Plexus Sys3 UNIX 3.1 Release Notice

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CONTENTS

1. INTRODUCTION

Sys3 is the implementation of the UNIX SYSTEM III operating system by Plexus Computers for the P/35 and P/60 computer systems. This document, which accompanies Sys3 3.1, is a collection of information about Sys3.

In this document, "SYSTEM III" refers to the stock software provided by Western Electric. "Sys3" refers to the equivalent software provided by Plexus.

This document has five chapters. The first chapter contains the introduction. The second describes in detail how to reload Sys3 Release 3.1; the third chapter tells how to install Sys3 Release 3.1 as an upgrade from 3.0 or 3.01. Optional and site-dependent procedures are described in Chapter 4, and Chapter 5 gives general information about Sys3.

Not everything in this manual applies to every site. See section 1.2 for guidelines.

1.1 Purpose

This document describes installation procedures for release 3.1 of Plexus Sys3. It is intended as a supplement to the *Plexus User's Manual.* This document also contains some usage and troubleshooting information.

If you encounter any problems with this software or documentation, please contact:

> Software Support Center
> Plexus Computers Inc
> 2230 Martin Ave
> Santa Clara, CA 95050
> 408/988-1755

1.2 How to Use This Manual

If you are receiving a new Plexus P/35 or P/60, Sys3 Release 3.1 will normally be already on disk. See section 1.5 for special instructions for new sites.

This document mainly contains procedures for reloading Sys3 3.1 (described in Chapter 2), and for moving from Sys3 3.0 or 3.01 to Sys3 3.1.

Follow the reload procedures (Chapter 2) if

1. your system has a new primary disk and system software must all be reloaded; or

2. your system has experienced a catastrophic failure such that all the software is lost.

Follow the procedures outlined in Chapter 3 if you are moving from Sys3 Release 3.0 or 3.01.

1.3 Release 3.1 Overview

Plexus UNIX Sys3 Release 3.1 consists of a Release Tape and this release document.

The Release Tape comprises 25 files. Files 0-19 are blocked at 1024 bytes per record; file 20 is blocked at 10240 bytes per record; files 21 through the end of the tape are blocked at 5120 bytes per record. Most of the tape files are Release 3.1 standalone programs. These are for backup and emergency purposes, in case the disk copies of the standalones become inaccessible and you need to run the standalone programs from tape. File 20 is a dump of a standard release 3.1 system.

Please note the following about Sys3 3.1:

1. Performance enhancements that have been made to this release are evident in init states 2, 7, or 8. The system will not run noticeably faster in init state 1 (single-user).

2. IMPORTANT: When bringing up Sys3 3.1, you may go to init state 2 ONLY from the *first* single user shell prompt. This means that with 3.1, you *cannot* follow the ordinary bringup sequence of running **fsck** (or any other single user mode commands) and then issuing the 'init 2' command. You should still run **fsck** whenever you bring up the system. The recommended bringup procedure for Sys3 3.1 is to shut down normally, hit reset, boot Sys3, run **fsck** (and any other single user commands you wish), then issue the **sync** command, hit reset again, and when the single user prompt appears, go to init state 2.

    Avoid autoboot mode, since autoboot prevents you from following the procedure outlined above.

3. If you are upgrading from 3.0 or 3.01, do NOT use your old /etc/rc file with Sys3 3.1. Make a hardcopy of your old **/etc/rc** and manually install your customized commands (e.g., mounts) in the **rc** file that comes with Sys3 3.1.

4. Because of a bug fixed in 3.1 (involving the structure **sgtty.h**), programs compiled and linked in 3.1 CANNOT be run on 3.0 or 3.01 systems. You will probably also need recompiled versions of third party software; check with your software vendor.

5. Sys3 3.1 introduces IEEE standard representation of floating point numbers. Plexus customers running 3.0 or 3.01 may have written programs which write out binary representations of floating point numbers. Such programs do not work correctly under 3.1. Plexus will provide conversion software to any site needing assistance converting such programs to 3.1 format. Please contact the Software Support Center.

    The introduction of IEEE floating point standard may affect third party software not acquired through Plexus; you should contact your third party software vendor if you experience any problems with such software.

    UNIFY, a data base management package provided thorugh Plexus, uses floating point format extensively. UNIFY will run under 3.1, but requires that certain special preparatory steps be followed. If you use UNIFY, especially in conjunction with C language program development, please contact the Software Support Center for special instructions.

6. Running out of space in any file system may destroy that file system and/or **dk1**.

7. P/60s only: **fbackup**(8) does not work. Use standalone **dd** as an alternative.

1.4 Differences Between Sys3 3.1 and 3.0/3.01

Sys3 Release 3.1 differs from Sys3 Releases 3.0 and 3.01 in the following ways:

1. System performance is much improved. Kernel optimizations have been made for the Plexus 68000 architecture. The C compiler has been much improved, and generates much better code. The C optimizer is now operational. All executable modules have been recompiled using this new compiler and optimizer.

2. Floating point format is now IEEE standard.

3. Many bugs and omissions have been fixed (see 5.4.2).

1.5 Instructions for New Systems

If you are receiving a new Plexus P/35 or P/60 system, you do not have to install Sys3 3.1, since it is installed by Plexus in the factory. However, you may need to do a few other procedures. Read this subsection to determine if other procedures are required by your site.

When these steps are completed, you need only start up the system as described in section 2.4 (and in the *Plexus User's Manual*).

