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SunOS Release 4.0 READ THIS FIRST

Read This First

Software READ THIS FIRST
SunOS Release 4.0

Introduction

This document supports software for the SunOS™ Release 4.0 installed on Sun-2™, Sun-3™ and Sun-4™ systems. Workstations may be configured as standalone systems, diskless or dataless clients, or homogeneous or heterogenous servers. Workstations may be installed from 1/2 inch or 1/4 inch tape and must have a minimum of 4Mbytes of memory.

For information concerning compatibility between Release 4.0 and Sun unbundled products see the *Release 4.0 Change Notes*, Chapter 2.

This document is divided into various sections to help you obtain the information you need to install and use this release. Under the heading *Installation Issues*, you will find general installation information that is important to all users. Then there is a section for servers only, which you can skip if you are installing a standalone. The *Known Problems in the Software* section is divided into a series of headings to help you identify the areas that are appropriate to your installation and usage needs. *Documentation Errata and Addenda* contains changes to Release 4.0 docmentation. Finally, there are appendices at the end of this RTF that contain the following:

□ Kernel Configuration Issues

□ Boot PROM Issues

□ Allocation of Disk Space

□ Remote Installation Notes

□ Sun-2, Sun-3, and Sun-4 Distribution Tape Layouts

Getting Help

If you have any problems installing or using Release 4.0, call Sun Microsystems at: 1-800-USA-4SUN (1-800-872-4786).

Sun Customers throughout the world have service hotlines available for both software and hardware support questions. Outside the USA, call you local support office or the number provided with your software support contract. Have your system's model number and the SunOS release number (for software) ready to give to the dispatcher.

You can also send questions by electronic mail to `sun!hotline`. Be sure to include your name, company, phone number, and SunOS release number in your mail message.

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

□ To see the SunOS release number, type: **cat /etc/motd**

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Installation Issues

General Issues

SunOS 4.0 is a major new release that includes significant changes to the filesystem layout. As a result, upgrading from earlier releases of the SunOS to SunOS 4.0 is not possible. You must do a complete new installation. Back up your customized and user files, do a complete installation of SunOS 4.0, and then restore the saved files. (As always, full dumps should be done prior to re-installing your system.)

1. If you have a Fujitsu-M2284/M2322 disk and are using `format` to relabel your disk, the standard label is incorrect because the starting cylinder for the `swap` partition is wrong. If you want to use the standard label, edit `/etc/format.dat`. Go to the section for this particular disk and change `b=105` to `b=50`.

2. If you are installing a server, installing a system which may become a server at a later date, using a system as a remote installation server, or planning on adding Sun software after installing the SunOS, answer **y** to `Install files` category on the Software Form:

```
    Install files: y
```

3. If the "Security" software is selected then the "System_V" software must also be selected. If it is not, the `C2conv` script used to configure C2 security will fail attempting to execute `/bin/id`.

4. For Sun-3 and Sun-4 machines with 1/4" tape drives, choose the `st8` option for 1/4" tape type.

5. If you have a 100U with an Archive 1/4" tape controller, you can not boot `MUNIX` and use `format` to format and label your disks. Instead use the `diag` program from Release 3.5 to format and label your disks.

6. Setting the correct time zone in suninstall.

    When *suninstall* is invoked it will request information on your local time zone. There is no default for this information and it must be filled in when asked for. See Appendix B of *Installing the SunOS* for a complete listing of world timezones.

7. The `suninstall.log` file.

    After completing an installation and before booting the newly installed system review the file `/usr/etc/install/files/suninstall.log`. Errors from utilities such as `tar` will appear here even if they were scrolled off the screen during the installation.

8. Diskless Sun2's (or Sun 100U's) with 3Com Ethernet interface (`ec0`) will have trouble booting from fast servers such as Sun-3s or Sun-4s. To correct this, apply the following patch.

    On the machine named SERVER, do the following for the client named CLIENT:

```
    SERVER# cd /export/root/CLIENT
    SERVER# echo 'nfstsize+0x22?w800' | adb -w vmunix
    SERVER#
```

    Also, be sure that the client's `/etc/fstab` entries have the `rsize` and `wsize` options set to 2K for any fast

servers.

For example, the entry for "/usr" should look similar to the following:

```
SERVER:/export/exec/sun2          /usr      nfs  ro,rsize=2048,wsize=2048 0 0
```

Alternatively, the `ec` board should be upgraded to a Sun multibus Ethernet board (`ie0`); see your sales representative for details.

9. The symbol `LOGHOST` is not correctly defined by `syslogd` on loghost machines. This results in 100% CPU usage and `syslogd` accumulating large amounts of CPU time.

