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## Errata for SunOS Release 4.0/4.0.1

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Sun Microsystems, Inc. • 2550 Garcia Avenue • Mountain View, CA 94043 • 415-960-1300

Revision A, 20 January 1989 Part No: 800-3823-10

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# Errata for SunOS Release 4.0/4.0.1

## 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 heterogeneous servers. Workstations may be installed from 1/2-inch or 1/4-inch tape and must have a minimum of 4 megabytes of memory. For ERRATA specific to releases that update documentation after 4.0.1, see the Release/Upgrade Box shipped with a specific release.

Co-packaged with the 4.0 distribution tapes you will find SunOS release 4.0.1. SunOS 4.0.1 is a collection of fixes for bugs discovered in SunOS 4.0. Please complete the installation of SunOS 4.0 and boot and check the operation of your workstation(s) before proceeding with the upgrade to SunOS 4.0.1. Information on SunOS 4.0.1 is provided in the *SunOS 4.0.1 ERRATA*, attached at the end of this document as Appendix G.

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.

The section *Known Problems in the Software* is divided into a series of headings to help identify the areas that are appropriate to your installation and usage needs.

*Documentation Errata and Addenda* contains changes to Release 4.0 documentation.

Finally, there are appendices at the end of this RTF that contain the following:

- Boot PROM Issues
- Sizing Your Disk Partitions
- Remote Installation Notes
- Kernel Configuration Procedures
- Performance Tips
- Sun-2, Sun-3, and Sun-4 Distribution Tape Layouts
- SunOS 4.0.1 Bugfix ERRATA

## 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 your local support office or the number provided with your software support contract. Have your system 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`

## Installation Issues

Installation is separated into three parts: pre-installation issues that should be considered before actual procedures begin; issues with *Installing the SunOS 4.0*; and post-installation considerations.

### Pre-Installation Issues

1. SunOS 4.0 is a major new release that includes significant changes to the filesystem layout. As a result, upgrading from releases prior 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.)
2. Refer to Appendix A of this document, *PROM Issues*, to find out if you need an updated boot PROM.
3. 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.
4. For Sun-3 and Sun-4 machines with 1/4-inch tape drives, choose the `st8` option for 1/4-inch tape type.
5. If you have a Sun 100U with an Archive 1/4-inch tape controller, you cannot 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. 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.
7. 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`.

### Issues on Installing the SunOS

1. When installing a system which uses a serial terminal as console and setting the terminal type to *other*, certain other non-Sun terminal types may cause `suninstall` to dump core later on during the installation. This problem stems from an inadequate buffer for parsing the `termcap` file. Work around this as follows:

Before entering `suninstall`, set the `TERMCAP` environment variable to the `termcap` entry with these keyins:

```
# setnoglob
# eval `tset -s terminal_type`
# unset noglob
```

2. 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 4.0* for a complete listing of world timezones.

3. 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
```

This will load `setup_exec(8)` and other system administration utilities.

4. 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`.

5. 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.

6. 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, you cannot install a Sun-3 heterogeneous server by loading the Sun-3 software from a local 1/2-inch tape drive and the Sun-2 software from a remote 1/4-inch tape drive. If such an installation is necessary, install the machine as a homogeneous server (be sure to select `Install optional software`), bring up the SunOS and then use `setup_exec` and `setup_client` to add the heterogeneous software and clients.

## Post-Installation Issues

1. Booting Ethernet interface `ec0` from fast servers:

Diskless Sun-2s (or Sun 100Us) 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` on the CLIENT 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.

- 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)
```

- 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.
- The directory `/mann` is missing under `/usr/man`; this results in `catman` failure. To prevent this problem, create the directory `mann` under `/usr/man`:

```
# mkdir /usr/man/mann
```

## Known Problems with the Software

### System Administration Issues

- File system blocksize must be  $\geq$  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. System page sizes are: Sun-2 - 2K; Sun-3 - 8K; Sun-4 - 8K.

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 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. Sun 3/2xx and Sun 4/2xx workstations configured with an SMD disk plus two or more SCSI devices may hang under heavy load. Prevent this problem by upgrading to SunOS 4.0.1, specifically the "SCSI" and "mb" fixes.
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' may indicate 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 RTFs as well as this errata for complete information about the release.

### *SunOS Reference Manual*

1. In the printed versions of the Reference Manual pages listed below, 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.