1.5.1 Change the TZ Variable

If you are not in the Pacific time zone, and you are receiving a new Plexus system, you must change the TZ variable in a number of system files. The files that must be changed are

> **/etc/cshprofile**
> **/etc/inittab**
> **/etc/rc**
> **/etc/profile**

The TZ variable has the default value "PST8PDT" in all these files. This string actually has three parts: "PST" means "Pacific Standard Time"; "8" means "8 hours west of Greenwich Mean Time (GMT)"; and "PDT" means "Pacific Daylight Time". You should change this string in the four files listed above as appropriate for your time zone. The first three characters should be the three-letter time zone name; the next character(s) should be the number of hours west of GMT; the third should be the three-character name for the daylight time zone, if you have daylight savings time in your time zone. For example, the TZ variable for Eastern time should be "EST5EDT".

1.5.2 Modify /etc/inittab

This section discusses two modifications to /etc/inittab: all sites must make the first, and some sites must make the second.

1.5.2.1 Eliminate One Login Port

A Plexus *n*-user system consists of *n* minus 1 login ports plus the console. The file **/etc/inittab** contains lines for *n* login ports. Thus, one of the login ports in **/etc/inittab** cannot be used as a login port, though it can be used in other ways, e.g., as a dialout or printer port. Pick the port you wish to use for some other purpose (it doesn't matter which port or purpose), and change its line in **/etc/inittab**, substituting an "o" for the "c" in the third field. For example, to disable logins on tty8, the line

> 2:08:c:/etc/getty tty8 b

should be changed to

> 2:08:o:/etc/getty tty8 b

1.5.2.2 Special Instructions for 8 or 24 User Systems

Plexus delivers either 16- or 32-user release tapes. If you have an 8- or 24-user system, you should modify the file **/etc/inittab**. If you have an 8-user system, **inittab** will contain lines that do continuous **gettys** for ports 8-15; since these ports are unavailable on an 8-user system, the **gettys** are extraneous. If you have an 24-user system, **inittab** will contain lines that do continuous **gettys** for ports 24-31; since these ports are unavailable on a 24-user system, these **gettys** are also extraneous. The modification to **inittab** suggested here helps avoid excess CPU load associated with these **gettys**. It also helps limit the growth of the file **/usr/adm/wtmp**.

For each unused line in **/etc/inittab** -- ttys 8-15 for an 8-user system, and ttys 24-31 for a 24-user system -- change the 'c' field to an 'o'. For example, the line

> 2:08:c:/etc/getty tty8 b

should be changed to

> 2:08:o:/etc/getty tty8 b

and so on for each unused line.

Note also that *any* port not having a login associated with it should have an 'o' in the third field above.

Now go on to start up your system as described in section 2.4. These steps complete the software preparation of a new, factory-installed Sys3 3.1.

2. RELOADING SYS3 3.1

This chapter gives procedures for the basic steps required to reload Sys3 3.1. Remember to follow these reload procedures only if

1. your system has a new primary disk and system software must all be reloaded; or

2. your system has experienced a catastrophic failure such that all the software is lost and you do not have a dump backup of **dk1**.

The first section of this chapter is a checklist for reloading Sys3 3.1. Each subsequent section of this chapter corresponds to one item in the checklist.

If you are receiving a brand new Plexus system, you don't have to follow ANY procedures except those listed in section 1.5.

2.1 Checklist for Reloading Sys3 3.1

This section gives a checklist for reloading Sys3 3.1. Each step in this checklist is described in a separate subsection below.

1. Verify that the data on disk block 0 is correct by running **dconfig**.

2. Install the Release Tape.

3. Startup the system.

4. The following steps are optional:

    a. Set the console default baud rate.

    b. Enable the accounting package.

    c. Add additional disk and special files.

5. Go to multi-user state.

2.2 Run dconfig

Shut down your system, press reset, and obtain the primary boot prompt. Then run standalone **dconfig**; see the *Plexus User's Manual* for instructions. If you need to get the **dconfig** program off tape, you will have to mount a tape.

If you intend to use **uucp**, you may install the system node name using **dconfig** at this time.

2.3 Install the Release Tape

Follow these directions to load the system software onto a new disk. This procedure destroys any previous contents of the disk.

To load the tape, do the following:

1. Turn on system power. Press reset button.

2. Wait for "PLEXUS SELFTEST REV X.X COMPLETE" message. The system informs you about the disk and tape driver names in use on your system (e.g., pd, pt), tells you about the various boards (e.g., Ethernet, ICPs), and tells the memory size. Then the boot message appears. The boot message is "PLEXUS PRIMARY BOOT REV 2.0". After the boot message comes the ":" prompt.

3. The disks come preformatted from the factory. Only in the event of a major catastrophe will you be required to reformat the disks. See the *Plexus User's Manual* for instructions on how to do this if necessary.

4. Make a file system on the disk with **mkfs**. To do this, mount the Release Tape and respond as indicated in **bold** below. The file system size is given in 1024-byte blocks.

    NOTE: **mkfs** DESTROYS THE DATA ON THE DESIGNATED FILE SYSTEM, SO USE CAUTION!!!

    The sequence is

    : **mkfs**

    $$ mkfs **/dev/dk1 18000 1 500**
    isize = <some number -- varies according to file system size>
    m/n = 1 500

    When the **mkfs** finishes executing, the system prints the message "Exit 0".

