ESV Series Workstations

2.3 Release Notes

EVANS & SUTHERLAND COMPUTER CORPORATION
Salt Lake City, Utah

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1. Introduction

This document describes the 2.3 Release of the ESV Workstation software.

- Chapter 1, "Introduction," (this chapter) describes the functionality added in the 2.3 Release.
- Chapter 2, "Known Bugs in the System," describes known bugs in the 2.3 Release.
- Chapter 3, "Bugs Fixed in the Release," describes bugs that have been fixed in the 2.3 Release.
- Chapter 4, "Installation Instructions," is the installation procedure for the tapes included in the 2.3 Release.
- Appendix A, "Documentation Corrections," describes additions and corrections to the ESV documentation and contains change pages for the ESV documentation.

Additional information is found in the following document which is distributed with the 2.3 Release:

MIPS Software Binary Release Notes, RISCos 4.52 Release

On-line release notes for the operating system, compilers, and OSF/Motif are found in the **/usr/pkg/rn** directory.

Internet Security

If you do not plan to immediately install 2.3 ES/os, and are on the Internet, and are concerned about security, you should call E&S Software Support (800-582-4375) for more information.

PEX Rendering Layer

The PEX portion of the server supports two drawing modes with the 2.3 Release. The first drawing mode uses the PEX Workstation resource. All graphics drawn through the Workstation resource must be stored in a server-side Central Structure Store (CSS). Traversals are atomic, meaning that once you request a traversal, your client can't communicate with the server until the traversal has completed. All graphics are drawn with double-buffering by the hardware. The Workstation resource has been supported by Evans & Sutherland since the ESV Series Workstations were introduced.

With the 2.3 Release, support for drawing through the PEX Renderer resource has been added. When the Renderer resource is used, graphical primitives received from the client are displayed immediately into the window. Traversals can be non-atomic, meaning the client can draw some

primitives, send and receive other information from the server, and draw more primitives. The Renderer resource is the PEX equivalent of "immediate mode."

According to PEX semantics, the Renderer layer has been implemented as single-buffered. The ESV Workstation provides a method to double buffer graphics drawn through the Renderer layer with the **-dblbuf** option. If double buffering is desired, use the **-dblbuf** option described later. The Renderer resource is used primarily for single-buffered purposes.

Two interfaces are provided to the Rendering layer: drawing with PHIGS and drawing with PEXIM.

Drawing Through the Renderer Resource with PHIGS

If the client is a PHIGS application, it can instruct the PHIGS library and PEX server to use the Renderer resource by altering the way it opens PHIGS as follows:

- On the call to **popen_xphigs**, the **force_client_SS** flag is set ON, and the **no_monitor** flag is set OFF.

  This causes the PHIGS library to spawn a process called the PHIGS monitor (**phigsmon**). The **phigsmon** contains the CSS.

- When a traversal is requested, the **phigsmon** traverses the structure, and sends all graphics to the server, which immediately displays the image.

The client program still stores primitives in a structure, but how those primitives are transferred to, and handled by, the server is much different than the way these operations are handled in the Workstation resource drawing mode. Visually, the only difference in graphics is the single-buffering of the Renderer resource, meaning that consecutive frames flicker as the window is cleared and the image is constructed in the visible frame buffer.

Only standard PHIGS input is available in this mode. ES/PEX extensions for device input are not available.

Drawing Through the Renderer Resource with PEXIM

PEXIM is provided for the client programmer who is looking for a more "immediate mode" feel. PEXIM is X Consortium-contributed software, written at Stardent Computer, Inc. It is located in the **contrib_s** subpackage tape, and is provided as-is. It is not supported by Evans & Sutherland.

PEXIM is similar to PHIGS, but without PHIGS input. It also differs from PHIGS by allowing direct access to the Renderer resource. With the PEXIM library, it is possible for the client to send primitives directly to the server, by-

passing the PHIGS concept of the CSS. PEXIM also supports "mixed-mode," where some graphics are cached in the server and others are sent by the client.

Buffering

Although the Renderer layer is implemented as single-buffered, the server can run immediate mode clients in two modes controlled by the command line option **-dblbuf**. If this option is present on the server command line, the server double-buffers immediate mode graphics for the client.

If it is not present, immediate mode clients are rendered single-buffered. If you are programming in PHIGS and are accessing PEX immediate mode by forcing a client side CSS at **OPEN PHIGS** time, you should run the server in single-buffered mode. Because the PHIGS library sends an **XClearArea** request before each frame, it would defeat the server's attempts at double buffering.

Note that **-dblbuf** is NOT intended to be used in conjunction with the PHIGS library.

If you are programming with the PEXIM library, the functions **pbegin_rendering** and **pend_rendering** have two different meanings depending on whether or not the server was started with the **-dblbuf** option.

- **-dblbuf** present (double buffering)

  pbegin_rendering – This function implicitly clears the back buffer. Primitives to be rendered are drawn into the back buffer.

  pend_rendering – This function swaps the back and displayed buffer. All primitives rendered into the back buffer are now visible.

- **-dblbuf** not present (single buffering)

  pbegin_rendering – This function does not clear any drawing surface. If the drawing surface is to be cleared, the application must do so using an X clear request, such as **XClearArea**.

  pend_rendering – No swap buffer is done. Any number of subsequent **pbegin/pend_rendering** pairs may follow, with clearing at the client's discretion.

Programmers are encouraged to use **-dblbuf** only if immediate mode double buffering is a requirement. Double buffered immediate mode is not a feature of PEX, but is an Evans & Sutherland enhancement. It does not conform to the PEX 5.0P specification. Interoperability problems with other PEX-based machines may result from use of **-dblbuf**.

For more information on PEXIM, see the **pexim_intro** manual page. This manual page describes three calls that are not implemented with the 2.3 Release: **begin structure**, **end structure**, and **set structure workstation**.

Available PEXIM calls include the following:

open renderer **close renderer**
begin rendering **end rendering**
pexim initialization
pause rendering **resume rendering**
inquire renderer state

The table below summarizes recommended usage for the two drawing modes, the interfaces, and the commands discussed previously in this section. An X indicates the command-mode-interface combination is recommended.

Drawing modes and interface combinations

Commands and command options	PHIGS WS (E&S extension input)	PHIGS Monitor (PHIGS input only)	PEX Renderer with PHIGS	PEX Renderer with PEXIM
Popen_phigs	X	n/a	X	n/a
force_client_ss	OFF	n/a	ON	n/a
no_monitor	ON	n/a	OFF	n/a
Popen_xphigs	n/a	X	X	n/a
force_client_ss	n/a	OFF	ON	n/a
no_monitor	n/a	OFF	OFF	n/a
Popen_renderer	n/a	n/a	n/a	X
Start server with option **-dblbuf**	NO	NO	NO	yes-double buffering no- single buffering

Line Widths

This release supports three line widths which are available through the PHIGS **SET LINEWIDTH** element. Line widths $\geq$0.0 and $\leq$1.0 are the same as in earlier releases. These are the fastest drawn lines.

Line widths >1.0 and <2.0 have a better appearance. Because they are slightly wider and cover more pixels, they are slower to draw in parts of the hardware. Your application may or may not notice this. Line widths $\geq$2.0 are distinctly wider than the other two widths.

Changing line widths can significantly degrade performance.

1.1.3 OSF/Motif

1.1.3 OSF/Motif is a patch release which fixes several bugs.

INQUIRE TEXT EXTENT

Support for the PHIGS function **INQUIRE TEXT EXTENT** has been added in the 2.3 Release. For more information, see the *ES/PHIGS Reference Manual [2.0]* or the on-line manual page for this function.

Blinking as PHIGS Highlighting

Two new identifiers of the **GENERALIZED STRUCTURE ELEMENT** have been added. They are **PES_GSE_HIGHLIGHT_MODE** and **PES_GSE_HIGHLIGHT_COLR**. Change pages have been provided for the **GSE** function. The **ESCAPE** manual page has been added because an escape is used to implement blinking.

PES_GSE_HIGHLIGHT_MODE sets the highlighting mode for certain primitives. The highlighting mode can be color or blinking. If the ***mode*** field is set to **PES_HIGHLIGHT_COLR**, then the highlight color is used to highlight polyline, marker, and text primitives. If the ***mode*** field is set to **PES_HIGHLIGHT_BLINKING**, then blinking is used to highlight primitives.

PES_GSE_HIGHLIGHT_COLR sets the highlighting color. If the highlighting mode is set to **color** then the specified ***colr*** is used to highlight primitives.

sendmail.nis and DNS

The **sendmail.nis** program is intended for sites running Network Information Services (YP). The **sendmail.nis** program in the previous 2.2 Release required that a system also have access to a Domain Name Server. As of the 2.3 Release, the **sendmail.nis does not** require access to DNS. If your site does wish to use both NIS and services from a Domain Name Server, you will have to install a proper **resolv.conf** file of the form:

```
domain local.corp.com
nameserver 192.0.0.2
nameserver 192.0.0.4
```

Where the italicized entries are replaced with your domain name and internet addresses of your network's Primary and Secondary name servers respectively.

comp.config File

In the directories **/sysv/usr/lib/cmplrs/cc2.20** and **/bsd43/usr/lib/cmplrs/cc2.20**, there is a **comp.config** file which contains all of the suggested compiler options for compiling in the specified **systype**.

At compile time, the compiler driver reads the **comp.config** file and passes the options in the file to the compiler components.

The 2.3 Release provides default **comp.config** files, one each in the **/sysv/** and **/bsd43/** directories, with the following recommended options for ESV graphics programming (**/sysv/** and **/bsd43/**, respectively:

```
-oldc -Dconst= -DSYSV -Wf,-XNd50000 -Wf,-XNp50000
-oldc -Dconst= -DBSD43 -Wf,-XNd50000 -Wf,-XNp50000
```

Note that the flag **-Dconst=** allows use of the ANSI-C keyword **const** which was not implemented in the old "C" front end. This flag is necessary when the file **/usr/include/stdlib.h** is used. These files can be customized by the user, or deleted if they are not wanted.

Any previous versions of the **comp.config** file on your system will be preserved. If this is the case, you may want to add **-Dconst=** to your file to allow the use of the file **/usr/include/stdlib.h**.

xdm Login Manager

Some changes in the **xdm** login manager have been made in the 2.3 Release. A complete description of these changes is found in the Helpful Hints change pages.

pexcopter Demo

A new demo called **pexcopter** is supplied with the 2.3 Release. **pexcopter** is a simple helicopter simulation program. Read the manual pages **pexcopter** or **fly** for more information. You must install the **demo_s** subpackage from the ES/PEX server tape to have this demo on your machine. You may wish to add this demo to the **.xcmrc** in your home directory if you use the **xcm** client. A sample **.xcmrc** file including the **pexcopter** startup path is located in **/usr/lib/X11/system.xcmrc**. All demos are located in the **/usr/esdemo** directory.

Sample Files in /usr/src/samples

The following sample files in **/usr/src/samples** have been updated and minor errors corrected. If you are using any of these files, you may want to replace your working copy with the updated version.

.cshrc
.emacs
.mwmrc
.login
.Xdefaults
.xinitrc
.xsession

2. Known Bugs in the 2.3 Release

This chapter describes bugs known to be in the 2.3 Release in addition to those listed in previous release notes.

Note: For additional information about operating system and compiler bugs, refer to the *MIPS Release Notes*, which are found on-line in the **/usr/pkg/rn** directory.

ES/os Bugs

2.18 make fails when the path plus the directory name is greater than 100 characters

make has a hard limit of 100 characters in the combined length of the program name and the entire directory pathname. If you need more characters, please contact the E&S hotline.

2.19 Printing manual pages

Manual pages may be rejected by the printer due to the presence of text bolding in the header line. To avoid the problem, use one of the following commands:

```
man command | colcrt | lpr
```

or

```
man command | colcrt >file
```

2.20 Blank manual pages

The following is a list of ES/os manual pages that have a blank first page when viewed with **xman**. To view the manual page, scroll down a page using the scrollbar on the left.

- User commands

  cfe
  cord
  dbx
  dis
  f(BSD)
  lastcomm(BSD)
  nm
  pixie
  pixstats
  prof
  size

- Subroutines

  abort(f)
  disassembler(x)
  dup2(c)
  ldnsseek(x)
  ldohseek(x)
  ldopen(x)

intro(f)
irand(f)
ldaclose(x)
ldahread(x)
ldaopen(x)
ldclose(x)
ldfhread(x)
ldgetaux(x)
ldgetname(x)
ldgetpd(x)
ldlinit(x)
ldlitem(x)
ldlread(x)
ldlseek(x)
ldnlseek(x)
ldnrseek(x)
ldnshread(x)
ldrseek(x)
ldshread(x)
ldsseek(x)
ldtbread(x)
ldtbseek(x)
len(f)
rand(f)
ranhash(x)
ranhashinit(x)
ranlookup(x)
sex
srand(f)
staux
stcu
stfd
stfe
stio

- Device and file formats

  ldfcn

- Special files and networking

  sduart

- System administration

  swap(m)

2.21 ctime

The manual page for BSD 4.3 **ctime** should have the following line added:

```
#include <sys/type.h>
```

The manual page for the System V **ctime** is correct.

2.22 FORTRAN compiler

Mistakenly specifying **filename.e** instead of **filename.f** when using the **f77** compiler will cause a complete loss of the original **filename.f**. Be extremely careful when using **f77** to make sure you specify the correct file extension.

2.23 rgb manual page error

The **rgb** manual page is incorrect. The syntax for rebuilding **rgb.dir** and **rgb.pag** files is as follows:

```
cat /usr/lib/X11/rgb.txt | rgb
```

ES/PEX Bugs

4.47 Inquire invalid set bundle index should report as 1

Any bundle index that is greater than the maximum entries should be reported as 1. The **INQUIRE REPRESENTATION** function should report the value set if **set** is requested, and it should report the actual value used on traversal if **realized** is requested.

4.48 PHIGS picking fails

Picking using the PHIGS monitor does not work because the wrong pick status and pick path is returned. Use the E&S picking extension for picking.

4.49 Pipeline context attribute

Setting the light state source with client-side structure store can result in a server crash. To avoid this, use server-side structure stores.

4.50 Index color on tristrips and quadmesh won't change

Using index color for either quad mesh or triangle strips produces the color that was in the table at element creation time instead of the color in the table at structure traversal time. The color does not change if the color table changes.

X Window System Bugs

5.42 delete elements between labels using invalid labels

When a structure is open and the element pointer is placed randomly in the structure, if a **delete elements between labels** command is called using two values for the labels that are not present in the structure, the program **Xerrors** out rather than returning an error number 206.

5.43 Cascade buttons

Cascade buttons do not work on the stereoscopic screen when they are being used on the monoscopic screen.

5.44 XDrawArc with 0-length arc

Calling **XDrawArc** with a zero-length arc will cause a fatal error in the server.

AVS 3.0 Bugs

Render geometry module

In the E&S implementation of AVS 3.0, successive instances of the render geometry module are named **top2**, **top3**, and so forth. As other modules always expect to find the name **top**, they become inoperable. To work around this problem, you must manually rename the new render geometry modules to **top**.