### System and Network Administration

1. 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 while in the Disk form. If you need to REDUCE the size of the 'b' partition you must use `MUNIX` and `format`.
- II. Add swap space in a regular file; these keyins 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`.

2. 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
```

### *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 initially mounted read-only. This allows `fsck` to repair any damaged filesystems reliably. The root filesystem can be initially mounted read/write 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 ERRATA

- A. Boot PROM Issues
- B. Sizing Your Disk Partitions
- C. Remote Tape Installation
- D. Kernel Configuration Procedures
- E. Performance Tips
- F. Sun-2, Sun-3, and Sun-4 Distribution Tape Layouts
- G. SunOS 4.0.1 ERRATA

## A: PROM Issues

- Minimum boot PROM revision levels:

If you have a Sun-3 system and try to load 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 check your boot PROM revision level. The table below lists the minimum PROM revision level required with the various Sun architectures.

Table 1 *PROM Revision Levels for Sun Architectures*

Architecture	Minimum PROM Level
Sun-3/50	1.8
Sun-3/75	1.8
Sun-3/110	1.8
Sun-3/140	1.8
Sun-3/150	1.8
Sun-3/160	1.8
Sun-3/180	1.8
Sun-3/260	1.8
Sun-3/280	1.8
Sun-3/60	1.6

- How to determine your current PROM revision:

Have your system administrator bring your system down safely:

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

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

```
>kb 
```

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...
```

Look at the ROM Rev number and compare it with the revision given for your architecture in the table above. If the number is less than the minimum level shown in the table, you need an upgrade kit.

- How to obtain an upgrade PROM kit:

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.

□ **PROM bugs:**

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 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 Wangtec 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 the boot still fails contact hardware support at 1-800-USA-4SUN. Outside the USA call your local support office. Please mention FA #136.

- 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, call Sun as described above and request that you receive the latest PROM revision. Please mention FA #135.
- If you have a Sun-2 shoebox connected to a Sun-3 workstation and get a tape error message, call Sun as described above. Please mention FA #137 and FA #138.

## B: Sizing Your Disk Partitions

### □ / (root)

The default root filesystem size is about 8 megabytes. This size should be correct for most applications.

### □ swap

The default swap partition size is about 16 megabytes. This should be ample for general applications. Certain applications will require more swap space. You can expand the size of the swap partition using the Disk Form of `suninstall` during your installation. Once the system has been installed you can add swap space using the procedures in this RTF. (*Documentation Errata and Addenda, System and Network Administration.*)

### □ /usr

The `/usr` partition is expanded by `suninstall` to accommodate the optional software selected in the Disk Form of `suninstall`. The space needed is 'stolen' from the partition designated as the 'Free Hog', typically the `/home` partition.

Allowing `suninstall` to automatically size the `/usr` partition by stealing from the Free Hog partition 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 8 megabytes or 10%, whichever is greater. This will allow room for building a custom kernel, etc. Also add space for any custom or unbundled software which you intend to add to the `/usr` filesystem.

### □ /var

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 risks the possibility 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 `/usr/adm`, `/usr/tmp`, and `/usr/spool` requirements in previous releases.

### □ /export

`/export` is the default name on a server for the partition used to support diskless clients. It includes three primary subdirectories. You may, if you wish, make each of these a separate disk partition.

#### `/export/exec`

This directory's partition is grown by `suninstall` as optional software is selected for client systems of architectures different from the server's, much like `/usr`. As in the case of `/usr` you will want to add more space to accommodate kernel configuration and additional software. (Note that every standalone and server system has a symbolic link `/export/exec/arch` to its own `/usr` partition.)

#### `/export/root`

This is the default name on a server for the directory used to hold diskless clients' root partitions. Allow a minimum of 2 megabytes for each diskless client.

#### `/export/swap`

This is the default name on a server for the directory used to hold diskless clients' swap partitions. The suggested size for a client's swap area is 16 Megabytes. (Note that this is only a suggestion, requirements are system and application dependent.) To size this partition add up the swap sizes for the diskless clients to be supported and then add about 6% more room for file system overhead.

## C: Remote Tape Installation

1. Before beginning a remote tape installation, insert the hostname of the target system into the `/.rhosts` file of the tapehost system, creating the file if it does not exist.
2. For remote 1/2-inch tape installation, the user should always pick remote `mt0` regardless of the actual half-inch tape controller type on the tapehost.
3. 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: Kernel Configuration Procedures

If you have never configured a kernel, read *Installing the SunOS*, Appendix A. Specific procedures for building a kernel are provided below.