    To prevent this problem insert the following line at the beginning of `/etc/syslog.conf` on loghost machines:

```
define(LOGHOST, 1)
```

10. Even if a machine is chosen as a `yp` server during *suninstall*, it is still necessary to run `/usr/etc/ypinit` on the server before booting clients. After doing this, edit `/etc/rc.local` and remove the comment symbols from the lines of code referring to `ypbind`. If you do not do this the yellow pages will not work on the server.

Server Information

As in previous releases, it is recommended that networks be configured with servers more powerful than their clients (especially for diskless operation). SunOS 4.0 has improved heterogeneity, file caching and buffer management features that make the benefits of this arrangement more apparent.

1. Installing from mixed types of distribution tapes.

    suninstall does not currently support installation of the different architectures on a heterogeneous server from different tape drives. (For example; installing a Sun-3 heterogeneous server by loading the Sun-3 software from a local 1/2" tape drive and the Sun-2 software from a remote 1/4" tape drive.) If it is necessary to do such an installation, install the machine as a homogeneous server (be sure to select `Install` optional software), bring up the Operating System and then use `setup_exec` and `setup_client` to add the heterogeneous software and clients.

Known Problems with the Software

System Administration Issues

1. File system blocksize must be >= system page size.

    The system will not support the use of file systems with a block size that is smaller than the page size of the system. An example would be a file system with a blocksize of 4K bytes used on a Sun-3 (8K page size). Such file systems should be recreated with an appropriate block size. This problem does *not* affect file systems with a block size *larger* than page size. For example, a block size of 8K on a Sun-2 (2K page size) works properly.

2. *core* files appear to be very large.

    A *core* file of a dynamically linked program produced by 4.0 appears to be very large, having a *length* over

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2Mbytes in many cases (as shown by an `ls -l` command). However, their actual size on disk (as shown by an `ls -s`) is often much less, usually less than it would be with previous versions of the system. Such files contain one or more "holes" of unused space that are optimized out of the disk space allocation.

If such files (or for that matter, any file containing a hole) are copied using a command such as `cp` or `tar`, the "holes" will be filled in and as a consequence the file will actually occupy the amount of disk space indicated by its length. This is not a problem if the files are renamed (via `mv`) or dumped with `dump`.

Graphics Issues

1. In *SunCGI*, one can specify that the view surface be retained. When this view surface is redisplayed (when the window is overlapped or `Redisplay` is selected from the menu), the image shifts to the right. This effectively negates the utility of having a retained view surface. Use `canvases` if retained data is a must. Otherwise, avoid using the `retained` flag to `open_vws`.

2. In GPSI, lines drawn using the XF_LINE_INT_2D, and INT_3D commands seem to be shifted off of the left side of the screen where they are clipped (one pixel usually remains on the screen). This happens regardless of the viewport and transformation matrix used. Use XF_LINE_FLT_2D or FLT_3D commands instead. There is no work around for users of the INT package.

SCSI/SMD Issues

1. In the rare case of a Sun 3/2XX or a Sun 4/2XX configured with an SMD disk plus two or more SCSI devices, a modification is needed to ensure smooth operation. Please call Sun Microsystems (regardless of support contract level) if you are installing SunOS 4.0 on the above configurations.

2. On workstations using SMD disks supported by the Xylogics 450/451 disk controller messages may appear in the following form:

```
xy<disk partition>: read/write retry (message) - blk #xxxxx, abs blk #xxxxx
```

The message may be one of:

```
disk sequencer error
cylinder & head header error
memory addr error
header not found
lost interrupt
```

Occasional retry or restore messages are normal and are not cause for concern, and indicate that the i/o operation ultimately succeeded. If the message states that the operation 'failed', you should be more concerned. In particular, read operations that fail with the message 'hard ecc error' can be indicative of worn cabling, poor drive grounding, or possible drive problems.

Sun FORTRAN and Sun PASCAL Issues

Sun FORTRAN 1.1 and Sun Pascal 1.1 are separate, value-added products that will be shipped subsequently to SunOS 4.0.   f77 and pc, the UNIX FORTRAN and Pascal compilers have been removed from SunOS 4.0 tapes. Customers with support contracts are eligible to receive a one time upgrade to SunOS 4.0 versions of Sun FORTRAN and Sun Pascal free of charge. Other customers may purchase these as separate products.

Sun FORTRAN has many new features including performance enhancements and VMS extensions. Sun Pascal is ISO Pascal with separate compilation, variable-length strings, a variety of extensions, and global optimization.

For additional information, please call your sales representative.

