Solbourne Computer

OS/MP 4.1B
Release and Installation Notes

Part Number: 106190-AA
Revision: 01

November 1992

Table of Contents

Introduction

This document describes the release and installation of OS/MP 4.1B.

OS/MP 4.1B is a "full" installation that you can use to:

- install OS/MP 4.1B on a Solbourne system
- add support to a server for an OS/MP 4.1B client
- repartition a hard disk drive

This release applies to the following Solbourne architectures: Series5, Series5E, Series6, and Series S4000 systems. In these release notes, the term "Series S4000," or simply "S4000," refers to all Solbourne S4000, S4000DX, and S3000 systems; also "Series5" refers to both Series5 and Series5E architectures.

OS/MP 4.1B offers basic binary application compatibility with SunOS 4.1.2 and 4.1.3.

Customer Support Information

If you have problems installing or using the features included in the Solbourne OS/MP 4.1B release, call the Solbourne toll free support number, **1-800-447-2861**, if you are within the United States. Customers outside the U.S. should call their local Solbourne representative. If you have purchased a support contract that includes support for OS/MP 4.1B from Solbourne, this service is provided at no extra charge.

When you call, please be prepared to give the following information about your system:

- Model number (such as Series5/602 or S4000)
- Serial number
- Solbourne OS/MP release number (4.1B)

The system's model number and serial number can usually be determined using the **eeprom**(8) command, as in the following:

```
# /usr/etc/eeprom MODEL SERIAL
```

To check the Solbourne OS/MP release number, enter the **cat** command as shown below:

```
# cat /etc/motd
OS/MP 4.1B Export (GENERIC/root) #5: Tue May 26 11:36:061992
#
```

To request OS/MP patches:

- call the SOURCE at **1-800-447-2861**
- e-mail support@solbourne.com
- via anonymous ftp from solbourne.solbourne.com at 141.138.2.2. Log in as anonymous and use the password ftp. The patches are in pub/support/OS/MP 4.1B. An index file describes the set of available patches and whether the patch is mandatory or optional.
- via the listserv system SOLIS (Solbourne On-Line Information System) by e-mailing solis@solbourne.com

If you have questions about Solbourne's support services or your shipment, call your Solbourne sales representative.

Documentation Conventions

In the body of this document, commands and file names are presented in **boldface** and command parameters for which you substitute a value are *italicized.* User input instructions and examples are presented in a constant width font. In these notes, the following convention is followed:

- Information displayed by the system is given in `normal constant width`.
- Information you enter is displayed in **`bold constant width`**.
- Variables for which you substitute a value are shown in *`oblique constant width`*.

Definitions

local A device that is physically connected to the system being installed. For example, a *local disk drive.*

remote A device that is physically connected to a system other than the system being installed. For example, a *remote tape drive.*

package The components of a distribution are referred to as packages. Examples of packages are FORTRAN 1.4, X Windows, and Solbourne OS/MP Optional Software for S4000.

ramdisk image The ramdisk image is a special UNIX kernel with a built-in RAM disk that contains the installation software.

server A system that is on a network and may provide NFS disk services.

client A system that uses NFS services provided by another system. A diskful system with **root(/), swap,** and **/usr** on a local disk.

diskless A system whose **root(/), swap,** and **/usr** filesystems are provided by a server, instead of a local disk.

dataless A system whose **/usr** filesystem is on a remote disk and whose **root** (/) filesystem and **swap** disk partition are on a local disk.

standalone A system that has no networking. It also does not depend on a server for its **root, swap,** or **/usr** filesystems.

filesystem A set of files and directories that reside on one disk partition. The term is also used to refer to the swap area, even though the swap area does not actually contain files and directories.

hostnumber The host portion (the last number of a class C address) of the Internet Protocol address. For example, if the Internet address is 192.1.3.42, the hostnumber is 42.

Physical Elements of this Release

This release contains the following items:

Table 1. Physical Elements of the OS/MP 4.1B Release

Part Number	Description
106197 106200 106202	1/4-inch QIC-150 OS/MP 4.1B tape, or 8mm Exabyte OS/MP 4.1B tape, or CD-ROM OS/MP 4.1B disk
106190	Release and Installation Notes for OS/MP 4.1B

Contents of the OS/MP 4.1B Tape

Table 2. Contents of OS/MP 4.1B Tape

File #	File	Format	Size (KB)
0	Table of Contents	dd	2
1	Package Description File for Full 4.1B Installation	dd	2
2	Series5 Installation Kernel	dd	6801
3	Series6 Installation Kernel	dd	6848
4	S4000 Installation Kernel	dd	6476
5	Tools files	tar	296
6	Miniusr	dd	18432
7	Root files	tar	6780
8	Series5 kvm files	tar	11280
9	Series6 kvm files	tar	11392
10	S4000 kvm files	tar	9984
11	Usr files	tar	28512
12	debugging files	tar	2888
13	games files	tar	3136
14	man files	tar	7520
15	networking files	tar	1056
16	graphics files	tar	1784
17	security files	tar	312
18	sunview_programmers files	tar	1848
19	sunview_users files	tar	3064
20	system_v files	tar	4032
21	text files	tar	720
22	versatec files	tar	5960
23	uucp files	tar	608
24	rfs files	tar	928
25	shlib_custom files	tar	1376
26	tli files	tar	48

OS/MP Enhancements

Performance Improvements

OS/MP 4.1B incorporates many performance improvements. These improvements were obtained by multithreading kernel subsystems that were previously single-threaded, improving already multithreaded subsystems, and optimizing critical code paths.

- In a multiprocessing kernel, locks are constantly acquired and released during context switching. This is a critical code path in the kernel. The new locking scheme lets you turn on lock debugging dynamically, realizing a 30% improvement in context switch times.
- UNIX system pipes are implemented as a pair of UNIX system domain sockets. Since pipes are used frequently, improving their performance is especially important. Multithreading this subsystem not only improved the performance of pipes, it optimized performance for those who use UNIX system domain sockets for synchronization. In addition, parallelizing UNIX system domain sockets also parallelized the following system calls:

`pipe`	`bind`	`recvfrom`
`socket`	`setsockopt`	`sendto`
`connect`	`listen`	`shutdown`
`accept`	`recvmsg`	`socketpair`
`send`	`sendmsg`	`getpeername`
`recv`	`getsockopt`	`getsockname`

- The `select` system call was optimized for RDBMS applications.
- The SCSI subsystem has been multithreaded in OS/MP 4.1B. This speeds up the raw I/O-to-SCSI subsystem. Databases using raw I/O with SCSI disks will benefit from this improvement.

- The file table, the credentials, and some system accounting functions were parallelized. The following system calls were made parallel as a result.

`close`	`dup`	`ioctl`
`fstat`	`dup2`	`fcntl`

- OS/MP has a new Hardware Address Translation (HAT) layer. The HAT layer manages the hardware aspects of virtual memory. The OS/MP 4.1B improvements allow larger kernel configurations which, in turn, increase the number of maxusers.

- `Fork`, `exec`, and `exit`, which were parallelized in OS/MP 4.1A.3, were further improved in OS/MP 4.1B.

- OS/MP 4.1B also includes reader/writer locking primitives.

- A number of bugs have been fixed in both the static and dynamic link editors. These fixes have been available in patches to `/usr/bin/ld` and `/usr/lib/ld.so`. There are no enhancements or other functional changes as a result of these repairs.

  However, one of the repairs corrects a problem (Sun Bug ID 1019004) and reveals bugs in other parts of the system. Specifically, this bug allowed the construction of programs that silently permitted inclusion of shared libraries having unresolved references. The bug fix makes the link editing of programs using such libraries now report errors where previously the link editing operation appeared to have completed successfully.

  In many cases, the unresolved references were never used. Therefore, no problem ever appeared, even though such libraries are, strictly speaking, incorrectly constructed. In other cases, such as for users reporting Sun Bug 1019004, the failure to report the unresolved reference permitted users to believe they had correct programs. Then, during execution, the dynamic link editor would report the unresolved reference.

  Another repair (to Sun Bug ID 1052428) restricts the behavior of the dynamic loader library search algorithm for set-user- or set-group-id programs.

Unsupported Software Features

The following software features are not supported in OS/MP 4.1B.

- DES encryption facilities are supported through a separately available release tape.
  - /usr/bin/crypt
  - /usr/bin/des
- Loadable modules are not supported.
- Device drivers are not binary compatible with SunOS 4.1.2 or 4.1.3.
- There is no support for new hardware with extended VME addressing.

- "Special" drivers, including any and all device drivers from third-party vendors or Solbourne Tactical Engineering, may or may not work with OS/MP 4.1B. If "special" drivers are installed on your machine, you may need to contact our driver suppliers.
- The following files are not included in OS/MP 4.1B:
  - /usr/etc/gpconfig
  - /usr/lib/*.ucode

System Architectures

Solbourne systems have an application architecture of "sun4". This is the output printed by **arch**(1). The kernel architecture is either "Series5", "Series6", or "S4000." These are the outputs printed by **arch -k** The exit code for **arch sun4** is 0; for other argument values, the exit code is 1.

SunView

Version 1.8 of SunView is included with OS/MP 4.1B. This is the same version currently available from Sun. The SunView application **dbxtool** is not included.

Configuring a Kernel

The type of kernel you can configure depends on the kernel architecture of the machine, which may be determined using the **arch -k** command.

To configure a Series S4000 kernel, change directory to **/sys/idt/conf** and use **config**(8). The generic kernel configuration file is named **GENERIC**. Refer to the file **/sys/idt/conf/README** for more information on customizing a kernel.

To configure a Series5, Series5E, or Series6 kernel, change directory to **/sys/kbus/conf** and use **config**(8). The generic kernel configuration file is named **GENERIC**. Refer to the file **/sys/kbus/conf/README** for more information on customizing a kernel.

The kernel configuration files from previous OS/MP releases are not compatible with the kernel configuration files for OS/MP 4.1B. Compare your previous kernel configuration file with the generic OS/MP 4.1B kernel configuration file and make the corresponding changes to the OS/MP kernel configuration file.

The generic kernel does not provide configuration information for the Multi-Channel Accelerator Board. Refer to the *System and Network Administration* manual and the *Release Notes for the Multi-Channel Accelerator Board.*

The generic kernel does provide configuration information to support two VMEbus Cougar controllers and two BoSS enclosures. Refer to the *BoSS Release Notes and Update Pages* (part number 106181).

Supported Hardware

The OS/MP 4.1B release supports the hardware listed in this section. Solbourne provides installation instructions with each supported peripheral.

Series6 CPU Board Support

Software support for Solbourne's Series6 CPU board is introduced in OS/MP 4.1B. The Series6 CPU board may only be installed in Series 700 and Series 900 systems. The following new ROM commands have been added to the in-circuit bootROM to support the Series6:

- **cpustatus:** displays the bootROM version strings for each CPU in the system. It also displays any CPU that has failed the power-on self-test.
- **romcopy:** copies the ROM firmware from one CPU board to another. To do this, the CPU containing the ROM firmware to be copied must be made the master CPU.

The following command was modified to support the Series6CPU board:

- arch

Please refer to the *Series6 CPU Board Release Notes and Update Pages* (part number 106145), and the man pages **cpustatus**(8), and **romcopy**(8) for more information.

Banks Of SCSI Storage

Software support for Banks of SCSI Storage (BoSS) is introduced in OS/MP 4.1B. BoSS may only be installed in Series 700 and Series 900 systems. The following commands have been changed to support BoSS:

- **fsck**
- **partition**
- **inst_sys**
- **svstat**
- **sysdiag**

Please refer to the *Solbourne BoSS Release Notes and Update Pages* (part number 106181) for more information.

Disk Drives

Table 3 lists the disk drives supported in the OS/MP 4.1B release.

Table 3. Supported Disk Drives

Device	Bus	Name
830 Mbyte SMD Hard Disk Drive	VMEbus	xd
1040 Mbyte SMD Hard Disk Drive	VMEbus	xd
1.2 Gbyte IPI Hard Disk Drive	VMEbus	xd
3.0 Gbyte IPI Hard Disk Drive	VMEbus	xd
327 Mbyte Hard Disk Drive (5 1/4-inch)	SCSI	sd
661 Mbyte Hard Disk Drive (5 1/4-inch)	SCSI	sd
1 Gbyte Hard Disk Drive (3 1/2-inch)	SCSI	sd
1.3 GbyteHard Disk Drive (5 1/4-inch)	SCSI	sd
500 Mbyte Hard Disk Drive (3 1/2-inch)	SCSI	sd
200 Mbyte Hard Disk Drive (3 1/2-inch)	SCSI	sd
1.44 Mbyte Floppy Disk Drive (3 1/2-inch)	-	fd0
CD ROM Drive	SCSI	sr0

The "LXT213" entry in **/etc/format.dat** is not supported by Solbourne. The "LXT200" entry should be used instead. Solbourne treats the LXT200 and LXT213 drives identically and formats both types to 200 Megabytes before shipping. Solbourne may ship one type as a replacement for the other.

The floppy disk drive is available only on Series S4000 machines. Other non-SCSI devices are not available on Series S4000 machines.

All hard disk drives are shipped with a default partitioning.

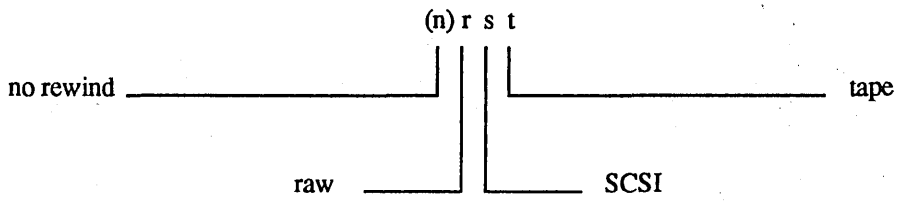
Tape Drives

Table 4 lists the tape drives supported in the OS/MP 4.1B release.

Table 4. Supported Tape Drives

Tape Drive	Bus	Name
QIC-150	SCSI	st
8mm Cartridge	SCSI	st

Tape drives are accessed via entries in **/dev**, all tape drives are on the SCSI bus. **MAKEDEV** creates **mt** devices by making hard links to the corresponding **st** device; **/dev/rst0** is identical to **/dev/rmt0** and either name can be used to access the tape For devices that support multiple densities, consult the (4) manual page for information on how to manipulate the unit number to access the various densities. Tape operations are on the character (raw) device, such as **/dev/rst0; /dev/st0** is the block device.



The **dump** and **restore** commands have been modified to use a media database, **/etc/media**. The **M** option causes **dump** and **restore** to consult the database to determine the blocking factor, length and density to maximize the tape use. Use the following command to dump file systems:

```
# dump 0Mf media /dev/nrst8 filesystem
```

where *media* is the media type described below and *filesystem* is the file system to dump. Use **/dev/nrst9** if the tape drive is set to SCSI id 0x5 (**st1**).

Table 5 gives a sampling of the different media types described in the **/etc/media** file. Additional media types may be added by editing **/etc/media**. Refer to the **media**(5) man page for details of this database.

Table 5. Examples of Media Types

Media	Format	Description
Q150_600	QIC-150	1/4-inch 600-foot XTD tape
P6-120	466033	8mm cartridge tape

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dump *indicates it is rewinding the tape even when using a no-rewind name. Ignore the message.*

For example, the following command gives the maximum tape use for a QIC-150 with a 600 XTD tape:

```
# dump 0Mf Q150_600 /dev/nrst1 /usr
```

The generic kernel supports two SCSI tape drives. To add a first or second tape drive, power down the system, plug in the drive and reboot. One drive must be set to SCSI id 0x4, while the other drive must be set to SCSI id 0x5 to be recognized. See the hardware installation manual for the device to determine how to set the drive to the appropriate SCSI ID.

To add more tape drives, the kernel must be reconfigured. A maximum of eight tape drives may be configured. The following example details how to reconfigure a kernel for three SCSI tape drives.

1. Create a kernel configuration file to edit:

```
# cd /sys/idt/conf
# cp GENERIC 3TAPES
# chmod u+w 3TAPES
```

2. Edit the 3TAPES file.

   a. Go to the line that contains:

```
tape st1 at si0 drive 0x05
```

   b. Add this line:

```
tape st2 at si0 drive 0x06
```

   c. Comment out (insert a '#' at the beginning of) this line:

```
disk sr0 at si0 drive 0x06
```

3. Run config:

```
# usr/etc/config 3TAPES
[...]
```

4. Build the kernel:

```
# cd ../3TAPES
# make
[...]
# mv /vmunix /vmunix.orig
# cp vmunix /
# reboot
```

The following list gives specific information about the supported tape drives:

QIC-150 The QIC-150 drive has the capacity to store 150 Megabytes when using 3M 600 XTD tapes. When reading tapes using the QIC-150 drive, the tape format (QIC-150, 120, 24, or 11) is automatically detected by the tape unit; therefore, tapes created with a QIC-24 drive can be read with the QIC-150 drive. The drive always writes QIC-150 format

8mm Cartridge This drive has the capacity to store 2 Gbytes on the 8200, and 5Gbytes on the 8500, when used with P6-120 8mm cartridge tapes.

Network Controllers

Table 6 lists the Network controllers supported in the OS/MP 4.1B release.

Table 6. Supported Network Controllers

Device	Name
System Board Ethernet controller	ei0
Sbus Ethernet controller (Series S4000)	ei1
Channel Board Ethernet controller (Series 5, 5E, and 6)	ei1
VMEbus Ethernet controller	eg0
FDDI controller	pg0

The System Board Ethernet controller is a standard component. The Sbus Ethernet controller (usable on the S4000 Series) is available from third-party vendors. To add the Sbus Ethernet gateway, install the card in the system and make the indicated changes to these files:

file	add	following
/etc/hosts	**internet_address gatewayname**	line containing 'localhost'
/etc/hostname.ei1	**gatewayname**	(create new file)

The I/O ASIC Ethernet controller is standard on Series 5, 5E, and 6 systems. To add the VMEbus Ethernet gateway on one of these systems, install the controller in the system and make the indicated changes to these files:

file	add	following
/etc/hosts	**internet_address gatewayname**	line containing 'localhost'
/etc/hostname.eg0	**gatewayname**	(create new file)

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If your network uses Network Information Service (NIS), the internal_address and gateway must be added to the maps on the NIS/YP master as well as the local **/etc/hosts** *file.*

gatewayname is the name for the Ethernet interface, often *hostname_gw*, it must be distinct from the name used for the onboard interface. The Sbus Ethernet controller is configured into the generic kernel. After you have made these changes, reboot the system.

Serial Multiplexers

The generic kernels for kbus systems (Series5, Series5E, and Series6) support four serial mux controllers. Each serial mux controller supports 16 lines. Modify the **maxusers** setting on the kernel depending on the number of serial mux controllers in the system. To modify **maxusers**, edit the appropriate kernel configuration file in **/sys/kbus/conf** and set **maxusers** equal to the quantity ((number_of_serial_-mux_boards * 16) + 8). After you have modified the configuration file, configure and build a kernel.

Floppy Disk Drives

Series S4000 machines contain an optional 3.5-inch floppy drive. This drive supports two different densities. The low density is 720K (formatted) and the high density is 1.44Mb (formatted). Diskettes may be interchanged with Sun SPARCstation systems. Solbourne provides a utility, pcnfs, to read and write MS-DOS-compatible diskettes.

Several OS/MP 4.1B commands work with the floppy drive. Please refer to the appropriate manual pages for details.

- **fdformat**(1) is used for formatting a diskette. By default **fdformat** assumes that a high density diskette is in the drive. If a low density diskette is being formatted, the **-l** (for "low") option should be used.
- **eject**(1) is used to remove the diskette from the drive.
- **bar**(1) can be used to dump a file or files to the diskette that normally would not fit. When **bar** completes writing to one diskette, the diskette will be ejected and a request for a second diskette will be made

The /dev entries for the floppy are shown in Table 7:

Table 7. Floppy /dev Entries

Device	Partition
/dev/rfd0a	partition A on the raw disk
/dev/rfd0b	partition B
/dev/rfd0c	partition C
/dev/rfd0	same as partition C
/dev/fd0a	partition A on the diskette using block mode
/dev/fd0b	partition B
/dev/fd0c	partition C
/dev/fd0	same as partition C using block mode

Keyboards and Consoles

Keyboards

OS/MP 4.1B supports the international keyboard layouts provided in SunOS 4.1.2, and supports two keyboard styles: a PC-style keyboard and an engineering-style keyboard.

The international keyboards provided are installed by setting the ROM environment variable KBD_LAYOUT to the appropriate hex value, *x* (shown in Table 8). For example:

ROM> **setenv KBD_LAYOUT 0***x*

Table 8. Country hex values

Country	Hex Value
US	00
FRANCE_BELGIUM	02
CANADA_FRENCH	03
DENMARK	04
GERMANY	05
ITALY	06
NETHERLANDS	07
NORWAY	08

Table 8. Country hex values

Country	Hex Value
PORTUGAL	09
SPAIN_LATINAMERICA	0a
SWEDEN_FINLAND	0b
SWITZERLAND_FRENCH	0c
SWITZERLAND_GERMAN	0d
UK	0e
JAPAN	20

The PC-style keyboard is compatible with Sun's Type-4 keyboard. OS/MP 4.1B maps the PC-style keyboard so it is identical to Sun's Type-4 keyboard. Applications that expect the Type-4 keyboard, such as editors, will recognize the PC-style keyboard as a Type-4.

The Engineering-style keyboard is compatible with Sun's Type-3 keyboard. OS/MP 4.1B maps the Engineering-style keyboard so it is identical to Sun's Type-3 keyboard. Applications that expect the Type-3 keyboard, such as editors, will recognize the Engineering-style keyboard as a Type-3.

In the following discussion, "extra keys" are defined as those keys that appear on an Engineering-style keyboard that do not appear on a Sun Type-3 keyboard. Support for the extra keys has changed in OS/MP 4.1B:

- The keypost code for the '8' key on the numeric keypad is now the same as the post code for the scroll-lock key.
- The extra keys are not enabled by default. To enable them, issue an ioctl, as described in the **kb**(4) man page.

Use of the extra keys by applications is discouraged. Support for them may disappear in a future release of OS/MP.

L1-A Key Sequence

The **L1-A** key sequence can be used to force a system to halt via panic(). Once **L1-A** is entered and forces a panic the system must be rebooted, it can not be "continued" from the ROM> prompt. This key sequence is turned off by default on Kbus machines; it is turned on by default on Series S4000 machines. See **kbd-abort**(1) for information on enabling and disabling **L1-A**.

Serial Port Consoles

The OS/MP 4.1B kernel allows the display, keyboard, and mouse to be used when the normal console is set to a serial port.

This feature allows the keyboard and display to be operated as a non-console device while still allowing a dumb terminal to be used as the real **/dev/console**. The **/dev/fb**, **/dev/kbd**, and **/dev/mouse** special devices will be automatically mapped to the correct display/keyboard group. **suntools** and X11 will function as they normally would.

To enable this feature on a system with an operational graphics display, do the following steps:

1. Edit **/etc/ttytab**. Copy the line containing console:

```
console "/usr/etc/getty std.9600" sun on local secure
```

In the copied line, change **console** to **ttyc1**.

2. Comment out (add # to the beginning of) the line in **/etc/ttytab** for the serial port, which is either ttya or ttyb depending on the bootROM environment variable. See setting the bootROM environment on page 27.

3. Set the serial port to ttya or ttyb, according to the value used in the previous step. For Series5, Series5E, and Series6 systems use the following command for ttya:

```
# eeprom 'CONSOLE=zs()'
```

For ttyb on Series5, Series5E, and Series6 systems use the following command:

```
# eeprom 'CONSOLE=zs(,1)'
```

For Series S4000 systems, use the following commands to set the serial port to ttya:

```
# eeprom 'INPUT-DEVICE=ttya'
# eeprom 'OUTPUT-DEVICE=ttya'
```

Substitute ttyb in the above commands to set the serial device to ttyb.

Enter the command:

```
# kill -HUP 1
```

This instructs **init** to start a getty by sending it a SIGHUP.

To enable this feature on a system without an operational graphics display:

1. Power on the system with the diag switch on (on Series S4000 machines, temporarily unplug the keyboard) and a serial terminal hooked to ttya.

2. On a Kbus machine enter:

```
ROM> set CONSOLE=zs()
```

On a Series S4000 machine enter:

```
ROM> set INPUT-DEVICE=ttya
ROM> set OUTPUT-DEVICE=ttya
```

3. Turn the diag switch off (on Series S4000 machines, plug the keyboard back in) and enter:

```
ROM> reset warm
```

4. Enter:

```
ROM> boot -s
```

5. Perform steps 1, 2 and 4 from the instructions given above for a system with an operational graphics display.

During the boot up console configuration process, the kernel assigns the **/dev/console** mappings to the serial port, and then scans for any remaining frame buffer/-keyboard pairs. If a color frame buffer exists, then that frame buffer and its keyboard/mouse is assigned to the device **/dev/ttyc1**. The devices **/dev/fb1**, **/dev/kbd1**, and **/dev/mouse1** refer to this board. Additional color frame buffer boards would be assigned to **/dev/ttyc2** or **/dev/ttyc3**.

On Series5, Series5E, and Series6 systems, the I/O board contains a bwtwo monochrome frame buffer and keyboard interface. It is assigned to the next console device, either **/dev/ttyc1**, **/dev/ttyc2**, or **/dev/ttyc3**, depending upon how many color frame buffer devices exist.

The **screenblank**(1) command now accepts a **-u** option for use when a serial port is used as the console, or when two graphics displays are in use. The argument to **-u** indicates the unit number (1-3) of the display to be blanked.

With this configuration, Solbourne supports running a windowing system, either SunView or X. If started from a normal login running on **/dev/ttyc1**, then the command **suntools** is all that is required, since the alternate kbd and mouse devices allow the kernel to reopen the correct kbd1 and mouse1 devices. A console window can be invoked, and any output to **/dev/ttyc1** will appear in this window. The **/dev/console** always refers to the serial port.

Multiple-Display Consoles

If more than one frame buffer exists, the OS/MP **adjacentscreens**(1) utility is supported. For instance, the following commands would start SunTools and extend the windowing system to the second frame buffer:

```
# suntools
# suntools -d /dev/fb2
```

To connect the displays, use the following command:

```
# adjacentscreens /dev/fb -l /dev/fb2
```

When using the X Window System, multiple displays are automatically connected by the X server.

Setting the BootROM Environment

BootROM environment variables that describe devices have the syntax:

```
[protocol.]device([ctlr], [unit], [devid])
```

Empty parentheses () or empty fields (,,) default to 0. *protocol* is required for SCSI devices and Ethernet devices.

- The disk *unit* number corresponds to the disk's SCSI address. *devid* describes partitions for disks (0 to 7 corresponding to partition a to h)
- Tape *unit* numbers are determined by adding 4 to the number in the **/dev** entry. In other words, the unit number for **st0** is 4, and **st1** is 5. The tape *devid* is the file on tape (the first file being number 0).
- Ethernet *unit* should always be 0. The *devid* is the IP host number of the system being contacted. On Series S4000 machines with an SBus Ethernet controller, the *ctlr* field should contain the slot number of the controller. The controller on the motherboard is represented by a value of 0.

The bootROM environment variables listed in Table 9 must be set. The values shown in the table are correct for using **sd0** (with the I/O ASIC controller) as the boot disk and using a frame buffer.

Table 9. BootROM Environment Variables

Variables	Value	Meaning
DEFAULTROOT	sd.si() sd.sv(2,1)	root filesystem disk and partition BoSS example
DEFAULTSWAP	sd.si(,,1) sd.sv(2,3,6)	swap disk and partition BoSS example
DEFAULTDUMP	sd.si(,,1)	kernel dump device
DEFAULTBOOT	vmunix	kernel to boot
DIAGBOOT	sd.si(,,6)kvm/st and/dg	diagnostic to boot when in diag mode
BOOTMODE	manual	automatic reboot of
INSTALLED	0 or 1	1 = mandatory files already installed
NOSPINNER	0 or 1	1 = suppress "N pages lcft" in dumps, savecore
INPUT-DEVICE	keyboard, ttya, ttyb	console input (Series S4000 only)
OUTPUT-DEVICE	screen, ttya, ttyb	console output (Series S4000 only)
CONSOLE	bw(), cg(), zs(), or fb()	monitor type (Series 5, 5E, or 6 only)

For Series S4000, set INPUT-DEVICE and OUTPUT-DEVICE; for Series5, Series5E, and Series6 set CONSOLE instead.

To print the bootROM environment, use the command:

```
ROM> printenv
```

The command to set a bootROM environment variable is:

```
ROM> setenv variable value
```

There is a space (not an equal sign) between *variable* and *value.*

For Series S4000, begin by setting the INPUT-DEVICE variable. For example:

```
ROM> setenv input-device keyboard
```

This sets the console input to the keyboard on a Series S4000.

If **OUTPUT-DEVICE** is set to "screen", the last frame buffer found in the system will be used as the output device. If frame buffers are installed in Sbus slot 1 and Sbus slot 3, the console output would be displayed on the frame buffer in Sbus slot 3. Normally the Sbus slots are probed in numerical order (where slot 1 is the nearest to the power supply). This default probe order can be changed by setting the bootROM environment variable **SBUS-PROBE-LIST**. By setting **SBUS-PROBE-LIST** to "231", the console output would be displayed on the frame buffer in Sbus slot 1.

While the **DEFAULTDUMP** variable is normally set to a disk device, it can be set instead to a tape device, for example "st.si(,4,)". This is primarily intended for creating a tape to send to Solbourne for investigating a crash. Customers wishing to examine this tape themselves can read the contents of the tape with the **dd** command. An input block size of 8k must be specified, for example:

```
# dd if=/dev/rst0 of=core ibs=8k
```

After changing the bootROM environment, the bootROM must be reset to make the changes take effect:

```
ROM> reset warm
```

Using **reset warm** forces reinitialization of the system. If **reset cold** is used, the Solbourne system comes up just as it does from a power-up start.

Table 10 describes some examples of boot devices.

Table 10. Examples of Boot Disk Devices

value	partition/file	description
sd.si()	a	SCSI disk 0 (sd0)
sd.si(,,6)	g	SCSI disk 0 (sd0)
sd.si(,1,)	a	SCSI disk 1 (sd1)
xd(,3,)	a	IPI/SMD disk3 (xd3)
st.si(,4,)	0	SCSI tape 0 (st0)
st.si(,5,1)	1	SCSI tape 1 (st1)
sd.sv(2,3,6)	6	SCSI disk 3 on BoSS controller 2

The usage format for SCSI disks is as follows:

```
sd.si(,unit,devid)
```

For example, the command to set the DEFAULTROOT unit to SCSI disk 1 and the partition to a (''sd1a'', in Unix terms) follows:

```
ROM> setenv defaultroot sd.si(,1,0)
```

For IPI and SMD disks, use the following command syntax:

```
ROM> setenv defaultroot xd(ctlr,unit,devid)
```

The controller value should be 0 if there is only a single controller. The default root and default swap must use controller 0 and unit 0-3 to boot properly with generic kernels.

There was a bug in 4.0D and older releases of OS/MP that prevented running SCSIbus at full speed, even though it printed out the full speed transfer rate of 5Mb/sec. With this bug fix some sites with long SCSI bus cables have experienced SCSIbus timeouts.

These SCSIbus timeouts are the cause of occasional OS/MP installation failure due to the failure of extracting files from an Exabyte.

A ROM environment variable has been added that allows the "slowing down" of the SCSI bus by limiting the maximum synchronous transfer rate that will be negotiated. The 5Mb/sec transfer rate results in 200ns/byte. Setting the ROM environmental SI_NSPERBYTE to 300 will slow down the transfer rate to a maximum transfer rate of 3.33Mb/sec

```
ROM> setenv si_nsperbyte 300
```

OS/MP Bugs Open at OS/MP 4.1B

The bugs are listed in categories, and include the bug ID and a synopsis of the bug. The following categories are included:

- File System
- Kernel
- Network
- Utility
- User
- Diagnostics
- Other OS
- Documentation
- Ongoing Software Dependencies
- Sunbug

File System

B910612003	5/24 tape: tfs filesystem operations report error, but succeed
B920921003	fsck doesn't find all dirty filesystems on first pass

Kernel

B910508320	"-target sun4" should be set in GENERIC conf's makeoptions
B910508333	would like to know which simm is bad (S4000)
B910703002	RFS doesn't seem to come down correctly when rebooting
B910718010	Panic using Channel Board due to Memory timeout error
B911017031	would like to add ipi drives dynamically (Kbus)
B911002002	kernel doesn't correctly note available memory (S4000)
B911106002	maxusers greater than 24 will cause system to reset due to double trap (S4000)
B920401002	cannot configure a kernel without IPC options (Kbus)
B920401003	cannot configure a kernel without pty, ether, ei
B920914009	message requested when kmap_alloc falls below kmap_lowat (S4000)

B921010001	kmem_free: block already free panic running net_tests
B920825006	fsck hangs systems with >5 CPUs installed (Kbus)
B920914006	CDROM on BoSS hangs SCSI bus
B911101004	many useless vmunix keyboard errors at 4.1A.1
B920925003	ei0: eiread: mbuf allocation failure on low end Series5
B921022003	low-memory system starves processes
B920728001	floppy activity with mouse activity causes zs2 silo overflow

Network

B910718011	spray -l 2000 can hang a system's network activity
B911204018	Pipe writes block differently than under SunOS 4.1.[12]
B920403007	spray statistics go negative for extreme traffic

Utility

B910430006	term isn't correct if console defaults to ttya (S4000)
B910508281	initial dopackage prompt confusing
B910508285	12/14 tape: timezone paths can contain
B910508293	12/18: error installing X when man pages don't exist
B910508296	12/18 tape: inst_sys doesn't allow for gateways
B910508297	12/18 tape: config_system doesn't allow for gateway
B910508322	1/23 tape: /etc/mtab is world-writable
B910508325	automounter shouldn't start if not a network system
B910508331	dopackage reports bad tape format when tape busy
B910508335	Can't switch partitions in file sys def menu
B910508345	config_server ungraceful about perm denied
B910508346	config_server tape usage inefficient
B910508362	tools for monitoring per-cpu stats
B910508390	inst-sys will dump core from this input:
B910508391	make dopackage more robust in accepting responses
B910508401	at menu not all dopackage variables get changed
B910508429	dopackage does not update its list of variables after abort
B910508452	soft links are not created during installation (S4000)
B910508453	/etc/hosts is not updated on dataless client
B910510208	install enhancement for handling patches
B910513003	Script when you first boot should allow selection of interface
B910517002	upgrade of Kbus clients fails if config_servers used -n
B910614003	Rebooting on ramdisk doesn't work properly Kbus)
B911101001	quota is not updated dynamically,rc.local entry doesn't work
B920714010	partition tool doesn't do anything with new mount points
B920716001	cannot install a Solbourne client from CDROM
B920716004	Install tries to newfs 0 length partitions
B920825009	More templates are listed than can fit in the given space
B920910002	config_server - it is desirable not to have /etc/exports modified;
B920910003	update_exports - doesn't process /etc/exports lines that exceed 512 characters;

	B920910004	dis -F does not work
	B920910007	newfsing of all partitions should be done in parallel
	B921008004	can't install hsNFS on Series6 4.1b machine
	B921019002	/usr/lib/libbsdmalloc.a missing from 4.1B
	B921103005	/etc/rc.local assumes network, sunview installed
	B921105001	/etc/hostname.ei0 is not updated on dataless clients
	B921106002	config_system doesn't get default netmask from inst_sys
	B910508453	/etc/hosts is not included on dataless client
	B910510016	Dis(1)'s usage message refers to itself as "kdis
User		
	B920904002	corrupted screen images with screendump/screenload (Kbus)
	B920630005	no man page for the /usr/etc/scsistat man page
	B921028001	mounting some cdrom is incompatible with Sun
Diagnostics		
	B920526004	Adding more than 256M on Series5 boards causes misalignment panics
	B920814008	Disk write/read test fails when prompted (kbus)
Other OS		
	B910912008	partition does not see changes to label until reboot
	B911017013	cannot close net. interface with ifconfig
	B911128004	mon/keyboard.h missing
Documentation		
	B920618002	device drivers man. incorrect about vme32 master to kbus transactions
	B910510023	no man page for life(6)
	B910508428	mt ret of exabytes do not work
	B910510169	iostat output display is difficult to interpret
	B910508458	the eeprom man page should describe defaultdump
	B910508457	eeprom man page shouldn't mention CONSOLE variable
	B910508455	sd man page should describe scsi disk cmd optimization
Ongoing Software Dependencies		
	B910508274	All Utility: Need to add additional terminal support
	B910819005	All OS: L1A doesn't act correctly for the FRANCE Keyboard
	B911021013	All Utility: dopackage on a tvi925 generates an unreadable display
	B920221002	All Sunbug: automounter may spew lots of pathok() error messages; refer to Sun bug id 1080368
	B920320002	All OS: audible bell doesn't work without windowing system

B911002004	Kbus Compilers: Solbourne is not defined when using the System V compiler
B910508315	All Utility: boot and opt software tape types must be the same
B920624001	All Utility: hp2621 console not supported in partition tool
B920813001	S4000 OS: small-memory system wedges under moderate stress
B920513004	Kbus OS: eeprom -p option not always recognized

Any application which statically links an old libsunwindow binary, or any application which does not use libsunwindow tp properly lock things, will not work correctly. This is true for Sun systems as well as Solbourne systems.

Sunbug

B910508294	12/18 tape: cannot restore from floppy (S4000)
B910508279	bar doesn't tell you if the file doesn't exist
B910508295	aioread doesn't return EINVAL when it should
B910508354	malloc (4294967295) returns a valis pointer
B910508355	calloc() can dump core
B910508292	tlfs credential failure ->kernel printf
B910516004	suntools files in /usr/lib
B910516001	various symbolic links in /usr/bin to sunview/...
B910508283	no man page for uutry
B910508319	sga20: shadows not refreshed correctly (S4000)
B910508324	ctags dumps core
B910509003	RFS can panic RFS servers or clients at the drop of a hat
B910617005	bug in /usr/lib/acct/dodisk
B911022001	sendmail can break when /var/spool/mail is a link and the automounter is in use
B911204007	4.1 man pages from Sun came with older dates than 4.0 man pages
B920130015	uniq command bus error core dump
B920205017	using more causes screen to go blank (csh bug)
B920318002	bug in make
B920414002	named complains about bad xfer when set up as a secondary nameserver
B920529004	/tmp/tty.txt.pid files created by cmdtool are not deleted
B920601002	3rd party software which uses 'delay' function will not work
B920708004	request that tip does ioctl call to save window settings
B920225005	using quoted :e function in vi causes segmentation violation
B920131004	cannot build valid kernel for diskless client
B921013005	man pages for pstat do not explain the fields displayed with -u option
B921106001	mpstat seems to report cpu0 data in the average column (Kbus)
B920710002	ejecting CD while HSFS disc mounted may cause "seg_release addr" panic
B920831001	in.rsh hangs closing stdin and stdout
B921112002	problem with curses redrawing the screen unnecessarily

B921116001	lint libraries are missing elementary function
B910508307	trace doesn't like having stderr clode on it
B910508308	should /etc/motd be world writable?
B910508372	connect(2) security bug
B910508399	attempting to mount swap space hangs machine
B910508450	Sun NFS bug causes failure of SI test
B910510080	pty fix
B910510085	B, O, X, and Z constants used only in DATA statements
B910510097	selection_svc and rpc can be sued to gain access to system files
B910510098	file corruption, inode or vnode pointing to wrong file
B910510108	strcmp erroneously reads beyond the end of the string
B910513004	security bug: processes do not disassociate from ptys when user logs out
B911001002	you can write to a cdrom, creating a bad inode
B920708004	request that tip does ioctl call to save window settings
B910508470	SGA20: clipping can cause seg_fault (S4000)
B910508471	SGA20: moving mouse off-screen during resizes loses (S4000)
B910510038	error message - "loking for internet address for..."
B910510040	cpp mis-identifies itself
B910510041	cron queedefs file is ignored
B910510042	jobs must ALL complete before newly added jobs will run
B910510053	directory scan permissions don't work on nfs mounts
B910510062	make does not expand all dynamic macros properly when additional suffixes are declared
B910510067	cannot create a profiled kernel with config -p
B910510079	data fault panics

OS/MP Bugs Fixed in OS/MP 4.1B

The bugs are listed in categories, and include the bug ID and a synopsis of the bug. The following categories are included:

- Kernel
- Network
- SCSI
- Graphics
- Utility
- User
- File System
- Library
- Libsuntool
- Sunview
- Compiler/Loader
- C2
- Documentation
- Other OS
- Sunbug
- Diagnostics

Kernel

Sun Bugs Fixed in SunOS 4.1.2

1008324 TIOCCONS is a security hole
1016767 /boot works for 1st disk controller only
1029802 4/280 with xy451 panics: regs accessed while busy (patchid 100364-01)
1032053 getreg should use fuword() when simulating instructions
1032534 Kernel panics with panic: psig on exiting sunview
1033861 Request an intelligent swap block freeing algorithm

1036167 modified superblock may not be updated at unmount
1036196 MLOCK/MUNLOCK broken
1036449 modified superblock may not be updated at unmount
1037039 ufs_readdir hangs on a 0len entry
1037052 shmdt(2) will not detach a read only segment
1037715 ISO orderly release is not supported, but TCPTLI says so
1038651 Using tmpfs ie ram /tmp can cause data initlztn w Fortran on 4.1
1038686 System panics with "panic: hat_ptesync - invalid pme" message
1039275 writing to an PROT_READ area is giving SIGBUS not SIGSEGV
1039287 tcp/tli transport cannot send more than 4052 bytes of data
1039410 putting default swap partition in fstab causes system crash, dump
1039840 unmount doesn't close block device
1039846 unmount leaves metadata cached
1039850 inode left locked on symlink creation
1040722 Pseudo-ttys become attached to other users or hang
1042350 tmpfs problem with ftruncate test in SCTS from SUNVS
1042808 nopagereclaim erroneously set to 1 for Sun-4/4xx
1043270 tmpfs disallows mmap beyond end of file
1043801 panic: assertion failed, pmg->pmg_keepcnt== 1
1044192 hard link to a directory succeeds on tmpfs for non-root users
1044666 panic: ttcompat: unexpected ioctl acknowledgment
1044668 umount/sync race can hang system
1044888 Streams run out of dblks and hung the system
1045360 spurious VME intrrpts cause kernel to panic: data f
1045582 NeWSprint 1.0 hangs on 4/75 and 4/40
1046449 multiple-register sbus cards don't work on a 4/75
1047295 mounting certain iso 9660 cd's succeed but directory becomes data
1047355 polling not working correctly
1047586 mkfifo does not work on tmpfs
1048128 xon flow control problems on serial i/o
1049010 DLS60 kernel config file is incorrect.
1049027 tmpfs hangs and deadlocks
1049125 System panic's when reject a network connection via TLI
1050340 mmap(MAP_PRIVATE), madvise(MADV_SEQUENTAIL)=>panic: swap_xlate
1050540 mount and sync can deadlock and hang the box
1050543 umount can cause a inactive panic
1050546 putpage can hang the box
1050548 nfs_putpage can hang the box
1050558 Sparcstation 2 running SunOS 4.1.1 crashes under some applications
1051875 mkfs can create an unusable file system
1051876 system hangs when pageout sleeps in ufs_putpage
1051983 buffer cache sz decreases w lg kernels causing high (patch 100330-02)
1051992 pageout and clustering are not cooperating
1052649 write system call is returning EINTR

1052669 panic: data fault in strwrite - streams corruption
1053582 mount/sync window causes panic: sleep
1054054 +s and +t together do not work as expected
1054999 syncip overhead in ufs_inactive causes poor NFS performance
1056058 panic when writing to a >=2g-bsize file
1056245 Process hangs in page_cv_wait, ufs_getpage after locking page
1056992 4.1.1 leaks kernelmap
1056992 4.1.1 leaks kernelmap (patch 100330-02)
1057211 VME master bus accesses can time out during heavy I/O
1057478 access to non-existn mmap /dev/sbus/ cause panic: async memory err
1057481 System hangs when running TLI
1057929 sys hang: prestosrve and NC400 exhausting kernelmap (patch 100330-02)
1057963 cannot mount an exported tmpfs directory
1060281 `poll()` sys call gives bad returns for `fd` events
1061174 `poll` does not return -1 when it receives a signal
1063310 floppy driver reports drive as "unexpectedly busy"
1065858 Can't run OW xinit on 4/670, 4/630 running 412A1.2
1066086 4.1.2 kernel crashes under async I/O load, running MP
1066422 performance enhancements for the sun4m IPI driver
1066743 Track crosscall stats separately from intrrpt stats
1067681 `lockfs` signal behavior may break applications
1068051 profiling kernel support for sun4m
1068283 `vmstat` reports incorrect number
1068363 system crashes with 112mb memory and 128 maxusers
1068462 kernel workaround needed for bugid 1067719
1068548 PROM mailbox not properly mapped
1068907 remote CDROM driver debug info
1068910 Dump of data using `/dev/sbus*` device files broken
1069072 Int div on sparc can be used to modify data
1070099 support for removable disks got busted in 4.1.1

Solbourne Bugs Fixed in OS/MP 4.1B

B910508122 12/18 tape: kernel loses key-up events
B910508123 12/18 tape: kernel confused by mouse & xtool
B910508303 system with cg30 card reports no keyboard on io-board
B910716011 SunOS lpd vulnerability
B910806002 incorrect memory attributes in software ptes can hang system (S4000)
B910814017 preprocessor symbol needs to be defined to be compatible with sun (Kbus)
B910918002 Should apply Sun integer division security patch
B911023002 format does not look beyond sd6 in its search_path...(Kbus)
B920206001 No timestamp in dmesg

B920213008	DKIOCGGEOM and DKIOCGAPART ioctl calls give info on a non-existent fd device (S4000)
B920311005	lock timeout panic when mux and ipi are used together on vme
B920401004	cannot configure a kernel without NFS support
B920401006	dk_busy variable overrun with 64 configured disks
B920522003	memory addr alignment panic running multiple nfs benchmarks
B920611002	iostat does not see CDROM or FLOPPY disks
B920904003	Sun patch 100397-02
B920130012	divide by zero test program yields unpredicyable results
B920406004	request for Sun patvh 100303-02
B920804004	assertion failed: pp->p_vnode ==NULL, file: ../../vm/vm_pvn.c,line:25
B920827003	Sun patch 100173-08 that has CERT files
B920911001	usr.lib Makefile doesn't install libr pcsvc subdir
B920928002	data fault panic in ldtermsrv
B921002001	iostat ouput broken in 4.1A.1 and 4.1A.3
B911126002	unable to take machine to monitor mode from ascii console using break
B92102002	lock violation panic after trying to reacquire mbuf lock
B921005002	very large nfs read request can hang server
B921116003	request for Sun patch 100075-09

Network

Sun Bugs Fixed in SunOS 4.1.2

1006905	add lock file to render rpc.yppasswdd s1ngle threaded
1034328	client can crash if two procs unlink (patchid 100173-06)
1038060	`ie0: WARNING: if_snd full` error still noted
1039326	`vmunix : ie0` : lost interrupt : resetting
1041303	ifcon() off by one
1045211	Problem with booting diskless clients
1045531	Lock Mgr. suspends "file locking" processes indefinitely
1045536	nfs exprts to non-sun sys can result (patchid 100173-06)
1064433	Export of subtree doesn't work (patchid 100173-06)
1066287	nfs hang when looking at lg file changed on server (patchid 100173-06)
1066663	SIGIO signal for async io fails to pend across NFS (patchid 100357-01)
1029628	setuid bit copied to NFS file system
1030884	NFS full file sys gets ENOSPC even when overwriting existing file
1034328	client can crash if two proc's unlink the same file at once
1034750	automount hangs while trying to open a mount point
1037476	Sending bad proc to NFS server can cause mbuf leak
1038302	NFS export option "anon=-1" does not work
1038308	4.1 automount sets up a different sym link 5 mins after 1st access
1039406	3960-3980th repeated sckt open & close fails w addr already in use
1039839	nres_gethostbyaddr logs erroneous messages to NIS server's console
1039977	bug in the NFS DEBUG code, file nfs_export.c

1041409 cannot execute setuid root programs in NFS mounted filesystem
1041559 system is panicing in mclput
1042435 client side noninterruptible hang
1043343 increase arp table size
1044565 pc-nfs client failed locking entire UNIX file
1045536 NFS exports to non-sun systems can result in file truncation
1045700 lockf fails when two processes try to read, write simultaneously
1045993 NFS file caching still occurring on locked files
1045995 unlink(2) on a file will prevent NFS file locks on the same file
1045996 File locks are not removed on the server when a client is rebooted
1046001 fcntl is interrupted by signals and returns the wrong error code
1046945 'ping' caused machine to panic
1047557 Old pages not being purged if file gets truncated on server
1048875 Missing /etc/mtab file can fork the automounter
1052330 locking on NFS file doesn't cause cache purged after the 1st time
1052879 panic iesynccmd with SunNet OSI 7.0
1053552 ip_input drops pckts w IP opts as bad checksum w mclput pnc patch
1053679 file region locking of NFS files was broken in 4.x
1054669 telnetd allows password snooping
1057673 panic: inactive may result from klm code
1057685 4.1.1 NFS servers freezing
1057878 panic due to window in rtfree()

Solbourne Bugs Fixed in OS/MP 4.1B

B910508400 OS/MP -- starting OpenWindows causes a portmap error message;
B910828012 rpc.lockd fails on nfs loopback mounts
B920825010 panic on boot with FDDI and some combinations of other devices
B9200422002 fddi: pg driver: undesirable connection message wrong. A->D

SCSI

Sun Bugs Fixed in Sun OS 4.1.2

1036481 bsr after reading EOF doesn't record space back, wrong pstn stat
1042822 st: warning tape may be wearing.... on Exabytes
1045071 sd: does not scan past 1 GB when using format utility
1045586 Handling of special FORMAT command is broken w.r.t blkno decode
1046305 some XXgetcap cases reversed
1046580 bug in esp host adapter can cause panic during error recovery
1048141 esp does not always recognize a marginal SCSI bus
1049417 select phase not timed out causing indefinite hangs
1049674 general bug report for some esp problems
1049830 timeouts in polled mode cause a panic
1050067 esp driver resource alloc fails when esp is child if dma
1051244 SCSI Tape drive is misusing signals
1052613 max dma limits set by host adapters are too small

1052659 FSR on the old SCSI tape driver fails in 4.1.1
1052888 st driver can cause a panic: zero divide trap
1055184 3/2 sundev/sd.c uses only one buffer per unit
1058682 Reassign block (format "repair") malfunctions beyond 1 GB
1059139 Accessing a SCSI tape drive causes system crash
1062430 st drvr writes extra file mrks if opened then closed after writing
1065300 front load tape doesn't reliably read tapes
1067300 st: soft errors sometimes cause loss of data
1070535 esp: sync xfer rate is not renegotiated
1070540 esp: incomplt cleanup after proxy msg causes panic
1070876 delay after scsi bus reset required
[various] improvements in st ioctl, EOF, EOT, EOM handling & status rprt

Graphics

Sun Bugs Fixed in Sun OS 4.1.2

1045577 rasfilter_rgtobgr always fails
1046046 The colormap is not correct when 128 colors are used on 4.1.1
1046327 P4 CG6 hardware cursor invisible under Sunwindows on 4.1.1
1063738 Diffuse positional lights on color-per-vertex tri
1063743 Ambient positional lights for color-per-vertex
1064295 Degenerate hollow triangles cause internal edge
1066677 GT crashes w SunPHIGS Quick Update of batched polyl
1066772 wide patterned polylines without nvertex colours
1066851 `gtconfig -M` flag doesn't preserve VIDEO_ENABLE
1066983 quick check pgm to visually test accel port to dev
1067972 hi res version of cg12 (gsxr) text is trash in pr_b
1068136 `gtconfig` needs sync generator setup pgms for NTSC
1068153 Leaf nodes which set no attributes cause QUM mode
1068802 pixwin double buffer bug for GS
1069396 gtconfig: sync generator pgm change needed for
1069691 phigschild crashes GT system when huge application
1070466 Setting hatch_transparency to false affects perf
1071971 Get jitter when using 1280 @ 67hz video output format

Utility

Sun Bugs Fixed in Sun OS 4.1.2

1016437 lpd does not check file names for legality
1022363 format: remove dummy defect list commit for embedded SCSI disks
1025250 Zero-length defect list causes format to fail ectractn of mnfc...
1030087 sendmail yp aliasing does not work with non-sun yp masters
1031577 modload does not recognize the "vector" keyword
1035625 not enough information on embedded scsi defect lists
1036159 A user can run programs with root's group privileges...

