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# Table of Contents

**Introduction** .......................................................................................................................... 9
  - Customer Support Information .......................................................................................... 9
  - Documentation Conventions .......................................................................................... 10
  - Definitions ....................................................................................................................... 10
  - Physical Elements of this Release ................................................................................. 11
  - Contents of the OS/MP 4.1B Tape .................................................................................. 12

**OS/MP Enhancements** ........................................................................................................... 13
  - Performance Improvements ............................................................................................ 13
  - Unsupported Software Features ....................................................................................... 14
  - System Architectures ........................................................................................................ 15
  - SunView ........................................................................................................................... 15
  - Configuring a Kernel ........................................................................................................ 15

**Supported Hardware** ................................................................................................................ 17
  - Series6 CPU Board Support ........................................................................................... 17
  - Banks Of SCSI Storage ..................................................................................................... 17
  - Disk Drives ....................................................................................................................... 18
  - Tape Drives ..................................................................................................................... 19
  - Network Controllers ......................................................................................................... 21
  - Serial Multiplexers ........................................................................................................... 22
  - Floppy Disk Drives ........................................................................................................... 22
  - Keyboards and Consoles ................................................................................................. 23
    - Keyboards ..................................................................................................................... 23
    - L1-A Key Sequence ......................................................................................................... 24
    - Serial Port Consoles ....................................................................................................... 25
  - Multiple-Display Consoles ............................................................................................... 27
  - Setting the BootROM Environment .................................................................................... 27

**OS/MP Bugs Open at OS/MP 4.1B** ....................................................................................... 31
  - File System ....................................................................................................................... 31
  - Kernel ............................................................................................................................... 31
  - Network ............................................................................................................................. 32
  - Utility ............................................................................................................................... 32
  - User ................................................................................................................................ 33
  - Diagnostics ......................................................................................................................... 33
  - Other OS ............................................................................................................................ 33
  - Documentation .................................................................................................................... 33
  - Ongoing Software Dependencies ....................................................................................... 33
  - Sunbug ............................................................................................................................... 34

**OS/MP Bugs Fixed in OS/MP 4.1B** ....................................................................................... 37
  - Kernel ............................................................................................................................... 37
    - Sun Bugs Fixed in SunOS 4.1.2 .................................................................................... 37
    - Solbourne Bugs Fixed in OS/MP 4.1B ......................................................................... 39
  - Network ............................................................................................................................. 40
    - Sun Bugs Fixed in SunOS 4.1.2 .................................................................................... 40
    - Solbourne Bugs Fixed in OS/MP 4.1B ......................................................................... 41
  - SCSI .................................................................................................................................. 41
    - Sun Bugs Fixed in Sun OS 4.1.2 ................................................................................... 41
  - Graphics ............................................................................................................................ 42
    - Sun Bugs Fixed in Sun OS 4.1.2 ................................................................................... 42
  - Utility ............................................................................................................................... 42
    - Sun Bugs Fixed in Sun OS 4.1.2 ................................................................................... 42
    - Solbourne Bugs Fixed in OS/MP 4.1B ......................................................................... 43
User .......................................................................................................................... 44
Solbourne Bugs Fixed in OS/MP 4.1B ................................................................. 44
File System ............................................................................................................... 44
Solbourne Bugs Fixed in OS/MP 4.1B ................................................................. 44
Library .................................................................................................................... 45
Sun Bugs Fixed in Sun OS 4.1.2 ........................................................................ 45
Libsuntool ............................................................................................................... 45
Sun Bugs Fixed in Sun OS 4.1.2 ........................................................................ 45
Sunview .................................................................................................................. 45
Sun Bugs Fixed in Sun OS 4.1.2 ........................................................................ 45
Compiler/Loader ................................................................................................... 45
Sun Bugs Fixed in Sun OS 4.1.2 ........................................................................ 45
Solbourne Bugs Fixed in OS/MP 4.1B ................................................................. 46
C2 .............................................................................................................................. 46
Sun Bugs Fixed in Sun OS 4.1.2 ........................................................................ 46
Documentation ..................................................................................................... 46
Sun Bugs Fixed in Sun OS 4.1.2 ........................................................................ 46
Solbourne Bugs Fixed in OS/MP 4.1B ................................................................. 46
Other OS ................................................................................................................. 47
Solbourne Bugs Fixed in OS/MP 4.1B ................................................................. 47
Sunbug ................................................................................................................... 47
Bugs Fixed in OS/MP 4.1B ................................................................................... 47
Diagnostics ............................................................................................................. 48
Solbourne Bugs Fixed in OS/MP 4.1B ................................................................. 48
Patches Included in OS/MP 4.1B ...................................................................... 49
Sun Patches in OS/MP 4.1B .................................................................................. 49
Installing OS/MP 4.1B on a Standalone System ............................................... 51
Before Installing .... .............................................................................................. 51
Installing... ............................................................................................................. 51
Installing on a Series5, Series5E or Series6: ...................................................... 51
Loading the Ramdisk .......................................................................................... 51
Loading the Ramdisk via a Local Tape Drive .................................................... 52
Loading the Ramdisk via a Local CD-ROM Drive ............................................ 52
Diskful Installation ............................................................................................ 53
Install Software .................................................................................................... 56
Standard Filesystem Definition ......................................................................... 56
Installation Media Identification Menu ............................................................. 58
Tape Installation .................................................................................................... 59
Local CD-ROM Installation ................................................................................ 59
Package Selection Menu ..................................................................................... 59
Rebooting from the Ramdisk .............................................................................. 66
After Installing... .................................................................................................. 69
Initial Boot System Configuration .................................................................. 69
Reconfiguring the System ................................................................................. 71
Installing on a Series S4000 ............................................................................... 72
Loading the Ramdisk .......................................................................................... 72
Loading the Local Ramdisk via a Local Tape Drive .......................................... 72
Loading the Ramdisk via a Local CD-ROM Drive ............................................ 72
Diskful Installation ............................................................................................ 73
Software Installation from the Ramdisk ............................................................. 76
Standard Filesystem Definition ......................................................................... 76
Changing an entry at the Standard Filesystem Definition ................................ 77
Installation Media Identification Menu ............................................................. 78
Tape Installation ................................................................. 79
Local CD-ROM Installation .............................................. 79
Package Selection Menu .................................................. 79
Rebooting from the Ramdisk ............................................. 86

After Installing............................................................... 89
Initial Boot System Configuration ..................................... 89
Reconfiguring the System ............................................... 91

Installing OS/MP 4.1B on a Standalone using reinst_sys ......... 93
Before Installing............................................................ 94
Extracting reinst_sys via a Local Tape Drive ...................... 94
Extracting reinst_sys via a Local CD-ROM Drive ................. 94
Installing........................................................................ 95
Installing Software ......................................................... 96
Installation Media Identification Menu ............................. 99
Installing from a Tape Drive ............................................ 99
Local CD-ROM Installation ............................................ 100
Package Selection Menu ................................................ 100

Installing OS/MP 4.1B on a Server .................................... 109
Before Installing............................................................ 109
Installing.......................................................................... 110
Installing on a Series5, Series5E or Series6: ....................... 110
Loading the Ramdisk ....................................................... 110
Loading the Ramdisk via a Local Tape Drive ....................... 110
Loading the Ramdisk via a Remote Tape Drive ................. 111
Loading the Ramdisk via a Local CD-ROM Drive ............... 112
Loading the Ramdisk via a Remote CD-ROM Drive or the Network .... 113

Diskful Installation .......................................................... 115
Install Software ............................................................... 117
Media Identification Menu ............................................ 119
Local Tape Drive Installation ........................................ 121
Remote Tape Drive Installation ..................................... 121
Local CD-ROM Installation ........................................... 121
Network and remote CD-ROM Installations ...................... 121
Package Selection Menu ................................................ 123
Rebooting from the Ramdisk ........................................... 129
Disabling tftp ................................................................ 131

After Installing............................................................... 132
Initial Boot System Configuration .................................... 132
Reconfiguring the System ............................................... 134

Installing on Series $4000 ................................................. 135
Loading the Ramdisk ....................................................... 135
Loading the Local Ramdisk via a Local Tape Drive ............. 135
Loading the Ramdisk via a Remote Tape Drive ................. 135
Loading the Ramdisk via a Local CD-ROM Drive ............... 138
Loading the Ramdisk via a Remote CD-ROM Drive or the Network .... 138

Diskful Installation .......................................................... 140
Install Software ............................................................... 142
Standard Filesystem Definition .................................... 143
Installation Media Identification Menu ............................. 144
Local Tape Drive Installation ........................................ 145
Remote Tape Drive Installation ..................................... 145
Local CD-ROM installation ............................................ 146
Network and remote CD-ROM Installations ...................... 146
Installing OS/MP 4.1B on a Server using reinst_sys

Before Installing...

Exacting reinst_sys via a Local Tape Drive
Exacting reinst_sys via a Remote Tape Drive
Exacting reinst_sys via a Local CD-ROM Drive
Exacting reinst_sys via a Remote CD-ROM Drive or the Network

Installing...

Installing Software
Installation Media Identification Menu
Installing from a Tape Drive
Installing From a Remote Tape
Local CD-ROM Installation
Network and remote CD-ROM Installations
Package Selection Menu

Installing OS/MP 4.1B on a Dataless Client

Before Installing...

Installing...

Installing on a Series5, Series5E, or Series6:
Loading the Ramdisk
Loading the Ramdisk via a Local Tape Drive
Loading the Ramdisk via a Remote Tape Drive
Loading the Ramdisk via a Local CD-ROM Drive
Loading the Ramdisk via a Remote CD-ROM Drive or the Network

Dataless Installation

After Booting Ramdisk
Software Installation from the Ramdisk
Standard Filesystem Definition
Changing an entry at the Standard Filesystem Definition
The Media Identification Menu
Installing from a Tape Drive
Local CD-ROM Installation
Network and remote CD-ROM Installations
Root Files Installation
Rebooting from the Ramdisk

After Installing...

Initial Boot System Configuration
Reconfiguring the System

Installing on a Series $4000

Loading the Ramdisk
Loading the Ramdisk via a Local Tape Drive
Loading the Ramdisk via a Remote Tape Drive
Loading the Ramdisk via a Local CD-ROM Drive ........................................ 209
Loading the Ramdisk via a Remote CD-ROM Drive or the Network ......... 210
Dataless Installation ......................................................................................... 212
After Booting Ramdisk .................................................................................... 212
Software Installation from the Ramdisk ......................................................... 214
Standard Filesystem Definition ....................................................................... 215
Changing an entry at the Standard Filesystem Definition ......................... 215
Media Identification Menu ........................................................................... 217
Installing from a Tape .................................................................................... 217
Local CD-ROM Installation ........................................................................... 218
Network and remote CD-ROM Installations .................................................. 218
Root Files Installation .................................................................................... 220
Rebooting from the Ramdisk ........................................................................ 222
After Installing... ............................................................................................ 224
Initial Boot System Configuration ................................................................. 224
Reconfiguring the System ............................................................................ 226
Installing OS/MP 4.1B on a Diskless Client ................................................... 227
Before Installing... .......................................................................................... 227
Installing... .................................................................................................... 228
Setting BootROM Variables .......................................................................... 228
After Installing... ............................................................................................ 230
Reconfiguring the System ............................................................................ 232
Changing Disk Partitioning ........................................................................... 233
Partition or Review Disk ................................................................................ 235
Resizing Partitions ......................................................................................... 236
Changing Mount Points ................................................................................ 238
Templates ....................................................................................................... 239
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 `eprom(8)` command, as in the following:

```
# /usr/etc/eprom 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>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>106197</td>
<td>1/4-inch QIC-150 OS/MP 4.1B tape, or</td>
</tr>
<tr>
<td>106200</td>
<td>8mm Exabyte OS/MP 4.1B tape, or</td>
</tr>
<tr>
<td>106202</td>
<td>CD-ROM OS/MP 4.1B disk</td>
</tr>
<tr>
<td>106190</td>
<td>Release and Installation Notes for OS/MP 4.1B</td>
</tr>
</tbody>
</table>
## Contents of the OS/MP 4.1B Tape

### Table 2. Contents of OS/MP 4.1B Tape

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

  - bind
  - setsockopt
  - listen
  - recvmsg
  - sendmsg
  - getsockopt

- 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 Series6 CPU 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**

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

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

<table>
<thead>
<tr>
<th>Tape Drive</th>
<th>Bus</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>QIC-150</td>
<td>SCSI</td>
<td>st</td>
</tr>
<tr>
<td>8mm Cartridge</td>
<td>SCSI</td>
<td>st</td>
</tr>
</tbody>
</table>

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.