Unbundled Product Issues

Some Sunlink products cause diskless nodes to hang during boot:

In order to install Sunlink products that contain kernel drivers on diskless nodes running 4.0, the configuration file line for the system's Ethernet device MUST be placed BEFORE the config file lines that define the zs ports.

```
Old:

device                zs0 at obio ? csr 0x20000 flags 3 priority 3
device                zs1 at obio ? csr 0x00000 flags 0x103 priority 3
device                ie0 at obio ? csr 0xc0000 priority 3

New:

device                ie0 at obio ? csr 0xc0000 priority 3
device                zs0 at obio ? csr 0x20000 flags 3 priority 3
device                zs1 at obio ? csr 0x00000 flags 0x103 priority 3
```

Documentation Errata and Addenda

There are several miniboxes shipped with this release. In each box, you will find a READ THIS FIRST that pertains to the information exclusive to the manuals contained in the specific box. Be sure and read these RTF's as well as this one for complete information about the release.

SunOS Reference Manual

1. In the printed versions of the following Reference Manual pages, the indicated files are incorrectly shown as residing in /etc. The on-line versions correctly show these files as residing in /usr/etc:

    audit_warn(8)   **/usr**/etc/security/audit/audit_warn

    auditd(8)   **/usr**/etc/auditd

    config(8)   **/usr**/etc/config

    devnm(8)   **/usr**/etc/devnm

    lockd(8C)   **/usr**/etc/rpc.lockd

    routed(8C)   **/usr**/etc/in.routed

sendmail(8)	**/usr**/etc/sendmail
statd(8C)	**/usr**/etc/rpc.statd

2. The printed version of the init(8) Reference Manual page incorrectly states that for a secure system, when the console is marked secure in /etc/ttytab, a root password is required before the system comes up in single-user mode. The on-line page correctly states that when the console is *not* marked secure, the root password is required.

Release 4.0 Change Notes

Chapter 2, Section 2.3: Shared Libraries

By default, programs are built to access shared libraries. This is the standard behavior and can only be changed through the use of the -Bstatic flag. See the ld(1) man page for more information.

Chapter 2, Section 2.3: Kernel Boot Sequence
The kernel boots with the root filesystem mounted read-only. This allows fsck to repair any damaged filesystems reliably. This feature can be overridden by using the new -w option when booting.

Chapter 2, Section 2.7: Utilities

fsck(8)
fsck(8) now checks the raw device by default. fsck(8) is unreliable in checking filesystems currently mounted read-write since the filesystem activity can interfere with fsck operation.

mount(8)
A new remount option for the mount(8) command allows converting 4.2 filesystems mounted as read-only to read-write. This facility is used in the rc scripts to remount 4.2 filesystems as read-write after the filesystems have passed fsck.

Chapter 2, Section 2.9: System V Enhancements

The definition for the largest shared memory segment has been changed from SHMPOOL in Release 3.x to SHMSIZE in Release 4.0.

Sun-4 Assembly Language Reference Manual

Correction to Sun-4 Assembly Language Reference Manual, pages 17 and 18 of Table 2-3:

The following SPARC floating-point instructions are not supported in the SunOS 4.0 release version of the Sun-4 SPARC assembler: FINTRZ, FCLASS, FEXPO, FSCALE, FREM, and FQUOT.

APPENDICES to the SunOS 4.0 READ THIS FIRST

- Kernel Configuration Issues

- Boot PROM Issues

- Allocation of Disk Space

- Remote Installation Notes

- Sun-2, Sun-3, and Sun-4 Distribution Tape Layouts

A: Kernel Configuration Issues

1. Custom kernels on the Sun 4/110 with SCSI drives.

    The Sun 4/110 uses the `sw` SCSI driver. If the `si`, and `sc` drivers and their associated devices are removed from the kernel (as they should be for best performance) the kernel make will fail. To fix this, insert the following lines into `/usr/share/sys/sundev/sc_conf.c` at line 14:

    ```
    #include "sw.h"
    #include "wds.h"
    ```

2. Making Custom Kernels for Diskless and Dataless Clients

    Following are two methods for making customized kernels for diskless clients of an NFS server. The first method (Procedure I) is somewhat simpler to perform but has two restrictions:

    You must have root privileges on the server.

    Client and server must be the same architecture. If the client is of a different architecture, use Procedure II. (That is, kernels for Sun-3 and Sun-2 clients of a Sun-4 server must be made on the clients using Procedure II.)

    The second method (Procedure II) will work for any combination of client and server architectures. It requires only that you have root privileges on the client; no special privileges are needed on the server.

□   **Procedure I:**

    All procedures are performed logged in as `root` on the server. *SYS_NAME* represents the hostname of the client system. *sun#* represents sun2, sun3, or sun4 to match the architecture of the client system.