1039221 bar core dumps w -x or -t option
1045185 Disks are displayed in controller order but chosen in disk order
1045636 4.1 /bin/mail problem delivering mail
1047340 /bin/mail can be used to invoke a root shell
1049010 DLS60 config file does not work
1050675 Original, extract format command fails if defect count is zero
1051638 format mode selects don't support SCSI-2 page format
1052805 Low-level format of MD21 disks usually fail with Warning...
1053733 pax gets into infinite loop at EOT
1055402 Bourne shell scripts using inline redirection and
1058003 When reading from /dev/printer lpd does not check how much data it has read
1058236 checksum error even with -c -i options
1059212 Improvement needed in mode select error handling for SCSi disks
1059225 Do not hardwire any SCSI disk mode select parameters
1063772 possible to overwrite a file on system using lpr
1067216 Format fails on 207mb maxtor drive
1068402 `mkfs` should initialize UFS clean flag
1068640 formatting CDC drives generates errors

Solbourne Bugs Fixed in OS/MP 4.1B

B910730001 "c" partition doesn't get newfs'd if "a" was a partition
B910614002 attempting to examine pcb with crash(8) causes core dump
B910724014 nstall only shows first nine disks
B911212001 dopackage from disk has to have absolute paths
B920721005 inst_sys dumps core if user enters ? for help
B920910001 config_server - doesn't understand non-standard tape devices
B910508261 2/11 tape: mstat prints incorrect interrupt count
B910508326 can select "c" partition with other partitions mounted
B910508339 2/5 tape: garbled screen in partition tool
B910508340 2/5 tape: unable to read tape after restarting inst_sys
B910508357 the install_client doesn't update /etc/exports correctly
B910508358 the install_client doesn't add all the entries to /dev
B910508360 2/11: clients missing sga21 and sga22 devices
B910508371 install_client fails if exportfs fails
B910508402 dataless clients mount /usr read only
B910508410 3/25 tape: partition tool reads wrong disk label
B910508418 awk and ln are missing from ramdisk
B910508435 dopackage may die with non-explanatory error messages
B910514014 5/13 tape: partition core dumps if have >8 swap partitions
B910628002 4.1 installation reporting lots of zs0: parity erros, ignored
B910814002 lpr -s causes >64 spool etries to use unprintable chars in their name
B910819006 installer mishandles "c" partition of disks when other partitions in use
B910827006 installer does not warn about further use of c partition

B910909018	install_client allows client swap sizes less than 8m
B910911009	cannot delete files
B920408003	pmake can dump core if ti encounters NULL commands
B920501001	partition tool does not deal with lots of drives
B920828006	config_server fails in some cases with 4.1A.3 cdrom
B910520004	problems arise when restoring a large filesystem on ramdisk (S4000)
B910508310	partition tool foxed by tape drive at disk SCSI ID
B910508368	satools host tools doesn't work under 4.1
B910508432	quot(8) -v can dump core
B910604004	5/24 tape: partition prompt and help don't match for newfs
B910617007	config may dump core if the iobus phrase is not added correctly (Kbus)
B910709005	cpio dumps core after copying files if fed from text file
B910711001	can't dump u-area data when using adb on a kernel core
B910508286	12/14 tape: bogus remote path info kills ramdisk
B910903001	function shlist() loops indefinitely if /etc/shells exists
B910110006	traffic reports bogus data with fddi
B920615008	need inst_sys version for multi0user mode
B910508288	12/18 tape: 'partition' is ambiguous in inst_sys
B910508318	need a "load miniusr" command on ramdisk
B910514015	partition(8) says you aren't superusr in demo mode
B910508278	you can boot UNIX before the tape is done rewinding
B910508289	12/18 tape: error from /etc/rc -uucp -c results in usage message
B910508387	increase the number of bad block from 126 to correspond to the size of the disk
B910510026	uustat does not exist on your system
B910510155	ftp(1) globs its second argument, resulting in a core dump
B910510168	ftp help information refers users to Sun

User

Solbourne Bugs Fixed in OS/MP 4.1B

B910911002	umount will not always unmount a device
B920615006	hosts.equiv should not be shipped as it provides full net access
B920630006	scsi bus resets on tape timeouts
B910508384	software from ki research dies
B920701002	format, using file shows wrong drive
B910819005	LiA doesn't act correctly for the FRANCE keyboard

File System

Solbourne Bugs Fixed in OS/MP 4.1B

B910508440	NFS write errors reproduceable with RepliCORE
B920206003	filesystem full messages shouldn't flood user's terminal

Library

Sun Bugs Fixed in Sun OS 4.1.2

1038500 localtime or tzsetwall corrupts malloc space (libc)
1041074 The disk version of the "C" locale is incomplete
1044722 undefined symbol in libxpg.a
1044909 /usr/lib/expreserve race condition was used to break into a system
1045471 4.1(+) shared C libraries reference undefined symbols
1050040 fcvt() segment faults under 4.1.1
1051619 system() uses the system call fork() instead of vfor
1051881 colldef rejects apparently valid input
1052398 strxfrm is not 8 bit clean
1052463 colldef can't handle a substitute statement with hex numbers
1053346 There shouldn't be an imposed length limit for strings in strcoll()

Libsuntool

Sun Bugs Fixed in Sun OS 4.1.2

1038363 window_destroy does not release memory; 8k memory leak per textsw

Sunview

Sun Bugs Fixed in Sun OS 4.1.2

1028856 2/2 master defaults database is not being read
1038313 1/1 Can't open and use more than 64 windows concurrently
1039576 1/1 selection_svc and rpc can be used to gain access to system files
1039760 3/2 notifier fails to handle fcntl for FNDELAY correctly
1040606 2/3 selection_svc security problem

Compiler/Loader

Sun Bugs Fixed in Sun OS 4.1.2

NOTE: new compiler/loader in SunOS 4.1.2 includes substantial fixes that may affect some application programs. See "Link-editor Bug Fixes" in Chapter 2 for more detail.

1019004 -assert definitions can fail to report undefined symbols
1032208 ldd doesn't write file names if standard output is not a tty
1032209 ldd runs out of file descriptors
1032739 ld core dumps with many libs in mult. directories
1033086 Calling dlopen() on a file with BBS kills your application
1034788 -r and -pic do not mix bad secondary magic number on 4.1
1034833 ld: can't mixed -r with -Bstatic or -A flag in 4.1
1034844 missing symbol from ld -r 4.1 object; exists in 4.0.3 ld output
1037879 Cannot create executable w shared obj which points to another
1042261 ld only recognizes first directory in LD_LIBRARY_PATH
1043082 Bogus first arg to 'ldconfig' kills dynamic linking

1043300 dlclose prevents access to functions even after further dlopen
1044524 multiply defined symbols and seg. fault caused by 4.1's ld
1045194 dlsym returns bad addr for uninit global var in dlopened library
1045272 ld -u & -r don't seem to work properly
1046379 can't call a fnctn in a shared lib from a fnctn in another...
1046462 `ld` fails with seg fault proc nested incl
1050594 Uninitialized struct slot causes intermittent failures
1052428 ls.so usage of -L options confusing, leads to security problems
1064820 `ld` can produce bogus diags with cascaded
1069404 bad handle errors with dlsym(dlopen(NULL,1),"xxx")

Solbourne Bugs Fixed in OS/MP 4.1B

B911002004 Solbourne is not defined when using the System V compiler

C2

Sun Bugs Fixed in Sun OS 4.1.2

1040334 yppasswd won't allow user to change passwd from client..daemon dies
1040465 The passwd -e command does not work when c2 security is in place
1044204 rpc.passwdauthd can be used to guess passwords on c2 systems
1047131 getauditflagschar() routine as distrib in 4.1 libc does not work

Documentation

Sun Bugs Fixed in Sun OS 4.1.2

1051880 colldef input format not documented
1051882 semantics of colldef are unclear
1041627 add_services can fail if partition changes are made after SunInstall
1047095 install from CD stops and complains if floppy is in
1047696 Can't boot 4.1.1 munix on a sun-4c w/40mb of memory
1063858 disk form takes 5 minutes to exit in a 40 disk machine
1064779 dataless install corrupts file system
1069645 should add support for keytables in munix

Solbourne Bugs Fixed in OS/MP 4.1B

B910521005 B910508260 closed by OS but still in 4.1 release notes
B910510020 ssignal(3) never actually describes gsignal(1)
B910510115 man page for scandir(3) is wrong
B910806006 remove satools man page or include satools in release
B920305002 tar -r doesn't work for 8mm either
B911021008 config_server will not install anywhere by /export without editing the script
B911021009 install_client cannot be installed anywhere but /export without editing the script
B920903006 semctl() man page

Other OS

Solbourne Bugs Fixed in OS/MP 4.1B

B910508385	sundev/mbvar.h references bogus include file
B910508389	4.1A (5/2 tape) - S4000 diskless client exception when booted "-a"
B910822004	The link /usr/lib/rasfilters/convert.3 -> ../../bin/rasfilter_rgbtobgr is invalid;
B921028005	fsck on volume fails with error: fsck: can't stat /dev/vol/rvoll
B910508287	references to Sun in admin files need to be Solbourne
B910508375	core dumping problem with UUCP
B910508327	the list of a vnode can become long enough that a panic occurs
B920812002	bsf option of mt command returns i/o error

Sunbug

Bugs Fixed in OS/MP 4.1B

B910912002	pstat -u prints incorrect ru memory numbers
B920323003	process should not be able to ptrace itself
B911024001	spell ignores custom hashed dictionary
B911106001	need patch equiv. to Sun Bug ID 1028094/patch 100283-10
B910508313	ldd dumps core when run on ld.so.cache
B910508419	if severely abused, rpc.lockd can dump core due to a seg fault
B910510125	lint fails on this program
B910606001	rpc.lockd gives strange error message when remote host goes down
B910827012	cannot write >2.1GB file to a 5GB Exabyte tape drive
B910918001	4.1A dopackage will crash a 4.1.1 Sun with psig panic
B920428003	lpstat with list options
B920707002	you can lock up a system by attempting to connect a socket to itself
B920722001	need to apply CERT patches for NFS, integer muldiv and ICMP redirects
B920817001	request for Sun patch 100606-01
B920817003	request for Sun patch 100482-02
B920817004	request for Sun patch 100361-04
B920820002	request for Sun patch 100361-03
B921028002	Sun patch 100283-03
B910723011	filesystem limited to 2 Gbytes
B910508363	system hang condition
B920427005	can only fcntl (,F_SETLK,) or lockf fds associated with vnodes
B920206004	at now does not work
B910508282	lpq +<interval> problem
B910508290	sendmail.mx is broken
B910508349	doprint dies due to segmentation fault if "%<n>$" construct used
B910510047	system panics on swap file created by "mkfile -n"
B911002005	a power cycle or SCSI bus reset will allow the eject button on a cdrom drive

Diagnostics

Solbourne Bugs Fixed in OS/MP 4.1B

B920527001	DG disk fails on 3Gbyte IPI with 1K or 2K sectors
B920527002	Sysdiag disk read test doesn't get run on 3 G IPI with 1 or 2K sectors
B910619002	Sysdiag core dumps at 4.1 when running VME/RAM test

Patches Included in OS/MP 4.1B

Sun Patches in OS/MP 4.1B

100075-09	rpc.lockd jumbo patch
100103-11	script to change file permissions to a more secure mode
100170-09	jumbo patch to fix various ld problems
100173-09	NFS Jumbo Patch
100178-07	inetd "broken server detection" breaks on fast machines
100224-03	program "mail" "rmail" problem in delivering mail
100257-04	jumbo patch for ld.so, ldd, and ldconfig
100283-03	in.routed mishandles gateways, multiple routes
100296-04	netgroup exports to world
100303-02	system freezes using loopback interface
100338-05	system crashes with assertion failed panic
100342-03	NIS client needs long recovery time if server reboots
100359-06	streams jumbo patch
100371-01	utility;showfh showfh timeouts before accessing nfs filehandle
100376-04	SPARC:Integer division/multiplication bug
100377-05	Sendmail.mx doesn't recognize wildcard, forward, uid's > 32767, "LD_" environment variables can be exploited tosubvert security
100381-01	du and tar bug fix for compatibility with VMS
100383-05	rdist security enhancement
100407-05	accounting files are corrupted when commands run as nobody
100408-01	libcurses replacement with all 4.1.1 CTE patches
100414-01	programs using pty get output from previous application
100425-01	whois gets host unknown when using the hard coded NICHOST
100482-03	ypserv sends maps to anyone who guesses domainname
100505-01	Zero length directories can be left on system
100516-01	increase HEAPBYTES to prevent system hangs
100520-02	Cron dies when daylight savings time STARTS/STOPS
100539-01	umount of busy hsfs filesystem causes panic data fault
100567-04	mfree panic due to mbuf being freed twice, icmp redirects can be used to make a host drop connections
100606-01	ccom More than 15000 symbols causes "out of hash table"
100630-01	environment variables can be used to exploit login/su

100631-01	environment variables can be used to exploit login
100651-01	Cron dumps core & Cron dies when daylight savings time STARTS/STOPS
100731-01	kernel/db vendor's use of sticky bit on plain files causes corrupt nodes

Installing OS/MP 4.1B on a Standalone System

The OS/MP 4.1B software tape is a full installation media that allows you to update from a previous release, change the size of partitions on the root disk, add a disk to a previously diskless system, or configure a standalone.

A standalone is not a neworked system. A standalone system does not provide NFS disk services to clients. It also does not depend on a server for its **root, swap,** or **/usr** filesystems.

Before Installing....

★ ★ ★ CAUTION ★ ★ ★

Perform a full backup before installing OS/MP 4.1B. A complete installation overwrites all information on the disk partitions specified for the root (/), swap, /usr, /var, and /tmp filesystems.

Before installing the release tape you must clean the tape drive on the host machine. Failure to do so may result in damage to the release tape.

Installing...

Loading the ramdisk image is your first step. The ramdisk image is a special UNIX operating system kernel with a built-in RAM disk that contains the installation software. The command to load the ramdisk depends on the type of system. Follow the instructions for your system type.

Installing on a Series5, Series5E or Series6:

Loading the Ramdisk

Turn the system on. After the system passes the self-tests, the system displays the bootROM prompt.

Loading the Ramdisk via a Local Tape Drive

Ramdisk installation software uses the value of the bootROM variable **INSTALLED** to determine if a system needs to have the basic operating system installed. Set the value of this variable to 0 before loading the ramdisk:

```
ROM> setenv installed 0
```

The system asks if you want to re-install if **INSTALLED** is not 0.

The variable *TapeID* shown in the commands below should be replaced with the SCSI ID of the tape drive to be used. For st0, use 4; for st1, use 5.

To load the ramdisk on Series5 or 5E systems, enter a boot command of the following form:

```
ROM> boot st.si(,TapeID,2)
```

To load the ramdisk on Series6 systems, enter a boot command of the following form:

```
ROM> boot st.si(,TapeID,3)
```

The Series6 bootROM copies the ramdisk image into memory and boots it:

```
Boot: st.si(,4,3)
Entry: 0xfd080000
Size: 00xea000+0x43b878+0x3a9f0
```

The system displays spinner while it is copying the ramdisk into memory. When the copy completes, there is a pause of up to three minutes.

Loading the Ramdisk via a Local CD-ROM Drive

Power on the system. After the system passes the self-tests, the bootROM prompt is displayed.

Ramdisk installation software uses the value of the bootROM variable **INSTALLED** to determine if a system needs to have the basic operating system installed. Set the value of this variable to 0 before loading the ramdisk:

```
ROM> setenv installed 0
```

The system will ask if you want to re-install if **INSTALLED** is not 0.

Install the OS/MP 4.1B CD-ROM disk into the CD-ROM drive.

★ ★ ★ NOTE ★ ★ ★

In order to boot from the local CD-ROM disk, the bootROMs must be at version 3.5 or higher.

To load the ramdisk on Series5, and Series5E systems, using a local CD-ROM drive, enter a boot command of the following form:

```
ROM> boot sd.si(,6,)/Install.Series5
```

To load the ramdisk on Series6 systems, using a local CD-ROM drive, enter a boot command of the following form:

```
ROM> boot sd.si(,6,)/Install.Series6
```

The bootROM copies the ramdisk image into memory and boots it:

```
Boot: sd.si(,6,)/Install.Series6
Entry: 0xfd080000
Size: 00xea000+0x43b8b8+0x309a8
```

A spinner is displayed while copying the ramdisk into memory. When the copy completes, there is a pause of up to three minutes.

Diskful Installation

When the ramdisk is booted, it first determines what sort of terminal is being used. If it is a serial terminal, that is, a terminal attached to the **ttya/ttyb** port, or if the bootROM variable **CONSOLE** is not set, the system displays a list of supported terminals:

```
1) 610
2) ansi
3) hp
4) sun
5) tvi912
6) vt100
7) wyse50
What type of terminal are you using ('1'..'7')?
```

If you are using a frame-buffer, select the 4, the sun terminal type.

```
What type of terminal are you using ('1'..'7')? 4
```

If the value of the bootROM variable **INSTALLED** is non-zero, the mandatory system software has already been installed. In that case, the system displays the following:

```
THIS SYSTEM IS ALREADY INSTALLED

Do you want to re-install the system ('yes', 'no', or '?' for help)?
```

The above message is for the benefit of users intending to re-install the system software, but have not reset the **INSTALLED** environment variable, as described previously.

If the message appears, enter **yes** to re-install the mandatory system software, or **no** to continue installing software without re-installing mandatory OS/MP.

The disk drives attached to the system are then scanned, and a menu of procedures is displayed:

```
Ramdisk

 1) Change Disk Partitioning
 2) Install Software
 3) Invoke a Bourne Shell
 4) Reboot System
 5) Halt System
Enter number of function to execute ('1'..'5', or '?' for help):
```

The provided functions are described below:

Change Disk Partitioning - Allows changing the sizes of disk partitions, and where those partitions are to be used for, filesystem space, swap space, or unused space. Refer to the end of this chapter for details on changing disk partitions.

★★★NOTE★★★

If changes are going to be made to the disk partitions on which OS/MP 4.1B will reside, the changes must be made before installing software. Disk partitions not containing OS/MP 4.1B can be modified before or after the installation.

Install Software - Intended primarily for installing new systems. If system software has already been installed, then this option may be used to install any Solbourne software distribution, such as X Windows.

Invoke a Bourne Shell - Starts an interactive Bourne shell. This option is provided mainly for formatting disks and restoring filesystems. The sizes of disk partitions should not be changed here with the format(8) command. If they are, you must then select `Change Disk Partitioning` before attempting to `Install Software`.

Reboot System - Starts the UNIX operating system after software installation. Alternatively, you may reload the ramdisk from scratch.

Halt System - Returns control of the system to the bootROM.

You can request help at any ramdisk prompt by entering a question mark.Table 11 shows the edit commands available when you are entering text in response to prompts:

Table 11. Input Editing Commands

Character	Interpretation
backspace (^H)	delete last input character
delete (^?)	delete last input character
^U	erase input line
^R	redisplay input line
^W	delete input up to '/' or whitespace
^C	cancel input, returning to nearest menu
ESC	cancel input, returning to nearest menu
^L	redisplay entire screen
return (^M)	end input
newline (^J)	end input

If a string is too long to be displayed in the available space, the beginning of the string is displayed as "...". This allows display of the end of the string, which is usually of more interest.

Keywords can be shortened to any unique prefix (such as 'co' for 'continue'), except for 'yes' and 'no', which must always be spelled out.

Fatal errors during software installation are usually reported by messages beginning with `System error` or `Internal error` and ending with a "#" prompt. If a fatal error occurs, software installation may be restarted by entering:

```
# ^Jstty sane^J
# cd /
# rm -f /core
# inst_sys
```

where ^J is the linefeed character. The command **stty sane** may not be echoed (and is intended to fix exactly that problem). In the event of a fatal error during software installation, please report the problem to Solbourne customer support.

Install Software

Installing software has two distinct stages: gathering information and modifying the system. No permanent changes are made to the system until all information has been gathered.

The system uses three informational menus to gather the necessary information:

- Standard Filesystem Definition - specifies where the standard filesystems (**root** (**/**), **swap**, and **/usr**, optionally **/var** and **/tmp**) are located.
- Media Identification - Determines the installation media from which to install (tape, CD-ROM, or network directory), and determines where that media is located.
- Package Selection - allows selecting of which optional software packages are to be installed.

All three menus provide the command **cancel**. The first two also provide the command **previous**. These commands allow you to return to prior menus, optionally discarding any changes that have been made.

cancel always returns to the ramdisk menu. If changes are to be discarded, then all changes made since `Install Software` was selected are forgotten.

previous always returns to the previous menu (which is the ramdisk menu, in the case of the Filesystem Definition menu). The changes discarded in this case are those made in the menu you are leaving.

cancel has higher priority than **previous**. In other words, if you use **previous** to leave a menu without discarding changes, then **cancel** from that menu and discard changes, the changes made in the earlier menu are also discarded.

Standard Filesystem Definition

The Standard Filesystem Definition Menu defines where the mandatory filesystems are located.

Any changes made to the standard filesystems with the partition tool appear in this menu.

Normally, no changes need to be made at this menu. To proceed to the Media Identification Menu, enter '**continue**'.

The following steps assign the **/var** filesystem to **sd0d**, rather than using the default of **/var** being a subdirectory of the root filesystem.

These steps are optional. If followed, the result is a filesystem definition that is the same as that supplied on the factory installation of a diskful system. In addition, it makes use of partition **d**, thus using 9.3 MB of disk space that is not used when the default disk partition is used with the standard filesystem definition.

In Figure 1, the notation "(required)" appears next to the **root(/)**, **swap** and **/usr** filesystems. These filesystems must be defined; however, they may be placed on any partition of any disk.

```
                    Standard Filesystem Definition

  1) root on sd0a       (required)
  2) swap on sd0b       (required)
  3) /usr on sd0g       (required)
  4) /var on root partition
  5) /tmp on root partition

                    Disk Partitions (sizes in MB)
       (a)     (b)       (c)     (d)     (e)     (f)     (g)     (h)
sd0:   8.4    32.4      191.1    9.3     ---     ---     141.1   ---
sd1:   8.4    32.7      190.9    9.6     ---     ---     140.8   ---



Enter number of filesystem to change ('1'..'5'), 'continue', 'previous',
'cancel', or '?' for help:
```

Figure 1. Sample Standard Filesystem Definition Menu

To modify the **/var** filesystem, enter the number: **4**.

```
Enter number of filesystem to change ('1'..'5'), 'continue',
'previous', 'cancel' or '?' for help: 4
```

The var menu will be highlighted, and the system will request a disk partition. Assign it to sd0d.

```
Enter name of disk partition or host:path for /var
filesystem, 'none', ^C, or '?' for help: sd0d
```

The new arrangement is displayed as shown in Figure 2.

```
                    Standard Filesystem Definition

  1) root on sd0a      (required)
  2) swap on sd0b      (required)
  3) /usr on sd0g      (required)
  4) /var on sd0d
  5) /tmp on root partition

                    Disk Partitions (sizes in MB)
      (a)    (b)      (c)     (d)     (e)     (f)     (g)     (h)
sd0:  8.4    32.4     191.1   9.3     ----    ----    141.1   ----
sd1:  8.4    32.7     190.9   9.6     ----    ----    140.8   ----



Enter number of filesystem to change ('1'..'5'), 'continue', 'previous',
'cancel', or '?' for help:
```

Figure 2. Modified Standard Filesystem Definition Menu

Once all changes for the standard filesystems have been made, enter **continue** to proceed to the Media Identification Menu.

```
Enter number of filesystem to change ('1'..'5'), 'continue',
'previous', 'cancel', or '?' for help: continue
```

Installation Media Identification Menu

The Installation Media Identification menu specifies the location of the media which will be used during the installation. On systems other than the Series S4000, the default tape is the local, even if no such drive exists. Therefore, changing the settings on a non-Series S4000 machines probably will be necessary.

Figure 3 shows the Installation Media Identification menu of a machine that was booted from a local tape device st0 (SCSI address 4).

Installation may take place from Tape or CD-ROM. Each of these installations are discussed below.

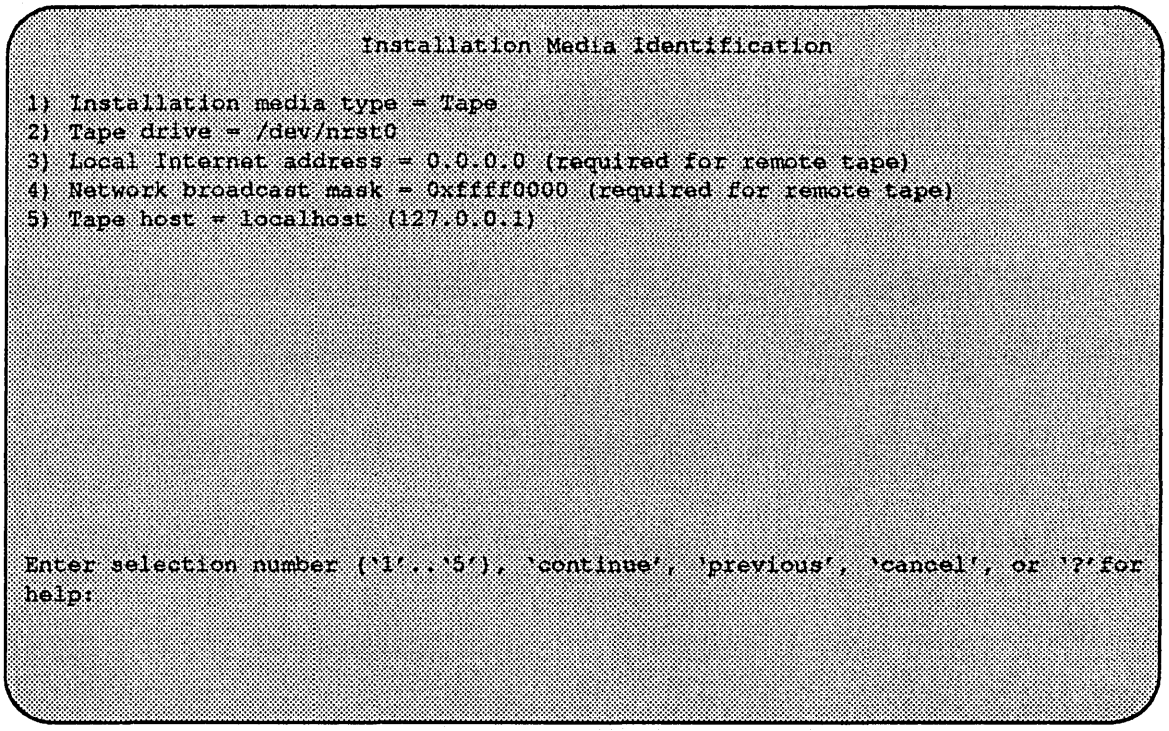

Figure 3. Installation Media Identification Menu - Local Tapehost

Tape Installation

Installing from a local tape drive requires that the *Tape drive* field be set to either **st0** or **st1** (the only supported tape drives) and that *Tape host* be set to '**localhost**'. The Installation media type must also be set to '**Tape**'.

Local CD-ROM Installation

Installing from a local CD-ROM disk drive requires that the Installation media type be set to **CD-ROM**, the CD-ROM drive field be set to **/dev/sr0** and the *CD host* field be set to '**localhost**'. Figure 4 shows the Installation media type menu with the CD-ROM parameters set to install from CD-ROM.

When the details of the media have been entered correctly, enter **continue**. You will be presented with the Package Selection Menu. If the operating system has already been installed, you will be prompted to insert the optional software distribution media.

Package Selection Menu

Use the Package Selection Menu to install optional Solbourne software distributions. It provides a menu-driven method of examining the components of the distribution tape, selecting the parts to be installed, and specifying the directories where the components will be located.

The components of a distribution are referred to as **packages**. Some examples of packages are **FORTRAN 1.4, X Windows**, and **Solbourne OS/MP Optional Software**. Packages contain one or more *modules*, which are groups of logically-

```
                    Installation Media Identification

1) Installation media type = CD-ROM
2) CD drive = /dev/sr0
3) Local Internet address = 0.0.0.0 (required for remote tape)
4) Network broadcast mask = 0xffff0000 (required for remote tape)
5) CD host = localhost (127.0.0.1)









Enter selection number ('1'..'5'), 'continue', 'previous', 'cancel', or '?' for
help:
```

Figure 4. Installation Media Identification Menu - Local CD-ROM

related files, such as executables or libraries. Most packages also have *variables*, which have two uses: controlling the actions of installation commands associated with the package, and prefixing where modules are to be installed.

A single package, Solbourne OS/MP Optional Software, is included on the OS/MP 4.1B distribution tape. The following display shown in Figure 5 appears; the values shown for `Size` in this and subsequent displays may vary.

The message `Mandatory Software Will Be Installed` indicates that the standard filesystems will be built from scratch (overwriting any old contents) when the **`install`** command is issued. If this message does not appear, only the packages selected in this menu will be installed.

The Optional Software package contains a set of software modules that have historically been installed as part of **/usr**. These modules are not necessary for the basic operation of the system, and have been provided separately so that **/usr** may be kept as small as possible. To examine the modules available, select the Optional Software package:

```
Enter number of package to examine ('1'..'1'), 'cancel',
'install', or '?' for help: 1

Should the Solbourne OS/MP 4.1B Optional Software package
be installed ('yes', 'no', ^C, or '?' for help)? yes
```

```
                        Package Selection

                Mandatory Software Will Be Installed

Package Name                                Size(KB)      Install

1) Solbourne OS/MP 4.1B Optional Software     35208           n




Enter number of package to examine ('1'..'1'), 'cancel', 'install', or '?'
for help:
```

Figure 5. Package Selection Menu

The `Should the Solbourne OS/MP 4.1B Optional Software package be installed` question refers to the package in general. The modules are individually selected for installation on the customization screen, and by default all are selected for installation.

After replying **`yes`**, the customization menu appears as shown in Figure 6.

★ ★ ★ NOTE ★ ★ ★

Figure 6 is only an example. The Free KB reported varies depending on the type and size of disk drive installed.

The size of each module in kilobytes is listed immediately to the right of the module's name. The column after the size indicates whether or not the module is currently marked for installation. If the module is to be installed, the directory that the module's files are to be installed in is listed, followed by the free space on the partition that the directory refers to.

Below are short descriptions of the individual modules:

DEBUGGING - program debugging aids
This module contains the debugging tool **dbx**(1) and the profiled versions of the standard libraries libc, libcurses, libm, libtermcap, libtermlib, libsuntool, and libsunwindow.

GAMES - games and demonstration programs
The recreational programs listed in Section 6 of the *UNIX User's Reference Manual.*

```
        Customization of Solbourne OS/MP 4.1B Optional Software

                              Software Modules
 Module          Size(KB)      Install     Directory      Free(KB)
 1) DEBUGGING        2760          y          /usr           58695
 2) GAMES            2872          y          /usr           58695
 3) MANUAL           7392          y          /usr           58695
 4) NETWORKING       1056          y          /usr           58695
 5) PLOT             1784          y          /usr           58695
 6) SECURITY          312          y          /usr           58695
 7) SV_PROG          1832          y          /usr           58695
 8) SV_USER          2872          y          /usr           58695
 9) SYSTEM_V         3992          y          /usr           58695
10) TEXT              720          y          /usr           58695
11) VERSATEC         5952          y          /usr           58695
12) UUCP              608          y          /usr           58695
13) RFS               928          y          /usr           58695
14) SHLIB            1368          y          /usr           58695
15) TLI                48          y          /usr           58695

Enter number of module to modify ('1'..'15'), 'continue', 'abort', or '?' for
help:
```

Figure 6. Package Selection Customization Menu

MANUAL - on-line manual pages
Sections 1 through 8 of the *UNIX User's and Programmer's Manuals* in machine-readable form. See **man**(1), **lookup**(1), and **qref**(1) for more details. This option requires that the TEXT option also be installed.

NETWORKING - network utilities
Utilities and commands that access a network, such as **rcp**(1) or **ftp**(1). This module is required on systems that are connected to a network, or that will use the NIS/YP database services.

PLOT - basic plot-generating applications
The standard UNIX plotting utilities, which allow the creation of plots and graphs from simple data to be displayed on a variety of plotters and graphics terminals. See **plot**(1G) and **graph**(1G).

SECURITY - C2 security
The SECURITY module provides features such as audit trails and shadow password files in the spirit of the Department of Defense's C2 Security Specification (the "Orange Book"). The compliance of these features has not been certified.

SV_PROG - SunView program development support
Include files and libraries needed for compiling SunView applications. This module requires that SV_USER also be installed.

SV_USER - basic SunView support
The SunView windowing system and associated applications (such as **suntools**(1) and **shelltool**(1)). This module is not required if only X Windows will be used on the system.

SYSTEM_V
System V-compatible libraries and executables. System VR3, POSIX, and X/OPEN are supported. See **svidii**(7v), **svidiii**(7v), **xopen**(7v), and **posix**(7v) for details.

TEXT - nroff/troff text processing
This module provides the text formatter **troff**(1) and its associated support programs and files. This option is required if the MANUAL option is installed.

VERSATEC - Versatec printer support
Various utilities specific to Versatec printers, i.e. **vtroff**(1) and **vplot**(1G).

UUCP - uucp applications suite
uucp(1C) and its support programs. These are normally used for communicating to other UNIX systems via phone line.

RFS
Utilities and libraries to support the System V Remote File System.

SHLIB
Position-independent versions of the BSD and System-V versions of the C library. These are provided to allow substituting or adding a module to the shared C library.

TLI
Libraries and headers to support developing programs that take advantage of the System V Transport Layer Interface.

Modifying a module allows selecting whether or not it is to be installed and, if so, the directory its files are to be extracted into.

★ ★ ★ NOTE ★ ★ ★

All modules are intended to be extracted in their default directory. If a module is extracted somewhere else, there is no guarantee that the programs provided in the module will work.

For example, to not install the VERSATEC module:

```
Enter number of module to modify ('1'..'15'), 'continue',
'abort', or '?' for help: 11
```

The VERSATEC menu entry is highlighted, and:

```
Modifying the Versatec printer support module
Should the VERSATEC module be installed ('yes', 'no', ^C,
or '?' for help)? no
```

Figure 7 shows the updated display:

```
          Customization of Solbourne OS/MP 4.1B Optional Software

                                Software Modules
 Module          Size(KB)       Install      Directory      Free(KB)
 1) DEBUGGING        2760           y            /usr          64647
 2) GAMES            2872           y            /usr          64647
 3) MANUAL           7392           y            /usr          64647
 4) NETWORKING       1056           y            /usr          64647
 5) PLOT             1784           y            /usr          64647
 6) SECURITY          312           y            /usr          64647
 7) SV_PROG          1832           y            /usr          64647
 8) SV_USER          2872           y            /usr          64647
 9) SYSTEM_V         3992           y            /usr          64647
10) TEXT              720           y            /usr          64647
11) VERSATEC         5952           n
12) UUCP              608           y            /usr          64647
13) RFS               928           y            /usr          64647
14) SHLIB            1368           y            /usr          64647
15) TLI                48           y            /usr          64647

Enter number of module to modify ('1'..'15'), 'continue', 'abort', or '?' for
help:
```

Figure 7. Package Selection Menu - Deletion of Versatec Module

★ ★ ★ NOTE ★ ★ ★

The free space for **/usr** *has been increased by the size of the VERSATEC module as shown in Figure 7.*

To install the GAMES module in **/fun** (on the root partition):

```
Enter number of module to modify ('1'..'13'), 'continue',
'abort', or '?' for help: 2
```

The GAMES menu entry is highlighted, and

```
Modifying the games and demonstration programs module

Should the GAMES module be installed ('yes', 'no', ^C, or
'?' for help)? yes

Install GAMES in what directory? /fun

/fun does not exist. Create it during installation ('yes',
'no', ^C, or '?' for help)? yes
```

The menu is updated to reflect the change, as shown in Figure 8.

★ ★ ★ NOTE ★ ★ ★

The free space for **/usr** *changes, and a completely new size (for* **/fun***) is also displayed as shown in Figure 8.*

```
          Customization of Solbourne OS/MP 4.1B Optional Software

                                  Software Modules
 Module          Size (KB)        Install     Directory     Free (KB)
  1) DEBUGGING        2760          y           /usr           67519
  2) GAMES            2872          y           /fun            4579
  3) MANUAL           7392          y           /usr           67519
  4) NETWORKING       1056          y           /usr           67519
  5) PLOT             1784          y           /usr           67519
  6) SECURITY          312          y           /usr           67519
  7) SV_PROG          1832          y           /usr           67519
  8) SV_USER          2872          y           /usr           67519
  9) SYSTEM_V         3992          y           /usr           67519
 10) TEXT              720          y           /usr           67519
 11) VERSATEC         5952          n
 12) UUCP              608          y           /usr           67519
 13) RFS               928          y           /usr           67519
 14) SHLIB            1368          y           /usr           67519
 15) TLI                48          y           /usr           67519

Enter number of module to modify ('1'..'15'), 'continue', 'abort', or '?' for
help:
```

Figure 8. Package Selection Menu - Install Games Module to /fun

If you decide to discard all changes made to the modules, use the command '**abort**'. This returns to the Package Selection Menu.

If you are satisfied with the changes (if any) made to the modules, enter the command '**continue**'. This will record the changes and return to the Package Selection Menu.

When you have completed package customization, (which may mean you didn't select any packages for installation), enter '**install**' as shown in Figure 9.

The actual installation begins at this point, and may require 10 minutes to one hour depending on how much software is being installed.

The steps taken during the installation are:

1. extract miniusr. (This contains the installation software, as well as enabling swapping)
2. create filesystems (**root**(/), **/usr**, or **/var** or **/tmp**, as well as any new filesystems requested via the partition tool)
3. create device entries
4. install mandatory **root** files
5. install mandatory **kvm** files
6. install mandatory **usr** files

```
                        Package Selection

                Mandatory Software Will Be Installed

Package Name                              Size (KB)      Install

1) Solbourne OS/MP 4.1B Optional Software     38864           y




Enter number of package to examine ('1'..'1'), 'cancel', 'install', or '?'
for help: install
```

Figure 9. Package Selection Menu

7. install optional software

When installation has finished, the ramdisk menu is displayed (see Figure 10). If the installation failed, call Customer Support.

Rebooting from the Ramdisk

After a successful installation, start UNIX by rebooting as shown in Figure 11.

Enter number of function to execute ('1'..'5', or '?' for help): **4**

At the Reboot System menu select Boot Unix:

```
Enter selection number ('1'..'3') or '?' for help: 1
```

```
                                Ramdisk

1) Change Disk Partitioning
2) Install Software
3) Invoke a Bourne Shell
4) Reboot System
5) Halt System


Enter number of function to execute ('1'..'5', or '?' for help): 4
```

Figure 10. Ramdisk Menu

```
                              Reboot System

1) Boot Unix
2) Boot on ramdisk
3) Return to Main Menu


Enter selection number ('1'..'3') or '?' for help: 1
```

Figure 11. Reboot System Menu

After selecting **1**, there is a short pause, and then:

```
Automatic boot enabled. Type Control-C to abort

ROM> boot

Boot: sd.si(0,0,0)/vmunix

Entry: 0xfd080000

Size: 0xd6000+0x33358+0x81548


OS/MP 4.1B_Export (GENERIC/root) #0: Tues May26 21:09:24
1992
Copyright (c) 1989, 1990 Sun Microsystems, Inc. and
Solbourne Computer, Inc.
[...]
```

At this point, the system configuration information must be specified.

After Installing...

Initial Boot System Configuration

When a newly installed system is booted multi-user for the first time, the system asks a series of configuration questions:

```
OS/MP 4.1B_Export (GENERIC/root) #0: Tue May 26 10:00:13
1992

Copyright (c) 1989-1991 Sun Microsystems, Inc. and
Solbourne Computer, Inc.


[...]

Automatic reboot in progress...
Thur May 28 16:55:42 PDT 1992
checking quotas: done.


This system has not yet been configured. Several values
need to be set before the system can come up to multi-user
Unix.

What is this system's name (default = 'Standlaone'):
<Return>

What is its Internet address (0 for none, default =
255.255.255.255)? 0 <Return>
```

★ ★ ★ NOTE ★ ★ ★

Using the default 'none' disables the NIS/YP services.

```
Time zone choices are:
Australia/  GMT+11      GMT-3       GMT6        Mideast/
Brazil/     GMT+12      GMT-4       GMT7        NZ
CET         GMT+13      GMT-5       GMT8        Navajo
CST6CDT     GMT+2       GMT-6       GMT9        PRC
Canada/     GMT+3       GMT-7       Greenwich   PST8PDT
Chile/      GMT+4       GMT-8       HST         Poland
Cuba        GMT+5       GMT-9       Hongkong    ROC
EET         GMT+6       GMT0        Iceland     ROK
EST         GMT+7       GMT1        Iran        Singapore
EST5EDT     GMT+8       GMT10       Israel      Turkey
Egypt       GMT+9       GMT11       Jamaica     UCT
Factory     GMT-0       GMT12       Japan       US/
GB-Eire     GMT-1       GMT13       Libya       UTC
GMT         GMT-10      GMT2        MET         Universal
GMT+0       GMT-11      GMT3        MST         W-SU
GMT+1       GMT-12      GMT4        MST7MDT     WET
GMT+10      GMT-2       GMT5        Mexico/     Zulu

('/' indicates time zone prefixes)

Enter time zone (default = 'US/Mountain'): US <Return>
Time zone choices are:
Alaska      Central     Hawaii      Pacific
Aleutian    East-Indiana Michigan   Pacific-New
Arizona     Eastern     Mountain    Samoa

Enter time zone: Mountain <Return>
What is today's date (mm/dd/yyyy, default = 05/28/1992)? <Return>
What time is it (24-hour hh:mm, default = 16:55)? <Return>

Current settings are:
 Host name              = standalone
 Internet address       = 0.0.0.0
 Network mask           = 0x00000000
 NIS domain             = none
 Time zone              = US/Mountain
 Date (m/d/y)           = 05/28/1992
 Time                   = 16:55

Are these correct ('yes' or 'no')?
yes

Setting netmask of ei0 to 255.255.255.0
Tue Dec 11 22:09:00 MST 1990
Setting password for root
Changing password for root on standalone.
New password:
Retype new password:
Continuing boot
starting rpc and net services: portmap [...]
```

Reconfiguring the System

You may need to reconfigure the system if: (1) wrong value was set during the initial configuration, or (2) the system did not successfully come up to multi-user mode.