5. Restore the file system onto the disk. Your response is in **bold**. The sequence is

    : **restor**

    $$ restor **r /dev/dk1 +20**
    Spacing forward 20 files on tape

    The final remark from the *restor* program before it commences to restore the file system is

    Last chance before scribbling on /dev/dk1.

    Respond with a <return> when you are ready to restore the file system. To abort the process, hit the reset button. The restoration of the file system should take about 30 minutes for a P/60, 60 minutes for a P/35. The boot prompt sequence reappears when it is finished.

2.4 System Startup

Obtain the primary boot prompt, a colon (:), by pressing the reset key if necessary. Once you have the boot prompt, type <return>. The machine should respond

    : **/sys3**

The following lines appear:

    SYS3/x.x: sys3.yy
    real mem = xxxxxx bytes
    avail mem = xxxxxx bytes
    sys3
    single-user
    #

This response includes the amount of memory in the system, and the amount available for user processes. The "xx" after "SYS3/" is the release number of the software. The "yy" after "sys3." is the number of users supported by the software.

These messages indicate that

1. The bootstrap program has been executed from the processor PROM;

2. Plexus Sys3 3.1 has been loaded from the system disk; and

3. The Sys3 3.1 operating system is ready for use.

The system is now in "init state 1" and only the system console is active.

While in init state 1, examine the date and correct it if necessary. (See **date**(1)). Also while in init state 1, perform configuration procedures as described in the *Plexus User's Manual.* You may also want to run the program **fsck**(1) to check the integrity of the file system(s). See the *Plexus User's Manual* for more information.

If you want to shut down the system at this point, type "sync" and then power down.

2.5 Go to Init State 2 (Multi-user)

The last required step in reloading Sys3 3.1 is to go to multi-user state. Type

> **/etc/init 2**

Messages reporting the startup of **cron**, the startup of **errdemon**, and the initialization of the Intelligent Communications Processors (ICPs) appear on the system console. The message "ICP software initialization complete" appears on /dev/tty0, /dev/tty8, /dev/tty16, /dev/tty24, and /dev/tty32. The last two messages are

> **multi-user**
> **type ctrl-d**

Respond by typing d with the control key depressed. The message

> **login:**

should appear on your console and on all active terminals.

3. UPGRADING TO SYS3 REL 3.1 FROM REL 3.0 OR 3.01

If you currently have Sys3 3.0 or Sys3 3.01, upgrading to Sys3 3.1 should be relatively easy. The following steps are required. Each step in this list is discussed at greater length in one of the subsections that follow.

1. Make a complete **dump**(1) of each of your file systems.

2. Save the customized system files you wish to bring over to the new system. Plexus provides shell procedures to automate this step.

3. Bring the system to single user mode and, using **mkfs**(1), remake all file systems. Be sure to use "1" as the gap option.

4. Install the release tape on the root file system and reboot.

5. Restore the other file systems.

6. Using **cpio**(1), copy back the files you saved in step 2.

7. Reboot.

3.1 Back Up Your System

Before you do anything, perform a complete dump of your system.

The **dump**(1) procedure involves making a tape of everything on your system. Do not rely on this dump tape for retrieving users' files and special system files, because these files cannot easily be accessed singly from the dump tape. Do the following:

1. Make a hardcopy of an **ls -l** listing of the **/dev** directory. You will need this when you restore your system in order to retrieve the device numbers of your disk devices.

2. Put the system in single-user mode. (Follow the directions in the *Plexus User's Manual.*)

3. If you have not changed the default file system boundaries, use **labelit**(1) to determine the size of each of your file systems. Save the sizes for use in rebuilding your file systems (the **mknod** and **restor** steps in sections 3.4 and 3.6).

    > /etc/labelit /dev/dk1
    > /etc/labelit /dev/dk2
    > .
    > .
    > /etc/labelit /dev/dkn

    If you have changed the default file system boundaries, determine the size and boundaries of each of your file systems using **dconfig**(8).

4. Clean up the file systems before dumping. Type

    > /etc/fsck /dev/dk1

    Follow the program's directives. Any files that cause the message "POSSIBLE FILE SIZE ERROR" cannot be saved via **dump** and **restor**. Determine which files correspond to the inode numbers in the error message using **ncheck**(1) with the "-i" option. Then use **tar**(1) or **cpio**(1) or some other means to back up these files AND DELETE THEM before proceeding with Step 5.

5. Make a complete (level 0) dump of each **dk** device (**/dev/dk1**, **/dev/dk2**, etc.) using the commands:

    > **dump 0 /dev/rdk1**
    > **dump 0 /dev/rdk2**
    > etc.

Begin with **/dev/dk1** if you use the standard Plexus file system layout; begin with **/dev/dk0** if you have defined that logical disk.

3.2 Save Files to Bring Over

Here is the procedure we suggest for saving the files you want to bring over to the new Sys3. Note that Plexus assumes no responsibility for modifications you may have made to the kernel or to the object files delivered with Sys3 3.0 or 3.01. If you have changed these files, you are responsible for ensuring that your changes are transferred to the new system.

1. Login as root.

2. Bring the system to single user mode. Systems using autoboot must have autoboot disabled in order to be booted in single-user mode.