```
(n) r s t
no rewind ____________________________ tape

raw _________________________ SCSI
```

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

<table>
<thead>
<tr>
<th>Media</th>
<th>Format</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q150_600</td>
<td>QIC-150</td>
<td>1/4-inch 600-foot XTD tape</td>
</tr>
<tr>
<td>P6-120</td>
<td>466033</td>
<td>8mm cartridge tape</td>
</tr>
</tbody>
</table>
**NOTE**

**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:

```bash
# dump 0mf qic50 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:

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

2. Edit the 3TAPES file.
   a. Go to the line that contains:

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

   b. Add this line:

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

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

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

3. Run `config`:

```bash
# /usr/etc/config 3TAPES
[...]
```
4. Build the kernel:

```bash
# cd ../TAPES
# 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 5 Gbytes 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**

<table>
<thead>
<tr>
<th>Device</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>System Board Ethernet controller</td>
<td>ei0</td>
</tr>
<tr>
<td>Sbus Ethernet controller (Series S4000)</td>
<td>ei1</td>
</tr>
<tr>
<td>Channel Board Ethernet controller (Series 5, 5E, and 6)</td>
<td>ei1</td>
</tr>
<tr>
<td>VMEbus Ethernet controller</td>
<td>eg0</td>
</tr>
<tr>
<td>FDDI controller</td>
<td>pg0</td>
</tr>
</tbody>
</table>

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)

★ ★ ★ NOTE ★ ★ ★

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 (Series 5, Series 5E, and Series 6) 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>
<thead>
<tr>
<th>Device</th>
<th>Partition</th>
</tr>
</thead>
<tbody>
<tr>
<td>/dev/rfd0a</td>
<td>partition A on the raw disk</td>
</tr>
<tr>
<td>/dev/rfd0b</td>
<td>partition B</td>
</tr>
<tr>
<td>/dev/rfd0c</td>
<td>partition C</td>
</tr>
<tr>
<td>/dev/rfd0</td>
<td>same as partition C</td>
</tr>
<tr>
<td>/dev/fd0a</td>
<td>partition A on the diskette using block mode</td>
</tr>
<tr>
<td>/dev/fd0b</td>
<td>partition B</td>
</tr>
<tr>
<td>/dev/fd0c</td>
<td>partition C</td>
</tr>
<tr>
<td>/dev/fd0</td>
<td>same as partition C using block mode</td>
</tr>
</tbody>
</table>

Table 7. Floppy /dev Entries

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 0x

Table 8. Country hex values

<table>
<thead>
<tr>
<th>Country</th>
<th>Hex Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>US</td>
<td>00</td>
</tr>
<tr>
<td>FRANCE_BELGIUM</td>
<td>02</td>
</tr>
<tr>
<td>CANADA_FRENCH</td>
<td>03</td>
</tr>
<tr>
<td>DENMARK</td>
<td>04</td>
</tr>
<tr>
<td>GERMANY</td>
<td>05</td>
</tr>
<tr>
<td>ITALY</td>
<td>06</td>
</tr>
<tr>
<td>NETHERLANDS</td>
<td>07</td>
</tr>
<tr>
<td>NORWAY</td>
<td>08</td>
</tr>
</tbody>
</table>
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.

---

### Table 8. Country hex values

<table>
<thead>
<tr>
<th>Country</th>
<th>Hex Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>PORTUGAL</td>
<td>09</td>
</tr>
<tr>
<td>SPAIN_LATINAMERICA</td>
<td>0a</td>
</tr>
<tr>
<td>SWEDEN_FINLAND</td>
<td>0b</td>
</tr>
<tr>
<td>SWITZERLAND_FRENCH</td>
<td>0c</td>
</tr>
<tr>
<td>SWITZERLAND_GERMAN</td>
<td>0d</td>
</tr>
<tr>
<td>UK</td>
<td>0e</td>
</tr>
<tr>
<td>JAPAN</td>
<td>20</td>
</tr>
</tbody>
</table>
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 ttycl.

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 Series 5, Series 5E, and Series 6 systems use the following command for ttya:

   ```
   # export CONSOLE=xs()
   ```

   For ttyb on Series 5, Series 5E, and Series 6 systems use the following command:

   ```
   # export CONSOLE=xs(/,1)
   ```

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

   ```
   # echo "INPUT-DEVICE=ttya"
   # echo "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 SeriesS, SeriesSE, 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([ctrlr], [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 `ctrlr` 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**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Value</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEFAULTROOT</td>
<td>sd.si()</td>
<td>root filesystem disk and partition</td>
</tr>
<tr>
<td></td>
<td>sd.sv(2,1)</td>
<td>BoSS example</td>
</tr>
<tr>
<td>DEFAULTSWAP</td>
<td>sd.si(,1)</td>
<td>swap disk and partition</td>
</tr>
<tr>
<td></td>
<td>sd.sv(2,3,6)</td>
<td>BoSS example</td>
</tr>
<tr>
<td>DEFAULTDUMP</td>
<td>sd.si(,1)</td>
<td>kernel dump device</td>
</tr>
<tr>
<td>DEFAULTBOOT</td>
<td>vmunix</td>
<td>kernel to boot</td>
</tr>
<tr>
<td>DIAGBOOT</td>
<td>sd.si(,6)kvm/stand/dg</td>
<td>diagnostic to boot when in diag mode</td>
</tr>
<tr>
<td>BOOTMODE</td>
<td>manual</td>
<td>automatic reboot of</td>
</tr>
<tr>
<td>INSTALLED</td>
<td>0 or 1</td>
<td>1 = mandatory files already installed</td>
</tr>
<tr>
<td>NOSPINNER</td>
<td>0 or 1</td>
<td>1 = suppress “N pages left” in dumps, savecore</td>
</tr>
<tr>
<td>INPUT-DEVICE</td>
<td>keyboard, ttya, ttyb</td>
<td>console input (Series S4000 only)</td>
</tr>
<tr>
<td>OUTPUT-DEVICE</td>
<td>screen, ttya, ttyb</td>
<td>console output (Series S4000 only)</td>
</tr>
<tr>
<td>CONSOLE</td>
<td>bw0, cg0, zs0, or fb()</td>
<td>monitor type (Series 5, 5E, or 6 only)</td>
</tr>
</tbody>
</table>

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 "DEFAULT-DUMP" 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=coredumps 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**

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

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(ctrlr,unit,devic)
```

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_nesperbyte 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)
32 Known Problems in OS/MP 4.1B

Network

B910718011 spray -1 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 ttys (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_server doesn't allow for gateway
B910508322 1/23 tape: /etc/mntab 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;
<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>B920910004</td>
<td>dis -F does not work</td>
</tr>
<tr>
<td>B920910007</td>
<td>newfsing of all partitions should be done in parallel</td>
</tr>
<tr>
<td>B921008004</td>
<td>can't install hsNFS on Series6 4.1b machine</td>
</tr>
<tr>
<td>B921019002</td>
<td>/usr/lib/libbsmallocc.a missing from 4.1B</td>
</tr>
<tr>
<td>B921103005</td>
<td>/etc/rc.local assumes network, sunview installed</td>
</tr>
<tr>
<td>B921105001</td>
<td>/etc/hostname.ei0 is not updated on dataless clients</td>
</tr>
<tr>
<td>B921106002</td>
<td>config_system doesn't get default netmask from inst_sys</td>
</tr>
<tr>
<td>B910508453</td>
<td>/etc/hosts is not included on dataless client</td>
</tr>
<tr>
<td>B910510016</td>
<td>Dis(1)'s usage message refers to itself as &quot;kdis&quot;</td>
</tr>
</tbody>
</table>

**User**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>B920904002</td>
<td>corrupted screen images with screendump/screenload (Kbus)</td>
</tr>
<tr>
<td>B920630005</td>
<td>no man page for the /usr/etc/scsistant man page</td>
</tr>
<tr>
<td>B921028001</td>
<td>mounting some cdrom is incompatible with Sun</td>
</tr>
</tbody>
</table>

**Diagnostics**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>B920526004</td>
<td>Adding more than 256M on Series5 boards causes misalignment panics</td>
</tr>
<tr>
<td>B920814008</td>
<td>Disk write/read test fails when prompted (kbus)</td>
</tr>
</tbody>
</table>

**Other OS**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>B910912008</td>
<td>partition does not see changes to label until reboot</td>
</tr>
<tr>
<td>B911017013</td>
<td>cannot close net. interface with ifconfig</td>
</tr>
<tr>
<td>B911128004</td>
<td>mon/keyboard.h missing</td>
</tr>
</tbody>
</table>

**Documentation**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>B920618002</td>
<td>device drivers man. incorrect about vme32 master to kbus transactions</td>
</tr>
<tr>
<td>B910510023</td>
<td>no man page for life(6)</td>
</tr>
<tr>
<td>B910508428</td>
<td>mt ret of exabytes do not work</td>
</tr>
<tr>
<td>B910510169</td>
<td>iostat output display is difficult to interpret</td>
</tr>
<tr>
<td>B910508458</td>
<td>the eeprom man page should describe defaultdump</td>
</tr>
<tr>
<td>B910508457</td>
<td>eeprom man page shouldn't mention CONSOLE variable</td>
</tr>
<tr>
<td>B910508455</td>
<td>sd man page should describe scsi disk cmd optimization</td>
</tr>
</tbody>
</table>

**Ongoing Software Dependencies**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>B910508274</td>
<td>All Utility: Need to add additional terminal support</td>
</tr>
<tr>
<td>B910819005</td>
<td>All OS: L1A doesn't act correctly for the FRANCE Keyboard</td>
</tr>
<tr>
<td>B911021013</td>
<td>All Utility: dopackage on a tvi925 generates an unreadable display</td>
</tr>
<tr>
<td>B920221002</td>
<td>All Sunbug: automounter may spew lots of pathok() error messages; refer to Sun bug id 1080368</td>
</tr>
<tr>
<td>B920320002</td>
<td>All OS: audible bell doesn't work without windowing system</td>
</tr>
</tbody>
</table>
Known Problems in OS/MP 4.1B

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 EINV AL when it should
B910508354  malloc (4294967295) returns a valid pointer
B910508355  calloc() can dump core
B910508292  tifS 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
Known Problems in OS/MP 4.1B

- lint libraries are missing elementary function
- trace doesn’t like having stderr clade on it
- should /etc/motd be world writable?
- connect(2) security bug
- attempting to mount swap space hangs machine
- Sun NFS bug causes failure of SI test
- pty fix
- B, O, X, and Z constants used only in DATA statements
- selection_svc and rpc can be sued to gain access to system files
- file corruption, inode or vnode pointing to wrong file
- strmp erroneously reads beyond the end of the string
- security bug: processes do not disassociate from ptys when user logs out
- you can write to a cdrom, creating a bad inode
- request that tip does ioctl call to save window settings
- SGA20: clipping can cause seg_fault (S4000)
- SGA20: moving mouse off-screen during resizes loses (S4000)
- error message - “looking for internet address for...”
- cpp mis-identifies itself
- cron queedefs file is ignored
- jobs must ALL complete before newly added jobs will run
- directory scan permissions don’t work on nfs mounts
- make does not expand all dynamic macros properly when additional suffixes are declared
- cannot create a profiled kernel with config -p
- 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 01en 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 initiztn 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 ftuncate 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 dbks 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_SEQUENTIAL)==panic: swap_xlate
1050540  mount and sync can deadlock and hang the box
1050543  umount can cause an 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
Bugs Fixed in OS/MP 4.1B

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
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 intrpt 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   DKIOC GGEO M and DKIOCGAPART ioctl calls give info on a non-existent fd device (S4000)
B920311005   lock timeout panic when mux andipi 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 unpredictable results
B920406004   request for Sun patch 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 cvs subdir
B920928002   data fault panic in Idterm srv
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.yppswd single 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
Bugs Fixed in OS/MP 4.1B

Scsi Bugs Fixed in OS/MP 4.1B

1041409 cannot execute setuid root programs in NFS mounted filesystem
1041559 system is panicking 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
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 pkcts 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 pstat 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
42 Bugs Fixed in OS/MP 4.1B

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 rpt

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 extractn 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  install 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 zfs0: parity errors, ignored
B910814002  lpr -s causes >64 spool entries 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
44 Bugs Fixed in OS/MP 4.1B

B910909018 install_client allows client swap sizes less than 8m
B910911009 cannot delete files
B920408003 pmake can dump core if it 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 fixed 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 multiuser 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) glob 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 reproducible 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/expreselVe 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 vfork
1051881  colldef rejects apparently valid input
1052398  strftime 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()
Bugs Fixed in OS/MP 4.1B

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 funcn in a shared lib from a funcn 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 dlfunc(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  getauditflagscharO 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
1063896  disk form takes 5 minutes to exit in a 40 disk machine
10464779  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
- B910508376: 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
- B911060001: 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
- B910508310: 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
- B910912001: 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
Sun Patches in OS/MP 4.1B

10075-09  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 to subvert 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 networked 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: 0xfd000000
Size: 00x800000x43b878+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.s1(,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.s1(,6,)/Install.Series6
```