Two methods for making a customized kernel are presented on the next two pages. The first, Procedure I, builds a kernel on a workstation with local disk. The second, Procedure II, builds a kernel on a diskless or dataless client.

The kernel used by a diskless client can be built on its server **only** if the diskless client is of the same architecture as the server. If a diskless client is of a different architecture from its server (heterogeneous), its kernel must be made on the client.

Procedure I is simpler to perform. It requires write privileges on the workstation `/usr` filesystem. Use it to build a kernel for:

- A standalone workstation
- A server
- A diskless client workstation of an architecture the same as its server
- A dataless client workstation of an architecture the same as its server

Procedure II requires a little more work, but allows building a kernel without having write privileges on the `/usr` filesystem. Procedure II requires only root privileges on the client workstation; no special privileges are needed on the server. Use the second procedure to build a kernel for:

- A diskless client workstation of an architecture different from its server
- A dataless client workstation of an architecture different from its server
- A diskless or dataless client workstation when you do not have `root` privileges on the server

All procedures are performed when logged in as `root` (or `su'd` to superuser if `root` logins are not allowed).

`SYS_NAME`, shown on the example screens following, is the name given to the custom kernel configuration file. It is typically chosen to match the hostname of the workstation that will run the kernel. This name is automatically compiled into the kernel and is announced when the kernel is booted. For example, a kernel made from a configuration file named `ASLAN` announces itself when booted as:

```
SunOS Release 4.0 (ASLAN) #1: Wed Sep 14 15:33:16 PDT 1988
```

A kernel that will be used by several client workstations of a server might be called `ASLAN_CLIENT`.

`sun#` on the example screens requires you to fill in `sun2`, `sun3` or `sun4`, whichever is appropriate to the workstation on which you are building the kernel.

□ **Procedure I:**

Log in as `root` and execute the following:

```
# 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.

To install the kernel on the standalone or server workstation it was built on:

```
# mv /vmunix /vmunix.SV
# cp vmunix /vmunix
```

To install the kernel on a diskless client workstation of the same architecture:

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

To install the kernel on a dataless workstation of the same architecture, log onto the dataless workstation as `root` and:

```
# mv /vmunix /vmunix.SV
# cp /usr/sys/sun#/SYS_NAME/vmunix /vmunix
```

Now halt and reboot the workstation whose kernel you have just installed.

## □ Procedure II:

The example for Procedure II makes the kernel in `/sys` on the client. The client's `/sys` will be located in the server's `/export/root` filesystem and there must be 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 any filesystem which is writable by the client that has sufficient free space.

Log in as `root` and execute the following:

```
# mkdir /sys
# cd /sys
# 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:

```
# 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.SV
# cp vmunix /vmunix
```

Halt and reboot the workstation.

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

```
# rm -rf /sys
```

## E: Performance Tips

The following recommendations are intended to improve performance on 4MB workstations running SunOS 4.0. They will not solve every performance problem, but many problems can be eliminated by implementing the following suggestions. The goal of these recommendations is to maximize the number of memory pages available to user processes (including SunView).

### □ Routing

Workstations with only one ethernet interface do not need to do dynamic routing with `in.routed`; instead, they can route statically by commenting out (with the pound sign "#" in column 1) these lines in `/etc/rc.local`:

```
#if [ -f /usr/etc/in.routed ]; then
#   in.routed;                (echo -n ' routed')    >/dev/console
#fi
```

(Routing table entries can still be added or modified by the kernel as a result of ICMP redirect messages.) Diskless clients have a default route provided automatically by the server; on other machines, a command of the form

```
/usr/etc/route add default router 1
```

can be added to `rc.local`, where `router` is the hostname of an IP router ("gateway") on your local network.

This action frees up both the pages used by `in.routed` and most of the memory allocated for routing table entries. Here at Sun in Mountain View, static routing typically reduces the size of the routing table from over 150 entries to 3.