If you find that a wrong value was set during configuration, you can modify the appropriate file manually, or reconfigure. Manually correcting the settings should only be done if you are an experienced system administrator. Reconfiguring automatically is fairly straight-forward, as explained in the following procedure.

If the system has hung up during the boot process, press the Reset button..

★ ★ ★ NOTE ★ ★ ★

If automatic boot is enabled it is necessary to interrupt the reboot by typing Control-C in the early stages of the reboot; otherwise the system will hang up as before.

Then bring up the system in single-user mode:

```
ROM> boot -s
[...]
```

If the system booted successfully originally, you may instead log in as root:

```
standalone login: root
Password:
```

In either case, if a file exists that tells the system it has been configured, remove it:

```
# rm /etc/sys_conf/system-configured
```

The above file may not exist; this is not a problem. Go ahead to the next step.

Now reboot. If you are in single-user mode, exit:

```
# exit
```

Otherwise, use fastboot:

```
# /etc/fastboot
```

The system asks configuration questions just as it did the first time it booted after being installed.

Installing on a Series S4000

Loading the Ramdisk

Turn the system on. After the system passes the self-tests, the system displays bootROM prompt.

Loading the Local Ramdisk via a Local Tape Drive

The ramdisk installation software uses the value of the bootROM variable **INSTALLED** to determine if the basic operating system needs to be installed. Set the value of this variable to 0 before loading the ramdisk as follows:

```
ROM> setenv installed 0
```

The system will ask if you want to re-install if **INSTALLED** is not 0.

Install the OS/MP 4.1B distribution tape into the tape drive and enter the **install** command. If there is more than one tape drive, the bootROM asks which tape drive to use. For example:

```
ROM> install
Which type of device do you wish to install from:
1) Tape
2) Network
Enter device type: 1
You have the following tape drives. Please choose one:
1) At Target4, drive name: ARCHIVE VIPER 150 21247-005
2) At Target5, drive name: EXABYTE EXB-8200 251K
Enter device number: 1
```

The bootROM copies the ramdisk image into memory and boots it:

```
Boot: st.si(,4,4)
Entry: 0xfd080000
Size: 0xea000+0x43b878+0x3a9f0
```

The system displays a spinner while copying the ramdisk into memory. When the copy completes, the spinner pauses for up to three minutes.

Loading the Ramdisk via a Local CD-ROM Drive

Power on the system. After the system passes the self-tests, the bootROM prompt is displayed.

The ramdisk installation software uses the value of the bootROM variable **INSTALLED** to determine if the basic operating system needs to be installed. Set the value of this variable to 0 before loading the ramdisk as follows:

```
ROM> setenv installed 0
```

The system will ask if you want to re-install if **INSTALLED** is not 0.

Install the OS/MP 4.1B CD-ROM disk into the CD-ROM drive.

To load the ramdisk on S4000 systems, using a local CD-ROM drive, enter a boot command of the following form:

```
ROM> boot sd.si(,6,)/Install.S4000
```

The bootROM copies the ramdisk image into memory and boots it:

```
Boot: sd.si(,6)/Install.S4000
Entry: 0xfd080000
Size: 00xea000+0x43b8b8+0x309a8
```

A spinner is displayed while copying the ramdisk into memory. When the copy completes, there is a pause of up to three minutes.

Diskful Installation

When the ramdisk is booted, it first determines what sort of terminal is being used. If it is a serial terminal, that is, a terminal attached to the **ttya/ttyb** port, or if the bootROM variable **CONSOLE** is not set, a list of supported terminals is displayed as follows:

```
1) 610
2) ansi
3) hp
4) sun
5) tvi912
6) vt100
7) wyse50
What type of terminal are you using ('1'..'7')?
```

If you are using a frame-buffer as the console, select the 4, the sun terminal type.

```
What type of terminal are you using ('1'..'7')? 4
```

If the value of the bootROM variable **INSTALLED** is non-zero, the mandatory system software has already been installed. In that case, the system displays the following:

```
THIS SYSTEM IS ALREADY INSTALLED

Do you want to re-install the system ('yes', 'no', or '?' for help)?
```

The above message is for the benefit of users intending to re-install the system software, but have not reset the **INSTALLED** environment variable.

If the message appears, enter **yes** to re-install the mandatory system software, or **no** to continue the installation without re-installing it.

The disk drives attached to the system are then scanned, and a menu of procedures is displayed:

```
Ramdisk

  1) Change Disk Partitioning
  2) Install Software
  3) Invoke a Bourne Shell
  4) Reboot System
  5) Halt System
Enter number of function to execute ('1'..'5', or '?' for help):
```

The provided functions are described below:

Change Disk Partitioning - Allows changing sizes of disk partitions, and whether those partitions are for filesystem space, swap space, or unused space.

★ ★ ★ NOTE ★ ★ ★

If changes are going to be made to the disk partitions on which OS/MP 4.1B will reside, the changes must be made before installing software. Disk partitions not containing OS/MP 4.1B can be modified before or after the installation.

Install Software - Intended primarily for installing new systems. If system software has already been installed, then this option may be used to install any Solbourne software distribution, such as X Windows. Refer to the section, "Software Installation from the Ramdisk," for more information.

Invoke a Bourne Shell - Starts an interactive Bourne shell. This option is provided mainly for formatting disks and restoring filesystems. The sizes of disk partitions should not be changed here with the format(8) command. If they are, you must then select `'Change Disk Partitioning'` before attempting to `'Install Software'`.

Reboot System - Starts UNIX after software installation. Alternatively, you may reload the ramdisk from scratch.

Halt System - Returns control of the system to the bootROM.

Help may be requested at any ramdisk prompt by entering a question mark by itself. Table 12 shows edit commands available when entering text in response to prompts:

Table 12. Input Editing Commands

Character	Interpretation
backspace (^H)	delete last input character
delete (^?)	delete last input character
^U	erase input line
^R	redisplay input line
^W	delete input up to '/' or whitespace
^C	cancel input, returning to nearest menu
ESC	cancel input, returning to nearest menu
^L	redisplay entire screen
return (^M)	end input
newline (^J)	end input

If a string is too long to be displayed in the available space, the beginning of the string is displayed as "...". This allows display of the end of the string, which is usually of more interest.

Keywords can be shortened to any unique prefix (such as 'co' for 'continue'), except for 'yes' and 'no', which must always be spelled out.

Fatal errors during software installation are usually reported by messages beginning with `System error` or `Internal error` and ending with a "#" prompt. If a fatal error occurs, software installation may be restarted by entering:

```
# ^Jstty sane^J
# cd /
# rm -f /core
# inst_sys
```

where ^J is the linefeed character. The command **stty sane** may not be echoed (and is intended to fix exactly that problem). In the event of a fatal error during software installation, please report the problem to Solbourne customer support.

Software Installation from the Ramdisk

Installing software has two distinct stages: gathering information and modifying the system. No permanent changes are made to the system until all information has been gathered.

The system uses three informational menus to gather the necessary information:

- Standard Filesystem Definition - specifies where the standard filesystems (**root** (/), **swap**, and **/usr**, optionally **/var** and **/tmp**) are located.
- Media Identification - Determines the installation media from which to install (tape, CD-ROM, or network directory), and determines where that media is located.
- Package Selection - allows selecting of which optional software packages are to be installed.

All three menus provide the command **cancel**. The first two also provide the command **previous**. These commands allow you to return to prior menus, optionally discarding any changes that have been made.

cancel always returns to the ramdisk menu. If changes are to be discarded, then all changes made since `Install Software` was selected are forgotten.

previous always returns to the previous menu (which is the ramdisk menu, in the case of the Filesystem Definition menu). The changes discarded in this case are those made in the menu you are leaving.

cancel has higher priority than **previous**. In other words, if you use **previous** to leave a menu without discarding changes, then **cancel** from that menu and discard changes, the changes made in the earlier menu are also discarded.

Standard Filesystem Definition

The Standard Filesystem Definition menu defines where the mandatory filesystems are located.

Any changes made to the standard filesystems with the partition tool will appear in this menu.

Normally, no changes need to be made at this menu. To proceed to the Media Identification Menu, enter '**continue**'.

Changing an entry at the Standard Filesystem Definition

The following steps assign the **/var** filesystem to **sd0d**, rather than using the default of **/var** being a subdirectory of the root filesystem.

These steps are optional. If followed, the result is a filesystem definition that is the same as that supplied on the factory installation of a diskful system. In addition, it makes use of partition **d**, thus using 9.3 MB of disk space that is not used when the default disk partition is used with the standard filesystem definition.

In Figure 12 shown below, the notation "(required)" appears next to the **root(/)**, **swap** and **/usr** filesystems. These filesystems must be defined; however, they may be placed on any partition of any disk.

```
                    Standard Filesystem Definition

  1) root on sd0a       (required)
  2) swap on sd0b       (required)
  3) /usr on sd0g       (required)
  4) /var on root partition
  5) /tmp on root partition

                      Disk Partitions (sizes in MB)
       (a)     (b)       (c)     (d)     (e)     (f)     (g)     (h)
sd0:   8.4    32.4      191.1    9.3     ---     ---     141.1    ---
sd1:   8.4    32.7      190.9    9.6     ---     ---     140.8    ---



Enter number of filesystem to change ('1'..'5'), 'continue', 'previous',
'cancel', or '?' for help:
```

Figure 12. Sample Standard Filesystem Definition Menu

To modify the **/var** filesystem, enter the number **4**.

```
Enter number of filesystem to change ('1'..'5'), 'continue',
'previous', 'cancel' or '?' for help: 4
```

The var menu will be highlighted, and the system will request a disk partition. Assign it to sd0d.

```
Enter name of disk partition or host:path for /var
filesystem, 'none', ^C, or '?' for help: sd0d
```

The new arrangement is displayed as shown in Figure 13.

```
                    Standard Filesystem Definition

  1) root on sd0a      (required)
  2) swap on sd0b      (required)
  3) /usr on sd0g      (required)
  4) /var on sd0d
  5) /tmp on root partition

                    Disk Partitions (sizes in MB)
       (a)    (b)      (c)     (d)     (e)     (f)     (g)     (h)
sd0:   8.4    32.4     191.1   9.3     ----    ----    141.1   ----
sd1:   8.4    32.7     190.9   9.6     ----    ----    140.8   ----




Enter number of filesystem to change ('1'..'5'), 'continue', 'previous',
'cancel', or '?' for help:
```

Figure 13. Modified Standard Filesystem Definition Menu

Once all changes for the standard filesystems have been made, enter **continue** to proceed to the Media Identification Menu:

```
Enter number of filesystem to change ('1'..'5'), 'continue',
'previous', 'cancel', or '?' for help: continue
```

Installation Media Identification Menu

The Installation Media Identification Menu specifies the location of the media which will be used during the installation.

On Series S4000 systems, the default values are determined by how the ramdisk was booted.

Figure 14 shows the Installation Media Identification menu of a S4000 machine that was booted from a local tape device st1 (SCSI address 5).

Installation may take place from Tape or CD-ROM. Each of these installations are discussed below.

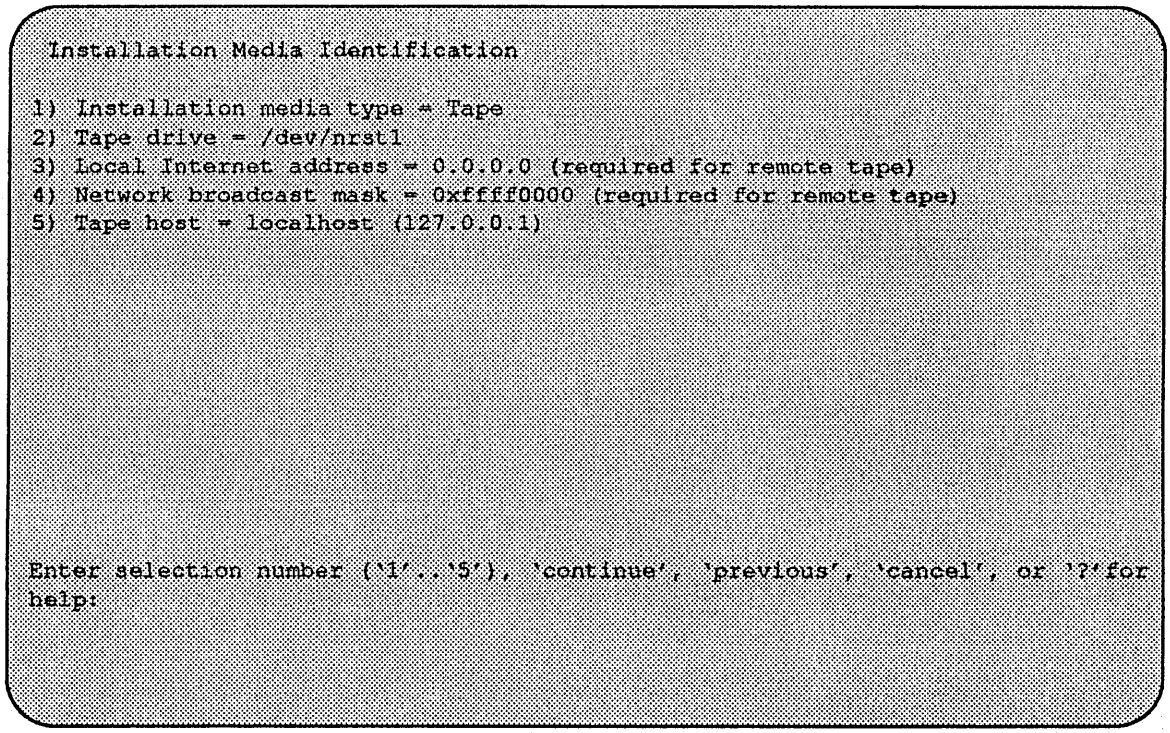

Figure 14. Installation Media Identification Menu - Local Tapehost

Tape Installation

Installing from a local tape drive requires that the *Tape drive* field be set to either **st0** or **st1** (the only supported tape drives) and that *Tape host* be set to '**localhost**'. The Installation media type must also be set to '**Tape**'.

Local CD-ROM Installation

Installing from a local CD-ROM disk drive requires that the Installation media type be set to **CD-ROM**, the CD-ROM drive field be set to **/dev/sr0** and the *CD host* field be set to '**localhost**'. Figure 15 shows the Installation media type menu with the CD-ROM parameters set to install from CD-ROM.

When the details of the media have been entered correctly, enter **continue**. You will be presented with the Package Selection Menu. If the operating system has already been installed, you will be prompted to insert the optional software distribution media.

Package Selection Menu

The Package Selection menu is used to install optional Solbourne software distributions. It provides a menu-driven method of examining the components of the distribution tape, selecting the parts to be installed, and specifying the directories where the components will be located.

The components of a distribution are referred to as **packages**. Some examples of packages are **FORTRAN 1.4, X Windows**, and **Solbourne OS/MP Optional Software**. Packages contain one or more *modules*, which are groups of logically-

```
Installation Media Identification

1) Installation media type = CD-ROM
2) CD drive = /dev/sr0
3) Local Internet address = 0.0.0.0 (required for remote tape)
4) Network broadcast mask = 0xffff0000 (required for remote tape)
5) CD host = localhost (127.0.0.1)









Enter selection number ('1'..'5'), 'continue', 'previous', 'cancel', or '?' for
help:
```

Figure 15. Installation Media Identification Menu - Local CD-ROM

related files, such as executables or libraries. Most packages also have *variables*, which have two uses: controlling the actions of installation commands associated with the package, and prefixing where modules are to be installed.

A single package, Solbourne OS/MP Optional Software, is included on the OS/MP 4.1B distribution tape. The following display shown in Figure 16 appears; the values shown for `Size` in this and subsequent displays may vary.

The message `Mandatory Software Will Be Installed` indicates that the standard filesystems will be built from scratch (overwriting any old contents) when the **`install`** command is issued. If this message does not appear, only the packages selected in this menu will be installed.

The Optional Software package contains a set of software modules that have historically been installed as part of **/usr**. These modules are not necessary for the basic operation of the system, and have been provided separately so that **/usr** may be kept as small as possible. To examine the modules available, select the Optional Software package:

```
Enter number of package to examine ('1'..'1'), 'cancel',
'install', or '?' for help: 1

Should the Solbourne OS/MP 4.1B Optional Software package
be installed ('yes', 'no', ^C, or '?' for help)? yes
```

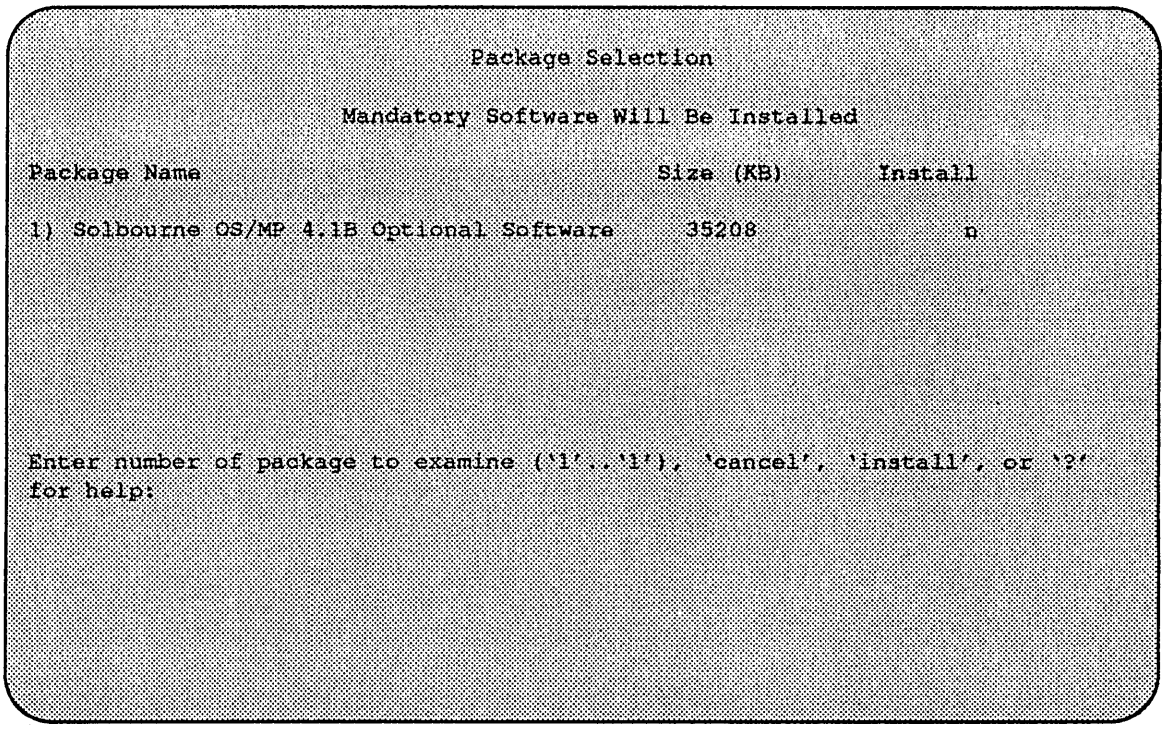

Figure 16. Package Selection Menu

The `Should the Solbourne Optional Software package be installed` question refers to the package in general. The modules are individually selected for installation on the customization screen, and by default all are selected for installation.

After replying **yes**, the customization menu will appear as shown in Figure 17.

★ ★ ★ NOTE ★ ★ ★

Figure 17 is only an example. The Free KB reported will vary depending on the type and size of disk drive installed.

The size of each module in kilobytes is listed immediately to the right of the module's name. The column after the size indicates whether or not the module is currently marked for installation. If the module is to be installed, the directory that the module's files are to be installed in is listed, followed by the free space on the partition that the directory refers to.

Below are short descriptions of the individual modules:

DEBUGGING - program debugging aids
This module contains the debugging tool **dbx**(1) and the profiled versions of the standard libraries libc, libcurses, libm, libtermcap, libtermlib, libsuntool, and libsunwindow.

GAMES - games and demonstration programs
The recreational programs listed in Section 6 of the *UNIX User's Reference Manual.*

```
         Customization of Solbourne OS/MP 4.1B Optional Software

                               Software Modules
 Module          Size(KB)      Install     Directory      Free(KB)
  1) DEBUGGING      2760          y           /usr           58695
  2) GAMES          2872          y           /usr           58695
  3) MANUAL         7392          y           /usr           58695
  4) NETWORKING     1056          y           /usr           58695
  5) PLOT           1784          y           /usr           58695
  6) SECURITY        312          y           /usr           58695
  7) SV_PROG        1832          y           /usr           58695
  8) SV_USER        2872          y           /usr           58695
  9) SYSTEM_V       3992          y           /usr           58695
 10) TEXT            720          y           /usr           58695
 11) VERSATEC       5952          y           /usr           58695
 12) UUCP            608          y           /usr           58695
 13) RFS             928          y           /usr           58695
 14) SHLIB          1368          y           /usr           58695
 15) TLI              48          y           /usr           58695

Enter number of module to modify ('1'..'15'), 'continue', 'abort', or '?' for help:
```

Figure 17. Package Selection Customization Menu

MANUAL - on-line manual pages
Sections 1 through 8 of the UNIX User's and Programmer's Manuals in machine-readable form. See **man**(1), **lookup**(1), and **qref**(1) for more details. This option requires that the TEXT option also be installed.

NETWORKING - network utilities
Utilities and commands that access a network, such as **rcp**(1) or **ftp**(1). This module is required on systems that are connected to a network, or that will use the NIS/YP database services.

PLOT - basic plot-generating applications
The standard UNIX plotting utilities, which allow the creation of plots and graphs from simple data to be displayed on a variety of plotters and graphics terminals. See **plot**(1G) and **graph**(1G).

SECURITY - C2 security
The SECURITY module provides features such as audit trails and shadow password files in the spirit of the Department of Defense's C2 Security Specification (the "Orange Book"). The compliance of these features has not been certified.

SV_PROG - SunView program development support
Include files and libraries needed for compiling SunView applications. This module requires that SV_USER also be installed.

SV_USER - basic SunView support
The SunView windowing system and associated applications (such as **suntools**(1) and **shelltool**(1)). This module is not required if only X Windows will be used on the system.

SYSTEM_V
System V-compatible libraries and executables. System VR3, POSIX, and X/OPEN are supported. See **svidii**(7v), **svidiii**(7v), **xopen**(7v), and **posix**(7v) for details.

TEXT - nroff/troff text processing
This module provides the text formatter **troff**(1) and its associated support programs and files. This option is required if the MANUAL option is installed.

VERSATEC - Versatec printer support
Various utilities specific to Versatec printers, i.e. **vtroff**(1) and **vplot**(1G).

UUCP - uucp applications suite
uucp(1C) and its support programs. These are normally used for communicating to other UNIX systems via phone line.

RFS
Utilities and libraries to support the System V Remote File System.

SHLIB
Position-independent versions of the BSD and System-V versions of the C library. These are provided to allow substituting or adding a module to the shared C library.

TLI
Libraries and headers to support developing programs that take advantage of the System V Transport Layer Interface.

Modifying a module allows selecting whether or not it is to be installed and, if so, the directory its files are to be extracted into.

★ ★ ★ NOTE ★ ★ ★

All modules are intended to be extracted in their default directory. If a module is extracted somewhere else, there is no guarantee that the programs provided in the module will work.

For example, to not install the VERSATEC module:

```
Enter number of module to modify ('1'..'15'), 'continue',
'abort', or '?' for help: 11
```

The VERSATEC menu entry is highlighted, and:

```
Modifying the Versatec printer support module
Should the VERSATEC module be installed ('yes', 'no', ^C,
or '?' for help)? no
```

Figure 18 shows the updated display.:

```
          Customization of Solbourne OS/MP 4.1B Optional Software

                                Software Modules
Module          Size(KB)      Install     Directory     Free(KB)
 1) DEBUGGING       2760          y           /usr          64647
 2) GAMES           2872          y           /usr          64647
 3) MANUAL          7392          y           /usr          64647
 4) NETWORKING      1056          y           /usr          64647
 5) PLOT            1784          y           /usr          64647
 6) SECURITY         312          y           /usr          64647
 7) SV_PROG         1832          y           /usr          64647
 8) SV_USER         2872          y           /usr          64647
 9) SYSTEM_V        3992          y           /usr          64647
10) TEXT             720          y           /usr          64647
11) VERSATEC        5952          n
12) UUCP             608          y           /usr          64647
13) RFS              928          y           /usr          64647
14) SHLIB           1368          y           /usr          64647
15) TLI               48          y           /usr          64647

Enter number of module to modify ('1'..'15'), 'continue', 'abort', or '?' for
help:
```

Figure 18. Package Selection Menu - Deletion of Versatec Module

★ ★ ★ NOTE ★ ★ ★

The free space for **/usr** *has been increased by the size of the VERSATEC module as shown in Figure 18.*

To install the GAMES module in **/fun** (on the root partition):

```
Enter number of module to modify ('1'..'13'), 'continue',
'abort', or '?' for help: 2
```

The GAMES menu entry is highlighted, and:

```
Modifying the games and demonstration programs module

Should the GAMES module be installed ('yes', 'no', ^C, or
'?' for help)? yes

Install GAMES in what directory? /fun

/fun does not exist. Create it during installation ('yes',
'no', ^C, or '?' for help) ? yes
```

The menu is updated to reflect the change, as shown in Figure 19.

★ ★ ★ NOTE ★ ★ ★

The free space for **/usr** *changes, and a completely new size (for* **/fun***) is also displayed as shown in Figure 19.*

```
        Customization of Solbourne OS/MP 4.1B Optional Software

                                Software Modules
 Module          Size(KB)      Install     Directory      Free(KB)
 1) DEBUGGING        2760          y          /usr           67519
 2) GAMES            2872          y          /fun            4579
 3) MANUAL           7392          y          /usr           67519
 4) NETWORKING       1056          y          /usr           67519
 5) PLOT             1784          y          /usr           67519
 6) SECURITY          312          y          /usr           67519
 7) SV_PROG          1832          y          /usr           67519
 8) SV_USER          2872          y          /usr           67519
 9) SYSTEM_V         3992          y          /usr           67519
10) TEXT              720          y          /usr           67519
11) VERSATEC         5952          n
12) UUCP              608          y          /usr           67519
13) RFS               928          y          /usr           67519
14) SHLIB            1368          y          /usr           67519
15) TLI                48          y          /usr           67519

Enter number of module to modify ('1'..'15'), 'continue', 'abort', or '?' for
help:
```

Figure 19. Package Selection Menu - Install Games module to /fun

If you decide to discard all changes made to the modules, use the command '**abort**'. This returns to the Package Selection menu.

If you are satisfied with the changes (if any) made to the modules, enter the command '**continue**'. This will record the changes and return to the Package Selection menu.

When package customization has been completed (which may mean no packages were selected for installation), enter '**install**' as shown in Figure 20.

The actual installation begins at this point, and may require 10 minutes to one hour.

The steps taken during the installation are:

1. extract miniusr. (This contains the installation software, as well as enabling swapping.)
2. create filesystems (**root**(/), **/usr**, or **/var** or **/tmp**, as well as any new filesystems requested via the partition tool)
3. create device entries
4. install mandatory **root** files
5. install mandatory **kvm** files
6. install mandatory **usr** files
7. install optional software

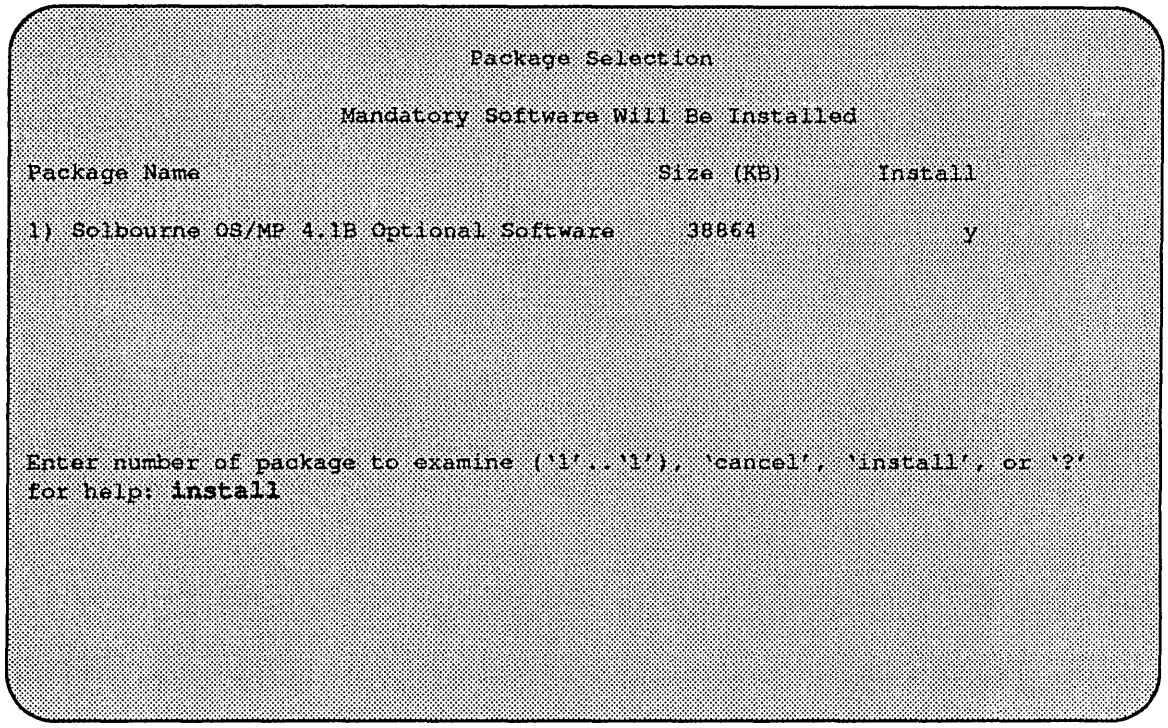

Figure 20. Package Selection Menu

When installation has finished, the ramdisk menu is displayed (see Figure 21). If the installation failed, call Customer Support.

Rebooting from the Ramdisk

After a successful installation, start UNIX by rebooting as show in Figure 22.

Enter number of function to execute ('1'..'5', or '?' for help): **4**

At the Reboot System menu select Boot Unix:

```
Enter selection number ('1'..'3') or '?' for help: 1
```

```
                                Ramdisk


1) Change Disk Partitioning
2) Install Software
3) Invoke a Bourne Shell
4) Reboot System
5) Halt System


Enter number of function to execute ('1'..'5', or '?' for help): 4
```

Figure 21. Ramdisk Menu

```
                              Reboot System


1) Boot Unix
2) Boot on ramdisk
3) Return to Main Menu


Enter selection number ('1'..'3') or '?' for help: 1
```

Figure 22. Reboot System Menu

After selecting **1**, there is a short pause, and then:

```
Automatic boot enabled. Type Control-C to abort
ROM> boot
Boot: sd.si(0,0,0)/vmunix

Entry: 0xfd080000
Size: 0xd6000+0x33358+0x81548

OS/MP 4.1B_Export (GENERIC/root) #0: Tues May26 21:09:24
1992
Copyright (c) 1989, 1990 Sun Microsystems, Inc. and
Solbourne Computer, Inc.
[...]
```

At this point, the system configuration information must be specified.

After Installing...

Initial Boot System Configuration

When a newly installed system is booted multi-user for the first time, the system asks a series of configuration questions:

```
OS/MP 4.1B_Export (GENERIC/root) #0: Tue May 26 10:00:13
1992

Copyright (c) 1989-1991 Sun Microsystems, Inc. and
Solbourne Computer, Inc.


[...]

Automatic reboot in progress...
Thur May 28 16:55:42 PDT 1992
checking quotas: done.


This system has not yet been configured. Several values
need to be set before the system can come up to multi-user
Unix.

What is this system's name (default = 'standalone'):
<Return>

What is its Internet address (0 for none, default =
255.255.255.255)? 0 <Return>
```

★ ★ ★ NOTE ★ ★ ★

Using the default 'none' disables the NIS/YP services.

```
Time zone choices are:
Australia/  GMT+11      GMT-3       GMT6        Mideast/
Brazil/     GMT+12      GMT-4       GMT7        NZ
CET         GMT+13      GMT-5       GMT8        Navajo
CST6CDT     GMT+2       GMT-6       GMT9        PRC
Canada/     GMT+3       GMT-7       Greenwich   PST8PDT
Chile/      GMT+4       GMT-8       HST         Poland
Cuba        GMT+5       GMT-9       Hongkong    ROC
EET         GMT+6       GMT0        Iceland     ROK
EST         GMT+7       GMT1        Iran        Singapore
EST5EDT     GMT+8       GMT10       Israel      Turkey
Egypt       GMT+9       GMT11       Jamaica     UCT
Factory     GMT-0       GMT12       Japan       US/
GB-Eire     GMT-1       GMT13       Libya       UTC
GMT         GMT-10      GMT2        MET         Universal
GMT+0       GMT-11      GMT3        MST         W-SU
GMT+1       GMT-12      GMT4        MST7MDT     WET
GMT+10      GMT-2       GMT5        Mexico/     Zulu

('/' indicates time zone prefixes)

Enter time zone (default = 'US/Mountain'): US <Return>
Time zone choices are:
Alaska      Central       Hawaii      Pacific
Aleutian    East-Indiana  Michigan    Pacific-New
Arizona     Eastern       Mountain    Samoa

Enter time zone: Mountain <Return>
What is today's date (mm/dd/yyyy, default = 05/28/1992)? <Return>
What time is it (24-hour hh:mm, default = 16:55)? <Return>

Current settings are:
 Host name              = standalone
 Internet address       = 0.0.0.0
 Network mask           = 0x00000000
 NIS domain             = Rodent.COM
 Time zone              = US/Mountain
 Date (m/d/y)           = 05/28/1992
 Time                   = 16:55

Are these correct ('yes' or 'no')?
yes

Setting netmask of ei0 to 255.255.255.0
Tue Dec 11 22:09:00 MST 1990
Setting password for root
Changing password for root on habitrail.
New password:
Retype new password:
Continuing boot
starting rpc and net services: portmap [...]
```

Reconfiguring the System

You may need to reconfigure the system if: (1) wrong value was set during the initial configuration, or (2) the system did not successfully come up to multi-user mode.

If you find that a wrong value was set during configuration, you can modify the appropriate file manually, or reconfigure. Manually correcting the settings should only be done if you are an experienced system administrator. Reconfiguring automatically is fairly straight-forward, as explained in the following procedure.

If the system has hung up during the boot process, cycle the power off and on .

★ ★ ★ NOTE ★ ★ ★

If automatic boot is enabled it is necessary to interrupt the reboot by typing Control-C in the early stages of the reboot; otherwise the system will hang up as before.

Then bring up the system in single-user mode:

```
ROM> boot -s
[...]
```

If the system booted successfully originally, you may instead log in as root:

```
rabbitrail login: root
Password:
```

In either case, if a file exists that tells the system it has been configured, remove it:

```
# rm /etc/sys_conf/system-configured
```

The above file may not exist; this is not a problem. Go ahead to the next step.

Now reboot. If you are in single-user mode, exit:

```
# exit
```

Otherwise, use fastboot:

```
# /etc/fastboot
```

The system asks configuration questions just as it did the first time it booted after being installed.

Installing OS/MP 4.1B on a Standalone using reinst_sys

This chapter describes how to install OS/MP 4.1B on a standalone using the new utility, `reinst_sys`, which allows the user to upgrade his system with a full installation of the operating system on unused partitions of one or more disks, while staying up in multi-user mode.

A standalone system does not provide NFS disk services to clients. It also does not depend on a server for its **root**, **swap**, or **/usr** filesystems.

The purpose of `reinst_sys` is to minimize downtime by performing a full install of onto a new system disk while the system continues to run an earlier version on an old system disk. Once `reinst_sys` is complete, you are free to do whatever local modifications are desirable before booting from the new disk.

For example, you might reconfigure the 4.1B kernel or modify files of local interest such as **/etc/printcap**. Only when the new system disk is ready to run do you need to halt the old system and reboot from the new disk.

Finally, unlike earlier full install releases, `reinst_sys` makes it possible to fall back to the earlier version of OS/MP if there turns out to be some problem with the way you set up the new system. To fall back to the old system, halt the new system, change ROM variables DEFAULTROOT and perhaps DEFAULTSWAP, and then boot.

★ ★ ★ NOTE ★ ★ ★

In order to use this utility, you must have an unused disk, or at least enough unused partitions, on which to install the OS/MP 4.1B release. You can not use reinst_sys to install over the currently running disk partitions. If you do not have an unused disk for reinst_sys to use, you will have to install OS/MP 4.1B from scratch, while the system is unavailable to your users, as was done in previous OS/MP full installation releases.

You should not install on a disk connected to a channel board as it will be impossible to boot from that drive.

Before Installing...

★ ★ ★ NOTE ★ ★ ★

Before using reinst_sys, you must know what disk(s) and partitions you want to install on. If changes need to be made to any of the disks partitions, you must do this prior to running reinst_sys. Use **partition***(8) to modify the disks.*

It is best to select a disk that will be recognized by an OS/MP 4.1B generic kernel. Otherwise it will be necessary to reconfigure the kernel (which may be desirable anyway) before rebooting. This is discussed in more detail at the end of this section.

★ ★ ★ CAUTION ★ ★ ★

If installing by tape, clean the tape drive on the machine you will be using before installing the release tape. Failure to do so may result in damage to the release tape.

To run `reinst_sys`, it must first be extracted from the OS/MP 4.1B media.

The following explains two different methods of extracting `reinst_sys` into the **/usr/etc** directory. You must be logged in as root.

Extracting reinst_sys via a Local Tape Drive

```
telly# cd /usr/etc
telly# mt -f /dev/nrst0 asf 5
telly# tar xpf /dev/nrst0 reinst_sys
```

Extracting reinst_sys via a Local CD-ROM Drive

Create a mount point directory (if one doesn't exist), mount the CD-ROM drive, and extract `reinst_sys` as follows:

```
telly# mkdir /cdrom
telly# mount /dev/sr0 /cdrom
telly# cd /usr/etc
telly# tar xpf /cdrom/Tools.tar
```

Installing...

This section covers the OS/MP 4.1B installation on Series5, Series5E, Series6 and S4000 systems.

During installation, you can request help at any prompt by entering a question mark. Table 1 shows edit commands available when entering text in response to prompts:

Table 1. Input Editing Commands

Character	Interpretation
backspace (^H)	delete last input character
delete (^?)	delete last input character
^U	erase input line
^R	redisplay input line
^W	delete input up to '/' or whitespace
^C	cancel input, returning to nearest menu
ESC	cancel input, returning to nearest menu
^L	redisplay entire screen
return (^M)	end input
newline (^J)	end input

If a string is too long to be displayed in the available space, the beginning of the string is displayed as "...". This allows display of the end of the string, which is usually of more interest.

Keywords can be shortened to any unique prefix (such as 'co' for 'continue'), except for 'yes' and 'no', which must always be spelled out.

Fatal errors during software installation are usually reported by messages beginning with `System error` or `Internal error` and ending with a "`#`" prompt. If a fatal error occurs, software installation may be restarted by entering:

```
# ^Jstty sane^J
# rm -f core
# /usr/etc/reinst_sys
```

where ^J is the linefeed character. The command **stty sane** may not be echoed (and is intended to fix exactly that problem). In the event of a fatal error during software installation, please report the problem to Solbourne customer support.

Installing Software

Installing software has two distinct stages: gathering information and modifying the system. No permanent changes are made to the system until all information has been provided.

There are three information gathering menus:

- Standard Filesystem Definition - specifies where the standard filesystems (**root** (/), **swap**, and **/usr**, optionally **/var** and **/tmp**) are located.
- Media Identification - Determines the installation media from which to install (tape, CD-ROM, or network directory), and determines where that media is located.
- Package Selection - allows selecting of which optional software packages are to be installed.

All three menus provide the command **cancel**. The first two also provide the command **previous**. These commands allow you to return to prior menus, optionally discarding any changes that have been made.

cancel always returns to the shell terminating reinst_sys.

previous always returns to the previous menu (which is the shell, in the case of the Filesystem Definition menu). The changes discarded in this case are those made in the menu you are leaving.

cancel has higher priority than **previous**. In other words, if you use **previous** to leave a menu without discarding changes, then **cancel** from that menu and discard changes, the changes made in the earlier menu are also discarded.

The Standard Filesystem Definition menu defines where the mandatory filesystems are located. These filesystems (except for root) may be either on a local disk partition or provided by a disk server. If root is to be on a remote system, install the system as a client of that system, even if the system actually contains a disk. You can add entries for any local disks to **/etc/fstab** after installing the system as a diskless client.

Any changes made to the standard filesystems with partition(8) will appear in this menu.

`reinst_sys` has the following options:

`reinst_sys` [-m] [-n] [-r /root/path] [-f host:/device/path] [-a arch]

-m	Don't mount or newfs filesystems
-n	Don't newfs filesystems
-r /root/path	Pretend /root/path is really/
-f host:/device/path	What tape device to use
-a arch	What cpu architecture to use - overrides cpustatus

In general, you will not need to use any of these options except perhaps the -a option. The -f option will be set while running `reinst_sys`.

The -a option is to be used when you are upgrading or changing the architecture of your machine. Suppose you have a machine with Series5 CPUs, and you want to upgrade to Series6 CPUs. To install the OS/MP 4.1B for Series6, login as root and issue the following command:

```
telly# /usr/etc/reinst_sys -a Series6
```

To install OS/MP 4.1B with no change in architecture, login as root and issue the command:

```
telly# /usr/etc/reinst_sys
```

`reinst_sys` begins by reading the current **/etc/fstab** file to determine the disks attached to your system (mounted disks are also probed).

After examining all attached disks, `reinst_sys` presents the first menu, the Standard Filesystem Definition menu.

The root, swap, and usr partitions are required and must be defined before going to the next menu. The swap will be defined as the current swap area, and may be redefined if you wish. The root and usr areas need to be defined from the currently available disk partitions that are highlighted in the Standard Filesystem Definition menu. For a disk partition to be available for use in `reinst_sys`, it must not be currently mounted, and it must not have an entry in the **/etc/fstab** file.

Example:

Currently, the **root**(/) filesystem is on **sd0a**, swap is on **sd0b**, and the **/usr** filesystem is on **sd0g**. Available partitions are highlighted. If the necessary partitions are not available, exit `reinst_sys`. A partition may not be available because it is mounted or an entry exists for it in the **/etc/fstab** file. Also, it may not be available because it does not exist, or it is not large enough, in which case you will need to run **partition**(8) to repartition the disk as needed.

Use the following steps to assign the **root** (/) filesystem to **sd2a**, the **/usr** filesystem to **sd2g**, and the **/var** filesystem to **sd2d** (rather than using the default of **/var** being a subdirectory of the root filesystem).

The steps for changing **/var** are optional. This makes use of partition **d**, thus using 9.5 MB of disk space that is not used when the default disk partition is used with the standard filesystem definition.

In Figure 1, the notation "(required)" appears next to the **root**(/), **swap** and **/usr** filesystems. These filesystems must be defined; however, they may be placed on any sufficiently large available partition of any disk.

```
                    Standard Filesystem Definition

  1) root              (required)      <not defined>
  2) swap on sd0b      (required)
  3) /usr              (required)      <not defined>
  4) /var on root partition
  5) /tmp on root partition

          Disk Partitions (sizes in MB) (available highlighted)
      (a)    (b)      (c)     (d)     (e)     (f)     (g)     (h)
sd0:  8.4    32.4     191.1   9.3     ---     ---     141.1   ---
sd2:  8.6    32.9     484.9   9.5     ---     ---     433.5   ---



Enter number of filesystem to change ('1'..'5'), 'continue', 'previous',
'cancel', or '?' for help:
```

Figure 1. Sample Standard Filesystem Definition Menu

To modify the **root** (/) filesystem, enter the number **1**.

```
Enter number of filesystem to change ('1'..'5'),
'continue', 'previous', 'cancel' or '?' for help: 1
```

The **root** menu will be highlighted, and the system will request a disk partition. Assign it to sd2a.

```
Enter name of disk partition or host:path for /root
filesystem, 'none', ^C, or'?' for help: sd2a
```

To modify the **/usr** filesystem, enter the number **3**.

```
Enter number of filesystem to change ('1'..'5'),
'continue', 'previous', 'cancel' or '?' for help: 3
```

The usr menu will be highlighted, and the system will request a disk partition. Assign it to sd2g.

```
Enter name of disk partition or host:path for /usr
filesystem, 'none', ^C, or'?' for help: sd2g
```

To modify the **/var** filesystem, enter the number **4**.

```
Enter number of filesystem to change ('1'..'5'),
'continue', 'previous', 'cancel' or '?' for help: 4
```

The var menu will be highlighted, and the system will request a disk partition. Assign it to sd2d.

```
Enter name of disk partition or host:path for /var
filesystem, 'none', ^C, or '?' for help: sd2d
```

The new arrangement is displayed as shown in Figure 2.

```
                    Standard Filesystem Definition

  1) root on sd2a      (required)
  2) swap on sd0b      (required)
  3) /usr on sd2g      (required)
  4) /var on sd2d
  5) /tmp on root partition

          Disk Partitions (sizes in MB) (available highlighted)
      (a)    (b)      (c)     (d)     (e)     (f)     (g)     (h)
sd0:  8.4    32.4     191.1   9.9     ----    ----    141.1   ----
sd2:  8.6    32.9     484.9   9.9     ----    ------  433.5   ------



Enter number of filesystem to change ('1'..'5'), 'continue', 'previous',
'cancel', or '?' for help:
```

Figure 2. Modified Standard Filesystem Definition menu

Once all changes for the standard filesystems have been made, enter **`continue`** to proceed to the Media Identification menu.

```
Enter number of filesystem to change ('1'..'5'),
'continue', 'previous', 'cancel', or '?' for help: continue
```

Installation Media Identification Menu

The Installation Media Identification Menu describes which media type (tape, CD-ROM, or network directory) will be used during the installation. Figure 3 shows the Installation Media Identification menu.