3. File 21 on the release tape contains the shell procedure to automate saving of your customized files. Make sure you have at least 500 blocks available in the root file system to run this procedure. Mount the release tape and load file 21 by typing

   > **cd /**
   > **/usr/plx/tape -f /dev/nrmt0 srcheof 21**
   > **cpio -iBvu** < **/dev/rmt0**

4. Issue the command

   > **./keep.files rmt0**

5. This procedure creates the file /**3.1-tmp**. Review the files selected in the file **3.1-tmp** and add any additional files that you wish to retain.

6. Unmount the release tape. Mount a good scratch tape and back up your files with the command

   > **cat 3.1-tmp | cpio -ovB** > **/dev/rmt0**

3.3 Remake File Systems

Now remake all your file systems using the copy of **mkfs**(1) that resides on the release tape. First, mount the release tape. The following step must be done for each file system including **dk1**. The file system size is given in 1024-byte blocks.

NOTE: **mkfs** DESTROYS THE DATA ON THE DESIGNATED FILE SYSTEM, SO USE CAUTION!!!

Issue the command

   > **: mkfs**

   > $$ mkfs /**dev/dkn** file_system_size **1 500**
   > isize = <some number -- varies according to file system size>
   > m/n = 1 500

where "n" is the number of the logical disk, and "file_system_size" is the number you saved from the **labelit** step in 3.1.

When the **mkfs** finishes executing, the system prints the message "Exit 0". and the colon prompt reappears.

3.4 Install the Release Tape and Reboot

The Release Tape contains all the new Sys3 files. Mount the Release Tape and load it using standalone **restor**(1). Type

> **: restor**

> **$$ restor r /dev/dk1 +20**

The final remark from the *restor* program before it commences to restore the file system is

> **Last chance before scribbling on /dev/dkn.**

Respond with a <return> when you are ready to restore the file system. Restoring *dk1* from the Release Tape takes 30 minutes to an hour. **Restor** returns a status message "end of tape", but this does NOT mean the program is finished; wait for "Exit 0" and the return of the colon prompt.

When the prompt returns, all the files changed for Sys3 3.1 have been brought in, including **/sys3**, which is the new 3.1 operating system. Plexus by default puts the kernel onto the root file system. This is where the new 3.1 system will be loaded when you install the release tape.

Now reboot according to the instructions in the *Plexus User's Manual*.

3.5 Restore Other File Systems

Now using the **dump** tape you made in step 1, restore the file systems dumped in step 1, EXCEPT for the root file system where the new **/sys3** has just been loaded. There are two steps involved; one is to do **mknods**(1) for the new file systems; the other is the actual **restor**. Do the following for all disk (*dk* and *rdk*) devices; your response is in **bold**.

> **/etc/mknod /dev/dkn b 0 n**
> **/etc/mknod /dev/rdkn c 3 n**

where "n" is the number of the logical disk, and goes in two places on this **mknod** command line. These logical disk numbers can be found by referring to the hardcopy **ls -l** listing of **/dev** that you made in section 3.2. (Ignore all the other lines in this listing except those that refer to *dk* and *rdk* revices.) When the **mknod**s are finished, restore the *dk* devices by issuing the command

> **/etc/restor r /dev/dkn**

using the same "n" numbers you used in the mknod step. (*Rdk* devices do not need to be **restor**'d.) The final remark from the *restor* program before it commences to restore a file system is

> **Last chance before scribbling on /dev/dkn.**

Respond with a <return> when you are ready to restore the file system. To abort the process, hit the DEL key. The restoration of each file system should take about 30 minutes for a P/60, 60 minutes for a P/35. The boot prompt sequence reappears when it is finished.

3.6 Reload Other Files

Using the **cpio** tape you made in step 2 above, load back all the customized system files. Load the **cpio** tape and issue the command

> **cpio -idumB < /dev/rmt0**

Customize the new **/etc/rc** file by referring to the saved one, **/etc/rc-before3.1**. Do NOT simply copy the old one to **/etc/rc**, because the new one has additional commands.

The following files will be left on your system as a result of this upgrade procedure:

/3.1-keep-files
/3.1-get-diff
/3.1-tmp
/3.1-ud-tmp0
/3.1-ud-tmp1
/3.1-ud-tmp2
/3.1-ud-tmp3
/3.1-ud-tmp3b
/3.1-ud-tmp3c
/3.1-ud-tmp4
/3.1-ud-tmp7
/3.1-ud-tmp8
/3.1-ud-tmp9
/etc/rc-before-3.1
/keep.files

You may save these or delete them as you wish.

3.7 Reboot

Reboot your system, and resume normal operations.

4. OTHER PROCEDURES

This chapter describes site-dependent and other procedures that may be necessary to complete the installation of Sys3 3.1. Included here are instructions for setting the console default baud rate and setting up for the commands **csh** and **vi**. See the *Plexus User's Manual* for detailed instructions on other procedures such as shutdown, adding line printers, and enabling accounting.

4.1 Setting the System Console Default Baud Rate

Setting the system console default baud rate is optional. You will want to do it if for any reason you don't want to use the default 9600 baud rate.

The Sys3 software does not need to use the processor board switches to determine the baud rate of the console or any other terminal. The baud rate can be set by software with the **getty**(8) command within the file /etc/inittab. On boot and selftest, however, the baud rate must be set to match the terminal. For details, please read about the **getty**(8) and **init**(8) commands in the *Plexus Sys3 UNIX Programmer's Manual -- Vol 1*.

