NEC

APM SYSTEM

Installation Manual

NEC America, Inc.

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Chapter 1   INTRODUCTION

The Open Application Interface (OAI) physical architecture provides a link between the NEC NEAX 2400 switching family and one or more general purpose computers. The general purpose computer, or User Application Processor (UAP) as it is referred to throughout this manual, provides a powerful processing platform for the introduction of new switching features via an Ethernet communication link. Figure 1-1 illustrates the simplicity of this architecture.
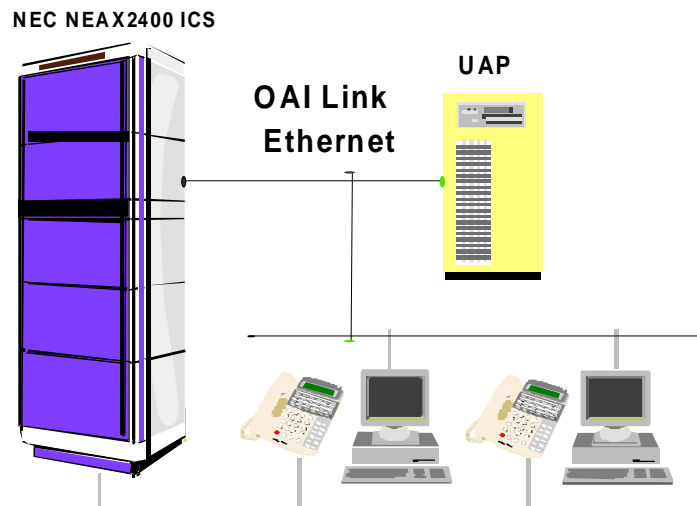
Figure 1-1   Open Application Interface (OAI) Architecture

The UAP, equipped with the Application Manager (APM) Platform, provides the necessary system configuration, installation controls, system logging, error recovery management, and communications required to support OAI and non-OAI applications. For complete details of the APM environment, refer to the *APM Operations Manual* and other OAI-related documentation.

Typical UAP

The following hardware components are required to provide the full functionality of what is referred to in this manual as a "typical UAP":

- a 386/486/Pentium-based PC
- an Ethernet (TCP/IP) communication card
- a 130 MB or larger hard disk
- a VGA graphics card and color monitor
- a line printer
- the SCO UNIX System V/386 Operating System (OS).

This profile of a typical UAP serves as a base of reference for the process of installing the required hardware and software. Any deviation from this system profile or the software associated to it in this manual may result in the need to adapt the instructions provided in this manual. It is important to ensure that the components chosen for installation are supported with manufacturer documentation and software drivers that operate within the SCO UNIX environment.

Sequential Step-by-Step Process

The installation procedures described in this manual are sequential. The success of each step is, in large part, dependent upon the success of the preceding step(s). Therefore, each step in the sequence must be performed completely and tested thoroughly before the next step is begun.

The sequence of steps is shown below in Figure 1-2:

STEP 1
This step involves installing the baseline hardware, formatting the hard drive, and configuring the systems internal memory with the correct settings required for the peripherals installed.

Baseline System

STEP 2
This step involves installation of the SCO UNIX Operating System which requires preparing the hard disk, defining the file systems, and installing the software.

UNIX Operating System

STEP 3
The APM Platform is installed from floppy disk or cartridge tape.

APM Platform

STEP 4
OAI Applications are installed through the APM administration menu (apmadm) using the installation option.
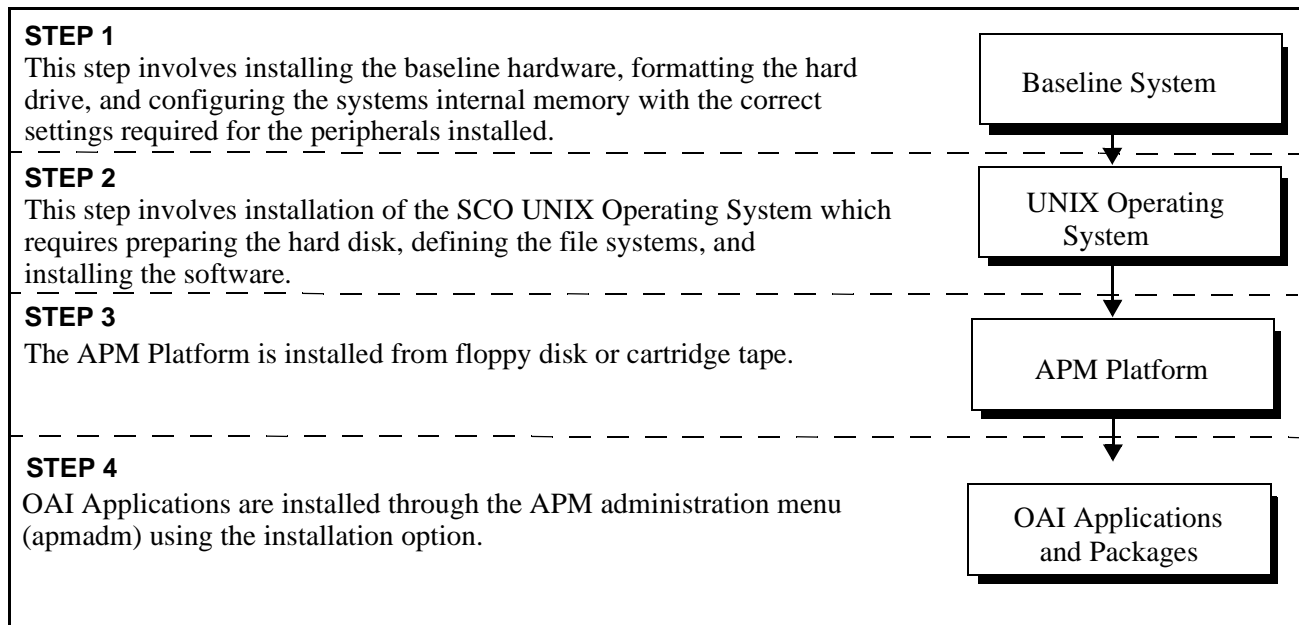
OAI Applications and Packages

Figure 1-2   Sequential Installation Process

Sequential Organization of Manual

The chapters in this manual correspond to this sequence of steps.

1. **Introduction** — This chapter introduces the basic OAI/APM architecture, the requirements of a typical-UAP system, the step-by-step and sequential installation process described in this manual, and useful information on how this manual should be used to assist in the installation process.

2. **Baseline System** — This chapter supplements manufacturer guides simply by introducing order to the installation of the required hardware and its baseline configuration.

3. **Operating System** — This chapter supplements manufacturer installation guidelines for SCO UNIX System V/386. The complete installation procedure is presented with the normal decision criteria answered for a typical UAP.

4. **APM Platform** — This chapter covers the steps necessary to install the APM Platform. This installation represents the heart of the OAI environment. It should not be attempted until the previous components have been installed and tested.

5. **Troubleshooting Issues** — This chapter discusses a few concerns that may arise during the course of the installation.

Chapter Layout

Each chapter in the sequenced installation process introduces the step discussed in the chapter, discusses any materials or preparation required to perform the step, indicates the necessary status of the system before the step can be performed, presents or refers to a detailed procedural guide to performance of the step, and, in some cases, describes testing methods for verifying success of the installation step. Each chapter, then, contains the following sections:

- **Introduction** — This section introduces the system component that is covered in the chapter. It also addresses the general purpose of the given component within the scope of the APM Platform.

- **Necessary Materials** — Specific configuration issues are addressed with suggested parameters for a typical UAP installation. Any installation media and documentation that may be required is identified.

- **Necessary Preparation** — This section provides a reference for the required status of the UAP before installing the given component. It also discusses any preparations that should be completed before beginning the installation procedure.

- **Installation Procedure** — A step-by-step installation procedure is provided in this section. Each step is presented under a dedicated subheading with all supporting decision criteria explained and further illustrated in figures that show expected display sequences.

- **Optional Testing** — Most chapters include simplified test criteria for the given component. In most cases the component installation can be verified by observing the information displayed during a boot process. This section offers the minimal amount of testing that should be completed before going onto the next step.

Use of Figures and Typefaces

Throughout this document, figures are used to show actual UAP display sequences, including prompts and user input at those prompts. System-supplied data in these figures is typically represented in plain typeface whereas user-supplied data is represented in boldface type. Wherever user input is variable (i.e., what is shown is only an example), mention is made of that fact in the narrative description that accompanies the display. Partial display sequences are illustrated via incomplete display figures as shown below. Irrelevant or unimportant screen information may be replaced with three vertical dots within a figure to show the incomplete nature of the display.

```
Login Prompt:   user id<RET>
Password:   password<RET>
      .
      .
      .
```

References

Manufacturer installation guides that are provided with each hardware component should be considered the primary references in the installation of the components which they accompany. The guidelines presented in this manual supplement these documents with supporting procedures and configuration information that must be addressed to meet minimum system requirements. The following documentation should prove most helpful to the installation processes described in this manual:

- **NEC America Inc. Documentation**
    - OAI Module Installation Manual for the NEAX2400 IMS.
    - OAI Concept Manual.
    - Applications Manager (APM) Operations Manual.
- **Operating System References**
    - SCO UNIX System V/386 Release 3.2 Version 4.2, Operating System Installation Guide and Release Notes, Santa Cruz Operation, Inc.
    - SCO UNIX System V/386 Release 3.2 Version 4.2, System Administrator's Guide, Santa Cruz Operation, Inc.
    - SCO UNIX System V/386 Release 3.2 Version 4.2, SCO TCP/IP Release and Installation Notes, Santa Cruz Operation, Inc.

General Guidelines

This section simply provides advice that is intended to make the overall installation process as painless and clean as possible. As with any major hardware/software system installation, there are many potential problems to be avoided. It is hoped that, by sequencing the installation into steps, laying out each step as methodically as possible, and working in concert with manufacturer documentation, such problems are minimized, and each step is performed successfully the first time.

1. **Prepare.** It is important to allow enough time to prepare and perform each step without interruption or hurry. Many of the installation steps are quite simple when everything is organized properly and taken "one step at a time." The first consideration should include a complete survey of the available hardware, manuals and tools necessary for the installation. Then, step-by-step, move through the sequenced installation process detailed in this manual.

2. **Read and follow instructions.** The typical UAP is generally shipped as individual components with separate documentation and installation guides for each. It is a common mistake to simply unpack everything, connect the hard drive, plug in the video card, install all of the peripheral devices into whatever slots are available, connect the keyboard and power up. This approach could result in a significant loss of time.