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

```
Boot: sd.s1(,6,)/Install.Series6
Entry: 0xfd080000
Size: 00x0000+0x43b9b8+0x309a0
```

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) anai
3) hp
4) sun
5) tv1912
6) vt100
7) wyse50
What type of terminal are you using {1,..,7}? 4
```

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

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

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:

```
^J
^J
^J
^J
```

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](image)

To modify the /var filesystem, enter the number: 4.
Installing OS/MP 4.1B on a Standalone System

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.

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.
Installing OS/MP 4.1B on a Standalone System

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-
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'..'4'), '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
```
Installing OS/MP 4.1B on a Standalone System 61

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
Installing OS/MP 4.1B on a Standalone System

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:

```
Inter 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:
Installing OS/MP 4.1B on a Standalone System

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'..'15'), '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.
Installing OS/MP 4.1B on a Standalone System

Customization of Solbourne OS/MP 4.1B Optional Software

<table>
<thead>
<tr>
<th>Module</th>
<th>Size (KB)</th>
<th>Install</th>
<th>Directory</th>
<th>Free (KB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) DEBUGGING</td>
<td>2760</td>
<td>y</td>
<td>/usr</td>
<td>67519</td>
</tr>
<tr>
<td>2) GAMES</td>
<td>2472</td>
<td>y</td>
<td>/fun</td>
<td>67519</td>
</tr>
<tr>
<td>3) MANUAL</td>
<td>7320</td>
<td>y</td>
<td>/usr</td>
<td>67519</td>
</tr>
<tr>
<td>4) NETWORKING</td>
<td>1056</td>
<td>y</td>
<td>/usr</td>
<td>67519</td>
</tr>
<tr>
<td>5) PLOT</td>
<td>1784</td>
<td>y</td>
<td>/usr</td>
<td>67519</td>
</tr>
<tr>
<td>6) SECURITY</td>
<td>312</td>
<td>y</td>
<td>/usr</td>
<td>67519</td>
</tr>
<tr>
<td>7) SV_PROG</td>
<td>1832</td>
<td>y</td>
<td>/usr</td>
<td>67519</td>
</tr>
<tr>
<td>8) SV_USER</td>
<td>2872</td>
<td>y</td>
<td>/usr</td>
<td>67519</td>
</tr>
<tr>
<td>9) SYSTEM_V</td>
<td>3920</td>
<td>y</td>
<td>/usr</td>
<td>67519</td>
</tr>
<tr>
<td>10) TEXT</td>
<td>720</td>
<td>y</td>
<td>/usr</td>
<td>67519</td>
</tr>
<tr>
<td>11) VERSATEC</td>
<td>5952</td>
<td>n</td>
<td></td>
<td>67519</td>
</tr>
<tr>
<td>12) UUCP</td>
<td>608</td>
<td>y</td>
<td>/usr</td>
<td>67519</td>
</tr>
<tr>
<td>13) RFS</td>
<td>928</td>
<td>y</td>
<td>/usr</td>
<td>67519</td>
</tr>
<tr>
<td>14) SHLIB</td>
<td>1368</td>
<td>y</td>
<td>/usr</td>
<td>67519</td>
</tr>
<tr>
<td>15) TLI</td>
<td>48</td>
<td>y</td>
<td>/usr</td>
<td>67519</td>
</tr>
</tbody>
</table>

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
66 Installing OS/MP 4.1B on a Standalone System

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
Installing OS/MP 4.1B on a Standalone System

Figure 10. Ramdisk Menu

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 11. Reboot System Menu

Reboot System

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

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
Silicon Beach 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...
Thu 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.
Installing OS/MP 4.1B on a Standalone System

Time zone choices are:
- Australia/ GMT+11
- Brazil/ GMT+12
- CET GMT+13
- CEST/CDT GMT+12
- Canada/ GMT+3
- Chile/ GMT+4
- Cuba/ GMT+4
- EST GMT+5
- EST5EDT GMT+5
- Egypt GMT+9
- Factory GMT-0
- GB-Eire GMT-1
- GMT GMT-0
- GMT+0 GMT-11
- GMT+1 GMT-12
- GMT+10 GMT-2

("/" 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 h/m/m, default = 16:55)? <Return>

Current settings are:
- Host name = standalone
- Internet address = 0.0.0.0
- Network mask = D0000000
- 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 s10 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:

```command
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:

```command
# 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:

```command
# exit
```

Otherwise, use fastboot:

```command
# /etc/fastboot
```

The system asks configuration questions just as it did the first time it booted after being installed.
Installing 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: 0xnea000+0x43b878+0x3e9f0
```

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 ad.si(6)/Install.S4000
```

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

```
Boot: ad.si(6)/Install.S4000
Entry: 0xfd080000
Size: 00x8a000+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>
<thead>
<tr>
<th>Character</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>backspace (^H)</td>
<td>delete last input character</td>
</tr>
<tr>
<td>delete (?)</td>
<td>delete last input character</td>
</tr>
<tr>
<td>^U</td>
<td>erase input line</td>
</tr>
<tr>
<td>^R</td>
<td>redisplay input line</td>
</tr>
<tr>
<td>^W</td>
<td>delete input up to '/' or whitespace</td>
</tr>
<tr>
<td>^C</td>
<td>cancel input, returning to nearest menu</td>
</tr>
<tr>
<td>ESC</td>
<td>cancel input, returning to nearest menu</td>
</tr>
<tr>
<td>^L</td>
<td>redisplay entire screen</td>
</tr>
<tr>
<td>return (^M)</td>
<td>end input</td>
</tr>
<tr>
<td>newline (^J)</td>
<td>end input</td>
</tr>
</tbody>
</table>

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:

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

where ^J is the linefeed character. The command sty 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](image)

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

To modify the /var filesystem, enter the number 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.

![Figure 13. Modified Standard Filesystem Definition Menu](image)

```
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)

<table>
<thead>
<tr>
<th></th>
<th>(a)</th>
<th>(b)</th>
<th>(c)</th>
<th>(d)</th>
<th>(e)</th>
<th>(f)</th>
<th>(g)</th>
<th>(h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>sd0</td>
<td>8.4</td>
<td>32.4</td>
<td>191.1</td>
<td>9.3</td>
<td>---</td>
<td>---</td>
<td>141.1</td>
<td>---</td>
</tr>
<tr>
<td>sd1</td>
<td>8.4</td>
<td>32.7</td>
<td>190.9</td>
<td>9.6</td>
<td>---</td>
<td>---</td>
<td>140.8</td>
<td>---</td>
</tr>
</tbody>
</table>
```

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

---

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.
Installing OS/MP 4.1B on a Standalone System

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 'local-host'. 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-

---

**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 'local-host'. 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-
Installing OS/MP 4.1B on a Standalone System

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
Installing OS/MP 4.1B on a Standalone System 81

Figure 16. Package Selection Menu

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, libsun, and libsunwindow.