3. Bugs Fixed in the 2.3 Release

This chapter lists bugs reported in previous releases that have been fixed in the 2.3 Release, as well as bugs not previously reported but fixed for this release. If it is a previously reported bug, the original bug number is placed in parentheses next to the title.

ES/os Bugs Fixed

tftp security hole

The default startup configuration for **tftp** made it possible to extract any file from the ESV Workstation, including the **/etc/passwd** file, if it was world readable. To fix this problem, in the **/usr/etc/inetd.conf** file the **tftp** line was changed to add the **-s** option. For example,

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

dump/restore for multiple tapes (2.15)

1) If you used the file system **dump** command to copy your disk files to multiple tapes, and then used the **restore** command to restore them to disk, all of the files may not have been restored properly. In particular, the last file of the first tape and/or the first file of the second and subsequent tapes may have been damaged. The following message was produced when the second or subsequent tape was read:

   ```
   resyncing restore, skipping x records
   ```

   The work-around was to use a block size of 1 when doing the restore as shown below:

   restore -vrb 1 */your_filesytem_name*

2) If you used the **/bsd43/usr/bin/dd** command to copy files, and used a block size larger than 1024, it caused incorrect data to be copied.

Error in csh manual page (1.22)

There was an error in the **csh** manual page under the "Files" section. It read:

```
~/.cshrc     Read at beginning of execution by each shell.
/etc/cshrc   Read by login shell, after /cshrc at login.
e&~/.login   Read by login shell, after .cshrc at login.
.
.
.
```

It now reads:

```
~/.cshrc     Read at beginning of execution by each shell.
/etc/cshrc   Read by login shell, before ~/.cshrc at login
~/.login     Read by login shell, after ~/.cshrc at login.
```

Garbled manual page headers (1.23)

For manual pages that are not pre-formatted, the **/usr/lib/tmac.an.new** macro package generated a header line that many appear garbled if the command name is long. The macro file needed editing to produce a header with only the command name centered on the page. This is fixed.

Blank manual pages when using xman (1.24)

The following ES/os manual pages used to have a blank first page. They have been fixed.

- **lastcomm** (BSD)
- **cfe**
- **vi**
- **view**
- **vedit**
- **dup2** (c)
- **len** (f)
- **lrand** (f)
- **rand** (f)
- **srand** (f)
- **ldfcn**
- **swap** (m)
- **battlestar** (BSD)

Memory leak (1.28)

Under some conditions the 2.2 X server exhibited a memory leak. This was most noticeable with certain non-default fonts. The work-around was to stop and restart your X server. This has been fixed in the 2.3 Release.

Unnecessary file checking during bootup (2.16)

When re-entering multi-user mode after having shut the machine down to single-user, all file systems were checked whether they were dirty or not. Since shutting down the single user doesn't automatically unmount the file systems, they couldn't be marked as clean and were checked when you came back up. This has been fixed.

ES/PSX Bugs Fixed

f:vec_extract and f:lbl_extract problem

If the functions **f:vec_extract** and **f:lbl_extract** were run many times with the same name being requested in the string sent to input <2>, the PSX process would abort. This was due to a wrap-around of the usage count belonging to the name. The problem has been fixed with the 2.3 release.

psxconnect rendering commands fail to work

The GSR routines which control polygon rendering did not work properly using **psxconnect**. These routines are **PIllum**, **PRsvSt**, **PAttr**, **PAttr2**, and **PSecPl**. Indeterminate results occurred when these were sent to ES/PSX through **psxconnect**. This has been fixed in the 2.3 Release.

ES/PSX hangs intermittently

At rare times the ES/PSX process would hang due to an optimization problem in the update process. The ES/PSX window would stay on the screen, but nothing would be updated. This has been fixed in the 2.3 Release.

ES/PEX Bugs Fixed

FORTRAN routines produced bus errors

In previous releases, using the FORTRAN routines for **INITIALIZE CHOICE**, or **INITIALIZE CHOICE 3**, **PINCH** or **PINCH 3** could produce a bus error. This has been fixed in 2.3.

Also using the routines **INQUIRE LIGHT SOURCE REPRESENTATION** and **PQLSR** would cause a bus error. This has been fixed.

ES/PHIGS FORTRAN binding

Previous versions of the FORTRAN binding of ES/PHIGS would not support the proper workstation type identifiers on inquires that required a workstation type. This has been fixed in 2.3.

Edge pattern affects hollow polygons

The selected edge pattern affected hollow polygons even if the edges were not drawn. Also the line pattern could affect polygon edges. This has been fixed.

xinit, rgb and xman had corrupted error databases

Some of the error handling, **showrgb** and **xman** paths included an incorrect prefix. This has been fixed.

/usr/lib/PEXapi.a needs socketpair.o

In the System V version of the ES/PEX library (**/usr/lib/libPEXapi.a**) the symbol **socketpair** was missing. It was fixed in the 2.3 Release by adding the library **/bsd43/usr/lib/libc.a** to the end of the listed libraries in the link edit line.

Cannot change hlhsr mode for some PHIGS clients

When using the PHIGS API with Client-side Structure Store (CSS) and the PHIGS monitor, the **hlhsr** mode could not be changed from the default value (**z-buffering**). This was fixed in the 2.3 Release. **pset_hlhsr_mode** now works with PHIGS workstation clients and with rendering clients.

Zero fill areas (4.40)

Fill area set primitives containing zero fill areas in the set result in a system hang. This has been fixed.

PES_PLINE_MASK not in supported edge types

Edge type **PES_PLINE_MASK** was not in the list of supported edge types returned by **pinq_edge_facs**. This has been fixed.

Nameset values

Nameset values greater than 32 used to cause visible abnormalities. This has been fixed.

pinq_pred_colr_map_rep returned bad method for index 1

pinq_pred_colr_map_rep (inquire predefined color mapping representation) returned color mapping method of 0 for index 1. This was an incorrect result. It has been fixed.

Bundle tables had only one predefined entry (4.38)

ESV documentation for PHIGS and PHIGS PLUS description tables states that the different PHIGS bundle tables have 5 or 6 predefined entries as required for minimum support. There was only one predefined bundle entry for each type of table.

Couldn't get DeviceMotion events when PHIGS monitor is running (4.39)

If you changed the parameters to **popen_xphigs** so that it used the PHIGS monitor and forced client-side CSS, the client no longer got Device Motion events from the dial box. If the client didn't use the PHIGS monitor or client-side CSS, it got Device Motion events with no problems. This has been fixed.

Errors 205 and 206 were not generated (4.41)

Error 205 on **SET ELEMENT POINTER AT LABEL** and Error 206 on **DELETE ELEMENT BETWEEN LABELS** were not generated. The PEX error 131 (PEXLabelError) was generated instead and the application was aborted.

HLHSR mode with circle and arc GDPs (4.42)

Setting the HLHSR mode for multi-pass traversal while using circle or arc **GDP**s caused visual problems in edges and line colors.

TRANSFORM POINT 3 broke under certain conditions (4.44)

In the PHIGS function **ptran_point3** (**TRANSFORM POINT**), the address of the input point to be transformed could not be the same as the address of the output transformed point. When it was, erroneous data was returned.

Picking on a stereo image returns the wrong structure ID (4.45)

Picking on a stereo image returned the wrong structure ID. The structure ID returned was a 0.

PHIGS valuator with dial_box and PET -1 segmentation faults (4.46)

When using the valuator device and Prompt/Echo Type -1, you had to set each of the fields in the data record. The label, format, low_label, and high_-label had to be set to NULL.

X Window System Bugs Fixed

xterm pseudo ttys not working

The **xterm** connects to the pseudo ttys (**/dev/ttyp0**). The **xterm** was supposed to change the ownership on these devices so that things like **mesg n** could work, but the **xterm** was only **suid** to **bin**. The **xterm** has now been made **suid** to **root** so it can change the ownership.

bsd43 sscanf returned incorrect values

The routine **sscanf** returned incorrect values when it was unsuccessful in converting the input stream to the assigned input types.

pcomposematrix caused segmentation fault with System V (4.43)

The problem with the following call causing a segmentation fault has been fixed:

```
pcomposematrix3(concat2, currmatrix, &error, currmatrix);
```

xmag corrupts global screen variable (5.39)

The **xmag** client corrupted the global screen variable when the environment variable ***DISPLAY*** was set to a different display other than the default screen 0.

Small dashed zero width arcs can crash the server (5.41)

If an arc drawn through **XDrawArc**(s) was so small that no points were to be drawn, and the line style was dashed, the X server caused a segmentation fault.

4. Installation Instructions

This chapter contains information on ESV Workstation tape drives and provides installation instructions for release tapes. This chapter is organized as follows:

Caution: You should carefully read the "OS Kernel Information" section before you begin the software installation.

OS Kernel Information

There are four kernels available on the tape. For the 25 MHz CPU there are the "development" and the "non-development" kernels. The same is true for the new 33 MHz and 40 MHz CPUs. The "non-development" kernel provides smaller resource allocations and can be used when systems mainly run existing applications. This kernel is installed on the ESV when it is shipped from the factory. For systems in which large application compiles and builds are done, the "development" kernel, which provides larger resource allocations, should be used.

To determine which type of kernel has previously been loaded on the system, you can boot the system and type the following command:

```
uname -A
```

This command will print the following system information:

```
sysname, nodename, release, version, machine, m_type, and base_rel
```

The `m_type` will be one of the following:

- **`m120-1`** if the non-development kernel was installed (25 MHz CPU)
- **`m120-2`** if the development kernel was installed (25 MHz CPU)
- **`m120-3`** if the non-development kernel was installed (33 or 40 MHz CPU)
- **`m120-4`** if the development kernel was installed (33 or 40 MHz CPU)

Note that all releases prior to 2.0 had only the 25 MHz development kernel.

If you need to install a kernel other than the one on the system, you can do so by following the Operating System Update Installation Instructions, but only installing the **root** and **m-120x** subpackages.

Configuration Information

The ES/os tape, the ES/PEX Server tape, and the ES/PEX Library tape (Developer's kit tape) include various optional subpackages. Since each subpackage requires space on an ESV disk, only those which will be used should be installed. The "2.3 Release Subpackage Sizes" section in this chapter provides information about disk space utilization of the various subpackages and options.

There are two basic configurations that are installed at the factory. These are the "non-development" configuration and the "development" configuration. Variations to these configurations are used for the Local Server and the CDRS. The following contains recommendations for which subpackages to install if you need to reinstall the software at your site.

Non-Development Systems

Non-development systems can include one or more of the following options: ES/PSX, ES/Dnet, LAT Host Services, Kodak Printer, and Visix Looking Glass. The following subpackages are installed at the factory for each of these non-development system tapes.

Table 4-1. Non-development system configuration

Tape	Subpackages Installed	Notes

ES/os 2.3 (Domestic or Foreign)	`root -`
	`m120-x -`
	`usr -`
	`cmplrs -`
	`man -`
	`bsd43 -`
		installed automatically on scratch install
		installed automatically on scratch install
		installed automatically on scratch install
		type `y` when prompted
		type `y` when prompted
		type `y` when prompted

ES/PEX 2.3 Server	`executables_s -`
	`library_s -`
	`pexs_man -`
	`fstest -`
		type `y` when prompted
		type `y` when prompted
		type `y` when prompted
		type `y` when prompted

All other options	all	

Development Systems

Development systems can include one or more of the following options: ES/PSX, MIPS Pascal RISCompiler, MIPS FORTRAN RISCompiler, ES/Dnet, LAT Host Services, AVS3, Local Server, Diskless Node, Kodak Printer, and Visix Looking Glass. The following subpackages are installed at the factory for each of these development system tapes.

Table 4-2. Development system configuration

Tape	Subpackages Installed
ES/os 2.3 (Domestic or Foreign)	all
ES/PEX 2.3 Server	all

Table 4-2. Development system configuration (continued)

Tape	Subpackages Installed
ES/PEX 2.3 Library	**executables_l** **library_l** **pexl-man** **pexl-man-unformat**
All other options	all

Local Server Systems

Local Server systems have software installed for both the SCPU (server CPU) and the GCPU (graphics CPU). This software is installed in different locations on the disk (see Local Server installation instructions). The following subpackages are installed at the factory for each of these tapes.

Table 4-3. Local Server system configuration

Tape	CPU	Notes
ES/os 2.3	SCPU or GCPU	can install either the non-development or the development configuration
ES/PEX 2.3 Server	SCPU	install at least the following subpackages: **executables_s**, **library_s**, and **pexs-man**
ES/PEX 2.3 Server	GCPU	can install either the non-development or the development configuration
ES/PEX 2.3 Library	SCPU and GCPU	install at least the following subpackages for both CPUs: **executables_l**, **library_l**, and **pexl-man**
Graphics options (ES/PSX 2.3, AVS 3.0, or Visix Looking Glass 2.1)	GCPU	install these options only on the GCPU
All other options	SCPU or GCPU	install on either CPU, depending on available disk space

CDRS Systems

CDRS systems can install either the non-development configuration or the development configuration. The subpackage **cdrs_library_l**, located on the ES/PEX tape, is optional. It should be installed if you need the ***_GO** libraries for development.

Tape Drive Data Cartridge Information

The ESV Workstation uses the TANDBERG DATA (SIEMENS) 3660 Series Tape Drive. Data cartridges that have proven to work on this drive include the following:.

Table 4-4. Tape drive data cartridges

Tape Vendor	Product	Length	Mbyte Capacity	Notes
3M	DC600A	620 ft	120 meg	used prior to 2.0**
3M	DC615A	150 ft	30 meg	used prior to 2.0**
BASF	DC600H	620 ft	120 meg	used prior to 2.0**
3M	DC6037	150 ft	37 meg	used for software distribution
3M	DC6150	600 ft	150 meg	used for software distribution

** We have found that these tapes cause premature head wear and are not recommended for the ESV. They may be used if the new tapes are not available.

2.3 Release Subpackage Sizes

Table 4-5. ES/os 2.3 Domestic subpackage size

Subpackage	bytes	Kbytes	Mbytes
root*	9836296	9605	9.38
m120-x*	4628852	4520	4.41
usr*	31249301	30516	29.80
usr_help	640488	625	0.61
usr_dvlp	9823926	9593	9.37
usr_terms	1564937	1528	1.49
cmplrs*	11824713	11547	11.28
cmplrs-bsd43	1677015	1637	1.60
man*	4030313	3935	3.84
man_misc	75926	74	0.07
bsd43*	10260331	10019	9.78
bsd43_troff	83235	81	0.08
bsd43_dvlp	3961359	3868	3.78
reconfig	10897292	10641	10.39
emacs	8695725	8491	8.29
posix	2847039	2780	2.71
uucp	2289845	2236	2.18
sccs	166148	162	0.16
news_readers	729779	712	0.70
games	3199535	3124	3.05
mh	14699372	14354	14.02
Total			
non-development	59136000	57750	56.40 (actual) **
Total			
development	120922112	118088	115.32 (actual) **

* Subpackages installed on a non-development system.