    ```
    # cd /usr/sys/sun#/conf
    # cp GENERIC SYS_NAME
    # chmod +w SYS_NAME
    # vi SYS_NAME
         (Edit out unneeded kernel modules.)
    # config SYS_NAME
    # cd ../SYS_NAME
    # make
    ```

    When the make completes successfully, install the kernel:

    ```
    # mv /export/root/SYS_NAME/vmunix /export/root/SYS_NAME/vmunix.ORIG
    # cp vmunix /export/root/SYS_NAME
    ```

    Halt and reboot the client.

□   **Procedure II:**

    All procedures are performed logged in as `root` on the client. *SYS_NAME* represents the hostname of the client system. *sun#* represents sun2, sun3, or sun4 to match the architecture of the client system.

The example for Procedure II makes the kernel in /home on the client. The client's /home is located in the server's /export/root filesystem and must have about two megabytes of disk space available in order to make a kernel. If space is not available in that filesystem the procedure may be done in another.

```
# mkdir /home/SYS_NAME
# cd /home/SYS_NAME
# ln -s /usr/sys/* .
# rm sun#
# mkdir sun#
# cd sun#
# ln -s /usr/sys/sun#/* .
# rm conf
# mkdir conf
# cd conf
# ln -s /usr/sys/sun#/conf/* .
```

Now configure and make a kernel as described in *Installing the SunOS*. That is:

```
# cp GENERIC SYS_NAME
# chmod +w SYS_NAME
# vi SYS_NAME
     (Edit out unneeded kernel modules.)
# config SYS_NAME
# cd ../SYS_NAME
# make
```

When the make completes successfully, install the kernel:

```
# mv /vmunix /vmunix.GEN
# cp vmunix /
```

Halt and reboot the client.

After the client has booted successfully, clean up /home (you may wish to save a copy of your customized configuration file first):

```
# rm -rf /home/SYS_NAME
```

B: PROM Issues

1. The Sun-3/60 Ethernet chip does not reset properly on power-up. This can be worked around by typing [K2] in the PROM monitor mode. See the *PROM User's manual for help in accessing the monitor*.

2. If you have a Sun-3 system and try to load your new SunOS, Version 4.0 from a 1/4-inch tape drive, the boot may fail and an error code may appear on the screen. If this happens, you should do the following to check your Boot PROM version:

    Have your system administrator bring your system down safely:

    ```
    %su
    enter password
    ##/etc/halt
    ```

3. After the > prompt, type **kb**:

    ```
    >kb  [ Return ]
    ```

    The system will respond with something like this:

    ```
    Self Test completed successfully.
    Sun Workstation, Model some number
    ROM Rev 1.8, 8MB memory installed
    and so on...
    ```

4. Look at the ROM Rev number. If you have a Sun-3/50, 3/75, 3/140, 3/160 or 3/180 and the number is below 1.8, you will need Sun to provide a PROM upgrade kit. If you have a Sun-3/60 and the number is below 1.6, you need an upgrade kit.

5. Now, re-boot the operating system with a command such as:

    ```
    >b          (this example is for an automatic boot)
    ```

    If you found that you need a new PROM and you have an On-site Hardware or Comprehensive Support contract, Sun will install the new PROM for you. On-site Hardware Support customers should phone the Sun Response Center at 800-USA-4SUN, request Field Service, and schedule PROM installation. If you want to install the PROM yourself, ask for a Sun-3 PROM Upgrade Kit to be mailed to you.

    If you do not have an On-Site or Comprehensive support contract, Sun will mail you this kit at no charge. The kit contains instructions for replacing the Boot PROM on your CPU board, a process that takes about 10-15 minutes. You should call Sun's 800 USA-4-SUN phone number, request Field Service, and ask for a Sun-3 PROM Upgrade Kit. If you want Sun to install the PROM, Sun will bill you on a time (but not materials) basis.

    If you find that your PROM Revision is greater than 1.8 but lower than 2.6, and you still receive an error code when you try to boot from 1/4-inch tape, the problem could be caused by one of the anomalies described below:

□   If your system contains a Sysgen Controller board and a Wantgek tape drive, and if the tape you are trying to load is *write protected*, you will receive an error message when you try to boot.

Remove the tape and make sure it is NOT write-protected.

□   If you have a Sysgen Controller and an Archive tape drive and your PROM revision level is greater than 1.8, but lower than 2.6, you need to call Sun as described above and request that you receive the latest PROM revision.

□   If you have a Sun-2 shoebox connected to a Sun-3 workstation and get a tape error message, contact hardware support at 1-800-USA-4SUN. Outside the USA call your local support office. Please mention FA #138.