The baud rate for a terminal, ttyXX, is taken from the processor switches only if a line like the following is put in the file /etc/inittab:

2:XX:c:/etc/getty ttyXX b

The 'b' argument to /etc/getty directs it to get the baud rate from the processor switches.

4.2 Setting Up for csh and vi

The commands **csh** and **vi** require that you perform certain setup tasks. These are outlined below.

csh

Two files are provided along with **csh**: **login** and **cshrc**. These are examples of the **.login** and **.cshrc** files that set the working environment of the C-shell. See **csh**(1) for more information.

Users desiring to have the C-shell as their login shell must have their entries in /etc/passwd changed appropriately. The environment variable SHELL in the **.login** file should still be set to /bin/sh, however, because some Sys3 programs use this variable in determining which shell to use, and do not work correctly otherwise (see below).

The file /etc/cshprofile is a command file that implements several startup features: message of the day, mail notification, and news. It also sets the time zone (TZ) automatically. The default time zone is Pacific Standard Time. If you are in a different time zone, the line 'setenv TZ' in /etc/cshprofile must be modified to reflect this.

Csh checks the format of shell scripts before executing them. It uses the presence of a shell comment in line 1 ('#' followed by text) to distinguish a **csh** shell script from a Sys3 **sh** shell script: scripts having the comment are treated as C-shell scripts. C-shell scripts are executed by the C-shell; Sys3 shell scripts are executed by the Sys3 shell. When the C-shell encounters a Sys3 shell script, it automatically invokes the Sys3 shell to execute it. However, several stock Sys3 commands are Bourne (Sys3) shell scripts with first line comments, so they look like C-shell scripts to the C-shell. Sys3 shell scripts may contain commands unintelligible to the C-shell, so when **csh** encounters these, it becomes confused and aborts. Therefore, if you use the C-shell, you should set your environment variable SHELL to /bin/sh. This causes the C-shell to invoke the Bourne shell by default. If you really want the C-shell to execute your shell scripts, you can call them from another C-shell, either by executing another C-shell or from within the script.

The following files have been altered for use with the C-shell:
> /usr/bin/greek
> /usr/bin/man
> /usr/bin/mancvt
> /usr/bin/mm
> /usr/bin/mmt
> /usr/bin/mvt
> /usr/bin/osdd
> /usr/bin/sccsdiff
> /usr/bin/spell
> /usr/bin/typo
> /usr/bin/uupick

vi

Vi requires two files: /etc/**termcap** and /etc/**ttytype**. The **termcap** file already exists in the right place. You must modify the file /etc/**ttytype** according to your terminal configuration. The environment variable TERM must also be set to the terminal type for each TTY port. See the **login** and **cshrc** files in /usr/**plx** for examples of how to do this. **Vi** has both a manual page and an associated document in the directory /usr/**man/docs/ex** as well as in the *Plexus Sys3 UNIX Programmer's Manual -- vol 2C*: see these for more information.
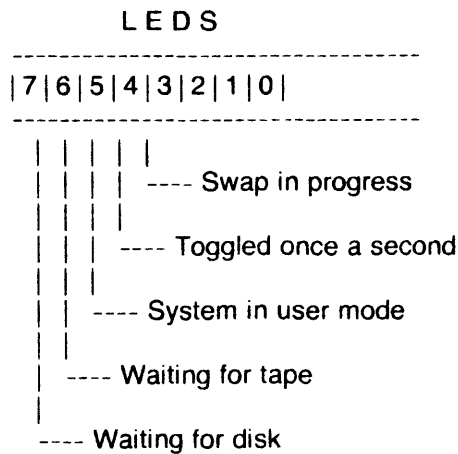
5. SYS3 GENERAL INFORMATION

This chapter contains general information about Sys3, including disk blocking data and comparisons with V7 and SYSTEM III.

5.1 Sys3: 16, 32, or 40 Users

Sys3 comes in three versions: a 16-user system, a 32-user system, and a 40-user system. The operating system limits the number of ports that can be opened for read-write access to the maximum allowed, either 16, 32, or 40.

5.2 Processor Board LEDs

The LEDs on the processor board (as shown in the the figure titled "Processor Board Option Selectors" of the *Plexus User's Manual*) have the following meaning when Sys3 is running.

```
        L E D S
   ------------------------------------
   |7|6|5|4|3|2|1|0|
   ------------------------------------

   | | | | |
   | | | |  ---- Swap in progress
   | | | |
   | | |  ---- Toggled once a second
   | | |
   | |  ---- System in user mode
   | |
   |  ---- Waiting for tape
   |
    ---- Waiting for disk
```

LEDs 0-2 are reserved.

5.3 Disk Blocking

Sys3 presents a logical file system blocked in 1024-byte blocks. This means that all disk blocks, including the super block, are 1024 bytes long, all blocked disk I/O is done with 1024-byte blocks, and commands that report or use block values assume the values are 1024-byte blocks. These commands include **acctdusg, acctdisk, du, df, find,** /etc/fsck, **ls -s,** /etc/mkfs, and **sum.**

Note that the blocking factor is independent of the physical size of a sector on the disk, and that the **dconfig** program uses sectors (512 bytes), not blocks.

5.3.1 Disk Organization
The default mapping of minor disk device (/dev/dkX) number to physical sections of disks is as follows. You can override the default and define your own mapping via the **dconfig** program described in the *Plexus User's Manual*. The disk starting sector and size in sectors are given below. The numbers are in 512-byte sectors.

