

CPL

UTX/32™ Release 2.1

Installation Guide

January 1988



323-005410-100



GOULD
Electronics

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History

The *Gould UTX/32 Installation Guide*, Release 2.0, Publication Order Number 323-005410-000, was printed in September 1986.

The *UTX/32 Release 2.1 Installation Guide*, Publication Order Number 323-005410-100, was printed in January 1988.

The volume contains the following pages:

Title
Copyright notice
History page, page iii/iv
Table of Contents, pages v through vii
List of Tables, page viii
Chapter 1, pages 1-1 through 1-3/1-4
Chapter 2, pages 2-1 through 2-2
Chapter 3, pages 3-1 through 3-22
Chapter 4, pages 4-1 through 4-4
Appendix A, page A-1/A-2
Appendix B, page B-1/B-2
Appendix C, pages C-1 through C-7/C-8
Appendix D, page D-1/D-2
Glossary, pages GL-1 through GL-2
References, page RF-1/RF-2

Contents

	Tables	vii
1	Introduction	1-1
1.1	Scope and Purpose of This Guide	1-1
1.2	Summary of Contents	1-1
1.3	Reader Prerequisites	1-2
1.4	WARNINGS and NOTES	1-2
1.5	Related Documents	1-2
1.6	Typographic Conventions	1-2
2	Equipment	2-1
2.1	Hardware	2-1
2.2	Software	2-1
2.2.1	Binary Distribution	2-1
2.2.2	Source Distribution	2-2
3	Single-User Installation	3-1
3.1	Power On the System	3-1
3.2	Update from a Previous Release of UTX/32	3-1
3.3	Format Disks	3-1
3.3.1	Formatting SCSI Disks Attached to an MFP	3-2
3.3.2	Format the Boot Disk (DPII, UDP, or HSDP Disks Only)	3-2
3.4	Decide Disk Organization	3-2
3.5	Boot from the Binary Distribution Tape	3-4
3.6	Set the System Date	3-7
3.7	Format the Boot Disk (SCSI Disks Only)	3-7
3.8	Initialize the Boot Disk for Use under UTX/32	3-9
3.8.1	A SCSI Disk on an MFP Controller	3-9
3.8.2	A Disk on a UDP/DPII Controller	3-10
3.8.3	A Disk on an HSDP Controller	3-11
3.8.4	Partition the Boot Disk — An Example	3-12
3.9	Building a Bootable Root File System	3-14
3.9.1	Creating a New File System	3-14
3.9.2	Restoring the Root File System Contents	3-15

3.10	Booting the UTX/32 System from the Boot Disk	3-15
3.11	Optional Automated Installation	3-16
3.12	Check Consistency of the Root File System	3-16
3.13	Set the System Date	3-17
3.14	Partition Another Disk	3-18
3.15	Construct the /usr.POWERNODE File System	3-18
3.15.1	Make the /usr.POWERNODE File System	3-18
3.15.2	Check Consistency of the /usr.POWERNODE File System	3-19
3.15.3	Update the File System Table (/etc/fstab)	3-19
3.15.4	Mount the /usr.POWERNODE File System	3-20
3.15.5	Read the /usr.POWERNODE Data from Tape	3-20
3.16	Edit /etc/rc.boot	3-21
3.17	Remove restoresymlinks	3-22
3.18	Establish Libraries	3-22
4	Multi-User Installation	4-1
4.1	Read the Source from the Source Tape	4-1
4.2	Generate a New Kernel	4-1
4.3	Add Terminals	4-1
4.4	Add Users	4-2
4.5	Add Groups	4-2
4.6	Edit /etc/rc.local	4-2
4.7	Set Up Security Auditing	4-2
4.8	Set Up the Lineprinter System	4-2
4.9	Set Up the Mail System	4-2
4.10	Set Up UUCP	4-3
4.11	Set Up Networking	4-3
4.12	Set Up NFS	4-3
4.13	Format Manual Pages	4-3
4.14	Set Up the Accounting System	4-3
4.15	Set Up tip and cu	4-3
4.16	Set Up Quotas	4-3
4.17	Bring Up the System Multi-User	4-4
Appendix A Checklist for a Single-User Mode Installation		A-1

Appendix B Checklist for a Multi-User Mode Installation	B-1
Appendix C Format, Partition and Initialize—An Example with SCSI Disks.....	C-1
C.1 Format the Boot Disk (SCSI Disks Only)	C-1
C.2 Initialize the Boot Disk for use under UTX/32	C-3
C.3 Partition the Boot Disk	C-4
Appendix D Default Line Control Characters	D-1
Glossary	GL-1
References	RF-1

Tables

Table		Page
3-1	Formatting HSDP Disks	3-2
3-2	SeIBUS Channel Addresses, Device Names, and Device Unit Numbers	3-5
D-1	Default Line Control Characters	D-1

1 Introduction

This introductory chapter provides the following information about this document:

- Its scope and purpose
- A summary of its contents
- Reader prerequisites
- An explanation of WARNINGS and NOTES
- Related documentation
- Typographic conventions

1.1 Scope and Purpose of This Guide

The *UTX/32™ Installation Guide* describes a step-by-step method by which system administrators can install UTX/32 from distribution tapes and bring it up to multi-user mode. When appropriate, references are made to the *UTX/32 Operations Guide*, which contains more detailed information on day-to-day operation and maintenance of the system.

This *UTX/32 Installation Guide* is specific to Release 2.1 of UTX/32 for the Gould CONCEPT Product Line (CPL) computers.

1.2 Summary of Contents

This guide contains five chapters, four appendixes, a glossary, and a reference page.

Chapter 1	Provides a brief introduction.
Chapter 2	Describes the equipment necessary for installation.
Chapter 3	Describes the installation of a UTX/32 system through single-user mode.
Chapter 4	Summarizes the installation of a UTX/32 system through multi-user mode.
Appendix A	Provides a checklist for system installation through single-user mode (a summary of chapter 3).
Appendix B	Provides a checklist for system installation through multi-user mode (a summary of chapter 4).
Appendix C	Provides the full text, as it would appear on a terminal, of a session with the prep program in which a SCSI disk is formatted, partitioned and initialized.

Appendix D	Provides a table of default line-control characters.
Glossary	Provides definitions for important terms in this guide.
References	Lists the documents cited in this guide.

1.3 Reader Prerequisites

Readers should be familiar with basic UNIX™ commands and have access to the documentation for this release. See the *UTX/32 Software Release Notes* and the *UTX/32 Documentation Guide* for an overview of the documentation.

1.4 WARNINGS and NOTES

Throughout this guide, special pieces of information highlight or augment instructions. These are of two kinds:

WARNINGS	Emphasize procedures that are essential to proper installation.
NOTES	Call attention to useful information that is not critical to the system's operation but which might otherwise be overlooked.

1.5 Related Documents

Most of this document is complete without reference to other manuals. The chapter "Multi-User Installation", however, refers frequently to the *UTX/32 Operations Guide*.

1.6 Typographic Conventions

The typographic conventions for this document are:

Prompts	The following prompts are displayed in this document:
	// Panel mode prompt.
	# Superuser prompt.
	\$ Bourne shell prompt.
	% C shell prompt.

Various other prompts will appear when you use the **prep** program. They are self-explanatory.

Boldface	Command and utility names, system-specific words and special characters, filenames and pathnames, and reserved words in code appear in boldface within the text.
-----------------	--

Example:

The **nroff** command is used to format text.

Lineprinter and **lineprinter bold**

Displays of code and user sessions are printed in lineprinter font. In displays of interactive user sessions, text typed by the user is printed in lineprinter bold.

Example:

```
$ ls
file1      file2      file3
```

Italics

Variable expressions that must be replaced with a value are printed in italics. Square brackets ([]) around an italicized variable expression signify that specifying the value is optional.

Example:

```
% cd [directory]
```

Italics are also used to introduce new terms, for titles of documents or manual pages, and occasionally for emphasis.

Examples:

See *mount*(8) for further information.

The first tape, called the *boot tape*, contains three boot programs.

Ellipses

Vertical or horizontal ellipses (. . .) indicate that information has been omitted.

Example:

```
% rsh fang
.
.
.
% logout
```

Blank pages

Since each major section of the document begins on a right-hand (odd-numbered) page, blank left-hand (even-numbered) pages occasionally precede new sections. You can be assured that such a page is intended to be blank if the preceding page has a double page number, such as 4-5/4-6.