6.   **xd** Boot Command

In the chapters on Sun-3 and Sun-4 PROM monitor commands, the **b**, or boot, command should include this option:

```
xd - Xylogics 7053 Disk Controller
```

C: Allocation of Disk Space

Release 4.0 uses the following amounts of disk space:
Sun 4
 Minimum: 19.16mb, Maximum: 65.93mb;
Sun 3
 Minimum: 18.16mb, Maximum: 60.71mb;
Sun 2
 Minimum:18.16mb, Maximum:59.62mb.

The minimum disk usage is just the sum of `root` and `usr` files. The maximum disk usage figure is the amount of disk space used when all optional software on the installation tapes is installed.

1. Sizing client root and swap partitions.

`root` partition

> `/export/root`: Size this partition to allow a minimum 2Mbytes for each diskless client.

swap partition

> `/export/swap`: The suggested size for a client's swap area is sixteen (16) Megabytes. (Note that this is only a suggestion, requirements are system and application dependent.) Size this partition using the formula:

> `(clientAswap + clientBswap + ... + clientNswap) * 1.06`

> The added 6% allows for file system overhead and allocation of full disk blocks to swap files.

2. The `/var` directory

> The `/var` directory tree is intended as a repository for files which vary in size. In 4.0 all of the following are links into `/var`: `/usr/adm`, `/usr/tmp`, `/usr/spool`. Additionally, database files on Yellow Pages servers are kept in `/var/yp`. As installed by default, `/var` is a plain directory in the `root` (`/`) filesystem. This raises the likelihood of rapidly filling the root filesystem during normal system operation.

> It is suggested that you allocate a separate disk partition for `/var`. Size it based on your experience with `adm`, `tmp`, and `spool` requirements in previous releases.

3. Freehog is the partition whose size can be reduced when `/usr` and `/export/exec` are running out of space. *suninstall* will automatically take space from the freehog partition if `/usr` and `/export/exec` are running out of space while users are selecting software categories.

> Currently `/usr` and `/export/exec` can not be used as the freehog partition. Do not select `/usr` or `/export/exec` as freehog. Select another partition which has extra space that can be reduced when `/usr` and `/export/exec` are running out of space.

4. Sizing the `/usr` partition.

> Allowing *suninstall* to automatically size the `/usr` partition by stealing from the freehog will result in a *very full* `/usr` partition. It is prudent to allow *suninstall* to size the partition and then to return to the Disk Form to expand the partition a bit further. Add about eight (8) megabytes to allow room for building a custom kernel, etc.

Also add additional space for any custom or unbundled software which you intend to add to the `/usr` filesystem. (This also applies to `/export/exec` on heterogeneous servers.)

1. Disk labeling: the importance of partition 'c'.

By Sun convention every disk drive must have a 'c' partition which starts at sector zero (0) and is the full size of the disk. All `format` default labels follow this convention. Please note that if the 'c' partition is not correctly designated on a drive *suninstall* will not 'see' it, that is, it will not show up in the Disk Form.

2. Changes and additions to *System and Network Administration*, Section 9.5, Changing Swap Space:

There are two ways to expand the local swap space of a standalone (or server) system.

I. Re-run *suninstall*. It is permissible to EXPAND the size of the 'b' (`swap`) partition. If you need to REDUCE the size of the 'b' partition you must use MUNIX and `format`.

II. To add `swap` space in a regular file. Create a `swap` file using *mkfile(8)*:

```
# mkfile -v 84m /export/swap/localswap
/export/swap/localswap 88080384 bytes
```

Add a `swap` entry to `/etc/fstab`:

```
# /export/swap/localswap swap swap rw 0 0
```

Execute `swapon(8)`:

```
# swapon -a
```

(On subsequent boots `swapon(8)` will be automatically executed by `/etc/rc`.

□ When using `mkfile(8)` to create client swap files for normal use DO NOT use the `-n` option to `mkfile(8)`. This option creates an empty file with no disk blocks allocated. This will result in a discontiguous (and therefore less efficient) `swap` file for the client. It also risks client failure if it attempts to allocate blocks to the swap file and none are available.