** Actual installed values will be somewhat smaller than the sum of subpackage values. This is due to space used by **pkg** to record hard links

which don't show up after an install. These values come from using the **bsd43** version of **df** located in **/usr/bsd43/bin.**

Table 4-6. ES/os 2.3 Foreign subpackage size

Subpackage	bytes	Kbytes	Mbytes
root*	9836296	9605	9.38
m120-x*	4628852	4520	4.41
usr*	31249301	30516	29.80
usr_help	640488	625	0.61
usr_dvlp	9823926	9593	9.37
usr_terms	1564937	1528	1.49
cmplrs	11824713	11547	11.28
cmplrs-bsd43	1677015	1637	1.60
man	4030313	3935	3.84
man_misc	75926	74	0.07
bsd43	10261331	10019	978.
bsd43_troff	83235	81	0.08
bsd43_dvlp	3961359	3868	3.78
reconfig	10897292	10641	10.29
emacs	8695725	8491	8.28
posix	2847039	2780	2.71
uucp	2289845	2236	2.18
sccs	166148	162	0.16
news_readers	729779	712	0.70
games	3199535	3124	3.05
mh	14699372	14354	14.02
Total			
non-develop	59136000	57750	56.40 (actual)**
Total			
development	1209221122	118088	115.32 (actual)**

* Subpackages installed on a non-development system.

** Actual installed values will be somewhat smaller than the sum of subpackage values. This is due to space used by **pkg** to record hard links which don't show up after an install. These values come from using the **bsd43** version of **df** located in **/usr/bsd43/bin**

Table 4-7. ES/PEX 2.3 Server subpackage size

Subpackage	bytes	Kbytes	Mbytes
executables_s*	12749031	12450	12.16
library_s*	9259834	9042	8.83
pexs-man*	524089	511	0.50
fstest*	10001235	9766	9.54
xclients	12846737	12545	12.25
pexs-man-unformat	934615	912	0.89
demo_s	7342573	7170	7.00
contrib_s	8431184	8233	8.04
Total default	33821696	33029	32.25 (actual)**
All	63810560	62315	60.85 (actual)**

Table 4-8. ES/PEX 2.3 Library subpackage size

Subpackage	bytes	Kbytes	Mbytes
executables_l	82544	80	0.08
library_l	48230034	47099	46.00
cdrs_library_l	45959790	44882	43.83
pexl-man	4847817	4734	4.62
pexl-man-unformat	642185	627	0.61
Total	62398464	60936	59.51 (actual)**
CDRS (development) sites	108358254	105818	103.34 (estimated)

Table 4-9. ES/PSX 2.3 subpackage size

Subpackage	bytes	Kbytes	Mbytes
psx	6956032	6793	6.63 (actual)**

Table 4-10. Pascal RISCompiler 2.20 subpackage size

Subpackage	bytes	Kbytes	Mbytes
cmplrs	8586764	8385	8.19
cmplrs-bsd43	1669480	1630	1.59
cmplrs-man	531339	518	0.51
pascal	469945	458	0.45
pascal-bsd43	129909	126	0.12
pascal-man	33308	32	0.03
Total w/o C cmplr	762880	745	0.73 (actual)**
All	11550463	11279	11.01 (estimated)

Table 4-11. FORTRAN RISCompiler 2.20 subpackage size

Subpackage	bytes	Kbytes	Mbytes
cmplrs	8586764	8385	8.19
cmplrs-bsd43	1669480	1630	1.59
cmplrs-man	531339	518	0.51
f77	3854063	3763	3.67
f77-bsd43	3377222	3298	3.22
f77-man	66034	64	0.06
Total w/o C cmplr	7520256	7344	7.17 (actual)**
All	18307839	17878	17.46 (estimated)

Table 4-12. AVS 3.0 subpackage size

Subpackage	bytes	Kbytes	Mbytes
avs	48453632	47318	46.21 (actual)**

Table 4-13. ES/Dnet 2.2.2 subpackage size

Subpackage	bytes	Kbytes	Mbytes
esdnet	8663195	8460	8.26 (estimated)

Table 4-14. LAT Host Services 2.2 subpackage size

Subpackage	bytes	Kbytes	Mbytes
eslat	302080	295	0.29 (actual)**

Table 4-15. Diskless Node 2.3 subpackage size

Subpackage	bytes	Kbytes	Mbytes
droot	4960210	4843	4.73
dusr	38223	37	0.04
dvar	512	0	0.00
Total	4998945	4881	4.77 (estimated)

Table 4-16. Kodak Printer 2.2 subpackage size

Subpackage	bytes	Kbytes	Mbytes
kodak	371712	363	0.35 (actual)**

Table 4-17. Visix Looking Glass 2.1 subpackage size

Subpackage	bytes	Kbytes	Mbytes
lookglass	4469357	4364	4.26 (estimated)

make.xman.sections Script

The following procedure needs to be performed after a scratch or update installation, in order for **xman** to "see" newly installed manual pages. In the following procedure, system output is shown in `typewriter normal` font, and user responses are shown in **`typewriter bold`** font. All user responses should be typed as shown and entered with a carriage return **<CR>**.

1) Login as **root**.
2) Type **cd /usr/man**
3) Type **su bin**
4) Type **./make.xman.sections**

```
The following questions will determine if we need to clean up the links and
mandesc file created by a previous invocation of make.xman.sections. You
may type q at any prompt to exit.

Do you just want to clean up the links and mandesc file from a previous
invocation of make.xman.sections and then exit?

Answer y, n, q: y (takes about one minute)
```

5) Type **./make.xman.sections**

```
The following questions will determine if we need to clean up the links and
mandesc file created by a previous invocation of make.xman.sections. You
may type q at any prompt to exit.

Do you just want to clean up the links and mandesc file from a previous
invocation of make.xman.sections and then exit?

Answer y, n, q: n

Are you running this after doing an update install? (y, n, q): n

(takes about two minutes)
```

6) Type **exit** (to get out of **su**).
7) The **xman** client will now see all manual page files installed on your system when invoked.
8) You should also update the **manwhatis** database by typing **/usr/lib/makewhatis**

rmpkg Utility

The **rmpkg** utility removes packages or subpackages to free up needed disk space. In the following procedure, system output is shown in `typewriter normal` font, and user responses are shown in **`typewriter bold`** font. All user responses should be typed as shown and entered with a carriage return **<CR>**.

1) Login as **root**.
2) Type **`cd /usr/pkg/bin`**
3) Type **`./rmpkg <package>`** (possible packages to remove are found in **/usr/pkg/lib**)
4) You will be prompted for each subpackage to remove from the given package.

> **Note:** This program prompts all subpackages available from a package even though it may or may not be installed. If you type **`y`** to a subpackage that is not installed, nothing happens.

Example: Removing manual pages from ES/PEX server release

```
./rmpkg pexs2.0
Pkgroot=/, Pkg=/usr/pkg/lib/pexs2.0 (package pexs 2.0)
Remove pexs.executables_s 2.0 (y n) [n]? n
Remove pexs.library_s 2.0 (y n) [n]? n
Remove pexs.pexs-man 2.0 (y n) [n]? y
Remove pexs.fstest 2.0 (y n) [n]? n
Remove pexs.xclients_s 2.0 (y n) [n]? n
Remove pexs.pexs-man-unformat 2.0 (y n) [n]? n
Remove pexs.demo_s 2.0 (y n) [n]? n

The following subpackages have been selected for removal: pexs-man
Ok (y n) [y]? y

removing pexs.pexs-man 2.0...
rm ./usr/man/catman/P_man/man7/colour.7
rm ./usr/man/catman/P_man/man7/phigs_description_table.7
rm ./usr/man/catman/P_man/man7/phigs_workstation_description_table.7
            .
            .
            .
rm ./usr/man/x_man/man1/xwud.1
rm ./usr/man/x_man/man5/gm_config.5
rm ./usr/man/x_man/man5/pex_config.5
Some of the boms for subpackages in this package remain in the packaging
information tree, so the packaging information tree will not be removed.
#
```

ES/os 2.3 Domestic/Foreign Tape Update Installation

Things to Do Prior to an Update Installation

You need to verify that your system has enough disk space for the increased size of this installation. For successful installation of all subpackages, your **/usr** partition should be less than 90% full. To check how much space you have, type **`df /usr`**.

If your machine does not have enough space on **/usr**, you may be able to reclaim a large amount of space by removing unneeded system-crash core files. To locate these files, type the following:

1) Login as **root**.
2) Type **`cd /usr/adm/crash`**
3) Remove any files named **core.*** and **unix.*** from this directory.
4) If your **/usr** partition still does not have enough space, you may need to find and remove **core** files from your system users' directories. To locate these files type **`find /usr -name core -print`** (searching will take a minute or two).

   If any **core** files are found, go to the appropriate directory and remove them.
5) If you still do not have enough room, you will need to do further file cleanup, transfer some of your users' accounts to another disk and/or elect not to install all the subpackages.

   Furthermore, when this script asks you if you want to clean up old versions of subpackages, always type **`y`**, to free up needed disk space.

Installation Begins Here

In the following procedure, system output is shown in `typewriter normal` font, and user responses are shown in **`typewriter bold`** font. All user responses should be typed as shown and entered with a carriage return **`<CR>`**.

> **Caution:** It is important that YOU be the only user logged onto the machine while loading this software.

1) Insert ES/os 2.3 domestic/foreign tape in the drive.
2) If you are at the **xdm** login window box, type **`ALT-F4`**.
3) Login as **root** (in blue console screen).
4) Clean up filesystems by typing **`fsck.ffs`**
5) Remove mouse from mousepad. (Do not unplug the mouse.)
6) Pay attention to the case-sensitivity of entries.
7) Type **`sync; sync`**
8) Type **`telinit 0`**

```
E&S CPU Board MIPS Monitor Version 5.00 MIPS OPT Mon Aug 5 10:12:44 MST 1991
Copyright 1988, MIPS Computer Systems Inc., All Rights Reserved
Memory size: 33554432 (0x2000000) bytes
Icache size: 65536 (0x10000) bytes
Dcache size: 65536 (0x10000) bytes

>> boot -f tqis(,,2)sash.std (for 25Mhz installs)
```

OR

```
>> boot -f tqis(,,3)sash.r200 (for 33Mhz and 40 MHz installs)

120544+23088+170432 entry: 0xa0300000
MIPS Standalone Shell Version 5.00 MIPS OPT Tue Jun 4 12:33:08 MDT 1991
sash: cp -b 16k tqis(,,4) dkis(,,1)

---------- Note: @5 minutes till next user response ----------

.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
13824000 (0xd2f000) bytes copied
```

Note: The next input determines the OS Kernel you will be installing. There are four to choose from. See "OS Kernel Information" located at the beginning of these installation notes before typing the next command.

```
sash: boot -f tqis(,,6)unix.std root=isc0d0s1 (25Mhz non-development
                                                systems)
```

OR

```
sash: boot -f tqis(,,7)unix.dvlp_std root=isc0d0s1 (25Mhz development
                                                    systems)
```

OR

sash: **boot -f tqis(,,8)unix.r200 root=isc0d0s1** (33Mhz and 40 MHz non-development systems)

OR

sash: **boot -f tqis(,,9)unix.dvlp_r200 root=isc0d0s1** (33Mhz and 40 MHz development systems)

```
846208+101360+789520 entry: 0x80021000
CPU: MIPS R3000 Processor Chip Revision: 2.0
FPU: MIPS R3010 VLSI Floating Point Chip Revision: 2.0

ES/os Release 2.3 ESV Version R_100
Total real memory = 33554432
Available memory = 31170560
abminit: ARS/HIC not present.
arsinit: ARS/HIC not present.
installing VME vector: addr 0x8007FFA4 ipl 2, vec 0xE0 unit 0
Root on dev 0x1001, Swap on dev 0x1001
installing VME vector: addr 0x8007FFA4 ipl 2, vec 0xE0 unit 0
Root fstype ffs
New swplo: 26992 swap size: 19272K bytes
Available memory = 29478912

Miniroot run level 1

Making miniroot device files for m120-1 system...
erase = ^H, kill = ^U, interrupt = ^C
# set -a
**************************************************************************
```

Warning: The next entry is case-sensitive. Failure to type exactly as shown will cause a scratch install of this software.

```
**************************************************************************
# Install=update
# inst

Software package installation

Installation Information:

This is an update install.
Packages will be read in from the local Q24 tape drive.
Machine type: m120-1
```

```
Is the information above correct? (y n) [y]? <CR>
Note: It is not necessary to install a kernel on the miniroot. The process
will take a few minutes.
Would you like to install the kernel to the miniroot (y n) [n]? <CR>

========== checking subpackages ==========

The following subpackages may be installed:

root          -- ES/os Standard Root Filesystem
m120-3        -- ES/os m/120, RC3240 Kernel and Devices
usr           -- ES/os Standard /usr Filesystem
usr_help      -- ES/os Standard /usr help facilities
usr_dvlp      -- ES/os Standard /usr Development files (header files &
                 libraries)
usr_terms     -- ES/os Standard /usr Miscellaneous Terminal descriptions
cmplrs        -- MIPS-C Compiler
cmplrs-bsd43  -- MIPS-C 4.3 BSD Include Files and Libraries
man           -- ES/os Manual Pages
bsd43         -- ES/os 4.3 BSD Utilities, Include Files and Libraries
bsd43_troff   -- ES/os 4.3 BSD Troff Utilities and Libraries
bsd43_dvlp    -- ES/os 4.3 BSD Include Files and Libraries
reconfig      -- Kernel Binary Reconfiguration Components
emacs         -- emacs
posix         -- ES/os POSIX P1003.1 Include Files, Commands and Libraries
uucp          -- UUCP
sccs          -- SCCS
news_readers  -- News Readers
games         -- Games
mh            -- mh

========== selecting subpackages ==========

You may select all of the above subpackages by answering "y" to the
following question. If you answer "n" then you will be asked to select the
optional subpackages you would like to have installed.

Install ALL subpackages (y n) [n]? See Configuration Information. Page 4-2

========== setting system clock/calendar ==========

The current value of the clock is: Thu Aug 30 16:32:55 PDT 1990
Is the clock correct (y n) [y]? <CR>
```

```
========== verifying single-user mode ==========

The system is in a single-user run level.

Please answer "y" to the following question unless you really understand
the consequences.

Do you want to install sash to the volume header (y n) [y]? <CR>
========== installing sash to volume header ==========

========== mounting filesystems ==========
```

Note: If you get a "dirty filesystem" error here, type the following:

```
# fsck.ffs <filesystem path> (i.e., /dev/dsk/isc0d0s0)
# inst
```

Then go back to page 4-15 and follow the installation instructions starting at **#inst** towards the bottom of the page.

Note: This cycle could repeat several times.