### □ Sendmail

Receiving mail on a diskless workstation typically causes a significant amount of paging, not only due to the creation of `sendmail` and `/bin/mail` processes, but also due to alias resolution and access over the network to the mailbox on the server. Recommendation: have each client mount its spool directory via secure NFS, change the YP alias map to direct users' mail to their servers, and don't run `sendmail` on the clients. For example, add a line like the following to each client's `/etc/fstab`:

```
server:/var/spool/mail /var/spool/mail nfs rw,bg,hard,intr,secure 0 0
```

Export `/var/spool/mail` on the server using the "secure" option. (Don't forget to run `exportfs`.) Change or create aliases in `/etc/aliases` on the YP master to provide aliases of the form

```
user: user@server
```

for all users who would otherwise receive mail on the clients, and re-make the YP alias map (`cd /var/yp; make aliases`). Comment out these lines in each client's `/etc/rc.local` and reboot the clients:

```
#if [ -f /usr/lib/sendmail -a -f /etc/sendmail.cf ]; then
#   (cd /var/spool/mqueue; rm -f nf* lf*)
#   /usr/lib/sendmail -bd -qlh; (echo -n ' sendmail')>/dev/console
#fi
```

An interesting side effect of this change is that a user can receive mail even if the client workstation is down. This change is also useful in environments where users wish to be able to log in to any machine of a cluster and read their mail.

#### □ Accounting

Don't enable process accounting. If accounting is not configured into the kernel (options SYSACCT), or the file /var/adm/acct does not exist at boot time, accounting is not enabled (see /etc/rc).

#### □ Other changes in /etc/rc.local

Don't start unnecessary server processes. Typically only portmap, ypbind, biod (4 of them), syslogd, update, inetd, and lpd are required on client workstations. Add keyserver if you use secure NFS, and sendmail if you don't implement the sendmail strategy above.

#### □ Miscellaneous

Make sure that you have defined LOGHOST if required as specified on page 4 of this document.

Don't enable file system quotas. (By default, quotas are not enabled.) Replacing /usr/ucb/quota with /usr/bin/true will prevent possible delays at login time due to calls to rpc.rquotad on each NFS server from which you have a filesystem mounted.

Use the default SunView background, and don't use retained windows.

Don't enable in.rwhod.

#### □ Minimizing kernel size

Don't run the **GENERIC** kernel except to configure a smaller one!

Kernel configuration file:

Remove all unnecessary entries from the kernel configuration file. For example, the following lines can be removed from DL50 in /usr/sys/sun3/conf:

```
options          CRYPT          (unless you use secure NFS)

pseudo-device    clone
pseudo-device    snit
pseudo-device    pf
pseudo-device    nbuf
device           des0 at obio ? csr 0x1c0000
```

Streams NIT is used by etherfind; to run etherfind, boot another kernel or run it on the server.

In many cases "maxusers" can be reduced to 3:

```
maxusers      3
```

Also, these lines can be changed as follows:

```
pseudo-device  dtop1
pseudo-device  ms1
pseudo-device  kb1
```

#### Streams buffers:

The default allocation of streams buffers is overly generous. Use the following procedure to make a kernel with smaller allocations.

1. Run `config` using your modified configuration file.
2. In `/usr/share/sys/sun3/KERNELNAME/param.c`, modify these lines as follows:

```
#define  NBLK2048    4
#define  NBLK1024   4
#define  NBLK512    4
#define  NBLK256    16
#define  NBLK128    64
#define  NBLK64     64
#define  NBLK16     64
#define  NBLK4      64

#define  NSTREAM    20
#define  NMUXLINK   37

#define  NSTREVENT  64
```

Larger allocations may be required in some environments; in some circumstances, running out can deadlock the system. Check your usage with `netstat -m`.

3. Run `make`.

#### Ethernet buffers:

If you have an `le` Ethernet interface (Sun-3/50 or 3/60), reduce the number of Ethernet buffers:

```
hostname# adb -w vmunix
_le_nrmnp2?W 3
_le_nrbufs?W A
$g
hostname#
```

If you have an **ie** Ethernet interface:

```
hostname# adb -w vmunix
_ie_tbufs?W 1
_ie_rbds?W 6
_ie_rfds?W 5
_ie_rbufs?W 9
$g
hostname#
```

UFS (Unix File System) buffers:

If you have a disk, you can reduce the number of buffers allocated to the UFS buffer cache:

```
hostname# adb -w vmunix
_nbuf?W 6
$g
hostname#
```

**F: Distribution Tape Layout**

The following tables describe the contents of the SunOS 4.0 distribution tapes. The list is in 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 <i>suninstall</i> .	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 <i>suninstall</i> .	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