This feature of `mkfile(8)` and NFS can be used on an experimental basis to determine efficient swap file sizes for clients. Note that while `ls -l` will show the maximum size for a file made using `mkfile -n`, `ls -ls` will also show the actual number of disk blocks allocated to the file:

```
# mkfile -n 16m mt
# mkfile 16m full
# ls -ls
16392     -rw-------t    1 root    16777216    full
   16     -rw-------t    1 root    16777216    mt
```

After making a swap file with `mkfile -n`, boot up the client and use it for awhile. Then check how many blocks have actually been required for normal operation of the client. Add some more room to avoid overrunning your swap space later and create the production `swap` file for the client:

```
# mkfile [blocks]k /export/swap/clientname
```

E: Remote Installations Notes

1. For remote 1/2" tape installation, the user should always pick remote mt0 regardless of the actual tape controller type on the tapehost.

2. For remote installations, on page 105 and 106 in Chapter 5 of *Installing the SunOS*, the user must specify bs (block size) in order for dd to copy the miniroot correctly. On page 105, the line

```
dd if=/dev/nr<tapedevice#> of=/export/exec/ARCH/local/miniroot
```

    should be changed to

```
dd if=/dev/nr<tapedevice#> bs=<blocksize>b of=/export/exec/ARCH/local/miniroot
```

    On page 106, the line

```
dd if=/usr/local/miniroot of=/dev/r<diskdevice#>b
```

should be changed to

```
dd if=/usr/local/miniroot bs=<blocksize>b of=/dev/r<diskdevice#>b
```

Block size is determined by the following:

For st0, bs is 126. For st8, bs is 200. For mt0, bs is 20.

If the user does not specify the correct block size, the miniroot will not boot.

D: Distribution Tape Layout

The following tables describe the distribution tapes' contents, and the order in which the tape files appear.

		SunOS 4.0 Sun-2 Release - 1/2" Media		
Tape/File	Name	Description	Size	Format
1/0	boot	A general purpose bootstrap program. Boot it from the PROM monitor.	26624	image
1/1	XDRTOC	Table of Contents in xdr(3N) format.	4096	toc
1/2	copy	Standalone copy.	33280	image
1/3	mini-root	An image of a mini version of SunOS sufficient to run *suninstall*.	6154240	image
1/4	munix	Memory UNIX.	696832	image
1/5	munixfs	The MUNIX initialization file.	1581056	image
1/6	root	The complete root file system for SunOS.	163840	tar
1/7	usr	Required /usr files.	18872320	tar
1/8	Sys	/usr/share/sys files for making custom kernels.	2682880	tar
1/9	Networking	Networking tools and programs.	962560	tar
1/10	Debugging	Debugging tools.	3287040	tar
1/11	SunView_Users	SunWindows for users.	1443840	tar
1/12	Copyright	The copyright file.	512	image
2/0	boot	General purpose boot.	26624	image
2/1	XDRTOC	Table of Contents in xdr(3N) format.	4096	toc
2/2	SunView_Programmers	SunWindows files for programmers.	2048000	tar
2/3	SunView_Demo	SunWindows demo programs source.	573440	tar
2/4	Text	Text processing tools and files.	696320	tar
2/5	Install	Installation and system administration tools.	972800	tar
2/6	User_Diag	Sysdiag.	931840	tar
2/7	SunCore	SunCore programmer's files.	2293760	tar
2/8	uucp	uucp files.	276480	tar
2/9	System_V	System V compatibility files.	4997120	tar
2/10	Manual	On-line man pages.	6184960	tar
2/11	Demo	Assorted graphics demonstrations including Graphics Processor source.	2744320	tar
2/12	Games	Game programs.	2406400	tar
2/13	Versatec	Versatec raster printer/plotter support.	6103040	tar
2/14	Security	C2 security support.	153600	tar
2/15	Copyright	The copyright file.	512	image