3. **Map the system.** Hardware components must be configured into the system without conflicting with each other. It is therefore important to map out the Interrupt Request (IRQ), Port Addressing, and memory requirements for each device installed. The System Configuration Data Sheet on the next page can be used to centralize the location of the typical information needed for the installation. Reference is made to this data sheet at those points in the installation process where documenting system data is important. Recording the overall system configuration on the **System Configuration Data Sheet** not only helps in the installation process, but when stored in a safe place, it can save valuable time in the future when maintenance and upgrade issues need to be addressed.

4. **Test, check, test, check . . .** Most chapters contain some suggested test procedures that can be performed after completing the installation step to make sure that the step has been completed successfully. If these test procedures are not performed at each step, error situations can compound, making it very difficult to discern the source of error conditions. Failure to record the overall system configuration and test each component could result in a failure severe enough to make it necessary to start over again at the operating system level.

5. **Be methodical.** Using a standardized approach such as the following can increase the likelihood of a successful installation:

   - Collect the hardware devices, software installation media and installation guides for the given component.

   - Check any switch setting on the hardware and record any addressing, memory or IRQ assignments on the System Configuration Data Sheet.

   - Install the component according to manufacturer guidelines and the specifications provided in this manual.

   - Rebuild the kernel and reboot as required.

   - Test the component before beginning the installation of anything else.

Confidential	**SYSTEM CONFIGURATION DATA SHEET**	Confidential

Company Name: _____

ADMINISTRATIVE INFORMATION

Host Name: _____

Administrator: _____   Date of Last Configuration Change: _____

(SU Password): _____   Administrative Note: _____

BASIC SYSTEM INFORMATION

CPU Model Number: _____ S/N: _____

Operating System: _____ Version: _____

      S/N: _____ OS Activation Key: _____

      Other: _____

System Memory (RAM): _____ Memory Card: _____

Video Adapter: _____ S/N: _____ Driver: _____

Hard Disk Controller 1: _____ S/N: _____ Type: _____

Hard Disk Controller 2: _____ S/N: _____ Type: _____

Hard Disk 1: _____ S/N: _____ Size: _____

Hard Disk 2: _____ S/N: _____ Size: _____

Floppy Drive 1: _____ S/N: _____ Size: _____

Floppy Drive 2: _____ S/N: _____ Size: _____

Tape Backup System: _____ IRQ: _____ Size: _____

      IPort: _____ DMA: _____

PERIPHERAL INFORMATION

Serial Communication Card: _____ Model: _____ S/N: _____

      Port: _____ Base Address: _____ Driver: _____

      Other: _____

LAN (TCP/IP) Card: _____ Model: _____ S/N: _____

      Port: _____ Base Address: _____ IRQ: _____

Driver/Other: _____

    Host Name: _____ IP Address: _____

X25 Card: _____ Model: _____ S/N: _____

      Port: _____ Base Address: _____ IRQ: _____

Driver/ Other: _____

INSTALLATION NOTES

_____

_____

_____

_____

Figure 1-3   System Configuration Data Sheet

Chapter 2   BASELINE SYSTEM

Introduction

The "typical" User Application Processor referred to in Chapter 1 is configured using an Intel 386/486 IBM compatible base unit with a line printer. The APM Platform is supported on the SCO UNIX System V/386 Operating System which provides the necessary facilities required for a comprehensive OAI UAP. This criteria coupled with the requirement for an Ethernet link and an external vt100 compatible display terminal (required to implement some OAI Applications), results in the following hardware configuration:

- 4 MB memory (RAM)
- 1 MB memory (RAM) for OAI/APM Platform
- Operator Console. (VGA Graphics Adapter, VGA Monitor and Keyboard)
- 130 MB hard disk (Minimum)
- 1.44 MB floppy disk drive and/or Tape Cartridge Unit
- Ethernet (TCP/IP) Communication Controller Card
- Additional 1 MB memory for each application

Necessary Materials

Most manufacturers provide adequate documentation for installation of the baseline hardware. In addition, the CPU manufacturer provides a "setup" disk needed to format the hard drive and configure the system internal memory with the correct settings required for the installed peripherals. The setup utility is also adequately documented.

The baseline system is configured with the basic components normally associated with a small computer. Gather all hardware components including installation manuals, disks and:

- Computer
- Hard Disk Drive and Controller
- Floppy Drive System(s)
- Memory Modules (Add-in boards and/or SIMMS)
- Video Adapter and Monitor
- Ethernet Communication Cards
- Other Hardware Adapters

Necessary Preparation

Configuring the baseline system involves plugging all of the hardware into available slots, making the required connections as directed by manufacturer guidelines, and powering up.

Before beginning it is important to ensure that the video card does not introduce addressing conflicts with the system BIOS. This is can be avoided by comparing the system memory map and the video cards addressing range. After the required hardware is installed, display the BIOS setup screen with a setup disk or by pressing the appropriate key (e.g., F2) while the system is booting. This BIOS screen allows configuration of the CMOS which identifies the video card type, floppy drive systems, amount of RAM, and the hard disk. It is also used to format the hard disk which is the next step.

Installation Procedure

The following step-by-step procedure is provided as an outline for the baseline system installation:

1. Using manufacturer guidelines, install the initial hardware suite:

    *   Computer

    *   Hard Disk Drive and Controller

    *   Floppy Drive System(s)

    *   Memory Modules (Add-in boards and/or SIMMS)

    *   Video Adapter and Monitor

2. Run the computer manufacturer's BIOS setup (this may require a setup disk provided by the manufacturer) and perform the following:

    *   Configure BIOS as recommended by the manufacturer

    *   Configure the hard disk. It is recommended by SCO that if the drive has more than 1024 cylinders, configure the BIOS to have only 1024 cylinders. This can prevent BIOS conflicts problems during installation of SCO Unix 3.2v4.2. During installation of SCO UNIX the proper number of cylinders will be set.

    *   Format the Hard Disk (typically IDE Hard disks do not require formatting).

    Record the system configuration on the **System Configuration Data Sheet** (refer to Chapter 1) before continuing to the next step presented in Chapter 3, "SCO UNIX SYSTEM V INSTALLATION").

Testing Procedure

Power up the baseline system. If the system BIOS version is correctly displayed and the standard memory test is performed without the display of any failure information or configuration conflicts, the baseline system is correctly installed.

Chapter 3   SCO UNIX SYSTEM V INSTALLATION

Introduction

The APM Platform is currently supported under SCO UNIX System V/386. This chapter supplements the *SCO UNIX System V/386 Operating System Installation Guide* with the recommended decision paths generally taken when setting up a UAP.

In addition to the operating system installation procedures there are a few other SCO-related operations that must be performed during the installation of other System and APM components. That is, it is necessary to know how to enter Single User Mode, back up the system, correctly shut down the system, and rebuild the kernel. There is also a post-installation procedure for extracting APM installation scripts from the APM Platform release media that should be performed at the completion of the operating system installation. Each of these operations is documented thoroughly within dedicated sections of this chapter.

Necessary Materials

SCO provides a wealth of valuable information that is essential to the installation and operation of the SCO UNIX operating system. Make sure that the complete manufacturer's documentation is at hand before continuing with the operating system installation. Throughout the remainder of this chapter reference to the *SCO UNIX System V/ 386 Operating System Installation Guide* will be presented in the brief form, *SCO OS Installation Guide*.

The SCO UNIX System V/386 operating system is delivered in two formats. If the UAP is equipped with a 150 Mbyte cartridge tape unit, this format offers a real time-saving advantage over the floppy disk format. In any event, check the *SCO OS Installation Guide* in the section titled "About Your Installation Media" to verify the completeness of the release media package.

The basic system components, including memory, tape unit (if applicable), floppy drive(s), keyboard and hard disk, should be installed, initialized, ready for power. The next section provides a procedural approach for verifying system readiness.

Necessary Preparation

Before beginning to install the operating system on the UAP, make sure that the following tasks have been completed:

1. Set up and assemble the hardware.

2. Verify that the hardware configuration meets the minimum requirements specified in Chapter 2, "BASELINE SYSTEM".

3. Run the hardware setup utility provided by the computer manufacturer.

4. Configure systems memory and BIOS settings as required.

5. Format the hard disk drive.

6. Determine the hard disk partitioning requirements.

When these basic steps have been completed the UNIX operating system can be installed. Chapter 1 of the *SCO UNIX System V/386 Operating System Installation Guide* discusses several important topics that include creating and formatting a physical DOS partition and planning disk layout.

Take some time to review Chapter 1 of that SCO manual before continuing the installation procedure. The remainder of this document guides a typical UAP installation and does not address issues that may result from the attempted installation of a non-typical UAP.

Installation Procedure

Chapter 2 of the *SCO UNIX System V/386 Operating System Installation Guide* provides a step-by-step installation procedure with supporting appendixes that cover troubleshooting, hard disk configuration, and the installation of additional software.

This section provides a supplemental procedure for installing SCO UNIX on a typical UAP. Be sure to refer frequently to the SCO installation instructions to ensure a smooth and timely installation. At this point the system should be powered up and the initial hardware configuration verified.

Step 1:   Provide Initial Installation Media

Regardless of whether the installation is being performed from cartridge tape or floppy disk, the system must be booted up from the SCO N1 and N2 floppy disks.

1. While the UAP system is turned off, insert the SCO-UNIX N1 disk. Power on the CRT and the computer by turning the system on or pressing the reset button.

2. At the following system prompt, press **Enter**:

```
Boot
:
```

Figure 3-1   Initial SCO UNIX Boot Prompt

3. Insert the N2 disk when prompted and press **Enter**.

Step 2:   Select Installation Type

When the booting process completes, the system prompts you to select an installation type, as illustrated below:

```
   Installation selection:
       1.    Fresh installation
       2.    Update installation
       3.    Exit

   Use the Numeric Keypad if present, using <Num Lock>
   if necessary, to select one of the above options:
```

A Fresh Installation cleanly installs the new release of the software on your system. The Update Installation replaces the current release of the software with the new release.

1. Type the number corresponding to the installation type you want to use. We recommend that you select option **1** (Fresh installation).