Installing from a Tape Drive

Installing from a local tape drive requires that the *Installation media type* be set to **`Tape`**, the *tape drive* field be set to either **`st0`** or **`st1`** (the only supported tape drives) and that *Tape host* be set to **`localhost`**.

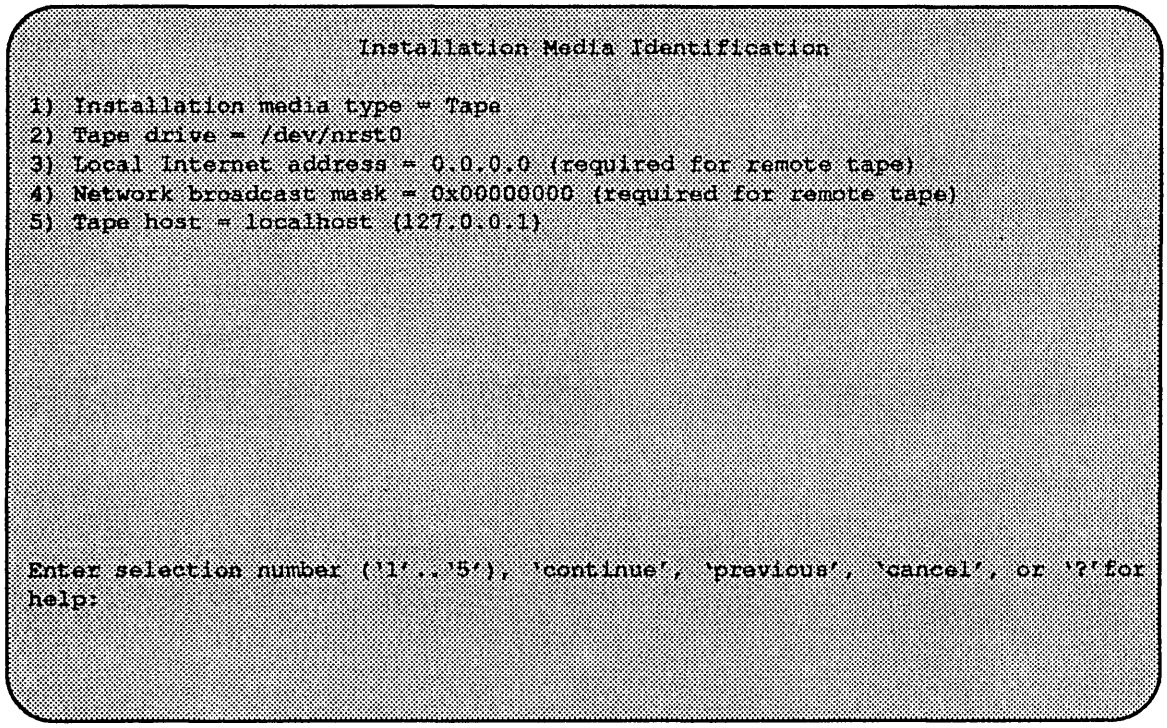

Figure 3. Media Identification Menu - Local Tapehost

When the details of the tape drive have been entered correctly, enter **`continue`**. You will be presented with the Package Selection Menu. If the operating system has already been installed, you will be prompted to insert the optional software distribution media.

Local CD-ROM Installation

Installing from a local CD-ROM drive requires that the *Installation media type* be set to **`CD-ROM`**, the *CD drive* field be set to **`/dev/sr0`**, and the *CD host* field be set to **`localhost`**.

Figure 4 shows the Installation Media Menu with the CD-ROM parameters set to install from CD-ROM.

Once the details of the media have been entered correctly, enter **`continue`** to proceed to the Package Selection Menu.

Package Selection Menu

Use this menu to install optional Solbourne software distributions. It provides a menu-driven method of examining the components of the distribution tape, selecting the parts to be installed, and specifying the directories where the components will be located.

The components of a distribution are referred to as **packages**. Some examples of packages are **FORTRAN 1.4, X Windows, and Solbourne OS/MP Optional Software**. Packages contain one or more *modules*, which are groups of logically-

```
                    Installation Media Identification

1) Installation media type = CD-ROM
2) CD drive = /dev/sr0
3) Local Internet address = 0.0.0.0 (required for remote install)
4) Network broadcast mask = 0x00000000 (required for remote install)
5) CD host = localhost (127.0.0.1)









Enter selection number ('1'..'5'), 'continue', 'previous', 'cancel', or '?' for
help:
```

Figure 4. Installation Media Identification Menu - Local CD-ROM

related files, such as executables or libraries. Most packages also have *variables*, which have two uses: controlling the actions of installation commands associated with the package, and prefixing where modules are to be installed.

A single package, OS/MP 4.1B Full-Install Optional Software, is included on the OS/MP 4.1B distribution tape. The following display shown in Figure 5 appears; the values shown for `Size` in this and subsequent displays may vary.

The message `Mandatory Software Will Be Installed` indicates that the standard filesystems will be built from scratch (overwriting any old contents) when the **`install`** command is issued. If this message does not appear, only the packages selected in this menu will be installed.

The Optional Software package contains a set of software modules that have historically been installed as part of **/usr**. These modules are not necessary for the basic operation of the system, and have been provided separately so that **/usr** may be kept as small as possible. To examine the modules available, select the Optional Software package:

```
Enter number of package to examine ('1'..'1'), 'cancel',
'install', or '?' for help: 1

Should the OS/MP 4.1B Full-Install Optional Software
package be installed ('yes', 'no', ^C, or '?' for help)?
```

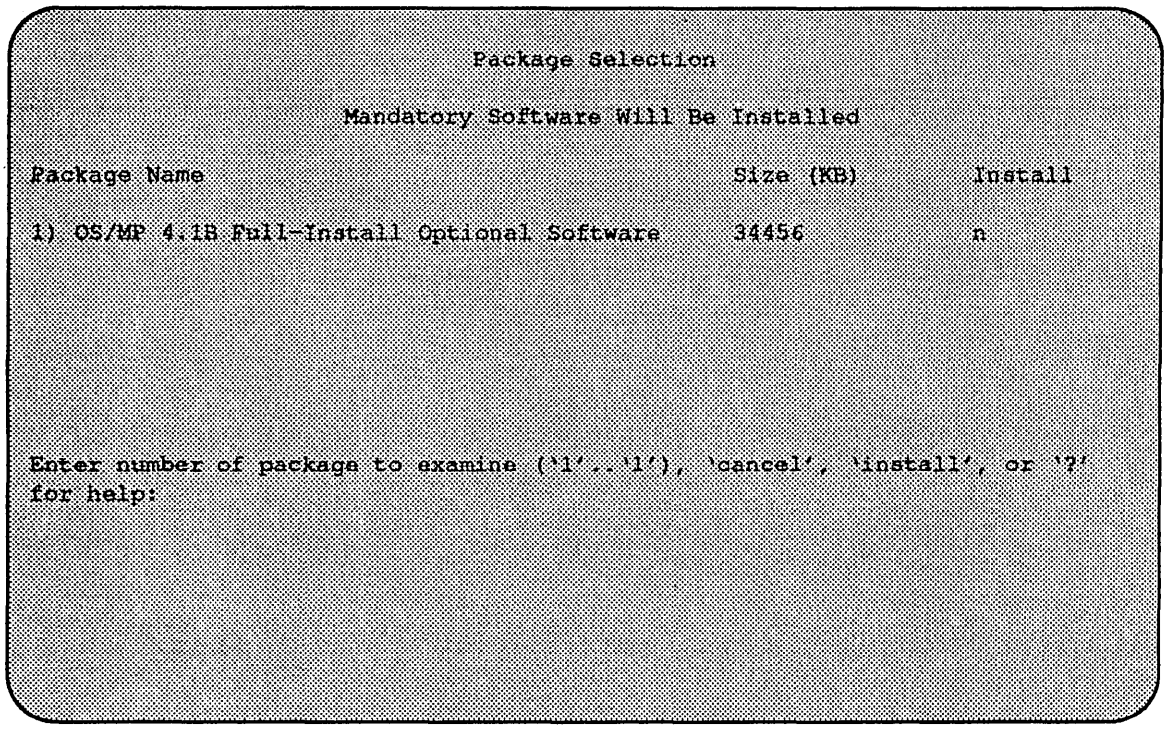

Figure 5. Package Selection Menu

The `Should the OS/MP 4.1B Full-Install Optional Software package be installed` question refers to the package in general. The modules are individually selected for installation on the customization screen, and by default all are selected for installation.

After replying **yes**, the customization menu will appear as shown in Figure 6.

★ ★ ★ NOTE ★ ★ ★

Figure 6 is only an example. The free KB reported varies depending on the type and size of disk drive installed.

The size of each module in kilobytes is listed immediately to the right of the module's name. The column after the size indicates whether or not the module is currently marked for installation. If the module is to be installed, the directory that the module's files are to be installed in is listed, followed by the free space on the partition that the directory refers to.

Below are short descriptions of the individual modules:

DEBUGGING - program debugging aids
This module contains the debugging tool **dbx**(1) and the profiled versions of the standard libraries libc, libcurses, libm, libtermcap, libtermlib, libsuntool, and libsunwindow.

GAMES - games and demonstration programs
The recreational programs listed in Section 6 of the *UNIX User's Reference Manual.*

```
        Customization of Solbourne OS/MP 4.1B Optional Software

                              Software Modules
 Module          Size(KB)      Install          Directory Free(KB)
 1) DEBUGGING        2888          y                /usr      58695
 2) GAMES            3136          y                /usr      58695
 3) MANUAL           7440          y                /usr      58695
 4) NETWORKING       1072          y                /usr      58695
 5) PLOT             1784          y                /usr      58695
 6) SECURITY          312          y                /usr      58695
 7) SV_PROG          1848          y                /usr      58695
 8) SV_USER          2320          y                /usr      58695
 9) SYSTEM_V         4032          y                /usr      58695
10) TEXT              720          y                /usr      58695
11) VERSATEC         5960          y                /usr      58695
12) UUCP              608          y                /usr      58695
13) RFS               912          y                /usr      58695
14) SHLIB            1376          y                /usr      58695
15) TLI                48          y                /usr      58695

Enter number of module to modify ('1'..'15'), 'continue', 'abort', or '?' for
help:
```

Figure 6. Package Selection Customization Menu

MANUAL - on-line manual pages
Sections 1 through 8 of the UNIX User's and Programmer's Manuals in machine-readable form. See **man**(1), **lookup**(1), and **qref**(1) for more details. This option requires that the TEXT option also be installed.

NETWORKING - network utilities
Utilities and commands that access a network, such as **rcp**(1) or **ftp**(1). This module is required on systems that are connected to a network, or that will use the NIS/YP database services.

PLOT - basic plot-generating applications
The standard UNIX plotting utilities, which allow the creation of plots and graphs from simple data to be displayed on a variety of plotters and graphics terminals. See **plot**(1G) and **graph**(1G).

SECURITY - C2 security
The SECURITY module provides features such as audit trails and shadow password files in the spirit of the Department of Defense's C2 Security Specification (the "Orange Book"). The compliance of these features has not been certified.

SV_PROG - SunView program development support
Include files and libraries needed for compiling SunView applications. This module requires that SV_USER also be installed.

SV_USER - basic SunView support
The SunView windowing system and associated applications (such as **suntools**(1) and **shelltool**(1)). This module is not required if only X Windows will be used on the system.

SYSTEM_V
System V-compatible libraries and executables. System VR3, POSIX, and X/OPEN are supported. See **svidii**(7v), **svidiii**(7v), **xopen**(7v), and **posix**(7v) for details.

TEXT - nroff/troff text processing
This module provides the text formatter **troff**(1) and its associated support programs and files. This option is required if the MANUAL option is installed.

VERSATEC - Versatec printer support
Various utilities specific to Versatec printers, such as **vtroff**(1) and **vplot**(1G).

UUCP - uucp applications suite
uucp(1C) and its support programs. These are normally used for communicating with other UNIX operating systems via phone line.

RFS
Utilities and libraries to support the System V Remote File System.

SHLIB
Position-independent versions of the BSD and System-V versions of the C library. These are provided to allow substituting or adding a module to the shared C library.

TLI
Libraries and headers to support developing programs that take advantage of the System V Transport Layer Interface.

Modifying a module allows selecting whether or not it is to be installed and, if so, the directory its files are to be extracted into.

★ ★ ★ NOTE ★ ★ ★

All modules are intended to be extracted in their default directory. If a module is extracted somewhere else, there is no guarantee that the programs provided in the module will work.

For example, to not install the VERSATEC module:

```
Enter number of module to modify ('1'..'15'), 'continue',
'abort', or '?' for help: 11
```

The VERSATEC menu entry is highlighted, and:

```
Modifying the Versatec printer support module
Should the VERSATEC module be installed ('yes', 'no', ^C,
or '?' for help)? no
```

Figure 7 shows the updated display.:

```
        Customization of Bolbourne OS/MP 4.1B Optional Software

                              Software Modules
 Module          Size (KB)      Install          Directory Free (KB)
 1) DEBUGGING         2888          y                /usr      64655
 2) GAMES             3136          y                /usr      64655
 3) MANUAL            7440          y                /usr      64655
 4) NETWORKING        1072          y                /usr      64655
 5) PLOT              1784          y                /usr      64655
 6) SECURITY           312          y                /usr      64655
 7) SV_PROG           1848          y                /usr      64655
 8) SV_USER           2320          y                /usr      64655
 9) SYSTEM_V          4032          y                /usr      64655
10) TEXT               720          y                /usr      64655
11) VERSATEC          5960          n
12) UUCP               608          y                /usr      64655
13) RFS                912          y                /usr      64655
14) SHLIB             1376          y                /usr      64655
15) TLI                 48          y                /usr      64655

Enter number of module to modify ('1'..'15'), 'continue', 'abort', or '?' for
help:
```

Figure 7. Package Selection Menu - Deletion of Versatec Module

★ ★ ★ NOTE ★ ★ ★

The free space for **/usr** *has been increased by the size of the VERSATEC module as shown in Figure 7.*

To install the GAMES module in **/fun** (on the root partition):

```
Enter number of module to modify ('1'..'13'), 'continue',
'abort', or '?' for help: 2
```

The GAMES menu entry is highlighted, and:

```
Modifying the games and demonstration programs module

Should the GAMES module be installed ('yes', 'no', ^C, or
'?' for help)? yes

Install GAMES in what directory? /fun

/fun does not exist. Create it during installation ('yes',
'no', ^C, or '?' for help)? yes
```

The menu is updated to reflect the change, as shown in Figure 8.

★ ★ ★ NOTE ★ ★ ★

The free space for **/usr** *changes, and a completely new size (for* **/fun***) is also displayed as shown in Figure 8.*

```
          Customization of Solbourne OS/MP 4.1B Optional Software

                                Software Modules
 Module          Size (KB)      Install          Directory Free (KB)
 1) DEBUGGING         2888          y                 /usr      67791
 2) GAMES             3136          y                 /fun       4579
 3) MANUAL            7440          y                 /usr      67791
 4) NETWORKING        1072          y                 /usr      67791
 5) PLOT              1784          y                 /usr      67791
 6) SECURITY           312          y                 /usr      67791
 7) SV_PROG           1848          y                 /usr      67791
 8) SV_USER           2320          y                 /usr      67791
 9) SYSTEM_V          4032          y                 /usr      67791
10) TEXT               720          y                 /usr      67791
11) VERSATEC          5960          n
12) UUCP               608          y                 /usr      67791
13) RFS                912          y                 /usr      67791
14) SHLIB             1376          y                 /usr      67791
15) TLI                 48          y                 /usr      67791

Enter number of module to modify ('1'..'15'), 'continue', 'abort', or '?' for
help:
```

Figure 8. Package Selection Menu - Install Games module to /fun

If you decide to discard all changes made to the modules, use the command **abort**. This returns to the Package Selection Menu.

If you are satisfied with the changes (if any) made to the modules, enter the command **continue**. This will record the changes and return to the Package Selection menu.

When package customization has been completed (which may mean no packages were selected for installation), enter **install** as shown in Figure 9.

The actual installation begins at this point. The steps taken during the installation are:

1. create filesystems (**root(/)**, **/usr**, possibly **/var** or **/tmp**
2. create device entries
3. install mandatory **root** files
4. install mandatory **kvm** files
5. install mandatory **usr** files
6. install optional software

```
                        Package Selection

                Mandatory Software Will Be Installed

Package Name                                    Size (KB)  Install

1) OS/MP 4.1B Full-Install Optional Software      34456         y




Enter number of package to examine ('1'..'1'), 'cancel', 'install', or '?'
for help: install
```

Figure 9. Package Selection Menu

When installation has finished, it gives the following message:

```
Optional Software Installation Succeeded

Press any character to continue
```

The next display gives the values of the previous and new ROM variables DEFAULTROOT, DEFAULTSWAP (if they have changed), and asks if you want to update the variables, as shown in Figure 10.

☆ ☆ ☆ NOTE ☆ ☆ ☆

Before you say 'yes', make sure that all the previous settings of these variables are recorded so that you can later reboot from the old version of the system if necessary. If you choose not to update the ROM variables, make sure that you record the new values and use them to reboot the newly installed system at a later time.

`reinst_sys` then performs the final system setup, and completes. The new system's filesystems are currently mounted under the **/etc/sys_conf/reinst_sys/root** directory. For example, the new version of the /var directory is mounted at **/etc/sys_conf/reinst_sys/root/var**.

At this point, the newly installed system is ready to boot. However, you may want to finish the installation by creating or editing such files as **/etc/rc.local**, automounter maps, **/etc/printcap**, the **/var/spool** directories, NIS/YP maps, or any other files local to your system. If you have comments in your **/etc/fstab** file, they will not exist in the new **/etc/fstab** file, so you may want to edit this file.

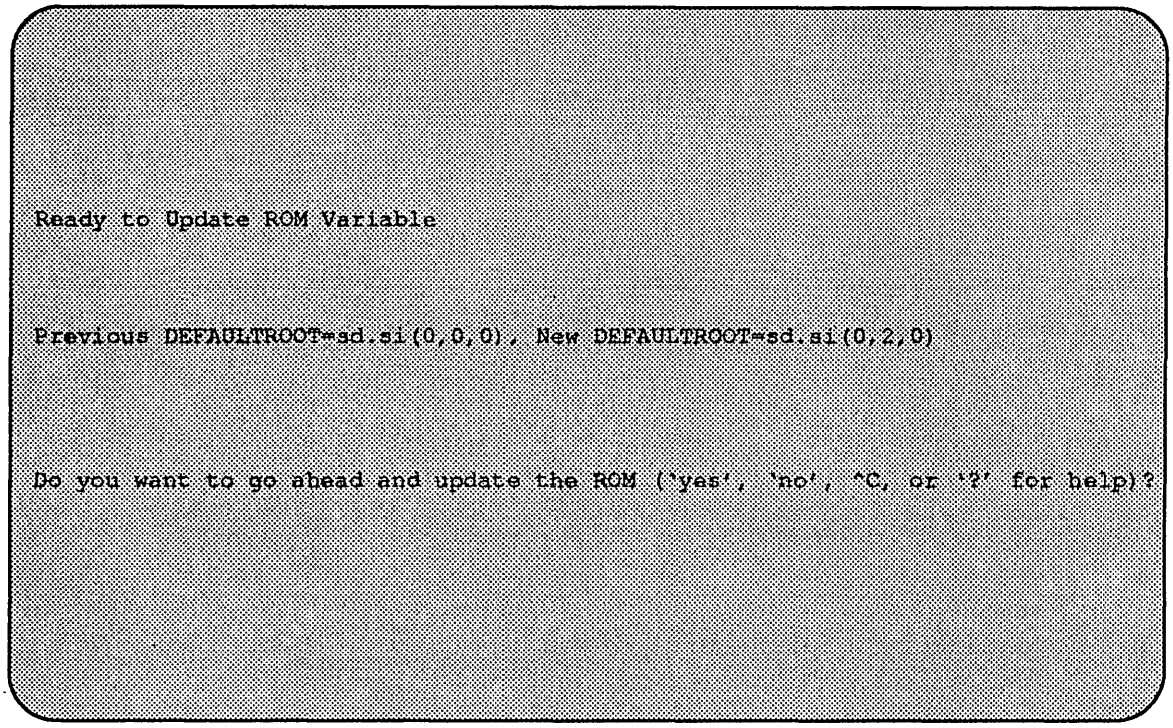

Figure 10. Update ROM Variables

★ ★ ★ NOTE ★ ★ ★

If you installed the new system on a disk that is not recognized by a 4.1B generic kernel, then you must reconfigure the kernel before rebooting.

You may also wish to create a customized kernel on the new system, so that hardware such as the channel board and VSCSI devices will be recognized. If you would rather wait until after rebooting the new system to configure your kernel, you should edit the new **/etc/fstab** file and comment out any partitions which are on disks not visible to the generic 4.1B kernel.

After you have completed customizing the new installation, reboot your machine, using the new ROM variables.

If you used the -a option to upgrade to a different architecture, then after customizing the new installation, halt the machine and turn off the power. Replace the old CPUs with the new CPUs, power up and boot your machine using the new ROM variables.

Installing OS/MP 4.1B on a Server

This chapter describes how to install OS/MP 4.1B on a server. A server is a system that is on a network and may provide NFS disk services.

Before Installing...

★ ★ ★ CAUTION ★ ★ ★

Perform a full system backup before installing OS/MP 4.1B. A complete installation overwrites all information on the disk partitions specified for the root (/), swap, /usr, /var, and /tmp filesystems.

Before installing the release tape, clean the tape drive on the host machine. Failure to do so may result in damage to the release tape.

Any host on a network must be added to the hosts database. Before you can add a host to either database, choose a name and an address for that host. Be sure both are unique for your network. Determine which one of the three network information databases you are using.

- *Static files* - this is the simplest form of the databases: two files, **/etc/hosts** and **/etc/ethers.**
- *Network Information Service* - NIS, formerly called Yellow Pages (YP), is a centralized version of the static files approach. Fundamentally, one system, the NIS/YP master, uses the static files. Other systems ask the master to look up entries in its files.
- *Domain Name Service* - DNS is part of the software used to administrate the Internet, and is beyond the scope of this document. If you are using it, contact your system administrator for information on updating entries in it.

If you are using NIS/YP, take the following actions on the NIS/YP master. If you are using static files, take the following actions on the system that is to act as a server (by providing either its tape or disk drive). Only the superuser (account name **root**) is allowed to update these files.

- Update the *hosts* database with the name and IP address chosen for any new client by adding a line of the following form to **/etc/hosts**:

```
192.1.3.42 hamster
```

- If you are installing a diskless client on your server, update the *ethers* database by adding a line of the form below to /etc/ethers. The six colon-separated numbers are the ones displayed by the system when the power is turned on. The name must be the same as was added to the *hosts* database.

```
0:0:8e:10:0:16 hamster
```

- If you are using NIS/YP, the working copy of the database must be updated:

```
# cd /var/yp
# make
```

★★★NOTE★★★

Execute **make** *on the NIS/YP master server only.*

Installing...

This section covers the 4.1B installation on Series5, Series5E, Series6 and S4000 systems.

Installing on a Series5, Series5E or Series6:

Loading the Ramdisk

The following explains four different methods of loading the ramdisk. After you have loaded the ramdisk continue on to the *Diskful Installation* section.

Loading the Ramdisk via a Local Tape Drive

Turn the system on. After the system passes the self-tests, the system displays the bootROM prompt.

The ramdisk installation software uses the value of the bootROM variable **INSTALLED** to determine if a system needs to have the basic operating system installed. Set the value of this variable to 0 before loading the ramdisk:

```
ROM> setenv installed 0
```

The system asks if you want to re-install if **INSTALLED** is not 0.

To load the ramdisk on Series5 or 5E systems using a local tape drive, enter a boot command in the following form:

```
ROM> boot st.si(,TapeID,2)
```

To load the ramdisk on Series6 systems using a local tape drive, enter a boot command in the following form:

```
ROM> boot st.si(,TapeID,3)
```

The variable *TapeID* shown in the command should be replaced with the SCSI ID of the tape drive to be used. For st0, use 4; for st1, use 5.

The bootROM copies the ramdisk image into memory and boots it:

```
Boot: st.si(,4,3)
Entry: 0xfd080000
Size: 00xea000+0x43b878+0x3a9f0
```

The system displays a spinner while copying the ramdisk into memory. When the copy completes, the spinner pauses for up to three minutes. Proceed to the *Diskful Installation* section

Loading the Ramdisk via a Remote Tape Drive

The system with the tape drive, referred to as *tapehost* in the following example, must be on the same network as the system being installed, referred to as *hamster* in the following example. For example, with a class C network, the first three numbers in the Internet addresses of the two machines must be the same, such as 192.1.3.42 and 192.1.3.17. Also, *hamster* must be listed in **/etc/hosts**, or in the NIS/YP hosts database, and **/.rhosts** on *tapehost*. In addition, the ethernet address must be in the *ethers* database. The ramdisk must be extracted from the OS/MP 4.1B distribution tape onto a disk on *tapehost*.

tapehost must also be running **rpc.mounted**(8) **nfsd**(8) and **rarpd**(8) daemons.

Since the system uses **tftp**(1) to load the ramdisk image, it must be enabled on the tapehost. Examine the file **/etc/inetd.conf**. A line similar to the one below should be in the file:

```
tftp dgram udp wait root /usr/etc/in.tftpd in.tftpd -s
/tftpboot
```

If the line starts with a #, remove the #.

If a `-s` appears after the last `in.tftpd` in **/etc/inetd.conf**, either remove it or use the directory **/tftpboot** instead of **/var/tmp** in the example below. Approximately 6 Mbytes will be needed in the directory used.

If **/etc/inetd.conf** has been changed, **inetd**(8) must be told to re-read the configuration file:

```
tapehost # ps ax | egrep inetd
  249 ? I 0:01 inetd
  541 p3 R 0:00 egrep inetd
```

The *pid* of inetd is the first number on the line that doesn't contain **egrep**. In the above output, *pid* is 249.

```
tapehost # kill -HUP pid
```

Put the distribution tape into the drive and execute the following commands.

★ ★ ★ NOTE ★ ★ ★

In the following example the install kernel will be named /var/tmp/install. The actual name of the file is not important, so long as it is used consistently here and in the example on the next page. Also note that the filesystem must have enough space to hold the install kernel.

In the **mt** command below, replace the variable *X* with one of the following values, depending on the type of system.

Table 13.

System	Value of X
Series5 and 5E	2
Series6	3

For Exabyte tape drives, use bs=1024 instead of bs=512 in the **dd** command shown below.

```
tapehost # cd /var/tmp
tapehost # mt -f /dev/nrst0 asf X
tapehost # dd if=/dev/nrst0 of=install bs=512
```

Enter the following boot command on the system being installed:

```
ROM> b tftp.ei(,,hostnumber)/var/tmp/install
```

In the example above, the variable `hostnumber` should be replaced with the last of the four numbers in the tapehost's Internet address.

Loading the Ramdisk via a Local CD-ROM Drive

Power on the system. After the system passes the self-tests, the bootROM prompt is displayed.

The ramdisk installation software uses the value of the bootROM variable **INSTALLED** to determine if the basic operating system needs to be installed. Set the value of this variable to 0 before loading the ramdisk as follows:

```
ROM> setenv installed 0
```

The system will ask if you want to re-install if **INSTALLED** is not 0.

Install the OS/MP 4.1B CD-ROM disk into the CD-ROM drive.

★ ★ ★ NOTE ★ ★ ★

In order to boot from the local CD-ROM disk, the bootROMs must be at version 3.5 or higher. For this reason, local CD-ROM installation for Series4 is not supported.

To load the ramdisk on Series5 or Series5E, using a local CD-ROM drive, enter a boot command of the following form:

```
ROM> boot sd.si(,6,)/Install.Series5
```

To load the ramdisk on Series6 systems, using a local CD-ROM drive, enter a boot command of the following form:

```
ROM> boot sd.si(,6,)/Install.Series6
```

The bootROM copies the ramdisk image into memory and boots it:

```
Boot: sd.si(,6,)/Install.Series6
Entry: 0xfd080000
Size: 00xea000+0x43b8b8+0x309a8
```

A spinner is displayed while copying the ramdisk into memory. When the copy completes, there is a pause of up to three minutes.

Loading the Ramdisk via a Remote CD-ROM Drive or the Network

Loading the ramdisk from a remote CD-ROM drive is essentially the same as loading the ramdisk from an image area of the OS/MP 4.1B contained on a remote disk accessed over the network.

Power on the system. After the system passes the self-tests, the bootROM prompt is displayed.

The ramdisk installation software uses the value of the bootROM variable **INSTALLED** to determine if the basic operating system needs to be installed. Set the value of this variable to 0 before loading the ramdisk as follows:

```
ROM> setenv installed 0
```

The system will ask if you want to re-install if **INSTALLED** is not 0.

If you are installing by a remote CD-ROM drive (via the network), install the OS/MP 4.1B CD-ROM disk into the remote CD-ROM drive. Create a mount point directory (if one doesn't exist), and mount the CD-ROM drive on the remote machine, referred to here as `diskhost`, as follows:

```
diskhost# mkdir /cdrom
diskhost# mount /dev/sr0 /cdrom
```

The remote system `diskhost`, must be on the same network as the system being installed. For example, with a class C network, the first three numbers in the Internet addresses of the two machines must be the same, such as 192.1.3.42 and 192.1.3.17. Also, the local machine must be listed in **/etc/hosts**, or in the NIS/YP *hosts* database, and in **/.rhosts** on `diskhost`. In addition, the ethernet address must be in **/etc/ethers**, or in the NIS/YP *ethers* database.

`diskhost` must have **`/cdrom`** in its **`/etc/exports`** file, and must also be running the **`rpc.mountd`**(8), **`nfsd`**(8), and **`rarpd`**(8C) daemons.

Since **tftp**(1) will be used by the system to load the ramdisk image, it must be enabled on the diskhost. Examine the file **/etc/inetd.conf**. A line similar to the one below should be in the file:

```
tftp dgram udp wait root /usr/etc/in.tftpd in.tftpd -s
/tftpboot
```

If the line starts with a #, remove the #.

If a `-s` appears after the last `in.tftpd` in **/etc/inetd.conf**, either remove it or use the directory /tftpboot instead of /var/tmp in the example below. Approximately 6 Mbytes will be needed in the directory used.

If **/etc/inetd.conf** has been changed, **inetd**(8) must be told to re-read the configuration file:

```
diskhost # ps ax | egrep inetd
  249 ? I 0:01 inetd
  541 p3 R 0:00 egrep inetd
```

The *pid* of inetd is the first number on the line that doesn't contain **egrep**. In the above output, *pid* is 249.

```
diskhost# kill -HUP pid
```

In the **boot** command below, replace the variable *X* with one of the following values, depending on the type of system

Table 14.

System	Value of X
Series5 and 5E	5
Series 6	6

Enter the following boot command:

```
ROM> b tftp.ei(,,hostnumber)/cdrom/Install.SeriesX
```

Diskful Installation

Once the ramdisk is booted, it first determines what sort of terminal you are using. If you are using a serial terminal, that is, a terminal attached to the **ttya/ttyb** port, or if the bootROM variable **CONSOLE** is not set, the system displays a list of supported terminals:

```
1) 610
2) ansi
3) hp
4) sun
5) tvi912
6) vt100
7) wyse50
What type of terminal are you using ('1'..'7')?
```

If a frame-buffer is being used as the console, select the 4, the sun terminal type.

```
What type of terminal are you using ('1'..'7')? 4
```

If the value of the bootROM variable **INSTALLED** is non-zero, the mandatory system software has already been installed. In that case, the system displays the following:

```
THIS SYSTEM IS ALREADY INSTALLED


Do you want to re-install the system ('yes', 'no', or '?'
for help)?
```

The above message is for the benefit of users intending to re-install the system software, but have not reset the **INSTALLED** environment variable.

If the message appears, enter **yes** to re-install the mandatory system software.

The disk drives attached to the system are then scanned, and the system displays a menu of procedures:

```
Ramdisk

 1) Change Disk Partitioning
 2) Install Software
 3) Invoke a Bourne Shell
 4) Reboot System
 5) Halt System
Enter number of function to execute ('1'..'5', or '?' for
help):
```

The provided functions are described as follows:

Change Disk Partitioning - Allows the changing of the sizes of disk partitions, and what those partitions are to be used for filesystem space, swap space, or unused space.

★ ★ ★ NOTE ★ ★ ★

If you are going to make changes to the disk partitions on which OS/MP 4.1B will reside, make those changes before installing software. Disk partitions not containing OS/MP 4.1B can be modified before or after the installation.

Install Software - Intended primarily for installing new systems. If system software has already been installed, then this option may be used to install any Solbourne software distribution, such as X Windows. See the section *Software Installation from the Ramdisk* for more information.

Invoke a Bourne Shell - Starts an interactive Bourne shell. This option is provided mainly for formatting disks and restoring filesystems. The sizes of disk partitions should not be changed here with the format(8) command. If they are, you must then select `Change Disk Partitioning` before attempting to `Install Software`.

Reboot System - Starts the UNIX operating system after software installation. Alternatively, you may reload the ramdisk from scratch.

Halt System - Returns control of the system to the bootROM.

You can request help at any ramdisk prompt by entering a question mark. Table 15 shows edit commands available when entering text in response to prompts:

Table 15. Input Editing Commands

Character	Interpretation
backspace (^H)	delete last input character
delete (^?)	delete last input character
^U	erase input line
^R	redisplay input line
^W	delete input up to '/' or whitespace
^C	cancel input, returning to nearest menu
ESC	cancel input, returning to nearest menu
^L	redisplay entire screen
return (^M)	end input
newline (^J)	end input

If a string is too long to be displayed in the available space, the beginning of the string is displayed as "...". This allows display of the end of the string, which is usually of more interest.

Keywords can be shortened to any unique prefix (such as 'co' for 'continue'), except for 'yes' and 'no', which must always be spelled out.

Fatal errors during software installation are usually reported by messages beginning with `System error` or `Internal error` and ending with a "#" prompt. If a fatal error occurs, software installation may be restarted by entering:

```
# ^Jstty sane^J
# cd /
# rm -f /core
# inst_sys
```

where ^J is the linefeed character. The command **stty sane** may not be echoed (and is intended to fix exactly that problem). In the event of a fatal error during software installation, please report the problem to Solbourne customer support.

Install Software

Installing software has two distinct stages: gathering information and modifying the system. No permanent changes are made to the system until all information has been provided.

There are three information gathering menus:

- Standard Filesystem Definition - specifies where the standard filesystems (**root (/), swap**, and **/usr**, optionally **/var** and **/tmp**) are located.
- Media Identification - Determines the installation media from which to install (tape, CD-ROM, or network directory), and determines where that media is located.
- Package Selection - allows selecting of which optional software packages are to be installed.

All three menus provide the command **cancel**. The first two also provide the command **previous**. These commands allow you to return to prior menus, optionally discarding any changes that have been made.

cancel always returns to the ramdisk menu. If changes are to be discarded, then all changes made since `Install Software` was selected are forgotten.

previous always returns to the previous menu (which is the ramdisk menu, in the case of the Filesystem Definition menu). The changes discarded in this case are those made in the menu you are leaving.

cancel has higher priority than **previous**. In other words, if you use **previous** to leave a menu without discarding changes, then **cancel** from that menu and discard changes, the changes made in the earlier menu are also discarded.

The Standard Filesystem Definition menu defines where the mandatory filesystems are located. These filesystems (except for root) may be either on a local disk partition or provided by a disk server. If root is to be on a remote system, install the system as a client of that system, even if the system actually contains a disk. You can add entries for any local disks to /etc/fstab after installing the system as a diskless client.

Any changes made to the standard filesystems with the partition tool will appear in this menu.

Normally, no changes need to be made at this menu. To proceed to the Media Identification menu, enter **continue**.

Example:

Use the following steps to assign the **/var** filesystem to **sd0d**, rather than using the default of **/var** being a subdirectory of the root filesystem.

These steps are optional. If followed, the result is a filesystem definition that is the same as that supplied on the factory installation of a diskful system. In addition, it makes use of partition **d**, thus using 9.3 MB of disk space that is not used when the default disk partition is used with the standard filesystem definition.

In Figure 23, the notation "(required)" appears next to the **root(/), swap** and **/usr** filesystems. These filesystems must be defined; however, they may be placed on any partition of any disk.

```
                    Standard Filesystem Definition

  1) root on sd0a      (required)
  2) swap on sd0b      (required)
  3) /usr on sd0g      (required)
  4) /var on root partition
  5) /tmp on root partition

                    Disk Partitions (sizes in MB)
       (a)     (b)      (c)     (d)     (e)     (f)     (g)     (h)
sd0:   8.4    32.4     191.1    9.3     ---     ---     141.1   ---
sd1:   8.4    32.7     190.9    9.6     ---     ---     140.8   ---



Enter number of filesystem to change ('1'..'5'), 'continue', 'previous',
'cancel', or '?' for help:
```

Figure 23. Sample Standard Filesystem Definition Menu

To modify the **/var** filesystem, enter the number: **4**.

```
Enter number of filesystem to change ('1'..'5'),
'continue', 'previous', 'cancel' or '?' for help: 4
```

The var menu will be highlighted, and the system will request a disk partition. Assign it to sd0d.

```
Enter name of disk partition or host:path for /var
filesystem, 'none', ^C, or '?' for help: sd0d
```

The new arrangement is displayed as shown in Figure 24.

Once all changes for the standard filesystems have been made, enter **continue** to proceed to the Media Identification menu.

```
Enter number of filesystem to change ('1'..'5'),
'continue', 'previous', 'cancel', or '?' for help: continue
```

Media Identification Menu

The Media Identification Menu describes which media type (tape, CD ROM, or network directory) will be used during the installation. Figure 25 shows the Media Identification menu.

```
                    Standard Filesystem Definition

  1) root on sd0a      (required)
  2) swap on sd0b      (required)
  3) /usr on sd0g      (required)
  4) /var on sd0d
  5) /tmp on root partition

                    Disk Partitions (sizes in MB)
      (a)    (b)      (c)     (d)     (e)     (f)     (g)     (h)
sd0:  8.4    32.4     191.1   9.3     ---     ---     141.1   ---
sd1:  8.4    32.7     190.9   9.6     ---     ---     140.8   ---



Enter number of filesystem to change ('1'..'5'), 'continue', 'previous',
'cancel', or '?' for help:
```

Figure 24. Modified Standard Filesystem Definition Menu

```
                        Media Identification

1) Installation media type = Tape
2) Tape drive = st0
3) Local Internet address = 0.0.0.0 (required for remote tape)
4) Network broadcast mask = 0xffff0000 (required for remote tape)
5) Tape host = localhost (127.0.0.1)









Enter selection number ('1'..'4'), 'continue', 'previous', 'cancel', or '?'for
help:
```

Figure 25. Media Identification Menu - Local Tapehost

Local Tape Drive Installation

Installing from a local tape drive requires that the *Tape drive* field be set to either **st0** or **st1** (the only supported tape drives) and that *Tape host* be set to **`localhost`**. The Installation media type must also be set to **`Tape`**.

Remote Tape Drive Installation

Installation media type must be set to Tape.

Tape drive should be the basic name of the tape drive on the tapehost.

The **Local Internet address** is the address of the system being installed. If the default value is not correct, make sure that the client name corresponding to the correct address appears in the tape host's **/.rhosts** file. Check **/etc/hosts** or the NIS/YP hosts map as appropriate.

The **broadcast mask** should not be changed unless your network uses a non-standard mask. Such a mask is used when a network is sub-netted (i.e., a Class B network is treated as several Class C networks). A leading '0x' is necessary if entering the mask as a hexadecimal number. A leading '0' is needed for octal numbers. If neither prefix is given, the value is assumed to be in decimal.

Tape host must be set to the name of the system with the tape, which is used to determine the tape host's Internet address. The name itself, however, is not especially important (it is discarded after the installation is complete). As such, the default name, *tape-n-boot-serv*, generally need not be changed.

Figure 26 shows the Media Identification Menu of a system that is set up to install from a remote tape using tape device st0 (SCSI address 4).

When the details of the tape drive have been entered correctly, enter **`continue`**. You will be presented with the Package Selection Menu. If the operating system has already been installed, you will be prompted to insert the optional software distribution media.

Local CD-ROM Installation

Installing from a local CD-ROM disk drive requires that the Installation media type be set to **`CD-ROM`**, the CD-ROM drive field be set to **`/dev/sr0`** and the *CD host* field be set to **`'localhost'`**. Figure 27 shows the Installation Media Menu with the CD-ROM parameters set to install from CD-ROM.

Network and remote CD-ROM Installations

Installation media type must be set to **`Network`**

Installation directory should be the full path name of the location of the installation area, or the full path of the CD-ROM mount point, on the network host. For example, if the remote CD-ROM is mounted on **`/usr/cdrom`**, then the installation path is simply **`/usr/cdrom`**.

```
                              Media Identification
1) Installation media type = Tape
2) Tape drive = st0
3) Local Internet address = 192.9.3.4 (required for remote tape)
4) Network broadcast mask = 0xffffff00 (required for remote tape)
5) Tape host = tape-n-boot-serv (192.9.3.1)









Enter selection number ('1'..'4'), 'continue', 'previous', 'cancel', or '?' for
help:
```

Figure 26. Media Identification Menu - Remote Tapehost

```
                         Installation Media Identification

1) Installation media type = CD-ROM
2) CD drive = /dev/sr0
3) Local Internet address = 0.0.0.0 (required for remote tape)
4) Network broadcast mask = 0xffff0000 (required for remote tape)
5) CD host = localhost (127.0.0.1)









Enter selection number ('1'..'5'), 'continue', 'previous', 'cancel', or '?' for
help:
```

Figure 27. Installation Media Identification Menu - Local CD-ROM

The **Local Internet address** is the address of the system being installed. If the default value is not correct, make sure that the client name corresponding to the correct address appears in the tape host's **/.rhosts** file. Check **/etc/hosts** or the NIS/YP hosts map as appropriate.

The **broadcast mask** should not be changed unless your network uses a non-standard mask. Such a mask is used when a network is sub-netted (i.e., a Class B network is treated as several Class C networks). A leading '0x' is necessary if entering the mask as a hexadecimal number. A leading '0' is needed for octal numbers. If neither prefix is given, the value is assumed to be in decimal.

Network host must be set to the name of the system with the installation directory, which is used to determine it's Internet address. The name itself, however, is not especially important (it is discarded after the installation is complete). As such, the default name, *tape-n-boot-serv*, generally need not be changed

When the details of the media have been entered correctly, enter **`continue`**. If You will be presented with the Package Selection Menu If the operating system has already been installed, you will be prompted to insert the optional software distribution media.

Package Selection Menu

Use the Package Selection Menu to install optional Solbourne software distributions. It provides a menu-driven method of examining the components of the distribution tape, selecting the parts to be installed, and specifying the directories where the components will be located.

The components of a distribution are referred to as **packages**. Some examples of packages are **FORTRAN 1.4, X Windows**, and **Solbourne OS/MP Optional Software**. Packages contain one or more *modules*, which are groups of logically-related files, such as executables or libraries. Most packages also have *variables*, which have two uses: controlling the actions of installation commands associated with the package, and prefixing where modules are to be installed.

A single package, Solbourne OS/MP Optional Software, is included on the OS/MP 4.1B distribution tape. The following display shown in Figure 28 appears; the values shown for `Size` in this and subsequent displays may vary.

The message `Mandatory Software Will Be Installed` indicates that the standard filesystems will be built from scratch (overwriting any old contents) when the **`install`** command is issued. If this message does not appear, only the packages selected in this menu will be installed.

The Optional Software package contains a set of software modules that have historically been installed as part of **/usr**. These modules are not necessary for the basic operation of the system, and have been provided separately so that **/usr** may be kept as small as possible. You must examine the package if you want it installed.

```
                        Package Selection

                Mandatory Software Will Be Installed

Package Name                                Size(KB)      Install

1) Solbourne OS/MP 4.1B Optional Software     35208           n



Enter number of package to examine ('1'..'1'), 'cancel', 'install', or '?'
for help:
```

Figure 28. Package Selection Menu

To examine the modules available, select the Optional Software package:

```
Enter number of package to examine ('1'..'1'), 'cancel',
'install', or '?' for help: 1

Should the Solbourne OS/MP 4.1B Optional Software package
be installed ('yes', 'no', ^C, or '?' for help)? yes
```

The `Should the Solbourne OS/MP 4.1B Optional Software package be installed` question refers to the package in general. The modules are individually selected for installation on the customization screen, and by default all are selected for installation.

After replying **yes**, the customization menu will appear as shown in Figure 29.

★ ★ ★ NOTE ★ ★ ★

Figure 29 is only an example. The free KB reported varies depending on the type and size of disk drive installed.

The size of each module in kilobytes is listed immediately to the right of the module's name. The column after the size indicates whether or not the module is currently marked for installation. If the module is to be installed, the directory that the module's files are to be installed in is listed, followed by the free space on the partition that the directory refers to.

Below are short descriptions of the individual modules:

```
        Customization of Solbourne OS/MP 4.1B Optional Software

                                Software Modules
 Module          Size(KB)       Install      Directory      Free(KB)
 1) DEBUGGING        2760           y            /usr          58695
 2) GAMES            2872           y            /usr          58695
 3) MANUAL           7392           y            /usr          58695
 4) NETWORKING       1056           y            /usr          58695
 5) PLOT             1784           y            /usr          58695
 6) SECURITY          312           y            /usr          58695
 7) SV_PROG          1832           y            /usr          58695
 8) SV_USER          2872           y            /usr          58695
 9) SYSTEM_V         3992           y            /usr          58695
10) TEXT              720           y            /usr          58695
11) VERSATEC         5952           y            /usr          58695
12) UUCP              608           y            /usr          58695
13) RFS               928           y            /usr          58695
14) SHLIB            1368           y            /usr          58695
15) TLI                48           y            /usr          58695

Enter number of module to modify ('1'..'15'), 'continue', 'abort', or '?' for
help:
```

Figure 29. Package Selection Customization Menu

DEBUGGING - program debugging aids

This module contains the debugging tool **dbx**(1) and the profiled versions of the standard libraries libc, libcurses, libm, libtermcap, libtermlib, libsuntool, and libsunwindow.

GAMES - games and demonstration programs

The recreational programs listed in Section 6 of the *UNIX User's Reference Manual.*

MANUAL - on-line manual pages

Sections 1 through 8 of the UNIX User's and Programmer's Manuals in machine-readable form. See **man**(1), **lookup**(1), and **qref**(1) for more details. This option requires that the TEXT option also be installed.

