will not work. To fix the problem, simply move the termination to the last device on the cable.

This release of the Operating System supports up to two AHA-154x Host Adapters. Each Host Adapter supports up to 7 SCSI hard disks. In addition, up to 4 ST506 hard disks are supported via two ST506 controllers. This means that XENIX 386GT supports systems with as many as 18 hard disks.

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 co-exist, the BIOS must be disabled on the second adapter. This can be done with the newer AHA boards (1540a/1542a) 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.

Each device on the SCSI bus must have an address. The address has two components: an address for the controller and an address for the device itself. The device address is known as a logical unit address (LUN). In this release, the first SCSI disk must be configured as ID-0:LUN-0 (controller address 0, device address 0). The ID number corresponds to the jumper settings on the disk, so care must be taken that hard disk jumpers are set correctly. 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 must always be 0.

If you have both ST506 and SCSI disks installed on your computer, XENIX must be installed on an ST506 disk, using it as the root disk. This implies that if you currently have XENIX installed on a SCSI disk and you want to add an ST506 disk, you must re-install XENIX using the ST506 as the root disk.

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.

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, may be present on the system. The SCSI tape may be configured at any ID on either Host Adapter.

Note

150 Mbyte and 120 Mbyte tape drives can generally read 60 Mbyte tapes but not write them.

Use **mkdev hd** to add more drives to the system, regardless of whether they are SCSI or WD controlled. Use **mkdev tape** to add a tapedrive to the system, SCSI or any other type.

Formatting a SCSI Disk

If you need to format a SCSI secondary disk after installing XENIX on the primary disk, you must use the **adfmt** command.

If the root hard disk is SCSI, then execute the **adfmt** command by entering the following command:

adfmt /dev/rhd10

If the root hard disk is ST506, then execute the **adfmt** command by entering the following command:

adfmt /dev/rhd20

This causes the secondary disk to be formatted. Note that **adfmt** is only used with SCSI disks. Also note that SCSI disks do not normally need to be formatted.

A.9.11 ESDI Guidelines

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 manufacturer's 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.

Standard 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** is 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.

dkinit

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 "disk [E]" banner was displayed at power-up, please use **sfmt** to modify these parameters. Otherwise, follow the instructions provided in the *XENIX Installation Guide*.

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.

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. The default for XENIX-286GT is DMA.

Standard personal computers that support I/O channel ready will work with the 286/386 GT 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.

Interleave Factors

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

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 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" table provided in the "Drive Tables" section on the 286/386GT Operating System. 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. Remove the existing hard disk controller 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 ESDI 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 ESDI controller in any available slot on the motherboard. *Caution*: Power must be off!

8. Use the manufacturers **setup** utility to change your system settings to indicate that there is no hard disk used with your system.

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

```
Boot
:
```

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

10. 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.

11. 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 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.

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

LUN 0		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

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 ST238	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 ST238	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
Rodine 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 prominent MFM drives in the industry. 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 prominent RLL drives in the industry. It is not a comprehensive list.

A.10 Microchannel Architecture Hardware Notes

The following sections explain what hardware can be used with 286 and 386 machines based on Microchannel Architecture.

A.10.1 Math Chips

Your personal computer may include the 80287 or 80387 math co-processor, which is automatically detected and supported by XENIX 286 and XENIX 386 System V Operating Systems. These co-processors will improve floating point efficiency.

Use math co-processors 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 co-processor 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 co-processor presence and check your hardware manual for the proper switch settings.

The following math co-processors 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 co-processor is supported for 286 microchannel architecture:

80287 IBM order number 3001

Some 80287 and 80387 exceptions have been masked. Refer to the manual page for **8087**(HW).

A.10.2 Serial Cards

The following serial cards are supported under the XENIX 286/386MC Operating System:

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

Serial Card Addresses and Notes

Serial Card Addresses

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

Dumb boards, on COM 2, such as:

Hostess
AST 4 port
IBM Dual Async

occupy addresses as shown below:

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

A.10.3 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.

A.10.4 Video Cards and Monitors

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

A.10.5 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)
Western Digital 1006V-MCI (ESDI disk controller)
Western Digital 1007V-MCI (ST506 disk controller)

The following controllers are supported for the 286 Microchannel Architecture:

IBM (ESDI disk controller)
IBM (ST506 disk controller)

A.10.6 Tape Drive/Controller Combinations

Personal System/2 tape support is being added as Personal System/2 tape devices are just becoming available. Call your software support center for latest tape driver availability.

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

A.10.7 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

A.10.8 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

A.10.9 SCSI Guidelines for 386 Microchannel Architecture

The SCSI bus consists of a 50 conductor flat cable which connects SCSI devices together in a daisy-chained configuration. There are two types of devices that can be hooked onto the SCSI bus: host adapters and controllers. The host adapter is a card that plugs into the computer. Controllers are used to connect different kinds of SCSI devices to the SCSI bus.

The 50 conductor flat cable has a minimum of two connectors and a maximum of eight. This cable can be up to 20 feet long. Care should be taken to ensure that the connectors are plugged into the 50-pin sockets in the correct direction. No electrical damage will result from incorrect orientation, but none of the devices on the bus will work.

The SCSI bus needs electrical termination at both ends of the cable. Host adapters and controllers normally have termination capability built onto their circuit boards. Setting termination on usually involves inserting or removing several resistor-packs from the circuit board, although this can vary from manufacturer to manufacturer. The AHA-1640 is shipped from the factory with termination set on.

If you accidentally terminate a device in the middle of the bus (i.e. not on the end of the cable), the remaining SCSI devices "below" the terminated device will not work. To fix the problem, simply move the termination to the last device on the cable.

The 386MC Operating System supports the following disk controller configurations:

1. A single ST506 controller (IBM, Adaptec 2610, 2620, Western Digital 1007)

2. A single ESDI controller (IBM, Western Digital 1006)

3. A single SCSI (Adaptec 1640)

4. An ST506 controller plus a SCSI (Adaptec 1640)

5. An ESDI controller plus a SCSI (Adaptec 1640)

6. A SCSI controller plus a SCSI (Adaptec 1640)

The root/boot device is always the first controller whether an ST506, ESDI or SCSI disk controller.

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.

Each device on the SCSI bus must have an address. The address has two components: an address for the controller and an address for the device itself. The device address is known as a logical unit address (LUN). In this release, the first SCSI disk must be configured as ID-0:LUN-0 (controller address 0, device address 0). The ID number corresponds to the jumper settings on the disk, so care must be taken that hard disk jumpers are set correctly. 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 must always be 0.

On a system with both ST506 and SCSI disks, the two supported ST506 disks are hd0 (the boot drive) and hd1. 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.

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, may be present on the system. The SCSI tape may be configured at any ID on either Host Adapter.

Note

150 Mbyte and 120 Mbyte tape drives can generally read 60 Mbyte tapes but not write them.

Use **mkdev hd** to add more drives to the system. Use **mkdev tape** to add a tapedrive to the system, SCSI or any other type.

A.10.10 Configuration Warning

It is advisable to configure your machine so that the serial ports, parallel ports and tape drives do not share the same interrupt. Sharing the same interrupt may cause your system to hang.

P/N 018-030-041
P.O. #25786