Device Number	Starting Sector	Size
/dev/dk0	0	1000000
/dev/dk1	0	40000 (last 4000 sectors are swap)
/dev/dk2	40000	to end of disk
/dev/dk3	60000	to end of disk
/dev/dk4	80000	to end of disk
:	:	:
/dev/dk15	300000	:

The amount of space available on the disk varies with different disks.

Users frequently want to create other file systems, in addition to the 18000K block root file system. To make a second file system spanning the rest of the disk, you need to run the **mkfs** (1) program. Type

mkfs /dev/dk2 <nblks> **1 500**

where "nblks" is one of the following:

Size of /dev/dk2	
Disk	IMSP
22 Mbyte 8"	43
36 Mbyte 8"	13405
72 Mbyte 8"	47473
72 Mbyte 14"	48085
142.6 Mbyte 8"	116272
145 Mbyte 14"	116170
289 Mbyte 14"	252544

"IMSP" is the name of the P/35 and P/60 disk controller.

The **mknod** for **/dev/dk2** (which ordinarily must be done before the **mkfs**) is done by Plexus at the factory. Once **/dev/dk2** is made, you must do the standard **mkdir** and **mount** steps;

To create additional file systems (devices **/dev/dk3** and higher), you must perform **mknods** to create the logical disk devices for each new file system; then make each file system on its device using **mkfs**; then do the **mkdir** and **mount** steps.

5.3.2 Special Devices
Sys3 uses the following special devices:

/dev/dk[0-2]	Disk, blocked I/O
/dev/rdk[0-2]	Disk, unblocked I/O
/dev/mt0	Magnetic media, blocked I/O; this device refers to the cartrdige tape if present, otherwise the 9-track tape
/dev/rmt0	Magnetic media, unblocked I/O; 9-track only; **mknod** must be done in order to use this device
/dev/nrmt0	Magnetic media, unblocked, no rewind; 9-track only; **mknod** must be done in order to use this device
/dev/pt0	Magnetic media, blocked I/O, cartridge only
/dev/rpt0	Magnetic media, unblocked I/O, cartridge only; **mknod** must be done in order to use this device
/dev/tty[0-40]	Serial ports

/dev/lp	Line printer port
/dev/pp[0-4]	Parallel ports
/dev/console	System console
/dev/ic[0-4]	ICP download ports
/dev/swap	Swap device, used by ps(1) and a few other commands
/dev/mem	Memory
/dev/kmem	Kernel data space within memory
/dev/liomem	Special I/O ports on processor board
/dev/mbmem	System's bus memory address space
/dev/mbiomem	System's bus I/O address space
/dev/null	Bit bucket
/dev/error	Provides access to error records in the kernel
/dev/prf	Provides access to activity information in the kernel

You may add additional disks as needed with the **mknod**(1) command.

5.4 Comparisons of Sys3 3.0 and Sys3 3.1

Sys3 3.1 is a full implementation of SYSTEM III with the exceptions noted below.

5.4.1 Plexus Additions to SYSTEM III
Sys3 3.1 has the following additions, which are not part of SYSTEM III.

/usr/plx/dumpdir	Lists contents of dump/restor tape.
/etc/openup	Enables efficient access to key files.
/usr/plx/arcv6	Converts **ar**(1) files from UNIX Version 6 format to Sys3 format.
/usr/plx/tape	Efficient tape manipulation program.
ms	Document preparation macros available in Version 7.
File locking	Allows a program exclusive access to a file. See **locking**(2).
date	The clock is battery powered. Must be reset only if the processor board is removed.

Sys3 also includes many of the programs that were on the Sys3 Release 3.0 Addenda tape, including those based on commands from the University of California at Berkeley, Rev. 2.0, such as **csh** and **vi**. It also includes the Berkeley utility **curses**(3), the Writer's Workbench tools **style**(1) and **diction**(1), and the system calls **phys**(2) and **lock**(2).

5.4.2 Bugs Fixed during Beta Test of Sys3 3.1
Sys3 3.1 fixes the following problems, which were present in its beta test versions.

cc	Unsigned right shifts now logical instead of arithmetic; structures may now be passed as arguments.
c2	Functions returning structures now work correctly; a bug involving optimization to auto-increment mode now works correctly.

All programs in Sys3 3.1 have been recompiled and relinked with the new compiler and optimizer. This by itself fixed problems reported with **csh** (*foreach* now works) and **vi** (terminal modes are restored normally when returning from an escape to the shell).

adb	Stack trace now works correctly in all cases. Now no longer does stream I/O and thus can be controlled *via* pipes.
curses	The routines *endwin()* and *initscr()* now pass the correct values to the **ioctl**(2) system call.

dformat	The maximum number of alternate tracks has been increased. It is now the number of heads multiplied by 50.
dial	Now executable and works correctly with Racal-Vadic 3451 autodial modem.
fsck	Default interleave while rebuilding free list now matches **mkfs**.
ld	"-m" switch now lists archive members as well as object and archive names.
getty	Files to support **getty** changes are now in **/usr/src/cmd** rather than **/usr/src**.
IMSP	A bug in the IMSP code involving very large I/O operations resulting in system crashes (bus error) has been fixed.
lock	System call now works correctly.
phys	System call now works correctly.
standalones	Standalone programs now work correctly when *rootdev* is specified as non-zero in **dconfig**. A bug has been fixed which caused any byte of "0xff" to be read as EOF.
stime	A bug that caused 4 to be added to leap year dates has been fixed.
user profiling	Fixed and now works correctly.