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 <i>suninstall</i> .	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

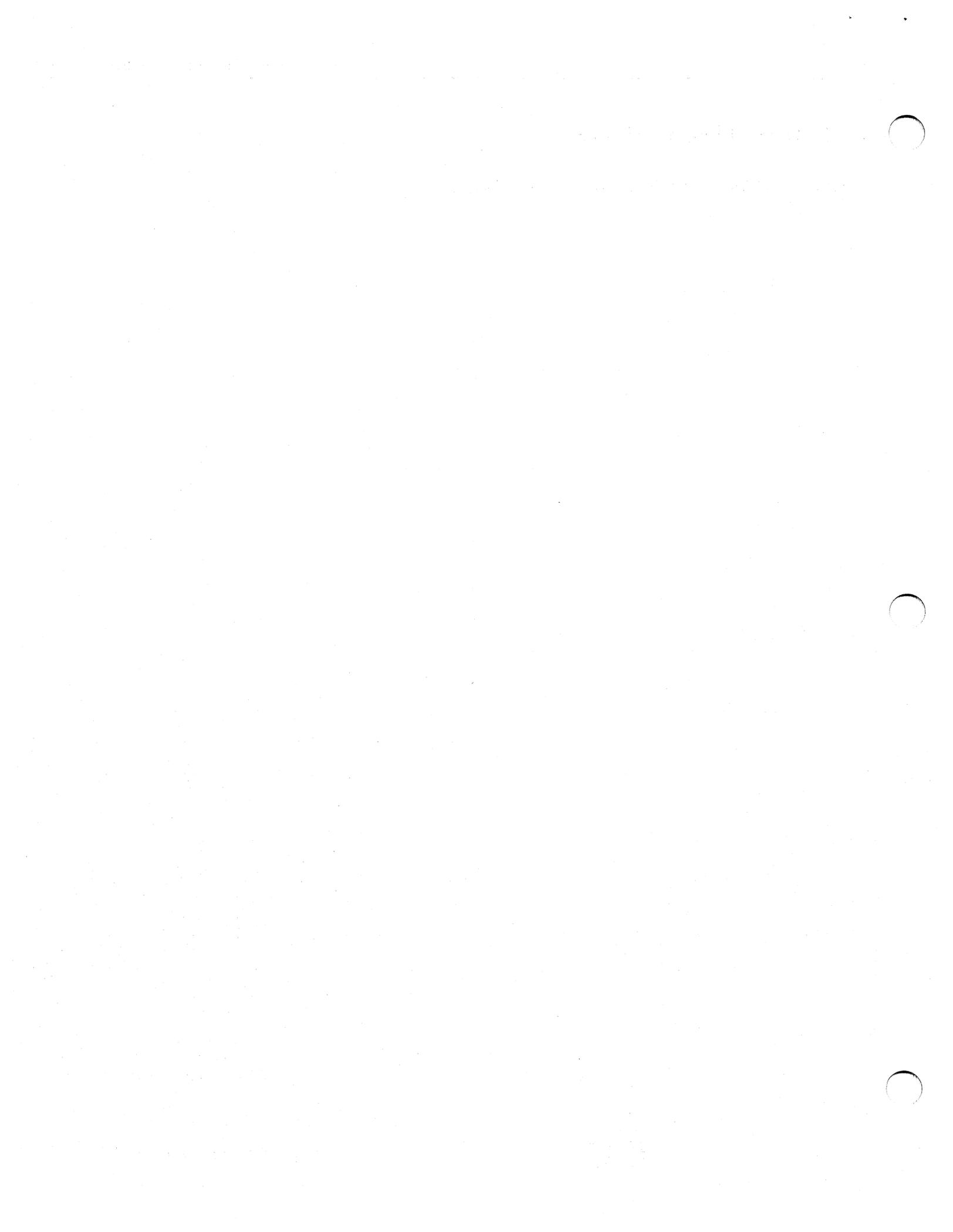
SunOS 4.0 Sun-3 Release - 1/4" Media				
Tape/ File	Name	Description	Size	Format
1/0	boot	A general purpose bootstrap program. Boot it from the PROM monitor.	32768	image
1/1	XDRTOC	Table of Contents in xdr(3N) format.	4096	toc
1/2	copy	Standalone copy.	41472	image
1/3	mini-root	An image of a mini version of SunOS sufficient to run <i>suninstall</i> .	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

<b>SunOS 4.0 Sun-4 Release - 1/2" Media</b>				
<b>Tape/ File</b>	<b>Name</b>	<b>Description</b>	<b>Size</b>	<b>Format</b>
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 <i>suninstall</i> .	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

SunOS 4.0 Sun-4 Release - 1/4" 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 <i>suninstall</i> .	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

**G: SunOS 4.0.1 Bugfix ERRATA**

The text of the ERRATA for SunOS Release 4.0.1 follows.