Otherwise, this should appear:

```
/dev/root mounted on /mnt
/dev/usr mounted on /mnt/usr
------------------------------------------------------------------------
Partition Megs Mounted File System or Partition Usage
------------------------------------------------------------------------
0 /dev/dsk/isc0d0s0 23 /dev/root
1 /dev/dsk/isc0d0s1 33 /
6 /dev/dsk/isc0d0s6 564 /dev/usr
7 /dev/dsk/isc0d0s7 14 -**** Available Partition ****-
------------------------------------------------------------------------
Disk Device /dev/dsk/isc0d0s2 632 Mbytes Total Size
------------------------------------------------------------------------
Do you wish to change swap partition configuration (y n) [n]? n

========== preserving local files ==========

Running preserve -s for subpackage root... 63 files preserved.
No preserve list or findmods list for m120- preserve not executed.
Running preserve -s for subpackage usr... 26 files preserved.
No preserve list or findmods list for usr_help- preserve not executed.
No preserve list or findmods list for usr_dvlp- preserve not executed.
No preserve list or findmods list for usr_terms- preserve not executed.
```

```
No preserve list or findmods list for cmplrs- preserve not executed.
No preserve list or findmods list for cmplrs-bsd43- preserve not executed.
No preserve list or findmods list for man- preserve not executed.
No preserve list or findmods list for bsd43- preserve not executed.
No preserve list or findmods list for bsd43_troff- preserve not executed.
No preserve list or findmods list for bsd43_dvlp- preserve not executed.
No preserve list or findmods list for reconfig- preserve not executed.
No preserve list or findmods list for emacs- preserve not executed.
No preserve list or findmods list for posix- preserve not executed.
No preserve list or findmods list for uucp- preserve not executed.
No preserve list or findmods list for sccs- preserve not executed.
No preserve list or findmods list for news_readers- preserve not executed.
No preserve list or findmods list for games- preserve not executed.
No preserve list or findmods list for mh- preserve not executed.

========== verifying disk space ==========

Do you want to check for space (please do so unless you really
understand the consequences) (y n) [y]? <CR>

The system will now be checked to verify that there is enough disk space
with the current configuration to successfully install the package (and any
selected optional subpackages). For large packages (especially operating
system packages), this can be time consuming...
```

You will see either this:

```
device bfree ifree breq ireq bcred icred
/dev/root 7873 8858 15146 440 9221 320
/dev/usr 61418 109649 108483 7264 50649 5788

WARNING! This package will fit on the disk, but it will cause more than 90%
of the disk to be used. This may cause problems for non-root users. It is
recommended that you abort the installation now.
```

OR this:

```
The package (and any selected optional subpackages) cannot be installed at
this time due to the shortage(s) of disk space and/or inodes shown above.
Please make the required space available and then retry the installation
procedure.

(Press return to continue...)

The script now restores the -preserve files and returns to the following
prompt:
```

```
*** At this point you will need to free up space or choose fewer subpackages
to install before preceding as follows:
```

```
# inst
```

Then go back to page 4-15 and follow the installation instructions starting at **#inst** towards the bottom of the page.

OR this:

```
There is enough space.

========== stripping old links ==========
Stripping links for subpackage root...
Stripping links for subpackage m120-x...
Stripping links for subpackage usr...
Stripping links for subpackage usr_help...
Stripping links for subpackage usr_dvlp...
Stripping links for subpackage usr_terms...
Stripping links for subpackage cmplrs...
Stripping links for subpackage cmplrs-bsd43...
Stripping links for subpackage man...
Stripping links for subpackage bsd43...
Stripping links for subpackage bsd43_troff...
Stripping links for subpackage bsd43_dvlp...
Stripping links for subpackage reconfig...
Stripping links for subpackage emacs...
Stripping links for subpackage posix...
Stripping links for subpackage uucp...
Stripping links for subpackage sccs...
Stripping links for subpackage news_readers...
Stripping links for subpackage games...
Stripping links for subpackage mh...

========== extracting files from subpackage archives ==========

rewinding the tape...
Verifying tape id... ok
Forward spacing the tape...

Loading subpackage: root...
Forward spacing the tape...
Loading subpackage: m120-x...
Forward spacing the tape...
Loading subpackage: usr...
Forward spacing the tape...
```

```
Loading subpackage: usr_help...
Forward spacing the tape...
Loading subpackage: usr_dvlp...
Forward spacing the tape...
Loading subpackage: usr_terms...
Forward spacing the tape...
Loading subpackage: cmplrs...
Forward spacing the tape...
Loading subpackage: cmplrs-bsd43...
Forward spacing the tape...
Loading subpackage: man...
Forward spacing the tape...
Loading subpackage: bsd43...
Forward spacing the tape...
Loading subpackage: bsd43_troff...
Forward spacing the tape...
Loading subpackage: bsd43_dvlp...
Forward spacing the tape...
Loading subpackage: reconfig...
Forward spacing the tape...
Loading subpackage: emacs...
Forward spacing the tape...
Loading subpackage: posix...
Forward spacing the tape...
Loading subpackage: uucp...
Forward spacing the tape...
Loading subpackage: sccs...
Forward spacing the tape...
Loading subpackage: news_readers...
Forward spacing the tape...
Loading subpackage: games...
Forward spacing the tape...
Loading subpackage: mh...
Forward spacing the tape...
rewinding the tape...

========== making device special files ==========

running MKDEV...
done.

========== running comply ==========

running first comply pass...
```

```
running second comply pass...

There were no comply messages...

========== doing uncompress Thu Apr 04 17:17:24 PST 1991 ==========

uncompress usr/bin/admin.Z
uncompress usr/bin/at.Z
uncompress usr/bin/chkey.Z

(Un-compresses occur here...)

uncompress usr/new/mh/vmh.Z
uncompress usr/new/mh/whatnow.Z
uncompress usr/new/mh/whom.Z

========== cleaning up old versions ==========

An attempt will now be made to clean up any files left over from previous
versions of the software which has just been installed.

Searching for old versions to remove...

At this point, you may be asked to "Cleanup" old software from the system.
It is recommended that you type "y" to these inquiries.

========== restoring preserved user files ==========

Running preserve -r for subpackage root...
No preserve list or findmods list for m120-x- no files restored.
Running preserve -r for subpackage usr...
No preserve list or findmods list for usr_help- no files restored.
No preserve list or findmods list for usr_dvlp- no files restored.
No preserve list or findmods list for usr_terms- no files restored.
No preserve list or findmods list for cmplrs- no files restored.
No preserve list or findmods list for cmplrs-bsd43- no files restored.
No preserve list or findmods list for man- no files restored.
No preserve list or findmods list for bsd43- no files restored.
No preserve list or findmods list for bsd43_troff- no files restored.
No preserve list or findmods list for bsd43_dvlp- no files restored.
No preserve list or findmods list for reconfig- no files restored.
No preserve list or findmods list for emacs- no files restored.
No preserve list or findmods list for posix- no files restored.
No preserve list or findmods list for uucp- no files restored.
```

```
No preserve list or findmods list for sccs- no files restored.
No preserve list or findmods list for news_readers- no files restored.
No preserve list or findmods list for games- no files restored.
No preserve list or findmods list for mh- no files restored.
========== running conversion scripts ==========

========== root.fstab Thu Apr 04 17:24:49 PST 1991 ==========

No ips devices found in /etc/fstab.

To take advantage of the improved parallel fsck, /etc/fstab will now be
modified to allow the root partition to be fscked on the first pass. All
other local filesystems will be fscked on the second pass.

A copy of /etc/fstab will be saved as /etc/fstab.save.1.

No changes made.

Press return to continue: <CR>

========== cleaning up ==========

Copying packaging information directory to /mnt/usr/pkg/lib/ESos2.3...

Removing Duplicate File /mnt/etc/TZ:2.3+
Removing Duplicate File /mnt/etc/exports:2.3+
Removing Duplicate File /mnt/etc/fstab:2.3+
Removing Duplicate File /mnt/etc/group:2.3+
Removing Duplicate File /mnt/etc/inittab:2.3+
Removing Duplicate File /mnt/etc/motd:2.3+
Removing Duplicate File /mnt/etc/networks:2.3+
Removing Duplicate File /mnt/etc/passwd:2.3+
Removing Duplicate File /mnt/usr/etc/exports:2.3+
Removing Duplicate File /mnt/usr/etc/bootptab:2.3+
Removing Duplicate File /mnt/usr/etc/timed.conf:2.3+
Removing Duplicate File /mnt/usr/lib/aliases:2.3+
Removing Duplicate File /mnt/usr/lib/sendmail.cf:2.3+
Removing Duplicate File /mnt/usr/lib/me/local.me:2.3+

Unmounting filesystems...
/mnt/usr: Unmounted
/mnt: Unmounted

========== installation complete ==========
```

```
# sync; sync
# telinit 0
#
INIT: New run level: 0

Miniroot shutdown

E&S CPU Board MIPS Monitor Version 5.00 MIPS OPT Tue Jun 4 12:33:08 MST 1991
Copyright 1988, MIPS Computer Systems Inc., All Rights Reserved
Memory size: 33554432 (0x2000000) bytes
Icache size: 65536 (0x10000) bytes
Dcache size: 65536 (0x10000) bytes
>> auto

Autoboot: Waiting to load dkis(0,0,8)sash (CTRL-C to abort, RETURN to
expedite) <CR>
loading
120544+23088+170432 entry: 0xa0300000
MIPS Standalone Shell Version 5.00 MIPS OPT Mon Feb 18 08:39:23 MDT 1991

Loading dkis(0,0,0)/unix
846208+101360+789520 entry: 0x80021000
CPU: MIPS R3000 Processor Chip Revision: 2.0
FPU: MIPS R3010 VLSI Floating Point Chip Revision: 2.0

ES/os Release 2.3 ESV Version R_100
Total real memory = 33554432
Available memory = 31170560
abminit: ARS/HIC not present.
arsinit: ARS/HIC not present.
installing VME vector: addr 0x8007FFA4 ipl 2, vec 0xE0 unit 0
installing VME vector: addr 0x8007FFA4 ipl 2, vec 0xE0 unit 0
Root fstype ffs
Available memory = 29478912

Checking root file system () if necessary.
The system is coming up. Please wait.

***** Normally all file systems are fscked.
***** To fsck only dirty ones, type 'yes' within 5 seconds:
***** All file systems will be fscked.
/dev/usr: 6199 files, 109289 used, 431746 free (2882 frags, 53608 blocks,
0.5% fragmentation)
/dev/usr mounted on /usr
```

```
No process accounting on this system
Aug 31 07:19:19 tonto unix: CPU: MIPS R3000 Processor Chip Revision: 2.0
Aug 31 07:19:19 tonto unix: FPU: MIPS R3010 VLSI Floating Point Chip
Revision: 2.0
Aug 31 07:19:20 tonto unix:
Aug 31 07:19:20 tonto unix: Total real memory = 33554432
Aug 31 07:19:20 tonto unix: Available memory = 31170560
Aug 31 07:19:20 tonto unix: abminit: ARS/HIC not present.
Aug 31 07:19:20 tonto unix: arsinit: ARS/HIC not present.
Aug 31 07:19:21 tonto unix: installing VME vector: addr 0x8007FFA4 ipl 2,
vec 0xE0
unit 0
Aug 31 07:19:21 tonto unix: installing VME vector: addr 0x8007FFA4 ipl 2,
vec 0xE0
unit 0
Aug 31 07:19:21 tonto unix: Root fstype ffs
Aug 31 07:19:21 tonto unix: Available memory = 29478912
checking for system core dump...
Internet daemons: routed snmpd snmptrapd portmap inetd timed(slave).
Export file systems
NFS daemons: nfsd biod lockd statd.
Aug 31 07:19:32 tonto rpc.statd[139]: enter statd_init
Aug 31 07:19:32 tonto rpc.statd[139]: 1
Aug 31 07:19:32 tonto rpc.statd[139]: local state = 1
Starting lpd
The system is ready.

tonto Console login:
```

You may now need to modify the **/etc/passwd** file to set up some accounts properly.

1) Login as **root**. Modify **/etc/passwd** file and update the **xdm** line to look like this:

```
xdm::98:1:Xdm starter login:/usr/admin:/usr/bin/X11/xdmshell
```

2) In the same file (**/etc/passwd**), modify the **esdemo** line to look like this:

```
esdemo::103:101:Demo Account:/usr/esdemo:/bin/csh
```

Warning: The System Manager will want to create passwords for the **fstest** and **esdemo** accounts using the **passwd** command while logged in as each of these. These accounts provide a security hole until you do so.

Final Important Note

In order for **xman** to "see" all manual pages newly installed on the system, you will need to run the **make.xman.sections** script using the instructions found previously in the "**make.xman.sections** Manual Page Setup Script" section of these notes. Perform these instructions after you have installed all software tapes provided for an upgrade.

End of Installation

ES/os 2.3 Domestic/Foreign Tape Scratch Installation

****

Warning: This software installation is a scratch install. Data on the **root** and **/usr** partitions on disk 0 will be lost. Back-up any files that you don't want destroyed. A list of systems files you might want to backup are listed below.

****

Things to Do Prior to a Scratch Install

1) Get the following from your system manager. You will need it later during installation.

- System Hostname
- Netmask (found in **/etc/local_hostname** file)
- Broadcast address (found in **/etc/local_hostname** file)
- Net address (found in **/etc/hosts** file)
- NIS Domain name for your site (found in **/etc/local_domainname** file)

2) Backup files.

If you have done any local system configuration and/or installed software licenses, it is important that you backup the modified files.

Here is a short list of files that you should copy to an area on your second disk (if you have one) or backup onto tape (you may also want a hard copy of some of them like **/etc/fstab** and **/etc/local_hostname**):

/etc/TZ
/etc/fstab
/etc/group
/etc/hosts
/etc/passwd
/etc/printcap
/usr/etc/exports
/etc/ki_pwd (if you have ES/Dnet)
/etc/local_hostname
/usr/lib/sendmail.cf

To backup these files onto tape, do the following:

a) `cd /tmp`

b) `mkdir /etc`

c) `cd /etc`

d) Copy each of the files listed above into the **/tmp/etc** directory using the command:

```
cp <filename> /tmp/etc
```

e) Now insert a blank tape into the tape drive.

f) **cd /tmp**

g) **/bin/tar -cv etc**

If you have any user accounts on the system disk, it is strongly recommended that you do a 0 level dump of the **/usr** partition before doing a scratch installation.

You will need to restore these files after the scratch install. Instructions on how to do this are near the end of these installation notes.

In the following procedure, system output is shown in `typewriter normal` font, and user responses are shown in **typewriter bold** font. All user responses should be typed as shown and entered with a carriage return **<CR>**.

This installation requires approximately 1.5 hours. There are many places where a time is indicated so you can walk away and come back later to continue the installation.

Caution: It is important that YOU be the only user logged onto the machine while loading this software.

1) Insert the ES/os 2.3 domestic/foreign tape into the drive.

2) Login as **root**.