NETWORKING - network utilities

Utilities and commands that access a network, such as **rcp**(1) or **ftp**(1). This module is required on systems that are connected to a network, or that will use the NIS/YP database services.

PLOT - basic plot-generating applications

The standard UNIX plotting utilities, which allow the creation of plots and graphs from simple data to be displayed on a variety of plotters and graphics terminals. See **plot**(1G) and **graph**(1G).

SECURITY - C2 security
The SECURITY module provides features such as audit trails and shadow password files in the spirit of the Department of Defense's C2 Security Specification (the "Orange Book"). The compliance of these features has not been certified.

SV_PROG - SunView program development support
Include files and libraries needed for compiling SunView applications. This module requires that SV_USER also be installed.

SV_USER - basic SunView support
The SunView windowing system and associated applications (such as **suntools**(1) and **shelltool**(1)). This module is not required if only X Windows will be used on the system.

SYSTEM_V
System V-compatible libraries and executables. System VR3, POSIX, and X/OPEN are supported. See **svidii**(7v), **svidiii**(7v), **xopen**(7v), and **posix**(7v) for details.

TEXT - nroff/troff text processing
This module provides the text formatter **troff**(1) and its associated support programs and files. This option is required if the MANUAL option is installed.

VERSATEC - Versatec printer support
Various utilities specific to Versatec printers, such as **vtroff**(1) and **vplot**(1G).

UUCP - uucp applications suite
uucp(1C) and its support programs. These are normally used for communicating with other UNIX operating systems via phone line.

RFS
Utilities and libraries to support the System V Remote File System.

SHLIB
Position-independent versions of the BSD and System-V versions of the C library. These are provided to allow substituting or adding a module to the shared C library.

TLI
Libraries and headers to support developing programs that take advantage of the System V Transport Layer Interface.

Modifying a module allows selecting whether or not it is to be installed and, if so, the directory its files are to be extracted into.

★ ★ ★ NOTE ★ ★ ★

All modules are intended to be extracted in their default directory. If a module is extracted somewhere else, there is no guarantee that the programs provided in the module will work.

For example, to not install the VERSATEC module:

```
Enter number of module to modify ('1'..'15'), 'continue',
'abort', or '?' for help: 11
```

The VERSATEC menu entry is highlighted, and:

```
Modifying the Versatec printer support module
Should the VERSATEC module be installed ('yes', 'no', ^C,
or '?' for help)? no
```

Figure 30 shows the updated display.

```
          Customization of Solbourne OS/MP 4.1B Optional Software

                              Software Modules
 Module          Size(KB)      Install     Directory      Free(KB)
 1) DEBUGGING        2760          y           /usr          64647
 2) GAMES            2872          y           /usr          64647
 3) MANUAL           7392          y           /usr          64647
 4) NETWORKING       1056          y           /usr          64647
 5) PLOT             1784          y           /usr          64647
 6) SECURITY          312          y           /usr          64647
 7) SV_PROG          1832          y           /usr          64647
 8) SV_USER          2872          y           /usr          64647
 9) SYSTEM_V         3992          y           /usr          64647
10) TEXT              720          y           /usr          64647
11) VERSATEC         5952          n
12) UUCP              608          y           /usr          64647
13) RFS               928          y           /usr          64647
14) SHLIB            1368          y           /usr          64647
15) TLI                48          y           /usr          64647

Enter number of module to modify ('1'..'15'), 'continue', 'abort', or '?' for
help:
```

Figure 30. Package Selection Menu - Deletion of Versatec Module

★ ★ ★ NOTE ★ ★ ★

The free space for **/usr** *has been increased by the size of the VERSATEC module as shown in Figure 30.*

To install the GAMES module in **/fun** (on the root partition):

```
Enter number of module to modify ('1'..'13'), 'continue',
'abort', or '?' for help: 2
```

The GAMES menu entry is highlighted, and:

```
Modifying the games and demonstration programs module

Should the GAMES module be installed ('yes', 'no', ^C, or
'?' for help)? yes

Install GAMES in what directory? /fun

/fun does not exist. Create it during installation ('yes',
'no', ^C, or '?' for help) ? yes
```

The menu is updated to reflect the change, as shown in Figure 31.

```
          Customization of Solbourne OS/MP 4.1B Optional Software

                                Software Modules
 Module          Size(KB)       Install     Directory      Free(KB)
  1) DEBUGGING       2760          y           /usr           67519
  2) GAMES           2872          y           /fun            4579
  3) MANUAL          7392          y           /usr           67519
  4) NETWORKING      1056          y           /usr           67519
  5) PLOT            1784          y           /usr           67519
  6) SECURITY         312          y           /usr           67519
  7) SV_PROG         1832          y           /usr           67519
  8) SV_USER         2872          y           /usr           67519
  9) SYSTEM_V        3992          y           /usr           67519
 10) TEXT             720          y           /usr           67519
 11) VERSATEC        5952          n
 12) UUCP             608          y           /usr           67519
 13) RFS              928          y           /usr           67519
 14) SHLIB           1368          y           /usr           67519
 15) TLI               48          y           /usr           67519 -

Enter number of module to modify ('1'..'15'), 'continue', 'abort', or '?' for
help:
```

Figure 31. Package Selection Menu - Install Games module to /fun

☆☆☆ NOTE ☆☆☆

The free space for /**usr** *changes, and a completely new size (for* /**fun**) *is also displayed as shown in Figure 31.*

If you decide to discard all changes made to the modules, use the command **abort**. This returns to the Package Selection Menu.

If you are satisfied with the changes (if any) made to the modules, enter the command **continue**. This will record the changes and return to the Package Selection menu.

When package customization has been completed (which may mean no packages were selected for installation), enter **install** as shown in Figure 32.

```
                        Package Selection

                Mandatory Software Will Be Installed

Package Name                                Size(KB)      Install

1) Solbourne OS/MP 4.1B Optional Software     38864           y




Enter number of package to examine ('1'..'1'), 'cancel', 'install', or '?'
for help: install
```

Figure 32. Package Selection Menu

Actual installation begins at this point, and may require from 10 minutes (if only mandatory root files are being installed and a local tape drive is used) to about two hours (if everything is being installed from a remote QIC-150 tape drive).

The steps taken during the installation are:

1. extract miniusr. (This contains the installation software, as well as enabling swapping. The root disk might not be repartitioned after this step without requiring reinstallation.)
2. create filesystems (**root**(/), **/usr**, or **/var** or **/tmp**, as well as any new filesystems requested via the partition tool)
3. create device entries
4. install mandatory **root** files
5. install mandatory **kvm** files
6. install mandatory **usr** files
7. install optional software

When installation has finished, the ramdisk menu is displayed (see Figure 33). If the installation failed, call Customer Support.

Rebooting from the Ramdisk

When the `Tape Change` selection is displayed, type **`continue.`**

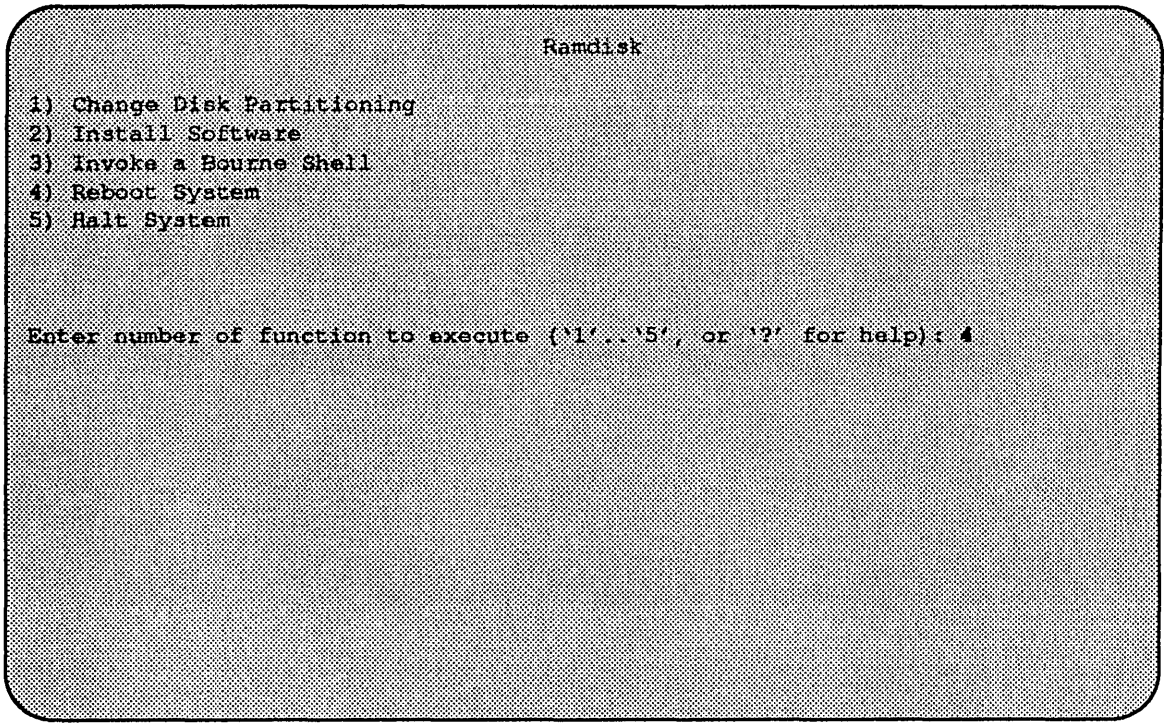

Figure 33. Ramdisk Menu

After a successful installation, start the UNIX operating system by rebooting as shown in Figure 34.

Enter number of function to execute ('1'..'5', or '?' for help): **4**

At the Reboot System menu select Boot Unix:

```
Enter selection number ('1'..'3') or '?' for help: 1
```

After selecting **1** there is a short pause, and then

```
Automatic boot enabled. Type Control-C to abort
ROM> boot
Boot: sd.si(0,0,0)/vmunix
Entry: 0xfd080000
Size: 0xd6000+0x33358+0x81548

OS/MP 4.1B_Export (GENERIC/root) #0: Tues May26 21:09:24
1992
Copyright (c) 1989, 1990 Sun Microsystems, Inc. and
Solbourne Computer, Inc.
[...]
```

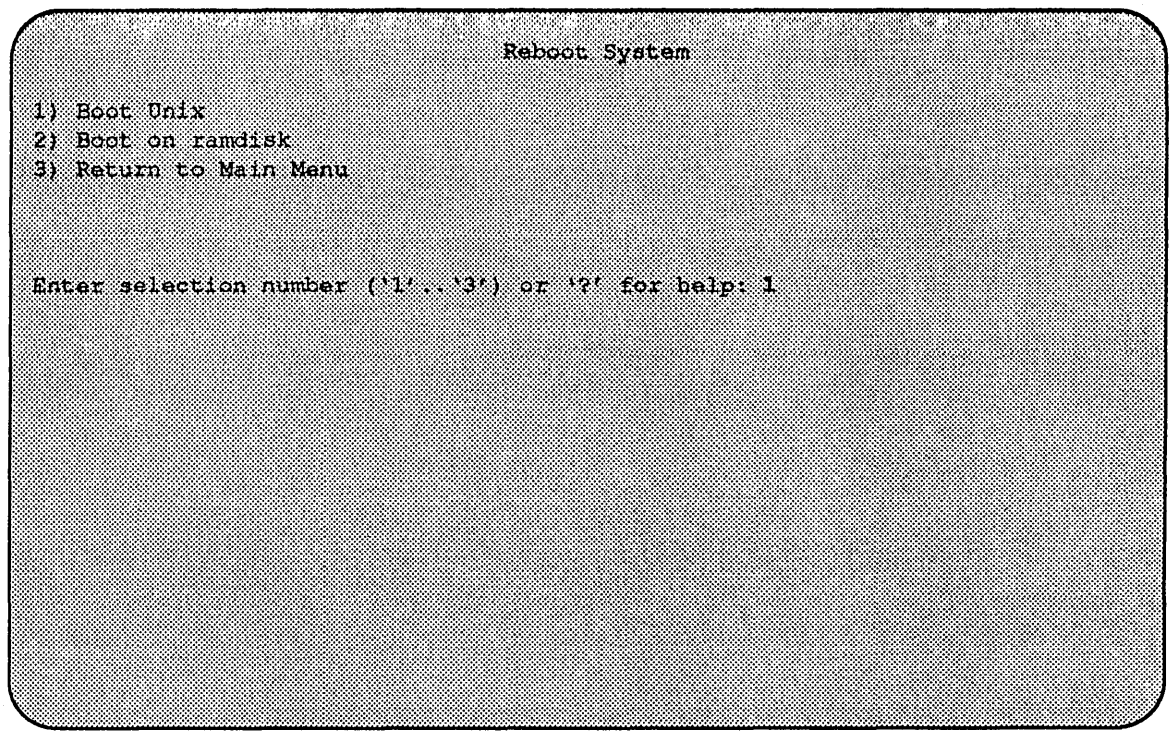

Figure 34. Reboot System Menu

Now you must specify system configuration information.

Disabling tftp

If the ramdisk was loaded from a remote tape drive, **tftp**(1) was enabled at that time.

For security reasons, it should now be disabled on the system from which the tape was read.

First, comment out the line, as shown below, in **/etc/inetd.conf**:

```
#tftp dgram udp wait root /usr/etc/in.tftpd in.tftpd
/tftpboot
```

Next, determine the process ID of **inetd**(8):

```
tapehost# ps ax | egrep inetd
  249 ?  I 0:01 inetd
  541 p3 R 0:00 egrep inetd
```

The *pid* of inetd is the first number on the line that doesn't contain egrep. In the above output, pid is 249.

Last, signal **inetd** to re-read the configuration file:

```
tapehost# kill -HUP pid
```

After Installing...

Initial Boot System Configuration

When a newly installed system is booted multi-user for the first time, the system asks a series of configuration questions:

```
OS/MP 4.1B_Export (GENERIC/root) #0: Tue May 26 10:00:13
1992

Copyright (c) 1989-1991 Sun Microsystems, Inc. and
Solbourne Computer, Inc.


[...]

Automatic reboot in progress...
Thur May 28 16:55:42 PDT 1992
checking quotas: done.


This system has not yet been configured. Several values
need to be set before the system can come up to multi-user
Unix.

What is this system's name (default = 'standalone'):
habitrail

What is its Internet address (0 for none, default =
192.9.3.4)? <Return>

What is the network broadcast mask (default = 0xffffff00)?
<Return>

What is the NIS domain name ('none' for none, default =
'none')? Rodent.COM
```

★★★NOTE★★★

Using the default 'none' disables the NIS/YP services.

```
Time zone choices are:
Australia/  GMT+11      GMT-3       GMT6        Mideast/
Brazil/     GMT+12      GMT-4       GMT7        NZ
CET         GMT+13      GMT-5       GMT8        Navajo
CST6CDT     GMT+2       GMT-6       GMT9        PRC
Canada/     GMT+3       GMT-7       Greenwich   PST8PDT
Chile/      GMT+4       GMT-8       HST         Poland
Cuba        GMT+5       GMT-9       Hongkong    ROC
EET         GMT+6       GMT0        Iceland     ROK
EST         GMT+7       GMT1        Iran        Singapore
EST5EDT     GMT+8       GMT10       Israel      Turkey
Egypt       GMT+9       GMT11       Jamaica     UCT
Factory     GMT-0       GMT12       Japan       US/
GB-Eire     GMT-1       GMT13       Libya       UTC
GMT         GMT-10      GMT2        MET         Universal
GMT+0       GMT-11      GMT3        MST         W-SU
GMT+1       GMT-12      GMT4        MST7MDT     WET
GMT+10      GMT-2       GMT5        Mexico/     Zulu

('/' indicates time zone prefixes)

Enter time zone (default = 'US/Mountain'): US <Return>
Time zone choices are:
Alaska      Central     Hawaii      Pacific
Aleutian    East-Indiana  Michigan  Pacific-New
Arizona     Eastern     Mountain    Samoa

Enter time zone: Mountain <Return>
What is today's date (mm/dd/yyyy, default = 05/28/1992)? <Return>
What time is it (24-hour hh:mm, default = 16:55)? <Return>

Current settings are:
 Host name                = habitrail
 Internet address         = 192.9.3.4
 Network mask             = 0xffffff00
 NIS domain               = Rodent.COM
 Time zone                = US/Mountain
 Date (m/d/y)             = 05/28/1992
 Time                     = 16:55

Are these correct ('yes' or 'no')?
yes

Setting netmask of ei0 to 255.255.255.0
Tue Dec 11 22:09:00 MST 1990
Setting password for root
Changing password for root on habitrail.
New password:
Retype new password:
Continuing boot
starting rpc and net services: portmap [...]
```

Reconfiguring the System

You may need to reconfigure the system if: (1) wrong value was set during the initial configuration, or (2) the system did not successfully come up to multi-user mode.

If you find that a wrong value was set during configuration, you can modify the appropriate file manually, or reconfigure. Manually correcting the settings should only be done if you are an experienced system administrator. Reconfiguring automatically is straight forward, as explained in the following procedure.

If the system has hung up during the boot process, press the Reset button.

★ ★ ★ NOTE ★ ★ ★

If automatic boot is enabled, interrupt the reboot by typing Control-C in the early stages of the reboot; otherwise the system will hang up as before

Then bring up the system in single-user mode:

```
ROM> boot -s
[...]
```

If the system booted successfully originally, you may instead log in as root:

```
habitrail login: root
Password:
```

In either case, if a file exists that tells the system it has been configured, remove it:

```
# rm /etc/sys_conf/system-configured
```

The above file may not exist; this is not a problem. Go to the next step.

Now reboot. If you are in single-user mode, exit:

```
# exit
```

Otherwise, use fastboot:

```
# /etc/fastboot
```

The system asks configuration questions just as it did the first time it booted after being installed.

Installing on Series S4000

Loading the Ramdisk

Turn the system on. After the system passes the self-tests, the system displays the bootROM prompt.

Loading the Local Ramdisk via a Local Tape Drive

The ramdisk installation software uses the value of the bootROM variable **INSTALLED** to determine if the basic operating system needs to be installed. Set the value of this variable to 0 before loading the ramdisk as follows:

```
ROM> setenv installed 0
```

The system asks if you want to re-install if **INSTALLED** is not 0.

Install the OS/MP 4.1B distribution tape into the tape drive and enter the **install** command. If there is more than one tape drive, the bootROM asks which tape drive to use. For example:

```
ROM> install
Which type of device do you wish to install from:
   1) Tape
   2) Network
Enter device type: 1
You have the following tape drives. Please choose one:
   1) At Target4, drive name: ARCHIVE VIPER 150 21247-005
   2) At Target5, drive name: EXABYTE EXB-8200 251K
Enter device number: 1
```

The bootROM copies the ramdisk image into memory and boots it:

```
Boot: st.si(,4,4)
Entry: 0xfd080000
Size: 0xea000+0x43b878+0x3a9f0
```

The system displays a spinner while copying the ramdisk into memory. When the copy completes, the spinner pauses for up to three minutes.

Loading the Ramdisk via a Remote Tape Drive

The system with the tape drive, referred to as *tapehost* in the following example, must be on the same network as the system being installed, referred to as *hamster* in the following example. For example, with a class C network, the first three numbers in the Internet addresses of the two machines must be the same, such as

192.1.3.42 and 192.1.3.17. Also, *hamster* must be listed in **/etc/hosts**, or in the NIS/YP hosts database, and **/.rhosts** on *tapehost*. In addition, the ethernet address must be in the *ethers* database.

The ramdisk must be extracted from the OS/MP 4.1B distribution tape onto a disk on *tapehost*.

Since **tftp**(1) will be used by the system to load the ramdisk image, it must be enabled on the tapehost. Examine the file **/etc/inetd.conf**. A line similar to the one below should be in the file:

```
tftp dgram udp wait root /usr/etc/in.tftpd in.tftpd -s
/tftpboot
```

If the line starts with a #, remove the #.

If a `-s` appears after the last `in.tftpd` in **/etc/inetd.conf**, either remove it or use the directory **/tftpboot** instead of **/var/tmp** in the example below. Approximately 6 MBytes will be needed in the directory used.

If **/etc/inetd.conf** has been changed, **inetd**(8) must be told to re-read the configuration file:

```
tapehost # ps ax | egrep inetd
249 ? I 0:01 inetd
541 p3 R 0:00 egrep inetd
```

The *pid* of inetd is the first number on the line that doesn't contain **egrep**. In the above output, *pid* is 249.

```
tapehost # kill -HUP pid
```

tapehost must also be running **rpc.mounted**(8) **nfsd**(8) and **rarpd**(8) daemons.

Put the distribution tape into the drive and execute the following commands.

★ ★ ★ NOTE ★ ★ ★

In the following example the install kernel will be named /var/tmp/install. The actual name of the file is not important, as long as it is used consistently here and in the example on the next page. Also note that the filesystem must have enough space to hold the install kernel.

For Exabyte tape drives, use bs=1024 instead of bs=512 in the **dd** command shown below.

```
tapehost # cd /var/tmp
tapehost # mt -f /dev/nrst0 asf 4
tapehost # dd if=/dev/nrst0 of=install bs=512
```

The ramdisk installation software uses the value of the bootROM variable **INSTALLED** to determine if a system needs to have the basic operating system installed. Set the value of this variable to 0 before loading the ramdisk:

```
ROM> setenv installed 0
```

The system will ask if you want to re-install if **INSTALLED** is not 0. Enter the **install** command, selecting network installation. In the following sample interaction, sample Internet addresses are shown. Where the system prompts for an Internet address, you should enter the value assigned to your system.

```
ROM> install
Which type of device do you wish to install from:
   1) Tape
   2) Network
Enter device type: 2
Enter internet address of this system (default=a.b.c.d):
192.9.3.4


Enter internet address of remote tape system
(default=a.b.c.d):
   192.9.3.1
Enter name of file to boot (default=/usr/boot/munix.S4000):
   /var/tmp/install
Using IP address 192.9.3.4 = C0090304
Server at IP address 192.9.3.1 = C0090301
Boot: tftp.ei(,1,1)/var/tmp/install
Entry: 0xfd080000
Size: 00xea000+0x43b878+0x3a9f0
```

A spinner is displayed while copying the ramdisk into memory. When the copy completes, there is a pause of up to three minutes.

Loading the Ramdisk via a Local CD-ROM Drive

Power on the system. After the system passes the self-tests, the bootROM prompt is displayed.

The ramdisk installation software uses the value of the bootROM variable **INSTALLED** to determine if the basic operating system needs to be installed. Set the value of this variable to 0 before loading the ramdisk as follows:

```
ROM> setenv installed 0
```

The system will ask if you want to re-install if **INSTALLED** is not 0.

Install the OS/MP 4.1B CD-ROM disk into the CD-ROM drive.

To load the ramdisk on S4000 systems, using a local CD-ROM drive, enter a boot command of the following form:

```
ROM> boot sd.si(,6,)/Install.S4000
```

The bootROM copies the ramdisk image into memory and boots it:

```
Boot: sd.si(,6,)/Install.S4000
Entry: 0xfd080000
Size: 00xea000+0x43b8b8+0x309a8
```

A spinner is displayed while copying the ramdisk into memory. When the copy completes, there is a pause of up to three minutes.

Loading the Ramdisk via a Remote CD-ROM Drive or the Network

Loading the ramdisk from a remote CD-ROM drive is essentially the same as loading the ramdisk from an image area of the OS/MP 4.1B contained on a remote disk accessed over the network. The command to load the ramdisk depends on the type of system.

Power on the system. After the system passes the self-tests, the bootROM prompt is displayed.

The ramdisk installation software uses the value of the bootROM variable **INSTALLED** to determine if the basic operating system needs to be installed. Set the value of this variable to 0 before loading the ramdisk as follows:

```
ROM> setenv installed 0
```

The system will ask if you want to re-install if **INSTALLED** is not 0.

If you are installing using a remote CD-ROM drive (via the network), install the OS/MP 4.1B CD-ROM disk into the remote CD-ROM drive. Create a mount point directory (if one doesn't exist), and mount the CD-ROM drive on the remote machine, referred to here as `diskhost`, as follows:

```
diskhost# mkdir /cdrom
diskhost# mount /dev/sr0 /cdrom
```

The remote system `diskhost`, must be on the same network as the system being installed. For example, with a class C network, the first three numbers in the Internet addresses of the two machines must be the same, such as 192.1.3.42 and 192.1.3.17. Also, the local machine must be listed in **/etc/hosts**, or in the NIS/YP *hosts* database, and in **/.rhosts** on `diskhost`. In addition, the ethernet address must be in **/etc/ethers**, or in the NIS/YP *ethers* database.

`diskhost` must have **/cdrom** in it's **/etc/exports** file, and must also be running the **rpc.mountd**(8) **nfsd**(8) and **rarpd**() daemons.

Since **tftp**(1) will be used by the system to load the ramdisk image, it must be enabled on the diskhost. Examine the file **/etc/inetd.conf**. A line similar to the one below should be in the file:

```
tftp dgram udp wait root /usr/etc/in.tftpd in.tftpd -s
/tftpboot
```

If the line starts with a #, remove the #.

If a `-s` appears after the last `in.tftpd` in **/etc/inetd.conf**, either remove it or use the directory **/tftpboot** instead of **/var/tmp** in the example below. Approximately 6 MBytes will be needed in the directory used.

If **/etc/inetd.conf** has been changed, **inetd**(8) must be told to re-read the configuration file:

```
diskhost # ps ax | egrep inetd
  249 ? I 0:01 inetd
  541 p3 R 0:00 egrep inetd
```

The *pid* of inetd is the first number on the line that doesn't contain **egrep**. In the above output, *pid* is 249.

```
diskhost# kill -HUP pid
```

Enter the following boot command:

```
ROM> b tftp.ei(,,hostnumber)/cdrom/Install.S4000
```

Diskful Installation

This section describes the procedure for installing diskful systems.

When the ramdisk is booted, it first determines what sort of terminal is being used. If it is a serial terminal, that is, a terminal attached to the **ttya/ttyb** port, or if the bootROM variable **CONSOLE** is not set, a list of supported terminals is displayed as follows:

```
1) 610
2) ansi
3) hp
4) sun
5) tvi912
6) vt100
7) wyse50
What type of terminal are you using ('1'..'7')?
```

If a frame-buffer is being used as the console, select the 4, the sun terminal type.

```
What type of terminal are you using ('1'..'7')? 4
```

If the value of the bootROM variable **INSTALLED** is non-zero, the mandatory system software has already been installed. In that case, the system displays the following:

```
THIS SYSTEM IS ALREADY INSTALLED

Do you want to re-install the system ('yes', 'no', or '?'
for help)?
```

The above message is for the benefit of users intending to re-install the system software, but have not reset the **INSTALLED** environment variable. If the message appears, enter **yes** to re-install the mandatory system software.

The disk drives attached to the system are then scanned, and a menu of procedures is displayed:

```
Ramdisk

  1) Change Disk Partitioning
  2) Install Software
  3) Invoke a Bourne Shell
  4) Reboot System
  5) Halt System
Enter number of function to execute ('1'..'5', or '?' for
help):
```

The provided functions are described below:

Change Disk Partitioning - Allows changing the sizes of disk partitions, and what those partitions are to be used for, such as filesystem, swap, or unused.

★ ★ ★ NOTE ★ ★ ★

If changes are going to be made to the disk partitions on which OS/MP 4.1B will reside, make the changes before installing software. Disk partitions not containing OS/MP 4.1B can be modified before or after the installation.

Install Software - Intended primarily for installing new systems. If system software has already been installed, then this option may be used to install any Solbourne software distribution, such as X Windows.

Invoke a Bourne Shell - Starts an interactive Bourne shell. This option is provided mainly for formatting disks and restoring filesystems. The sizes of disk partitions should not be changed here with the format(8) command. If they are, you must then select `Change Disk Partitioning` before attempting to `Install Software`.

Reboot System - Starts the UNIX operating system after software installation. Alternatively, you may reload the ramdisk from scratch.

Halt System - Returns control of the system to the bootROM.

You can request help at any ramdisk prompt by entering a question mark by itself. Table 16 shows edit commands available when entering text in response to prompts:

Table 16. Input Editing Commands

Character	Interpretation
backspace (^H)	delete last input character
delete (^?)	delete last input character
^U	erase input line
^R	redisplay input line
^W	delete input up to '/' or whitespace
^C	cancel input, returning to nearest menu
ESC	cancel input, returning to nearest menu
^L	redisplay entire screen
return (^M)	end input
newline (^J)	end input

If a string is too long to be displayed in the available space, the beginning of the string is displayed as "...". This allows display of the end of the string, which is usually of more interest.

Keywords can be shortened to any unique prefix (such as 'co' for 'continue'), except for 'yes' and 'no', which must always be spelled out.

Fatal errors during software installation are usually reported by messages beginning with "`System error`" or "`Internal error`" and ending with a "`#`" prompt. If a fatal error occurs, software installation may be restarted by entering:

```
# ^Jstty sane^J
# cd /
# rm -f /core
# inst_sys
```

where ^J is the linefeed character. The command **stty sane** may not be echoed (and is intended to fix exactly that problem). In the event of a fatal error during software installation, please report the problem to Solbourne customer support.

Install Software

Installing software has two distinct stages: gathering information and modifying the system. No permanent changes are made to the system until all information has been provided.

There are three information gathering menus:

- Standard Filesystem Definition - specifies where the standard filesystems (**root (/), swap,** and **/usr,** optionally **/var** and **/tmp**) are located.
- Media Identification - Determines the installation media from which to install (tape, CD-ROM, or network directory), and determines where that media is located.
- Package Selection - allows selecting of which optional software packages are to be installed.

All three menus provide the command **cancel.** The first two also provide the command **previous.** These commands allow you to return to prior menus, optionally discarding any changes that have been made.

cancel always returns to the ramdisk menu. If changes are to be discarded, then all changes made since `Install Software` was selected are forgotten.

previous always returns to the previous menu (which is the ramdisk menu, in the case of the Filesystem Definition menu). The changes discarded in this case are those made in the menu you are leaving.

cancel has higher priority than **previous.** In other words, if you use **previous** to leave a menu without discarding changes, then **cancel** from that menu and discard changes, the changes made in the earlier menu are also discarded.

Standard Filesystem Definition

The Standard Filesystem Definition menu defines where the mandatory filesystems are located. These filesystems (except for root) may be either on a local disk partition or provided by a disk server. If root is to be on a remote system, install the system as a client of that system, even if the system actually contains a disk.

Any changes made to the standard filesystems with the partition tool will appear in this menu.

Normally, no changes need to be made at this menu. To proceed to the Tape Identification Menu, enter **`continue`**.

Use the following steps to assign the **/var** filesystem to **sd0d,** rather than using the default of **/var** being a subdirectory of the root filesystem.

These steps are optional. If followed, the result is a filesystem definition that is the same as that supplied on the factory installation of a diskful system. In addition, it makes use of partition d, thus using 9.3 MB of disk space that is not used when the default disk partition is used with the standard filesystem definition.

In Figure 35, the notation "(required)" appears next to the **root(/), swap** and **/usr** filesystems. These filesystems must be defined; however, they may be placed on any partition of any disk.

```
                    Standard Filesystem Definition

  1) root on sd0a      (required)
  2) swap on sd0b      (required)
  3) /usr on sd0g      (required)
  4) /var on root partition
  5) /tmp on root partition

                    Disk Partitions (sizes in MB)
      (a)    (b)      (c)     (d)     (e)     (f)     (g)     (h)
sd0:  8.4    32.4     191.1   9.3     ----    ----    141.1   ----
sd1:  8.4    32.7     190.9   9.6     ----    ----    140.8   ----



Enter number of filesystem to change ('1'..'5'), 'continue', 'previous',
'cancel', or '?' for help:
```

Figure 35. Sample Standard Filesystem Definition Menu

To modify the **/var** filesystem, enter the number: **4**.

```
Enter number of filesystem to change ('1'..'5'),
'continue', 'previous', 'cancel' or '?' for help: 4
```

The var menu will be highlighted, and the system will request a disk partition. Assign it to sd0d.

```
Enter name of disk partition or host:path for /var
filesystem, 'none', ^C, or'?' for help: sd0d
```

The new arrangement is displayed as shown in Figure 36.

Once all changes for the standard filesystems have been made, enter **continue** to proceed to the Media Identification Menu:

```
Enter number of filesystem to change ('1'..'5'),
'continue', 'previous', 'cancel', or '?' for help: continue
```

Installation Media Identification Menu

The Media Identification Menu describes which media type (tape, CD ROM, or network directory) will be used during the installation.

On Series S4000 systems, the default values are determined by how the ramdisk was booted.

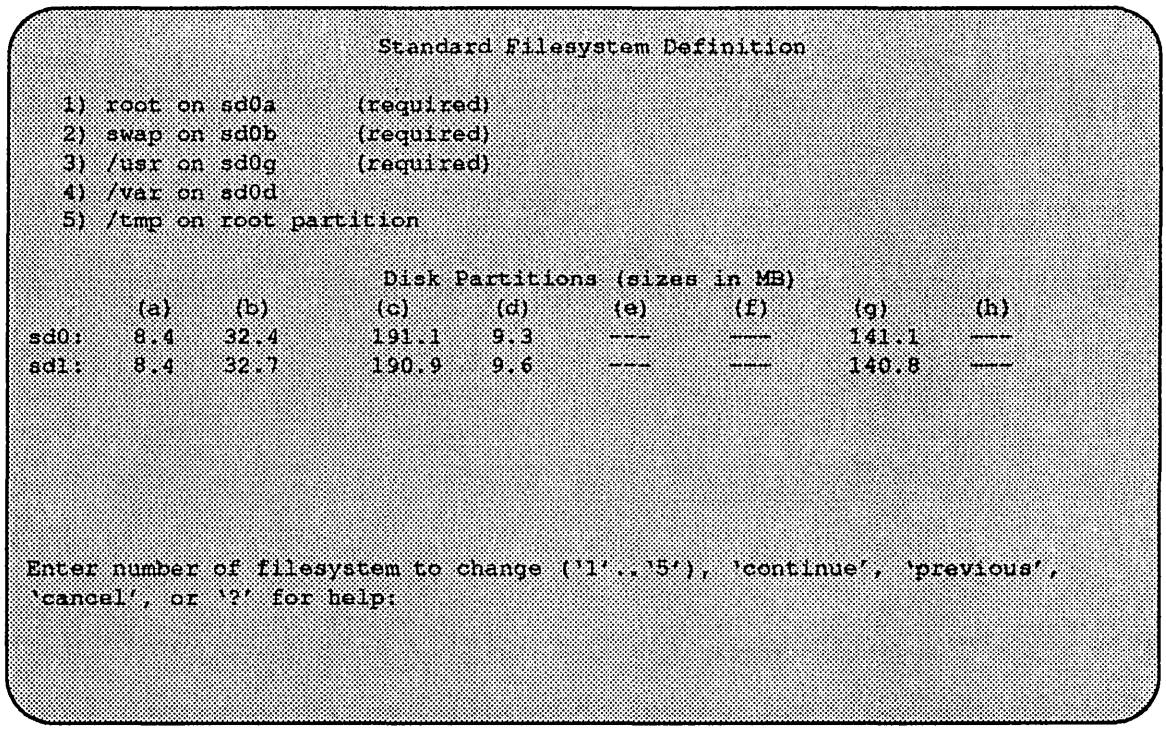

Figure 36. Modified Standard Filesystem Definition Menu

Figure 37 shows the Media Identification Menu of a S4000 machine that was booted from a local tape device st0 (SCSI address 4).

Local Tape Drive Installation

Installing from a local tape drive requires that the *Tape drive* field be set to either **st0** or **st1** (the only supported tape drives) and that *Tape host* be set to '**localhost**'. The Installation media type must also be set to '**Tape**'.

Remote Tape Drive Installation

Installation media type must be set to Tape.

Tape drive should be the basic name of the tape drive on the tapehost.

The **Local Internet address** is the address of the system being installed. If the default value is not correct, make sure that the client name corresponding to the correct address appears in the tape host's **/.rhosts** file. Check **/etc/hosts** or the NIS/YP hosts map as appropriate.

The **broadcast mask** should not be changed unless your network uses a non-standard mask. Such a mask is used when a network is sub-netted (i.e., a Class B network is treated as several Class C networks). A leading '0x' is necessary if entering the mask as a hexadecimal number. A leading '0' is needed for octal numbers. If neither prefix is given, the value is assumed to be in decimal.

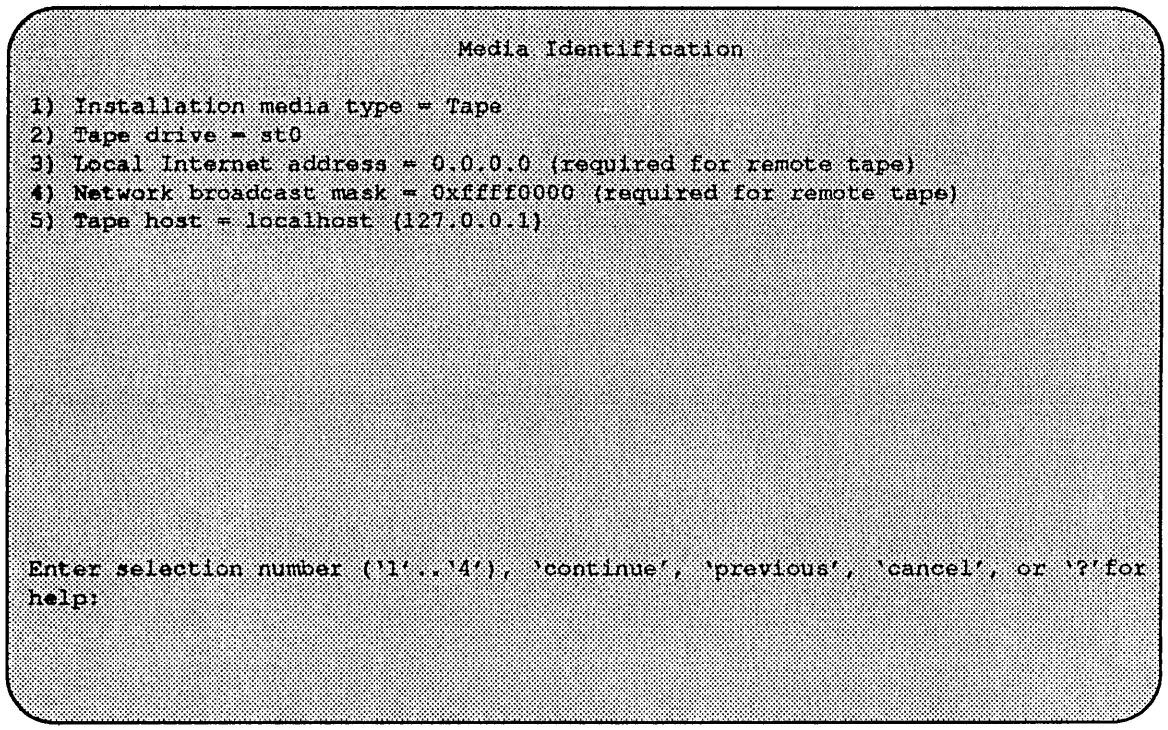

Figure 37. Media Identification Menu - Local Tapehost

Tape host must be set to the name of the system with the tape, which is used to determine the tape host's Internet address. The name itself, however, is not especially important (it is discarded after the installation is complete). As such, the default name, *tape-n-boot-serv*, generally need not be changed.

Figure 38 shows the Media Identification menu of a system loading software from a remote tape using tape device st1 (SCSI address 5).

When the details of the tape drive have been entered correctly, enter **`continue`**. You will be presented with the Package Selection Menu. If the operating system has already been installed, you will be prompted to insert the optional software distribution media.

Local CD-ROM installation

Installing from a local CD-ROM disk drive requires that the Installation media type be set to **`CD-ROM`**, the CD-ROM drive field be set to **`/dev/sr0`** and the *CD host* field be set to **`'localhost'`**. Figure 39 shows the Installation Media Identification menu with the CD-ROM parameters set to install from CD-ROM.

Network and remote CD-ROM Installations

Installation media type must be set to **`Network`**

Installation directory should be the full path name of the location of the installation area, or the full path of the CD-ROM mount point, on the network host. For example, if the remote CD-ROM is mounted on **`/usr/cdrom`**, then the installation path is simply **`/usr/cdrom`**.

```
                              Media Identification
1) Installation media type = Tape
2) Tape drive = st1
3) Local Internet address = 192.9.3.4 (required for remote tape)
4) Network broadcast mask = 0xffffff00 (required for remote tape)
5) Tape host = tape-n-boot-serv (192.9.3.1)









Enter selection number ('1'..'4'), 'continue', 'previous', 'cancel', or '?' for
help:
```

Figure 38. Media Identification Menu - Remote Tapehost

```
                        Installation Media Identification

1) Installation media type = CD-ROM
2) CD drive = /dev/sr0
3) Local Internet address = 0.0.0.0 (required for remote tape)
4) Network broadcast mask = 0xffff0000 (required for remote tape)
5) CD host = localhost (127.0.0.1)









Enter selection number ('1'..'5'), 'continue', 'previous', 'cancel', or '?' for
help:
```

Figure 39. Installation Media Identification Menu - Local CD-ROM

The **Local Internet address** is the address of the system being installed. If the default value is not correct, make sure that the client name corresponding to the correct address appears in the tape host's **/.rhosts** file. Check **/etc/hosts** or the NIS/YP hosts map as appropriate.

The **broadcast mask** should not be changed unless your network uses a non-standard mask. Such a mask is used when a network is sub-netted (i.e., a Class B network is treated as several Class C networks). A leading '0x' is necessary if entering the mask as a hexadecimal number. A leading '0' is needed for octal numbers. If neither prefix is given, the value is assumed to be in decimal.

Network host must be set to the name of the system with the installation directory, which is used to determine it's Internet address. The name itself, however, is not especially important (it is discarded after the installation is complete). As such, the default name, *tape-n-boot-serv*, generally need not be changed

When the details of the media have been entered correctly, enter **`continue`**. If You will be presented with the Package Selection Menu. If the operating system has already been installed, you will be prompted to insert the optional software distribution media.

Package Selection Menu

Use the he Package Selection Menu to install optional Solbourne software distributions. It provides a menu-driven method of examining the components of the distribution tape, selecting the parts to be installed, and specifying the directories where the components will be located.

The components of a distribution are referred to as **packages**. Some examples of packages are **FORTRAN 1.4, X Windows**, and **Solbourne OS/MP Optional Software**. Packages contain one or more *modules*, which are groups of logically-related files, such as executables or libraries. Most packages also have *variables*, which have two uses: controlling the actions of installation commands associated with the package, and prefixing where modules are to be installed.

A single package, Solbourne OS/MP Optional Software, is included on the OS/MP 4.1B distribution tape. The following display shown in Figure 40 appears; the values shown for `Size` in this and subsequent displays may vary.

The message `Mandatory Software Will Be Installed` indicates that the standard filesystems will be built from scratch (overwriting any old contents) when the **`install`** command is issued. If this message does not appear, only the packages selected in this menu will be installed.

```
                        Package Selection

                Mandatory Software Will Be Installed

Package Name                                Size (KB)      Install

1) Solbourne OS/MP 4.1B Optional Software       3



Enter number of package to examine ('1'..'1'), 'cancel', 'install', or '?'
for help:
```

Figure 40. Package Selection Menu

The Optional Software package contains a set of software modules that have historically been installed as part of **/usr**. These modules are not necessary for the basic operation of the system, and have been provided separately so that **/usr** may be kept as small as possible. To examine the modules available, select the Optional Software package:

```
Enter number of package to examine ('1'..'1'), 'cancel',
'install', or '?' for help: 1

Should the Solbourne OS/MP 4.1B Optional Software package
be installed ('yes', 'no', ^C, or '?' for help)? yes
```

The `Should the Solbourne OS/MP 4.1B. Optional Software package be installed` question refers to the package in general. The modules are individually selected for installation on the customization screen, and by default all are selected for installation.

After replying **yes**, the customization menu will appear as shown in Figure 41.

★ ★ ★ NOTE ★ ★ ★

In Figure 41, the free KB reported varies depending on the type and size of disk drive installed.

```
        Customization of Solbourne OS/MP 4.1B Optional Software

                              Software Modules
 Module          Size(KB)      Install     Directory      Free(KB)
 1) DEBUGGING        2760          y           /usr          58695
 2) GAMES            2872          y           /usr          58695
 3) MANUAL           7392          y           /usr          58695
 4) NETWORKING       1056          y           /usr          58695
 5) PLOT             1784          y           /usr          58695
 6) SECURITY          312          y           /usr          58695
 7) SV_PROG          1832          y           /usr          58695
 8) SV_USER          2872          y           /usr          58695
 9) SYSTEM_V         3992          y           /usr          58695
10) TEXT              720          y           /usr          58695
11) VERSATEC         5952          y           /usr          58695
12) UUCP              608          y           /usr          58695
13) RFS               928          y           /usr          58695
14) SHLIB            1368          y           /usr          58695
15) TLI                48          y           /usr          58695

Enter number of module to modify ('1'..'15'), 'continue', 'abort', or '?' for
help:
```

Figure 41. Package Selection Customization Menu

The size of each module in kilobytes is listed immediately to the right of the module's name. The column after the size indicates whether or not the module is currently marked for installation. If the module is to be installed, the directory that the module's files are to be installed in is listed, followed by the free space on the partition that the directory refers to.

Below are short descriptions of the individual modules:

DEBUGGING - program debugging aids
This module contains the debugging tool **dbx**(1) and the profiled versions of the standard libraries libc, libcurses, libm, libtermcap, libtermlib, libsuntool, and libsunwindow.

GAMES - games and demonstration programs
The recreational programs listed in section 6 of the *UNIX User's Reference Manual.*

MANUAL - on-line manual pages
Sections 1 through 8 of the UNIX User's and Programmer's Manuals in machine-readable form. See **man**(1), **lookup**(1), and **qref**(1) for more details. This option requires that the TEXT option also be installed.

NETWORKING - network utilities
Utilities and commands that access a network, such as **rcp**(1) or **ftp**(1). This module is required on systems that are connected to a network, or that will use the NIS/YP database services.

PLOT - basic plot-generating applications
The standard UNIX plotting utilities, which allow the creation of plots and graphs from simple data to be displayed on a variety of plotters and graphics terminals. See **plot**(1G) and **graph**(1G).

SECURITY - C2 security
The SECURITY module provides features such as audit trails and shadow password files in the spirit of the Department of Defense's C2 Security Specification (the "Orange Book"). The compliance of these features has not been certified.

SV_PROG - SunView program development support
Include files and libraries needed for compiling SunView applications. This module requires that SV_USER also be installed.

SV_USER - basic SunView support
The SunView windowing system and associated applications (such as **suntools**(1) and **shelltool**(1)). This module is not required if only X Windows will be used on the system.

SYSTEM_V
System V-compatible libraries and executables. System VR3, POSIX, and X/OPEN are supported. See **svidii**(7v), **svidiii**(7v), **xopen**(7v), and **posix**(7v) for details.