2. Press **Enter**.

Step 3:   Select the Appropriate Keyboard Type

1. Select the appropriate keyboard from among the following options:

```
       1.    American
       2.    British
       3.    French
       4.    German
       5.    Italian
       6.    Spanish

   Use the Numeric Keypad if present, using <Num Lock>
   if necessary, to select one of the above options:
```

2. Press **Enter**.

Step 4:   Initialization of Hard Disk

After you select a keyboard type, the following screen displays:

```
     1.     Fully Configurable Initialization
     2.     Automatic Initialization (use system defaults)
     3.     Exit Installation

Enter your choice:
```

You need to select the "Fully Configurable Initialization" option to allow for creation of the recommended filesystems. When the options are displayed, do the following:

1. Select the Fully Configurable Initialization option by typing **1** and pressing **Enter**.

   The following message appears: "During installation you may choose to overwrite all or part of the present contents of the hard disk. Do you wish to continue (y/n)?"

2. Continue by typing **y** and pressing **Enter**.

Note: *If you enter anything other than a "y" or "Y", the installation is terminated, and a message indicates when the process has been aborted.*

Step 5:   Display Current Disk Parameters

At this point, the formatting process should be completed and ready for verification of the drive's parameters and bad track table. The following menu displays:

```
Hard Disk Drive 0 Configuration
    1.    Display current disk parameters
    2.    Modify current disk parameters
    3.    Select default disk parameters

Enter your choice or q to quit:
```

1. Type **1** and press **Enter**.

    The drive's parameters display. For a typical 1 Gibabyte hard drive, the parameter table should contain the following values:

Disk Parameters	Values
1. Cylinders	2047
2. Heads	16
3. Write Reduce	0
4. Write Precomp	0
5. Ecc	0
6. Control	8
7. Landing Zone	2048
8. Sectors/track	63

Note: *The number of cylinders, sectors, and heads varies from disk to disk. These may need to be modified depending on the hard disk installed.*

2. If the parameters are not correct, select option **2** (*Modify current disk parameters*) and press **Enter**.

3. Type the number associated with the incorrect value and press **Enter**.

4. At the prompt, enter the replacement value and press **Enter**.

5. Continue this process until all values are correct, and display the parameters by typing **1** and pressing **Enter** at the Hard Disk Drive 0 Configuration menu.

6. If the values are correct, exit the menu by typing **q** and pressing **Enter**.

Step 6:   Elect to Use the Entire Disk for UNIX

Most UAPs are used exclusively for the purpose of providing an OAI interface to the PBX and a host for the APM Platform. For that reason, the typical UAP installation requires only a single UNIX partition on the hard disk. If installation must include a DOS partition or multiple UNIX partitions, consult the *SCO OS Installation Guide* for guidance in creating them.

```
        1.    Display Partition Table
        2.    Use Entire Disk for UNIX
        3.    Use Rest of Disk for UNIX
        4.    Create UNIX Partition
        5.    Activate Partition
        6.    Delete Partition

          Enter your choice or q to quit:
```

1. Select option **2** to use the entire disk for the UNIX operating system and press **Enter**.

2. If the operating system has previously been installed on the hard drive, the following prompt appears: "Warning! All data on your disk will be lost! Do you wish to continue! (y/n)?"

    Type **y** and press **Enter**.

3. At the prompt, press **Enter**.

    The menu redisplays.

4. Type **q** and press **Enter**. The following screen displays.

```
     1.    Print Current Bad Track Table
     2.    Scan Disk (You may choose Read-Only or Destructive later)
     3.    Add Entries to Current Bad Track Table by Cylinder/Head Number
     4.    Add Entries to Current Bad Track Table by Sector Number
     5.    Delete Entries Individually from Current Bad Track Table
     6.    Delete All Entries from Current Bad Track Table

  Enter your choice or q to quit:
```

Step 7: Perform a Destructive Disk Scan

1. As another level of verification, perform a destructive disk scan when the menu appears by typing a **2** and pressing **Enter**:

   The following menu displays:

   ```
          1.     Scan entire UNIX partition

          2.     Scan a specified range of tracks

          3.     Scan a specified filesystem

        Enter an option or q to quit:
   ```

2. Select a scan of the entire UNIX partition by typing **1** and pressing **Enter**.

   The following menu appears:

   ```
       1.     Quick scan (approximately 7 megabytes/min)

       2.     Thorough scan (approximately 1 megabyte/min)

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

3. Type **2** and press **Enter** to select a thorough scan.

   The message "Do you want this to be a destructive scan? (y/n)" displays.

4. Type **y** and press **Enter**.

   The message "This will destroy the present contents of the region you are scanning. Do you wish to continue? (y/n)" displays.

5. Type **y** and press **Enter**.

   The message "Scanning in progress, type q to interrupt at any time" displays. The scanning operation takes some time, depending upon the size of the drive. The status of the operation is updated by the display of the track being scanned and the percentage of the disk already scanned.

6. After scanning is complete, the Bad Track menu is displayed again. To exit the menu, type **q** and press **Enter**.

Step 8: Accept Recommended Space Value for Bad Tracks

SCO provides recommended values for the space needed for bad tracks. When prompted for the desired value, simply accept the default value by pressing **Enter**.

The prompt is illustrated below:

```
Enter the number of bad tracks to allocate space for
(or press <Return> to use the recommended value of 15):
```

Step 9: Accept Recommended Value for Swap Space

As in the previous step, a prompt requests the desired value for the size of the swap space to allocate. Once again simply accept the default value by pressing **Enter** at the given prompt and continue on to the next step.

Step 10: Create a Separate /u Filesystem

After you accept the recommended value for swap space, the "Do you want a separate /u filesystem? (y/n)" prompt displays. Type **n** and press **Enter**.

Step 11: Make Manual Adjustments to the Filesystems

The hard disk has been initialized, and it is now time to allocate the recommended filesystems. You will need to change initial filesystem names, set the create filesystem flag to "yes", and modify the First and Last block counts for some of the table entries, using the instructions below. The following values are recommended for the Application Manager.

Note: *These values may change, depending on the applications that are to be installed. The following example is for a 1 GB drive:*

Table 3-1 UNIX Partitions

Partition	Size of Partition (1K Blocks)	Optional	Partition Usage
root	50 MB (Minimum)	Required	Operating System
swap	default	Required	Operating System
oai	80 MB (Minimum)	Required	Application Manager and OAI
oailog	50 MB (Minimum)	Required	Application Manager and OAI
db	Remainder of the disk	Optional	Database (Application)

To make manual adjustments to the filesystems:

1. At the prompt ("Do you wish to make any manual adjustments to the sizes or names of the filesystems to swap area before they are created on the hard disk? (y/n)"), type **y** and press **Enter**.

    A filesystem table similar to the one shown in Figure 3-2 displays:

```
    Name         Type       New FS   #    First Block      Last Block
    root         EAFS        yes     0         0             515087
    swap        NON FS        no     1      515088          530087
     u           EAFS         no     2      530088          1030164
               NOT USED       no     3         -               -
               NOT USED       no     4         -               -
               NOT USED       no     5         -               -
   recover      NON FS        no     6      1030165         1030174
  d1057all    WHOLE DISK      no     7         0             1031152

 1030175 1K blocks for divisions, 977 1K blocks reserved for the system

Name            Type
n [name]        Name or rename a division.
c [create]      Create a new filesystem on this division.
t [type]        Select or change filesystem type on new filesystem.
p [revent]      Prevent a new filesystem from being created on this division.
s [tart]        Start a division on a different block.
e [nd]          End a division on a different block.
r [estore]      Restore the original division table.




Enter your choice or q to quit:
```

Figure 3-2   Filesystems Allocation Table

2. To create or rename a division, type **n** and press **Enter**.

3. Select a division to rename (0-7) and press **Enter**. (The division numbers are located in the # column of the allocation table, as illustrated in Figure 3-2.)

4. At the "What do you want to call it?" prompt, type the name of the division and press **Enter**.
    Repeat this process (steps 1 through 4) for each of the following division names:

    - root

    - swap

    - oai

    - oailog

    - db

5. Now the sizes of each of the partitions need to be configured. These will vary depending on the size of the hard disk and the requirements of the applications and customer.

    - To start a division on a different block, type **s** and press **Enter**. Type the number of the division for which you want to change the starting block and press **Enter**. (The division numbers are located in the # column of the allocation table, as illustrated in Figure 3-2.) Type the new starting value and press **Enter**.

    - To end a division on a different block, type **e** and press **Enter**. Type the number of the division for which you want to change the ending block and press **Enter**. (The division numbers are located in the # column of the allocation table, as illustrated in Figure 3-2.) Type the new ending value and press **Enter**.

    Repeat this process for each of the divisions. The following table shows typical starting and ending values for a 1 Gigabyte hard drive:

Division	First Block	Last Block
root	0	99999
swap	100000	163999
oai	164000	263999
oailog	264000	363999
db	364000	863999

6. The new filesystem flag should be turned to *yes* for the root, oai, and oailog divisions. (In other words, *yes* should appear in the New FS column of the allocation table which is illustrated in Figure 3-2.) If one of these flags is no, type **c** and press **Enter** at the prompt. Type the number of the division for which you need to create a new filesystem and press **Enter**.
    Continue this process until you have created a new filesystem for the root, oai, and oailog divisions.

7. When you have completed the adjustments to the filesystems, type **q** and press **Enter**.

Step 12: Provide Remainder of Installation Media

After you complete the adjustments to the filesystems, the following menu appears:

```
i[nstall]    Install the division set-up shown
r[eturn]     Return to the previous menu
```

To install the remainder of the installation media:

1. Type **i** and press **Enter**.

   The Product Medium Selection menu displays, as illustrated below:

```
SCO systems software provides three media for installing the product.
At this point, you can select the installation medium and configure
the driver parameters for the installation device.