2 Equipment

Installation of UTX/32™ requires the software distributed on the distribution tapes and the appropriate hardware. The following sections discuss the hardware and software components of the system.

2.1 Hardware

UTX/32 runs on Concept Product Line (CPL) machines such as a MICROSel™ or a PowerNode™ (PN) 60xx or 90xx series superminicomputer, configured with either a single CPU or a CPU/IPU™ pair. Four megabytes of memory are required. See the *UTX/32 Operations Guide* for details on the required hardware and firmware and the corresponding model numbers.

2.2 Software

UTX/32 software is distributed on a maximum of seven tapes: four in binary format and three in source format. The tapes you receive depend on the kind of license you have and whether you are eligible to receive encryption modules. All tapes are 9-track, recorded at 1600 bits per inch.

2.2.1 Binary Distribution

Customers with a binary license receive a distribution consisting of three tapes in binary format and, if explicitly ordered, a fourth binary tape containing the encryption modules.

The first tape, called the *boot tape*, contains an initial boot program, **tboot**, a memory-disk-based UTX/32 installation kernel, and a **dump** image of the UTX/32 root file system. The memory-disk-based kernel runs from a virtual disk that is based in RAM. In the root file system is an executable kernel called **unix** that can be booted as it is and later configured to suit your particular site. Although source for the utilities and the kernel is not included with a binary distribution, custom device drivers may be written and used.

The second and third tapes consist of a single dump image containing both the BSD `/usr.POWERNODE` files and the System V `/usr.POWERNODE/5*` files.

A fourth tape contains the encryption modules and can be included only with systems distributed in the United States.

2.2.2 Source Distribution

Customers with a source license receive the binary tapes described above and two tapes in source format. Eligible customers will receive a third source tape containing the encryption modules if encryption is explicitly ordered.

The first and second source tapes consist of a single dump image containing both the BSD `/usr.POWERNODE/src/src` source files and the System V `/usr.POWERNODE/src/5src` source files. The image includes source for commands and libraries. In addition, the BSD portion of the image includes source for the kernel and device drivers. Sites with a source license may modify the kernel or utilities. The contents of the source tape may be stored on disk.

The third source tape contains source and binaries for the encryption modules and can be distributed only in the United States.

3 Single-User Installation

This section provides a step-by-step procedure for installing a UTX/32 system through single-user mode.

WARNING: Read all procedures carefully before beginning. Then do exactly what the instructions say. If you deviate, the problems caused may not show up immediately.

For your convenience Appendix A provides a checklist of the steps necessary to install UTX/32 on your system to single-user mode. You may want to make copies of the checklist and check off each installation step as it is completed.

This chapter contains many examples of screen displays and user entries. The text frequently refers to a menu or series of questions that will appear on the terminal while only the final line is displayed in the text. Refer to Appendix C, "Format, Partition and Initialize—An Example with SCSI Disks," if you wish to review a complete sample listing of the displays.

3.1 Power On the System

Before beginning the installation procedure, the system must be powered on. This is done by the local customer engineer.

3.2 Update from a Previous Release of UTX/32

If your installation has been using an earlier release of UTX/32, there will be a number of files to protect while you update to this release. The *UTX/32 Software Release Notes (SRN)* describes the procedure for protecting these files during the new installation then refers you to this guide for installation procedures. After installation, you will return to the *SRN* for guidance in restoring the protected files.

3.3 Format Disks

All disk packs used for the installation of UTX/32 must be formatted before use. Formatting a pack initializes sector information, generates a bad block list, and confirms whether or not the disk is usable.

This and several succeeding sections assume that UTX/32 is being installed for the first time on new equipment with uninitialized and unformatted disks. Clearly, this is not always the case. If you are installing UTX/32 on a previously formatted disk you may skip this section. Formatting is a time-consuming process and there is no need to reformat a properly formatted disk that is not experiencing problems.

Different types of disks are formatted at different points in the installation process. The following text will prompt you to format each type at the appropriate time.

3.3.1 Formatting SCSI Disks Attached to an MFP

Users with SCSI (Small Computer Serial Interface) disks attached to MFPs should refer to the *prep(8)* manual page and the *UTX/32 Operations Guide*. Actual formatting takes place later in this installation process and is described in the section "Format the Boot Disk (SCSI Disks Only)."

3.3.2 Format the Boot Disk (DPII, UDP, or HSDP Disks Only)

For DPII, UDP or HSDP based disks, refer to the level two diagnostic program, Gould RPU Disc Processor Media Verification Program (RP.MVP), in the *RPU Disc Processor Media Verification (RP.MVP.r) Disc Utility Description* and Gould High Speed Disc Processor Media Verification Program (DP.MVP) in the *High Speed Disc Processor Media Verification (DP.MVP.r) Program Description* for more information.

NOTE: UDP and DPII disk packs must be formatted for 16 sectors per track. For the boot volume, sector 0 must be error free. HSDP disks must be formatted based on drive model:

Table 3-1
Formatting HSDP Disks

Gould Model #	Manuf. Model #	Sectors per Track
8888	CDC 9772	43 sectors at 1024 bytes per sector
8884	Fujitsu Eagle 2351A	24 sectors at 1024 bytes per sector
8889	Fujitsu Eagle 2361A	35 sectors at 1024 bytes per sector

3.4 Decide Disk Organization

If you are installing UTX/32 on a previously formatted disk and the existing partitions are suitable for current needs, you may skip this section.

The **prep** program contains default values for all of the following settings. If the default values are suitable for your needs, they will produce a usable system. In that case, you need not take the time to make the following calculations.

Before installing the UTX/32 system, you must decide the size and arrangement of the root, **/usr.POWERNODE**, and other file systems, as well as a swap partition. You must then calculate the cylinder offsets for the partitions. Refer to "Organizing Partitions and File Systems" and "Calculating Cylinder Offsets" in the *UTX/32 Operations Guide*.

When assigning functions to your partitions, consider the following:

- At least three disk partitions are required:

Root partition

Contains the root file system, which includes the kernel and the most commonly used commands. The root file system is necessary to run a minimal UTX/32 system. The root partition is always the a partition on the boot volume. It should be at least 20,000 blocks in size.

Swap partition

Must reside on the boot volume with a size of at least 20,000 blocks. Additional swap partitions may be allocated if there is high swap activity.

/usr.POWERNODE partition

Contains the **/usr.POWERNODE** file system, which includes commands, libraries, and system object files (**/sys/obj**) other than those included in the root file system. It is normally linked symbolically to **/usr** and must be at least 60,000 blocks in size.

- Several areas of the file tree often require significant amounts of disk space. It may be desirable to put these on their own disk partitions:

/tmp

The **/tmp** work area is designed to hold temporary files created by utilities such as the editors and C compilers. In small systems, there may not be enough partitions to make **/tmp** a separate file system. In that case, a directory named **/tmp** can be included with the root file system. Due to the extensive use of **/tmp**, however, it is preferable to define it as a mountable file system.

Home Directories

Space is required for users' home directories and for private work areas. This space is commonly designated **/mnt** or **/usr.POWERNODE/mnt**.

/usr.POWERNODE/adm

Space is required for accounting and logging files. Depending on the logging maintenance used, these files may grow very large and may require their own partition.

/usr.POWERNODE/spool

Depending on spooling requirements, a separate partition for spool directories may be required.

- For recipients of source distributions, two other partitions are recommended:

/usr.POWERNODE/src/src

Contains the source for the UTX/32 kernel and all the BSD utilities.

/usr.POWERNODE/src/5src

Contains the source for System V utilities.

After planning your disk layout, you should write down the partition information on the templates provided in Appendix A of the *UTX/32 Operations Guide*. This information is used throughout the installation procedure.

NOTE: It is recommended that the default swap partition reside in the **b** partition of the boot disk and that the **/usr.POWERNODE** file system reside on a disk which has a unit number ranging from 0 to 3. Not following these recommendations will complicate the installation procedure. See the section entitled "Construct the **/usr.POWERNODE** File System" later in this chapter.

WARNING: When UTX/32 first boots from disk, it checks the boot volume's media descriptor for a partition marked eligible for swapping. If an eligible partition cannot be found, the system will run with swapping disabled, limiting system capability. It is therefore very important to mark at least one partition as eligible for swap during the following procedure. (The **b** partition is by default marked as eligible for swap.)