GAMES - games and demonstration programs
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.:
### 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):

<table>
<thead>
<tr>
<th>Module</th>
<th>Size (KB)</th>
<th>Install</th>
<th>Directory</th>
<th>Free (KB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEBUGGING</td>
<td>2760</td>
<td>y</td>
<td><code>/usr</code></td>
<td>64647</td>
</tr>
<tr>
<td>GAMES</td>
<td>2872</td>
<td>y</td>
<td><code>/usr</code></td>
<td>64647</td>
</tr>
<tr>
<td>MANUAL</td>
<td>7392</td>
<td>y</td>
<td><code>/usr</code></td>
<td>64647</td>
</tr>
<tr>
<td>NETWORKING</td>
<td>1056</td>
<td>y</td>
<td><code>/usr</code></td>
<td>64647</td>
</tr>
<tr>
<td>PLOT</td>
<td>1784</td>
<td>y</td>
<td><code>/usr</code></td>
<td>64647</td>
</tr>
<tr>
<td>SECURITY</td>
<td>512</td>
<td>y</td>
<td><code>/usr</code></td>
<td>64647</td>
</tr>
<tr>
<td>SV_PROG</td>
<td>1832</td>
<td>y</td>
<td><code>/usr</code></td>
<td>64647</td>
</tr>
<tr>
<td>SV_USER</td>
<td>2872</td>
<td>y</td>
<td><code>/usr</code></td>
<td>64647</td>
</tr>
<tr>
<td>SYSTEM_V</td>
<td>3992</td>
<td>y</td>
<td><code>/usr</code></td>
<td>64647</td>
</tr>
<tr>
<td>TEXT</td>
<td>720</td>
<td>y</td>
<td><code>/usr</code></td>
<td>64647</td>
</tr>
<tr>
<td>VERSATEC</td>
<td>5952</td>
<td>n</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UUCP</td>
<td>606</td>
<td>y</td>
<td><code>/usr</code></td>
<td>64647</td>
</tr>
<tr>
<td>RFS</td>
<td>926</td>
<td>y</td>
<td><code>/usr</code></td>
<td>64647</td>
</tr>
<tr>
<td>SHLIB</td>
<td>1368</td>
<td>y</td>
<td><code>/usr</code></td>
<td>64647</td>
</tr>
<tr>
<td>TLI</td>
<td>48</td>
<td>y</td>
<td><code>/usr</code></td>
<td>64647</td>
</tr>
</tbody>
</table>

Enter number of module to modify (0..15), 'continue', 'abort', or '?' for help:

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.
Installing OS/MP 4.1B on a Standalone System

85

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

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

<table>
<thead>
<tr>
<th>Module</th>
<th>Size(KB)</th>
<th>Install</th>
<th>Directory</th>
<th>Free(KB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) DEBUGGING</td>
<td>2760</td>
<td>y</td>
<td>/usr</td>
<td>67519</td>
</tr>
<tr>
<td>2) GAMES</td>
<td>2672</td>
<td>y</td>
<td>/fun</td>
<td>4579</td>
</tr>
<tr>
<td>3) MANUAL</td>
<td>7392</td>
<td>y</td>
<td>/usr</td>
<td>67519</td>
</tr>
<tr>
<td>4) NETWORKING</td>
<td>1056</td>
<td>y</td>
<td>/usr</td>
<td>67519</td>
</tr>
<tr>
<td>5) PLOT</td>
<td>1784</td>
<td>y</td>
<td>/usr</td>
<td>67519</td>
</tr>
<tr>
<td>6) SECURITY</td>
<td>312</td>
<td>y</td>
<td>/usr</td>
<td>67519</td>
</tr>
<tr>
<td>7) SV_FROG</td>
<td>1832</td>
<td>y</td>
<td>/usr</td>
<td>67519</td>
</tr>
<tr>
<td>8) SV_USER</td>
<td>2872</td>
<td>y</td>
<td>/usr</td>
<td>67519</td>
</tr>
<tr>
<td>9) SYSTEM_V</td>
<td>3992</td>
<td>y</td>
<td>/usr</td>
<td>67519</td>
</tr>
<tr>
<td>10) TEXT</td>
<td>720</td>
<td>y</td>
<td>/usr</td>
<td>67519</td>
</tr>
<tr>
<td>11) VERSATEC</td>
<td>5952</td>
<td>n</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12) UUCP</td>
<td>608</td>
<td>y</td>
<td>/usr</td>
<td>67519</td>
</tr>
<tr>
<td>13) RFS</td>
<td>928</td>
<td>y</td>
<td>/usr</td>
<td>67519</td>
</tr>
<tr>
<td>14) SHLIB</td>
<td>1368</td>
<td>y</td>
<td>/usr</td>
<td>67519</td>
</tr>
<tr>
<td>15) TLI</td>
<td>48</td>
<td>y</td>
<td>/usr</td>
<td>67519</td>
</tr>
</tbody>
</table>

Enter number of module to modify ('1'-'15'), 'continue', 'abort', or '?' for help:
86 Installing OS/MP 4.1B on a Standalone System

**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
```
Installing OS/MP 4.1B on a Standalone System

Figure 21. Ramdisk Menu

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 22. Reboot System Menu

Reboot System

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

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: ad.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...
Thu 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.*
Installing OS/MP 4.1B on a Standalone System

Time zone choices are:

- Australia/ GMT+11
- Brazil/ GMT+12
- CET GMT+13
- CEST/CDT GMT+2
- Canada/ GMT+3
- Chile/ GMT+4
- Cuba GMT+5
- EST GMT+6
- EST5EDT GMT+7
- Egypt GMT+9
- Factory GMT-12
- GB-Eire GMT-1
- GMT GMT-10
- GMT+0 GMT-11
- GMT+1 GMT-12
- GMT-10 GMT-2

(\'/\' 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 = 05/26/1992)? <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) = 05/26/1992
- Time = 16:55

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

yes

Setting netmask of nil 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:

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

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
# xm -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:

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

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

```
telley# /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 re-defined 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.
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.

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.

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.
Installing OS/MP 4.1B on a Standalone using reinsys

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-
Installing OS/MP 4.1B on a Standalone using reinscsys 101

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)?
Installing OS/MP 4.1B on a Standalone using reinsCSYs

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, libcurl, libm, libtermcap, libtermlib, libsuntool, and libsunwindow.

GAMES - games and demonstration programs
Installing OS/MP 4.1B on a Standalone using reinst_sys

---

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

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

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/SYP 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 svdiid(7v), svdiid(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.
Installing OS/MP 4.1B on a Standalone using reinstSys 105

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

<table>
<thead>
<tr>
<th>Module</th>
<th>Size (KB)</th>
<th>Install</th>
<th>Directory Free (KB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) DEBUGGING</td>
<td>2688</td>
<td>y</td>
<td>/usr</td>
</tr>
<tr>
<td>2) GAMES</td>
<td>3136</td>
<td>y</td>
<td>/usr</td>
</tr>
<tr>
<td>3) MANUAL</td>
<td>7440</td>
<td>y</td>
<td>/usr</td>
</tr>
<tr>
<td>4) NETWORKING</td>
<td>1072</td>
<td>y</td>
<td>/usr</td>
</tr>
<tr>
<td>5) PLOT</td>
<td>1784</td>
<td>y</td>
<td>/usr</td>
</tr>
<tr>
<td>6) SECURITY</td>
<td>312</td>
<td>y</td>
<td>/usr</td>
</tr>
<tr>
<td>7) SV_PROG</td>
<td>1848</td>
<td>y</td>
<td>/usr</td>
</tr>
<tr>
<td>8) SV_USER</td>
<td>2320</td>
<td>y</td>
<td>/usr</td>
</tr>
<tr>
<td>9) SYSTEM_V</td>
<td>4032</td>
<td>y</td>
<td>/usr</td>
</tr>
<tr>
<td>10) TEXT</td>
<td>720</td>
<td>y</td>
<td>/usr</td>
</tr>
<tr>
<td>11) VERSATEC</td>
<td>5960</td>
<td>n</td>
<td></td>
</tr>
<tr>
<td>12) UUCP</td>
<td>608</td>
<td>y</td>
<td>/usr</td>
</tr>
<tr>
<td>13) RFS</td>
<td>912</td>
<td>y</td>
<td>/usr</td>
</tr>
<tr>
<td>14) SMLIB</td>
<td>1376</td>
<td>y</td>
<td>/usr</td>
</tr>
<tr>
<td>15) TLI</td>
<td>48</td>
<td>y</td>
<td>/usr</td>
</tr>
</tbody>
</table>

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.
Installing OS/MP 4.1B on a Standalone using reinscsys

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
Installing OS/MP 4.1B on a Standalone using reinst_sys

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
```
Installing OS/MP 4.1B on a Server

Installing on a Series 5, Series 5E, Series 6, or S4000 systems:

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 Series 5 or 5E systems using a local tape drive, enter a boot command in the following form:

```
ROM> boot st,sil(TapeID,2)
```

To load the ramdisk on Series 6 systems using a local tape drive, enter a boot command in the following form:

```
ROM> boot st,sil(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: 00x3a000+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.mountd` `nfsd` and `rarpd` 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 `-g` 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 ? S 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.

```bash
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>
<thead>
<tr>
<th>System</th>
<th>Value of X</th>
</tr>
</thead>
<tbody>
<tr>
<td>Series5 and SE</td>
<td>2</td>
</tr>
<tr>
<td>Series6</td>
<td>3</td>
</tr>
</tbody>
</table>

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

```bash
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:

```bash
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:

```bash
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: 0xd0080000
Size: 0x30a00+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 ?  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.

<table>
<thead>
<tr>
<th>System</th>
<th>Value of X</th>
</tr>
</thead>
<tbody>
<tr>
<td>Series5 and 5E</td>
<td>5</td>
</tr>
<tr>
<td>Series 6</td>
<td>6</td>
</tr>
</tbody>
</table>

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) tvd912
6) vr100
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.

```
ROM> 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:

```
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**

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

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:

```
# ^J{tty sane}^J
# cd /
# rm -f /core
# inst_syst
```

where `^J` is the linefeed character. The command `tty 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.
Installing OS/MP 4.1B on a Server

Figure 23. Sample Standard Filesystem Definition Menu

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

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

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.

<table>
<thead>
<tr>
<th>Standard Filesystem Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) root on sd0a (required)</td>
</tr>
<tr>
<td>2) swap on sd0b (required)</td>
</tr>
<tr>
<td>3) /usr on sd0g (required)</td>
</tr>
<tr>
<td>4) /var on root partition</td>
</tr>
<tr>
<td>5) /tmp on root partition</td>
</tr>
</tbody>
</table>

Disk Partitions (sizes in MB)

<table>
<thead>
<tr>
<th>(a)</th>
<th>(b)</th>
<th>(c)</th>
<th>(d)</th>
<th>(e)</th>
<th>(f)</th>
<th>(g)</th>
<th>(h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>sd0:</td>
<td>8.4</td>
<td>32.4</td>
<td>190.1</td>
<td>9.5</td>
<td></td>
<td></td>
<td>141.1</td>
</tr>
<tr>
<td>sd1:</td>
<td>8.4</td>
<td>32.7</td>
<td>190.9</td>
<td>9.6</td>
<td></td>
<td></td>
<td>140.8</td>
</tr>
</tbody>
</table>

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

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

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.