Medium Selection:
    1.    Floppy Diskette
    2.    Cartridge Tape
    3.    Compact Disc (CD-ROM)

Enter your choice or q to quit:
```

2. Type the number that corresponds to the type of media you are using to install
   the product and press **Enter**. If you are using floppy disks, type **1** and press
   Enter.

   The following prompt displays:

```
Insert N1 (Boot) floppy in the drive
and press <Return> or enter q to quit:
```

3. Insert the N1 disk and press **Enter**.

4. Follow the prompts that are displayed on your screen, inserting the appropriate
   diskettes and pressing **Enter**.

Step 13: Enter Serial Number and Activation Key

A prompt requests the unique serial number and activation key. These values are supplied on a card with the original SCO manufacturer's documentation. (This card should be stored in a secure location after the operating system installation is completed.) At the start of this sequence, enter the serial number at the prompt and press **Enter**, as shown:

Enter your serial number or enter q to quit: **xxxxxxxxx** ‹**Enter**›

Then enter the given activation key as follows:

Enter your activation key or enter q to quit: **xxxxxxx** ‹**Enter**›

Step 14: Enter Time Zone and Daylight Savings Time Information

A series of prompts now makes it possible to specify the correct time zone and daylight savings time information. Enter the appropriate information, and continue with the next step.

Step 15: Install Extended Operating System Utilities

After you have entered the time zone information, the following menu appears which allows you to install extended utilities or applications:

```
     1.    Install additional software
     2.    Continue installation

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

1. Type **1** and press **Enter**.
   The following menu displays:

```
 Install Remove List Quit                              Custom

         /                          Wednesday October 9, 1996 3:39

                             Products Currently Installed

   SCO UNIX System V Operating System
```

2. Select the **Install** option using the arrow keys and press **Enter**. (Install is highlighted when it is selected.)

   The following menu displays:

```
Select a product to install and press <Return>           Install
Press <ESC> to cancel, movement keys are active


       /                              Wednesday October 9, 1996 3:39
                           ┌──── Install ────┐
    Select a product:   [                      ]

    Choose an option:  Entire Product  Packages  Files

                           ┌─────────────────────────────────────┐
                           │ A New Product                       │
                           │ *SCO UNIX System V Operating System │
                           └─────────────────────────────────────┘
```

3. Select **SCO UNIX System V Operating System** using the arrow keys and press **Enter**.

   The following menu appears:

```
                                                         Install
Install the complete distribution


       /                              Wednesday October 9, 1996 3:39
                           ┌──── Install ────┐
    Choose an option:  Entire Product  Packages  Files
```

4. Select **Entire Product** using the arrow keys and press **Enter**.

5. At the prompt, insert the SCO UNIX Extended Utility Floppy Volume X1 diskette and press **Enter**.

6. Continue this process, inserting the appropriate diskettes when prompted.

   After you have loaded all of the software, the SCO UNIX System V Operating System Init Script runs, and the following prompt displays:

```
   Your system name is set to scosysv.
   Do you wish the mail system to use a different name? (y/n)
```

7. Type **y** and press **Enter**.

8. Type a name unique to your site and press **Enter**.

9. At the prompt, press **Enter** to continue.
    The following menu displays:

```
    /                                Wednesday October 9, 1996 3:39







 Press any key to continue

```

10. Press **Enter**.
    The Custom menu redisplays.

11. Using the arrow keys, select **Quit** and press **Enter**.

12. Press **Enter** again while **Yes** is highlighted to exit.

Step 16: Select Relaxed System Security

It is now necessary to decide on the desired level of security for your UNIX system.
After you exit the Custom menu, the following screen displays:

```
                       Trusted System Configuration
 The system is designed to meet the requirements for the C2 level of trust
 describing the protection given to prevent unauthorized access to a system
 and its data. Levels 1 and 2 below are suitable for C2 systems.

 You may reconfigure your system security to suit your own requirements.
 Four levels of preconfigured security defaults are available:

     1.    High security - recommended for systems containing confidential
           information and accessed by many users.

     2.    Improved security - recommended for systems accessed by groups of
           users who may share information.

     3.    Traditional UNIX security - provided for compatibility with other
           existing UNIX systems.

     4.    Low security - recommended only for systems not publicly
           accessible and used by a small number of cooperating users.


 Enter your choice:

```

1. Select Traditional UNIX security by typing **3** and pressing **Enter**.

2. Continue with the installation described in the next section.

Step 17: Continue Installation

After selecting a security type, the following menu displays:

```
        1.     Run System Administration Shell
        2.     Continue installation

Enter an option or q to quit:
```

1. Type **2** and press **Enter**.

2. Continue with the root password assignment described in the next section.

Step 18: Enter Root Password

In this step, the system prompts you to enter a password with the following menu:

```
        1.     Pick your own password
        2.     Pronounceable password will be generated for you

Enter choice (default is 1):
```

1. Type **1** and press **Enter**.

2. At the prompt, type a password and press **Enter**.

3. Re-enter the password at the prompt and press **Enter**.

Note: *Make sure to store the password in a safe place so that you will be able to login.*

Step 19: Shutdown and Reboot

This concludes the required SCO UNIX installation. After the "Power Off or Reboot" prompt is displayed, reboot the system from the hard disk by removing the floppy from the disk drive and pressing any key.

The screen will clear and display the "Boot:" prompt.

Adding Drivers to UNIX

If any specific boards or drivers are required by the system or application, **custom** or **installpkg** are used to install the new drivers.

1. From the "Boot:" prompt, press **Enter**.

2. Type your user password and press **Enter**.
    The "#" prompt appears.

Parallel I/O Device   The parallel I/O device is used by the printer on the OAI system. To install the parallel port issue the following command:

1. At the "#" prompt, type **mkdev parallel** and press **Enter**.
    The following screen appears:

```
Do you wish to:
    1.    Add a parallel port
    2.    Remove a parallel port
    3.    Show configuration
    4.    Help

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

2. Type **1** and press **Enter**.
    The following screen appears:

```
Please select the I/O address for the adapter:
    1.    Serial/Parallel adapter #1  : address = 378-37f
    2.    Parallel/Monochrome adapter : address = 3bc-3be
    3.    Serial/Parallel adapter #2  : address = 278-27a
    4.    Other configuration

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

3.   Type **1** and press **Enter**.

4. At the "Should this port use interrupt (default [7])" prompt, press **Enter**.
    The message "Do you wish to create a new kernel now? (y/n)" appears.

5. Type **n** and press **Enter**.

Second Serial I/O Device

1. At the "#" prompt, type **mkdev serial** and press **Enter**.
   The following screen appears:

   ```
   The following cards are currently configured:
       1.    IBM-COM1 1 port card i/o address = 3f8, interrupt = COM1
             i)nstall a new serial board
             r)emove an existing board
             q)uit

   Please enter your choice (i/r/q)  >
   ```

2. Type **i** and press **Enter**.
   The following screen appears:

   ```
   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
       6.    16 port card

   Enter your choice or q to quit:
   ```

3. Select the number corresponding to the port card to be added and press **Enter**.

4. Select the COM port for the device and press **Enter**.

5. Type the number that corresponds to the card you are using and press **Enter**.
   (Quadram and IBM-COM2 cards are supported.)

6. Type the baud rate to be used on the modem devices and press **Enter**.

7. Select an entry that corresponds to the baud rate and press **Enter**.

8. At the "Do you wish to create a new kernel now? (y/n)" prompt, type **n** and press **Enter**.

SCSI Adapter Device

Installing a SCSI adapter device may require custom or installpkg.

Note:　*This is an example of the 7800 SCSI adapter using the **installpkg** command.*

1. At the "#" prompt, type **installpkg** and press **Enter**.

2. Insert the SCSI Device Driver Floppy Disk (7800 Family Manager for SCO UNIX) and press **Enter**.
   If the program installation requires more than one floppy disk, be sure to insert the disks in the proper order, starting with disk number 1.

3. A prompt displays the packages that are on the disk. Type the name of the package you want to install (e.g. **alad**) and press **Enter**.

SCSI Tape Device

After installing the SCSI adapter, you can install a SCSI tape drive. To install any tape devices use the **mkdev tape** command.

Note:　*This example will install a SCSI tape device.*

1. At the "#" prompt, type **mkdev tape** and press **Enter**.
   The Tape Drive Configuration Program menu appears, as illustrated below:

```
Tape Drive Configuration Program
    1.    Install a Tape Drive
    2.    Remove a Tape Drive
    3.    Change default Tape Drive

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

2. Type **1** and press **Enter**.
   The Tape Drive Installation Menu appears, as illustrated below:

```
Tape Drive Installation Menu
    1.    Install Cartridge Tape Drive
    2.    Install Mini-Cartridge Tape Drive
    3.    Install Qic-40 or Qic-80 Tape Drive
    4.    Install SCSI Tape Drive

Select an option or enter q to return to the main menu:
```

3. Select the tape drive you want to install and press Enter. (In this example, type **4** and press **Enter**.)

    The following menu appears:

```
SCSI Tape Drive Installation Menu
    1.    Install SCSI Cartridge Tape Drive
    2.    Install SCSI Exabyte Tape Drive
    3.    Install SCSI 9-Track Tape Drive
    4.    Install SCSI DAT Drive
    5.    Install Compaq SCSI Tape Drive

Select an option or enter q to return to the main menu:
```

4. Select the appropriate drive (e.g., **1**), and press **Enter**.

5. At the "Do you wish to configure the SCSI Cartridge Tape Drive now? (y/n)" prompt, type **y** and press **Enter**.

6. Enter the prefix of the SCSI host adapter by typing **alad** and pressing **Enter**.

7. At the "Which 'alad' SCSI hot adapter supports this device?" prompt, type **0** and press **Enter**.

8. Enter the Target ID for the device by typing **2** or pressing **Enter**.

9. Enter the LUN of the device by typing **0** and pressing **Enter**.

10. At the "Update SCSI configuration? (y/n)" prompt, type **y** and press **Enter**.

11. At the prompt, press **Enter** to continue.

12. To leave the current string, type **q** and press **Enter**.

    The Tape Drive Configuration Program menu displays.

13. Type **q** and press **Enter**.

14. At the "Do you wish to create a new kernel now? (y/n)" prompt, type **n** and press **Enter**.

3C509 Ethernet Device

Use the following steps to install an ethernet driver for the 3C509 ethernet board.

1. At the "#" prompt, type **custom** and press **Enter**.

   The following menu displays:

```
 Install Remove List Quit                                    Custom


         /                              Wednesday October 9, 1996 3:39
                              Products Currently Installed

   SCO UNIX System V Operating System
```

2. Select the **Install** option using the arrow keys and press **Enter**. (Install is highlighted when it is selected.)

   The following menu displays:

```
Select a product to install and press <Return>          Install
Press <ESC> to cancel, movement keys are active


       /                                Wednesday October 9, 1996 3:39
                                    Install
    Select a product:  [                              ]

    Choose an option:  Entire Product   Packages   Files

                           A New Product
                          *SCO UNIX System V Operating System
```

3. Select **A New Product** using the arrow keys and press **Enter**.
    The following menu appears:

```
                                                            Install
Install the complete distribution


        /                                Wednesday October 9, 1996 3:39
                            ┌─────────── Install ───────────┐
    Choose an option:   Entire Product   Packages   Files



```

4. Select **Entire Product** using the arrow keys and press **Enter**.

5. At the prompt, insert the 3C509 Ethernet III Driver Floppy diskette and press **Enter**.

6. Press **Enter** at the prompt to continue the installation.

7. After the installation is complete, press **Enter** to continue.

TCP/IP Runtime System

Use the following steps to install the TCP/IP Runtime System.

1. At the "#" prompt, type **custom** and press **Enter**.
   The following menu displays:

```
 Install Remove List Quit                                    Custom


         /                          Wednesday October 9, 1996 3:39
                              Products Currently Installed

  SCO UNIX System V Operating System


```

2. Select the **Install** option using the arrow keys and press **Enter**. (Install is highlighted when it is selected.)
   The following menu displays:

```
Select a product to install and press <Return>          Install
Press <ESC> to cancel, movement keys are active


        /                          Wednesday October 9, 1996 3:39
                              Install

    Select a product:  [                         ]

    Choose an option:  Entire Product  Packages  Files

                              A New Product
                              *SCO UNIX System V Operating System

```

3. Select **A New Product** using the arrow keys and press **Enter**.

    The following menu appears:

```
                                                            Install
  Install the complete distribution


          /                              Wednesday October 9, 1996 3:39
                                   Install
      Choose an option:   Entire Product   Packages   Files



```

4. Select **Entire Product** using the arrow keys and press **Enter**.

5. At the prompt, insert the SCO TCP/IP Runtime Floppy Disk Volume 1 diskette and press **Enter**.

6. Press **Enter** at the prompt to continue the installation.

7. Continue this process, inserting the appropriate diskettes when prompted.

8. When prompted, use the serial number and activation key included with the SCO TCP/IP Runtime System distribution to enter the serial number and activation key. The serial number can be found on the SCO Product Activation Key Card in the *Read This First* booklet.

9. At the "Enter the system node name" prompt, press **Enter**.

10. Type the domain name for the node and press **Enter**.

    The following screen appears:

```
    256 TCP connections currently configured, do you want to:
        1.    Add TCP Connections
        2.    Remove TCP Connections

    Select an option or enter q to quit [q]:

```

11. Press **Enter**.

12. At the "Do you want to relink the kernel now?" prompt, type **n** and press **Enter**.

13. At the prompt, press **Enter** to continue.

Note: *Make sure that you remove the SCO TCP/IP Runtime Disk Volume 3 from the floppy disk drive.*

LLI Drivers   Use the following steps to install the LLI Drivers which are needed to configure
network drivers into the kernel.

1. At the "#" prompt, type **custom** and press **Enter**.
    The following menu displays:

```
 Install Remove List Quit                                        Custom


         /                              Wednesday October 9, 1996 3:39
                              Products Currently Installed

 SCO UNIX System V Operating System


```

2. Select the **Install** option using the arrow keys and press **Enter**. (Install is
    highlighted when it is selected.)
    The following menu displays:

```
Select a product to install and press <Return>          Install
Press <ESC> to cancel, movement keys are active


        /                              Wednesday October 9, 1996 3:39
                                  Install

   Select a product:  [                          ]

   Choose an option:  Entire Product  Packages  Files

                          A New Product
                          *SCO UNIX System V Operating System
                          *SCO TCP/IP Runtime System

```

3. Select **A New Product** using the arrow keys and press **Enter**.
    The following menu appears:

```
                                                              Install
Install the complete distribution


        /                              Wednesday October 9, 1996 3:39
                          ┌─────────── Install ───────────┐
     Choose an option:  Entire Product   Packages   Files



```

4. Select **Entire Product** using the arrow keys and press **Enter**.

5. At the prompt, insert the SCO LLI Floppy Disk Volume 1 diskette and press **Enter**.

6. Press **Enter** at the prompt to continue the installation.

7. When the installation is complete, press **Enter** to continue.

8. Using the arrow keys, select **Quit** and press **Enter**.

9. Press **Enter** again while **Yes** is highlighted to exit.

10. Remove the SCO LLI Floppy Disk Volume 1 from the floppy disk drive.

Network Configuration

At this point, you need to configure the TCP/IP.

1. At the "#" prompt, type **netconfig** and press **Enter**.
    The following screen displays:

```
    Available options:
        1.    Add a chain
        2.    Remove a chain
        3.    Reconfigure an element in a chain
        q.    Quit

    Select option:
```

2. Type **1** and press **Enter**.

3. Select the top level of the chain to add and press **Enter**.

4. Select the next level of chain to add and press **Enter**.

5. Confirm your selection by typing **y** and pressing **Enter**.

Note: *The setup procedure for the 3Com EtherLink III adapter is dependent on whether it is an ISA bus adapter (3C509), an EISA bus adapter (3C579), an MCA bus adapter (3C529), or a PCMCIA bus adapter (3C589). You must know which EtherLink III adapter type you have in order to configure the adapter correctly.*

6. Type the appropriate information for the adapter type you are using at the prompts, pressing **Enter** after each entry.

Note: *For each ISA bus adapter, there are three parameters which you may need to supply: the Interrupt Request Level, the I/O Base Address, and the Transceiver Type. However, because the adapter can be configured automatically, you can choose not to specify configuration parameters and let them be chosen for you. An available Interrupt Request Level and I/O Base Address will be selected, and the driver will automatically select the transceiver based on which connector the network is attached to. If you wish to automatically configure the adapter, answer yes at the next prompt.*

7. After you verify the Interface Address, Netmask, and Broadcast Address information, the following screen appears:

```
    O Pseudo ttys are currently configured, do you want to:
        1.    Add Pseudo ttys
        2.    Remove Pseudo ttys

    Select an option or enter q to quit [q]:
```

8. Type **1** and press **Enter**.

9. At the "How many additional pseduo ttys you want to be created" prompt, press **Enter**.

10. To exit the TCP Connections menu, type **q** and press **Enter**.

11. To exit the chain menu, type **q** and press **Enter**.

12. The system prompts you to relink the kernel. If there are no other drivers to be installed, type **y** and **Enter** to relink the kernel now. If there are other drivers to be installed (i.e. SunRiver Driver), type **n** and press **Enter**, and install the drivers as needed. After all of the drivers have been installed, relink the kernel and then reboot by typing shutdown **-g0 -y -i0** and press **Enter**.

**SunRiver
Controller Device**

Use the following steps to install the SunRiver Controller device.

1. At the "#" prompt, type **custom** and press **Enter**.
    The following menu displays:

```
 Install Remove List Quit                                   Custom


        /                              Wednesday October 9, 1996 3:39
                              Products Currently Installed

 SCO UNIX System V Operating System


```

2. Select the **Install** option using the arrow keys and press **Enter**. (Install is
    highlighted when it is selected.)
    The following menu displays:

```
Select a product to install and press <Return>           Install
Press <ESC> to cancel, movement keys are active


        /                                Wednesday October 9, 1996 3:39
                                     Install

    Select a product:  [                            ]

    Choose an option:  Entire Product  Packages  Files


                                 A New Product
                                 *SCO UNIX System V Operating System


```

3. Select **A New Product** using the arrow keys and press **Enter**.
    The following menu appears:

```
                                                              Install
Install the complete distribution


          /                                Wednesday October 9, 1996 3:39
                              ─── Install ───
      Choose an option:  Entire Product   Packages   Files



```

4. Select **Entire Product** using the arrow keys and press **Enter**.

5. At the prompt, insert the SunRiver Device Driver Floppy diskette and press **Enter**.

6. Press **Enter** at the prompt to continue the installation.

7. When the installation is complete, press **Enter** to continue.
    The following information displays:

```
                    RESTRICTED RIGHTS LEGEND

Use,  duplication, or disclosure by the Government is subject  to
restrictions as set forth in subdivision (b)(3)(ii) of the Rights
   in Technical Data and Computer Software clause at 252.227-7013.

The Santa Cruz Operation, Inc.      SunRiver Corporation
400 Encinal Street                  9430 Research Blvd., Ste IV-200
Santa Cruz, CA 95061                Austin, TX 78759-6543

    Copyright (C) The Santa Cruz Operation, 1988-1991
    Copyright (C) SunRiver Corporation, 1988-1994


Press <Return> to continue:

```

8. Press **Enter**.

9. Select the computer's bus type and press **Enter**.

10. To select the default interrupt selection, press **Enter**.

Note: *Refer to the Installation Guide to configure the SunRiver Host Adapter for the selected interrupt (10).*

11.Enter the number of multiscreens per station and press **Enter**.

12.At the "Do you wish to relink the kernel now?" prompt, type **y** and press **Enter**.

13.When the driver installation completes, press **Enter** to continue.

14.To exit Custom, press the right arrow key until **Quit** is selected and press **Enter**.

15.Press **Enter** again while Yes is highlighted to exit.

16.Remove the SunRiver Terminal Driver floppy disk.

17.At the "#" prompt, type **shutdown -g0 -y -i0** and press **Enter**.
　　The system shuts down.

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Chapter 4   APPLICATION MANAGER INSTALLATION

Use the information provided in this chapter to install the Application Manager (APM) on your system.

1. To begin the installation, the Application Manager must be installed from single user mode. To enter single user mode, you can reboot the system or use the **shutdown -g0 -y -is** command.

    To use the **shutdown -g0 -y -is** command, use the following steps:

    (a) At the login prompt, type **root** and press **Enter**.

    (b) At the password prompt, type your password and press **Enter**.
    The "#" prompt displays.

    (c) Type **shutdown -g0 -y -is** and press **Enter**.
    The following screen displays:

    ```
    INIT: SINGLE USER MODE

    Type CONTROL-d to proceed with normal startup,
    (or give root password for system maintenance):
    ```

    (d) Type the root password and press **Enter**.

    (e) After the system has entered single user mode, the "#" prompt displays.
    Type **tar xv INSTALLAPM** and press **Enter**.
    The "#" prompt displays again.

    (f) Type **./INSTALLAPM** and press **Enter**.
    The following screen appears:

    ```
    NEC America            APM Installation       Thu - Nov 21, 1996


                     *** APM Installation Procedure for SCO UNIX ***

    To ensure proper installation of the APM Platform, the OAI interface
    driver (i.e., X.25, TCP/IP, ...) between the UAP and PBX must be installed.
    Please refer to Chapter 5 of the APM System Installation Manual.


    Has the OAI interface driver been installed? (y/n)



      >
    ```

2. Type **y** and press **Enter** to indicate that the OAI interface has been installed. The OAI interface would be either X.25 or TCP/IP. These interfaces should have been installed when the UNIX operating system was loaded.

The following screen appears:

```
 ┌─────────────────────────────────────────────────────────────────────┐
 │ NEC America           APM Installation        Thu - Nov 21, 1996     │
 ├─────────────────────────────────────────────────────────────────────┤
 │                                                                       │
 │                                                                       │
 │    Release Media Devices are:                                         │
 │          (F)loppy Disk Device                                         │
 │          (C)artridge Tape Device                                      │
 │                                                                       │
 │    Enter Release Media Device or "Q" to Quit:                         │
 │                                                                       │
 │                                                                       │
 │                                                                       │
 │                                                                       │
 │                                                                       │
 ├─────────────────────────────────────────────────────────────────────┤
 │  >                                                                    │
 └─────────────────────────────────────────────────────────────────────┘
```

3. Type **f** and press **Enter** to continue the installation using floppy disks.

The following screen appears:

```
 ┌─────────────────────────────────────────────────────────────────────┐
 │ NEC America           APM Installation        Thu - Nov 21, 1996     │
 ├─────────────────────────────────────────────────────────────────────┤
 │                                                                       │
 │    System Time Zone is Central with Daylight Savings                  │
 │    Do you want to change the System Time Zone (y/n)                    │
 │                                                                       │
 │                                                                       │
 │                                                                       │
 │                                                                       │
 │                                                                       │
 │                                                                       │
 │                                                                       │
 │                                                                       │
 ├─────────────────────────────────────────────────────────────────────┤
 │  >                                                                    │
 └─────────────────────────────────────────────────────────────────────┘
```

4. Do one of the following:

    •   If you need to change the time zone information, type **y** and press **Enter**. The Time zone initialization menu appears. Type the number that corresponds to your time zone and press **Enter**. If daylight savings time applies to your location, type **y** and press **Enter** at the daylight savings time prompt. Otherwise, type **n** and press **Enter**.

    •   If you do not need to change system time zone, type **n** and press **Enter**.

5. The system displays the current date and the following prompt: "Is this information correct? (y/n)". Do one of the following:

   • If the system does not display the correct time, type **n** and press **Enter**. Type the new time in the format *[yymmdd]hhmm* and press **Enter**. The system displays the new time. If this time is correct, type **y** and press **Enter**. If the time is incorrect, type **n** and press **Enter** and repeat the time entry process.

   • If the system displays the correct time, type **y** and press **Enter**.

   The Installation Configuration screen displays with the information you entered. An example of this screen is illustrated below:

```
 NEC America              APM Installation         Thu - Nov 21, 1996

 Installation Configuration


      System Time Zone:    Eastern with Daylight Savings
         Current date:    Thu Nov 21 11:00:30 EST 1996
    Installation Device:   Floppy Disk Device - /dev/fd0



 Is this information correct? (y/n)


 >
```

6. Verify that System Time Zone, Current date, and Installation Device are correct. To accept this information, type **y** and press **Enter**.

   A screen similar to the one below displays:

```
 NEC America              APM Installation         Thu - Nov 21, 1996

 APM may be installed on one of the following partitions:

     /dev/root
     /dev/oai

 where /dev/root is root device. If APM is to be installed on any partition
 other than /dev/root, then all of the data on that partition will be
 destroyed.

 Which partition do you want APM to use?
     [/dev/root or /dev/oai]

 >
```

7. A partition must be allocated to install the OAI system. In most installations the partition used is *dev/oai*. The partitions are created when the UNIX operating system was installed. To use *dev/oai*, type **/dev/oai** and press **Enter**.

   The OAI Filesystem Creation screen appears, as illustrated below:

```
NEC America              APM Installation        Thu - Nov 21, 1996

OAI Filesystem Creation

Do you want to create a new filesystem on /dev/oai, or use an existing
filesystem? Creating a new filesystem will remove all data on /dev/oai.

Create a new filesystem? (y/n)




>
```

8. To create a new filesystem, type **y** and press **Enter**. The filesystem is where the OAI system will load its files from the floppy disk. A new filesystem is necessary if this is a fresh installation.

   The screen will display information about the /dev/oai filesystem and mount the filesystem to the /oai directory, as illustrated below:

```
NEC America              APM Installation        Thu - Nov 21, 1996

Making /oai filesystem (mkfs /dev/oai 179998) ...
Current fsname: , Current volname: , Blocks: 179998, Inodes: 22512
FS Units: 1Kb, Date last modified: Wed Nov 21 17:25:25 1996
NEW fsname = /oai, NEW volname = disk0 -- DEL if wrong!!

Verifying APM filesystem ...
/dev/oai
Fast File System: /oai Volume: disk0
    ** Phase 1 - Check Blocks and Sizes
    ** Phase 2 - Check Pathnames
    ** Phase 3 - Check Connectivity
    ** Phase 4 - Check Reference Counts
    ** Phase 5 - Check Free List Bitmap
2 files 26 blocks 177154 free

Mounting /oai ...Partition name = [/dev/oai]


>
```

If a separate partition was created for the OAI log files, the oailog partition will be created. This filesystem will contain the OAI log and debug files.

```
NEC America              APM Installation        Thu - Nov 21, 1996

Making /oai/log filesystem (mkfs /dev/oailog 99998) ...
Current fsname: , Current volname: , Blocks: 99998, Inodes: 12512
FS Units: 1Kb, Date last modified: Wed Nov 21 17:25:25 1996
NEW fsname = oailog, NEW volname = oailog -- DEL if wrong!!

Verifying oailog filesystem ...
/dev/oailog
Extended Fast File System: oailog Volume: oailog
   ** Phase 1 - Check Blocks and Sizes
   ** Phase 2 - Check Pathnames
   ** Phase 3 - Check Connectivity
   ** Phase 4 - Check Reference Counts
   ** Phase 5 - Check Free List Bitmap
2 files 18 blocks 98412 free

Mounting /oailog ...Partition name = [/dev/oailog]


>
```

Next, the installation will update the UNIX operating system files. The OAI user will be added to the UNIX password system and groups.

```
NEC America              APM Installation        Thu - Nov 21, 1996

Updating fstab ...


Updating group and password files ...

Updating /etc/conf/cf.d/init.base ...

Updating /etc/default/login ...




>
```

The APM installation displays a prompt for entry of the first disk of the Application Platform Manager, as illustrated below:

```
 NEC America           APM Installation        Thu - Nov 21, 1996

 Insert Floppy Disk Device APM Release Media 1 of 2 and press Enter:




 >
```
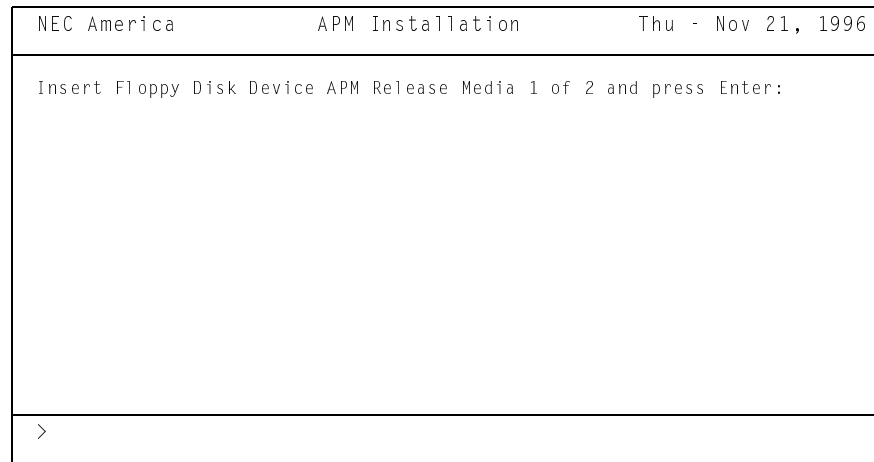
9. Insert the floppy disk into the disk drive and press **Enter**.

10. At the "Insert Floppy Disk Device APM Release Media 2 of 2" prompt, insert the second floppy disk of the Application Platform Manager and press **Enter**.

    The installation will begin verifying the files that have been loaded from the floppy disks. If a checksum error occurs, you will need a new set of Application Platform Manager floppy disks.
    When the verification is complete, the message "Install new line printer services? (y/n)" displays.

11. Install a new printer by typing **y** and pressing **Enter**. This will enable APM to output data to the line printer.

    The printer is installed, and the prompt "Enter new UAP name" displays.

12. Type the name of the UAP and press **Enter**. The name of UNIX operating system was entered when the system was installed. This name should be a unique name and should be related to the site. (NEC America would be NECAM). This name is important if remote access is necessary from NEC.

13. Press **Enter** at the prompt to continue.

14. If the installation uses TCP/IP as its OAI link, the TCP/IP services for APM must be configured. To configure the TCP/IP, type **y** and press **Enter** at the "Will this installation be using TCP/IP to communicate with the PBX" prompt, and type **y** and press **Enter** at the "Do you want to install the TCP/IP Services for the APM Platform now" prompt.

The TCP/IP Addressing menu displays:

```
NEC America              APM Installation        Thu - Nov 21, 1996

NEC America             TCP/IP Addressing


        Current TCP/IP Network interface(s)


Interface    IP Address         Network Mask      Broadcast Address
e3E0         192.168.1.10       255.255.255.0     192.168.1.255


Do you wish to change a UAP TCP/IP Interface Address (y/n)


>
```

15. The default IP address is configured when the UNIX TCP/IP Runtime system was installed. This does not need to be changed unless the UAP will be used to access the Internet or if the network administrator requires that the IP address conform to the network in place. The default IP is taken from the RFC 1597 where this address will not route through the Internet and will never be assigned. To accept the default IP address, type **n** and press **Enter** at the "Do you wish to change a UAP TCP/IP Interface Address" prompt.

16. The PBX TCP/IP address must be modified to allow the OAI system to communicate with the PBX. No PBX TCP/IP address is entered into the system during the UNIX installation. If this is a fresh installation, type **y** and press **Enter** at the "Do you wish to change a PBX TCP/IP Address (y/n)" prompt.

The following menu displays:

```
NEC America              APM Installation        Thu - Nov 21, 1996

   1  Add a PBX TCP/IP Address
   2  Delete an existing PBX TCP/IP Address
   3  View Current TCP/IP Addresses File

   S  Save and Exit with Changes
   Q  Quit and Discard Changes
   Enter Option:




>
```

17. To add an entry, type **1** and press **Enter**.

18. Type the host name of the PBX and press **Enter**.

19. Type the PBX TCP/IP address and press **Enter**.

20. If the host name and TCP/IP address are correct, type **y** and press **Enter**. The menu redisplays.

21. Type **s** and press **Enter** to save the PBX address and exit. The following screen appears:

```
NEC America            APM Installation          Thu - Nov 21, 1996

/etc/hosts file updated
Source Link Nodes and Destination Link Nodes must be setup that specify
the PBX hostname entries. This is done from the Applications Mananger (APM)
by selecting the 'System Configuration' entry in System Adminstration menu
and then followed by selecting the 'Source Link Configuration' and
'Destination Link Configuration' menus. For more information refer to the
Source/Destination Link Configuration sections in the APM
Operations Manual.