3.5 Boot from the Binary Distribution Tape

In this and following sections, you will be typing several commands. Typing errors are common and it may be necessary to make corrections. Refer to the table in Appendix D, "Default Line Control Characters," for a list of default keystrokes for correcting typographical errors.

In this step, the UTX/32 distribution kernel is loaded from tape into memory.

The UTX/32 distribution kernel from the binary tape must be loaded onto a system with at least the following devices at the following addresses:

- A console at 0x7efc*
- An IOP or an MFP on the SelBUS™ at address 0x7e00
- A tape drive on either a tape processor at address 0x1000 or 0x1800 or on an MFP at address 0x7e40 or 07e48.

* 0x indicates a hexadecimal number.

- A boot disk drive on either a disk processor at address 0x0800, 0x0802, 0x0804, or 0x0806 with a controller at 0x0800; or at address 0x0c00, 0x0c02, 0x0c04, or 0x0c06 with a controller at 0x0c00; or at address 0x0400, 0x0402, 0x0404, or 0x0406 with a controller at 0x0400; or on an MFP at address 0x7e00 or 0x7e08.

The following table lists the various SelBUS channel addresses, associated UTX/32 device names as configured in the distributed kernel, and associated device unit numbers.

Table 3-2
SelBUS Channel Addresses, Device Names, and Device Unit Numbers

SelBUS Channel Address	UTX/32 Device Name	Device Unit Number
0x0800	/dev/dk0*	0
0x0802	/dev/dk1*	1
0x0804	/dev/dk2*	2
0x0806	/dev/dk3*	3
0x0c00	/dev/dk4*	0
0x0c02	/dev/dk5*	1
0x0c04	/dev/dk6*	2
0x0c06	/dev/dk7*	3
0x0400	/dev/dk8*	0
0x0402	/dev/dk9*	1
0x0404	/dev/dk10*	2
0x0406	/dev/dk11*	3
0x7e00	/dev/sd0*	0
0x7e08	/dev/sd1*	1
0x1000	/dev/rmt0	0
0x1800	/dev/rmt1	0
0x7e40	/dev/rst0	0
0x7e48	/dev/rst1	1

The asterisk (*) in the above table must be replaced with a partition letter (a through h). The UTX/32 Release 2.1 root filesystem must be installed in an a partition. All partitions (a through h) on any single disk reside at the same address.

The unit number can usually be found on the front of the physical device. Make sure that that number agrees with the number in the above table.

WARNING: The instructions in the rest of this manual assume that you are booting from /dev/dk0, a disk drive located on unit 0 under the controller at address 0x0800. If you are booting from a unit other than unit 0, interpret the instructions accordingly: if *n* represents your drive number, replace

`/dev/dk0` with `/dev/dkn` and `/dev/rdk0` with `/dev/rdkn`.

Similarly, the instructions for SCSI disks assume that you are booting from `/dev/sd0`, a SCSI disk drive located on unit 0 under the controller at address 0x7e00. If you are booting from a unit other than unit 0, interpret the instructions accordingly: if *n* represents your drive number, replace `/dev/sd0` with `/dev/sdn` and `/dev/rsd0` with `/dev/rsdn`.

Complete the following steps to load the boot program from the boot tape.

1. Make sure there is no write ring on the boot tape. If there is, remove it.
2. Mount the boot tape on the tape drive.
3. Make sure the tape drive is online.
4. Put the blank formatted disk pack in the drive configured at 0x0800 (or at your alternate address).
5. Make sure the machine is halted and prepare to boot the system by entering the following commands on the console (explanations for each step are included parenthetically):

<code>//HALT</code>	(ensure that the CPU is halted)
<code>//RST</code>	(reset the registers)
<code>//CLE</code>	(clear memory)
<code>//RST</code>	(reset the registers used by CLE)
<code>//GPR7=2</code>	(set general purpose register 7)

The amount of time required for CLE is about one second per megabyte of memory.

`GPR7=2` prepares the system to be brought up in single-user mode instead of auto rebooting to multi-user mode. Single-user mode is in effect only for the subsequent IPL instruction.

6. Boot from the tape by entering:

<code>//IPL=address</code>	(Load program from device at <i>address</i> where <i>address</i> = 1000 for IOP based systems or <i>address</i> = 7e40 for MFP based systems.)
----------------------------	--

When the message **Booting from TAPE** appears on the console, the boot program has been loaded.

The tape bootstrap program will now read a special version of the UTX/32 distribution kernel into memory, followed by the image of a memory disk containing a root file system. This will take several minutes, after which you will see a UTX/32 prompt:

```
#
```

Any of the commands contained in this memory disk root file system may be executed in the normal UTX/32 manner.

For background on this and following sections of the guide, see the *prep(8)* manual page and the *UTX/32 Operations Guide*.

3.6 Set the System Date

The system date must accurately reflect the present date and time. Several system utilities depend on the correct date and time. When entering the current date, use the form *yymmddhhmm*. For example, enter:

```
# date 8802011312
```

to set the date to 1:12 P.M. on February 1, 1988.

NOTE: For **prep** time stamping to work correctly, the system date must be set properly at boot time and not changed thereafter. If the date is incorrect, the time stamps for the disk volume will be incorrect and misleading.

3.7 Format the Boot Disk (SCSI Disks Only)

This section describes the formatting process for a SCSI disk on an MFP controller. If you do not have a SCSI disk, skip this entire section.

This section also assumes that UTX/32 is being installed for the first time on new equipment with uninitialized and unformatted disks. Clearly, this is not always the case. If you are installing UTX/32 on a previously formatted disk you may skip this section. Formatting is a time-consuming process and there is no need to reformat a properly formatted disk that is not experiencing problems.

To format a SCSI disk on an MFP controller, perform the following steps.

1. At the prompt, enter the following command:

```
# /etc/prep /dev/rsd0a
```

2. The following message will appear. Respond with <CR> to indicate that the disk is ready for **prep**:

```
Ready to prep /dev/rsd0a at 0x7e00 <yes?? <CR>
```

3. Various items of disk information will now be displayed, followed by a menu. Select menu item 1 to format the disk:

Which option ? 1

4. Next, a menu of formatting options will be displayed. Select menu option 4, which will allow you to select the appropriate formatting options manually:

Which option ? 4

5. The following questions concerning formatting options will be presented, one at a time. Since all your initial choices are the default options, respond to each with <CR> to indicate acceptance:

Manage the primary defects list <yes>? <CR>
Enable certification option <yes>? <CR>
Stop format on error <yes>? <CR>
What interleave factor [0 - 8] <1> ? <CR>

6. **prep** will now give you one last chance to avoid reformatting a disk with valuable data. Assuming that formatting (or reformatting) is your plan, answer yes:

About to format disk at address 0x7e00, Are you sure <no>? **yes**

7. The following messages will then be displayed, approximately 20 minutes apart. Sorry, but all you can do in between is wait:

Please wait ~20 minutes for the format to complete...
Format complete.

8. The formatting options menu will be redisplayed. Since formatting is complete you will want to return to the main menu, which is option 0:

Which option ? 0

9. The main menu will be redisplayed. Since your work with **prep** is done for the moment, you will want to leave **prep**:

Which option ? 0

3.8 Initialize the Boot Disk for Use under UTX/32

If you are installing UTX/32 on a previously formatted and partitioned disk and the existing initialization is suitable for current needs, you may skip this section.

This section covers three types of configurations for UTX/32 systems:

- A SCSI disk on an MFP controller
- A disk on a UDP/DPII controller
- A disk on an HSDP controller

Each of the following subsections describes the procedure for one of the above situations. Select the subsection that applies to your installation.

WARNING: Reinitializing an existing boot disk will render the disk unusable to previous releases of UTX/32. Nevertheless, this reinitialization is highly recommended when possible to be compatible with current releases of Gould hardware diagnostics.