SunOS 4.0 Sun-2 Release - 1/4" Media				
Tape/File	Name	Description	Size	Format
1/0	boot	A general purpose bootstrap program. Boot it from the PROM monitor.	26624	image
1/1	XDRTOC	Table of Contents in xdr(3N) format.	4096	toc
1/2	copy	Standalone copy.	33280	image
1/3	mini-root	An image of a mini version of SunOS sufficient to run *suninstall*.	6246400	image
1/4	munix	Memory UNIX.	696832	image
1/5	munixfs	The MUNIX initialization file.	1638400	image
1/6	root	The complete root file system for SunOS.	204800	tar
1/7	Copyright	The copyright file.	512	image
2/0	boot	General purpose boot.	26624	image
2/1	XDRTOC	Table of Contents in xdr(3N) format.	4096	toc
2/2	usr	Required /usr files.	18944000	tar
2/3	Copyright	The copyright file.	512	image
3/0	boot	General purpose boot.	26624	image
3/1	XDRTOC	Table of Contents in xdr(3N) format.	4096	toc
3/2	Sys	/usr/share/sys files for making custom kernels.	2764800	tar
3/3	Networking	Networking tools and programs.	1024000	tar
3/4	Debugging	Debugging tools.	3379200	tar
3/5	SunView_Users	SunWindows for users.	1536000	tar
3/6	SunView_Programmers	SunWindows files for programmers.	2048000	tar
3/7	SunView_Demo	SunWindows demo programs source.	614400	tar
3/8	Text	Text processing tools and files.	716800	tar
3/9	Install	Installation and system administration tools.	1024000	tar
3/10	User_Diag	Sysdiag.	1024000	tar
3/11	SunCore	SunCore programmer's files.	2355200	tar
3/12	uucp	uucp files.	307200	tar
3/13	Games	Game programs.	2457600	tar
3/14	Copyright	The copyright file.	512	image
4/0	boot	General purpose boot.	26624	image
4/1	XDRTOC	Table of Contents in xdr(3N) format.	4096	toc
4/2	System_V	System V compatibility files.	5017600	tar
4/3	Manual	On-line man pages.	6246400	tar
4/4	Demo	Assorted graphics demonstrations including Graphics Processor source.	2764800	tar
4/5	Versatec	Versatec raster printer/plotter support.	6144000	tar
4/6	Security	C2 security support.	204800	tar
4/7	Copyright	The copyright file.	512	image

sun microsystems

SunOS 4.0 Sun-3 Release - 1/2" Media				
Tape/ File	Name	Description	Size	Format
1/0	boot	A general purpose bootstrap program. Boot it from the PROM monitor.	32768	image
1/1	XDRTOC	Table of Contents in xdr(3N) format.	4096	toc
1/2	copy	Standalone copy.	41472	image
1/3	mini-root	An image of a mini version of SunOS sufficient to run *suninstall*.	6154240	image
1/4	munix	Memory UNIX.	737792	image
1/5	munixfs	The MUNIX initialization file.	1581056	image
1/6	root	The complete root file system for SunOS.	163840	tar
1/7	usr	Required /usr files.	18780160	tar
1/8	Sys	/usr/share/sys files for making custom kernels.	2795520	tar
1/9	Networking	Networking tools and programs.	962560	tar
1/10	Debugging	Debugging tools.	3256320	tar
1/11	SunView_Users	SunWindows for users.	1443840	tar
1/12	Copyright	The copyright file.	512	image
2/0	boot	General purpose boot.	32768	image
2/1	XDRTOC	Table of Contents in xdr(3N) format.	4096	toc
2/2	SunView_Programmers	SunWindows files for programmers.	2048000	tar
2/3	SunView_Demo	SunWindows demo programs source.	573440	tar
2/4	Text	Text processing tools and files.	696320	tar
2/5	Install	Installation and system administration tools.	972800	tar
2/6	User_Diag	Sysdiag.	1464320	tar
2/7	SunCore	SunCore programmer's files.	2908160	tar
2/8	uucp	uucp files.	276480	tar
2/9	System_V	System V compatibility files.	4945920	tar
2/10	Manual	On-line man pages.	6184960	tar
2/11	Demo	Assorted graphics demonstrations including Graphics Processor source.	2744320	tar
2/12	Games	Game programs.	2396160	tar
2/13	Versatec	Versatec raster printer/plotter support.	6092800	tar
2/14	Security	C2 security support.	153600	tar
2/15	Copyright	The copyright file.	512	image

SunOS 4.0 Sun-3 Release - 1/4" Media				
Tape/File	Name	Description	Size	Format
1/0	boot	A general purpose bootstrap program. Boot it from the PROM monitor.	32768	image
1/1	XDRTOC	Table of Contents in xdr(3N) format.	4096	toc
1/2	copy	Standalone copy.	41472	image
1/3	mini-root	An image of a mini version of SunOS sufficient to run *suninstall*.	6246400	image
1/4	munix	Memory UNIX.	737792	image
1/5	munixfs	The MUNIX initialization file.	1638400	image
1/6	root	The complete root file system for SunOS.	204800	tar
1/7	usr	Required /usr files.	18841600	tar
1/8	Sys	/usr/share/sys files for making custom kernels.	2867200	tar
1/9	Networking	Networking tools and programs.	1024000	tar
1/10	Debugging	Debugging tools.	3276800	tar
1/11	SunView_Users	SunWindows for users.	1536000	tar
1/12	SunView_Programmers	SunWindows files for programmers.	2048000	tar
1/13	SunView_Demo	SunWindows demo programs source.	614400	tar
1/14	Text	Text processing tools and files.	716800	tar
1/15	Install	Installation and system administration tools.	1024000	tar
1/16	User_Diag	Sysdiag.	1536000	tar
1/17	SunCore	SunCore programmer's files.	2969600	tar
1/18	uucp	uucp files.	307200	tar
1/19	Copyright	The copyright file.	512	image
2/0	boot	General purpose boot.	32768	image
2/1	XDRTOC	Table of Contents in xdr(3N) format.	4096	toc
2/2	System_V	System V compatibility files.	5017600	tar
2/3	Manual	On-line man pages.	6246400	tar
2/4	Demo	Assorted graphics demonstrations including Graphics Processor source.	2764800	tar
2/5	Games	Game programs.	2457600	tar
2/6	Versatec	Versatec raster printer/plotter support.	6144000	tar
2/7	Security	C2 security support.	204800	tar
2/8	Copyright	The copyright file.	512	image