Press Return to continue


>
```

22. The IP addresses will be updated in the /etc/hosts file. After the installation has completed, the OAI links must be configured by the Application Platform Manager. Press **Enter** to continue.

23. The message "Do you wish to install the modem scripts and update the uucp files" displays. Type **y** and press **Enter** to install and program the modem that will be used for remote access.

24. The modems are normally attached to COM1 of the PC. The device that is associated with COM1 is /dev/tty1A. This option will program the modem with default values that correspond to modems used at NEC. The modem will be used for remote access in case a problem occurs. Type **/dev/tty1A** and press **Enter** when the following message displays: "Enter tty device attached to modem [/dev/tty1A]".
Information displays as the modem is being programmed, as illustrated below:

```
NEC America            APM Installation       Thu - Nov 21, 1996

*** Disable /dev/tty1A ***
*** Updating /usr/lib/uucp/Devices with ACU tty1A ***
*** Updating /usr/lib/uucp/Devices with tty1A ***
*** Updating /usr/lib/uucp/Dialers with US Robotics Modem ***
*** Updating /usr/lib/uucp/Permissions for Dial-in ***
*** Updating /etc/gettydefs with 19200NLY ***
*** Update /dev/tty1A in /etc/inittab to 19200 baud (k) ***
-> Se1A:2:off:/etc/getty -t60 tty1A 3
*** Update /dev/tty1A in /etc/conf/init.d/sio to 19200 baud (k) ***
-> Se1A:2:off:/etc/getty -t60 tty1A 3
*** Enable /dev/tty1A ***
/etc/inittab updated
/etc/conf/init.d/sio updated
Press return

>
```

25. Press **Enter** to continue.

    Modifications made to the UNIX operating system will require the operating system to relink. The UNIX operating system will relink and create a new operating system.

26. At this point in the installation, a new UNIX operating system is recreated. Type **y** and press **Enter** at the "Do you want this kernel to boot by default?" prompt. This kernel will be the default when the system boots.

27. Rebuild the kernel environment by typing **y** and pressing **Enter** at the "Do you want the kernel environment rebuilt?" prompt.

    The following screen displays:

```
NEC America            APM Installation       Thu - Nov 21, 1996

Unmounting /dev/oai ...
 The APM Platform has been successfully installed.
***************************************************************
Remove release media from Floppy Disk Device before rebooting.
***************************************************************


Press Enter to continue



>
```

28. After the new UNIX operating system has been created, it is necessary to reboot the system and load the new UNIX operating system. Press **Enter** to shut down the operating system.

    The installation will continue the shut down until the following screen appears:

```
INIT: New run level: 0
The system is coming down.  Please wait.
System services are now being stopped.
ps: /unix: not the booted system
Print services stopped.
TCP Shutdown...
Stopping TCP/IP daemons...
......
TCP Shutdown Complete.

The system is down.

**   Safe to Power Off   **
          -or-
** Press Any Key to Reboot **
```

29. To reboot the system press **Enter**.

    After the system has rebooted and enters multi-user mode, the Application Platform Manager login displays, as illustrated below. For more information about the operation of the Application Platform Manager consult the *Application Platform Manager Operations Manual*.

```
 Application Manager                       Thu - Nov 21, 1996

                      *** NEC Proprietary ***



                   Enter Password:   ▭▭▭▭



            <RET> to accept password,   <ESC> to quit


```

Chapter 5   BACKUP AND RESTORATION PROCEDURES

Creating Boot and Root Floppy Disks

SCO recommends the creation of an Emergency Boot Floppy set after installation. This is the only means of attempting recovery of the root filesystem or the kernel in the event that problems occur.

To create a boot and root floppy disks follow the procedure below:

1. At the "#" prompt, type **mkdev fd** and press **Enter**.
    The following screen appears:

```
Floppy Disk Filesystem Creation Program
Choices for type of floppy filesystem.
    1.    48tpi, double sided, 9 sectors per track
    2.    96tpi, double sided, 15 sectors per track
    3.    135tpi, double sided, 9 sectors per track
    4.    135tpi, double sided, 18 sectors per track

Enter an option or q to quit:
```

2. Type **4** and press **Enter**.
    The following screen appears:

```
Choices for contents of floppy filesystem.
    1.    Filesystem
    2.    Bootable only        (96ds15 and 135ds18 only)
    3.    Root filesystem only  (96ds15 and 135ds18 only)

Enter an option or q to quit:
```

3. Type **2** and press **Enter**.

4. Insert a 135ds18 floppy disk into the disk drive, and press **Enter**.

5. At the "Would you like to format the floppy disk first? (y/n) prompt, type **n** and press **Enter**.
    The bootable floppy is created, and the following screen appears:

```
Choices for contents of floppy filesystem.
    1.    Filesystem
    2.    Bootable only        (96ds15 and 135ds18 only)
    3.    Root filesystem only  (96ds15 and 135ds18 only)

Enter an option or q to quit:
```

6. Type **3** and press **Enter**.

7. Insert a 135ds18 floppy disk into the disk drive, and press **Enter**.

8. At the "Would you like to format the floppy disk first? (y/n) prompt, type **n** and press **Enter**.
   The filesystem floppy is created, and the menu reappears.

9. Exit the menu by typing **q** and pressing **Enter**.

Tape Backup and Restore

The UAP system must be backed up prior to making any changes to the system. This will ensure that the system can always be restored to initial configuration in the event of hard disk corruption or failure. Both the tape backup and restore rely on a valid boot and root floppy disks. Two sets of the boot and root floppies should be made with one set reserved for backup with the write protect tab set to write protected.

Note: *Before using the root floppy the write protect should be set to unprotected.*

Another backup should be made after the final configured system and applications have been completed.

Backup

For OAI applications that use INFORMIX software for databases, the INFORMIX databases must be backed up using the INFORMIX utilities. Refer to the application documentation for specific instructions.

To backup the UAP, use the following steps.

Step 1:   Record Partition Table Information

The partition table must be recorded from the hard disk in case there is a hard disk failure. Information in the partition table will vary according to the size of the hard disk. Record this information and store it with the root and boot floppy disks. To list the values of the partition table enter the following commands:

1. At the login prompt, type **root** and press **Enter**.

2. Type the root password, and press **Enter**.

3. At the "#" prompt, type **divvy** and press **Enter**.
   The partition table displays and is similar to the table below:

Name	Type	New FS	#	First Block	Last Block
root	EAFS	yes	0	0	99999
swap	NON FS	no	1	100000	163999
oai	EAFS	yes	2	164000	263999
oailog	EAFS	yes	3	264000	363999
db	NOT USED	no	4	364000	863999
	NOT USED	no	5	-	-
recover	NON FS	no	6	1030165	1030174
d1057all	WHOLE DISK	no	7	0	1031152

4. Record the information for future use.

5. After you have recorded the information, exit the menu by typing **q** and pressing **Enter**.

   The following screen displays:

```
i[nstall]     Install the division set-up shown
r[eturn]      Return to the previous menu
e[xit]        Exit without installing a division table
```

6. Type **e** and press **Enter**.

   The "#" prompt displays.

7. Type **exit** and press **Enter**.

Step 2: Boot the System from the Boot and Root Floppies

In order to backup the UAP, the system must be loaded from the boot and root floppies. If the system was loaded from the hard disk, it must be shut down so it can be loaded from the boot and root floppies. Perform the following steps to shutdown the system and boot it from the boot and root flopppies:

1. Terminate any initialized OAI applications and stop OAI if it has been active.

2. Exit from Application Manager (APM).

3. At the login prompt, type **root** and press **Enter**.

4. When the password prompt displays, type the root password and press **Enter**.

5. At the "#" prompt, type **shutdown -g0 -i0 -y** and press **Enter**.

   The system shuts down.

6. When the system displays the "Safe to Power Off" prompt, insert the *boot floppy* and press **Enter**.

7. When the "Boot:" prompt displays, press **Enter**.

   The UAP boots from the boot floppy and displays a prompt for the root floppy.

8. Insert the *root floppy* press **Enter**.

   When the system is loaded, the "#" prompt displays.

   Note: *Do not remove the root floppy until you shut down the system.*

Step 3: Backup the UAP

After you have booted the system from the boot and root floppies, use the following steps to backup the UAP:

1. Insert a tape into the tape drive.

2. To backup the different filesystems, each filesystem must be mounted. Type the following commands at the "#" prompt, pressing **Enter** after each:

   (a) # **mount /dev/hd0root /mnt**

   (b) # **mount /mnt/dev/oai /mnt/oai**

   (c) # **mount /mnt/dev/oailog /mnt/oai/log**

3. To save the drive parameters, fdisk partition information and divvy information on the root floppy and hard drive so that they can be viewed during the recovery procedure. Run the following commands pressing **Enter** after each line:

(a) # **dparam /dev/rhd00 > /dkinit.sav**

(b) # **dparam /dev/rhd00 > /mnt/dkinit.sav**

(c) # **fdisk -p > /fdisk.sav**

(d) # **fdisk -p > /mnt/fdisk.sav**

(e) # **divvy > /divvy.sav**

    q

    e

(f) # **divvy > /mnt/divvy.sav**

    q

    e

4. To begin the backup type the following commands at the "#" prompt, pressing **Enter** after each command. The -K525000 indicates the tape has 525000 1K blocks (525 Megabytes) . If your tape is of a different size, then change the block count accordingly. The /dev/rStp0 value specifies the tape device. If you are using a different tape device, then change the name accordingly.

(a) # **cd /mnt**

(b) # **find . -depth -print | cpio -ocvB -C10240 -K525000 > /dev/rStp0**

5. When the "#" prompt displays, the backup has finished. Remove the tape and label the tape *UAP Backup* and provide the current date.

6. To complete the backup procedure, the filesystem must be unmounted and the system shutdown. To perform this procedure type the following commands at the "#" prompt, pressing **Enter** after each:

(a) # **cd /**

(b) # **umount /mnt/dev/oailog**

(c) # **umount /mnt/dev/oai**

(d) # **umount /mnt**

7. To verify the data on the tape, type **cpio -itv < /dev/rStp0** and press **Enter**. The file names stored on the tape and total block count display.

8. To shutdown the system, type the following commands at the "#" prompt, pressing **Enter** after each:

(a) # **sync**

(b) # **sync**

(c) # **haltsys**

9. When the following "Safe to Power Off" prompt displays, remove the *root floppy* and press **Enter** to boot from the hard disk.

Restore Use the following steps to restore the UAP:

Step 1: Boot the UAP from the Boot and Root Floppies

In order to restore the UAP, the system must be loaded from the boot and root floppies. If the system was loaded from the hard disk, it must be shut down so it can be loaded from the boot and root floppies. For information on booting from the boot and root floppies, see "Step 2: Boot the System from the Boot and Root Floppies" on page 51.

Step 2: Procedures for a New or Reformatted Hard Drive

If the system has not been severely corrupted or damaged and you want to use the filesystem as it is but you need to restore the files back to their original state, go to "Restore the UAP" on page 56.

If the system has been severely corrupted or damaged, the drive should be reformatted (or possibly replaced). Use the instructions from the drive manufacturer to reformat the drive as needed. Then use the following procedures to setup the disk for restore.

1. You must set the correct drive parameters, fdisk partition information and divvy partition information for the hard drive. If the backup procedures were followed the following 3 commands can be typed to view the drive parameters, fdisk parition information and divvy partition information respectively that were saved on the root floppy.

   (a) # **cat /dkinit.sav**

   (b) # **cat /fisk.sav**

   (c) # **cat /divvy.sav**

   This data should be written down so that the data can be entered as needed in later steps of this Restore Procedure.

2. If the drive must have it's cylinders, head, and sectors/track adjusted, type **dkinit /dev/rhd00** and press **Enter**.