3.8.1 A SCSI Disk on an MFP Controller

To initialize a formatted SCSI disk on an MFP controller, perform the following steps:

1. At the prompt, enter the following command:

```
# /etc/prep /dev/rsd0a
```

2. The following message will appear. Respond with <CR> to indicate ready:

```
Ready to prep /dev/rsd0a at 0x7e00 <yes>? <CR>
```

3. Various items of disk information will now be displayed, followed by the main menu. Select menu option 2 to initialize the disk:

```
Which option ? 2
```

4. A list of disk models will appear. Select the appropriate device from this list. This example uses item 5, a 150Mb fixed SCSI disk:

```
Please select a drive type: [CR, +, -, ##] ? 5
```

5. Various disk information will again be displayed, followed by the question below. This write is required to complete disk initialization, so respond with yes:

About to write the Umap at address *address*
Do you really want to do this <no>? **yes**

The program will display the actual address of the write in place of *address* above.

6. Once the write is complete, the main menu will again be displayed. Select 0 to leave **prep**:

Which option ? 0

3.8.2 A Disk on a UDP/DPII Controller

To initialize a formatted disk on a UDP/DPII controller, perform the following steps:

1. At the prompt, enter the following command:

```
# /etc/prep /dev/rdk0a
```

2. The following message will appear. Respond with <CR> to indicate ready:

```
Ready to prep /dev/rdk0a at 0x800 <yes>? <CR>
```

3. A comment regarding the disk is printed, followed by the main menu. Select menu option 2 to initialize the disk:

```
Which option? 2
```

If your pack has been previously initialized, a series of questions will appear at this point. Responses to these questions will vary for each installation. If you are unsure of the appropriate responses, accept the default (by hitting <CR>) until you reach the question in the next item.

4. A list of disk models will appear. Select the appropriate device from this list. This example uses item 3, an 80Mb, 14 inch removable disk:

```
Please select a drive type: [CR, +, -, ##] ? 3
```

5. Next, you will be asked how many spare tracks should be allocated. The number of spare tracks needed is somewhat related to the size of the disk in question. Larger disks generally require more spare tracks. The default is just the number of tracks remaining in the last cylinder. Choose a value that will accomodate flaws that your disk may develop in the future.

The prompt will indicate the default number of spare tracks for your device. If you need a different number of spare tracks, enter the appropriate number:

```
How many spare tracks should be allocated <2> ? <CR>
```

6. At this point, several items of disk data will be printed, followed by this comment and question. This write is required to complete disk initialization, so respond with yes:

```
About to write the Umap at address address  
Do you really want to do this <no>? yes
```

The program will display the actual address of the write in place of *address* above.

7. A small amount of disk information will be printed, followed by the main menu. Your work with **prep** is finished for now. Select menu option 0 to leave:

```
Which option ? 0
```

3.8.3 A Disk on an HSDP Controller

To initialize a formatted disk on an HSDP controller, perform the following steps:

1. At the prompt, enter the following command:

```
# /etc/prep /dev/rdk4a
```

2. The following message will appear. Respond with <CR> to indicate ready:

```
Ready to prep /dev/rdk4a at 0x400 <yes>? <CR>
```

3. A comment and the main menu will appear. Select menu option 2:

```
Which option ? 2
```

4. A list of disk models will appear. Select the appropriate device from this list. This example uses item 2, an 80Mb, 9 inch removable disk cartridge:

```
Please select a drive type: [CR, +, -, ##] ? 2
```

5. Several informative comments will be displayed, followed by a question concerning spare tracks. The number of spare tracks needed is somewhat related to the size of the disk in question. Larger disks generally require more spare tracks. The default is just the number of tracks remaining in the last cylinder. Choose a value that will accommodate flaws that your disk may develop in the future.

The prompt will indicate the default number of spare tracks for your device. If you need a different number of spare tracks, enter the appropriate number:

```
How many spare tracks should be allocated <2> ? <CR>
```

6. Various items of disk information will now be displayed, followed by a comment and a question. This write is required to complete disk initialization, so respond with yes:

```
About to write the Umap at address address  
Do you really want to do this <no>? yes
```

The program will display the actual address of the write in place of *address* above.

7. Once the write is complete, the main menu will again be displayed. Select 0 to leave **prep**:

```
Which option ? 0
```

3.8.4 Partition the Boot Disk — An Example

Your disk will now be configured with standard partitions, the default partitions of the initializing process. However, it is normally advisable to customize the partitions on a disk and to modify swap partition eligibility to fit local needs. Since the optimal partition configuration is different for every installation, only an example is presented here. Your procedure will differ in some of the details.

If you are installing UTX/32 on a previously formatted disk and the existing partitions and initialization are suitable for current needs, you may skip this section.

To partition a disk with values other than the default settings of the UTX/32 disk initialization process, or to modify swap partition eligibility, steps similar to the following must be performed. In this particular example, the disk is given the identification number 42 and the size of the b partition is increased:

1. At the prompt, enter the following command:

```
# /etc/prep /dev/rdk0a
```

2. The following message will appear. Respond with <CR> to indicate ready:

```
Ready to prep /dev/rdk0a at 0x0800 <yes>? <CR>
```

3. Various items of disk information will appear, followed by the main menu. Select menu option 3 to set the default partitions:

Which option ? **3**

4. A variety of information concerning the existing disk partitions will be displayed, followed by an options menu. Select menu option 4 to change the pack ID:

Which option ? **4**

5. **Prep** will then ask for the new pack ID. In this example, it is reset to 42:

Current pack ID 0, new pack ID <0> ? **42**

6. Disk information will be redisplayed and the options menu will reappear. Select menu option 2 to modify the partitions:

Which option ? **2**

7. A series of questions will now appear, one at a time. They are displayed here in sequence. In this example, the size of the swap **b** partition is increased. The remaining partitions are moved farther out and the last partition is made smaller to compensate for the larger **b** partition.

Note **prep**'s response to the entry **999999** below. This is used to determine the maximum available number of cylinders. Use of an extremely large value forces the program to display the full allowable range. You may then enter the maximum value.

Otherwise, appropriate responses are shown in bold type. When no bold response appears, an appropriate response is <CR>. Enter q to leave the sequence early:

Modify partitions: enter 'q' to quit early

(a) Starting Cylinder <0>? <CR>

(a) Size In Blocks <18144> or Ending Cylinder <C111>? <CR>

(a) Swap <no>? <CR>

(a) 0 - 111 18144 not eligible for swap

(b) Starting Cylinder <112>? <CR>

(b) Size In Blocks <20088> or Ending Cylinder <C235>? **c300**

(b) Swap <yes>? <CR>

(b) 112 - 300 30618 eligible for swap

(c) Starting Cylinder <0>? <CR>

(c) Size In Blocks <156492> or Ending Cylinder <C965>? <CR>

(c) Swap <no>? <CR>

(c) 0 - 965 156492 not eligible for swap

(d) Starting Cylinder <236>? **301**

(d) Size In Blocks <50058> or Ending Cylinder <C609>? <CR>

(d) Swap <no>? <CR>

(d) 301 - 609 50058 not eligible for swap

```
(e) Starting Cylinder <545>? 610
(e) Size In Blocks <68202> or Ending Cylinder <C1030>? 999999
Size 999999 out of range (0 - 57773)
(e) Size In Blocks <68202> or Ending Cylinder <C1030>? 57773
(e) Swap <no>? <CR>
      (e) 610 - 965    57672 not eligible for swap
(f) Starting Cylinder <0>? q
```

8. The updated disk information will be displayed, followed by the options menu. Since your work with **prep** is complete, select 0 to return to the main menu:

```
Which option ? 0
```

9. The following comment and question will appear. Since this write must be completed to record the partition changes you have just made, respond yes:

```
About to write the Umap at address address
Do you really want to do this <no>? yes
```

The program will display the actual address of the write in place of *address* above.

10. When the write is complete, the main menu will appear. Select menu option 0 to leave **prep**:

```
Which option ? 0
```

3.9 Building a Bootable Root File System

After the root volume has been initialized with **prep**, an empty file system that has its boot block installed must be created in the a partition. Then the root file system contents must be restored.

3.9.1 Creating a New File System

You may skip this section if you already have the file system from a previous installation of UTX/32.

Create a new file system and install the bootstrap by entering:

```
# /etc/newfs /dev/dk0a
```

3.9.2 Restoring the Root File System Contents

1. Make the disk partition accessible by mounting the disk file system:

```
# /etc/mount /dev/dk0a /mnt
```

2. Make the disk file system your current directory:

```
# cd /mnt
```

3. Restore the root file system into the disk file system. This command will take 8 to 15 minutes to execute. Users may specify an additional option, `v`, as `restore rv` if they wish to print the name of each file as it is restored. Be aware that this option will add from 8 to 15 minutes more to the process. Enter the command:

```
# /etc/restore r
```

NOTE: When performing the restore, you will receive the message:

```
Warning: /lost+found: file exists
```

This warning can be safely ignored.