---

# SunOS Release 4.0.1 ERRATA

## Introduction

SunOS™ Release 4.0.1 contains fixes for bugs reported against SunOS 4.0. It applies to Sun-2™, Sun-3™, and Sun-4™ workstations.

This document includes important information on installing the fixes, post-installation procedures, dependencies, and kernel rebuilding. Read it carefully before you begin your upgrade.

## Getting Help

If you have any problems installing or using this release, call Sun Microsystems at 1-800-USA-4SUN (1-800-872-4786). Have your system's model number, release number for software, and Sun operating system—SunOS—release number 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, release 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, key in `cat /etc/motd`.

## Installing the 4.0.1 Fixes

SunOS Release 4.0.1 is a collection of individual patches rather than a monolithic release or upgrade. Related fixes are identified by a keyword and are individually installable using the program `install_fix` supplied on the 4.0.1 tape. The keywords, the files which are affected when a keyword is selected for installation, and a list of the bugs addressed by each keyword are all documented in the README file. Extract and study the README to decide which of the patches you'll want to install on your system.

If you elect to install all of the patches you may do so by executing `install_fix` without arguments and responding 'y' to each fix in turn.

**Read and understand the Post-Installation Procedures section of the document *before* installing the 4.0.1 fixes. In particular, on Sun-3 systems be sure to run `installboot` *before* rebooting the system.**

### *Extracting the README Document*

The release tape contains a README file with descriptions and installation instructions for each fix; it is important that you read this file before updating your system with the 4.0.1 fixes.

Mount the release tape in your tape drive and `tar (1)` off the README file for printing or viewing with this command sequence:

```
% cd /tmp
% mt -f /dev/nrdevice rew
% mt -f /dev/nrdevice fsf 2
% tar xvpf /dev/nrdevice README
```

*device* is one of the types given in Table 1 below.

Table 1 *Tape Device Types*

<i>Architecture</i>	<i>Tape</i>	<i>Device</i>	<i>Blocksize</i>
Sun-4	1/2"	mt8	20
Sun-4	1/4"	st8	200
Sun-3	1/2"	mt0	20
Sun-3	1/4"	st8	200
Sun-2	1/2"	mt0	20
Sun-2	1/4" (Archive)	ar0	126
Sun-2	1/4" (others)	st0	126

Remove the tape from the drive and print out the README file.

### *Saving Current Files*

As always, you should have a current backup of your system on hand prior to performing the upgrade.

### *Extracting the Installation Scripts*

Follow the procedures given in the next sections to extract the 4.0.1 installation scripts.

### *Local Tape Installation*

1. Become superuser and halt the system.  
If the system is a server, halt all client workstations before halting the system.

```
# /etc/halt
```

2. Reboot and bring the system up in single-user mode; *disk* is selected from the devices in Table 2 below:

```
>b disk(0,0,0)vmunix -s
```

Table 2 *Disk Devices*

<i>Devices</i>	<i>Description</i>
xy	Xylogics 450/451 SMD disk controller
xd	Xylogics 7053 VME/SMD disk controller
sd	SCSI disk controller

The boot completes in single-user mode.

3. Mount the tape appropriate to your workstation's architecture in the drive and type the following:

```
# cd /etc
# mt -f /dev/nrdevice rew
# mt -f /dev/nrdevice fsf 2
# tar xvpfb /dev/nrdevice blocksize
```

*device* is one of the types given in Table 1.

*blocksize* is as specified in Table 1.

This tars the following four files into /etc:

- `install_fix`, the file which installs the fixes contained in the release.
- `remove_fix`, the file which allows you to back out the fixes you have installed and replaces the 4.0 binaries for these modules.
- `read_info`, the file which parses information from the README file for the scripts. You do not have to be concerned with this file.
- README, the file describing all the fixes available in 4.0.1, as well as special installation instructions for many of them. You must read this file before installing the release.