5.4.3 Bugs Fixed in Sys3 3.1

Sys3 3.1 fixes the following problems, which were present in Sys3 3.0.

adb	Symbol table problems and ":e" breakpoint fixed.
admin	"-i" and "-a" options can now be used on the same line.
boot message	Memory size given in the boot message is now correct.
cc	"-r" option fixed; various problems with floating point expressions fixed; "-u" option fixed.
csh	The "!-" option now works.
copytape	Streaming mode fixed.
dc, bc	Obase fixed.
dump	**dump** of large, sparse files now works.
ecclog	Now cleared on freshly restored systems.
/etc/inittab	Some missing entries have been added.
execle	Extra 0 argument no longer required.
fatal.h	No longer causes SCCS to trap.
fbackup	**Fbackup** of more than 20000 sectors to cartridge tape fixed.
fsck	Setbuf call added so buffers get flushed.
gettytab.c	Added to release.
icpdmp	Added to release.
ioctl	Now returns a value if successful.
lint	Interprets negative numbers correctly.

ld	"-r" option fixed.
lpr and umask 077	Setgid was added to give access to any group.
mkfs	Gap/block parameters now default to 1/500.
mount	Message "WARNING!! - mounting < > as < >" now prints file/device names within the < >.
nice	Now returns a value if successful.
nroff/troff	Option ".nx" fixed.
pack	**pack** and associated tools (**unpack, pcat**) work correctly.
prs	Error message (reversed cm7 and cm8) fixed.
prs	Dataspec fields reversed bytes now fixed.
reform +s	No longer causes an error message when used on non-SCCS or empty files.
script	Added to release.
shutdown	Now asks for name of temp file if it needs one.
sort	Increased maximum record size and added a warning message if this size is exceeded.
stty	"-cread" fixed in brief version.
stty	Now sets raw mode correctly.
sys3msg	Now updated properly.
sysgen	Relink of kernel now allowed.
termcap	Entry for tvi925 added.
time	Now reports correct time.
ttytype	Entries now make sense.
uucp	Checksum problem fixed.

5.4.4 Known Bugs in Stock SYSTEM III

The following are known bugs in the standard SYSTEM III UNIX.

calendar	Does not recognize "today" and "tomorrow" as advertised.
checkcw	When given many file arguments, it may not be able to open some of them.
/etc/cron	Goes awry when date changed or is wrong.
csplit	**csplit** does not always create files of the proper number of lines if given a file with an excessively long line.
dd	Does not swap bytes (conv=swab) for small block sizes such as bs=2.
tp	Cannot write a tape with r option.

5.4.5 Known Deficiencies in Plexus Sys3

The following are known deficiencies in Plexus Sys3.

adb	Running a program may change some of the terminal modes.
cref	"-a" flag: does not recognize comments /* ... */ as comments; considers instructions, condition codes as symbols.

"-c" flag: unsigned, int, etc. treated as symbols.

ps   Does not work with -c option.

stty   Raw mode (**stty raw**) exists for compatibility with V7 and works as documented. It clears all flags and sets CS8. However, because there is not a one to one correspondence between **stty** settings in V7 and Sys3, the command **stty -raw** does not simply reverse the effects of a **stty raw**. **stty -raw** sets BRKINT, IGNPAR, ISTRIP, IXON, OPOST, ISIG, CS7, INPCK, and ICANON; it also resets EOF and EOL and clears PARENB.

/etc/volcopy   Prints erroneous info when doing copy disk to tape and told 2400 feet, 1600 bpi.

graphics   Most SYSTEM III graphics capabilities are not yet part of the Plexus Sys3 release.

5.4.6 Known Problems with Sys3 3.1

The following are problems with Plexus Sys3 3.1. Most of the entries in this list reflect bug reports received too late for fixes to be included in Sys3 3.1. In addition, some of these problems have not been verified.

copytape   May give ioctl error message when used with the "-r" and "-p" options. With "-v" option, may destroy file systems.

/etc/rc   For 40-user system, you need to add a line to /etc/rc to inform you about downloading the fifth ICP during the boot process.

ex   Shows problems with reading commands in a ".so" file and problems with redirected input.

icp   Character positions are occasionally reversed in the input stream.

indirect system call   Not supported.

make   May not check date properly in combination with SCCS tools.

more   Does not work properly in single user mode.

mount   **mount** of a disk that is not ready yields invalid information.

NBUF   If you change the value of NBUF when reconfiguring your kernel, the new value must be a multiple of 4.

tail -f   Stops/hangs occasionally.

tape I/O   Tape I/O to cartridge cannot write files less than 512 bytes in length.

tar   Does not work properly when recording to a cartridge if a value smaller than 20 is given as the blocking size factor. No warning is given if such a failure occurs. A block size of 20 **must** be specified to ensure the proper operation of the record function. Note that the default value of 2 does not work.

time   May not complete its whole report.

uucp   May fail when transferring large files.

vi   May hang on blank lines given the "/$" request.

5.4.7 Not Provided - Not Applicable

The following list defines programs, libraries and other software that are not provided because they are:

1. specific to non-PLEXUS hardware; or

2. replaced by equivalent software.

The associated manual pages are also not provided.