4. Make the memory disk your current directory:

```
# cd /
```

5. Unmount the root file system:

```
# /etc/umount /dev/dk0a
```

6. Halt the system:

```
# /etc/halt
```

It will take about a minute to return the system to the panel mode prompt.

3.10 Booting the UTX/32 System from the Boot Disk

In this section you will boot the UTX/32 system from disk to single-user mode.

1. If the system is already halted during the following series of commands, an operator error message will be displayed after `HALT` is entered. Ignore this message.

Enter the following:

```
//HALT           (ensure that the CPU is halted)
//RST           (reset the registers)
//CLE          (clear memory)
//RST           (reset the registers used by CLE)
```

2. Boot UNIX by entering the following commands:

```
//GPR7=2        (set general purpose register 7)
//IPL=address   (Load program from device at address
                  where address is the device address
                  of the root partition.)
```

3. When the prompt

```
#
```

appears, the generic UTX/32 system is up and running in single-user mode with the root file system mounted on partition **a** of the boot volume. The # prompt is from the UTX/32 shell and signifies that you are logged in as superuser.

3.11 Optional Automated Installation

Now that the operating system has been booted, you may choose either to use automated scripts to complete installation or to continue with the step-by-step manual entries described in the remainder of this chapter.

The automated procedure, called **simple_install** or **si**, consists of a set of shell scripts contained in the directory **/etc/system_setup**. To use the automated procedure, follow the instructions given in the *system_setup(8)* manual page.

If you elect not to invoke the automated scripts, continue the manual installation by checking the root file system as described in the next section.

3.12 Check Consistency of the Root File System

Check the root file system using **fsck**. (See the *fsck(8)* manual page for a detailed description of the command.) If you are booting from a disk drive that is not located on unit 0, adjust the block device name accordingly by replacing the unit number 0 with the correct unit number for your boot device.

If you are using a UDP or HSDP, enter:

```
# /etc/fsck /dev/dk0a           (or alternative block device file)
```

If you are using an MFP SCSI disk, enter:

```
# /etc/fsck /dev/sd0a
```

(or alternative block device file)

NOTE: With **fsck**, you must use the block device file (for example, **/dev/dk0a**) when checking the root file system and the raw device file (for example, **/dev/rdk0d**) when checking other file systems.

WARNING: File system consistency checks ensure the proper linkages of files and directories in a file system. Severe problems in the system's operation can result if the links are faulty.

If file system consistency problems show up, do the following:

1. Respond yes to all of the prompts from **fsck**.
2. Halt and reboot the system if instructed to do so by **fsck**. Do *not* type **sync** before halting the system.
3. Repeat the instructions in the section titled "Boot the UTX/32 System From the Boot Disk."
4. Check for file system consistency again.

3.13 Set the System Date

The system date must accurately reflect the present date and time. Several system utilities depend on the correct date and time. When entering the current date, use the form **yymmddhhmm**. For example, enter:

```
# date 8802011312
```

to set the date to 1:12 P.M. on February 1, 1988.

NOTE: A warning message,

```
Communication error with timed
```

may appear. It can be ignored.

NOTE: For the auditing system to work correctly (see "Using the Auditing System" in the *UTX/32 Operations Guide*), the system date must be set properly at boot time and not changed thereafter. If the date is incorrect, the time stamps in the audit trail file will be incorrect and misleading. NOTE: While the system date was set earlier in the installation process, the computer has been rebooted since. It must be reset now because the system date is lost at reboot.

3.14 Partition Another Disk

Before the `/usr.POWERNODE` file system can be constructed, you may need to partition another disk. You will need 60000 blocks for both BSD and System V executables: 42000 for BSD and 18000 for System V.

If you decide to put the `/usr.POWERNODE` file system on your boot drive, go directly to the next section.

If the `/usr.POWERNODE` file system is to be located on a disk drive other than the boot drive where the root file system (`/`) resides, you must partition the new disk pack with `prep`. Once you have prepared the disk, go on to the next section.

3.15 Construct the `/usr.POWERNODE` File System

If, according to your disk partition layout, `/usr.POWERNODE` resides on a disk that does not have a unit number ranging from 0 to 3, then you must reconfigure the kernel before continuing. Refer to "Reconfiguring the System" in the *UTX/32 Operations Guide*.

At this point you are ready to construct the `/usr.POWERNODE` file system. The following subsections tell you how to

1. Make a file system on the partition to be used for the `/usr.POWERNODE` file system.
2. Check the consistency of the file system.
3. Update the file system table.
4. Mount the file system.
5. Read in the `/usr.POWERNODE` data from tape.

WARNING: If your `/usr.POWERNODE` filesystem partition is small, all of the distributed programs may not fit in it. You will need about 42,000 blocks for BSD and 18,000 blocks for System V.

WARNING: The disk on which `/usr.POWERNODE` is to reside must first have been partitioned by `prep` before the file system can be made using `newfs`. (See the `newfs(8)` manual page for a detailed description of the command.) See the preceding section, "Partition Another Disk" for detailed information about preparing disks for file systems.

3.15.1 Make the `/usr.POWERNODE` File System

In the following command, `device_file` is the raw device name of the partition to which `/usr.POWERNODE` has been assigned. For example, the standard default is that `/usr` resides on the `d` partition. If `/usr.POWERNODE` is to reside on the `d` partition of drive 0, you would enter `/etc/newfs /dev/rdk0d`. See "Making File Systems with `newfs`" in the *UTX/32 Operations Guide* for more information.

Make a file system for `/usr.POWERNODE` by entering:

```
# /etc/newfs device_file
```

WARNING: `newfs` creates the directory named `lost+found` on the destination partition. This directory is used by `fsck`. *Do not delete it.*

3.15.2 Check Consistency of the `/usr.POWERNODE` File System

You must check the `/usr.POWERNODE` file system for consistency using `fsck`. Again, `device_file` is the raw device name of the partition to which `/usr.POWERNODE` has been assigned. Enter:

```
# /etc/fsck device_file
```

If errors are reported, see the `fsck(8)` manual page. Also see “Checking File System Consistency” in the *UTX/32 Operations Guide* for more information.

3.15.3 Update the File System Table (`/etc/fstab`)

You must modify the file system table to make the system aware of the file systems you made in the previous steps.

As distributed, `/etc/fstab` contains the following entries, with fields separated by blank spaces:

```
/dev/dk0a / 4.3 rw,noquota 1 1
# /dev/dk0b is the default swap partition
/dev/dk0d /usr.POWERNODE 4.3 rw,noquota 1 2
```

Edit `/etc/fstab`, if necessary, so that the entries for the file systems `/` and `/usr.POWERNODE` match your file system organization. Use the `ed` editor since `ex` and `vi` are not available until `/usr.POWERNODE` has been loaded onto disk. (See the `ed(1)` manual page for details on the use of this editor.) See “Setting Up `/etc/fstab`” in the *UTX/32 Operations Guide* for examples of what the entries should look like.

WARNING: Make entries only for `/` and `/usr.POWERNODE` in `/etc/fstab` at this point. Other directory names, or incorrect `/` and `/usr.POWERNODE` entries in `/etc/fstab`, may later crash the system when it tries to mount all file systems.

WARNING: The entry for `/` must be the first line in `/etc/fstab`.

WARNING: The default swap partition should not be included in `/etc/fstab`; otherwise, an error message is generated during reboot. The distributed file explains in a comment that the `b` partition is the default swap partition.

3.15.4 Mount the /usr.POWERNODE File System

Mount the /usr.POWERNODE file system by entering:

```
# /etc/mount block_device_name /usr.POWERNODE
```

See "Mounting File Systems with mount" in the *UTX/32 Operations Guide* for more information.