3) Type **cd /**

4) Type **sync; sync;**

5) Shutdown your ESV by typing **shutdown -y -g0 -i0**

```
E&S CPU Board MIPS Monitor Version 5.00 MIPS OPT Mon Feb 18 15:00:28 MST
1991
Copyright 1988, MIPS Computer Systems Inc., All Rights Reserved
Memory size: 33554432 (0x2000000) bytes
Icache size: 65536 (0x10000) bytes
Dcache size: 65536 (0x10000) bytes
>> boot -f tqis(,,2)format.std (for 25 Mhz installs)
```

OR

```
>> boot -f tqis(,,3)format.r200 (for 33 Mhz and 40 MHz installs)

128896+31552+206928 entry: 0x80020000
```

Note: The following sequence writes a volume header on DISK 0. Old data on the disk may be unreadable after this procedure.

```
MIPS Format Utility
Version 5.00 Mon Feb 18 15:47:23 MST 1991

name of device? dkis
LUN number? 0
target id? 0
vendor: CDC
product: 94191-15

Disk has block caching enabled

device parameters from disk don't match table entries!
choose new device parameters (y if yes)? y
Drive has 5061 cylinders
256 sectors per cylinder
234 sectors left over

dump device parameters (y if yes)? <CR>
modify device parameters (y if yes)? <CR>

dump partition table (y if yes)? <CR>
modify partition table (y if yes)? <CR>

formatting destroys ALL SCSI disk data, perform format (y if yes)? <CR>

formatting wasn't done, perform scan anyway (y if yes)? <CR>

SCSI defect list manipulation, when prompted choose one of (list, add,
delete, quit) command? q

writing volume header...
exit(0) called
```

Note: The following sequence writes a volume header on DISK 1. Skip this section if you are not modifying DISK 1.

****

Warning: Only perform this sequence at the factory or if you really want to reformat and destroy data on DISK 1.

****

```
E&S CPU Board MIPS Monitor Version 5.00 MIPS OPT Mon Feb 18 15:00:28 MST
1991
```

```
Copyright 1988, MIPS Computer Systems Inc., All Rights Reserved
Memory size: 33554432 (0x2000000) bytes
Icache size: 65536 (0x10000) bytes
Dcache size: 65536 (0x10000) bytes
>> go
MIPS Format Utility
Version 5.00 Mon Feb 18 15:47:23 MST 1991

name of device? dkis
LUN number? 0
target id? 1
vendor: CDC
product: 94161-9

device parameters from disk don't match table entries!
choose new device parameters (y if yes)? y

dump device parameters (y if yes)? <CR>
modify device parameters (y if yes)? <CR>

dump partition table (y if yes)? <CR>
modify partition table (y if yes)? <CR>

formatting destroys ALL SCSI disk data, perform format (y if yes)? <CR>

formatting wasn't done, perform scan anyway (y if yes)? <CR>

SCSI defect list manipulation, when prompted choose one of (list, add,
delete, quit) command? q

writing volume header...
exit(0) called

------------------- End of DISK 1 Formatting Sequence -------------------

E&S CPU Board MIPS Monitor Version 5.00 MIPS OPT Mon Feb 18 15:00:28 MST
1991
Copyright 1988, MIPS Computer Systems Inc., All Rights Reserved
Memory size: 33554432 (0x2000000) bytes
Icache size: 65536 (0x10000) bytes
Dcache size: 65536 (0x10000) bytes

>> boot -f tqis(,,2)sash.std (for 25Mhz installs)
```

OR

```
>> boot -f tqis(,,3)sash.r200 (for 33Mhz 40 MHz installs)

120544+23088+170432 entry: 0xa0300000
MIPS Standalone Shell Version 5.00 MIPS OPT Mon Feb 18 08:39:23 MDT 1991
sash: cp -b 16k tqis(,,4) dkis(,,1)

---------- Note: Takes @5 minutes till next user response ----------

.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
13824000 (0xd2f000) bytes copied
```

Note: The next input determines the OS Kernel you will be installing. There are four to choose from. See "OS Kernel Information" located at the beginning of these installation notes before typing the next command.

```
sash: boot -f tqis(,,6)unix.std root=isc0d0s1 (25 Mhz non-development
                                                systems)
```

OR

```
sash: boot -f tqis(,,7)unix.dvlp_std root=isc0d0s1 (25 Mhz development
                                                    systems)
```

OR

```
sash: boot -f tqis(,,8)unix.r200 root=isc0d0s1 (33 Mhz 40 MHz non-
                                                development systems)
```

OR

```
sash: boot -f tqis(,,9)unix.dvlp_r200 root=isc0d0s1 (33 Mhz 40 MHz
                                                     development systems)

---------- Note: Takes @8 minutes till next user response ----------
```

```
846208+101360+789520 entry: 0x80021000
CPU: MIPS R3000 Processor Chip Revision: 3.0
FPU: MIPS R3010 VLSI Floating Point Chip Revision: 4.0

ES/os Release 2.3 ESV Version R_100
Total real memory = 33554432
Available memory = 31170560
abminit: ARS/HIC not present.
arsinit: ARS/HIC not present.
installing VME vector: addr 0x8007FFA4 ipl 2, vec 0xE0 unit 0
Root on dev 0x1001, Swap on dev 0x1001
Root fstype ffs
New swplo: 26992 swap size: 19272K bytes
Available memory = 29478912

Miniroot run level 1

Making miniroot device files for m120-3 system... (takes 5 minutes)
erase = ^H, kill = ^U, interrupt = ^C
# inst

Software package installation

Installation Information:

This is a SCRATCH install. Data on the root and /usr disks will be lost.
Packages will be read in from the local Q24 tape drive.
Machine type: m120-3

Is the information above correct? (y n) [y]? y

Note: It is not necessary to install a kernel on the miniroot. The process
will take a few minutes.
Would you like to install the kernel to the miniroot (y n) [n]? <CR>

========== checking subpackages ==========

The following subpackages may be installed:

root          -- ES/os Standard Root Filesystem
m120-3        -- ES/os m/120, RC3240 Kernel and Devices
usr           -- ES/os Standard /usr Filesystem
usr_help      -- ES/os Standard /usr help facilities
```

```
usr_dvlp      -- ES/os Standard /usr Development files (header files &
                 libraries)
usr_terms     -- ES/os Standard /usr Miscellaneous Terminal descriptions
cmplrs        -- MIPS-C Compiler
cmplrs-bsd43  -- MIPS-C 4.3 BSD Include Files and Libraries
man           -- ES/os Manual Pages
bsd43         -- ES/os 4.3 BSD Utilities, Include Files and Libraries
bsd43_troff   -- ES/os 4.3 BSD Troff Utilities and Libraries
bsd43_dvlp    -- ES/os 4.3 BSD Include Files and Libraries
reconfig      -- Kernel Binary Reconfiguration Components
emacs         -- emacs
posix         -- ES/os POSIX P1003.1 Include Files, Commands and Libraries
uucp          -  UUCP
sccs          -- SCCS
news_readers  -- News Readers
games         -- Games
mh            -- mh

========== selecting subpackages ==========
```

Note: For the default configuration, only the following subpackages will be installed at the factory: root, m120-x, usr, cmplrs, man, and bsd43. These subpackages are REQUIRED. You may choose to install any or all of the remaining subpackages depending on your needs and how much disk space you have. At this printing the "default" installation uses @57000 Kbytes. If you install everything available on this tape, you will need @117000 Kbytes.

```
You may select all of the above subpackages by answering "y" to the
following question. If you answer "n" then you will be asked to select the
optional subpackages you would like to have installed.

Install ALL subpackages (y n) [n]? n -> See Configuration Information. Page
4-2

When asked if you want to install a subpackage, please answer with one of
the following:

 y - Yes, you want to install the subpackage
 n - No, you do NOT want to install the subpackage
 l - List the contents of the subpackage and ask me again
```

```
Subpackage root will be installed
Subpackage m120-1 will be installed
Subpackage usr will be installed

Install subpackage usr_help (1 y n) [n]? n
Install subpackage usr_dvlp (1 y n) [n]? n
Install subpackage usr_terms (1 y n) [n]? n
Install subpackage cmplrs (1 y n) [n]? y
Install subpackage cmplrs-bsd43 (1 y n) [n]? n
Install subpackage man (1 y n) [n]? y
Install subpackage bsd43 (1 y n) [n]? y
Install subpackage bsd43_troff (1 y n) [n]? n
Install subpackage bsd43_dvlp (1 y n) [n]? n
Install subpackage reconfig (1 y n) [n]? n
Install subpackage emacs (1 y n) [n]? n
Install subpackage posix (1 y n) [n]? n
Install subpackage uucp (1 y n) [n]? n
Install subpackage sccs (1 y n) [n]? n
Install subpackage news_readers (1 y n) [n]? n
Install subpackage games (1 y n) [n]? n
Install subpackage mh (1 y n) [n]? n

Selected subpackages:
 root m120-1 usr cmplrs man bsd43
Is this what you want (y n) [y]? y

========== setting system clock/calendar ==========

The current value of the clock is: Thu Aug 30 14:10:44 PDT 1990
Is the clock correct (y n) [y]? <CR>

========== verifying single-user mode ==========

The system is in a single-user run level.

Please answer "y" to the following question unless you really understand
the consequences.

Do you want to install sash to the volume header (y n) [y]? <CR>

========== installing sash to volume header ==========

========== determining /usr partition ==========
```

```
--------------------------------------------------------------------------
Partition Megs Mounted File System or Partition Usage
--------------------------------------------------------------------------
3 /dev/dsk/isc0d0s3 578 -**** Available Partition ****-
4 /dev/dsk/isc0d0s4 376 -**** Available Partition ****-
5 /dev/dsk/isc0d0s5 188 -**** Available Partition ****-
6 /dev/dsk/isc0d0s6 564 -**** Available Partition ****-
--------------------------------------------------------------------------
Disk Device /dev/dsk/isc0d0s2 632 Mbytes Total Size
--------------------------------------------------------------------------
Possible partitions to use are marked by -**** Available Partition ****-
 select either partition 3, 4, 5 or 6
Which partition should /usr be installed on [6]? <CR>
/usr partition will be installed on partition 6

========== initializing filesystems ==========

A scratch install of an operating system package is being performed from
the miniroot. Normally in this case the filesystems are initialized. When
a filesystem is initialized, any existing data will be lost. You will be
given a chance to override initialization of each individual filesystem
below.

Initialize filesystems (y n) [y]? <CR>
Disk type for controller 0 drive 0 [94171]? <CR>
Initialize filesystem on /dev/root (y n) [y]? <CR>
Initialize filesystem on /dev/usr (y n) [y]? <CR>

---------- Note: Takes @12 minutes until next user response ----------

Initializing the filesystem on /dev/root...
/dev/root: 46080 sectors in 180 cylinders of 1 tracks, 256 sectors
 23.6Mb in 12 cyl groups (16 c/g, 2.10Mb/g, 832 i/g)
super-block backups (for fsck -b#) at:
 32, 4128, 8224, 12320, 16416, 20512, 24608, 28704, 32800, 36896,
 40992, 45088,
rotational delay between contiguous blocks changes from 7ms to 0ms

Checking the filesystem on /dev/root...
** /dev/root
** Last Mounted on
** Phase 1 - Check Blocks and Sizes
** Phase 2 - Check Pathnames
```

```
** Phase 3 - Check Connectivity
** Phase 4 - Check Reference Counts
** Phase 5 - Check Cyl groups
2 files, 9 used, 21574 free (14 frags, 2695 blocks, 0.1% fragmentation)

Initializing the filesystem on /dev/usr...

/dev/usr: 1154304 sectors in 4509 cylinders of 1 tracks, 256 sectors
 591.0Mb in 282 cyl groups (16 c/g, 2.10Mb/g, 896 i/g)
super-block backups (for fsck -b#) at:
 32, 4128, 8224, 12320, 16416, 20512, 24608, 28704, 32800, 36896,
 40992, 45088, 49184, 53280, 57376, 61472, 65568, 69664, 73760, 77856,
 81952, 86048, 90144, 94240, 98336, 102432, 106528, 110624, 114720, 118816,
 122912, 127008, 131104, 135200, 139296, 143392, 147488, 151584, 155680,
159776,
 163872, 167968, 172064, 176160, 180256, 184352, 188448, 192544, 196640,
200736,
 204832, 208928, 213024, 217120, 221216, 225312, 229408, 233504, 237600,
241696,
 245792, 249888, 253984, 258080, 262176, 266272, 270368, 274464, 278560,
282656,
 286752, 290848, 294944, 299040, 303136, 307232, 311328, 315424, 319520,
323616,
 327712, 331808, 335904, 340000, 344096, 348192, 352288, 356384, 360480,
364576,
 368672, 372768, 376864, 380960, 385056, 389152, 393248, 397344, 401440,
405536,
 409632, 413728, 417824, 421920, 426016, 430112, 434208, 438304, 442400,
446496,
 450592, 454688, 458784, 462880, 466976, 471072, 475168, 479264, 483360,
487456,
rotational delay between contiguous blocks changes from 7ms to 0ms

Checking the filesystem on /dev/usr...
** /dev/usr
** Last Mounted on
** Phase 1 - Check Blocks and Sizes
** Phase 2 - Check Pathnames
** Phase 3 - Check Connectivity
** Phase 4 - Check Reference Counts
** Phase 5 - Check Cyl groups
2 files, 9 used, 541026 free (10 frags, 67627 blocks, 0.0% fragmentation)

========== mounting filesystems ==========
```

```
/dev/root mounted on /mnt
/dev/usr mounted on /mnt/usr
------------------------------------------------------------------------
Partition Megs Mounted File System or Partition Usage
------------------------------------------------------------------------
0 /dev/dsk/isc0d0s0 23 /dev/root
1 /dev/dsk/isc0d0s1 33 /
6 /dev/dsk/isc0d0s6 564 /dev/usr
7 /dev/dsk/isc0d0s7 14 -**** Available Partition ****-
------------------------------------------------------------------------
Disk Device /dev/dsk/isc0d0s2 632 Mbytes Total Size
------------------------------------------------------------------------
Do you wish to change swap partition configuration (y n) [n]? <CR>

========== verifying disk space ==========

Do you want to check for space (please do so unless you really understand
the consequences) (y n) [y]? y

---------- Note: Takes @30 minutes til next user response ----------

The system will now be checked to verify that there is enough disk space
with the current configuration to successfully install the package (and any
selected optional subpackages). For large packages (especially operating
system packages), this can be time consuming...

There is enough space.

========== extracting files from subpackage archives ==========

rewinding the tape...
Verifying tape id... ok
Forward spacing the tape...

Loading subpackage: root...
Forward spacing the tape...
Loading subpackage: m120-3...
Forward spacing the tape...
Loading subpackage: usr...
Forward spacing the tape...
Loading subpackage: cmplrs...
Forward spacing the tape...
Loading subpackage: man...
Forward spacing the tape...
Loading subpackage: bsd43...
```

```
Forward spacing the tape...
rewinding the tape...

========== making device special files ==========
```

Note: You must obtain the appropriate information from your network manager or from your old **local_hostname** file before completing this section.

```
running MKDEV...
done.

========== running comply ==========

running first comply pass...
running second comply pass...

Note: Ignore any comply messages...

========== doing uncompress Thu Aug 30 15:27:31 PDT 1990 ==========

uncompress usr/bin/admin.Z
uncompress usr/bin/at.Z

(Uncompresses Occur Here)

uncompress usr/bin/chkey.Z
uncompress usr/new/mh/whatnow.Z
uncompress usr/new/mh/whom.Z
```

Once again, before you can type "y" to the next questions, your system administrator must provide you with the following information:

1) System hostname.
2) Netmask.
3) Broadcast address.
4) Net address.
5) Domain name for your site.