Enter number of filesystem to change ('1'..'5'), 'continue', 'previous', 'cancel', or '?' for help: continue
Installing OS/MP 4.1B on a Server

Figure 24. Modified Standard Filesystem Definition 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

<table>
<thead>
<tr>
<th></th>
<th>(a)</th>
<th>(b)</th>
<th>(c)</th>
<th>(d)</th>
<th>(e)</th>
<th>(f)</th>
<th>(g)</th>
<th>(h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>sd0:</td>
<td>8.4</td>
<td>32.4</td>
<td>191.1</td>
<td>9.3</td>
<td>---</td>
<td>---</td>
<td>141.1</td>
<td>---</td>
</tr>
<tr>
<td>sd1:</td>
<td>8.4</td>
<td>32.7</td>
<td>190.9</td>
<td>9.6</td>
<td>---</td>
<td>---</td>
<td>140.8</td>
<td>---</td>
</tr>
</tbody>
</table>

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

Figure 25. Media Identification Menu - Local Tapehost

**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:
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 local-host. 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 = 0xffffffff (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 = 0xffffffff (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.
Installing OS/MP 4.1B on a Server

Figure 28. Package Selection Menu

To examine the modules available, select the Optional Software package:

```
Enter number of package to examine ('1', '2'), 'cancel', 'install', or '?' for help:
```

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

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.

```
Package Name                  Size(KB)    Install
1) Solbourne OS/MP 4.1B Optional Software   35200
```

Enter number of package to examine ('1', '2'), 'cancel', 'install', or '?' for help: 1

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:
Figure 29. Package Selection Customization Menu

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

GAMES - games and demonstration programs

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 svidll(7v), svidll(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.

```
<table>
<thead>
<tr>
<th>Module</th>
<th>Size (KB)</th>
<th>Install</th>
<th>Directory</th>
<th>Free (KB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEBUGGING</td>
<td>2760</td>
<td>y</td>
<td>/usr</td>
<td>66667</td>
</tr>
<tr>
<td>GAMES</td>
<td>2872</td>
<td>y</td>
<td>/usr</td>
<td>66667</td>
</tr>
<tr>
<td>MANUAL</td>
<td>7392</td>
<td>y</td>
<td>/usr</td>
<td>66667</td>
</tr>
<tr>
<td>NETWORKING</td>
<td>1056</td>
<td>y</td>
<td>/usr</td>
<td>66667</td>
</tr>
<tr>
<td>PLOT</td>
<td>1784</td>
<td>y</td>
<td>/usr</td>
<td>66667</td>
</tr>
<tr>
<td>SECURITY</td>
<td>312</td>
<td>y</td>
<td>/usr</td>
<td>66667</td>
</tr>
<tr>
<td>SV_PROG</td>
<td>1832</td>
<td>y</td>
<td>/usr</td>
<td>66667</td>
</tr>
<tr>
<td>SV_USER</td>
<td>2872</td>
<td>y</td>
<td>/usr</td>
<td>66667</td>
</tr>
<tr>
<td>SYSTEM_V</td>
<td>3992</td>
<td>y</td>
<td>/usr</td>
<td>66667</td>
</tr>
<tr>
<td>TEXT</td>
<td>720</td>
<td>y</td>
<td>/usr</td>
<td>66667</td>
</tr>
<tr>
<td>VERSATEC</td>
<td>5952</td>
<td>n</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UUCP</td>
<td>608</td>
<td>y</td>
<td>/usr</td>
<td>66667</td>
</tr>
<tr>
<td>RFS</td>
<td>928</td>
<td>y</td>
<td>/usr</td>
<td>66667</td>
</tr>
<tr>
<td>SHLIB</td>
<td>1368</td>
<td>y</td>
<td>/usr</td>
<td>66667</td>
</tr>
<tr>
<td>TLI</td>
<td>48</td>
<td>y</td>
<td>/usr</td>
<td>66667</td>
</tr>
</tbody>
</table>
```

```
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.

<table>
<thead>
<tr>
<th>Module</th>
<th>Size(KB)</th>
<th>Install</th>
<th>Directory</th>
<th>Free(KB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) DEBUGGING</td>
<td>2760</td>
<td>y</td>
<td>/usr</td>
<td>67519</td>
</tr>
<tr>
<td>2) GAMES</td>
<td>2872</td>
<td>y</td>
<td>/fun</td>
<td>4579</td>
</tr>
<tr>
<td>3) MANUAL</td>
<td>7392</td>
<td>y</td>
<td>/usr</td>
<td>67519</td>
</tr>
<tr>
<td>4) NETWORKING</td>
<td>1056</td>
<td>y</td>
<td>/usr</td>
<td>67519</td>
</tr>
<tr>
<td>5) PLOT</td>
<td>1784</td>
<td>y</td>
<td>/usr</td>
<td>67519</td>
</tr>
<tr>
<td>6) SECURITY</td>
<td>312</td>
<td>y</td>
<td>/usr</td>
<td>67519</td>
</tr>
<tr>
<td>7) SV_PROG</td>
<td>1832</td>
<td>y</td>
<td>/usr</td>
<td>67519</td>
</tr>
<tr>
<td>8) SV_USER</td>
<td>2872</td>
<td>y</td>
<td>/usr</td>
<td>67519</td>
</tr>
<tr>
<td>9) SYSTEM_V</td>
<td>3992</td>
<td>y</td>
<td>/usr</td>
<td>67519</td>
</tr>
<tr>
<td>10) TEXT</td>
<td>720</td>
<td>y</td>
<td>/usr</td>
<td>67519</td>
</tr>
<tr>
<td>11) VERSATEC</td>
<td>5952</td>
<td>n</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12) UUCP</td>
<td>608</td>
<td>y</td>
<td>/usr</td>
<td>67519</td>
</tr>
<tr>
<td>13) RFS</td>
<td>928</td>
<td>y</td>
<td>/usr</td>
<td>67519</td>
</tr>
<tr>
<td>14) SHLIB</td>
<td>1368</td>
<td>y</td>
<td>/usr</td>
<td>67519</td>
</tr>
<tr>
<td>15) TLI</td>
<td>46</td>
<td>y</td>
<td>/usr</td>
<td>67519</td>
</tr>
</tbody>
</table>

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

---

**NOTE**

_The free space for lusr 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.
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.
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: /dev/sd0(0,0,0)/vmunix
Entry: 0x7a80000
Size: 0xd000+0x3358+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:

```bash
#tftp dgram udp wait root /usr/etc/in.tftpd in.tftpd /tftpboot
```

Next, determine the process ID of inetd(8):

```
tapehost# ps ax | grep inetd
   249  ?  0:01 inetd
   541  p3  0:00  grep 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 = 0xffffffff00)? <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 |
| CEST/CDT | GMT+2 | GMT-6 | GMT9 | PRC |
| Canada/ | GMT+3 | GMT-7 | Greenwich | PST/PDST |
| 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+1 | GMT-11 | GMT3 | MST | M-60 |
| GMT+2 | GMT-12 | GMT4 | MST/MDT | WET |
| GMT+10 | GMT-2 | GMT5 | Mexico/ | Zulu |

('/* indicates time zone prefixes)

Enter time zone (default = 'US/Mountain'): US <Return>

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:

<table>
<thead>
<tr>
<th>Host name</th>
<th>habitrail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internet address</td>
<td>192.9.3.4</td>
</tr>
<tr>
<td>Network mask</td>
<td>0xffffffff</td>
</tr>
<tr>
<td>NIS domain</td>
<td>Rodent.COM</td>
</tr>
<tr>
<td>Time zone</td>
<td>US/Mountain</td>
</tr>
<tr>
<td>Data (m/d/y)</td>
<td>05/26/1992</td>
</tr>
<tr>
<td>Time</td>
<td>16:55</td>
</tr>
</tbody>
</table>

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

Setting netmask of e10 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:

```
hat:~> 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: EXBYTE EX8-8200 25iK
Enter device number: 1
```

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

```
Boot: st.si(4,4)
Entry: 0xfd080000
Size: 0xaaa000+0x43b678+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 ?  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 #
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: 0x6a000+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(,e,)/Install:S4000
```

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

```
Boot: sd.si(,e,)/Install:S4000
Entry: 0xfd080000
Size: 00x8a000+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(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 pts 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,e(,hostnumber)/cdrom/Install.84000
```
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:

```
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**

<table>
<thead>
<tr>
<th>Character</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>⟨^H⟩</td>
<td>delete last input character</td>
</tr>
<tr>
<td>⟨^?⟩</td>
<td>delete last input character</td>
</tr>
<tr>
<td>⟨^U⟩</td>
<td>erase input line</td>
</tr>
<tr>
<td>⟨^R⟩</td>
<td>redisplay input line</td>
</tr>
<tr>
<td>⟨^W⟩</td>
<td>delete input up to ‘/’ or whitespace</td>
</tr>
<tr>
<td>⟨^C⟩</td>
<td>cancel input, returning to nearest menu</td>
</tr>
<tr>
<td>ESC</td>
<td>cancel input, returning to nearest menu</td>
</tr>
<tr>
<td>⟨^M⟩</td>
<td>redisplay entire screen</td>
</tr>
<tr>
<td>⟨^J⟩</td>
<td>end input</td>
</tr>
</tbody>
</table>

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:

```
^J stty 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.
144 Installing OS/MP 4.1B on a Server

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

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

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.
Installing OS/MP 4.1B on a Server 145

Figure 36. Modified Standard Filesystem Definition Menu

<p>| | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>b</td>
<td>c</td>
<td>d</td>
<td>e</td>
<td>f</td>
<td>g</td>
</tr>
<tr>
<td>sd0:</td>
<td>8.4</td>
<td>32.4</td>
<td>191.1</td>
<td>9.3</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>sd1:</td>
<td>8.4</td>
<td>32.7</td>
<td>190.9</td>
<td>9.6</td>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>

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

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 `local-host`. 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 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 = st
3) Local Internet address = 192.9.3.4 (required for remote tape)
4) Network broadcast mask = 0xffffffff (required for remote tape)
5) Tape host = tape-n-boot-serv (192.9.3.1)

Enter selection number ('1'..'5'), '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 = 0xffffffff (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 /etc/hosts 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 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.
Installing OS/MP 4.1B on a Server

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:

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

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

<table>
<thead>
<tr>
<th>Module</th>
<th>Size (KB)</th>
<th>Install</th>
<th>Directory</th>
<th>Free (KB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) DEBUGGING</td>
<td>2760</td>
<td>y</td>
<td>/usr</td>
<td>58695</td>
</tr>
<tr>
<td>2) GAMES</td>
<td>2872</td>
<td>y</td>
<td>/usr</td>
<td>58695</td>
</tr>
<tr>
<td>3) MANUAL</td>
<td>7392</td>
<td>y</td>
<td>/usr</td>
<td>58695</td>
</tr>
<tr>
<td>4) NETWORKING</td>
<td>1056</td>
<td>y</td>
<td>/usr</td>
<td>58695</td>
</tr>
<tr>
<td>5) PLOT</td>
<td>1784</td>
<td>y</td>
<td>/usr</td>
<td>58695</td>
</tr>
<tr>
<td>6) SECURITY</td>
<td>312</td>
<td>y</td>
<td>/usr</td>
<td>58695</td>
</tr>
<tr>
<td>7) SV_PROG</td>
<td>1632</td>
<td>y</td>
<td>/usr</td>
<td>58695</td>
</tr>
<tr>
<td>8) SV_USER</td>
<td>2872</td>
<td>y</td>
<td>/usr</td>
<td>58695</td>
</tr>
<tr>
<td>9) SYSTEM_V</td>
<td>3992</td>
<td>y</td>
<td>/usr</td>
<td>58695</td>
</tr>
<tr>
<td>10) TEXT</td>
<td>720</td>
<td>y</td>
<td>/usr</td>
<td>58695</td>
</tr>
<tr>
<td>11) VERSATEC</td>
<td>5952</td>
<td>y</td>
<td>/usr</td>
<td>58695</td>
</tr>
<tr>
<td>12) UUCP</td>
<td>606</td>
<td>y</td>
<td>/usr</td>
<td>58695</td>
</tr>
<tr>
<td>13) RFS</td>
<td>926</td>
<td>y</td>
<td>/usr</td>
<td>58695</td>
</tr>
<tr>
<td>14) SHLIB</td>
<td>1368</td>
<td>y</td>
<td>/usr</td>
<td>58695</td>
</tr>
<tr>
<td>15) TLI</td>
<td>48</td>
<td>y</td>
<td>/usr</td>
<td>58695</td>
</tr>
</tbody>
</table>

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 `libe`, `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.
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.