4. Now execute `install_fix`:

```
# install_fix
```

### ***Remote Tape Installation***

For a remote installation, use this procedure:

1. Remote installation in single-user mode requires that these network files be properly set up:
  - On the machine you are updating, `/etc/hosts` must include the internet number and hostname of the machine with the tape drive.
  - On the machine whose tape drive you are using, `.rhosts` must include the hostname of the system you are updating.

2. Become superuser and halt the system. If the system is a server, make sure to halt all clients before halting the system.

```
# /etc/halt
```

3. Reboot to bring the system up in single user mode; *disk* is selected from Table 2:

```
>b disk(0,0,0)vmunix -s
```

The boot completes in single-user mode.

4. Now configure the network interface:

```
# /etc/ifconfig interface hostname up -trailers
```

*interface* is **ie0**, **le0**, or **ec0**, depending on your Ethernet interface type.

*hostname* is the name of the system you are updating.

More information on `ifconfig` is in Section 8 of the *SunOS Reference Manual*.

5. Mount the filesystems, and then tar the script files into `/etc`:

```
# mount -a
# cd /etc
# rsh tapehost mt -f /dev/nrdevice rew
# rsh tapehost mt -f /dev/nrdevice fsf 2
# rsh tapehost -n dd if=/dev/nrdevice bs=blocksizeb | tar xvpfB -
```

*tapehost* above is the name of the system with the tape drive.

*device* is selected from Table 1.

*blocksize* as found in Table 1.

6. Now execute `install_fix`:

```
# install_fix
```

## Post-Installation Procedures

The following condenses the individual Special Installation Instructions listed in the README document. Once the `install_fix` script has completed, perform the following procedures.

### □ Before rebooting your system:

#### *On Sun-3 workstations only:*

If you have installed the `lgkernel` fix, you must install the new boot block. To do this, key in the commands on the display below.

```
# cd /usr/mdac
# installboot -v /boot bootdd /dev/rdd0a
```

`dd` on the screen above is `sd`, `xy`, or `xd`, as shown in Table 2.

If your Sun-3 is equipped with a Floating Point Accelerator (FPA) board and you have installed the `fpaload` fix, you will need to merge changes into your `/etc/rc.local`. The new `rc.local` was left in `/usr/share/tmp/sun3` by `install_fix`. Compare the two. The only change from the standard version of `rc.local` as shipped with SunOS 4.0 is the addition of this line:

```
(echo 'initializing fpa board ...') >/dev/console
```

The line is added immediately following line 91 of `rc.local` which reads:

```
if [ -f /dev/fpa ]; then
```

#### *On all workstations:*

Rebuild your kernel. Be sure to keep a copy of your current, working kernel in the root directory (as `/vmunix.SV`, for example) to boot in case of problems with the new kernel. Refer to the *Kernel Rebuild Procedures* section of this document.

### □ After rebooting your system:

Relink any statically linked programs in which you wish to incorporate library fixes. Dynamically linked programs will pick up the fixes automatically.

Make sure that the yellow pages maps which will support the nameserver are built with the `-b` flag to `madebm`. Refer to manual page `named(8)`.

### □ Each time you use the `format(8S)` program:

The new `format` program must be reinstalled each time it is run while booted from MUNIX or from the miniroot. The quickest way to do this is to `tar` a copy of the 4.0.1 `format` program to a scratch tape. Then, once MUNIX or the miniroot is up and running, `tar` back the new `format` program over the old one in `/usr/etc/format`.

## Bugs Fixed in SunOS Release 4.0.1

A list of the bugs fixed by this release appears in the README file. The bug descriptions are arranged in alphabetical order by keyword. They are further listed in ascending bug reference numerical order within each keyword heading.

Each bug is described by the five kinds of information shown below. Note that when 'Special Installation Instructions' are given for the bug, these **MUST** be completed correctly to install the fix.

Reference Number: nnnnnnn  
 Synopsis:  
 Description:  
 Files Changed:  
 Special Installation Instructions:  
 Instructions, or 'None required.'