/bin/kas	/stand/boot2	/usr/lib/lib2A.a
/bin/kasb	/stand/iltd	/usr/lib/lib2B.a
/bin/kun	/stand/rf11boot	/usr/man/man1/kas.1
/bin/kunb	/stand/rk11boot	/usr/mdec
/etc/fscv	/stand/rl11boot	/usr/mdec/copy
/etc/stcntrl	/stand/rp03boot	/usr/mdec/dldr
/etc/stload	/stand/rp04boot	/usr/mdec/iltd
/etc/stproto	/stand/rs04boot	/usr/mdec/list
/etc/vlx	/unixhpht	/usr/mdec/mboot
/lib/as2	/unixhptm	/usr/mdec/rf11booti
/lib/c0	/unixrktm	/usr/mdec/rk11boot
/lib/c1	/unixrlht	/usr/mdec/rkf
/lib/fc0	/unixrltm	/usr/mdec/rp03boot
/lib/fc1	/unixrpht	/usr/mdec/rp04boot
/lib/fcrt0.o	/unixrptm	/usr/mdec/rs04boot
/lib/fmcrt0.o	/usr/bin/sdb	/usr/mdec/tapeboot
/stand/boot1	/usr/include/sys.s	/usr/mdec/tboot

5.4.8 Not Provided - No Source

The following commands are documented in SYSTEM III but were omitted from the SYSTEM III source:

/bin/primes
/bin/factor
/bin/vcat
/bin/vpr

6. SYS3 3.1 MANUAL PAGES

This section contains new manual pages corresponding to new commands implemented in Sys3 3.1. These include **style**(1), **diction**(1), **phys**(2), **lock**(2), and **curses**(3). These pages are in Volume 1 format so you can insert these into your current manuals.

NAME

    diction - print wordy sentences

    explain - interactive thesaurus for diction

SYNOPSIS

    /usr/plx/diction [-ml] [-mm] [-n] [-f pfile] file ...

    /usr/plx/explain

DESCRIPTION

    Diction finds all sentences in a document that contain phrases from a data base of bad or wordy diction. Each phrase is bracketed with [ ]. Because *diction* runs *deroff* before looking at the text, formatting header files should be included as part of the input. The default macro package -ms may be overridden with the flag -mm. The flag -ml which causes deroff to skip lists, should be used if the document contains many lists of non-sentences. The user may supply her/his own pattern file to be used in addition to the default file with -f *pfile.* If the flag -n is also supplied the default file will be suppressed.

    Explain is an interactive thesaurus for the phrases found by diction.

SEE ALSO

    deroff(1)

BUGS

    Use of non-standard formatting macros may cause incorrect sentence breaks.

NAME

style - analyze surface characteristics of a document

SYNOPSIS

/usr/plx/style [-ml] [-mm] [-a] [-e] [-l num] [-r num] [-p] [-P] file ...

DESCRIPTION

Style analyzes the surface characteristics of the writing style of a document. It reports on rea-
dability, sentence length and structure, word length and usage, verb type, and sentence
openers. Because *style* runs *deroff* before looking at the text, formatting header files should be
included as part of the input. The default macro package **-ms** may be overridden with the flag
-mm. The flag **-ml**, which causes **deroff** to skip lists, should be used if the document contains
many lists of non-sentences. The other options are used to locate sentences with certain
characteristics.

-a   print all sentences with their length and readability index.

-e   print all sentences that begin with an expletive.

-p   print all sentences that contain a passive verb.

-l*num*   print all sentences longer than *num*.

-r*num*   print all sentences whose readability index is greater than *num*.

-P   print parts of speech of the words in the document.

SEE ALSO

deroff(1), diction(1)

BUGS

Use of non-standard formatting macros may cause incorrect sentence breaks.

NAME

lock - lock a process in memory

SYNOPSIS

lock(flag)

DESCRIPTION

If the *flag* argument is non-zero, the process executing this call will not be swapped except if it is required to grow. If the argument is zero, the process is *unlocked*. This call may be executed only by the super-user.

BUGS

Locked processes interfere with the compaction of primary memory and can cause deadlock. This system call is not considered a permanent part of the system.

NAME

phys - allow a process to access physical memory

SYNOPSIS

long phys (virtualpage, pagecount, physaddr)
int virtualpage;
long pagecount;
long physpage;

DESCRIPTION

The argument *virtualpage* specifies a process (data-space) address range of *pagecount X 4K* bytes starting at virtual address *virtualpage X 4K* bytes. This address range is mapped into physical address *physpage X 4K* bytes. All three arguments, *virtualpage, pagecount,* and *physpage,* correspond to 4K (4096) byte pages, which is the logical and physical page size of the machine. If *pagecount* is zero, any previous mapping of *virtualpage* is nullified. If *pagecount* is -1, the previous logical to physical mapping for *virtualpage* is returned. (In the cases where *pagecount* is 0 or -1, *physaddr* is ignored.) For exmaple, the call

phys(0x10,2,0x100);

will map virtual addresses 0x10000-0x12000 to physical addresses 0x100000-0x102000.

This call may be executed only by the superuser.

RETURN VALUE

Upon successful completion, the previous page number associated with the logical page is returned. Otherwise, a value of -1 is returned and *errno* is set to indicate the error.

SEE ALSO

syslock(2)

BUGS

If an error is encountered while changing the mapping, the mapping for the valid pages may be changed anyway.

This system call is obviously very machine-dependent and very dangerous. It was originally in VERSION 7 UNIX but was removed from SYSTEM III. It is not considered a permanent part of the system.