TEXT - nroff/troff text processing
This module provides the text formatter **troff**(1) and its associated support programs and files. This option is required if the MANUAL option is installed.

VERSATEC - Versatec printer support
Various utilities specific to Versatec printers, such as **vtroff**(1) and **vplot**(1G).

UUCP - uucp applications suite
uucp(1C) and its support programs. These are normally used for communicating with other UNIX operating systems via phone line.

RFS
Utilities and libraries to support the System V Remote File System.

SHLIB
Position-independent versions of the BSD and System-V versions of the C library. These are provided to allow substituting or adding a module to the shared C library.

TLI
Libraries and headers to support developing programs that take advantage of the System V Transport Layer Interface.

Modifying a module allows selecting whether or not it is to be installed and, if so, the directory its files are to be extracted into.

★ ★ ★ NOTE ★ ★ ★

All modules are intended to be extracted in their default directory. If a module is extracted somewhere else, there is no guarantee that the programs provided in the module will work.

For example, to not install the VERSATEC module:

```
Enter number of module to modify ('1'..'15'), 'continue',
'abort', or '?' for help: 11
```

The VERSATEC menu entry is highlighted, and:

```
Modifying the Versatec printer support module
Should the VERSATEC module be installed ('yes', 'no', ^C,
or '?' for help)? no
```

Figure 42 shows the updated display.

```
          Customization of Solbourne OS/MP 4.1B Optional Software

                              Software Modules
Module          Size(KB)      Install     Directory     Free(KB)
 1) DEBUGGING       2760          y           /usr          64647
 2) GAMES           2872          y           /usr          64647
 3) MANUAL          7392          y           /usr          64647
 4) NETWORKING      1056          y           /usr          64647
 5) PLOT            1764          y           /usr          64647
 6) SECURITY         312          y           /usr          64647
 7) SV_PROG         1832          y           /usr          64647
 8) SV_USER         2872          y           /usr          64647
 9) SYSTEM_V        3992          y           /usr          64647
10) TEXT             720          y           /usr          64647
11) VERSATEC        5952          n
12) UUCP             608          y           /usr          64647
13) RFS              928          y           /usr          64647
14) SHLIB           1368          y           /usr          64647
15) TLI               48          y           /usr          64647

Enter number of module to modify ('1'..'15'), 'continue', 'abort', or '?' for
help:
```

Figure 42. Package Selection Menu - Deletion of Versatec Module

★ ★ ★ NOTE ★ ★ ★

The free space for **/usr** *has been increased by the size of the VERSATEC module as shown in Figure 42.*

To install the GAMES module in **/fun** (on the root partition):

```
Enter number of module to modify ('1'..'13'), 'continue',
'abort', or '?' for help: 2
```

The GAMES menu entry is highlighted, and:

```
Modifying the games and demonstration programs module

Should the GAMES module be installed ('yes', 'no', ^C, or
'?' for help)? yes

Install GAMES in what directory? /fun

/fun does not exist. Create it during installation ('yes',
'no', ^C, or '?' for help) ? yes
```

The menu is updated to reflect the change, as shown in Figure 43.

```
        Customization of Solbourne OS/MP 4.1B Optional Software

                                Software Modules
 Module          Size(KB)      Install     Directory     Free(KB)
 1) DEBUGGING        2760          y          /usr          67519
 2) GAMES            2872          y          /fun           4579
 3) MANUAL           7392          y          /usr          67519
 4) NETWORKING       1056          y          /usr          67519
 5) PLOT             1784          y          /usr          67519
 6) SECURITY          312          y          /usr          67519
 7) SV_PROG          1832          y          /usr          67519
 8) SV_USER          2872          y          /usr          67519
 9) SYSTEM_V         3992          y          /usr          67519
10) TEXT              720          y          /usr          67519
11) VERSATEC         5952          n
12) UUCP              608          y          /usr          67519
13) RFS               928          y          /usr          67519
14) SHLIB            1368          y          /usr          67519
15) TLI                48          y          /usr          67519

Enter number of module to modify ('1'..'15'), 'continue', 'abort', or '?' for
help:
```

Figure 43. Package Selection Menu - Install Games module to /fun

★ ★ ★ NOTE ★ ★ ★

The free space for **/usr** *changes, and a completely new size (for* **/fun***) is also displayed as shown in Figure 43.*

If you decide to discard all changes made to the modules, use the command **abort**. This returns to the Package Selection Menu.

If you are satisfied with the changes (if any) made to the modules, enter the command **continue**. This will record the changes and return to the Package Selection menu.

When package customization has been completed (which may mean no packages were selected for installation), enter **install** as shown in Figure 44.

```
                        Package Selection

                Mandatory Software Will Be Installed

Package Name                                Size(KB)      Install

1) Solbourne OS/MP 4.1B Optional Software     38864           y




Enter number of package to examine ('1'..'1'), 'cancel', 'install', or '?'
for help: install
```

Figure 44. Package Selection Menu

Actual Installation

Actual installation begins at this point, and may require from 10 minutes (if only mandatory root files are being installed and a local tape drive is used) to about two hours (if everything is being installed from a remote QIC-150 tape drive).

The steps taken during the installation are:

1. extract miniusr. (This contains the installation software, as well as enabling swapping. The root disk might not be repartitioned after this step without requiring reinstallation.)
2. create filesystems (**root**(/), **/usr**, possibly **/var** or **/tmp**, as well as any new filesystems requested via the partition tool)
3. create device entries
4. install mandatory **root** files
5. install mandatory **kvm** files
6. install mandatory **usr** files

7. install optional software

When installation has finished, the ramdisk menu is displayed (see Figure 45). If the installation failed, call Customer Support.

Rebooting from the Ramdisk

After a successful installation, start UNIX by rebooting as shown in Figure 45.

```
                                Ramdisk

1) Change Disk Partitioning
2) Install Software
3) Invoke a Bourne Shell
4) Reboot System
5) Halt System


Enter number of function to execute ('1'..'5', or '?' for help): 4
```

Figure 45. Ramdisk Menu

Enter number of function to execute ('1'..'5', or '?' for help): **4**

At the Reboot System menu select Boot Unix:

```
Enter selection number ('1'..'3') or '?' for help: 1
```

After selecting **1**, there is a short pause, and then:

```
Automatic boot enabled. Type Control-C to abort

ROM> boot

Boot: sd.si(0,0,0)/vmunix

Entry: 0xfd080000

Size: 0xd6000+0x33358+0x81548


OS/MP 4.1B_Export (GENERIC/root) #0: Tues May26 21:09:24
1992
Copyright (c) 1989, 1990 Sun Microsystems, Inc. and
Solbourne Computer, Inc.
[...]
```

Now you must specify the system configuration information must be specified.

Disabling tftp

If the ramdisk was loaded from a remote tape drive, **tftp**(1) was enabled at that time.

For security reasons, it should now be disabled on the system from which the tape was read.

First, comment out the line, as shown below, in **/etc/inetd.conf**:

```
#tftp dgram udp wait root /usr/etc/in.tftpd in.tftpd
/tftpboot
```

Next, determine the process ID of **inetd**(8):

```
tapehost# ps ax | egrep inetd
  249 ?  I 0:01 inetd
  541 p3 R 0:00 egrep inetd
```

The *pid* of inetd is the first number on the line that doesn't contain egrep. In the above output, pid is 249.

Last, signal **inetd** to re-read the configuration file:

```
tapehost# kill -HUP pid
```

After Installing...

Initial Boot System Configuration

When a newly installed system is booted multi-user for the first time, the system asks a series of configuration questions:

```
OS/MP 4.1B_Export (GENERIC/root) #0: Tue May 26 10:00:13
1992

Copyright (c) 1989-1991 Sun Microsystems, Inc. and
Solbourne Computer, Inc.

[...]


Automatic reboot in progress...
Thur May 28 16:55:42 PDT 1992
checking quotas: done.


This system has not yet been configured. Several values
need to be set before the system can come up to multi-user
Unix.

What is this system's name (default = 'standalone'):
habitrail <Return>

What is its Internet address (0 for none, default =
192.9.3.4)? <Return>

What is the network broadcast mask (default = 0xffffff00)?
<Return>

What is the NIS domain name ('none' for none, default =
'none')? Rodent.COM <Return>
```

★★★NOTE★★★

Using the default 'none' disables the NIS/YP services.

```
Time zone choices are:
Australia/  GMT+11      GMT-3       GMT6        Mideast/
Brazil/     GMT+12      GMT-4       GMT7        NZ
CET         GMT+13      GMT-5       GMT8        Navajo
CST6CDT     GMT+2       GMT-6       GMT9        PRC
Canada/     GMT+3       GMT-7       Greenwich   PST8PDT
Chile/      GMT+4       GMT-8       HST         Poland
Cuba        GMT+5       GMT-9       Hongkong    ROC
EET         GMT+6       GMT0        Iceland     ROK
EST         GMT+7       GMT1        Iran        Singapore
EST5EDT     GMT+8       GMT10       Israel      Turkey
Egypt       GMT+9       GMT11       Jamaica     UCT
Factory     GMT-0       GMT12       Japan       US/
GB-Eire     GMT-1       GMT13       Libya       UTC
GMT         GMT-10      GMT2        MET         Universal
GMT+0       GMT-11      GMT3        MST         W-SU
GMT+1       GMT-12      GMT4        MST7MDT     WET
GMT+10      GMT-2       GMT5        Mexico/     Zulu

('/' indicates time zone prefixes)

Enter time zone (default = 'US/Mountain'): US <Return>
Time zone choices are:
Alaska      Central       Hawaii      Pacific
Aleutian    East-Indiana  Michigan    Pacific-New
Arizona     Eastern       Mountain    Samoa

Enter time zone: Mountain <Return>
What is today's date (mm/dd/yyyy, default = 05/28/1992)? <Return>
What time is it (24-hour hh:mm, default = 16:55)? <Return>

Current settings are:
 Host name                = habitrail
 Internet address         = 192.9.3.4
 Network mask             = 0xffffff00
 NIS domain               = Rodent.COM
 Time zone                = US/Mountain
 Date (m/d/y)             = 05/28/1992
 Time                     = 16:55

Are these correct ('yes' or 'no')?
yes

Setting netmask of ei0 to 255.255.255.0
Tue Dec 11 22:09:00 MST 1990
Setting password for root
Changing password for root on habitrail.
New password:
Retype new password:
Continuing boot
starting rpc and net services: portmap [...]
```

Reconfiguring the System

You may need to reconfigure the system if: (1) wrong value was set during the initial configuration, or (2) the system did not successfully come up to multi-user mode.

If you find that a wrong value was set during configuration, you can modify the appropriate file manually, or reconfigure. Manually correcting the settings should only be done if you are an experienced system administrator. Reconfiguring automatically is fairly straight-forward, as explained in the following procedure.

If the system has hung up during the boot process, cycle the power off and on.

★ ★ ★ NOTE ★ ★ ★

If automatic boot is enabled it is necessary to interrupt the reboot by typing Control-C in the early stages of the reboot; otherwise the system will hang up as before.

Then bring up the system in single-user mode:

```
ROM> boot -s
[...]
```

If the system booted successfully originally, you may instead log in as root:

```
habitrail login: root
Password:
```

In either case, if a file exists that tells the system it has been configured, remove it:

```
# rm /etc/sys_conf/system-configured
```

The above file may not exist; this is not a problem. Go ahead to the next step.

Now reboot. If you are in single-user mode, exit:

```
# exit
```

Otherwise, use fastboot:

```
# /etc/fastboot
```

The system asks configuration questions just as it did the first time it booted after being installed.

Installing Diskless Clients on Sun and Solbourne Servers

The commands **config_server** and **install_client** automate the installation of diskless clients.

config_server sets up a prototype area for clients of a particular architecture (i.e. sun4C at OS 4.1).

install_client sets up a unique area for each individual client.

You may set up a network in which either a Solbourne or a Sun acts as the server. The clients may be either Solbourne or Sun systems. The clients need not be at the same OS release level as the server or each other.

The necessary steps depend on your arrangement, and are discussed in the following subsections.

1 Installing the correct **config_server**

If the server is a Sun, or a Solbourne not running OS/MP 4.1B or later you must install and configure a new version of **config_server**.

If the server is a Solbourne system running OS/MP 4.1B or later it already has the necessary version of **config_server**. Skip *the* "Installing config_server" subsection and go to "Configuring the Server".

2 Running **config_server**

3 Running **install_client**

4 Booting the client

★ ★ ★ NOTE ★ ★ ★

An OS/MP 4.1B server can support any Solbourne S4000, Series5, or Series6 clients at OS/MP 4.1B or Series4 at OS/MP 4.1A.3. It can also support Sun clients running SunOS.

Installing config_server

This procedure is necessary only for systems not running OS/MP level 4.1B or above. It can be used for any type of Sun or Solbourne system.

When using a local tape drive, install **config_server** using the following commands:

```
# mt -f /dev/nrst0 asf 5
# cd /usr/etc
# tar xpf /dev/nrst0
```

When using a remote tape drive, the system name needs to be in the "tapehosts" **/.rhosts** file. Install **config_server** using the following commands:

```
# rsh -n tapehost mt -f /dev/nrst0 asf 5
# cd /usr/etc
# rsh -n tapehost dd if=/dev/nrst0 bs=8k | tar xpBf -
```

In this example, you should replace *tapehost* with the actual name of your tape host machine.

★ ★ ★ NOTE ★ ★ ★

Some older versions of SunOS do not support the 'asf' request for **mt**. *If this is the case for your tape host, first substitute 'rew' for 'asf 5' in the above example, and then re-execute* **mt** *with 'fsf 5' instead of 'rew'.*

When using a local CD-ROM drive, install **config_server** using the following commands:

```
# mkdir /cdrom
# mount /dev/sr0 /cdrom
# cd /usr/etc
# tar xpf /cdrom/Tools.tar
```

When installing over the network, or when using a remote CD-ROM drive, first you create a mount point directory (if one doesn't exist), and mount the CD-ROM drive on the remote machine, referred to here as `nethost`, as follows:

```
nethost# mkdir /cdrom
nethost# mount /dev/sr0 /cdrom
```

The system name needs to be in the "nethosts" **/.rhosts** file. Install **config_server** using the following commands:

```
# cd /usr/etc
# rsh -n nethost dd if=/cdrom/Tools.tar bs=8k | tar xpBf -
```

In this example, replace *nethost* with the actual name of the remote host machine, and replace *cdrom* with the actual path name or mount point.

Configuring the Server

The command **config_server** installs executables on the server for use by one or more client systems. The executables are placed in **/export** directories, as described below. Since the **/export** directories may grow to be quite large, you may wish to have **/export** be a link to a file system with more space, for example:

```
# mkdir /usr/export
# ln -s /usr/export /export
```

If you wish to use a directory other than **/export**, set the environment variable EXPORT_DIR to the directory that you desire:

```
# setenv EXPORT_DIR /usr/clients
```

When installing from tape, **config_server** prompts for a carriage return, which you enter after loading the tape containing the required files for the specified architecture.

config_server accepts several options and arguments. The following are the most commonly used:

- The **-f** option specifies the tape drive from which the software will be loaded onto the server. In the examples, **/dev/nrst0** is the value used. When accessing a remote tape drive, use a value of the form *tapehost:tapedrive*.

  If the software that will be loaded onto the server is from a **CD-ROM** disk, or the mount point of the CD-ROM, the **-f** option specifies the pathname from which to read architecture-dependent directories.

- The **-c** option is used to specify a selected tape/on-disk configuration file.

  If you are using a **CD-ROM** disk or a remote system over the network, you will need to specify this option and one of the following four configuration files: **s4000-cd, s4-cd, s5-cd** and **s6-cd**. These configuration files contain the required root, usr and kvm tar files. They also contain the optional tar files for 4.1B and/or 4.1A.3, and may be added by editing the corresponding configuration file and taking out the "#" at the beginning of each line..

  If the server is a Solbourne, and the client is a Sun, use one of the configuration files in **/usr/etc/setup** corresponding to the architecture, operating system, and media of the client. You may also create a configuration file for any Sun tape or CD-ROM. Refer to the **config_server**(8) man page.

- The **-n** option specifies the operating system and release level of the client systems, where these differ from the server. It is also used when clients with the same architecture are not all running the same release level.

  The values used may be any you wish, provided you are consistent when running the **config_server** and **install_client** commands. For example, you could use the values OS/MP.4.1A, OS/MP.4.1A.1, OS/MP.4.1A.2, OS/MP.4.1A.3 or OS/MP 4.1B.

The result is to create subdirectories of **/export** named such that the machine type is the basename and the OS release is the extension.

- **client_arch**, the final argument to **config_server**, specifies the machine architecture of the client, such as Series5, Series5E , Series6, S4000, sun4, sun4c, or sun3.

Run **config_server** as many times as necessary to support the variety of machine architectures, operating systems, and release levels in use by clients on your network.

A number of examples are presented here. For additional details, refer to the **config_server**(8) man page.

The first example configures a Solbourne OS/MP 4.1B server for a Series5 client also running OS/MP 4.1B. On the Solbourne server enter the following:

```
# /usr/etc/setup/config_server -f /dev/nrst0 Series5
```

The next example configures a Solbourne server running OS/MP 4.1B for a pair of Solbourne S4000 clients, one at 4.1B and the other running 4.1A.1

```
# /usr/etc/setup/config_server -f /dev/nrst0 S4000

# /usr/etc/setup/config_server -f /dev/nrst0 -n
osmp.4.1A.1 S4000
```

Notice that the first invocation of **config_server** shown above did not use the **-n** option, by default supporting the client at the same release level as the server. The second example used the **-n** option, since the server and client are at different release levels.

The next example is for a Series5 server which supports several Sun 4 clients, some running SunOS 4.1 and others running SunOS 4.0.3:

```
# /usr/etc/setup/config_server -f /dev/nrst0 -n sunos.4.1
-c sun4-4.1-tl.4 sun4

# /usr/etc/setup/config_server -f /dev/nrst0 -n
sunos.4.0.3 -c sun4-4.0.3c-tl.4 sun4
```

The last example is running **config_server** from 4.1B software on a CD-ROM disk for a Solbourne OS/MP 4.1B server which supports Solbourne S4000 clients, Series5 clients, and Series6 clients respectively:

```
# /usr/etc/setup/config_server -f /cdrom -c \
/usr/etc/setup/s4000-cd S4000

# /usr/etc/setup/config_server -f /cdrom -c \
/usr/etc/setup/s5-cd Series5

# /usr/etc/setup/config_server -f /cdrom -c \
/usr/etc/setup/s4-cd Series6
```

Replace *cdrom* with the actual path name or mount point on the local or remote host.

This concludes the examples of **config_server**.

After running **config_server**, add the client to the **/etc/hosts** and **/etc/ethers** files, or the corresponding network information services databases (NIS/YP).

If the server is using NIS/YP, **/etc/ethers** and **/etc/hosts** must be modified on the master server. **config_server** does not update NIS/YP; this must be done manually.

If the server is not using NIS/YP, the domain name must be set to "none" for **install_client** to work correctly.

★ ★ ★ NOTE ★ ★ ★

/etc/ethers *must not start with a blank line.*

Installing Clients

The **install_client** command installs the diskless client on the server. It creates the client's root filesystem under the server's **/export/root** directory, links the client's **/usr** to the appropriate **/export/exec** directory, and sets up the client's kernel-specific files, such as **/vmunix.** After running **install_client** on the server, the client can boot as soon as the client's bootROM variables are set correctly.

The **install_client** command accepts a number of options and arguments. The following are the most commonly used:

The **-n** option. If you used the **-n** option to **config_server** when setting up the server for this client, be sure to use it in the same way when invoking **install_client**. If necessary, examine the subdirectory names in **/export/exec** on the server; when you find the relevant subdirectory, the portion of the name after the first dot is the value to use for the **-n** argument.

The **client** argument identifies the name of the client being installed.

The **machine_arch** argument specifies the type of machine in the client, such as Series5, Series5E, Series6, S4000, sun4, sun4c, or sun3.

Other options and further details are discussed in the **install_client**(8) man page.

The examples which follow parallel the server configuration examples.

Example install_client Command Lines

The first example installs a Solbourne OS/MP 4.1B client (named "rootbeer") on a Series5 server which also run OS/MP 4.1B. On the Solbourne server enter the following:

```
# /usr/etc/setup/install_client rootbeer Series5
```

The next example installs a pair of Solbourne S4000 clients, one running OS/MP 4.1B ("rootbeer") and the other running 4.1A.1 ("lemonade"), on a Solbourne server running OS/MP 4.1B.

```
# /usr/etc/setup/install_client rootbeer S4000
# /usr/etc/setup/install_client -n osmp.4.1A.1 lemonade
S4000
```

Note that the first invocation of **install_client** shown above did not use the **-n** option, by default placing the client at the same release level as the server. The second example used **-n** since the server and client are at different release levels.

The next example is for two Sun 4 clients, one running SunOS 4.1("candybar") and the other running SunOS 4.0.3 ("popcorn"), supported by a Solbourne server:

```
# /usr/etc/setup/install_client -n sunos.4.1 candybar sun4
# /usr/etc/setup/install_client -n sunos.4.0.3 popcorn
sun4
```

★ ★ ★ NOTE ★ ★ ★

install_client *modifies only the local* **/etc/bootparams**. *If the server is using NIS/YP,* **/etc/bootparams** *must be modified on the NIS/YP master server.*

This concludes the examples of **install_client**.

Installing OS/MP 4.1B on a Server using reinst_sys

This chapter describes how to install OS/MP 4.1B on a server using the new utility, `reinst_sys`, which allows you to upgrade your system with a full installation of the operating system on unused partitions of one or more disks, while staying up in multi-user mode.

A server is a system that provides NFS disk services.

The purpose of `reinst_sys` is to minimize downtime by performing a full install of OS/MP onto a new system disk while the system continues to run an earlier version on an old system disk. Once `reinst_sys` is complete, you are free to do whatever local modifications are desirable before booting from the new disk.

For example, you might reconfigure the OS/MP 4.1B kernel or modify files of local interest such as **/etc/printcap**. Only when the new system disk is ready to run do you need to halt the old system and reboot from the new disk.

Finally, unlike earlier full install releases, `reinst_sys` makes it possible to fall back to the earlier version of OS/MP if there turns out to be some problem with the way you set up the new system. To fall back to the old system, halt the new system, change ROM variables DEFAULTROOT and perhaps DEFAULTSWAP, and then boot.

★ ★ ★ NOTE ★ ★ ★

In order to use this utility, you must have an unused disk, or at least enough unused partitions, on which to install the OS/MP 4.1B release. You can not use reinst_sys to install over the currently running disk partitions. If you do not have an unused disk for reinst_sys to use, you will have to install OS/MP 4.1B from scratch, while the system is unavailable to your users, as was done in previous OS/MP full installation releases.

You should not install on a disk connected to a channel board as it will be impossible to boot from that device.

Before Installing...

★ ★ ★ NOTE ★ ★ ★

Before using reinst_sys, you must know what disk(s) and partitions you want to install on. If changes need to be made to any of the disks partitions, you must do this prior to running reinst_sys. Use **partition***(8) to modify the disks.*

It is best to select a disk that will be recognized by an OS/MP 4.1B generic kernel. Otherwise it will be necessary to reconfigure the kernel (which may be desirable anyway) before rebooting. This is discussed in more detail at the end of this section.

★ ★ ★ CAUTION ★ ★ ★

If installing by tape, clean the tape drive on the machine you will be using before installing the release tape. Failure to do so may damage the release tape.

To run `reinst_sys`, it must first be extracted from the OS/MP 4.1B media.

The following explains four different methods of extracting `reinst_sys` into the **/usr/etc** directory. You must be logged in as root.

Extracting reinst_sys via a Local Tape Drive

```
telly# cd /usr/etc
telly# mt -f /dev/nrst0 asf 5
telly# tar xpf /dev/nrst0 reinst_sys
```

Extracting reinst_sys via a Remote Tape Drive

Routing from the system being installed to the tapehost must exist. Refer to the *System Network and Administration Guide* (101481). The local machine, `telly` in this example, must be listed in **/etc/hosts**, or in the NIS/YP *hosts* database, and **/.rhosts** on `tapehost`.

```
telly# cd /usr/etc
telly# rsh -n tapehost mt -f /dev/nrst0 asf 5
telly# rsh -n tapehost dd if=/dev/nrst0 bs=8k | tar xpBf -
```

Extracting reinst_sys via a Local CD-ROM Drive

Create a mount point directory (if one doesn't exist), mount the CD-ROM drive, and extract `reinst_sys` as follows:

```
telly# mkdir /cdrom
telly# mount /dev/sr0 /cdrom
telly# cd /usr/etc
telly# tar xpf /cdrom/Tools.tar
```

Extracting reinst_sys via a Remote CD-ROM Drive or the Network

Create a mount point directory (if one doesn't exist), and mount the CD-ROM drive on the remote machine, referred to here as `diskhost`, as follows:

```
diskhost# mkdir /cdrom
diskhost# mount /dev/sr0 /cdrom
```

The local machine must be listed in **/etc/hosts**, or in the NIS/YP *hosts* database, and in **/.rhosts** on `diskhost`.

`diskhost` must have **/cdrom** in its **/etc/exports** file, and it must be exported (see **exportfs**(8)). `diskhost` must also be running the **rpc.mountd**(8) and **nfsd**(8) daemons.

On the local machine, create a mount point directory (if one doesn't exist), mount the remote directory, and extract `reinst_sys` as follows:

```
telly# mkdir /cdrom
telly# mount diskhost:/cdrom /cdrom
telly# cd /usr/etc
telly# tar xpf /cdrom/Tools.tar
```

Installing...

This section covers the 4.1B installation on Series5, Series5E, Series6 and S4000 systems.

During installation, you can request help at any prompt by entering a question mark. Table 17 shows edit commands available when entering text in response to prompts:

Table 17. Input Editing Commands

Character	Interpretation
backspace (^H)	delete last input character
delete (^?)	delete last input character
^U	erase input line
^R	redisplay input line
^W	delete input up to '/' or whitespace
^C	cancel input, returning to nearest menu
ESC	cancel input, returning to nearest menu
^L	redisplay entire screen
return (^M)	end input
newline (^J)	end input

If a string is too long to be displayed in the available space, the beginning of the string is displayed as "...". This allows display of the end of the string, which is usually of more interest.

Keywords can be shortened to any unique prefix (such as 'co' for 'continue'), except for 'yes' and 'no', which must always be spelled out.

Fatal errors during software installation are usually reported by messages beginning with `System error` or `Internal error` and ending with a "#" prompt. If a fatal error occurs, software installation may be restarted by entering:

```
# ^Jstty sane^J
# rm -f core
# /usr/etc/reinst_sys
```

where ^J is the linefeed character. The command **stty sane** may not be echoed (and is intended to fix exactly that problem). In the event of a fatal error during software installation, please report the problem to Solbourne customer support.

Installing Software

Installing software has two distinct stages: gathering information and modifying the system. No permanent changes are made to the system until all information has been provided.

There are three information gathering menus:

- Standard Filesystem Definition - specifies where the standard filesystems (**root (/), swap,** and **/usr,** optionally **/var** and **/tmp**) are located.
- Media Identification - Determines the installation media from which to install (tape, CD-ROM, or network directory), and determines where that media is located.
- Package Selection - allows selecting of which optional software packages are to be installed.

All three menus provide the command **cancel**. The first two also provide the command **previous**. These commands allow you to return to prior menus, optionally discarding any changes that have been made.

cancel always returns to the shell terminating `reinst_sys`.

previous always returns to the previous menu (which is the shell, in the case of the Filesystem Definition menu). The changes discarded in this case are those made in the menu you are leaving.

cancel has higher priority than **previous**. In other words, if you use **previous** to leave a menu without discarding changes, then **cancel** from that menu and discard changes, the changes made in the earlier menu are also discarded.

The Standard Filesystem Definition menu defines where the mandatory filesystems are located. These filesystems (except for root) may be either on a local disk partition or provided by a disk server. If root is to be on a remote system, install the system as a client of that system, even if the system actually contains a disk. You can add entries for any local disks to **/etc/fstab** after installing the system as a diskless client.

Any changes made to the standard filesystems with partition(8) will appear in this menu.

`reinst_sys` has the following options:

`reinst_sys` [-m] [-n] [-r /root/path] [-f host:/device/path] [-a arch]

-m	Don't mount or newfs filesystems
-n	Don't newfs filesystems
-r /root/path	Pretend /root/path is really /
-f host:/device/path	What tape device to use
-a arch	What cpu architecture to use - overrides cpustatus

In general, you will not need to use any of these options except perhaps the -a option. The -f option will be set while running `reinst_sys`.

The -a option is to be used when you are upgrading or changing the architecture of your machine. Suppose you have a machine with Series5 CPUs, and you want to upgrade to Series6 CPUs. To install the OS/MP 4.1B for Series6, log in as root and issue the following command:

```
telly# /usr/etc/reinst_sys -a Series6
```

To install OS/MP 4.1B with no change in architecture, log in as root and issue the command:

```
telly# /usr/etc/reinst_sys
```

`reinst_sys` begins by reading the current **/etc/fstab** file to determine the disks attached to your system (mounted disks are also probed).

After examining all attached disks, `reinst_sys` presents the first menu, the Standard Filesystem Definition menu.

The root, swap, and usr partitions are required and must be defined before going to the next menu. The swap will be defined as the current swap area, and may be redefined if you wish. The root and usr areas need to be defined from the currently available disk partitions that are highlighted in the Standard Filesystem Definition menu. For a disk partition to be available for use in `reinst_sys`, it must not be currently mounted, and it must not have an entry in the **/etc/fstab** file.

Example:

Currently, the **root**(/) filesystem is on **sd0a**, **swap** is on **sd0b**, and the **/usr** filesystem is on **sd0g**. Available partitions are highlighted. If the necessary partitions are not available, exit `reinst_sys`. A partition may not be available because it is mounted or an entry exists for it in the **/etc/fstab** file. Also, it may not be available because it does not exist, or it is not large enough, in which case you will need to run **partition**(8) to repartition the disk as needed.

Use the following steps to assign the **root** (/) filesystem to **sd2a**, the **/usr** filesystem to **sd2g**, and the **/var** filesystem to **sd2d** (rather than using the default of **/var** being a subdirectory of the root filesystem). Leaving **swap** on the disk may be desirable.

The steps for changing **/var** are optional. This makes use of partition **d**, thus using 9.5 MB of disk space that is not used when the default disk partition is used with the standard filesystem definition.

In Figure 46, the notation "(required)" appears next to the **root**(/), **swap** and **/usr** filesystems. These filesystems must be defined; however, they may be placed on any sufficiently large available partition of any disk.

```
                    Standard Filesystem Definition

  1) root              (required)      <not defined>
  2) swap on sd0b      (required)
  3) /usr              (required)      <not defined>
  4) /var on root partition
  5) /tmp on root partition

          Disk Partitions (sizes in MB) (available highlighted)
       (a)    (b)      (c)     (d)     (e)     (f)     (g)     (h)
sd0:   8.4    32.4     191.1   9.3     ----    ----    141.1   ----
sd2:   8.6    32.9     484.9   9.5     ----    ----    433.5   ----




Enter number of filesystem to change ('1'..'5'), 'continue', 'previous',
'cancel', or '?' for help:
```

Figure 46. Sample Standard Filesystem Definition Menu

To modify the **root** (/) filesystem, enter the number 1.

```
Enter number of filesystem to change ('1'..'5'),
'continue', 'previous', 'cancel' or '?' for help: 1
```

The **root** menu will be highlighted, and the system will request a disk partition. Assign it to sd2a.

```
Enter name of disk partition or host:path for /root
filesystem, 'none', ^C, or'?' for help: sd2a
```

To modify the **/usr** filesystem, enter the number **3**.

```
Enter number of filesystem to change ('1'..'5'),
'continue', 'previous', 'cancel' or '?' for help: 3
```

The usr menu will be highlighted, and the system will request a disk partition. Assign it to sd2g.

```
Enter name of disk partition or host:path for /usr
filesystem, 'none', ^C, or'?' for help: sd2g
```

To modify the **/var** filesystem, enter the number **4**.

```
Enter number of filesystem to change ('1'..'5'),
'continue', 'previous', 'cancel' or '?' for help: 4
```

The var menu will be highlighted, and the system will request a disk partition. Assign it to sd2d.

```
Enter name of disk partition or host:path for /var
filesystem, 'none', ^C, or '?' for help: sd2d
```

The new arrangement is displayed as shown in Figure 47.

```
                    Standard Filesystem Definition

  1) root on sd2a      (required)
  2) swap on sd0b      (required)
  3) /usr on sd2g      (required)
  4) /var on sd2d
  5) /tmp on root partition

            Disk Partitions (sizes in MB) (available highlighted)
       (a)    (b)      (c)     (d)     (e)     (f)     (g)     (h)
sd0:   8.4   32.4     191.1    9.3     ----    ----    141.1   ----
sd2:   8.6   32.9     484.9    9.9     ----    ----    433.5   ----




Enter number of filesystem to change ('1'..'5'), 'continue', 'previous',
'cancel', or '?' for help:
```

Figure 47. Modified Standard Filesystem Definition Menu

Once all changes for the standard filesystems have been made, enter **continue** to proceed to the Installation Media Identification menu.

```
Enter number of filesystem to change ('1'..'5'),
'continue', 'previous', 'cancel', or '?' for help: continue
```

Installation Media Identification Menu

The Installation Media Identification menu describes which media type (tape, CD-ROM, or network directory) will be used during the installation. Figure 48 shows the Installation Media Identification menu.

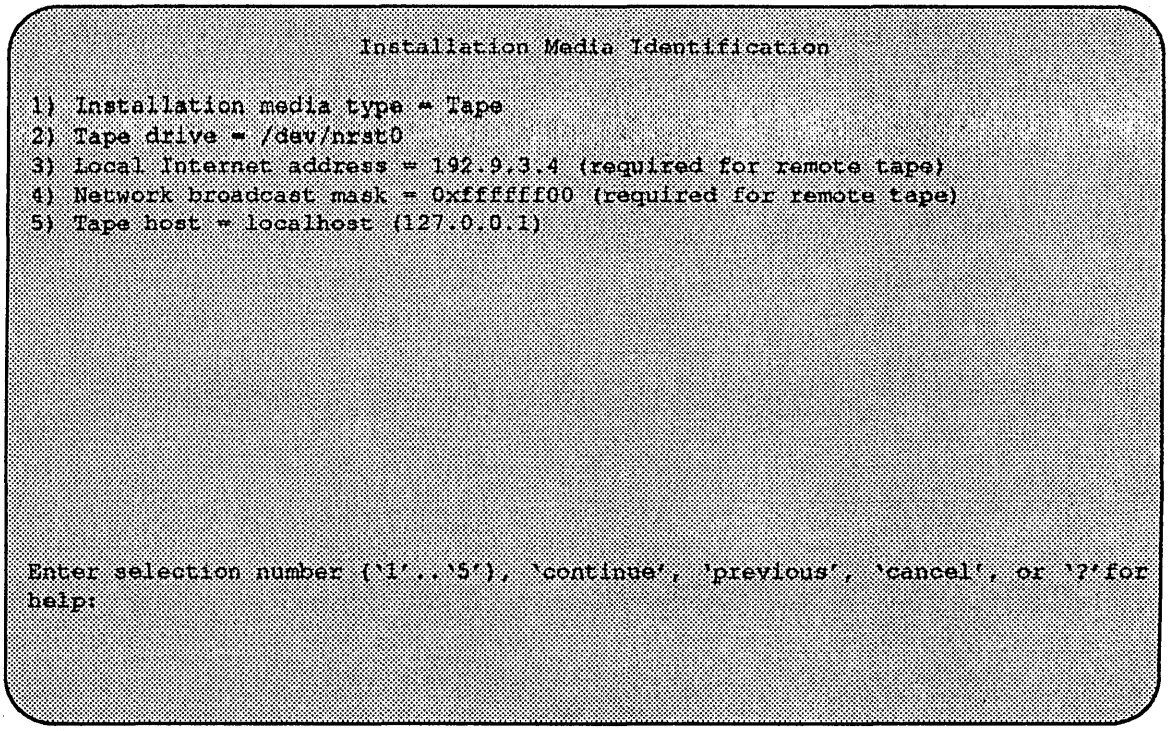

Figure 48. Media Identification Menu - Local Tapehost

Installing from a Tape Drive

Installing from a local tape drive requires that the *Installation media type* be set to **Tape**, the *tape drive* field be set to either **st0** or **st1** (the only supported tape drives) and that *Tape host* be set to **localhost**.

Installing From a Remote Tape

Installation media type must be set to **Tape**.

Tape drive should be the base name of the tape drive on the tapehost, either **st0** or **st1**.

The **Local Internet address** is the address of the system being installed. If the default value is not correct, make sure that the client name corresponding to the correct address appears in the tape host's **/.rhosts** file. Check **/etc/hosts** or the NIS/YP hosts map as appropriate.

The **broadcast mask** should not be changed unless your network uses a non-standard mask. Such a mask is used when a network is sub-netted (i.e., a Class B network is treated as several Class C networks). A leading '0x' is necessary if entering the mask as a hexadecimal number. A leading '0' is needed for octal numbers. If neither prefix is given, the value is assumed to be in decimal.

Tape host must be set to the name of the system with the tape (**rootbeer** in this example), which is used to determine the tape host's Internet address.

Figure 49 shows the Installation Media Identification Menu of a system that is set up to install from a remote tape using tape device st0 (SCSI address 4).

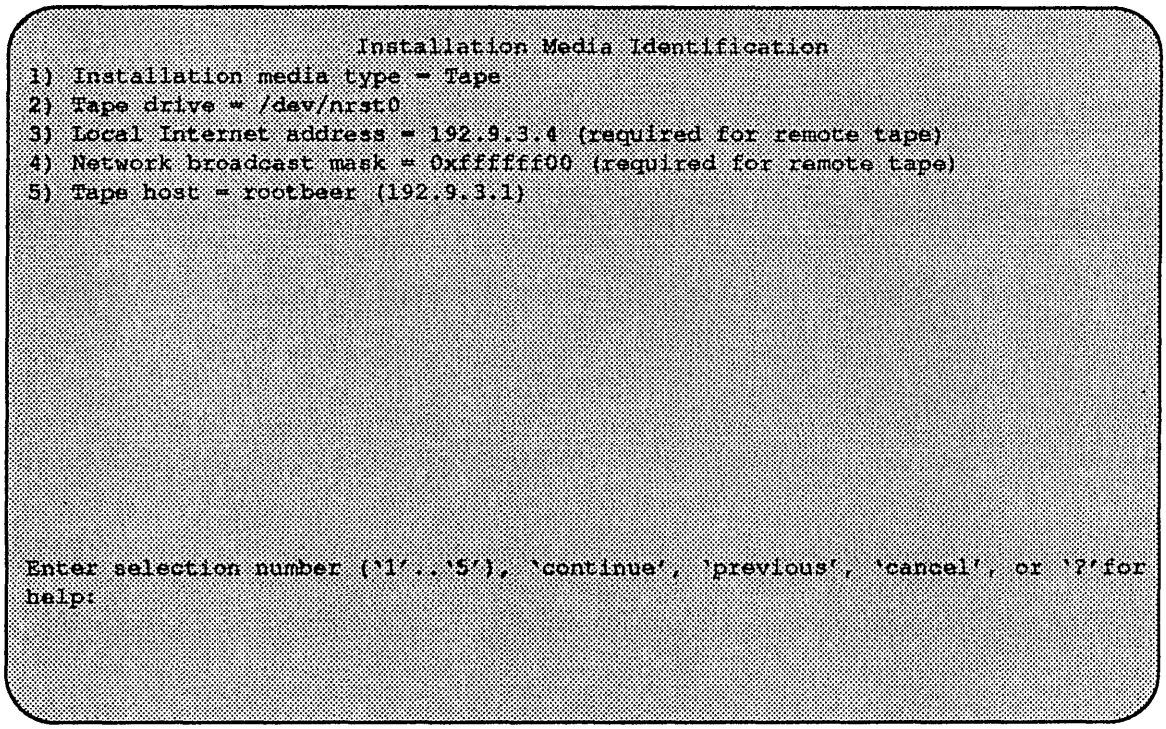

Figure 49. Installation Media Identification Menu - Remote Tapehost

When the details of the tape drive have been entered correctly, enter **continue**. You will be presented with the Package Selection Menu.

Local CD-ROM Installation

Installing from a local CD-ROM drive requires that the *Installation media type* be set to **CD-ROM**, the *CD drive* field be set to **/dev/sr0**, and the *CD host* field be set to **localhost**.

Figure 50 shows the Installation Media Menu with the CD-ROM parameters set to install from CD-ROM.

Network and remote CD-ROM Installations

Installation media type must be set to **Network**.

Installation directory should be the full path name of the location of the installation area, OR the full path of the CD-ROM mount point, on the network host. Figure 50 shows the installation directory as **/usr/local/install/4.1B** on the host rootbeer. If you are installing from a remote CD-ROM mounted on **/usr/cdrom**, for example, then the installation directory is simply **/usr/cdrom**.

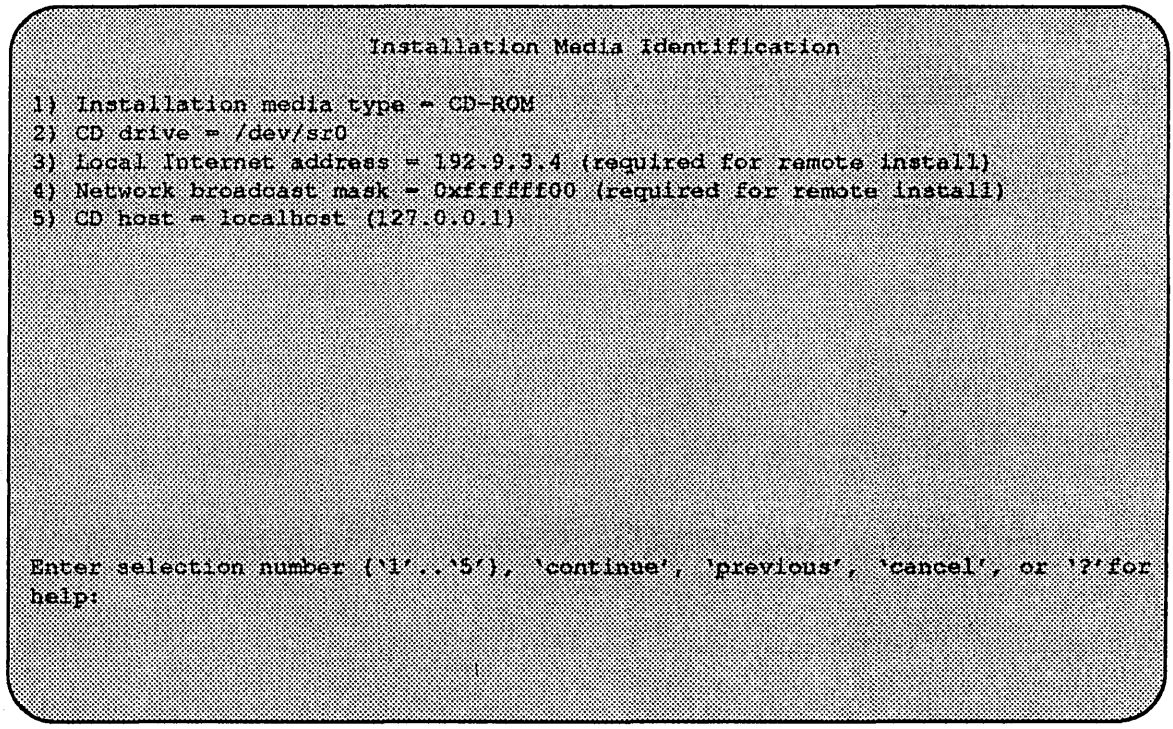

Figure 50. Installation Media Identification Menu - Local CD-ROM

The **Local Internet address** is the address of the system being installed. If the default value is not correct, make sure that the client name corresponding to the correct address appears in the tape host's **/.rhosts** file. Check **/etc/hosts** or the NIS/YP hosts map as appropriate.

The **broadcast mask** should not be changed unless your network uses a non-standard mask. Such a mask is used when a network is sub-netted (i.e., a Class B network is treated as several Class C networks). A leading '0x' is necessary if entering the mask as a hexadecimal number. A leading '0' is needed for octal numbers. If neither prefix is given, the value is assumed to be in decimal.

Network host must be set to the name of the system with the installation directory (**`rootbeer`** in this example), which is used to determine its Internet address.

Figure 51 shows the Installation Media Menu with the values set for a network installation

Once the details of the media have been entered correctly, enter **`continue`** to proceed to the Package Selection Menu.

Package Selection Menu

Use this menu to install optional Solbourne software distributions. It provides a menu-driven method of examining the components of the distribution tape, selecting the parts to be installed, and specifying the directories where the components will be located.

```
                    Installation Media Identification
1) Installation media type = Network
2) Installation directory = /usr/local/install/4.1B
3) Local Internet address = 192.9.3.4 (required for remote install)
4) Network broadcast mask = 0xffffff00 (required for remote install)
5) Network host = rootbeer (192.9.3.1)



Enter selection number ('1'..'5'), 'continue', 'previous', 'cancel', or '?' for
help:
```

Figure 51. Installation Media Identification Menu - Network

The components of a distribution are referred to as **packages**. Some examples of packages are **FORTRAN 1.4, X Windows,** and **Solbourne OS/MP Optional Software**. Packages contain one or more *modules*, which are groups of logically-related files, such as executables or libraries. Most packages also have *variables*, which have two uses: controlling the actions of installation commands associated with the package, and prefixing where modules are to be installed.

A single package, OS/MP 4.1B Full-Install Optional Software, is included on the OS/MP 4.1B distribution tape. The following display shown in Figure 52 appears; the values shown for `Size` in this and subsequent displays may vary.

The message `Mandatory Software Will Be Installed` indicates that the standard filesystems will be built from scratch (overwriting any old contents) when the **`install`** command is issued. If this message does not appear, only the packages selected in this menu will be installed.

The Optional Software package contains a set of software modules that have historically been installed as part of **/usr**. These modules are not necessary for the basic operation of the system, and have been provided separately so that **/usr** may be kept as small as possible. To examine the modules available, select the Optional Software package:

```
Enter number of package to examine ('1'..'1'), 'cancel',
'install', or '?' for help: 1

Should the OS/MP 4.1B Full-Install Optional Software
package be installed ('yes', 'no', ^C, or '?' for help)?
```

```
                    Package Selection

              Mandatory Software Will Be Installed

Package Name                                Size(KB)        Install

1) OS/MP 4.1B Full-Install Optional Software    34456           n




Enter number of package to examine ('1'..'1'), 'cancel', 'install', or '?'
for help:
```

Figure 52. Package Selection Menu

The `Should the OS/MP 4.1B Full-Install Optional Software package be installed` question refers to the package in general. The modules are individually selected for installation on the customization screen, and by default all are selected for installation.

After replying **yes**, the customization menu will appear as shown in Figure 53.