The following entries are given for example ONLY!

```
Do you wish to configure the network (y n) [n]? y

========== making special network files ==========

Set hostname [no_hostname]? tonto

Set netmask [0xffff0000]? 0xffffff00
Set broadcast address [255.255.255.0]? 130.187.85.0
Set net address [127.1.0.0]? 130.187.85.156
Should we create the /etc/local_hostname file (y n) [y]? y

tonto 130.187.85.156
Should we add the above entry to the /etc/hosts file (y n) [y]? y

Set domain name [your-NIS-domain]? utah.edu
Should we create the /etc/local_domainname file (y n) [y]? y

========== cleaning up ==========

Copying packaging information directory to /mnt/usr/pkg/lib/ESos2.3...
Copying miniroot fstab to installed system...
Unmounting filesystems...
/mnt/usr: Unmounted
/mnt: Unmounted

========== installation complete ==========
```

****

Warning: If this is a Local Server or Diskless Node Install - **STOP**, do not proceed further using these instructions. Instead, go to the Diskless Node 2.3 Installation Instructions and continue with the **#sync; sync** command found in those instructions.

****

```
# sync; sync
# telinit 0
#
INIT: New run level: 0

Miniroot shutdown

E&S CPU Board MIPS Monitor Version 5.00 MIPS OPT Mon Feb 18 15:00:28 MST
1991
```

```
Copyright 1988, MIPS Computer Systems Inc., All Rights Reserved
Memory size: 33554432 (0x2000000) bytes
Icache size: 65536 (0x10000) bytes
Dcache size: 65536 (0x10000) bytes
>> auto

Autoboot: Waiting to load dkis(0,0,8)sash (CTRL-C to abort, RETURN to
expedite) <CR>
loading
120544+23088+170432 entry: 0xa0300000
MIPS Standalone Shell Version 5.00 MIPS OPT Mon Feb 18 08:39:23 MDT 1991

Loading dkis(0,0,0)/unix
846208+101360+789520 entry: 0x80021000
CPU: MIPS R3000 Processor Chip Revision: 2.0
FPU: MIPS R3010 VLSI Floating Point Chip Revision: 2.0

ES/os Release 2.3 ESV Version R_100
Total real memory = 33554432
Available memory = 31170560
abminit: ARS/HIC not present.
arsinit: ARS/HIC not present.
installing VME vector: addr 0x8007FFA4 ipl 2, vec 0xE0 unit 0
installing VME vector: addr 0x8007FFA4 ipl 2, vec 0xE0 unit 0
Root fstype ffs
Available memory = 29478912

Checking root file system () if necessary.
The system is coming up. Please wait.

***** Normally all file systems are fscked.
***** To fsck only dirty ones, type 'yes' within 5 seconds:
***** All file systems will be fscked.
/dev/usr: 6199 files, 109289 used, 431746 free (2882 frags, 53608 blocks,
0.5% fragmentation)
/dev/usr mounted on /usr
No process accounting on this system
Aug 31 07:19:19 tonto unix: CPU: MIPS R3000 Processor Chip Revision: 2.0
Aug 31 07:19:19 tonto unix: FPU: MIPS R3010 VLSI Floating Point Chip
Revision: 2.0
Aug 31 07:19:20 tonto unix:
Aug 31 07:19:20 tonto unix: Total real memory = 33554432
Aug 31 07:19:20 tonto unix: Available memory = 31170560
Aug 31 07:19:20 tonto unix: abminit: ARS/HIC not present.
```

```
Aug 31 07:19:20 tonto unix: arsinit: ARS/HIC not present.
Aug 31 07:19:21 tonto unix: installing VME vector: addr 0x8007FFA4 ipl 2,
vec 0xE0
unit 0
Aug 31 07:19:21 tonto unix: installing VME vector: addr 0x8007FFA4 ipl 2,
vec 0xE0
unit 0
Aug 31 07:19:21 tonto unix: Root fstype ffs
Aug 31 07:19:21 tonto unix: Available memory = 29478912
checking for system core dump...
Internet daemons: routed snmpd snmptrapd portmap inetd timed(slave).
Export file systems
NFS daemons: nfsd biod lockd statd.
Aug 31 07:19:32 tonto rpc.statd[139]: enter statd_init
Aug 31 07:19:32 tonto rpc.statd[139]: 1
Aug 31 07:19:32 tonto rpc.statd[139]: local state = 1
Starting lpd
The system is ready.

tonto Console login:
```

Warning: The System Manager will want to create passwords for the **root**, **fstest**, and **esdemo** accounts using the **passwd** command while logged in as each of these. These accounts provide a security hole until you do so.

Restoring Saved Files from Second Disk

1) Login as **root**.
2) Type **mkdir /<*disk2Name*>** (where ***disk2Name*** is the name of your second disk).
3) Type **mount /dev/dsk/isc0d1<*sx*> /<*disk2Name*>** (where ***sx*** is the partition number you used to create the filesystem on the second disk).
4) You should compare the files you saved with the newly installed version (using **diff**). If the system portions of the files have changed, you may need to edit your saved files to include the system changes.
5) Now copy saved files from where you saved them on **<*disk2Name*>** to their respective **/etc** locations.
6) Type **cd /tmp**
7) Type **mount -a** to mount any **nfs** disks specified in **/etc/fstab**.

Restoring Saved Files from Tape

1) Login as **root**.
2) Type `cd /tmp`
3) Insert backup tape into tape drive.
4) Type `/bin/tar -xv`
5) You should compare the files you saved with the newly installed version (using **diff**). If the system portions of the files have changed, you may need to edit your saved files to include the system changes.
6) Now copy saved files from **/tmp/etc** to their respective **/etc** locations.

Final Important Note

In order for **xman** to see all manual pages newly installed on the system, you will need to run the **make.xman.sections** script using the instructions found previously in the "**make.xman.sections** Manual Page Setup Script" section of these notes. Perform these instructions after you have installed all software tapes provided.

End of installation

ES/PEX 2.3 Server Tape Installation

In the following procedure, system output is shown in `typewriter normal` font, and user responses are shown in **`typewriter bold`** font. All user responses should be typed as shown and entered with a carriage return **<CR>**.

Caution: It is recommended that YOU are the only user logged onto the machine while loading this software. The X server must not be running when you do this installation.

Installation Procedure Begins Here

1) Insert ES/PEX 2.3 Server tape into the drive.
2) If you are at the **xdm** login prompt (login box) then enter **ALT F4**.
3) Login as **root**.
4) Type **ps -e**
   Look for the line that contains the process name xdm. If the process exists, using the process ID number located in the first column, type:

   kill <*process id number*>

5) Type **cd /**
6) Type **/usr/pkg/bin/inst**

```
Software Package Installation
Install package relative to where [/]? <CR>
Please mount the (first, if multiple tapes) distribution tape, then press
return... <CR>

Rewinding the tape...
Verifying tape id... ok

Extracting packaging information tree... pexs2.3

Installation Information:

Packages will be read in from the local Q24 tape drive.
Machine type: m120-2

Is the information above correct? (y n) [y]? y

========== checking subpackages ==========

The following subpackages may be installed:
```

```
executables_s -- PEX 2.3 Executable Release
library_s -- PEX 2.3 Library Release
pexs-man -- PEX 2.3 Man Page Release
fstest -- fstest Release
xclients_s -- PEX 2.3 XClients Release
pexs-man-unformat -- Unformatted Man Page Release
demo_s -- Demo_s Release
contrib_s -- Contrib_s Release

========== selecting subpackages ==========

You may select all of the above subpackages by answering "y" to the
following question. If you answer "n" then you will be asked to select the
optional subpackages you would like to have installed.

Install ALL subpackages (y n) [n]? y

========== setting system clock/calendar ==========

The current value of the clock is: Wed Jun 26 14:11:11 PDT 1991
Is the clock correct (y n) [y]? y

========== verifying single-user mode ==========

This system is not presently in a single-user run level. Installation of a
package can fail if performed at this run level. We recommend that the
system be brought to a single user run level (using "init S") prior to
performing the installation.

Are you absolutely sure you wish to continue (y n) [n]? y

========== preserving local files ==========

Running preserve -s for subpackage executables_s... 0 files preserved.
No preserve list or findmods list for library_s- preserve not executed.
No preserve list or findmods list for pexs-man- preserve not executed.
No preserve list or findmods list for fstest- preserve not executed.
No preserve list or findmods list for xclients_s- preserve not executed.
No preserve list or findmods list for pexs-man-unformat- preserve not
executed.
No preserve list or findmods list for demo_s- preserve not executed.
No preserve list or findmods list for contrib_s- preserve not executed.

========== verifying disk space ==========
```

```
Do you want to check for space (please do so unless you really understand
the consequences) (y n) [y]? y

The system will now be checked to verify that there is enough disk space
with the current configuration to successfully install the package (and any
selected optional subpackages). For large packages (especially operating
system packages), this can be time consuming...

There is enough space.

========== stripping old links ==========

Stripping links for subpackage executables_s...
Stripping links for subpackage library_s...
Stripping links for subpackage pexs-man...
Stripping links for subpackage fstest...
Stripping links for subpackage xclients_s...
Stripping links for subpackage pexs-man-unformat_s...
Stripping links for subpackage demo_s...
Stripping links for subpackage contrib_s...

========== extracting files from subpackage archives ==========

rewinding the tape...
Verifying tape id... ok
Forward spacing the tape...

Loading subpackage: executables_s...
Forward spacing the tape...
Loading subpackage: library_s...
Forward spacing the tape...
Loading subpackage: pexs-man...
Forward spacing the tape...
Loading subpackage: fstest...
Forward spacing the tape...
Loading subpackage: xclients_s...
Forward spacing the tape...
Loading subpackage: pexs-man-unformat_s...
Forward spacing the tape...
Loading subpackage: demo_s...
Forward spacing the tape...
Loading subpackage: contrib_s...
Forward spacing the tape...
rewinding the tape...
```

```
========== running comply ==========

running first comply pass...
running second comply pass...
There were no comply messages from the second pass.

========== doing uncompress Wed Jun 26 14:28:18 PDT 1991 ==========

========== cleaning up old versions ==========

An attempt will now be made to clean up any files left over from previous
versions of the software which has just been installed.

Searching for old versions to remove...
Note: Type y to any cleanup messages that may appear here.

========== restoring preserved user files ==========

Running preserve -r for subpackage executables_s...
No preserve list or findmods list for library_s- no files restored.
No preserve list or findmods list for pexs-man- no files restored.
No preserve list or findmods list for fstest- no files restored.
No preserve list or findmods list for xclients_s- no files restored.
No preserve list or findmods list for pexs-man-unformat_s- no files
restored.
No preserve list or findmods list for demo_s- no files restored.
No preserve list or findmods list for contrib_s- no files restored.

========== running conversion scripts ==========

========== pexs-man.conversion Wed Jun 26 14:28:33 PDT 1991 ==========

Manpage Conversion...

Making x_man -> catman/x_man softlink...
Making P_man -> catman/P_man softlink...

Done.
========== cleaning up ==========

Remove install tools (y n) [n]? y

========== installation complete ==========
#
```

If you are upgrading from a release prior to 2.0 (such as 1.3), your **/usr/lib/X11/pex_config.dat** file from prior releases may have been preserved. However, without modification it will not work with the 2.3 Release.

Before PEX clients can be run, the file **/usr/lib/X11/pex_config.dat** must be modified to update the **MAX_TABLE_ENTRIES** in the **COLOUR_APPROXIMATION_TABLE** from 0 to 256. To do this, find the following lines in the file **/usr/lib/pex_config.dat**:

```
COLOUR_APPROXIMATION_TABLE
        START_INDEX 0
        MAX_TABLE_ENTRIES 0
        NUMBER_PREDEFINED 0
        FIRST_PREDEFINED_INDEX 0
        LAST_PREDEFINED_INDEX 0
```

Change the following line,

```
        MAX_TABLE_ENTRIES 0
```

to read,

```
        MAX_TABLE_ENTRIES 256
```

Also, the following line should be entered on line 4 of the **pex_config.dat** file (the line before the `LINE_BUNDLE_TABLE` entry):

```
        NAME_SET_SIZE 64
```

ES/PEX 2.3 Library Tape Installation

In the following procedure, system output is shown in `typewriter normal` font, and user responses are shown in **`typewriter bold`** font. All user responses should be typed as shown and entered with a carriage return **<CR>**.

Caution: It is recommended that YOU are the only user logged onto the machine while loading this software.

Installation Procedure Begins Here

1) Insert ES/PEX 2.3 Library tape into the drive.
2) If you are at the **xdm** login window box, type **ALT-F4**.
3) Login as **root**.
4) Type **cd /**
5) Type **/usr/pkg/bin/inst**

```
Software package installation

Install package relative to where [/]? <CR>

Please mount the (first, if multiple tapes) distribution tape, then press
return... <CR>
Rewinding the tape...
Verifying tape id... ok

Extracting packaging information tree... pexl2.3

Installation Information:

Packages will be read in from the local Q24 tape drive.
Machine type: m120-2

Is the information above correct? (y n) [y]? y

========== checking subpackages ==========

The following subpackages may be installed:

executables_1 -- PEX 2.3 Executable Release
library_1 -- PEX 2.3 Library Release
cdrs_library_1 -- PEX 2.3 CDRS Library Release
pexl-man -- PEX 2.3 Man Pages
pexl-man-unformat -- PEX 2.3 Unformatted Man Pages
```

```
========== selecting subpackages ==========

You may select all of the above subpackages by answering "y" to the
following question. If you answer "n" then you will be asked to select the
optional subpackages you would like to have installed.

Install ALL subpackages (y n) [n]? n - See Configuration Information - page
4-2


When asked if you want to install a subpackage, please answer with one of
the following:

y - Yes, you want to install the subpackage
n - No, you do NOT want to install the subpackage
l - List the contents of the subpackage and ask me again

Install subpackage executables_l (l y n) [n]? y
Install subpackage library_l (l y n) [n]? y
Install subpackage cdrs_library_l (l y n) [n]? n
Install subpackage pexl-man (l y n) [n]? y
Install subpackage pexl-man-unformat (l y n) [n]? y

Selected subpackages:
executables_l library_l pexl-man pexl-man-unformat
Is this what you want (y n) [y]? y

========== setting system clock/calendar ==========

The current value of the clock is: Thu Jun 27 13:27:19 MDT 1991
Is the clock correct (y n) [y]? y

========== verifying single-user mode ==========

This system is not presently in a single-user run level. Installation of a
package can fail if performed at this run level. We recommend that the
system be brought to a single user run level (using "init S") prior to
performing the installation.

Are you absolutely sure you wish to continue (y n) [n]? y

========== preserving local files ==========

No preserve list or findmods list for executables_l- preserve not executed.
```

```
No preserve list or findmods list for library_1- preserve not executed.
No preserve list or findmods list for pexl-man- preserve not executed.
No preserve list or findmods list for pexl-man-unformat- preserve not
executed.

========== verifying disk space ==========

Do you want to check for space (please do so unless you really understand
the consequences) (y n) [y]? y

The system will now be checked to verify that there is enough disk space
with the current configuration to successfully install the package (and any
selected optional subpackages). For large packages (especially operating
system packages), this can be time consuming...

There is enough space.

========== stripping old links ==========

Stripping links for subpackage executables_1...
Stripping links for subpackage library_1...
Stripping links for subpackage pexl-man...
Stripping links for subpackage pexl-man-unformat...

========== extracting files from subpackage archives ==========

rewinding the tape...
Verifying tape id... ok
Forward spacing the tape...

Loading subpackage: executables_1...
Forward spacing the tape...
Loading subpackage: library_1...
Forward spacing the tape...
Forward spacing the tape...
Loading subpackage: pexl-man...
Forward spacing the tape...
Loading subpackage: pexl-man-unformat...
Forward spacing the tape...
rewinding the tape...

========== running comply ==========

running first comply pass...
running second comply pass...
```

```
There were no comply messages from the second pass.

========== doing uncompress Thu Jun 27 14:00:32 MDT 1991 ==========

========== cleaning up old versions ==========

An attempt will now be made to clean up any files left over from previous
versions of the software which has just been installed.

Searching for old versions to remove...
Clean up pexl.library_1 2.2 (y n) [n]? y
Clean up pexl.pexl-man 2.2 (y n) [n]? y
Clean up pexl.pexl-man-unformat 2.2 (y n) [n]? y

========== restoring preserved user files ==========

No preserve list or findmods list for executables_1- no files restored.
No preserve list or findmods list for library_1- no files restored.
No preserve list or findmods list for pexl-man- no files restored.
No preserve list or findmods list for pexl-man-unformat- no files restored.

========== running conversion scripts ==========

========== pexl-man.conversion Thu Jun 27 14:01:42 MDT 1991 ==========

Manpage Conversion...

x_man exists
P_man exists
C_man exists
m_man exists
man3 exists

Done.

========== cleaning up ==========

Remove install tools (y n) [n]? y

========== installation complete ==========

#
```

ES/PSX 2.3 Tape Installation

In the following procedure, system output is shown in `typewriter normal` font, and user responses are shown in **`typewriter bold`** font. All user responses should be typed as shown and entered with a carriage return **<CR>**.