3.15.5 Read the /usr.POWERNODE Data from Tape

The second and third binary distribution tapes contain an image of the /usr.POWERNODE file system, including the System V /usr.POWERNODE/5* directories. To read the data onto the /usr.POWERNODE partition, follow these instructions:

1. Mount the first /usr.POWERNODE tape (the second binary distribution tape).
2. Check the ownership, by using `ls`, of the /usr.POWERNODE filesystem on disk. It should be owned by `root` and its group name should be `staff`. Use `chown` or `chgrp` if either is incorrect. (See the `ls(1)`, `chown(8)` or `chgrp(1)` manual pages for detailed descriptions of these commands.)

```
# ls -lgd /usr.POWERNODE
drwxr-xr-x 32 root      staff      1024 Oct 15 15:43 /usr.POWERNODE
```

3. Change directory to /usr.POWERNODE:

```
# cd /usr.POWERNODE
```

4. You are now ready to read in the BSD and System V (optional) environments. In the following command, the `r` option asks `restore` to restore all of the files from the tape; the `f` option asks `restore` to use the named device, where *raw_tape_device* is the name of the raw tape device to be used. The default tape device name is `/dev/rmt8`. Use the appropriate device name and number for your installation. If you are using a SCSI tape device, the device name will be `/dev/rst?` where `?` is the unit number of the tape drive.

If you wish to see a listing of the files as they are being read from the tape, include the `v` option when you type the `restore` command line (i.e., `restore rvf`). However, this option increases the amount of time necessary to execute the command. (Users of hardcopy terminals, in particular, will probably not want to use this option.)

If you wish to read in *both* environments, type the following command. This `restore` will read from both the second and third distribution tapes. You will be prompted when it is time to mount the third tape:

```
# restore rf /dev/raw_tape_device
```

If you wish to read in *only* the BSD environment, type the following command. You will be prompted when it is time to mount the third tape:

```
# restore if /dev/raw_tape_device
restore > add [a-zA-Z0-46-9]*
restore > extract
restore > quit
```

It may take up to 45 minutes to read the data from the first tape and up to 15 minutes for the second tape.

NOTE: When performing the restore, you will receive the message:

```
Warning: /lost+found: file exists
```

This warning can be safely ignored. NOTE: If you get an out-of-phase error and are using a streaming tape drive on a buffered tape processor, go back to step one of this section and try again.

5. To help ensure the integrity of the file system data, type:

```
# sync
```

after reading the desired data from the tapes. This command ensures that the file system information in primary memory is the same as that on disk.

3.16 Edit /etc/rc.boot

The file `/etc/rc.boot` is invoked by the system when it is booted. It sets up information important to the system's operation.

Edit the file and change the hostname from the distributed `noname` to the name that you want your host identified as. The line should look like this when you finish:

```
/bin/hostname your_hostname
```

Next, the comment character preceding the root filesystem check and the message following the check should both be removed. Thus the two lines

```
#          /etc/preen -o
echo "Check commented out, uncomment once you have edited /etc/fstab!"
```

will be changed to

```
/etc/preen -o
```

Besides setting the hostname, this file clears the mount table record, forces the mounting of the root filesystem, sets the SUN Yellow Pages domain, initializes ps tables on the booted kernel, and sets the protect mode. (See the *prot(8)* manual page.)

3.17 Remove restoresymtables

restore creates the file **restoresymtable**. Now that the restores are complete, you can safely remove these two files by executing the following commands:

```
# rm /restoresymtable
# rm /usr.POWERNODE/restoresymtable
```

3.18 Establish Libraries

Enter the command:

```
# /ranlib.sh
```

to reset the dates on system libraries and create files for **lookbib**.

This shell script takes just over a minute to complete and will print several warnings. The warnings can be safely ignored. Once the script has finished, the single-user installation is complete.

4 Multi-User Installation

The previous section has taken you through a single-user installation. This section lists both necessary and optional steps for preparing the system for multi-user mode and bringing the system up multi-user. There is considerably more information on multi-user installation in the *UTX/32 Operations Guide*. The section references in this section direct you to that manual, unless otherwise noted.

For your convenience Appendix B provides a checklist of the steps necessary to bring UTX/32 on your system up to multi-user mode. You may want to make copies of the checklist and check off each installation step as it is completed.

4.1 Read the Source from the Source Tape

This step is optional.

If you have a source license and want to read in the source code at this time, see "Reading BSD and System V Source Code from the Source Tape."*

4.2 Generate a New Kernel

You must generate a new kernel for your hardware configuration. See "Reconfiguring the System."*

NOTE: Several of the activities described in the following sections require that the kernel be reconfigured. There is no reason that all the reconfiguration changes cannot be done at the same time. It is therefore recommended that you consider all your reconfiguration needs and make all necessary changes at the same time.

The sections following that ultimately require regeneration of a new kernel are "Add Terminals," "Set Up the Lineprinter System," "Set Up UUCP," and "Set Up tip and cu."

4.3 Add Terminals

The system needs to know the tty ports configured into your system. See "Adding Terminals."*

* All section references are to the *UTX/32 Operations Guide* unless otherwise noted.

4.4 Add Users

Users must be listed in the `/etc/passwd` file if they are to login and use system resources. In addition, it is useful to set up home directories for users. See “Adding Users”^{*} for information on these tasks.

NOTE: You need not add all users now—only those who should have access to the system when it first comes up multi-user.

4.5 Add Groups

The groups to which users can belong must be added to the system. See “Adding Groups.”^{*}

NOTE: You need not add all groups now—only those associated with the users added in the previous step.

4.6 Edit `/etc/rc.local`

`/etc/rc.local` must be modified to suit your system requirements. See the subsection on `/etc/rc.local` in “Site-dependent System Files.”^{*}

4.7 Set Up Security Auditing

This step is optional.

You may want to modify the name of the security audit file that is distributed with the system. Also, you may want to modify the level of security auditing, depending on what security events you want audited. To make these changes, you must edit the file `/etc/rc`. See the subsection on `/etc/rc` in “Site-dependent System Files”^{*} and the `setslogdetail(8)` manual page.

4.8 Set Up the Lineprinter System

This step is optional.

The system as distributed is set up for one lineprinter. If you wish to set up additional lineprinters, see “Setting Up a New Lineprinter.”^{*}

4.9 Set Up the Mail System

This step is optional.

The system is distributed with a usable mail system; however, you may wish to make some modifications to its files. See “The Mail System.”^{*}

^{*} All section references are to the *UTX/32 Operations Guide* unless otherwise noted.

4.10 Set Up UUCP

This step is optional.

If you would like to set up UUCP communications, see “UUCP.”*

4.11 Set Up Networking

This step is optional.

If you want to set up Ethernet, SCM, or NSC Hyperchannel, see “Networking.”*

4.12 Set Up NFS

This step is optional.

If you want to set up NFS or other SUN networking extensions, see “SUN Network Extensions.”*

4.13 Format Manual Pages

This step is optional.

Both BSD and System V manual pages are available on-line. To format all on-line manual pages before bringing the system up multi-user, see “BSD Manual Page Formatting”* and “System V Manual Page Formatting.”*

4.14 Set Up the Accounting System

This step is optional.

If you want accounting enabled on your system, see “The Accounting System.”*

4.15 Set Up tip and cu

This step is optional.

If you want to configure dialin and dialout ports for your system, see “tip and cu.”*

4.16 Set Up Quotas

This step is optional.

If you want to establish disk quotas on your system, see “Administering Disk Quotas.”*

* All section references are to the *UTX/32 Operations Guide* unless otherwise noted.

4.17 Bring Up the System Multi-User

You are now ready to bring the system up multi-user. See "Single- to Multi-User Mode."*

* All section references are to the *UTX/32 Operations Guide* unless otherwise noted.

Appendix A

Checklist for a Single-User Mode Installation

- _____ Power on the system.
- _____ Protect files from overwriting (OPTIONAL).
- _____ Format the disk volume (DPII, UDP, or HSDP only).
- _____ Decide on partition sizes and arrangement and calculate cylinder offsets.
- _____ Boot the tape based UTX/32.
- _____ Set the system date.
- _____ Format the disk volume (SCSI only).
- _____ Initialize the disk volume for UTX/32.
- _____ Partition the boot volume.
- _____ Make a file system in the a partition and install the bootstrap loader.
- _____ Restore the **root** file system.
- _____ Boot the disk-based system single-user.
- _____ Check consistency of the root file system.
- _____ Set the system date.
- _____ Partition another disk volume.
- _____ Make **/usr.POWERNODE** file system.
- _____ Check consistency of **/usr.POWERNODE** file system.
- _____ Add **/usr.POWERNODE** to **/etc/fstab**.
- _____ Mount **/usr.POWERNODE** file system.
- _____ Read **/usr.POWERNODE** from the tape.
- _____ Edit **/etc/rc.boot**.
- _____ Remove **restoresymtable** files.
- _____ Establish libraries.