★ ★ ★ NOTE ★ ★ ★

Figure 53 is only an example. The free KB reported varies depending on the type and size of disk drive installed.

The size of each module in kilobytes is listed immediately to the right of the module's name. The column after the size indicates whether or not the module is currently marked for installation. If the module is to be installed, the directory that the module's files are to be installed in is listed, followed by the free space on the partition that the directory refers to.

Below are short descriptions of the individual modules:

DEBUGGING - program debugging aids
This module contains the debugging tool **dbx**(1) and the profiled versions of the standard libraries libc, libcurses, libm, libtermcap, libtermlib, libsuntool, and libsunwindow.

GAMES - games and demonstration programs
The recreational programs listed in Section 6 of the *UNIX User's Reference Manual.*

```
        Customization of Solbourne OS/MP 4.1B Optional Software

                                Software Modules
Module          Size(KB)        Install     Directory       Free(KB)
 1) DEBUGGING       2888            y           /usr           58695
 2) GAMES           3136            y           /usr           58695
 3) MANUAL          7440            y           /usr           58695
 4) NETWORKING      1072            y           /usr           58695
 5) PLOT            1784            y           /usr           58695
 6) SECURITY         312            y           /usr           58695
 7) SV_PROG         1848            y           /usr           58695
 8) SV_USER         2320            y           /usr           58695
 9) SYSTEM_V        4032            y           /usr           58695
10) TEXT             720            y           /usr           58695
11) VERSATEC        5960            y           /usr           58695
12) UUCP             608            y           /usr           58695
13) RFS              912            y           /usr           58695
14) SHLIB           1376            y           /usr           58695
15) TLI               48            y           /usr           58695

Enter number of module to modify ('1'..'15'), 'continue', 'abort', or '?' for
help:
```

Figure 53. Package Selection Customization Menu

MANUAL - on-line manual pages
Sections 1 through 8 of the UNIX User's and Programmer's Manuals in machine-readable form. See **man**(1), **lookup**(1), and **qref**(1) for more details. This option requires that the TEXT option also be installed.

NETWORKING - network utilities
Utilities and commands that access a network, such as **rcp**(1) or **ftp**(1). This module is required on systems that are connected to a network, or that will use the NIS/YP database services.

PLOT - basic plot-generating applications
The standard UNIX plotting utilities, which allow the creation of plots and graphs from simple data to be displayed on a variety of plotters and graphics terminals. See **plot**(1G) and **graph**(1G).

SECURITY - C2 security
The SECURITY module provides features such as audit trails and shadow password files in the spirit of the Department of Defense's C2 Security Specification (the "Orange Book"). The compliance of these features has not been certified.

SV_PROG - SunView program development support
Include files and libraries needed for compiling SunView applications. This module requires that SV_USER also be installed.

SV_USER - basic SunView support
The SunView windowing system and associated applications (such as **suntools**(1) and **shelltool**(1)). This module is not required if only X Windows will be used on the system.

SYSTEM_V
System V-compatible libraries and executables. System VR3, POSIX, and X/OPEN are supported. See **svidii**(7v), **svidiii**(7v), **xopen**(7v), and **posix**(7v) for details.

TEXT - nroff/troff text processing
This module provides the text formatter **troff**(1) and its associated support programs and files. This option is required if the MANUAL option is installed.

VERSATEC - Versatec printer support
Various utilities specific to Versatec printers, such as **vtroff**(1) and **vplot**(1G).

UUCP - uucp applications suite
uucp(1C) and its support programs. These are normally used for communicating with other UNIX operating systems via phone line.

RFS
Utilities and libraries to support the System V Remote File System.

SHLIB
Position-independent versions of the BSD and System-V versions of the C library. These are provided to allow substituting or adding a module to the shared C library.

TLI
Libraries and headers to support developing programs that take advantage of the System V Transport Layer Interface.

Modifying a module allows selecting whether or not it is to be installed and, if so, the directory its files are to be extracted into.

★ ★ ★ NOTE ★ ★ ★

All modules are intended to be extracted in their default directory. If a module is extracted somewhere else, there is no guarantee that the programs provided in the module will work.

For example, to not install the VERSATEC module:

```
Enter number of module to modify ('1'..'15'), 'continue',
'abort', or '?' for help: 11
```

The VERSATEC menu entry is highlighted, and:

```
Modifying the Versatec printer support module
Should the VERSATEC module be installed ('yes', 'no', ^C,
or '?' for help)? no
```

Figure 54 shows the updated display.:

```
        Customization of Solbourne OS/MP 4.1B Optional Software

                              Software Modules
 Module          Size(KB)      Install     Directory      Free(KB)
 1) DEBUGGING        2888          y           /usr           64655
 2) GAMES            3136          y           /usr           64655
 3) MANUAL           7440          y           /usr           64655
 4) NETWORKING       1072          y           /usr           64655
 5) PLOT             1784          y           /usr           64655
 6) SECURITY          312          y           /usr           64655
 7) SV_PROG          1848          y           /usr           64655
 8) SV_USER          2320          y           /usr           64655
 9) SYSTEM_V         4032          y           /usr           64655
10) TEXT              720          y           /usr           64655
11) VERSATEC         5960          n
12) UUCP              608          y           /usr           64655
13) RFS               912          y           /usr           64655
14) SHLIB            1376          y           /usr           64655
15) TLI                48          y           /usr           64655

Enter number of module to modify ('1'..'15'), 'continue', 'abort', or '?' for
help:
```

Figure 54. Package Selection Menu - Deletion of Versatec Module

★ ★ ★ NOTE ★ ★ ★

The free space for **/usr** *has been increased by the size of the VERSATEC module as shown in Figure 54.*

To install the GAMES module in **/fun** (on the root partition):

```
Enter number of module to modify ('1'..'13'), 'continue',
'abort', or '?' for help: 2
```

The GAMES menu entry is highlighted, and:

```
Modifying the games and demonstration programs module

Should the GAMES module be installed ('yes', 'no', ^C, or
'?' for help)? yes

Install GAMES in what directory? /fun

/fun does not exist. Create it during installation ('yes',
'no', ^C, or '?' for help)? yes
```

The menu is updated to reflect the change, as shown in Figure 55.

★ ★ ★ NOTE ★ ★ ★

The free space for **/usr** *changes, and a completely new size (for* **/fun***) is also displayed as shown in Figure 55.*

```
        Customization of Solbourne OS/MP 4.1B Optional Software

                                Software Modules
 Module          Size(KB)       Install     Directory      Free(KB)
 1) DEBUGGING        2888           y           /usr          67791
 2) GAMES            3136           y           /fun           4579
 3) MANUAL           7440           y           /usr          67791
 4) NETWORKING       1072           y           /usr          67791
 5) PLOT             1784           y           /usr          67791
 6) SECURITY          312           y           /usr          67791
 7) SV_PROG          1848           y           /usr          67791
 8) SV_USER          2320           y           /usr          67791
 9) SYSTEM_V         4032           y           /usr          67791
10) TEXT              720           y           /usr          67791
11) VERSATEC         5960           n
12) UUCP              608           y           /usr          67791
13) RFS               912           y           /usr          67791
14) SHLIB            1376           y           /usr          67791
15) TLI                48           y           /usr          67791

Enter number of module to modify ('1'..'15'), 'continue', 'abort', or '?' for
help:
```

Figure 55. Package Selection Menu - Install Games module to /fun

If you decide to discard all changes made to the modules, use the command **abort**. This returns to the Package Selection Menu.

If you are satisfied with the changes (if any) made to the modules, enter the command **continue**. This will record the changes and return to the Package Selection menu.

When package customization has been completed (which may mean no packages were selected for installation), enter **install** as shown in Figure 56.

The actual installation begins at this point. The steps taken during the installation are:

1. create filesystems (**root**(/), **/usr**, possibly **/var** or **/tmp**
2. create device entries
3. install mandatory **root** files
4. install mandatory **kvm** files
5. install mandatory **usr** files
6. install optional software

```
                        Package Selection

                Mandatory Software Will Be Installed

Package Name                                Size (KB)      Install

1) OS/MP 4.1B Full-Install Optional Software  34456            y




Enter number of package to examine ('1'..'1'), 'cancel', 'install', or '?'
for help: install
```

Figure 56. Package Selection Menu

When installation has finished, it gives the following message:

```
Optional Software Installation Succeeded
Press any character to continue
```

The next display gives the values of the previous and new ROM variables DEFAULTROOT, DEFAULTSWAP (if they have changed), and asks if you want to update the variables, as shown in Figure 57.

★ ★ ★ NOTE ★ ★ ★

Before you say 'yes', make sure that all the previous settings of these variables are recorded so that you can later reboot from the old version of the system if necessary. If you choose not to update the ROM variables, make sure that you record the new values and use them to reboot the newly installed system at a later time.

`reinst_sys` then performs the final system setup, and completes. The new system's filesystems are currently mounted under the **/etc/sys_conf/reinst_sys/root** directory. For example, the new version of the /var directory is mounted at **/etc/sys_conf/reinst_sys/root/var**.

At this point, the newly installed system is ready to boot. However, you may want to finish the installation by creating or editing such files as **/etc/rc.local**, automounter maps, **/etc/printcap**, the **/var/spool** directories, NIS/YP maps, or any other files local to your system. If you have comments in your **/etc/fstab** file, they will not exist in the new **/etc/fstab** file, so you may want to edit this file.

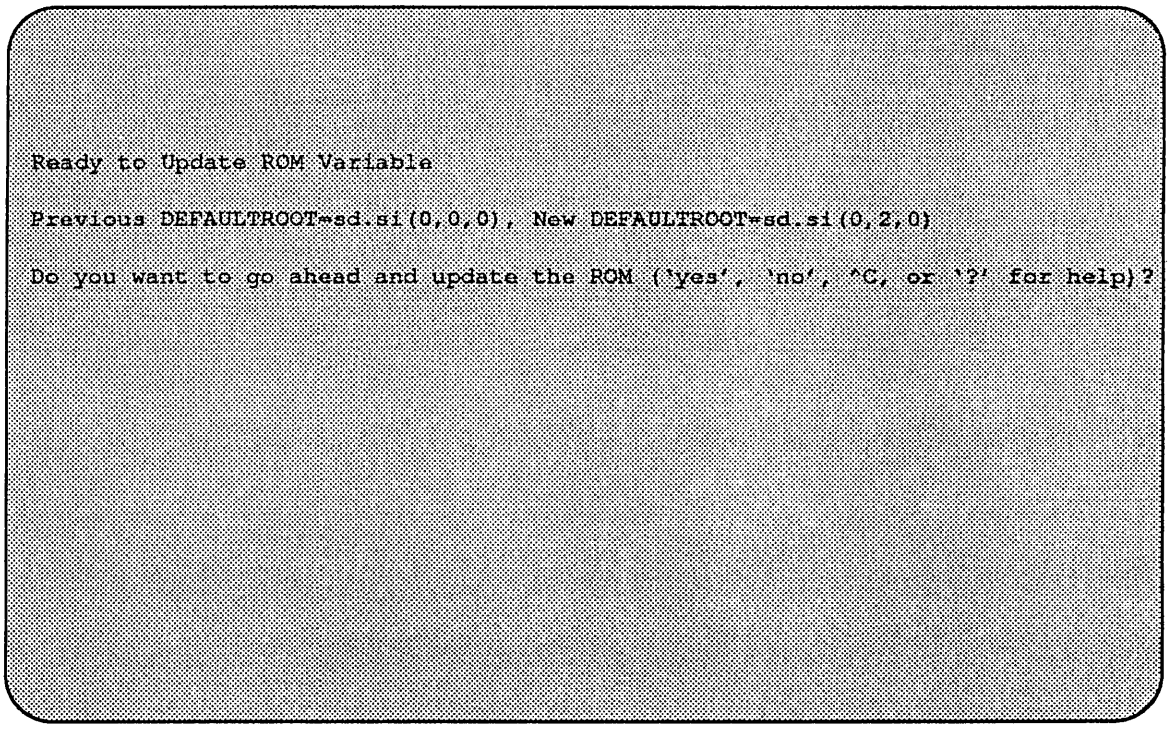

Figure 57. Update ROM Variable

★ ★ ★ NOTE ★ ★ ★

If you installed the new system on a disk that is not recognized by a OS/MP 4.1B generic kernel, then you must reconfigure the kernel before rebooting.

You may also wish to create a customized kernel on the new system, so that hardware such as the channel board and VSCSI devices will be recognized. If you would rather wait until after rebooting the new system to configure your kernel, you should edit the new **/etc/fstab** file and comment out any partitions which are on disks not visible to the generic OS/MP 4.1B kernel.

After you have completed customizing the new installation, reboot your machine, using the new ROM variables.

If you used the -a option to upgrade to a different architecture, then after customizing the new installation, halt the machine and turn off the power. Replace the old CPUs with the new CPUs, power up and boot your machine using the new ROM variables.

Installing OS/MP 4.1B on a Dataless Client

Before Installing...

This chapter describes how to install OS/MP 4.1B on a Dataless Client.

A dataless client is a machine whose /usr files are NFS-mounted from another machine (the "server") but whose root partition is on a local disk.

★ ★ ★ CAUTION ★ ★ ★

Perform a full backup before installing OS/MP 4.1B. A complete installation will overwrite all information on the disk partitions specified for the root (/), swap, /var, and /tmp filesystems.

Before installing the release tape, you must clean the tape drive on the host machine. Failure to do so may damage the release tape.

Installing...

Loading the ramdisk image is your first step in a diskful installation. The ramdisk image is a special UNIX operating system kernel with a built-in ramdisk that contains the installation software. The command to load the ramdisk depends on the type of system. Follow the instructions for your system type.

Installing on a Series5, Series5E, or Series6:

Loading the Ramdisk

Turn the system on. After the system passes the self-tests, the system displays the bootROM prompt.

Loading the Ramdisk via a Local Tape Drive

The ramdisk installation software uses the value of the bootROM variable **INSTALLED** to determine if a system needs to have the basic operating system installed. Set the value of this variable to 0 before loading the ramdisk:

```
ROM> setenv installed 0
```

The system asks if you want to re-install if **INSTALLED** is not 0.

To load the ramdisk on Series5 or 5E systems using a local tape drive, enter the following boot command:

```
ROM> boot st.si(,TapeID,2)
```

To load the ramdisk on Series6 systems using a local tape drive, enter the following boot command:

```
ROM> boot st.si(,TapeID,3)
```

The variable *TapeID* shown in the command should be replaced with the SCSI ID of the tape drive to be used. For st0, use 4; for st1, use 5.

The bootROM copies the ramdisk image into memory and boots it:

```
Boot: st.si(,4,3)
Entry: 0xfd080000
Size: 00xea000+0x43b878+0x3a9f0
```

The system displays a spinner while copying the ramdisk into memory. When the copy completes, the spinner pauses for up to three minutes.

Loading the Ramdisk via a Remote Tape Drive

The system with the tape drive, referred to as *tapehost* in the following example, must be on the same network as the system being installed, referred to as *hamster* in the following example. For example, with a class C network, the first three numbers in the Internet addresses of the two machines must be the same, such as 192.1.3.42 and 192.1.3.17. Also, *hamster* must be listed in **/etc/hosts**, or in the NIS/YP hosts database, and **/.rhosts** on *tapehost*. In addition, the ethernet address must be in the *ethers* database. The ramdisk must be extracted from the OS/MP 4.1B distribution tape onto a disk on *tapehost*.

Since the system uses **tftp**(1) to load the ramdisk image, it must be enabled on the tapehost. Examine the file **/etc/inetd.conf**. A line similar to the one below should be in the file:

```
tftp dgram udp wait root /usr/etc/in.tftpd in.tftpd -s
/tftpboot
```

If the line starts with a #, remove the #.

If a `-s` appears after the last `in.tftpd` in **/etc/inetd.conf**, either remove it or use the directory **/tftpboot** instead of **/var/tmp** in the example below. Approximately 6 Mbytes will be needed in the directory used.

If **/etc/inetd.conf** has been changed, **inetd(8)** must be told to re-read the configuration file:

```
tapehost # ps ax | egrep inetd
  249 ? I  0:01 inetd
  541 p3 R  0:00 egrep inetd
```

The *pid* of inetd is the first number on the line that doesn't contain **egrep**. In the above output, *pid* is 249.

```
tapehost # kill -HUP pid
```

Put the distribution tape into the drive and execute the following commands.

tapehost must also be running **rpc.mounted**(8) **nfsd**(8) and **rarpd**(8) daemons.

★ ★ ★ NOTE ★ ★ ★

In the following example the install kernel will be named /var/tmp/install. The actual name of the file is not important, as long as it is used consistently here and in the example on the next page. Also note that the filesystem must have enough space to hold the install kernel.

In the **mt** command below, replace the variable *X* with one of the following values, depending on the type ofsystem:

Table 18.

System	Value of X
Series5 and 5e	2
Series6	3

For Exabyte tape drives, use bs=1024 instead of bs=512 in the **dd** command shown below.

```
tapehost # cd /var/tmp
tapehost # mt -f /dev/nrst0 asf X
tapehost # dd if=/dev/nrst0 of=install bs=512
```

Enter the following boot command:

```
ROM> b tftp.ei(,,hostnumber)/var/tmp/install
```

In the example above, the variable *hostnumber* should be replaced with the last of the four numbers in the system's Internet address.

Loading the Ramdisk via a Local CD-ROM Drive

Power on the system. After the system passes the self-tests, the bootROM prompt is displayed.

The ramdisk installation software uses the value of the bootROM variable **INSTALLED** to determine if the basic operating system needs to be installed. Set the value of this variable to 0 before loading the ramdisk as follows:

```
ROM> setenv installed 0
```

The system will ask if you want to re-install if **INSTALLED** is not 0.

Install the OS/MP 4.1B CD-ROM disk into the CD-ROM drive.

★ ★ ★ NOTE ★ ★ ★

In order to boot from the local CD-ROM disk, the bootROMs must be at version 3.5 or higher.

In the two boot commands below, replace the variable *X* with one of the following values, depending on the type of system.

Table 19.

System	Value of X
Series5 and 5E	5
Series6	6

To load the ramdisk on Series5, 5E, or 6 systems, using a local CD-ROM drive, enter a boot command of the following form:

```
ROM> boot sd.si(,6,)/Install.SeriesX
```

The bootROM copies the ramdisk image into memory and boots it:

```
Boot: sd.si(,6,)/Install.SeriesX
Entry: 0xfd080000
Size: 00xea000+0x43b8b8+0x309a8
```

A spinner is displayed while copying the ramdisk into memory. When the copy completes, there is a pause of up to three minutes.

Loading the Ramdisk via a Remote CD-ROM Drive or the Network

Loading the ramdisk from a remote CD-ROM drive is essentially the same as loading the ramdisk from an image area of the OS/MP 4.1B contained on a remote disk accessed over the network. The command to load the ramdisk depends on the type of system.

Power on the system. After the system passes the self-tests, the bootROM prompt is displayed.

The ramdisk installation software uses the value of the bootROM variable **INSTALLED** to determine if the basic operating system needs to be installed. Set the value of this variable to 0 before loading the ramdisk as follows:

```
ROM> setenv installed 0
```

The system will ask if you want to re-install if **INSTALLED** is not 0.

If you are installing by a remote CD-ROM drive (via the network), install the OS/MP 4.1B CD-ROM disk into the remote CD-ROM drive. Create a mount point directory (if one doesn't exist), and mount the CD-ROM drive on the remote machine, referred to here as `diskhost`, as follows:

```
diskhost# mkdir /cdrom
diskhost# mount /dev/sr0 /cdrom
```

The remote system `diskhost`, must be on the same network as the system being installed. For example, with a class C network, the first three numbers in the Internet addresses of the two machines must be the same, such as 192.1.3.42 and 192.1.3.17. Also, the local machine must be listed in **/etc/hosts**, or in the NIS/YP *hosts* database, and in **/.rhosts** on `diskhost`. In addition, the ethernet address must be in **/etc/ethers**, or in the NIS/YP *ethers* database.

`diskhost` must have **`/cdrom`** in it's **`/etc/exports`** file, and must also be running the **`rpc.mountd`**(8) **`nfsd`**(8) and **`rarpd`**(8) daemons.

Since **tftp**(1) will be used by the system to load the ramdisk image, it must be enabled on the diskhost. Examine the file **/etc/inetd.conf**. A line similar to the one below should be in the file:

```
tftp dgram udp wait root /usr/etc/in.tftpd in.tftpd -s
/tftpboot
```

If the line starts with a #, remove the #.

If a `-s` appears after the last `in.tftpd` in **/etc/inetd.conf**, either remove it or use the directory **/tftpboot** instead of **/var/tmp** in the example below. Approximately 6 MBytes will be needed in the directory used.

If **/etc/inetd.conf** has been changed, **inetd**(8) must be told to re-read the configuration file:

```
diskhost # ps ax | egrep inetd
  249 ? I 0:01 inetd
  541 p3 R 0:00 egrep inetd
```

The *pid* of inetd is the first number on the line that doesn't contain **egrep**. In the above output, *pid* is 249.

```
diskhost# kill -HUP pid
```

In the **boot** command below, replace the variable *X* with one of the following values, depending on the type of system

Table 20.

System	Value of X
Series5 and 5E	5
Series 6	6

Enter the following boot command:

```
ROM> b tftp.ei(,,hostnumber)/cdrom/Install.SeriesX
```

The bootROM copies the ramdisk image into memory and boots it:

```
Boot: tftp.ei(,,hostnumber)/cdrom/Install.SeriesX
Entry: 0xfd080000
Size: 00xea000+0x43b878+0x3a9f0
```

A spinner is displayed while copying the ramdisk into memory. When the copy completes, there is a pause of up to three minutes.

Dataless Installation

After Booting Ramdisk

When the ramdisk is booted, it first determines what sort of terminal is being used. If it is a serial terminal, that is, a terminal attached to the **ttya/ttyb** port, or if the bootROM variable **CONSOLE** is not set, a list of supported terminals is displayed as follows:

```
1) 610
2) ansi
3) hp
4) sun
5) tvi912
6) vt100
7) wyse50
What type of terminal are you using ('1'..'7')?
```

If a frame-buffer is being used as the console, select the 4, the sun terminal type.

```
What type of terminal are you using ('1'..'7')? 4
```

If the value of the bootROM variable **INSTALLED** is non-zero, the mandatory system software has already been installed. In that case, the system displays the following:

```
THIS SYSTEM IS ALREADY INSTALLED


Do you want to re-install the system ('yes', 'no', or '?'
for help)?
```

The above message is for the benefit of users intending to re-install the system software, but have not reset the **INSTALLED** environment variable.

If the message appears, enter `yes` to re-install the mandatory system software, or `no` to continue the installation without re-installing it.

The disk drives attached to the system are then scanned, and a menu of procedures is displayed:

```
Ramdisk

 1) Change Disk Partitioning
 2) Install Software
 3) Invoke a Bourne Shell
 4) Reboot System
 5) Halt System
Enter number of function to execute ('1'..'5', or '?' for
help):
```

The provided functions are described below:

Change Disk Partitioning - Allows the changing of the sizes of disk partitions, and what those partitions are to be used for, i.e. filesystem, swap, or unused. Refer to the *Changing Disk Partitions* Section for details on changing disk partitions.

★★★NOTE★★★

If changes are going to be made to the disk partitions on which OS/MP 4.1B will reside, the changes must be made before installing software. Disk partitions not containing OS/MP 4.1B can be modified before or after the installation.

Install Software - Intended primarily for installing new systems. If system software has already been installed, then this option may be used to install any Solbourne software distribution, such as X Windows. See "Software Installation from the Ramdisk," for more information.

Invoke a Bourne Shell - Starts an interactive Bourne shell. This option is provided mainly for formatting disks and restoring filesystems. The sizes of disk partitions should not be changed here with the format(8) command. If they are, you must then select `Change Disk Partitioning` before attempting to `Install Software`.

Reboot System - Starts UNIX after software installation. Alternatively, you may reload the ramdisk from scratch.

Halt System - Returns control of the system to the bootROM.

Help may be requested at any ramdisk prompt by entering a question mark by itself. Table 21 shows edit commands available when entering text in response to prompts:

Table 21. Input Editing Commands

Character	Interpretation
backspace (^H)	delete last input character
delete (^?)	delete last input character
^U	erase input line
^R	redisplay input line
^W	delete input up to '/' or whitespace
^C	cancel input, returning to nearest menu
ESC	cancel input, returning to nearest menu
^L	redisplay entire screen
return (^M)	end input
newline (^J)	end input

If a string is too long to be displayed in the available space, the beginning of the string is displayed as "...". This allows display of the end of the string, which is usually of more interest.

Keywords can be shortened to any unique prefix (such as 'co' for 'continue'), except for 'yes' and 'no', which must always be spelled out.

Fatal errors during software installation are usually reported by messages beginning with "`System error`" or "`Internal error`" and ending with a "`#`" prompt. If a fatal error occurs, software installation may be restarted by entering:

```
# ^Jstty sane^J
# cd /
# rm -f /core
# inst_sys
```

where ^J is the linefeed character. The command **stty sane** may not be echoed (and is intended to fix that problem). In the event of a fatal error during software installation, please report the problem to Solbourne customer support.

Software Installation from the Ramdisk

Installing software has two distinct stages: gathering information and modifying the system. No permanent changes are made to the system until all information has been provided.

There are three informational menus:

- Standard Filesystem Definition - specifies where the standard filesystems (**root (/), swap,** and **/usr,** optionally **/var** and **/tmp**) are located.
- Media Identification - Determines the installation media from which to install (tape, CD-ROM, or network directory), and determines where that media is located.
- Package Selection - allows selecting of which optional software packages are to be installed.

All three menus provide the command **cancel.** The first two also provide the command **previous.** These commands allow you to return to prior menus, optionally discarding any changes that have been made.

cancel always returns to the ramdisk menu. If changes are to be discarded, then all changes made since `Install Software` was selected are forgotten.

previous always returns to the previous menu (which is the ramdisk menu, in the case of the Filesystem Definition menu). The changes discarded in this case are those made in the menu you are leaving.

cancel has higher priority than **previous.** In other words, if you use **previous** to leave a menu without discarding changes, then **cancel** from that menu and discard changes, the changes made in the earlier menu are also discarded.

Standard Filesystem Definition

The Standard Filesystem Definition menu defines where the mandatory filesystems are located. The **/usr** files should have already been installed on the server.

Any changes made to the standard filesystems with the partition tool will appear in this menu.

Changing an entry at the Standard Filesystem Definition

The following steps assign the **/usr** filesystem to **rootbeer:/export/exec/Series5.**, rather than using the default of **/usr** being a subdirectory of the root filesystem.

To modify the **/usr** filesystem, enter the number **3.**

```
Enter number of filesystem to change ('1'..'5'),
'continue', 'previous', 'cancel' or '?' for help: 3
```

The **usr** menu will be highlighted, and the system will request a disk partition. Assign it to **rootbeer:/export/exec/Series5.**

The new arrangement is displayed as shown in Figure 58.

The following steps assign the **/var** filesystem to **sd0d,** rather than using the default of **/var** being a subdirectory of the root filesystem.

These steps are optional. If followed, the result is a filesystem definition that is the same as that supplied on the factory installation of a diskful system. In addition, it makes use of partition d, thus using 9.3 MB of disk space that is not used when the default disk partition is used with the standard filesystem definition.

In Figure 58 shown below, the notation "(required)" appears next to the **root(/)**, **swap** and **/usr** filesystems. These filesystems must be defined; however, they may be placed on any partition of any disk.

```
                    Standard Filesystem Definition

  1) root on sd0a      (required)
  2) swap on sd0b      (required)
  3) /usr on rootbeer:/export/exec/Series5(required)
  4) /var on root partition
  5) /tmp on root partition

                      Disk Partitions (sizes in MB)
       (a)     (b)      (c)      (d)      (e)      (f)      (g)      (h)
sd0:   8.4    32.4     191.1    9.3      ---      ---      141.1    ---
sd1:   8.4    32.7     190.9    9.6      ---      ---      140.8    ---



Enter number of filesystem to change ('1'..'5'), 'continue', 'previous',
'cancel', or '?' for help:
```

Figure 58. Sample Standard Filesystem Definition Menu for Dataless Clients

To modify the **/var** filesystem, enter the number **4**.

```
Enter number of filesystem to change ('1'..'5'),
'continue', 'previous', 'cancel' or '?' for help: 4
```

The var menu will be highlighted, and the system will request a disk partition. Assign it to **sd0d.**

```
Enter name of disk partition or host:path for /var
filesystem, 'none', ^C, or'?' for help: sd0d
```

The new arrangement is displayed as shown in Figure 59.

```
                    Standard Filesystem Definition

  1) root on sd0a      (required)
  2) swap on sd0b      (required)
  3) /usr on rootbeer:/export/exec/Series5(required)
  4) /var on sd0d
  5) /tmp on root partition

                     Disk Partitions (sizes in MB)
       (a)    (b)      (c)     (d)     (e)     (f)     (g)     (h)
sd0:   8.4    32.4     191.1   9.3     ---     ---     141.1   ---
sd1:   8.4    32.7     190.9   9.6     ---     ---     140.8   ---



Enter number of filesystem to change ('1'..'5'), 'continue', 'previous',
'cancel', or '?' for help:
```

Figure 59. Modified Standard Filesystem Definition Menu for Dataless Clients

Once all changes for the standard filesystems have been made, enter **`continue`** to proceed to the Media Identification menu:

```
Enter number of filesystem to change ('1'..'5'),
'continue', 'previous', 'cancel', or '?' for help: continue
```

The Media Identification Menu

The Media Identification Menu describes which type of installation media will be used during the installation and where it is located. On Series5, Series5E, and Series6 systems, the default is to install from a local tape drive, even if no such drive exists. Therefore, changing the settings on a non-Series S4000 machines probably will be necessary.

Figure 60 shows the Media Identification Menu.

Installing from a Tape Drive

Installing from a local tape drive requires that the *Tape drive* field be set to either **st0** or **st1** (the only supported tape drives) and that *Tape host* be set to **`localhost`**. The Installation media type must also be set to **`Tape`**.

Installing from a remote tape drive requires that all the fields be set:

Installation media type must be set to **`Tape`**.

Tape drive should be the basic name of the tape drive on the tapehost.

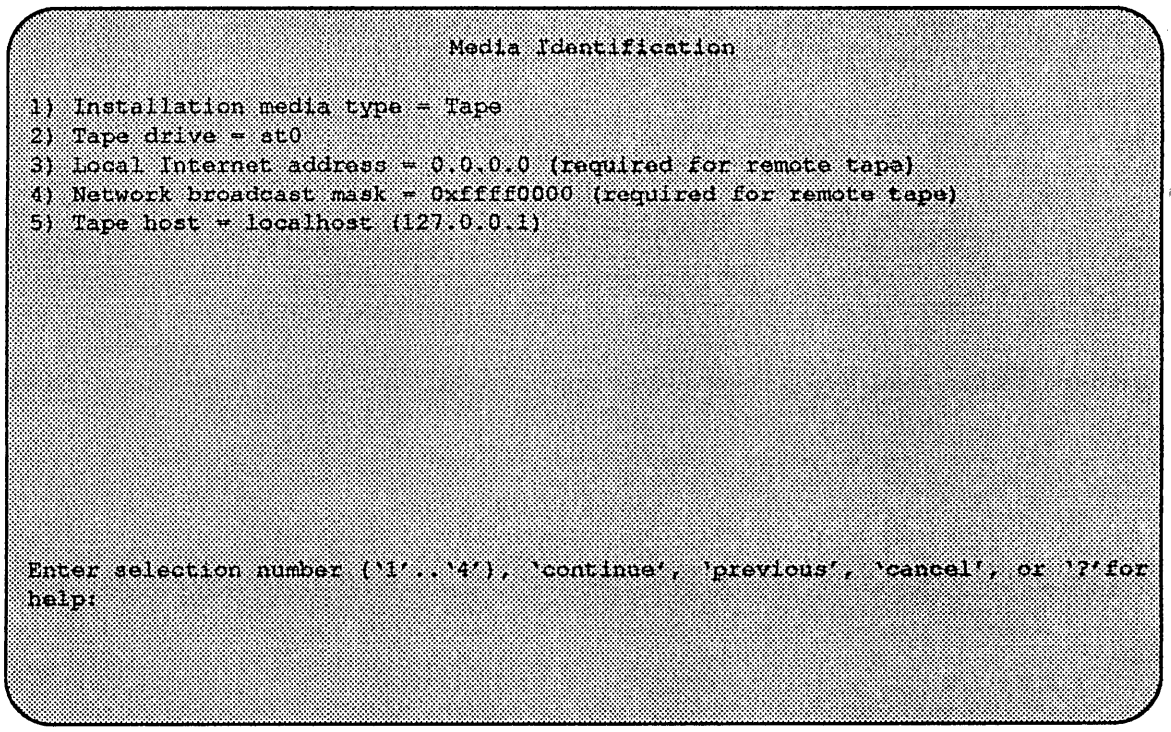

Figure 60. Media Identification Menu - Local Tapehost

The **Local Internet address** is the address of the system being installed. If the default value is not correct, make sure that the client name corresponding to the correct address appears in the tape host's **/.rhosts** file. Check **/etc/hosts** or the NIS/YP hosts map as appropriate.

The **broadcast mask** should not be changed unless your network uses a non-standard mask. Such a mask is used when a network is sub-netted (i.e., a Class B network is treated as several Class C networks). A leading '0x' is necessary if entering the mask as a hexadecimal number. A leading '0' is needed for octal numbers. If neither prefix is given, the value is assumed to be in decimal.

Tape host must be set to the name of the system with the tape, which is used to determine the tape host's Internet address. The name itself, however, is not especially important (it is discarded after the installation is complete). As such, the default name, *tape-n-boot-serv*, generally need not be changed.

Figure 61 shows the Media Identification menu of a system that was booted from a remote tape using tape device st0 (SCSI address 4).

When the details of the tape drive have been entered correctly, enter **`continue`**.

Local CD-ROM Installation

Installing from a local CD-ROM disk drive requires that the Installation media type be set to **`CD-ROM`**, the CD-ROM drive field be set to **`/dev/sr0`** and the *CD host* field be set to **`'localhost'`**. Figure 62 shows the Installation media type menu with the CD-ROM parameters set to install from CD-ROM.

```
                              Media Identification
1) Installation media type = Tape
2) Tape drive = st0
3) Local Internet address = 192.9.3.4 (required for remote tape)
4) Network broadcast mask = 0xffffff00 (required for remote tape)
5) Tape host = tape-n-boot-serv (192.9.3.1)









Enter selection number ('1'..'4'), 'continue', 'previous', 'cancel', or '?'for
help:
```

Figure 61. Media Identification Menu - Remote tapehost

```
                        Installation Media Identification

1) Installation media type = CD-ROM
2) CD drive = /dev/sr0
3) Local Internet address = 0.0.0.0 (required for remote tape)
4) Network broadcast mask = 0xffff0000 (required for remote tape)
5) CD host = localhost (127.0.0.1)









Enter selection number ('1'..'5'), 'continue', 'previous', 'cancel', or '?'for
help:
```

Figure 62. Installation Media Identification Menu - Local CD-ROM

Network and remote CD-ROM Installations

Installation media type must be set to **`Network`**

Installation directory should be the full path name of the location of the installation area, or the full path of the CD-ROM mount point, on the network host. For example, if the remote CD-ROM is mounted on **`/usr/cdrom`**, then the installation path is simply **`/usr/cdrom`**.

The **Local Internet address** is the address of the system being installed. If the default value is not correct, make sure that the client name corresponding to the correct address appears in the tape host's **/.rhosts** file. Check **/etc/hosts** or the NIS/YP hosts map as appropriate.

The **broadcast mask** should not be changed unless your network uses a non-standard mask. Such a mask is used when a network is sub-netted (i.e., a Class B network is treated as several Class C networks). A leading '0x' is necessary if entering the mask as a hexadecimal number. A leading '0' is needed for octal numbers. If neither prefix is given, the value is assumed to be in decimal.

Network host must be set to the name of the system with the installation directory, which is used to determine it's Internet address. The name itself, however, is not especially important (it is discarded after the installation is complete). As such, the default name, *tape-n-boot-serv*, generally need not be changed

When the details of the media have been entered correctly, enter **`continue`**.

Root Files Installation

Next, you are asked if you want to install just the mandatory root files. This is asked as a confirmation before starting the installation:

```
Install only mandatory root files ('yes', 'no', ^C, or '?'
for help)?
```

After entering **`yes`**, the installation is performed. When it completes, you will be returned to the ramdisk menu. Reboot the system.

The steps taken during the installation are:

1. extract miniusr. This contains the installation software, as well as enabling swapping.
2. create filesystems (**root(/)**, possibly **/var** or **/tmp**, as well as any new filesystems requested via the partition tool)
3. create device entries
4. install mandatory root files

   When installation has finished, the ramdisk menu is displayed (see Figure 63). If the installation failed, call Customer Support.

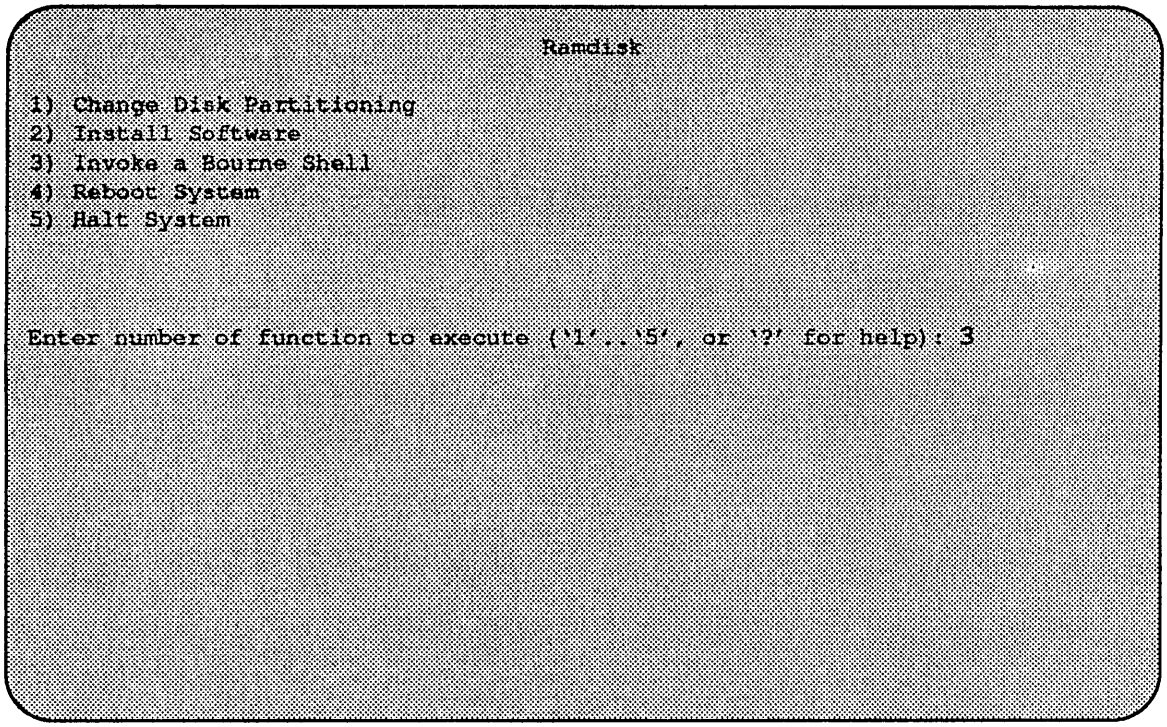

Figure 63. Ramdisk Menu

5. Invoke the Bourne Shell by selecting **3** on the ramdisk menu.

   - Before rebooting the system, edit the **/etc/hosts** and **/etc/hostname.ei0** files. The **/etc/hosts** file must have the name and internet address for the system on which you installed the operating system.

```
ramdisk# cat >> /disk/etc/hosts <return>
141.138.8.1 hostname
^D
ramdisk#
```

   - The **/etc/hostname.ei0** must contain the name of the system on which you installed the operating system.

```
ramdisk# cat >> /disk/etc/hostname.ei0 <return>
hostname
^D
ramdisk#
```

6. **^D** at the ramdisk prompt to return to the ramdisk menu.

Rebooting from the Ramdisk

After a successful installation, start UNIX by rebooting as shown in Figure 64.

```
                                Ramdisk

1) Change Disk Partitioning
2) Install Software
3) Invoke a Bourne Shell
4) Reboot System
5) Halt System


Enter number of function to execute ('1'..'5', or '?' for help): 4
```

Figure 64. Ramdisk Menu

Enter number of function to execute ('1'..'5', or '?' for help): **4**

At the Reboot System menu select Boot Unix:

```
Enter selection number ('1'..'3') or '?' for help: 1
```

After selecting **1**, there is a short pause, and then:

```
Automatic boot enabled. Type Control-C to abort

ROM> boot

Boot: sd.si(0,0,0)/vmunix

Entry: 0xfd080000

Size: 0xd6000+0x33358+0x81548


OS/MP 4.1B_Export (GENERIC/root) #0: Tues May26 21:09:24
1992
Copyright (c) 1989, 1990 Sun Microsystems, Inc. and
Solbourne Computer, Inc.
[...]
```

Now you must specify the system configuration information must be specified.

After Installing...

Initial Boot System Configuration

When a newly installed system is booted multi-user for the first time, the system asks a series of configuration questions:

```
OS/MP 4.1B_Export (GENERIC/root) #0: Tue May 26 10:00:13
1992

Copyright (c) 1989-1991 Sun Microsystems, Inc. and
Solbourne Computer, Inc.


[...]

Automatic reboot in progress...
Thur May 28 16:55:42 PDT 1992
checking quotas: done.


This system has not yet been configured. Several values
need to be set before the system can come up to multi-user
Unix.

What is this system's name (default = 'standalone'):
<Return>

What is its Internet address (0 for none, default =
192.9.3.4)? <Return>

What is the network broadcast mask (default = 0xffffff00)?
<Return>

What is the NIS domain name ('none' for none, default =
'none')? <Return>
```

★★★NOTE★★★

Using the default 'none' disables the NIS/YP services.

```
Time zone choices are:
Australia/  GMT+11      GMT-3       GMT6        Mideast/
Brazil/     GMT+12      GMT-4       GMT7        NZ
CET         GMT+13      GMT-5       GMT8        Navajo
CST6CDT     GMT+2       GMT-6       GMT9        PRC
Canada/     GMT+3       GMT-7       Greenwich   PST8PDT
Chile/      GMT+4       GMT-8       HST         Poland
Cuba        GMT+5       GMT+9       Hongkong    ROC
EET         GMT+6       GMT0        Iceland     ROK
EST         GMT+7       GMT1        Iran        Singapore
EST5EDT     GMT+8       GMT10       Israel      Turkey
Egypt       GMT+9       GMT11       Jamaica     UCT
Factory     GMT-0       GMT12       Japan       US/
GB-Eire     GMT-1       GMT13       Libya       UTC
GMT         GMT-10      GMT2        MET         Universal
GMT+0       GMT-11      GMT3        MST         W-SU
GMT+1       GMT-12      GMT4        MST7MDT     WET
GMT+10      GMT-2       GMT5        Mexico/     Zulu

('/' indicates time zone prefixes)

Enter time zone (default = 'US/Mountain'): US <Return>
Time zone choices are:
Alaska      Central     Hawaii      Pacific
Aleutian    East-Indiana  Michigan  Pacific-New
Arizona     Eastern     Mountain    Samoa

Enter time zone: Mountain <Return>
What is today's date (mm/dd/yyyy, default = 05/28/1992)? <Return>
What time is it (24-hour hh:mm, default = 16:55)? <Return>

Current settings are:
 Host name                  = habitrail
 Internet address           = 192.9.3.4
 Network mask               = 0xffffff00
 NIS domain                 = Rodent.COM
 Time zone                  = US/Mountain
 Date (m/d/y)               = 05/28/1992
 Time                       = 16:55

Are these correct ('yes' or 'no')?
yes

Setting netmask of ei0 to 255.255.255.0
Tue Dec 11 22:09:00 MST 1990
Setting password for root
Changing password for root on habitrail.
New password:
Retype new password:
Continuing boot
starting rpc and net services: portmap [...]
```

Reconfiguring the System

You may need to reconfigure the system if: (1) wrong value was set during the initial configuration, or (2) the system did not successfully come up to multi-user mode.

If you find that a wrong value was set during configuration, you can modify the appropriate file manually, or reconfigure. Manually correcting the settings should only be done if you are an experienced system administrator. Reconfiguring automatically is fairly straight-forward, as explained in the following procedure.

If the system has hung up during the boot process, press the Reset button..

★ ★ ★ NOTE ★ ★ ★

If automatic boot is enabled it is necessary to interrupt the reboot by typing Control-C in the early stages of the reboot; otherwise the system will hang up as before.

Then bring up the system in single-user mode:

```
ROM> boot -s
[...]
```

If the system booted successfully originally, you may instead log in as root:

```
Rabitrail login: root
Password:
```

In either case, if a file exists that tells the system it has been configured, remove it:

```
# rm /etc/sys_conf/system-configured
```

The above file may not exist; this is not a problem. Go ahead to the next step.

Now reboot. If you are in single-user mode, exit:

```
# exit
```

Otherwise, use fastboot:

```
# /etc/fastboot
```

The system asks configuration questions just as it did the first time it booted after being installed.

Installing on a Series S4000

Loading the Ramdisk

The following explains four different methods of loading the ramdisk. After you have loaded the ramdisk continue on to the *Dataless Installation* section.

Loading the Ramdisk via a Local Tape Drive

Turn the system on. After the system passes the self-tests, the system displays the bootROM prompt.

The ramdisk installation software uses the value of the bootROM variable **INSTALLED** to determine if a system needs to have the basic operating system installed. Set the value of this variable to 0 before loading the ramdisk:

```
ROM> setenv installed 0
```

The system asks if you want to re-install if **INSTALLED** is not 0.

To load the ramdisk on Series S4000 systems using a local tape drive, enter a boot command in the following form:

```
ROM> install
Which type of device do you wish to install from:
   1) Tape
   2) Network
Enter device type: 1
You have the following tape drives. Please choose one:
   1) At Target4, drive name: ARCHIVE VIPER 150 21247-005
   2) At Target5, drive name: EXABYTE EXB-8200 251K
Enter device number: 1
```

The bootROM copies the ramdisk image into memory and boots it:

```
Boot: ar.si(,4,4)
Entry: 0xfd080000
Size: 0xea000+0x43b878+0x3a9f0
```

The system displays a spinner while copying the ramdisk into memory. When the copy completes, the spinner pauses for up to three minutes. Proceed to the *Dataless Installation* section

Loading the Ramdisk via a Remote Tape Drive

The system with the tape drive, referred to as *tapehost* in the following example, must be on the same network as the system being installed, referred to as *hamster* in the following example. For example, with a class C network, the first three numbers in the Internet addresses of the two machines must be the same, such as 192.1.3.4 and 192.1.3.1. Also, *hamster* must be listed in **/etc/hosts**, or in the NIS/-YP hosts database, and **/.rhosts** on *tapehost*. In addition, the ethernet address must be in the *ethers* database. The ramdisk must be extracted from the OS/MP 4.1B distribution tape onto a disk on *tapehost*.