Caution: It is recommended that YOU be the only user logged onto the machine while loading this software.

Installation Procedure Begins Here

1) Insert ES/PSX 2.3 tape into the drive.
2) If you are at the **xdm** login window box, type **ALT-F4**.
3) Login as **root**.
4) Type **cd /**
5) Type **/usr/pkg/bin/inst**

```
Software package installation

Install package relative to where [/]? <CR>
Please mount the (first, if multiple tapes) distribution tape, then press
return... <CR>
Rewinding the tape...
Verifying tape id... ok

Extracting packaging information tree... psx2.3

Installation Information:

Packages will be read in from the local Q24 tape drive.
Machine type: m120

Is the information above correct? (y n) [y]? <CR>

========== checking subpackages ==========

The following subpackages may be installed:

psx          -- PSX 2.3 Release

========== selecting subpackages ==========
```

```
You may select all of the above subpackages by answering "y" to the
following question. If you answer "n" then you will be asked to select the
optional subpackages you would like to have installed.

Install ALL subpackages (y n) [n]? y

========== setting system clock/calendar ==========

The current value of the clock is: Wed Sep 26 09:58:24 PDT 1990
Is the clock correct (y n) [y]? <CR>

========== verifying single-user mode ==========

This system is not presently in a single-user run level. Installation of a
package can fail if performed at this run level. We recommend that the
system be brought to a single user run level (using "init S") prior to
performing the installation.

Are you absolutely sure you wish to continue (y n) [n]? y

========== preserving local files ==========

No preserve list or findmods list for psx- preserve not executed.

========== verifying disk space ==========

Do you want to check for space (please do so unless you really understand
the consequences) (y n) [y]? <CR>

The system will now be checked to verify that there is enough disk space
with the current configuration to successfully install the package (and any
selected optional subpackages). For large packages (especially operating
system packages), this can be time consuming...

There is enough space.
```

If you see this type of error message:

```
space: error: fstabind(): couldn't find device file for dev=0x1439
```

there is a filesystem linked through NFS to another system which must be removed before the installation can be performed.

```
========== stripping old links ==========
```

```
Stripping links for subpackage psx...

========== extracting files from subpackage archives ==========

rewinding the tape...
Verifying tape id... ok
Forward spacing the tape...

Loading subpackage: psx...
Forward spacing the tape...
rewinding the tape...

========== running comply ==========

running first comply pass...
running second comply pass...
There were no comply messages from the second pass.

========== doing uncompress Wed Sep 26 10:01:10 PDT 1990 ==========

========== cleaning up old versions ==========

An attempt will now be made to clean up any files left over from previous
versions of the software which has just been installed.

Searching for old versions to remove...

========== restoring preserved user files ==========

No preserve list or findmods list for psx- no files restored.

========== cleaning up ==========

Remove install tools (y n) [n]? y

========== installation complete ==========
```

Pascal RISCompiler 2.20 Tape Installation

In the following procedure, system output is shown in `typewriter normal` font, and user responses are shown in **`typewriter bold`** font. All user responses should be typed as shown and entered with a carriage return **<CR>**.

Installation Procedure Begins Here

Caution: It is recommended that YOU be the only user logged onto the machine while loading this software.

1) Insert the Pascal RISCompiler 2.20 tape into the drive.
2) If you are at the **xdm** login window box, type **ALT-F4**.
3) Login as **root**.
4) Type **cd /**
5) Type **/usr/pkg/bin/inst**

```
Software package installation

Install package relative to where [/]? <CR>

Please mount the (first, if multiple tapes) distribution tape, then press
return... <CR>
Rewinding the tape...
Verifying tape id... ok

Extracting packaging information tree... pascal2.20

Installation Information:

Packages will be read in from the local Q24 tape drive.
Machine type: m120-1

Is the information above correct? (y n) [y]? y

========== checking subpackages ==========

The following subpackages may be installed:

cmplrs            -- MIPS-C
cmplrs-bsd43      -- MIPS-C 4.3 BSD Libraries
cmplrs-man        -- MIPS-C Manual Pages
pascal            -- MIPS-Pascal
pascal-bsd43      -- MIPS-Pascal 4.3 BSD Libraries
```

```
pascal-man          -- MIPS-Pascal Manual Pages

========== selecting subpackages ==========

You may select all of the above subpackages by answering "y" to the
following question. If you answer "n" then you will be asked to select the
optional subpackages you would like to have installed.

Install ALL subpackages (y n) [n]? n

When asked if you want to install a subpackage, please answer with one of
the following:

 y - Yes, you want to install the subpackage
 n - No, you do NOT want to install the subpackage
 l - List the contents of the subpackage and ask me again

Install subpackage cmplrs (l y n) [n]? n
Install subpackage cmplrs-bsd43 (l y n) [n]? n
Install subpackage cmplrs-man (l y n) [n]? n
Install subpackage pascal (l y n) [n]? y
Install subpackage pascal-bsd43 (l y n) [n]? y
Install subpackage pascal-man (l y n) [n]? y

Selected subpackages:
pascal pascal-bsd43 pascal-man
Is this what you want (y n) [y]? y

========== setting system clock/calendar ==========

The current value of the clock is: Mon Jun 3 14:42:49 MDT 1991
Is the clock correct (y n) [y]? y

========== verifying single-user mode ==========

This system is not presently in a single-user run level. Installation of a
package can fail if performed at this run level. We recommend that the
system be brought to a single user run level (using "init S") prior to
performing the installation.

Are you absolutely sure you wish to continue (y n) [n]? y

========== preserving local files ==========
```

```
No preserve list or findmods list for pascal- preserve not executed.
No preserve list or findmods list for pascal-bsd43- preserve not executed.
No preserve list or findmods list for pascal-man- preserve not executed.

========== verifying disk space ==========

Do you want to check for space (please do so unless you really understand
the consequences) (y n) [y]? y

The system will now be checked to verify that there is enough disk space
with the current configuration to successfully install the package (and any
selected optional subpackages). For large packages (especially operating
system packages), this can be time consuming...

There is enough space.

========== stripping old links ==========

Stripping links for subpackage pascal...
Stripping links for subpackage pascal-bsd43...
Stripping links for subpackage pascal-man...

========== extracting files from subpackage archives ==========

rewinding the tape...
Verifying tape id... ok
Forward spacing the tape...

Forward spacing the tape...
Loading subpackage: pascal...
Forward spacing the tape...
Loading subpackage: pascal-bsd43...
Forward spacing the tape...
Loading subpackage: pascal-man...
Forward spacing the tape...
rewinding the tape...

========== running comply ==========

running first comply pass...
running second comply pass...
There were no comply messages from the second pass.

========== doing uncompress Mon Jun 3 14:48:30 MDT 1991 ==========
```

```
========== cleaning up old versions ==========

An attempt will now be made to clean up any files left over from previous
versions of the software which has just been installed.

Searching for old versions to remove...

========== restoring preserved user files ==========

No preserve list or findmods list for pascal- no files restored.
No preserve list or findmods list for pascal-bsd43- no files restored.
No preserve list or findmods list for pascal-man- no files restored.

========== cleaning up ==========

Remove install tools (y n) [n]? y

========== installation complete ==========

#
```

Now run the install script to compile a small Pascal test program.

```
# /usr/lib/cmplrs/pc2.20/checkinstall
Compiling and linking test program
Executing test program...

MIPS-Pascal RISCompiler

The compiler installation completed.
```

If the script succeeds the installation has completed successfully, otherwise please call Evans & Sutherland for assistance.

FORTRAN RISCompiler 2.20 Tape Installation

In the following procedure, system output is shown in `typewriter normal` font, and user responses are shown in **`typewriter bold`** font. All user responses should be typed as shown and entered with a carriage return **<CR>**.

Caution: It is recommended that YOU be the only user logged onto the machine while loading this software.

1) Insert FORTRAN RISCompiler 2.20 tape into the drive.
2) If you are at the **xdm** login window box, type **ALT-F4**.
3) Login as root.
4) Type **cd /**
5) Type **/usr/pkg/bin/inst**

```
Software package installation

Install package relative to where [/]? <CR>

Please mount the (first, if multiple tapes) distribution tape, then press
return... <CR>
Rewinding the tape...
Verifying tape id... ok

Extracting packaging information tree... f772.20

Installation Information:

Packages will be read in from the local Q24 tape drive.
Machine type: m120-1

Is the information above correct? (y n) [y]? y

========== checking subpackages ==========

The following subpackages may be installed:

cmplrs            -- MIPS-C
cmplrs-bsd43      -- MIPS-C 4.3 BSD Libraries
cmplrs-man        -- MIPS-C Manual Pages
f77               -- MIPS-FORTRAN
f77-bsd43         -- MIPS-FORTRAN 4.3 BSD Libraries
f77-man           -- MIPS-FORTRAN Manual Pages
```

```
========== selecting subpackages ==========

You may select all of the above subpackages by answering "y" to the
following question. If you answer "n" then you will be asked to select the
optional subpackages you would like to have installed.

Install ALL subpackages (y n) [n]? n

When asked if you want to install a subpackage, please answer with one of
the following:

 y - Yes, you want to install the subpackage
 n - No, you do NOT want to install the subpackage
 l - List the contents of the subpackage and ask me again

Install subpackage cmplrs (l y n) [n]? n
Install subpackage cmplrs-bsd43 (l y n) [n]? n
Install subpackage cmplrs-man (l y n) [n]? n
Install subpackage f77 (l y n) [n]? y
Install subpackage f77-bsd43 (l y n) [n]? y
Install subpackage f77-man (l y n) [n]? y

Selected subpackages:
 f77 f77-bsd43 f77-man
Is this what you want (y n) [y]? y

========== setting system clock/calendar ==========

The current value of the clock is: Mon Jun 3 14:28:09 MDT 1991
Is the clock correct (y n) [y]? y

========== verifying single-user mode ==========

This system is not presently in a single-user run level. Installation of a
package can fail if performed at this run level. We recommend that the
system be brought to a single user run level (using "init S") prior to
performing the installation.

Are you absolutely sure you wish to continue (y n) [n]? y

========== preserving local files ==========

No preserve list or findmods list for f77- preserve not executed.
No preserve list or findmods list for f77-bsd43- preserve not executed.
```

```
No preserve list or findmods list for f77-man- preserve not executed.

========== verifying disk space ==========

Do you want to check for space (please do so unless you really
understand the consequences) (y n) [y]? y

The system will now be checked to verify that there is enough disk space
with the current configuration to successfully install the package (and any
selected optional subpackages). For large packages (especially operating
system packages), this can be time consuming...

There is enough space.

========== stripping old links ==========

Stripping links for subpackage f77...
Stripping links for subpackage f77-bsd43...
Stripping links for subpackage f77-man...

========== extracting files from subpackage archives ==========

rewinding the tape...
Verifying tape id... ok
Forward spacing the tape...

Forward spacing the tape...
Loading subpackage: f77...
Forward spacing the tape...
Loading subpackage: f77-bsd43...
Forward spacing the tape...
Loading subpackage: f77-man...
Forward spacing the tape...
rewinding the tape...

========== running comply ==========

running first comply pass...
running second comply pass...
There were no comply messages from the second pass.

========== doing uncompress Mon Jun 3 14:35:39 MDT 1991 ==========

========== cleaning up old versions ==========
```

```
An attempt will now be made to clean up any files left over from previous
versions of the software which has just been installed.

Searching for old versions to remove...

========== restoring preserved user files ==========

No preserve list or findmods list for cmplrs- no files restored.
No preserve list or findmods list for cmplrs-bsd43- no files restored.
No preserve list or findmods list for cmplrs-man- no files restored.
No preserve list or findmods list for f77- no files restored.
No preserve list or findmods list for f77-bsd43- no files restored.
No preserve list or findmods list for f77-man- no files restored.

========== cleaning up ==========

Remove install tools (y n) [n]? y

========== installation complete ==========

#
```

Now run the install script to compile a small FORTRAN test program:

```
# /usr/lib/cmplrs/f772.20/checkinstall
Compiling and linking test program...
Executing test program...

MIPS-FORTRAN RISCompiler

The compiler installation completed.
```

If the script succeeds the installation has completed successfully, otherwise please call Evans & Sutherland for assistance.

ES/Dnet 2.2.2 Tape Installation

In the following procedure, system output is shown in `typewriter normal` font, and user responses are shown in **`typewriter bold`** font. All user responses should be typed as shown and entered with a carriage return **<CR>**.

Caution: It is recommended that YOU be the only user logged onto the machine while loading this software.