Appendix B

Checklist for a Multi-User Mode Installation

- _____ Read the source from tape (OPTIONAL).
- _____ Generate a new kernel.
- _____ Add terminals.
- _____ Add users.
- _____ Add groups.
- _____ Edit **/etc/rc.local**.
- _____ Set up security auditing (OPTIONAL).
- _____ Set up lineprinters (OPTIONAL).
- _____ Set up the mail system (OPTIONAL).
- _____ Set up UUCP (OPTIONAL).
- _____ Set up networking (OPTIONAL).
- _____ Set up NFS (OPTIONAL).
- _____ Format manual pages (OPTIONAL).
- _____ Set up accounting (OPTIONAL).
- _____ Set up **tip** and **cu** (OPTIONAL).
- _____ Set up quotas (OPTIONAL).
- _____ Bring up the system multi-user.

Appendix C

Format, Partition and Initialize—An Example with SCSI Disks

The following sample illustrates the complete formatting, partitioning and initialization processes for a typical installation with a SCSI disk mounted on an MFP. There are, of course, several other available combinations. Since one example illustrates most of the steps involved for any configuration, only one is presented.

Operator input is printed in **bold courier** type while prompts, menus and other output from the various programs are printed in regular courier type. If no response is indicated after a prompt, the proper response is <CR>.

If the operator were to sit down at his or her terminal and enter the indicated commands, the session would run from the beginning to the end of this appendix without interruption. However, a minimal number of comments have been inserted to indicate the flow of the session. More complete comments can be found by reading the chapter on "Single-User Installation."

C.1 Format the Boot Disk (SCSI Disks Only)

To format a SCSI disk on an MFP controller, the following steps would be performed under UTX/32:

```
# /etc/prep /dev/rsd0a
Ready to prep /dev/rsd0a at 0x7e00 <yes>? <CR>
```

Disk is on MFP type controller.

SCSI Disk Summary Information:

```
Vendor ID: CDC
Vendor Product ID: 94161-9
Device Type: direct-access
Qualifier: 0x0
Data Format: common command set
Fixed media
ANSI version: unspecified
No ECMA compliance
No ISO compliance
Revision level: 6206
```

Main menu options are:

- 0 - Leave prep
- 1 - Format the disk
- 2 - Initialize the disk for UTX/32
- 3 - Partition the disk and/or set swapping partition(s)
- 4 - Remap a bad block

- 5 - Display and/or modify the disk flaw map
- 6 - Display and/or modify the disk track labels
- 7 - Display and/or modify data blocks

Which option ? **1**

Formatting options are:

- 0 - Return to main menu
- 1 - Format without the grown defect list
- 2 - Reformat with the grown defect list
- 3 - Restore to factory format
- 4 - Format after setting options manually

Which option ? **4**

Manage the primary defects list <yes>? **<CR>**

Enable certification option <yes>? **<CR>**

Stop format on error <yes>? **<CR>**

What interleave factor [0 - 8] <1> ? **<CR>**

About to format disk at address 0x7e00, Are you sure <no>? **y**

Please wait ~20 minutes for the format to complete...

Format complete.

Formatting options are:

- 0 - Return to main menu
- 1 - Format without the grown defect list
- 2 - Reformat with the grown defect list
- 3 - Restore to factory format
- 4 - Format after setting options manually

Which option ? **0**

Main menu options are:

- 0 - Leave prep
- 1 - Format the disk
- 2 - Initialize the disk for UTX/32
- 3 - Partition the disk and/or set swapping partition(s)
- 4 - Remap a bad block
- 5 - Display and/or modify the disk flaw map
- 6 - Display and/or modify the disk track labels
- 7 - Display and/or modify data blocks

Which option ? **0**

C.2 Initialize the Boot Disk for use under UTX/32

To initialize a formatted SCSI disk on a MFP controller for use under UTX/32, the following steps would be performed:

```
# /etc/prep /dev/rsd0a
Ready to prep /dev/rsd0a at 0x7e00 <yes>? <CR>
```

Disk is on MFP type controller.

SCSI Disk Summary Information:

```
Vendor ID: CDC
Vendor Product ID: 94161-9
Device Type: direct-access
Qualifier: 0x0
Data Format: common command set
Fixed media
ANSI version: unspecified
No ECMA compliance
No ISO compliance
Revision level: 6206
```

Main menu options are:

- 0 - Leave prep
- 1 - Format the disk
- 2 - Initialize the disk for UTX/32
- 3 - Partition the disk and/or set swapping partition(s)
- 4 - Remap a bad block
- 5 - Display and/or modify the disk flaw map
- 6 - Display and/or modify the disk track labels
- 7 - Display and/or modify data blocks

Which option ? 2

- 0 - Gould Model Unknown, Undefined Drive type
- 1 - Gould Model 8880, Dual Floppy
- 2 - Gould Model 8838, CDC 80Mb 9 inch removable cartridge
- 3 - Gould Model 9342, CDC 80Mb 14 inch removable
- 4 - Gould Model 8148, CDC 160Mb removable
- 5 - Gould Model 8820, CDC 150Mb fixed SCSI
- 6 - Gould Model 9346, CDC 300Mb removable
- 7 - Gould Model 8821, CDC 300Mb fixed SCSI
- 8 - Gould Model 8858, CDC 340Mb fixed
- 9 - Gould Model 8895, CDC 368Mb fixed
- 10 - Gould Model 8896, CDC 500Mb fixed
- 11 - Gould Model 8155, CDC 697Mb fixed
- 12 - Gould Model 8897, CDC 736Mb fixed
- 13 - Gould Model 8898, CDC 750Mb fixed
- 14 - Gould Model 8888, CDC 858Mb fixed
- 15 - Gould Model 8894, CDC 1030Mb fixed

```
16 - Gould Model 8893, CDC 1300Mb fixed
17 - Gould Model 8887, Fuji 337Mb fixed
18 - Gould Model 8884, Fuji 474Mb fixed
19 - Gould Model 8889, Fuji 689Mb fixed
20 - Gould Model 8881, NEC 800Mb fixed
21 - Gould Software Ramdisk
22 - Gould Model HRAM, Hardware Ramdisk
Please select a drive type: [CR, +, -, #] ? 5
Geometry (916/9/18)  Umap (156593)
```

```
UMAP: Created: Fri Oct 16 05:30:05 1987
      ID = 0  RPM = 3600
      Last available data block = 156592
      Spare sectors per track: 1
      Spare tracks: 0
```

```
About to write the Umap at address 156593
Do you really want to do this <no>? yes
Umap written at address 156593.
```

Main menu options are:

- 0 - Leave prep
- 1 - Format the disk
- 2 - Initialize the disk for UTX/32
- 3 - Partition the disk and/or set swapping partition(s)
- 4 - Remap a bad block
- 5 - Display and/or modify the disk flaw map
- 6 - Display and/or modify the disk track labels
- 7 - Display and/or modify data blocks

Which option ? 0

C.3 Partition the Boot Disk

To partition a disk to values other than those set when the disk is initialized for UTX/32, or to modify swap partition eligibility, the following steps would be performed: (In this example, the disk is given an identification number and the default b partition size is increased.)

```
# /etc/prep /dev/rsd0a
Ready to prep /dev/rsd0a at 0x7e00 <yes>? <CR>
```

Disk is on MFP type controller.

```
SCSI Disk Summary Information:
  Vendor ID: CDC
  Vendor Product ID: 94161-9
  Device Type: direct-access
```

Qualifier: 0x0
Data Format: common command set
Fixed media
ANSI version: unspecified
No ECMA compliance
No ISO compliance
Revision level: 6206

Main menu options are:

- 0 - Leave prep
- 1 - Format the disk
- 2 - Initialize the disk for UTX/32
- 3 - Partition the disk and/or set swapping partition(s)
- 4 - Remap a bad block
- 5 - Display and/or modify the disk flaw map
- 6 - Display and/or modify the disk track labels
- 7 - Display and/or modify data blocks

Which option ? **3**

The pack (ID = 0) was previously prepped on Fri Oct 16 05:30:05 1987
Geometry (916/9/18) Umap (156593)