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', 'y', or 'n' for help)? yes
Install GAMES in what directory? /fun

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

The menu is updated to reflect the change, as shown in Figure 43.

---

### Customization of Serciente OS/MP 4.1B Optional Software

<table>
<thead>
<tr>
<th>Module</th>
<th>Size(KB)</th>
<th>Software Modules</th>
<th>Install</th>
<th>Directory</th>
<th>Free(KB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) DEBUGGING</td>
<td>2760</td>
<td>y</td>
<td>/usr</td>
<td>67519</td>
<td></td>
</tr>
<tr>
<td>2) GAMES</td>
<td>2872</td>
<td>y</td>
<td>/fun</td>
<td>4879</td>
<td></td>
</tr>
<tr>
<td>3) MANUAL</td>
<td>7392</td>
<td>y</td>
<td>/usr</td>
<td>67519</td>
<td></td>
</tr>
<tr>
<td>4) NETWORKING</td>
<td>1056</td>
<td>y</td>
<td>/usr</td>
<td>67519</td>
<td></td>
</tr>
<tr>
<td>5) PLOT</td>
<td>1784</td>
<td>y</td>
<td>/usr</td>
<td>67519</td>
<td></td>
</tr>
<tr>
<td>6) SECURITY</td>
<td>312</td>
<td>y</td>
<td>/usr</td>
<td>67519</td>
<td></td>
</tr>
<tr>
<td>7) SV_PROG</td>
<td>1832</td>
<td>y</td>
<td>/usr</td>
<td>67519</td>
<td></td>
</tr>
<tr>
<td>8) SV_USER</td>
<td>2072</td>
<td>y</td>
<td>/usr</td>
<td>67519</td>
<td></td>
</tr>
<tr>
<td>9) SYSTEM_V</td>
<td>5992</td>
<td>y</td>
<td>/usr</td>
<td>67519</td>
<td></td>
</tr>
<tr>
<td>10) TEXT</td>
<td>720</td>
<td>y</td>
<td>/usr</td>
<td>67519</td>
<td></td>
</tr>
<tr>
<td>11) VERSATEC</td>
<td>5952</td>
<td>n</td>
<td>/usr</td>
<td>67519</td>
<td></td>
</tr>
<tr>
<td>12) UUCP</td>
<td>608</td>
<td>y</td>
<td>/usr</td>
<td>67519</td>
<td></td>
</tr>
<tr>
<td>13) RFS</td>
<td>928</td>
<td>y</td>
<td>/usr</td>
<td>67519</td>
<td></td>
</tr>
<tr>
<td>14) SHLIB</td>
<td>1368</td>
<td>y</td>
<td>/usr</td>
<td>67519</td>
<td></td>
</tr>
<tr>
<td>15) TLI</td>
<td>48</td>
<td>y</td>
<td>/usr</td>
<td>67519</td>
<td></td>
</tr>
</tbody>
</table>

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.

![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: 0x6000+0x33358+0x815d8

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
/tftphost
```

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:

```plaintext
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.


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')?
habitail <Return>

What is its Internet address (0 for none, default = 192.9.3.4)? <Return>

What is the network broadcast mask (default = 0xffffffff00)? <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.
Installing OS/MP 4.1B on a Server

Time zone choices are:

<table>
<thead>
<tr>
<th>Country</th>
<th>Time Zone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>GMT+11</td>
</tr>
<tr>
<td>Brazil</td>
<td>GMT+12</td>
</tr>
<tr>
<td>CET</td>
<td>GMT+13</td>
</tr>
<tr>
<td>CET/EDT</td>
<td>GMT+2</td>
</tr>
<tr>
<td>Canada/</td>
<td>GMT+3</td>
</tr>
<tr>
<td>Chile/</td>
<td>GMT+4</td>
</tr>
<tr>
<td>Cuba</td>
<td>GMT+5</td>
</tr>
<tr>
<td>EET</td>
<td>GMT+6</td>
</tr>
<tr>
<td>EST</td>
<td>GMT+7</td>
</tr>
<tr>
<td>EST/EDT</td>
<td>GMT+8</td>
</tr>
<tr>
<td>Egypt</td>
<td>GMT+9</td>
</tr>
<tr>
<td>Factory</td>
<td>GMT-0</td>
</tr>
<tr>
<td>GB-Eire</td>
<td>GMT-1</td>
</tr>
<tr>
<td>GMT</td>
<td>GMT-10</td>
</tr>
<tr>
<td>GMT+0</td>
<td>GMT-11</td>
</tr>
<tr>
<td>GMT+1</td>
<td>GMT-12</td>
</tr>
<tr>
<td>GMT+10</td>
<td>GMT-2</td>
</tr>
</tbody>
</table>

(‘/’ indicates time zone prefixes)

Enter time zone (default = ‘US/Mountain’): US <Return>

Time zone choices are:

<table>
<thead>
<tr>
<th>Time Zone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alaska</td>
</tr>
<tr>
<td>Central</td>
</tr>
<tr>
<td>Hawaii</td>
</tr>
<tr>
<td>Pacific</td>
</tr>
<tr>
<td>Aleutian</td>
</tr>
<tr>
<td>East-Indiana</td>
</tr>
<tr>
<td>Michigan</td>
</tr>
<tr>
<td>Pacific-New</td>
</tr>
<tr>
<td>Arizona</td>
</tr>
<tr>
<td>Eastern</td>
</tr>
<tr>
<td>Mountain</td>
</tr>
<tr>
<td>Samoa</td>
</tr>
</tbody>
</table>

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:

<table>
<thead>
<tr>
<th>Setting</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Host name</td>
<td>habitrail</td>
</tr>
<tr>
<td>Internet address</td>
<td>192.9.3.4</td>
</tr>
<tr>
<td>Network mask</td>
<td>0xfffffff00</td>
</tr>
<tr>
<td>NIS domain</td>
<td>Rodent.COM</td>
</tr>
<tr>
<td>Time zone</td>
<td>US/Mountain</td>
</tr>
<tr>
<td>Date (m/d/y)</td>
<td>05/28/1992</td>
</tr>
<tr>
<td>Time</td>
<td>16:55</td>
</tr>
</tbody>
</table>

Are these correct (‘yes’ or ‘no’)?
yes

Setting netmask of e10 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:


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 mnt -f /dev/nrst0 asf 5
# cd /usr/etc
# rsh -n tapehost dd if=/dev/nrst0 bs=8k | tar xpf -
```

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 mnt. If this is the case for your tape host, first substitute 'rew' for 'asf 5' in the above example, and then re-execute mnt with 'fif 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 xpf -
```

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 smp 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 sun-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.

```bash
# /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:

```bash
# /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

```bash
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.

```bash
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 xpf -
```
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>
<thead>
<tr>
<th>Character</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>backspace (^H)</td>
<td>delete last input character</td>
</tr>
<tr>
<td>delete (^?)</td>
<td>delete last input character</td>
</tr>
<tr>
<td>^U</td>
<td>erase input line</td>
</tr>
<tr>
<td>^R</td>
<td>redisplay input line</td>
</tr>
<tr>
<td>^W</td>
<td>delete input up to '/' or whitespace</td>
</tr>
<tr>
<td>^C</td>
<td>cancel input, returning to nearest menu</td>
</tr>
<tr>
<td>ESC</td>
<td>cancel input, returning to nearest menu</td>
</tr>
<tr>
<td>^L</td>
<td>redisplay entire screen</td>
</tr>
<tr>
<td>return (^M)</td>
<td>end input</td>
</tr>
<tr>
<td>newline (^J)</td>
<td>end input</td>
</tr>
</tbody>
</table>

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:

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

where ^J is the linefeed character. The command tty 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 disk-less 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.
Installing OS/MP 4.1B on a server using reinst_sys

Figure 46. Sample Standard Filesystem Definition Menu

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

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

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

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

To modify the /var filesystem, enter the number 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 Menu](image)

1) root on sd2a (required)
2) swap on sd0b (required)
3) /usr on sd2q (required)
4) /var on sd2d
5) /tmp on root partition

Disk Partitions (sizes in MB) (available highlighted)

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(a)</td>
<td>(b)</td>
<td>(c)</td>
<td>(d)</td>
<td>(e)</td>
</tr>
<tr>
<td>sd0: 8.4</td>
<td>32.4</td>
<td>191.1</td>
<td>9.3</td>
<td>---</td>
</tr>
<tr>
<td>sd2: 8.6</td>
<td>32.9</td>
<td>484.9</td>
<td>9.9</td>
<td>---</td>
</tr>
</tbody>
</table>

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

![Installation Media Identification Menu](image)

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.
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 48. Media Identification Menu - Local Tapehost

<table>
<thead>
<tr>
<th>Selection</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Installation media type = Tape</td>
</tr>
<tr>
<td>2</td>
<td>Tape drive = /dev/rdst0</td>
</tr>
<tr>
<td>3</td>
<td>Local Internet address = 192.0.0.4 (required for remote tape)</td>
</tr>
<tr>
<td>4</td>
<td>Network broadcast mask = Oxfffffff00 (required for remote tape)</td>
</tr>
<tr>
<td>5</td>
<td>Tape host = localhost (127.0.0.1)</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Installation media type</th>
<th>Tape</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tape drive</td>
<td>/dev/nrst0</td>
</tr>
<tr>
<td>Local Internet address</td>
<td>192.9.3.0 (required for remote tape)</td>
</tr>
<tr>
<td>Network broadcast mask</td>
<td>0xffffffff00 (required for remote tape)</td>
</tr>
<tr>
<td>Tape host</td>
<td>rootbeer (192.9.3.1)</td>
</tr>
</tbody>
</table>

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

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/r/cdrom`. 
Installing OS/MP 4.1B on a server using reinst_sys

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 \texttt{/rhosts} file. Check \texttt{/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 (\texttt{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 \texttt{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-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:
Installing OS/MP 4.1B on a server using reinst_sys 179

Figure 52. Package Selection Menu

<table>
<thead>
<tr>
<th>Package Name</th>
<th>Size (KB)</th>
<th>Install</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) OS/MP 4.1B Full-Install Optional Software</td>
<td>34456</td>
<td>n</td>
</tr>
</tbody>
</table>

Enter number of package to examine ('1'-'9'), '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*. 
Installing OS/MP 4.1B on a server using reinsys

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

<table>
<thead>
<tr>
<th>Module</th>
<th>Size (KB)</th>
<th>Install</th>
<th>Directory</th>
<th>Free (KB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) DEBUGGING</td>
<td>2886</td>
<td>y</td>
<td>/usr</td>
<td>58695</td>
</tr>
<tr>
<td>2) GAMES</td>
<td>3136</td>
<td>y</td>
<td>/usr</td>
<td>58695</td>
</tr>
<tr>
<td>3) MANUAL</td>
<td>7440</td>
<td>y</td>
<td>/usr</td>
<td>58695</td>
</tr>
<tr>
<td>4) NETWORKING</td>
<td>1072</td>
<td>y</td>
<td>/usr</td>
<td>58695</td>
</tr>
<tr>
<td>5) PLOT</td>
<td>1784</td>
<td>y</td>
<td>/usr</td>
<td>58695</td>
</tr>
<tr>
<td>6) SECURITY</td>
<td>312</td>
<td>y</td>
<td>/usr</td>
<td>58695</td>
</tr>
<tr>
<td>7) SV_PROG</td>
<td>1643</td>
<td>y</td>
<td>/usr</td>
<td>58695</td>
</tr>
<tr>
<td>8) SV_USER</td>
<td>2320</td>
<td>y</td>
<td>/usr</td>
<td>58695</td>
</tr>
<tr>
<td>9) SYSTEM V</td>
<td>4032</td>
<td>y</td>
<td>/usr</td>
<td>58695</td>
</tr>
<tr>
<td>10) TEXT</td>
<td>720</td>
<td>y</td>
<td>/usr</td>
<td>58695</td>
</tr>
<tr>
<td>11) VERSATEC</td>
<td>5960</td>
<td>y</td>
<td>/usr</td>
<td>58695</td>
</tr>
<tr>
<td>12) UDPCP</td>
<td>606</td>
<td>y</td>
<td>/usr</td>
<td>58695</td>
</tr>
<tr>
<td>13) RFS</td>
<td>312</td>
<td>y</td>
<td>/usr</td>
<td>58695</td>
</tr>
<tr>
<td>14) SHLLA</td>
<td>1376</td>
<td>y</td>
<td>/usr</td>
<td>58695</td>
</tr>
<tr>
<td>15) TLI</td>
<td>48</td>
<td>y</td>
<td>/usr</td>
<td>58695</td>
</tr>
</tbody>
</table>

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.
Installing OS/MP 4.1B on a server using reinst_sys

Customization of Solbourne OS/MP 4.1B Optional Software

<table>
<thead>
<tr>
<th>Module</th>
<th>Size (KB)</th>
<th>Install</th>
<th>Directory</th>
<th>Free (KB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEBUGGING</td>
<td>2886</td>
<td>y</td>
<td>/usr</td>
<td>64655</td>
</tr>
<tr>
<td>GAMES</td>
<td>3136</td>
<td>y</td>
<td>/usr</td>
<td>64655</td>
</tr>
<tr>
<td>MANUAL</td>
<td>7440</td>
<td>y</td>
<td>/usr</td>
<td>64655</td>
</tr>
<tr>
<td>NETWORKING</td>
<td>1072</td>
<td>y</td>
<td>/usr</td>
<td>64655</td>
</tr>
<tr>
<td>PLOT</td>
<td>1784</td>
<td>y</td>
<td>/usr</td>
<td>64655</td>
</tr>
<tr>
<td>SECURITY</td>
<td>312</td>
<td>y</td>
<td>/usr</td>
<td>64655</td>
</tr>
<tr>
<td>SV_PROG</td>
<td>1848</td>
<td>y</td>
<td>/usr</td>
<td>64655</td>
</tr>
<tr>
<td>SV_USER</td>
<td>2320</td>
<td>y</td>
<td>/usr</td>
<td>64655</td>
</tr>
<tr>
<td>SYSTEM_V</td>
<td>4032</td>
<td>y</td>
<td>/usr</td>
<td>64655</td>
</tr>
<tr>
<td>TEXT</td>
<td>720</td>
<td>y</td>
<td>/usr</td>
<td>64655</td>
</tr>
<tr>
<td>VERSATEC</td>
<td>5960</td>
<td>n</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UCR</td>
<td>608</td>
<td>y</td>
<td>/usr</td>
<td>64655</td>
</tr>
<tr>
<td>RFS</td>
<td>912</td>
<td>y</td>
<td>/usr</td>
<td>64655</td>
</tr>
<tr>
<td>SHLIB</td>
<td>1274</td>
<td>y</td>
<td>/usr</td>
<td>64655</td>
</tr>
<tr>
<td>TLI</td>
<td>48</td>
<td>y</td>
<td>/usr</td>
<td>64655</td>
</tr>
</tbody>
</table>

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.
Installing OS/MP 4.1B on a server using reinsys

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
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.
Installing OS/MP 4.1B on a server using reinsys

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 server using reinst_sys
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: 00x0a000+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 0:02 inetd
 541 pts 0 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.mountd(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 of system:

**Table 18.**

<table>
<thead>
<tr>
<th>System</th>
<th>Value of X</th>
</tr>
</thead>
<tbody>
<tr>
<td>Series 5 and 5e</td>
<td>2</td>
</tr>
<tr>
<td>Series 6</td>
<td>3</td>
</tr>
</tbody>
</table>

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.**

<table>
<thead>
<tr>
<th>System</th>
<th>Value of X</th>
</tr>
</thead>
<tbody>
<tr>
<td>Series 5 and 5E</td>
<td>5</td>
</tr>
<tr>
<td>Series 6</td>
<td>6</td>
</tr>
</tbody>
</table>

To load the ramdisk on Series 5, 5E, or 6 systems, using a local CD-ROM drive, enter a boot command of the following form:

```
ROM> boot sd.ai(/,6,)/Install.SeriesX
```

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

```
Boot: sd.ai(/,6,)/Install.SeriesX
Entry: 0xfd080000
Size: 00x9a0000+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/scr0 /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>
<thead>
<tr>
<th>System</th>
<th>Value of X</th>
</tr>
</thead>
<tbody>
<tr>
<td>Series5 and 5E</td>
<td>5</td>
</tr>
<tr>
<td>Series 6</td>
<td>6</td>
</tr>
</tbody>
</table>

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: 0x0e000+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) 510
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**

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

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^O
# cd /
# x m -f /c x e
# inst_s y s
```

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.
Installing OS/MP 4.1B on a Dataless Client

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](image)

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.
Installing OS/MP 4.1B on a Dataless Client

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 local-host. 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.
Installing OS/MP 4.1B on a Dataless Client

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 = Oxffff0000 (required for remote tape)
5) Tape host = localhost (127.0.0.1)

Enter selection number ('1'..'4'), 'continue', 'previous', 'cancel', or '?' for help:

---

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.
Installing OS/MP 4.1B on a Dataless Client

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 = 0xffffffff (required for remote tape)
5) Tape host = tape-n-boot-nsv (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 = 0xffffffff (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.
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>
141.136.8.1 hostname
^D
```

- 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
```

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: ad.s1(0,0,0)/vmunix
Entry: 0xfd080000
Size: 0xd6000+0x33958+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
Sorbonne 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 = 0xffffffff0000)? <Return>

What is the NIS domain name ('none' for none, default = 'none')? <Return>
```

★★★★ NOTE ★★★★

*Using the default 'none' disables the NIS/YP services.*
Installing OS/MP 4.1B on a Dataless Client

Time zone choices are:

<table>
<thead>
<tr>
<th>Time Zone</th>
<th>Time Zone</th>
<th>Time Zone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia/ GMT+11</td>
<td>GMT-3</td>
<td>GMT6</td>
</tr>
<tr>
<td>Brazil/ GMT+12</td>
<td>GMT-4</td>
<td>GMT7</td>
</tr>
<tr>
<td>CET</td>
<td>GMT+13</td>
<td>GMT-5</td>
</tr>
<tr>
<td>CST/CDT</td>
<td>GMT-2</td>
<td>GMT-6</td>
</tr>
<tr>
<td>Canada/</td>
<td>GMT+3</td>
<td>GMT-7</td>
</tr>
<tr>
<td>Chile/</td>
<td>GMT+4</td>
<td>GMT-8</td>
</tr>
<tr>
<td>Cuba</td>
<td>GMT+5</td>
<td>GMT-9</td>
</tr>
<tr>
<td>EET</td>
<td>GMT+6</td>
<td>GMT0</td>
</tr>
<tr>
<td>EST</td>
<td>GMT+7</td>
<td>GMT1</td>
</tr>
<tr>
<td>EST/EDT</td>
<td>GMT+8</td>
<td>GMT10</td>
</tr>
<tr>
<td>Egypt</td>
<td>GMT+9</td>
<td>GMT11</td>
</tr>
<tr>
<td>Factory</td>
<td>GMT-0</td>
<td>GMT12</td>
</tr>
<tr>
<td>GB-Zone</td>
<td>GMT-1</td>
<td>GMT13</td>
</tr>
<tr>
<td>GMT</td>
<td>GMT-10</td>
<td>GMT2</td>
</tr>
<tr>
<td>GMT+0</td>
<td>GMT-11</td>
<td>GMT3</td>
</tr>
<tr>
<td>GMT+1</td>
<td>GMT-12</td>
<td>GMT4</td>
</tr>
<tr>
<td>GMT+10</td>
<td>GMT-2</td>
<td>GMT5</td>
</tr>
</tbody>
</table>

(’/’ indicates time zone prefixes)

Enter time zone (default = ‘US/Mountain’): US <Return>

Time zone choices are:

<table>
<thead>
<tr>
<th>Time Zone</th>
<th>Time Zone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alaska</td>
<td>Central</td>
</tr>
<tr>
<td>Aleutian</td>
<td>Hawaii</td>
</tr>
<tr>
<td>Arizona</td>
<td>Pacific</td>
</tr>
<tr>
<td>East-Indiana</td>
<td>Michigan</td>
</tr>
<tr>
<td>Pacific-New</td>
<td>Mountain</td>
</tr>
<tr>
<td>Samoan</td>
<td></td>
</tr>
</tbody>
</table>

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:

<table>
<thead>
<tr>
<th>Setting</th>
<th>Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Host name</td>
<td>habitrail</td>
</tr>
<tr>
<td>Internet address</td>
<td>192.9.3.4</td>
</tr>
<tr>
<td>Network mask</td>
<td>0xfffff00</td>
</tr>
<tr>
<td>NIS domain</td>
<td>Rodent.COM</td>
</tr>
<tr>
<td>Time zone</td>
<td>US/Mountain</td>
</tr>
<tr>
<td>Date (m/d/y)</td>
<td>05/28/1992</td>
</tr>
<tr>
<td>Time</td>
<td>16:55</td>
</tr>
</tbody>
</table>

Are these correct (‘yes’ or ‘no’)? yes

Setting netmask of e10 to 255.255.255.0
The 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:

```
RM> 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 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: st.s1(/,4,4)
Entry: 0xfd080000
Size: 0xe0000+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 = C0069004
Server at IP address 192.9.3.1 = C0069001
Boot: tftp:el,(1,1)/var/tmp/install
Entry: 0xf080000
Size: 0xe00000004x3b87840x3a9f0
```

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: 0x3000+0x438b8+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 ?  0:01 inetd
  541 p3  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) $10
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:

<table>
<thead>
<tr>
<th>Ramdisk</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Change Disk Partitioning</td>
</tr>
<tr>
<td>2) Install Software</td>
</tr>
<tr>
<td>3) Invoke a Bourne Shell</td>
</tr>
<tr>
<td>4) Reboot System</td>
</tr>
<tr>
<td>5) Halt System</td>
</tr>
<tr>
<td>Enter number of function to execute ('1'..'5', or '?' for help):</td>
</tr>
</tbody>
</table>

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

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 -2 /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.