		SunOS 4.0 Sun-4 Release - 1/2" Media			
Tape/ File	Name	Description	Size	Format
1/0	boot	A general purpose bootstrap program. Boot it from the PROM monitor.	40960	image
1/1	XDRTOC	Table of Contents in xdr(3N) format.	4096	toc
1/2	copy	Standalone copy.	49664	image
1/3	mini-root	An image of a mini version of SunOS sufficient to run *suninstall*.	6154240	image
1/4	munix	Memory UNIX.	942592	image
1/5	munixfs	The MUNIX initialization file.	1581056	image
1/6	root	The complete root file system for SunOS.	163840	tar
1/7	usr	Required /usr files.	18974720	tar
1/8	Sys	/usr/share/sys files for making custom kernels.	3194880	tar
1/9	Networking	Networking tools and programs.	1024000	tar
1/10	Debugging	Debugging tools.	4270080	tar
1/11	SunView_Users	SunWindows for users.	1495040	tar
1/12	SunView_Programmers	SunWindows files for programmers.	2314240	tar
1/13	SunView_Demo	SunWindows demo programs source.	573440	tar
1/14	Text	Text processing tools and files.	768000	tar
1/15	Install	Installation and system administration tools.	1054720	tar
1/16	User_Diag	Sysdiag.	1628160	tar
1/17	SunCore	SunCore programmer's files.	1781760	tar
1/18	uucp	uucp files.	286720	tar
1/19	System_V	System V compatibility files.	5314560	tar
1/20	Manual	On-line man pages.	6184960	tar
1/21	Demo	Assorted graphics demonstrations including Graphics Processor source.	2754560	tar
1/22	Games	Game programs.	2580480	tar
1/23	Versatec	Versatec raster printer/plotter support.	6103040	tar
1/24	Security	C2 security support.	184320	tar
1/25	Copyright	The copyright file.	512	image

Tape/ File	Name	Description	Size	Format
1/0	boot	A general purpose bootstrap program. Boot it from the PROM monitor.	40960	image
1/1	XDRTOC	Table of Contents in xdr(3N) format.	4096	toc
1/2	copy	Standalone copy.	49664	image
1/3	mini-root	An image of a mini version of SunOS sufficient to run *suninstall*.	6246400	image
1/4	munix	Memory UNIX.	942592	image
1/5	munixfs	The MUNIX initialization file.	1638400	image
1/6	root	The complete root file system for SunOS.	204800	tar
1/7	usr	Required /usr files.	19046400	tar
1/8	Sys	/usr/share/sys files for making custom kernels.	3276800	tar
1/9	Networking	Networking tools and programs.	1024000	tar
1/10	Debugging	Debugging tools.	4300800	tar
1/11	SunView_Users	SunWindows for users.	1536000	tar
1/12	SunView_Programmers	SunWindows files for programmers.	2355200	tar
1/13	SunView_Demo	SunWindows demo programs source.	614400	tar
1/14	Text	Text processing tools and files.	819200	tar
1/15	Copyright	The copyright file.	512	image
2/0	boot	General purpose boot.	40960	image
2/1	XDRTOC	Table of Contents in xdr(3N) format.	4096	toc
2/2	Install	Installation and system administration tools.	1126400	tar
2/3	User_Diag	Sysdiag.	1638400	tar
2/4	SunCore	SunCore programmer's files.	1843200	tar
2/5	uucp	uucp files.	307200	tar
2/6	System_V	System V compatibility files.	5324800	tar
2/7	Manual	On-line man pages.	6246400	tar
2/8	Demo	Assorted graphics demonstrations including Graphics Processor source.	2764800	tar
2/9	Games	Game programs.	2662400	tar
2/10	Versatec	Versatec raster printer/plotter support.	6144000	tar
2/11	Security	C2 security support.	204800	tar
2/12	Copyright	The copyright file.	512	image

SunOS 4.0 Sun-4 Release - 1/4" Media