Pack ID 0, Cylinders available 966+, Blocks available 156593
Drive type: Gould Model 8820, CDC 150Mb fixed SCSI
(Cylinder bounded partitioning in effect)

Part	Overlaps	_Cylinders_	_Blocks_	Swap
(a)	__c__	0 - 111	18144	no
(b)	__c__	112 - 235	20088	yes
(c)	ab_de__	0 - 965	156492	no
(d)	__c__	236 - 544	50058	no
(e)	__c__	545 - 965	68202	no
(f)	_____	0 - 0	0	no
(g)	_____	0 - 0	0	no
(h)	_____	0 - 0	0	no

Partitioning and swapping options are:

- 0 - Return to main menu
- 1 - Toggle absolute : cylinder bounded partitioning
- 2 - Modify the partition and/or swapping information
- 3 - Set the default partition information
- 4 - Set the pack ID
- 5 - Set drive type

Which option ? **4**

Current pack ID 0, new pack ID <0> ? **42**

Pack ID 42, Cylinders available 966+, Blocks available 156593
Drive type: Gould Model 8820, CDC 150Mb fixed SCSI
(Cylinder bounded partitioning in effect)

Part	Overlaps	_Cylinders_	_Blocks_	Swap
(a)	<u> c </u>	0 - 111	18144	no
(b)	<u> c </u>	112 - 235	20088	yes
(c)	<u>ab_de</u>	0 - 965	156492	no
(d)	<u> c </u>	236 - 544	50058	no
(e)	<u> c </u>	545 - 965	68202	no
(f)	<u> </u>	0 - 0	0	no
(g)	<u> </u>	0 - 0	0	no
(h)	<u> </u>	0 - 0	0	no

Partitioning and swapping options are:

- 0 - Return to main menu
- 1 - Toggle absolute : cylinder bounded partitioning
- 2 - Modify the partition and/or swapping information
- 3 - Set the default partition information
- 4 - Set the pack ID
- 5 - Set drive type

Which option ? **2**

Modify partitions: enter 'q' to quit early

- (a) Starting Cylinder <0>? **<CR>**
- (a) Size In Blocks <18144> or Ending Cylinder <C111>? **<CR>**
- (a) Swap <no>? **<CR>**
 - (a) 0 - 111 18144 not eligible for swap
- (b) Starting Cylinder <112>? **<CR>**
- (b) Size In Blocks <20088> or Ending Cylinder <C235>? **c300**
- (b) Swap <yes>? **<CR>**
 - (b) 112 - 300 30618 eligible for swap
- (c) Starting Cylinder <0>? **<CR>**
- (c) Size In Blocks <156492> or Ending Cylinder <C965>? **<CR>**
- (c) Swap <no>? **<CR>**
 - (c) 0 - 965 156492 not eligible for swap
- (d) Starting Cylinder <236>? **301**
- (d) Size In Blocks <50058> or Ending Cylinder <C609>? **<CR>**
- (d) Swap <no>? **<CR>**
 - (d) 301 - 609 50058 not eligible for swap
- (e) Starting Cylinder <545>? **610**
- (e) Size In Blocks <68202> or Ending Cylinder <C1030>? **999999**
Size 999999 out of range (0 - 57773)
- (e) Size In Blocks <68202> or Ending Cylinder <C1030>? **57773**
- (e) Swap <no>? **<CR>**
 - (e) 610 - 965 57672 not eligible for swap
- (f) Starting Cylinder <0>? **q**

Pack ID 42, Cylinders available 966+, Blocks available 156593
 Drive type: Gould Model 8820, CDC 150Mb fixed SCSI
 (Cylinder bounded partitioning in effect)
 Part Overlaps _Cylinders_ _Blocks_ Swap

(a)	__c__	0 - 111	18144	no
(b)	__c__	112 - 300	30618	yes
(c)	ab_de__	0 - 965	156492	no
(d)	__c__	301 - 609	50058	no
(e)	__c__	610 - 965	57672	no
(f)	_____	0 - 0	0	no
(g)	_____	0 - 0	0	no
(h)	_____	0 - 0	0	no

Partitioning and swapping options are:

- 0 - Return to main menu
- 1 - Toggle absolute : cylinder bounded partitioning
- 2 - Modify the partition and/or swapping information
- 3 - Set the default partition information
- 4 - Set the pack ID
- 5 - Set drive type

Which option ? **0**

About to write the Umap at address 156593

Do you really want to do this <no>? **yes**

Umap written at address 156593.

Main menu options are:

- 0 - Leave prep
- 1 - Format the disk
- 2 - Initialize the disk for UTX/32
- 3 - Partition the disk and/or set swapping partition(s)
- 4 - Remap a bad block
- 5 - Display and/or modify the disk flaw map
- 6 - Display and/or modify the disk track labels
- 7 - Display and/or modify data blocks

Which option ? **0**

#

Appendix D

Default Line Control Characters

The following table lists the default line control characters as initialized by UTX/32. The information is provided to assist in correcting typographical errors during the installation process.

Table D-1
Default Line Control Characters

Character	Function
@	Kill or erase the current line.
^C	Interrupt a process.
^H	Erase or backspace.
^\	Quit.

Glossary

8LAS	Eight-line asynchronous communications multiplexor. A device controlling communication between the CPU and up to eight terminals or modems. This RS-232 device is connected to the IOP.
block device	An input/output device, such as a disk, that deals with data in randomly addressable blocks.
boot	To bring parts of the operating system, usually from disk into memory, initializing the system and beginning execution.
boot tape	The distribution tape containing all files necessary to boot the system. For UTX/32, this includes initial boot programs, a kernel, and a copy of the UTX/32 root file system.
boot volume	The boot device and its media, from which the user boots the operating system.
CPU	Central Processing Unit. The main processor in a computer.
DPII	Disk Processor II. An extended I/O-compatible disk system consisting of the disk processor and a collection of compatible disk drives.
HSDP	High-Speed Disk Processor. A high-performance channel controller capable of handling any mixture of up to eight disk drives.
IOP	Input/Output Processor. An I/O system controller for Gould PowerNode computers. This processor controls slow speed devices, boots the system, and runs panel mode.
IPU	Internal Processing Unit. A second processor available in Gould PowerNode computers.
memory disk	An image of a disk that is resident in RAM. Reads and writes are at the speed of memory access rather than disk access. Has all the traits of a physical disk except permanence: contents are lost when power is lost or the machine goes down. During UTX/32 installation, a no-swap kernel is loaded into memory disk, which allows control of the entire system installation process without the use of a previously formatted disk.
MFP	Multi-Function Processor. A part of the I/O subsystem for Gould PowerNode computers; it replaces the input/output processor on smaller systems, such as the MICROSel. This processor controls SCSI disks, tapes, low-speed serial ports, and interrupts; it also boots the system and runs panel mode. It is a single board that provides either the console port and 7 asynchronous ports, or 8 asynchronous ports, along with a lineprinter interface, 2 SCSI

busses, a real-time clock, a programmable interval timer, and up to 12 external interrupts.

no-swap kernel	A kernel that operates with virtual memory disabled. When the UTX/32 kernel is running in no-swap mode, swapping and paging do not occur. All programs must fit in the physical memory available.
partition	A logical division on a disk storage device. Partitions can be of almost any arbitrary size, the limitation being that blocks cannot be split. A disk may have up to eight partitions, and partitions are named by letters a through h.
root partition	The partition of the boot volume that contains the root file system.
RP.MVP	RPU (Regional Processing Unit) disk processor Media Verification Program. A Gould diagnostic program used to format and verify disk media on UDP and DPIO disk controllers.
SCM	Synchronous Communications Multiplexor. A piece of communications hardware used on Gould PowerNode computers, which allows point-to-point networking over serial lines.
SCSI	Small Computer Systems Interface. A standard industry interface for mass storage devices such as disks or tapes.
UDP	Universal Disk Processor. A communications processor between the disk drives and the CPU.

References

Gould Inc. CSD. *UTX/32 Release 2.1 Software Release Notes*. 324-005550-100. January 1988.

Gould Inc. CSD. *Gould RPU Disc Processor Media Verification (RP.MVP.r) Disc Utility Description*. 326-005320.

Gould Inc. CSD. *Gould High Speed Disc Processor Media Verification (DP.MVP.r) Program Description*. 326-006000.

Gould Inc. CSD. *UTX/32 Release 2.1 Operations Guide*. 323-005420-100. January 1988.