![Sample Standard Filesystem Definition Menu](image)

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

The var menu will be highlighted, and the system will request a disk partition. As­
sign it to 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.:
Installing OS/MP 4.1B on a Dataless Client

1) root on sd0a  (required)
2) swap on sd0b  (required)
3) /usr on rootbeer:/export/exec/s4000 (required)
4) /var on sd0d
5) /tmp on root partition

<table>
<thead>
<tr>
<th>Disk Partitions (sizes in MB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a)</td>
</tr>
<tr>
<td>sd0: 8.4</td>
</tr>
<tr>
<td>sd1: 8.4</td>
</tr>
</tbody>
</table>

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

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 st0 (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 'local-host'. 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.
Installing OS/MP 4.1B on a Dataless Client

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.
Figure 68. Tape Drive Identification Menu - Remote Tapehost

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 = 0xffffffff (required for remote tape)
5. Tape host = tape-n-boot-srv (192.9.3.1)

Enter selection number ('1'-'4'), 'continue', 'previous', 'cancel', or '?' for help:

Figure 69. Installation Media Identification Menu - Local CD-ROM

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 = 0xffffffff (required for remote tape)
5. CD host = localhost (127.0.0.1)

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

![Screenshot](image)

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.
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.
Installing OS/MP 4.1B on a Dataless Client

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 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 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.s1(0,0,0)/vmunix

Entry: 0xf0d08000

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:

```plaintext
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 = 0xffffffff) ? <Return>

What is the NIS domain name ('none' for none, default = 'none')? <Return>
```

★★★ NOTE ★★★

*Using the default 'none' disables the NIS/YP services.*
Installing OS/MP 4.1B on a Dataless Client

Time zone choices are:

<table>
<thead>
<tr>
<th>Country</th>
<th>Zone</th>
<th>Time Zone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia/</td>
<td>GMT+11</td>
<td>GMT-3</td>
</tr>
<tr>
<td>Brazil/</td>
<td>GMT+12</td>
<td>GMT-4</td>
</tr>
<tr>
<td>CET</td>
<td>GMT+13</td>
<td>GMT-5</td>
</tr>
<tr>
<td>CEST/CEST</td>
<td>GMT+2</td>
<td>GMT-6</td>
</tr>
<tr>
<td>Canada/</td>
<td>GMT+3</td>
<td>GMT-7</td>
</tr>
<tr>
<td>Chile/</td>
<td>GMT+4</td>
<td>GMT-8</td>
</tr>
<tr>
<td>Cuba</td>
<td>GMT+5</td>
<td>GMT-9</td>
</tr>
<tr>
<td>EST</td>
<td>GMT+6</td>
<td>GMT0</td>
</tr>
<tr>
<td>EST5EDT</td>
<td>GMT+7</td>
<td>GMT1</td>
</tr>
<tr>
<td>Egypt</td>
<td>GMT+9</td>
<td>GMT10</td>
</tr>
<tr>
<td>Factory</td>
<td>GMT0</td>
<td>GMT12</td>
</tr>
<tr>
<td>GB-Eire</td>
<td>GMT-1</td>
<td>GMT13</td>
</tr>
<tr>
<td>GMT</td>
<td>GMT-10</td>
<td>GMT2</td>
</tr>
<tr>
<td>GMT+0</td>
<td>GMT-11</td>
<td>GMT3</td>
</tr>
<tr>
<td>GMT+1</td>
<td>GMT-12</td>
<td>GMT4</td>
</tr>
<tr>
<td>GMT+10</td>
<td>GMT-2</td>
<td>GMT5</td>
</tr>
<tr>
<td>MidEast/</td>
<td>GMT5</td>
<td></td>
</tr>
<tr>
<td>NZ</td>
<td>GMT7</td>
<td></td>
</tr>
<tr>
<td>Navajo</td>
<td>GMT8</td>
<td></td>
</tr>
<tr>
<td>PRC</td>
<td>GMT9</td>
<td></td>
</tr>
<tr>
<td>Poland</td>
<td>HST</td>
<td></td>
</tr>
<tr>
<td>ROK</td>
<td>GMT0</td>
<td></td>
</tr>
<tr>
<td>Singapore</td>
<td>GMT1</td>
<td></td>
</tr>
<tr>
<td>ROC</td>
<td>GMT9</td>
<td></td>
</tr>
<tr>
<td>ROK</td>
<td>GMT0</td>
<td></td>
</tr>
<tr>
<td>UTC</td>
<td>GMT1</td>
<td></td>
</tr>
<tr>
<td>Japan</td>
<td>GMT12</td>
<td></td>
</tr>
<tr>
<td>US/</td>
<td>GMT11</td>
<td></td>
</tr>
<tr>
<td>Libya</td>
<td>GMT13</td>
<td></td>
</tr>
<tr>
<td>UTC</td>
<td>GMT2</td>
<td></td>
</tr>
<tr>
<td>Universal</td>
<td>GMT3</td>
<td></td>
</tr>
<tr>
<td>W-SO</td>
<td>GMT4</td>
<td></td>
</tr>
<tr>
<td>WET</td>
<td>GMT5</td>
<td></td>
</tr>
<tr>
<td>Zulu</td>
<td>GMT8</td>
<td></td>
</tr>
</tbody>
</table>

("/") indicates time zone prefix)

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 = 0xffffffff
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 e10 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:
Re-type 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:

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

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

```
hostname 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.
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**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Sample Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEFAULTROOT</td>
<td>tftp.ei(„hostnumber)</td>
</tr>
<tr>
<td>DEFAULTBOOT</td>
<td>/export/root/clientname/vmunix</td>
</tr>
<tr>
<td>DEFAULTSWAP</td>
<td>/export/swap/clientname/swap.clientname</td>
</tr>
<tr>
<td>DIAGBOOT</td>
<td>/export/exec/Series5/kvm/stand/dg for a Series5 client</td>
</tr>
<tr>
<td></td>
<td>/export/exec/Series6/kvm/stand/dg for a Series6 client</td>
</tr>
<tr>
<td>DIAGSERVER</td>
<td>tftp.ei(„hostnumber)</td>
</tr>
<tr>
<td>CONSOLE</td>
<td>bw(), cg(), zs(), or fb()</td>
</tr>
</tbody>
</table>

**Table 24. Variables that Must be Set on a Solbourne Series S4000 Client**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Sample Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEFAULTROOT</td>
<td>tftp.ei(„hostnumber)</td>
</tr>
<tr>
<td>DEFAULTBOOT</td>
<td>/clients/root/clientname/vmunix</td>
</tr>
<tr>
<td>DEFAULTSWAP</td>
<td>/clients/swap/clientname/swap.clientname</td>
</tr>
</tbody>
</table>
Table 24. Variables that Must be Set on a Solbourne Series S4000 Client

<table>
<thead>
<tr>
<th>Variable</th>
<th>Sample Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIAGBOOT</td>
<td>/clients/exec/S4000/kvm/stand/dg</td>
</tr>
<tr>
<td>DIAGSERVER</td>
<td>tftp.ei(,hostnumber)</td>
</tr>
<tr>
<td>INPUT-DEVICE</td>
<td>keyboard, ttya, or ttyb</td>
</tr>
<tr>
<td>OUTPUT-DEVICES</td>
<td>screen, ttya, or ttyb</td>
</tr>
</tbody>
</table>

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/clientnameswap.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
```
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
Solvbourne 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 = 0xffffffff00)? <Return>

What is the NIS domain name ('none' for none, default = 'none')? Rodent.COM
```

★★★ NOTE ★★★

*Using the default 'none' disables the NIS/YP services.*
Installing OS/MP 4.1B on a Diskless Client

Time zone choices are:

- Australia/ GMT+11
- Brazil/ GMT+12
- CET GMT+13
- CST/CDT GMT+2
- Canada/ GMT+3
- Chile/ GMT+4
- Cuba/ GMT+5
- CET GMT+6
- EST GMT+7
- EST-EDT GMT+8
- Egypt GMT+9
- Factory GMT+10
- GB-Belfast GMT+11
- GMT GMT+10
- GMT-0 GMT-11
- GMT-1 GMT-12
- GMT-2 GMT-4
- GMT0 GMT0
- GMT1 GMT1
- GMT2 GMT2
- GMT3 GMT3
- GMT4 GMT4
- GMT5 GMT5
- GMT6 GMT6
- GMT7 GMT7
- GMT8 GMT8
- GMT9 GMT9
- GMT10 GMT10
- GMT11 GMT11
- GMT12 GMT12
- Mideast/ NZ
- Poland
- ROC
- ROK
- Singapore
- Turkey
- US/ Canada
- Malaysia
- Japan
- UTC
- Universal
- W-SD
- WET

("/" indicates time zone prefixes)

Enter time zone (default = 'US/Mountain'): US <Return>

Time zone choices are:
- Alaska
- 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 = ff:ff:ff:ff:ff:ff:ff:ff
- 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 et0 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:

```
root@localhost:~$ 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>
<thead>
<tr>
<th>Partition</th>
<th>Filesystem</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>/</td>
</tr>
<tr>
<td>b</td>
<td>swap</td>
</tr>
<tr>
<td>d</td>
<td>/var</td>
</tr>
<tr>
<td>g</td>
<td>/usr</td>
</tr>
</tbody>
</table>

★★★ 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, '7', 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.

```
Disk sd0:
Total Disk Size: 194.1 Mb
a: 8.4 Megabytes
b: 32.3 Megabytes
c: 194.1 Megabytes
d: 9.3 Megabytes
e: 0.0 Megabytes
f: 0.0 Megabytes
g: 141.1 Megabytes
h: 0.0 Megabytes

1. Resize partition
2. Change mount points
3. Overlay with template
4. Store as new template
5. Change display parameters
6. Undo last action
7. Undo ALL actions
8. Return to previous menu
```

** 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.
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: 8
Template has been modified. Do you wish to accept these changes?
'yes' or 'no' to exit, any other input to continue editing:
yes
```

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:

```
Please specify partition to be resized: d
Enter size of partition d in Megabytes: 12
Please specify partition to contribute this space: g
```

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(0) 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.
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

<table>
<thead>
<tr>
<th>Partition Use</th>
<th>1.2 Gbytes 512 byte sectors</th>
<th>3.0 Gbytes 512 byte sectors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sectors</td>
<td>Size (Mbytes)</td>
</tr>
<tr>
<td>a</td>
<td>/</td>
<td>18522</td>
</tr>
<tr>
<td>b</td>
<td>swap</td>
<td>65856</td>
</tr>
<tr>
<td>c</td>
<td>all</td>
<td>1679328</td>
</tr>
<tr>
<td>d</td>
<td>/var</td>
<td>20580</td>
</tr>
<tr>
<td>g</td>
<td>/usr</td>
<td>1574370</td>
</tr>
<tr>
<td>h</td>
<td>unmounted</td>
<td>N/A</td>
</tr>
</tbody>
</table>
Table 27. Example SCSI Disk Partitions

<table>
<thead>
<tr>
<th>SCSI Disks (sd0)</th>
<th>327 Mbytes</th>
<th>661 Mbytes</th>
<th>200 Mbytes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sectors</td>
<td>Size (Mbytes)</td>
<td>Sectors</td>
</tr>
<tr>
<td>a</td>
<td>/</td>
<td>16800</td>
<td>8</td>
</tr>
<tr>
<td>b</td>
<td>swap</td>
<td>66150</td>
<td>32</td>
</tr>
<tr>
<td>c</td>
<td>all</td>
<td>639450</td>
<td>312</td>
</tr>
<tr>
<td>d</td>
<td>/var</td>
<td>19425</td>
<td>9</td>
</tr>
<tr>
<td>g</td>
<td>/usr</td>
<td>537075</td>
<td>262</td>
</tr>
</tbody>
</table>

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.
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.
Changing Disk Partitioning