```
Hard Disk Drive 0 Configuration
    1.    Display current disk parameters
    2.    Modify current disk parameters
    3.    Select default disk parameters

Enter your choice or q to quit:
```

3. Type **1** and press **Enter**.

   The drive's parameters display. For a typical 1 Gigabyte hard drive, the parameter table would contain the following values:

Disk Parameters	Values
1. Cylinders	2047
2. Heads	16
3. Write Reduce	0
4. Write Precomp	0
5. Ecc	0
6. Control	8
7. Landing Zone	2048
8. Sectors/track	63

Note: *The number of cylinders, sectors, and heads varies from disk to disk. These may need to be modified depending on the hard disk installed.*

4. If the parameters are not correct, select option **2** (*Modify current disk parameters*) and press **Enter**.

5. Type the number associated with the incorrect value and press **Enter**.

6. At the prompt, enter the replacement value and press **Enter**.

7. Continue this process until all values are correct, and display the parameters by typing **1** and pressing **Enter** at the Hard Disk Drive 0 Configuration menu.

8. If the values are correct, exit the menu by typing **q** and pressing **Enter**.

9. Enter the following command to stamp the disk geometry onto the hard disk.
   # **dparam /dev/rhd00 'dparam /dev/rhd00'**

Note: *The quotes in the above dparam command are back quotes which are located in the top left corner of the keyboard on most keyboards .*

10. At the "#" prompt type **fdisk** and press **Enter**.

    The fdisk program will display a menu of selections.

11. Setup a UNIX partition as needed. If the backup procedures were followed the cat /fdisk.sav command of step 1 shows the original fdisk values used. For most installations, the entire disk is used for UNIX and therefore the **2** option can be used to use the entire disk for UNIX.

12. Type **q** and press **Enter** to exit the fdisk command.

13. At the "#" prompt, type **divvy -i** and press **Enter**.

    The following message displays: "Please enter the swap-space allocation, or press <Return> to get the default allocation of 15000 1K blocks."

14. Press **Enter**.

    The following message displays: "Do you want a separate /u filesystem? (y/n)"

15. Type **n** and press **Enter**.

 The following message displays: "Do you wish to make any manual adjustments to the sizes or names of the filesystems or swap area before they are created on the hard disk? (y/n)".

16. Type **y** and press **Enter**.

17. The the divvy table will displayed. The table will list the divisions (0 thru 7) on the hard disk and the names of each partition. The root, swap, recover, and hd0a divisions will be listed. The **oai**, **oailog**, and **db** divisions will need to be named. The first and last blocks for each division will need to be modified and new filesystems created for **oai** and **oailog** partitions. This information is found in the partition table that was recorded in the backup procedure and displayed from the cat /divvy.sav comand in step 1. Refer to "Step 11: Make Manual Adjustments to the Filesystems" on page 16 for information on updating the partition table.

18. After the table has been modified, type **q** and press **Enter**.

 The following menu displays:

```
        i[nstall]     Install the division set-up shown
        r[eturn]      Return to the previous menu
```

19. To install the new divvy table enter, type **i** and press **Enter**.

 The filesystems will then be installed on the hard disk.

20. To update the boot loader on the hard disk, type the following commands at the "#" prompt, pressing **Enter** after each:

 (a) **dd if=/etc/hdboot0   of=/dev/hd0a**

 (b) **dd if=/etc/hdboot1   of=/dev/hd0a bs=1k seek=1**

Step 3: Restore the UAP

1. Insert a tape into the tape drive.

2. To restore the different filesystem, the root filesystem must be mounted first and restored. Type the following commands at the "#" prompt, pressing **Enter** after each:

    (a) **mount /dev/hd0root   /mnt**

    (b) **cd /mnt**

    (c) **cpio -icvmadu "[!o]*" < /dev/rStp0**

3. Once the root partition has been restored, the OAI and OAILOG filesystem will be restored. To restore the filesystems, type the following commands at the "#" prompt, pressing **Enter** after each:

    (a) **/mnt/bin/mkdir   /mnt/oai**

    (b) **mount /mnt/dev/oai   /mnt/oai**

    (c) **/mnt/bin/mkdir   /mnt/oai/log**

    (d) **mount /mnt/dev/oailog   /mnt/oai/log**

    (e) **cd /mnt**

    (f) **cpio -icvmadu "o*" < /dev/rStp0**

4. To complete the restore procedure, the filesystem must be unmounted and the system shutdown. To perform this procedure, type the following commands at the "#" prompt, pressing **Enter** after each:

    (a) **cd /**

    (b) **umount /mnt/dev/oailog**

    (c) **umount /mnt/dev/oai**

    (d) **umount /mnt**

5. To shutdown the system, type the following commands at the "#" prompt, pressing **Enter** after each:

    (a) **sync**

    (b) **sync**

    (c) **haltsys**

6. When the following "Safe to Power Off" prompt displays, remove the *root floppy* and press **Enter** to boot from the hard disk.

Chapter 6   TROUBLESHOOTING ISSUES

This chapter addresses some general-system issues that may cause an installation attempt to fail or to produce unpredictable results. If problems occur during installation, review the relevant chapter in this manual and verify that you have performed the procedures accurately, making sure that you have conducted the recommended testing procedures successfully. Then, review the troubleshooting issues discussed in this chapter. If the problem is still not resolved, consult the system distributor.

TCP/IP Connectivity to PBX

If the applications are unable to connect to the PBX, the problem could be that Ethernet connection to the PBX is not operating properly. To test for Ethernet connectivity perform the following:

Step 1:   "ping" for Localhost Connectivity

The "ping" test verifies the network driver communication with the Ethernet card. The following example shows the use of this command to send 3 ICMP packets of 1024 bytes in length to the local network card:

1. At the "#" prompt, type **ping -s 1024 -c 3** and press **Enter**.

   The following screen displays:

   ```
   #ping localhost     10243
   PING localhost:    1024 data bytes
   1032 bytes from 127.0.0.1:     icmp_seq=0.      time=16.   ms
   1032 bytes from 127.0.0.1:     icmp_seq=1.      time=0.ms
   1032 bytes from 127.0.0.1:     icmp_seq=2.      time=0.   ms


   ----localhost PING Statistics----
   3 packets transmitted, 3 packets received, 0% packet loss
   round-trip (ms)  min/avg/max = 0/5/16
   ```

2. In the example above, the message "3 packets transmitted, 3 packets received, 0% packet loss" indicates that the TCP/IP device drivers are operating properly. If the transmission was unsuccessful, consult the SCO TCP/IP Runtime System documentation and reinstall TCP/IP.

Step 2: "netstat"

At the "#" prompt, issue the **netstat** command, as illustrated below. This command shows the state of the interfaces that have been configured into the system.

```
#netstat -i
Name   Mtu    Network          Address     Ipkts    Ierrs   Opkts    Oerrs   Coll
e3B0   1500   111.222.333.444  mymachine   155888   570     100795   0       3507
1o0    2048   loopback         localhost   88856    0       88856    0       0
```

Step 3: "ping" for Remote Host Connectivity

After successfully testing the "localhost" communications, use the "ping" command to verify that the connectivity of other network hosts is available.

1. At the "#" prompt, type the **ping** command using the following format:
   #ping othermachine1 -s 1024 -c 3

2. If this test is unsuccessful, perform the following verifications and refer to the SCO UNIX documentation for further troubleshooting instructions:

   (a) Ensure the correct IP address is stored in the "/etc/hosts" for the *othermachine1* host.

   (b) Ensure the actual target machine is operating correctly on the network.

16 Mbyte RAM

If SCO UNIX is being installed onto a system with 16 Mbytes of RAM, it may be necessary to use a special NEC version of the "N1" installation disk. If this disk is needed, contact NEC Technologies for instructions on obtaining one.

COM Port Usage

The typical UAP does not require use of the COM1 and COM2 serial I/O ports for OAI-related input. Generally the COM2 port which is assigned to Interrupt Request (IRQ) 3 will be disabled so that other communication devices to be installed later can use this address. Consult the CPU technical documentation to isolate the location of the correct switch settings often found on the mother board itself.

A TCP/IP Ethernet card is a good candidate for using IRQ 3 or IRQ 5. If IRQ 3 is chosen without first disabling the COM2 port on the mother board, unpredictable results may occur when testing the card. To prevent unpredictable results, consult the system manual for information on disabling the COM2 port. Typically this is done through the BIOS setup.

Note: *Disabling the COM2 port does not affect the operation of the COM1 port, which remains available for attaching a mouse or other desired device. If the UAP does not have a tape backup system installed, use IRQ 5.*

Video Adapter Addressing

Most VGA video adapters operate in either an 8- or 16-bit mode. Consult manufacturer documentation for all of the peripherals that must be installed if the video card is to be operated in a 16-bit mode. In some systems, this causes a conflict when installing other 8-bit device controllers, making the outcome unpredictable at best.

During the hardware "setup" it would be wise to disable RAM Video Shadowing since it often conflicts with memory address ranges that are needed by other required devices.

Root File System Recovery

To restore a kernel or to check the root filesystem when having problems with the system, refer to Chapter 5, "BACKUP AND RESTORATION PROCEDURES".

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