Since the system uses **tftp**(1) to load the ramdisk image, it must be enabled on the tapehost. Examine the file **/etc/inetd.conf**. A line similar to the one below should be in the file:

```
tftp dgram udp wait root /usr/etc/in.tftpd in.tftpd -s
/tftpboot
```

If the line starts with a #, remove the #.

If a `-s` appears after the last `in.tftpd` in **/etc/inetd.conf**, either remove it or use the directory **/tftpboot** instead of **/var/tmp** in the example below. Approximately 6 MBytes will be needed in the directory used.

If **/etc/inetd.conf** has been changed, **inetd**(8) must be told to re-read the configuration file:

```
tapehost # ps ax | egrep inetd
  249 ? I 0:01 inetd
  541 p3 R 0:00 egrep inetd
```

The *pid* of inetd is the first number on the line that doesn't contain **egrep**. In the above output, *pid* is 249.

```
tapehost # kill -HUP pid
```

Put the distribution tape into the drive and execute the following commands.

tapehost must also be running **rpc.mounted**(8) **nfsd**(8) and **rarpd**(8) daemons.

★ ★ ★ NOTE ★ ★ ★

In the following example the install kernel will be named /var/tmp/install. The actual name of the file is not important, so long as it is used consistently here and in the example on the next page.Also note that the filesystem must have enough space to hold the install kernel.

For Exabyte tape drives, use bs=1024 instead of bs=512 in the **dd** command shown below.

```
tapehost # cd /var/tmp
tapehost # mt -f /dev/nrst0 asf 4
tapehost # dd if=/dev/nrst0 of=install bs=512
```

Enter the following boot command:.

```
ROM> install
Which type of device do you wish to install from:
   1) Tape
   2) Network
Enter device type: 2
Enter internet address of this system (default=a.b.c.d):
192.9.3.4

Enter internet address of remote tape system
(default=a.b.c.d):
   192.9.3.1
Enter name of file to boot (default=/usr/boot/munix.S4000):
   /var/tmp/install
Using IP address 192.9.3.4 = C0090304
Server at IP address 192.9.3.1 = C0090301
Boot: tftp.ei(,1,1)/var/tmp/install
Entry: 0xfd080000
Size: 00xea000+0x43b878+0x3a9f0
```

In the example above, the variable *hostnumber* should be replaced with the last of the four numbers in the system's Internet address.

Loading the Ramdisk via a Local CD-ROM Drive

Power on the system. After the system passes the self-tests, the bootROM prompt is displayed.

The ramdisk installation software uses the value of the bootROM variable **INSTALLED** to determine if the basic operating system needs to be installed. Set the value of this variable to 0 before loading the ramdisk as follows:

```
ROM> setenv installed 0
```

The system will ask if you want to re-install if **INSTALLED** is not 0.

Install the OS/MP 4.1B CD-ROM disk into the CD-ROM drive.

To load the ramdisk on S4000 systems, using a local CD-ROM drive, enter a boot command of the following form:

```
ROM> boot sd.si(,6,)/Install.S4000
```

The bootROM copies the ramdisk image into memory and boots it:

```
Boot: sd.si(,6,)/Install.S4000
Entry: 0xfd080000
Size: 00xea000+0x43b8b8+0x309a8
```

The system displays a spinner while copying the ramdisk into memory. When the copy completes, the spinner pauses up to three minutes.

Loading the Ramdisk via a Remote CD-ROM Drive or the Network

Loading the ramdisk from a remote CD-ROM drive is essentially the same as loading the ramdisk from an image area of the OS/MP 4.1B contained on a remote disk accessed over the network. The command to load the ramdisk depends on the type of system.

Power on the system. After the system passes the self-tests, the bootROM prompt is displayed.

The ramdisk installation software uses the value of the bootROM variable **INSTALLED** to determine if the basic operating system needs to be installed. Set the value of this variable to 0 before loading the ramdisk as follows:

```
ROM> setenv installed 0
```

The system will ask if you want to re-install if **INSTALLED** is not 0.

If you are installing by a remote CD-ROM drive (via the network), install the OS/MP 4.1B CD-ROM disk into the remote CD-ROM drive. Create a mount point directory (if one doesn't exist), and mount the CD-ROM drive on the remote machine, referred to here as `diskhost`, as follows:

```
diskhost# mkdir /cdrom
diskhost# mount /dev/sr0 /cdrom
```

The remote system `diskhost`, must be on the same network as the system being installed. For example, with a class C network, the first three numbers in the Internet addresses of the two machines must be the same, such as 192.1.3.42 and 192.1.3.17. Also, the local machine must be listed in **/etc/hosts**, or in the NIS/YP *hosts* database, and in **/.rhosts** on `diskhost`. In addition, the ethernet address must be in **/etc/ethers**, or in the NIS/YP *ethers* database.

`diskhost` must have **/cdrom** in it's **/etc/exports** file, and must also be running the **rpc.mountd**(8) **nfsd**(8) and **rarpd**(8) daemons.

Since **tftp**(1) will be used by the system to load the ramdisk image, it must be enabled on the diskhost. Examine the file **/etc/inetd.conf**. A line similar to the one below should be in the file:

```
tftp dgram udp wait root /usr/etc/in.tftpd in.tftpd -s
/tftpboot
```

If the line starts with a #, remove the #.

If a `-s` appears after the last `in.tftpd` in **/etc/inetd.conf**, either remove it or use the directory **/tftpboot** instead of **/var/tmp** in the example below. Approximately 6 MBytes will be needed in the directory used.

If **/etc/inetd.conf** has been changed, **inetd**(8) must be told to re-read the configuration file:

```
diskhost # ps ax | egrep inetd
  249 ? I 0:01 inetd
  541 p3 R 0:00 egrep inetd
```

The *pid* of inetd is the first number on the line that doesn't contain **egrep**. In the above output, *pid* is 249.

```
diskhost# kill -HUP pid
```

Enter the following boot command:

```
ROM> b tftp.ei(,,hostnumber)/cdrom/Install.S4000
```

Dataless Installation

After Booting Ramdisk

When the ramdisk is booted, it first determines what sort of terminal is being used. If it is a serial terminal, that is, a terminal attached to the **ttya/ttyb** port, or if the bootROM variable **CONSOLE** is not set, a list of supported terminals is displayed as follows:

```
1) 610
2) ansi
3) hp
4) sun
5) tvi912
6) vt100
7) wyse50
What type of terminal are you using ('1'..'7')?
```

If you are using a frame-buffer as the console, select the 4, the sun terminal type.

```
What type of terminal are you using ('1'..'7')? 4
```

If the value of the bootROM variable **INSTALLED** is non-zero, the mandatory system software has already been installed. In that case, the system displays the following:

```
THIS SYSTEM IS ALREADY INSTALLED


Do you want to re-install the system ('yes', 'no', or '?'
for help)?
```

The above message is for the benefit of users intending to re-install the system software, but have not reset the **INSTALLED** environment variable.

If the message appears, enter `yes` to re-install the mandatory system software, or `no` to continue the installation without re-installing it.

The disk drives attached to the system are then scanned, and a menu of procedures is displayed:

```
Ramdisk

 1) Change Disk Partitioning
 2) Install Software
 3) Invoke a Bourne Shell
 4) Reboot System
 5) Halt System
Enter number of function to execute ('1'..'5', or '?' for
help):
```

The provided functions are described below:

Change Disk Partitioning - Allows changing the sizes of disk partitions, and whether those partitions are for filesystem space, swap space, or unused space.

★ ★ ★ NOTE ★ ★ ★

If changes are going to be made to the disk partitions on which OS/MP 4.1B will reside, the changes must be made before installing software. Disk partitions not containing OS/MP 4.1B can be modified before or after the installation.

Install Software - Intended primarily for installing new systems. If system software has already been installed, then this option may be used to install any Solbourne software distribution, such as X Windows.

Invoke a Bourne Shell - Starts an interactive Bourne shell. This option is provided mainly for formatting disks and restoring filesystems. The sizes of disk partitions should not be changed here with the format(8) command. If they are, you must then select `Change Disk Partitioning` before attempting to `Install Software`.

Reboot System - Starts UNIX after software installation. Alternatively, you may reload the ramdisk from scratch.

Halt System - Returns control of the system to the bootROM.

Help may be requested at any ramdisk prompt by entering a question mark by itself.Table 22 shows edit commands available when entering text in response to prompts:

Table 22. Input Editing Commands

Character	Interpretation
backspace (^H)	delete last input character
delete (^?)	delete last input character
^U	erase input line
^R	redisplay input line
^W	delete input up to '/' or whitespace
^C	cancel input, returning to nearest menu
ESC	cancel input, returning to nearest menu
^L	redisplay entire screen
return (^M)	end input
newline (^J)	end input

If a string is too long to be displayed in the available space, the beginning of the string is displayed as "...". This allows display of the end of the string, which is usually of more interest.

Keywords can be shortened to any unique prefix (such as 'co' for 'continue'), except for 'yes' and 'no', which must always be spelled out.

Fatal errors during software installation are usually reported by messages beginning with `System error` or `Internal error` and ending with a "#" prompt. If a fatal error occurs, software installation may be restarted by entering:

```
# ^Jstty sane^J
# cd /
# rm -f /core
# inst_sys
```

where ^J is the linefeed character. The command **stty sane** may not be echoed (and is intended to fix that problem). In the event of a fatal error during software installation, please report the problem to Solbourne customer support.

Software Installation from the Ramdisk

Installing software has two distinct stages: gathering information and modifying the system. No permanent changes are made to the system until all information has been provided.

For a dataless client installation, there are two informational menus:

- Standard Filesystem Definition - specifies where the standard filesystems (**root (/), swap,** and **/usr,** optionally **/var** and **/tmp**) are located.
- Media Identification - Determines the installation media from which to install (tape, CD-ROM, or network directory), and determines where that media is located.

Both menus provide the commands **cancel and previous.** These commands allow you to return to prior menus, optionally discarding any changes that have been made.

cancel always returns to the ramdisk menu. If changes are to be discarded, then all changes made since `Install Software` was selected are forgotten.

previous always returns to the previous menu (which is the ramdisk menu, in the case of the Filesystem Definition menu). The changes discarded in this case are those made in the menu you are leaving.

cancel has higher priority than **previous.** In other words, if you use **previous** to leave a menu without discarding changes, then **cancel** from that menu and discard changes, the changes made in the earlier menu are also discarded.

Standard Filesystem Definition

The Standard Filesystem Definition menu defines where the mandatory filesystems are located. These filesystems (except for root) may be either on a local disk partition or provided by a disk server. If root is to be on a remote system, install the system as a client of that system. For a dataless system, the **/usr** files should have already been installed on the server.

Any changes made to the standard filesystems with the partition tool will appear in this menu.

Changing an entry at the Standard Filesystem Definition

To modify the **/usr** filesystem, enter the number **3.**

```
Enter number of filesystem to change ('1'..'5'),
'continue', 'previous', 'cancel' or '?' for help: 3
```

The **usr** menu will be highlighted, and the system will request a disk partition. Assign it to **rootbeer:/export/exec/S4000.**

The new arrangement is displayed as shown in Figure 65.

The following steps assign the **/var** filesystem to **sd0d,** rather than using the default of **/var** being a partition of a local disk.

These steps are optional. If followed, the result is a filesystem definition that is the same as that supplied on the factory installation of a diskful system. In addition, it makes use of partition d, thus using 9.3 MB of disk space that is not used when the default disk partition is used with the standard filesystem definition.

In Figure 65 shown below, the notation "(required)" appears next to the **root(/)**, **swap** and **/usr** filesystems. These filesystems must be defined; however, they may be placed on any partition of any disk.

```
                    Standard Filesystem Definition

  1) root on sd0a      (required)
  2) swap on sd0b      (required)
  3) /usr rootbeer:/export/exec/S4000(required)
  4) /var on root partition
  5) /tmp on root partition

                    Disk Partitions (sizes in MB)
       (a)    (b)      (c)     (d)     (e)     (f)     (g)     (h)
sd0:   8.4    32.4     191.1   9.3     ---     ---     141.1   ---
sd1:   8.4    32.7     190.9   9.6     ---     ---     140.8   ---




Enter number of filesystem to change ('1'..'5'), 'continue', 'previous',
'cancel', or '?' for help:
```

Figure 65. Sample Standard Filesystem Definition Menu

To modify the **/var** filesystem, enter the number **4**.

```
Enter number of filesystem to change ('1'..'5'),
'continue', 'previous', 'cancel' or '?' for help: 4
```

The var menu will be highlighted, and the system will request a disk partition. Assign it to sd0d.

```
Enter name of disk partition or host:path for /var
filesystem, 'none', ^C, or'?' for help: sd0d
```

The new arrangement is displayed as shown in Figure 66.

Once all changes for the standard filesystems have been made, enter **continue** to proceed to the Media Identification menu.:

```
Enter number of filesystem to change ('1'..'5'),
'continue', 'previous', 'cancel', or '?' for help: continue
```

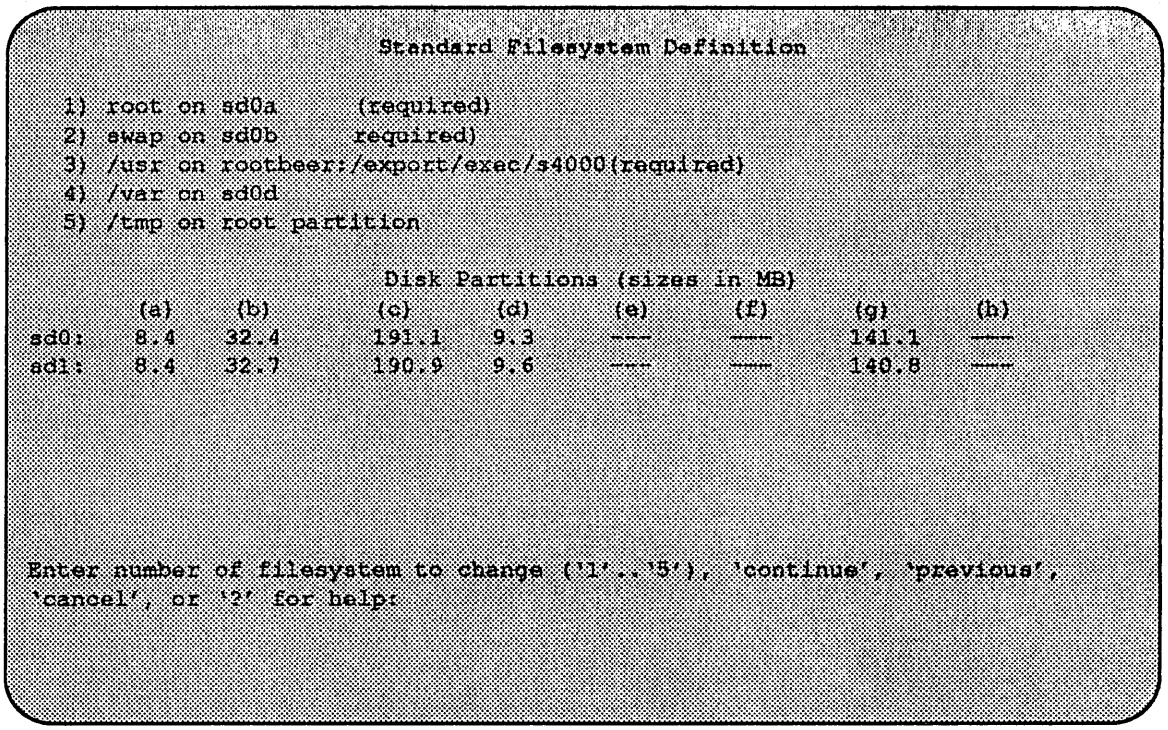

Figure 66. Modified Standard Filesystem Definition Menu

Media Identification Menu

The Media Identification Menu describes which media will be used during the installation.

On Series S4000 systems, the default values are determined by how the ramdisk was booted.

Figure 67 shows the Media Identification Menu of a S4000 machine that was booted from a local tape device st1 (SCSI address 5).

Installing from a Tape

Installing from a local tape drive requires that the *Tape drive* field be set to either **st0** or **st1** (the only supported tape drives) and that *Tape host* be set to '**localhost**'. The Installation media type must also be set to '**Tape**'.

Installing from a remote tape drive requires that all the fields be set:

Installation media type must be set to **Tape**.

Tape drive should be the basic name of the tape drive on the tapehost.

Tape host must be set to the name of the system with the tape, which is used to determine the tape host's Internet address. The name itself, however, is not especially important (it is discarded after the installation is complete). As such, the default name, *tape-n-boot-serv*, generally need not be changed.

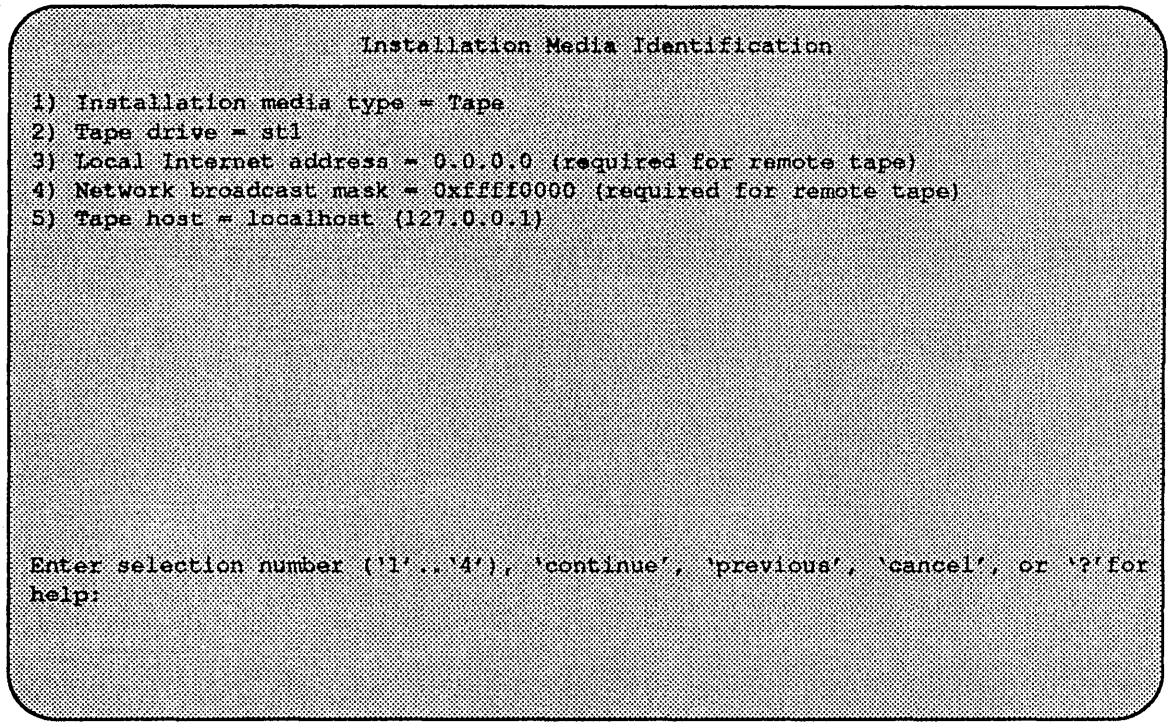

Figure 67. Installation Media Identification Menu - Local Tapehost

The **Local Internet address** is the address of the system being installed. If the default value is not correct, make sure that the client name corresponding to the correct address appears in the tape host's **/.rhosts** file. Check **/etc/hosts** or the NIS/YP hosts map as appropriate.

The **broadcast mask** should not be changed unless your network uses a non-standard mask. Such a mask is used when a network is sub-netted (i.e., a Class B network is treated as several Class C networks). A leading '0x' is necessary if entering the mask as a hexadecimal number. A leading '0' is needed for octal numbers. If neither prefix is given, the value is assumed to be in decimal.

Figure 68 shows the Tape Drive Identification menu of a system that was booted from a remote tape using tape device st0 (SCSI address 4).

Local CD-ROM Installation

Installing from a local CD-ROM disk drive requires that the Installation media type be set to **CD-ROM**, the CD-ROM drive field be set to **/dev/sr0** and the *CD host* field be set to '**localhost**'. Figure 69 shows the Installation media type menu with the CD-ROM parameters set to install from CD-ROM.

Network and remote CD-ROM Installations

Installation media type must be set to **Network**

```
                    Installation Media Identification
1) Installation media type = Tape
2) Tape drive = st0
3) Local Internet address = 192.9.3.4 (required for remote tape)
4) Network broadcast mask = 0xffffff00 (required for remote tape)
5) Tape host = tape-n-boot-serv (192.9.3.1)









Enter selection number ('1'..'4'), 'continue', 'previous', 'cancel', or '?' for
help:
```

Figure 68. Tape Drive Identification Menu - Remote Tapehost

```
                    Installation Media Identification

1) Installation media type = CD-ROM
2) CD drive = /dev/ar0
3) Local Internet address = 0.0.0.0 (required for remote tape)
4) Network broadcast mask = 0xffff0000 (required for remote tape)
5) CD host = localhost (127.0.0.1)









Enter selection number ('1'..'5'), 'continue', 'previous', 'cancel', or '?' for
help:
```

Figure 69. Installation Media Identification Menu - Local CD-ROM

Installation directory should be the full path name of the location of the installation area, or the full path of the CD-ROM mount point, on the network host. For example, if the remote CD-ROM is mounted on **/usr/cdrom**, then the installation path is simply **/usr/cdrom**.

The **Local Internet address** is the address of the system being installed. If the default value is not correct, make sure that the client name corresponding to the correct address appears in the tape host's **/.rhosts** file. Check **/etc/hosts** or the NIS/YP hosts map as appropriate.

The **broadcast mask** should not be changed unless your network uses a non-standard mask. Such a mask is used when a network is sub-netted (i.e., a Class B network is treated as several Class C networks). A leading '0x' is necessary if entering the mask as a hexadecimal number. A leading '0' is needed for octal numbers. If neither prefix is given, the value is assumed to be in decimal. *Network host* must be set to the name of the system with the installation directory, which is used to determine it's Internet address. The name itself, however, is not especially important (it is discarded after the installation is complete). As such, the default name, *tape-n-boot-serv*, generally need not be changed

When the details of the media have been entered correctly, enter **continue**.

Root Files Installation

You are then asked if you want to install just the mandatory root files. This is asked as a confirmation before starting the installation:

```
Install only mandatory root files ('yes', 'no', ^C, or '?' for help)?
```

After entering **yes**, the installation is performed.

The actual installation begins at this point.

The steps taken during the installation are:

1. extract miniusr. (This contains the installation software, as well as enabling swapping. The root disk might not be repartitioned after this step without requiring reinstallation.)
2. create filesystems (**root(/)**, **/usr**, possibly **/var** or **/tmp**, as well as any new filesystems requested via the partition tool)
3. create device entries
4. install mandatory root files

When installation has finished, the ramdisk menu is displayed (see Figure 70). If the installation failed, call Customer Support.

```
                                Ramdisk

1) Change Disk Partitioning
2) Install Software
3) Invoke a Bourne Shell
4) Reboot System
5) Halt System


Enter number of function to execute ('1'..'5', or '?' for help): 3
```

Figure 70. Ramdisk Menu

5. Invoke the Bourne Shell by selecting **3** on the Ramdisk menu.

   - Before rebooting the system, edit the **/etc/hosts** and **/etc/hostname.ei0** files. The **/etc/hosts** file must have the name and internet address for the system on which you installed the operating system.

```
ramdisk# cat >> /disk/etc/hosts <return>
141.138.8.1 hostname
^D
ramdisk#
```

   - The **/etc/hostname.ei0** must contain the name of the system on which you installed the operating system.

```
ramdisk# cat >> /disk/etc/hostname.ei0 <return>
hostname
^D
ramdisk#
```

6. **^D** at the ramdisk prompt to return to the ramdisk menu.

Rebooting from the Ramdisk

After a successful installation, you must have first run config_server on the server before booting UNIX as shown in Figure 71.

```
                              Reboot System

1) Boot Unix
2) Boot on ramdisk
3) Return to Main Menu


Enter selection number ('1'..'3') or '?' for help: 1
```

Figure 71. Reboot System Menu

Enter number of function to execute ('1'..'5', or '?' for help): **4**

At the Reboot System menu select Boot Unix:

```
Enter selection number ('1'..'3') or '?' for help: 1
```

After selecting **1**, there is a short pause, and then:

```
Automatic boot enabled. Type Control-C to abort

ROM> boot

Boot: sd.si(0,0,0)/vmunix

Entry: 0xfd080000

Size: 0xd6000+0x33358+0x81548


OS/MP 4.1B_Export (GENERIC/root) #0: Tues May26 21:09:24
1992
Copyright (c) 1989, 1990 Sun Microsystems, Inc. and
Solbourne Computer, Inc.
[...]
```

At this point, the system configuration information must be specified as described in the section *After Installing...*

After Installing...

Initial Boot System Configuration

When a newly installed system is booted multi-user for the first time, the system asks a series of configuration questions:

```
OS/MP 4.1B_Export (GENERIC/root) #0: Tue May 26 10:00:13
1992

Copyright (c) 1989-1991 Sun Microsystems, Inc. and
Solbourne Computer, Inc.


[...]

Automatic reboot in progress...
Thur May 28 16:55:42 PDT 1992
checking quotas: done.


This system has not yet been configured. Several values
need to be set before the system can come up to multi-user
Unix.

What is this system's name (default = 'standalone'):
<Return>

What is its Internet address (0 for none, default =
192.9.3.4)? <Return>

What is the network broadcast mask (default = 0xffffff00)?
<Return>

What is the NIS domain name ('none' for none, default =
'none')? <Return>
```

★★★NOTE★★★

Using the default 'none' disables the NIS/YP services.

```
Time zone choices are:
Australia/  GMT+11      GMT-3       GMT6        Mideast/
Brazil/     GMT+12      GMT-4       GMT7        NZ
CET         GMT+13      GMT-5       GMT8        Navajo
CST6CDT     GMT+2       GMT-6       GMT9        PRC
Canada/     GMT+3       GMT-7       Greenwich   PST8PDT
Chile/      GMT+4       GMT-8       HST         Poland
Cuba        GMT+5       GMT-9       Hongkong    ROC
EET         GMT+6       GMT0        Iceland     ROK
EST         GMT+7       GMT1        Iran        Singapore
EST5EDT     GMT+8       GMT10       Israel      Turkey
Egypt       GMT+9       GMT11       Jamaica     UCT
Factory     GMT-0       GMT12       Japan       US/
GB-Eire     GMT-1       GMT13       Libya       UTC
GMT         GMT-10      GMT2        MET         Universal
GMT+0       GMT-11      GMT3        MST         W-SU
GMT+1       GMT-12      GMT4        MST7MDT     WET
GMT+10      GMT-2       GMT5        Mexico/     Zulu

('/' indicates time zone prefixes)

Enter time zone (default = 'US/Mountain'): US <Return>
Time zone choices are:
Alaska      Central     Hawaii      Pacific
Aleutian    East-Indiana  Michigan  Pacific-New
Arizona     Eastern     Mountain    Samoa

Enter time zone: Mountain <Return>
What is today's date (mm/dd/yyyy, default = 05/28/1992)? <Return>
What time is it (24-hour hh:mm, default = 16:55)? <Return>

Current settings are:
 Host name                = habitrail
 Internet address         = 192.9.3.4
 Network mask             = 0xffffff00
 NIS domain               = Rodent.COM
 Time zone                = US/Mountain
 Date (m/d/y)             = 05/28/1992
 Time                     = 16:55

Are these correct ('yes' or 'no')?
yes

Setting netmask of ei0 to 255.255.255.0
Tue Dec 11 22:09:00 MST 1990
Setting password for root
Changing password for root on habitrail.
New password:
Retype new password:
Continuing boot
starting rpc and net services: portmap [...]
```

Reconfiguring the System

You may need to reconfigure the system if: (1) wrong value was set during the initial configuration, or (2) the system did not successfully come up to multi-user mode.

If you find that a wrong value was set during configuration, you can modify the appropriate file manually, or reconfigure. Manually correcting the settings should only be done if you are an experienced system administrator. Reconfiguring automatically is fairly straight-forward, as explained in the following procedure.

If the system has hung up during the boot process, cycle the power off and on).

★ ★ ★ NOTE ★ ★ ★

If automatic boot is enabled it is necessary to interrupt the reboot by typing Control-C in the early stages of the reboot; otherwise the system will hang up as before.

Then bring up the system in single-user mode:

```
ROM> boot -s
[...]
```

If the system booted successfully originally, you may instead log in as root:

```
habitrail login: root
Password:
```

In either case, if a file exists that tells the system it has been configured, remove it:

```
# rm /etc/sys_conf/system-configured
```

The above file may not exist; this is not a problem. Go ahead to the next step.

Now reboot. If you are in single-user mode, exit:

```
# exit
```

Otherwise, use fastboot:

```
# /etc/fastboot
```

The system asks configuration questions just as it did the first time it booted after being installed.

Installing OS/MP 4.1B on a Diskless Client

Before Installing...

Any host on a network must be added to the hosts database. Before you can add a host to either database, a name and an address must be chosen for that host. Be sure both are unique for your network.There are three forms of network information databases to be considered.

- *Static files* - this is the simplest form of the databases: two files, **/etc/hosts** and **/etc/ethers.**
- *Network Information Service* - NIS, formerly called Yellow Pages (YP), is a centralized version of the static files approach. Fundamentally, one system, the NIS/YP master, uses the static files. Other systems ask the master to look up entries in its files.
- *Domain Name Service* - DNS is part of the software used to administrate the Internet, and is beyond the scope of this document. If you are using it, contact your system administrator for information on updating entries in it.

If you are using NIS/YP, the following actions must be taken on the NIS/YP master. If you are using static files, these actions must be taken on the system that is to act as a server (by providing either its tape or disk drive). Only the superuser (account name **root**) is allowed to update these files.

First: Update the *hosts* database with the name and IP address chosen for the new client by adding a line of the following form to **/etc/hosts**:

192.1.3.42 hamster

Next: If you are installing a diskless client, update the *ethers* database by adding a line of the form below to **/etc/ethers.** The six colon-separated numbers are the ones displayed by the system when the power is turned on. The name must be the same as was added to the *hosts* database.

0:0:8e:10:0:16 hamster

Finally: If you are using NIS/YP, the working copy of the database must be updated:

```
# cd /var/yp
# make
```

★ ★ ★ NOTE ★ ★ ★

The **make** *command should be executed on the NIS/YP master server only.*

Before installing a diskless client, you must have already installed the server. On the server, you must also have run **config_server** for this client's architecture, and you must have run **install_client** for this machine. Refer to Installing OS/MP 4.1B on a Server for details.

Installing...

Setting BootROM Variables

The Solbourne diskless client must have the proper bootROM environment variables set, in order to boot from a server by default. The following tables list variables that must be set on a Solbourne client.

Table 23. Variables that Must be Set on a Solbourne Series 5, 5E or 6 Client

Variable	Sample Value
DEFAULTROOT	**tftp.ei**(„*hostnumber)*
DEFAULTBOOT	**/export/root/***clientname***/vmunix**
DEFAULTSWAP	**/export/swap/***clientname***/swap.***clientname*
DIAGBOOT	**/export/exec/Series5/kvm/stand/dg***for a Series5 client*
	/export/exec/Series6/kvm/stand/dg*for a Series6 client*
DIAGSERVER	**tftp.ei**(„*hostnumber*)
CONSOLE	**bw**(), **cg**(), **zs**(), or **fb**()

Table 24. Variables that Must be Set on a Solbourne Series S4000 Client

Variable	Sample Value
DEFAULTROOT	**tftp.ei**(„*hostnumber)*
DEFAULTBOOT	**/clients/root/***clientname***/vmunix**
DEFAULTSWAP	**/clients/swap/***clientname***/swap.***clientname*

Table 24. Variables that Must be Set on a Solbourne Series S4000 Client

Variable	Sample Value
DIAGBOOT	/clients/exec/S4000/kvm/stand/dg
DIAGSERVER	**tftp.ei**(,,*hostnumber*)
INPUT-DEVICE	keyboard, ttya, or ttyb
OUTPUT-DEVICES	screen, ttya, or ttyb

In the tables above, *clientname* represents the name of the diskless client and *hostnumber* represents the last portion of the internet address of the server. For example, if the server's Internet address is 192.9.201.134, the *hostnumber* is 134.

The acceptable settings for **CONSOLE** depend on the version of the bootROM in the system.

The diskless client must have the proper bootROM environment variables set to boot from a server by default. To set the variables:

Turn on the client.

Set the following bootmode variables:

```
ROM> setenv defaultroot tftp.ei(,,hostnumber)
ROM> setenv defaultboot /export/root/clientname/vmunix
ROM> setenv defaultswap
/export/swap/clientname/swap.clientname
ROM> setenv diagboot
tftp.ei(,,hostnumber)/export/exec/kvm/type/stand/dg
```

In the commands above, `clientname` represents the name of the diskless client, and `hostnumber` is the last portion of the internet address of the server. For example, if the server's internet address is 192.9.201.134 the `hostnumber` is 134.

The `type` can be Series5, Series6 or S4000, or a directory name comprised of a basename standing for the machine architecture and an extension standing for the operating system and release level, as created by the **-n** option of **config_server**; for example, S4000.osmp.4.1A.

Set the BOOTMODE to auto and reboot:

```
ROM> setenv bootmode auto
ROM> b
```

★ ★ ★ NOTE ★ ★ ★

If the system reports a protocol error while attempting to boot, kill and restart **inetd***(8) on the server.*

After Installing...

When a newly installed system is booted multi-user for the first time, the system asks a series of configuration questions:

```
OS/MP 4.1B_Export (GENERIC/root) #0: Tue May 26 10:00:13
1992

Copyright (c) 1989-1991 Sun Microsystems, Inc. and
Solbourne Computer, Inc.


[...]


Automatic reboot in progress...
Thur May 28 16:55:42 PDT 1992
checking quotas: done.


This system has not yet been configured. Several values
need to be set before the system can come up to multi-user
Unix.

What is this system's name (default = 'standalone'):
habitrail

What is its Internet address (0 for none, default =
192.9.3.4)? <Return>

What is the network broadcast mask (default = 0xffffff00)?
<Return>

What is the NIS domain name ('none' for none, default =
'none')? Rodent.COM
```

★ ★ ★ NOTE ★ ★ ★

Using the default 'none' disables the NIS/YP services.

```
Time zone choices are:
Australia/  GMT+11      GMT-3       GMT6        Mideast/
Brazil/     GMT+12      GMT-4       GMT7        NZ
CET         GMT+13      GMT-5       GMT8        Navajo
CST6CDT     GMT+2       GMT-6       GMT9        PRC
Canada/     GMT+3       GMT-7       Greenwich   PST8PDT
Chile/      GMT+4       GMT-8       HST         Poland
Cuba        GMT+5       GMT-9       Hongkong    ROC
EET         GMT+6       GMT0        Iceland     ROK
EST         GMT+7       GMT1        Iran        Singapore
EST5EDT     GMT+8       GMT10       Israel      Turkey
Egypt       GMT+9       GMT11       Jamaica     UCT
Factory     GMT-0       GMT12       Japan       US/
GB-Eire     GMT-1       GMT13       Libya       UTC
GMT         GMT-10      GMT2        MET         Universal
GMT+0       GMT-11      GMT3        MST         W-SU
GMT+1       GMT-12      GMT4        MST7MDT     WET
GMT+10      GMT-2       GMT5        Mexico/     Zulu

('/' indicates time zone prefixes)

Enter time zone (default = 'US/Mountain'): US <Return>
Time zone choices are:
Alaska      Central       Hawaii      Pacific
Aleutian    East-Indiana  Michigan    Pacific-New
Arizona     Eastern       Mountain    Samoa

Enter time zone: Mountain <Return>
What is today's date (mm/dd/yyyy, default = 05/28/1992)? <Return>
What time is it (24-hour hh:mm, default = 16:55)? <Return>

Current settings are:
 Host name                = habitrail
 Internet address         = 192.9.3.4
 Network mask             = 0xffffff00
 NIS domain               = Rodent.COM
 Time zone                = US/Mountain
 Date (m/d/y)             = 05/28/1992
 Time                     = 16:55

Are these correct ('yes' or 'no')?
yes

Setting netmask of ei0 to 255.255.255.0
Tue Dec 11 22:09:00 MST 1990
Setting password for root
Changing password for root on habitrail.
New password:
Retype new password:
Continuing boot
starting rpc and net services: portmap [...]
```

Reconfiguring the System

You may need to reconfigure the system if: (1) wrong value was set during the initial configuration, or (2) the system did not successfully come up to multi-user mode.

If you find that a wrong value was set during configuration, you can modify the appropriate file manually, or reconfigure. Manually correcting the settings should only be done if you are an experienced system administrator. Reconfiguring automatically is fairly straight-forward, as explained in the following procedure.

If the system has hung up during the boot process, press the Reset button (for Series S4000 machines, cycle the power off and on).

★ ★ ★ NOTE ★ ★ ★

If automatic boot is enabled, to interrupt the reboot by typing Control-C in the early stages of the reboot; otherwise the system will hang up as before.

Then bring up the system in single-user mode:

```
ROM> boot -s
[...]
```

If the system booted successfully originally, you may instead log in as root:

```
habitrail login: root
Password:
```

In either case, if a file exists that tells the system it has been configured, remove it:

```
# rm /etc/sys_conf/system-configured
```

The above file may not exist; this is not a problem. Go ahead to the next step.

Now reboot. If you are in single-user mode, exit:

```
# exit
```

Otherwise, use fastboot:

```
# /etc/fastboot
```

The system asks configuration questions just as it did the first time it booted after being installed.

Changing Disk Partitioning

All hard disks are shipped with a default partitioning. Disk partitioning is useful for:

- ❒ Changing the size of a partition
- ❒ Assigning secondary swap space before installation
- ❒ Assigning mount points

OS/MP 4.1B uses the default partitions in the following way:

Table 25. Default Disk Partitions and Filesystem Assignments

Partition	Filesystem
a	/
b	swap
d	/var
g	/usr

★ ★ ★ CAUTION ★ ★ ★

Changing the size of a partition destroys any information on that partition.

★ ★ ★ NOTE ★ ★ ★

If you change the partitioning on the drive containing the root partition, you must reinstall the operating system.

The following instructions assume the ramdisk has already been loaded, as described in the *Starting Diskful Installation* section.

After selecting `Change Disk Partitioning` from the ramdisk menu (as shown in Figure 72), a spinner is displayed while the partition tool starts up.

Once its initialization is complete, it displays a description screen and asks if you wish to continue. Answering '**no**' returns to the ramdisk menu. Answering '**yes**' produces a menu of disks installed in the system (see Figure 73). If a disk is missing from this menu, verify that the SCSI address is set correctly on the drive, and that the cables are firmly seated.

```
                                Ramdisk

1) Change Disk Partitioning
2) Install Software
3) Invoke a Bourne Shell
4) Reboot System
5) Halt System









Enter number of function to execute ('1'..'5', or '?' for help): 1
```

Figure 72. Ramdisk Menu

```
                        Select Disk to Partition or Review

1) sd0 (191.1 Mb)
2) sd1 (193.8 Mb)









Enter disk number, '?', or 'exit': 1
```

Figure 73. Disk Partitioning Menu

To return to the ramdisk menu, enter '**exit**' at the disk menu.

Select the disk you wish to examine and proceed to section, "Partition or Review Disk". This tool is also available on installed systems in **/usr/etc/partition.**

Partition or Review Disk

Upon selecting the disk you wish to examine, a screen describing the disk is displayed as shown in Figure 74.

```
                    Partition or Review Disk

Disk sd0:
Total Disk Size: 191.1 Mb

a: 8.4 Megabytes
b: 32.3 Megabytes
c: 191.1 Megabytes
d: 9.3 Megabytes
e: 0.0 Megabytes
f: 0.0 Megabytes
g: 141.1 Megabytes
h: 0.0 Megabytes


1. Resize partition                    5. Change display parameters
2. Change mount points                 6. Undo last action
3. Overlay with template               7. Undo ALL actions
4. Store as new template               8. Return to previous menu


Please enter menu number:
```

Figure 74. Partition or Review Disk Menu

To change the size of a partition, see "Resizing Partitions," section. To modify mount points, see "Changing Mount Points". For discussion of templates, see "Templates". Other available actions are:

- **Change display parameters** - modifies how partition sizes are displayed, in megabytes, blocks (sectors), or cylinders/tracks/sectors.
- **Undo last action** - does just that. Only the most-recent change is remembered, and undo counts as a change. Therefore, two undos in a row have no net effect.
- **Undo ALL actions** - discards all changes made since selecting this disk from the disk menu. It is possible to undo an undo all.

No changes are made to the disk itself until returning to disk menu. If changes have been requested:

```
Please enter menu number: 8

Template has been modified. Do you wish to accept these
changes?

'yes' or 'no' to exit, any other input to continue editing:
yes
```

Resizing Partitions

This section demonstrates changing the size of partitions by increasing the size of partition d to 12 megabytes, taking the additional space from the g partition.

First, select the resize partition action from the `Partition or Review Disk` menu:

```
Please enter menu number: 1
```

This causes the Resize partition menu entry to highlight, and the following questions to be asked:

```
Please specify partition to be resized: d

Enter size of partition d in Megabytes: 12

Please specify partition to contribute this space: g
```

Figure 75 shows the updated screen with the new sizes. Observe that the d partition is not exactly 12 megabytes. This is because partition sizes may only be changed in fixed quantities determined by cylinder boundaries (the number of sectors per track and the number of heads in the drive).

Also, the tool is asking for another partition to resize. It will continue to do so until a blank line is entered by just typing **<Return>** at the prompt, `Please specify partition to be resized:`

The default partitions can be changed during the install procedure. We recommend using partition c for the entire disk.

OS/MP 4.1B supports booting from any configured disk, whether IPI, SMD, or SCSI (except in the case of an IPI or SCSI drive connected by a Multi-Channel Accelerator Board). For example, if you have two SCSI drives, you may choose either **sd0** or **sd1** as your DEFAULTROOT device. The **root**(/) file system may be on any partition on the boot disk. See section on page 25 for setting DEFAULTROOT. The installation tools and the supplied "GENERIC" kernels require that the **root** and **usr** file systems for IPI-based systems be assigned to partitions of the first four drives of the first controller.

```
                    Partition or Review Disk

Disk sd0: Maxtor LXT-200
Total Disk Size: 191.1 Mb

a: 8.4          Megabytes       /
b: 32.3         Megabytes       (swap)
c: 191.1        Megabytes
d: 12.1         Megabytes
e: 0.0          Megabytes
f: 0.0          Megabytes
g: 138.3        Megabytes       /usr
h: 0.0          Megabytes


1. Resize partition             5. Change display parameters
2. Change mount points          6. Undo last action
3. Overlay with template        7. Undo ALL actions
4. Store as new template        8. Return to previous menu


Please specify partition to be resized: Return
```

Figure 75. Partition or Review Disk Menu - Resizing Partition

The Series5, Series5E and Series6 generic kernels support four SCSI disks on the I/O ASIC SCSI controller as well as four VMEbus "xd" disk controllers. Each "xd" disk controller can support four disks in the generic kernels.

Example partitions for these drives are listed in the following tables:

Table 26. Example IPI Disk Partitions

IPI Disks					
		1.2 Gbytes 512 byte sectors		3.0 Gbytes 512 byte sectors	
Partition Use		Sectors	Size (Mbytes)	Sectors	Size (Mbytes)
a	/	18522	9		
b	swap	65856	32		
c	all	1679328	820		
d	/var	20580	10		
g	/usr	1574370	768		
h	unmounted	N/A	N/A		

Table 27. Example SCSI Disk Partitions

SCSI Disks (sd0)							
Partition Use		327 Mbytes		661 Mbytes		200 Mbytes	
		Sectors	Size (Mbytes)	Sectors	Size (Mbytes)	Sectors	Size (Mbytes)
a	/	16800	8	16695	8	16800	8
b	swap	66150	32	66780	32	66220	32
c	all	639450	312	1292670	631	391300	191
d	/var	19425	9	19080	9	18963	9
g	/usr	537075	262	1190115	581	288960	141

Changing Mount Points

Partitions that will contain filesystems must be given mount points. A mount point is where in the directory structure the filesystem will appear. Two filesystem mount points that must be defined on all systems are / (also called **root**) and **/usr**. The following example shows how to define a new filesystem.

To define a new filesystem named /bench on partition b, begin by entering **2** in response to the `Partition or Review Disk` menu:

```
Please enter menu number: 2
```

This causes the `Change mount points entry` to be highlighted, and you may specify the partition and desired mount point:

```
Change mount point for which partition (or '?'): b

Enter full unix pathname on which to mount this partition,
'none', or '?'

 -> /bench
```

The display is updated to reflect the new mount-point, as shown in Figure 76. As with changing partition with changing partition sizes, the tool is asking for another mount point to change. Entering a blank line by pressing **<Return>** will return to the menu prompt.

To define a swap partition, proceed as if defining a mount point, but enter either "**swap**" or "**primary**" as the partition name. Only one partition should be labeled primary. This partition is verified to be sufficiently large, and is presented to the system as the primary swap space, however, you can add additional swap space by labeling the others "swap". The primary swap area must be at least 32MB.

Other swap areas should be listed in the **/etc/fstab** file and enabled by the **swapon**(8) command from within the **/etc/rc.local** file.

```
                        Partition or Review Disk

Disk sd0:
Total Disk Size: 191.1 Mb

a: 8.4      Megabytes   /
b: 32.3     Megabytes   /bench
c: 191.1    Megabytes
d: 9.3      Megabytes
e: 0.0      Megabytes
f: 0.0      Megabytes
g: 141.1    Megabytes   /usr
h: 0.0      Megabytes


1. Resize partition                 5. Change display parameters
2. Change mount points              6. Undo last action
3. Overlay with template            7. Undo ALL actions
4. Store as new template            8. Return to previous menu


Change mount point for which partition: Return
```

Figure 76. Partition or Review Disk Menu - Changing Mount Points

Templates

Overlaying with a template is a fast way to change all the partition sizes on a disk simultaneously. Initially, only the Solbourne standard templates are available. However, if a customized template is saved, it can be used just as readily as the standard templates. This feature is mainly used when there are several identical disks in a system.

After a particular set of partition sizes has been settled upon, it can be saved as a new template (menu item 4). This new template is stored on the ramdisk, and so is lost when the system is next halted or rebooted.

★ ★ ★ CAUTION ★ ★ ★

Applying a template from one type or size of disk to a different type or size of disk is very likely to result in corrupted filesystems on the modified disk. Such a mistake usually causes a system panic at some point (possibly several days) in the future.