## Fix Dependencies and 'Be-Awares'

- Page 4 of the SunOS Release 4.0 READ THIS FIRST (800-1737-15 or 800-1737-16) mentions a modification needed if your workstation is a Sun-3/2xx or a Sun-4/2xx configured with an SMD disk plus two or more SCSI devices. The 'scsi' fix in SunOS 4.0.1 supersedes this modification (the SCSI/ALM-2 Patch Tape part #700-1873-10). Additionally, the 'serial' fix in SunOS 4.0.1 supersedes the ALM-2 fix on the SCSI/ALM-2 Patch Tape. If you do not have this Patch Tape you do not need it. If you have previously installed this Patch Tape, simply install the 4.0.1 'scsi' and 'serial' fixes over it to get the preferred 4.0.1 fixes.
- If you install the 'sysdiagp' fix, you must also install the 'serial' patch.
- If you install the 'dbx' fix without installing the 'winlibs' fix, when `dbxtool(1)` executes you will receive the warning message:

```
ld.so: warning: /usr/lib/libsuntool.so.0.28 has older revision than expected 30
```

This message is expected in this case and not a cause for concern. Installing the 'winlibs' fix will prevent the error message from occurring.

- When compiling programs which use the suntools libraries, you may receive this warning message:

```
ld: /lib/libsuntool.sa.0.30: warning: table of contents for archive is  
out of date; rerun ranlib(1)
```

To prevent the warning from being displayed, become superuser and execute the following:

```
# ranlib -t /lib/libsuntool.sa.0.30
```

## Kernel Rebuild Procedures

The 'Special Installation Instructions' given for many of the bug fixes require rebuilding the kernel. If you have never configured a kernel, read *Installing the SunOS*, Appendix A. Specific procedures for rebuilding a kernel are provided below.

### Making Custom Kernels

Two methods for making a customized kernel are shown on the next two pages. The first, Procedure I, builds a kernel on a workstation with local disk. The second, Procedure II, builds a kernel on a diskless or dataless client.

The kernel used by a diskless client can be built on its server **only** if the diskless client is of the same architecture as the server. If a diskless client is of a different architecture from its server (heterogeneous), its kernel must be made on the client.

Procedure I is simpler to perform. It requires write privileges on the workstation `/usr` filesystem. Use it to build a kernel for:

- A standalone workstation
- A server
- A diskless client workstation of an architecture the same as its server
- A dataless client workstation of an architecture the same as its server

Procedure II requires a little more work, but allows building a kernel without having write privileges on the `/usr` filesystem. Procedure II requires only root privileges on the client workstation; no special privileges are needed on the server. Use the second procedure to build a kernel for:

- A diskless client workstation of an architecture different from its server
- A dataless client workstation of an architecture different from its server
- A diskless or dataless client workstation when you do not have `root` privileges on the server

All procedures are performed when logged in as `root` (or `su'd` to superuser if `root` logins are not allowed).

`SYS_NAME`, shown on the example screens following, is the name given to the custom kernel configuration file. It is typically chosen to match the hostname of the workstation that will run the kernel. This name is automatically compiled into the kernel and is announced when the kernel is booted. For example, a kernel made from a configuration file named `ASLAN` announces itself when booted as:

```
SunOS Release 4.0 (ASLAN) #1: Wed Sep 14 15:33:16 PDT 1988
```

A kernel that will be used by several client workstations of a server might be called `ASLAN_CLIENT`.

`sun#` on the example screens requires you to fill in `sun2`, `sun3` or `sun4`, whichever is appropriate to the workstation on which you are building the kernel.

**□ Procedure I:**

Log in as `root` and execute the following:

```
# 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.

To install the kernel on the standalone or server workstation it was built on:

```
# mv /vmunix /vmunix.SV
# cp vmunix /vmunix
```

To install the kernel on a diskless client workstation of the same architecture:

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

To install the kernel on a dataless workstation of the same architecture, log onto the dataless workstation as `root` and:

```
# mv /vmunix /vmunix.SV
# cp /usr/sys/sun#/SYS_NAME/vmunix /vmunix
```

Now halt and reboot the workstation whose kernel you have just installed.

## □ Procedure II:

The example for Procedure II makes the kernel in `/sys` on the client. The client's `/sys` will be located in the server's `/export/root` filesystem and there must be 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 any filesystem which is writable by the client that has sufficient free space.

Log in as `root` and execute the following:

```
# mkdir /sys
# cd /sys
# 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:

```
# 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.SV
# cp vmunix /vmunix
```

Halt and reboot the workstation.

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

```
# rm -rf /sys
```