1) In order for the ES/Dnet installation to work correctly, no ES/Dnet processes should be running on the system. To stop Decnet, type **`/etc/init.d/decnet stop`**
2) Insert ES/Dnet 2.2.2 tape into the drive.
3) If you are at the **xdm** login window box, type ALT-F4.
4) Login as **root**.
5) Type **`cd /`**
6) Type **`/usr/pkg/bin/inst`**

```
Software package installation

Install package relative to where [/]? <CR>
Please mount the (first, if multiple tapes) distribution tape, then press
return... <CR>
Rewinding the tape...
Verifying tape id... ok

Extracting packaging information tree... esdnet2.2.2

Installation Information:

Packages will be read in from the local Q24 tape drive.
Machine type: m120

Is the information above correct? (y n) [y]? <CR>

========== checking subpackages ==========

The following subpackages may be installed:

esdnet       -- ES/Dnet Release

========== selecting subpackages ==========
```

```
You may select all of the above subpackages by answering "y" to the
following question. If you answer "n" then you will be asked to select the
optional subpackages you would like to have installed.

Install ALL subpackages (y n) [n]? y

========== setting system clock/calendar ==========

The current value of the clock is: Thu Oct 4 09:43:52 MDT 1990
Is the clock correct (y n) [y]? <CR>

========== verifying single-user mode ==========

This system is not presently in a single-user run level. Installation of a
package can fail if performed at this run level. We recommend that the
system be brought to a single user run level (using "init S") prior to
performing the installation.

Are you absolutely sure you wish to continue (y n) [n]? y

========== preserving local files ==========

No preserve list or findmods list for esdnet- preserve not executed.

========== verifying disk space ==========

Do you want to check for space (please do so unless you really understand
the consequences) (y n) [y]? y

The system will now be checked to verify that there is enough disk space
with the current configuration to successfully install the package (and any
selected optional subpackages). For large packages (especially operating
system packages), this can be time consuming...

There is enough space.

========== stripping old links ==========

Stripping links for subpackage esdnet...

========== extracting files from subpackage archives ==========

rewinding the tape...
Verifying tape id... ok
Forward spacing the tape...
```

```
Loading subpackage: esdnet...
Forward spacing the tape...
rewinding the tape...

========== running comply ==========
running first comply pass...
running second comply pass...
There were no comply messages from the second pass.

========== doing uncompress Thu Oct 4 09:47:18 MDT 1990 ==========

========== cleaning up old versions ==========

An attempt will now be made to clean up any files left over from previous
versions of the software which has just been installed.

Searching for old versions to remove...
Clean up esdnet.esdnet 2.0 (y n) [n]? y
Removing leftover files from esdnet.esdnet 2.0...

There are no longer any boms present for any subpackages from
//usr/pkg/lib/esdnet2.0 version 2.0. This probably indicates that no
subpackages installed from this package are still present on this system.

Remove the packaging information tree for this package (y n) [y]? <CR>

========== restoring preserved user files ==========

No preserve list or findmods list for esdnet- no files restored.

========== cleaning up ==========

Remove install tools (y n) [n]? y

========== installation complete ==========
```

Installing the Software Key

The ES/Dnet license key is normally installed on the system at the factory. If this is a customer installed option and/or the **/etc/ki_pwd** file does not already exist, call the Field Service Hotline at **1-800-582-4375** to obtain the key.

Using any editor, create the file **/etc/ki_pwd**. Enter the *Software Key Number* on one line of the file, with no spaces before, or between, any of the 18 digits.

If you have already installed the LAT Host Services software, this file will already exist. In this case, enter the ES/Dnet key before the existing key.

Installing the ES/Dnet Software

Run the installation script located in **/usr/etc/esdnet/dna/bin/install.dna**. The following example shows the installation of the ES/Dnet software. The names and numbers used in the user responses are for example only.

> **Note:** The DECnet name is a maximum of six (6) characters. Therefore, it may be different from your system name.

```
ES/Dnet Installation procedure
ln -s /usr/etc/esdnet/dna /usr/etc/dna
ln -s /usr/etc/esdnet/dna/bin/uninstall.dna /usr/etc/uninstall.dna
ln -s /usr/etc/esdnet/dna/bin/install.dna /usr/etc/install.dna
ln -s /usr/etc/esdnet/dna/bin/config.dna /usr/etc/config.dna
To continue, you must know the DECnet node number and name that has been
assigned for your host and for a remote node (which has a DECnet database).
If you do not know these, press <ENTER> and rerun this installation later
by executing '/usr/etc/install.dna'
Do you wish to continue? [Y/N]
y
What is your DECnet node name [keyhole]?
keyhol
What is your DECnet area number [1]?
1
What is your DECnet node number?
59
Defining local node 'keyhol' as DECnet address 1.59
What is the remote DECnet node name?
rd780b
What is the remote DECnet area number [1]?
1
What is the remote DECnet node number?
2
Defining remote node 'rd780b' as DECnet address 1.2
Saving configuration commands in /usr/etc/esdnet/dna/database/ncp.cmd
Would you like to see the ncp.cmd file now? [Y/N]
y
!
! File Generated By ES/Dnet Version 1.4.3
! Generated On Thu Feb 22 18:24:21 1990
!
!
```

```
! First we should let DECnet know what our local address is:
Define Executor Address 1.59
!
! OK, Now for the Executor Characteristics:
Set Executor Buffer Size 1461
Set Hello Timer 15 Seconds
Set Inactivity Timer 60 Seconds
Set Incoming Timer 120 Seconds
Set Outgoing Timer 90 Seconds
Set Keepalive Timer 300 Seconds

!
!Need to know the LAN Device Name
Set LAN Device Name la0

!
!And now to define all the nodes:
!
Set Node    1.2   Name rd780b
Set Node    1.2   Hardware Address AA-00-04-00-02-04
Set Node    1.2   Identification rd780b

Set Node    1.59  Name keyhol
Set Node    1.59  Hardware Address AA-00-04-00-3B-04
Set Node    1.59  Identification keyhole

!
! And now to define all the objects:
!
Set Object d_server Number 17 File /usr/etc/dna/bin/d_server
Set Object mirror Number 25 File /usr/etc/dna/bin/mirror
Set Object dnamaild Number 27 File /usr/etc/dna/bin/dnamaild

If you want to know about options that can be used when starting ES/Dnet,
you can use the "-help" option, i.e.:
            % deknet -help
Would you like to see this help display now? [Y/N]
n
Installation complete
To start ES/Dnet, type the following:
/etc/init.d/deknet start
```

Downloading the DECnet Database

To download the DECnet Database, run the following script: **/usr/etc/config.dna**

The script will ask for the *username*, *password*, and *node name* of the VAX/VMS machine. The following is a typical example.

```
Enter username for remote node
rbass
Enter password for remote node
(password will not be echoed)
Enter remote node name
rd780b
The script will now update the DECnet Database without any more input.
Username: RBASS
Password:
Welcome to VAX/VMS version V5.2 on node RD780B
Last interactive login on Thursday, 15-FEB-1990 15:48
Last non-interactive login on Wednesday, 14-FEB-1990 19:27
(RD780b) $
(RD780b) $
(RD780b) $
(RD780b) $
(RD780b) $ ncp :== $ncp
(RD780b) $ ncp show known nodes
Known Node Volatile Summary as of 15-FEB-1990 16:38:35
Executor node = 1.2 (RD780B)
State                    = on
Identification           = DECnet-VAX V5.2, VMS V5.2
Node              State        Active   Delay   Circuit   Next
                               Links                      Node
1.1 (PARK)        unreachable
1.3 (TRAIN)       reachable                     UNA-0     1.3 (TRAIN)
1.4 (CAD780)      reachable                     UNA-0     1.4 (CAD780)
1.306 (SPVAX2)    reachable                     UNA-0     1.35 (ESIMSA)
1.309 (CTVS09)    reachable                     UNA-0     1.309 (CTVS09)
(RD780b) $ logout
RBASS        logged out at 15-FEB-1990 16:38:46.18
SETHOST for ES/Dnet version 1.4.3
Remote Session Terminated. Returning control to local system
Using command file 'test.cmd'
NCP>!
NCP>! File Generated By CVTNCP on Thu Feb 15 16:41:18 1990
NCP>! Released with ES/Dnet Version 1.4.3
NCP>!
```

```
NCP>
NCP> Set Node 1.2 Name RD780B
NCP> Set Node 1.2 ident DECnet-VAX V5.2, VMS V5.2
NCP> Set Node 1.1 Name PARK
NCP> Set Node 1.3 Name TRAIN
NCP> Set Node 1.306 Name SPVAX2
NCP> Set Node 1.309 Name CTVS09
NCP> *** EOF ***
Updating database with changes
NCP Execution Complete
```

Update the running database with the following command:

```
/usr/etc/dna/bin/updb
```

AVS 3.0 Tape Installation

In the following procedure, system output is shown in `typewriter normal` font, and user responses are shown in **`typewriter bold`** font. All user responses should be typed as shown and entered with a carriage return **<CR>**.

Caution: It is recommended that YOU be the only user logged onto the machine while loading this software.

1) Insert AVS 3.0 tape into the drive.
2) If you are at the **xdm** login window box, type **ALT-F4**.
3) Login as **root**.
4) Type **cd /**
5) Type **/usr/pkg/bin/inst**

```
Software package installation

Install package relative to where [/]? <CR>

Please mount the (first, if multiple tapes) distribution tape, then press
return... <CR>

Rewinding the tape...
Verifying tape id... ok
Extracting packaging information tree... avs3.0

Installation Information:
Packages will be read in from the local Q24 tape drive.
Machine type: m120-2
Is the information above correct? (y n) [y]? y

========== checking subpackages ==========

The following subpackages may be installed:

avs          -- AVS3 Release

========== selecting subpackages ==========

You may select all of the above subpackages by answering "y" to the
following question. If you answer "n" then you will be asked to
select the optional subpackages you would like to have installed.

Install ALL subpackages (y n) [n]? y
```

```
========== setting system clock/calendar ==========
The current value of the clock is: Tue Jul 23 09:42:54 MDT 1991
Is the clock correct (y n) [y]? y

========== verifying single-user mode ==========

This system is not presently in a single-user run level. Installation of a
package can fail if performed at this run level. We recommend that the
system be brought to a single user run level (using "init S") prior to
performing the installation.

Are you absolutely sure you wish to continue (y n) [n]? y

========== preserving local files ==========

No preserve list or findmods list for avs- preserve not executed.

========== verifying disk space ==========

Do you want to check for space (please do so unless you really understand
the consequences) (y n) [y]? y

The system will now be checked to verify that there is enough disk space
with the current configuration to successfully install the package (and any
selected optional subpackages). For large packages (especially operating
system packages), this can be time consuming...

There is enough space.

========== stripping old links ==========

Stripping links for subpackage avs...

========== extracting files from subpackage archives ==========

rewinding the tape...
Verifying tape id... ok
Forward spacing the tape...

Loading subpackage: avs...
Forward spacing the tape...
rewinding the tape...

========== running comply ==========
```

```
running first comply pass...
running second comply pass...
There were no comply messages from the second pass.
========== doing uncompress Tue Jul 23 09:58:24 MDT 1991 ==========

========== cleaning up old versions ==========

An attempt will now be made to clean up any files left over from previous
versions of the software which has just been installed.

Searching for old versions to remove...

========== restoring preserved user files ==========

No preserve list or findmods list for avs- no files restored.

========== cleaning up ==========

Remove install tools (y n) [n]? y

========== installation complete ==========
```

LAT Host Services 2.2 Tape Installation

Before Installation

Before you install LAT Host Services, you must have the following information:

- The *Factory Ethernet Address* of your ESV Workstation. Enter the following command to get this address:

/usr/etc/factaddr

```
Factory Ethernet Address __ - __ - __ - __ - __ - __
```

Note that you must be logged in as **root** and that both LAT and ES/Dnet must be stopped for this to work. If you need to stop these programs, use the command **/etc/init.d/deknet stop**.

The LAT Host Services *Software Key Number* (18 digits). This license key is normally installed on the system at the factory. If the **/etc/ki_pwd** file does not exist, call the Field Service Hotline at **1-800-582-4375** to obtain the key.

- You will be asked for the *System Type* (ESV Workstation) and the *Factory Ethernet Address*.

Software Key Number_____

Loading the LAT Host Services Software

In the following procedure, system output is shown in `typewriter normal` font, and user responses are shown in **`typewriter bold`** font. All user responses should be typed as shown and entered with a carriage return **<CR>**.

Installation Procedure Begins Here

You must be logged on the system as **root**.

Caution: It is recommended that YOU be the only user logged onto the machine while loading this software.

1) Insert LAT Host Services 2.2 tape into the drive.
2) If you are at the **xdm** login window box, type **ALT-F4**.
3) Login as **root**.
4) Type **cd /**
5) Type **/usr/pkg/bin/inst**

```
Software package installation
Install package relative to where [/]? <CR>
Please mount the (first, if multiple tapes) distribution tape, then press
return... <CR>
Rewinding the tape...
Verifying tape id... ok
Extracting packaging information tree... eslat2.2
```

```
Installation Information:

Packages will be read in from the local Q24 tape drive.
Machine type: m120
Is the information above correct? (y n) [y]? <CR>
========== checking subpackages ==========

The following subpackages may be installed:

eslat        -- LAT Host Services 5.5.1 Release

========== selecting subpackages ==========

You may select all of the above subpackages by answering "y" to the
following question. If you answer "n" then you will be asked to select the
optional subpackages you would like to have installed.

Install ALL subpackages (y n) [n]? y

========== setting system clock/calendar ==========

The current value of the clock is: Thu Oct 4 09:59:06 MDT 1990
Is the clock correct (y n) [y]? y

========== verifying single-user mode ==========

This system is not presently in a single-user run level. Installation of a
package can fail if performed at this run level. We recommend that the
system be brought to a single user run level (using "init S") prior to
performing the installation.

Are you absolutely sure you wish to continue (y n) [n]? y

========== preserving local files ==========

No preserve list or findmods list for eslat- preserve not executed.

========== verifying disk space ==========

Do you want to check for space (please do so unless you really understand
the consequences) (y n) [y]? y
The system will now be checked to verify that there is enough disk space
with the current configuration to successfully install the package (and any
selected optional subpackages). For large packages (especially operating
system packages), this can be time consuming...
```

```
There is enough space.

========== stripping old links ==========

Stripping links for subpackage eslat...

========== extracting files from subpackage archives ==========

rewinding the tape...
Verifying tape id... ok
Forward spacing the tape...

Loading subpackage: eslat...
Forward spacing the tape...
rewinding the tape...

========== running comply ==========

running first comply pass...
running second comply pass...
There were no comply messages from the second pass.

========== doing uncompress Wed Jul 31 5:00:17 MDT 1991 ==========

========== cleaning up old versions ==========

An attempt will now be made to clean up any files left over from previous
versions of the software which has just been installed.

Searching for old versions to remove...

========== restoring preserved user files ==========

No preserve list or findmods list for eslat- no files restored.

========== cleaning up ==========

Remove install tools (y n) [n]? y

========== installation complete ==========
```

To start LAT Host Services, enter the following command:

/etc/init.d/lat start

Installing the Software Key

Using any editor, create the file **/etc/ki_pwd**. Enter the Software Key Number on one line of this file, with no spaces before, or between, any of the 18 digits.

If you have previously installed the ES/Dnet software, this file will already exist. In this case, enter the LAT key after the existing key. The ES/Dnet software key number goes on the top line, the LAT key goes on the second line.

Diskless Node 2.3 Tape Installation

The following instructions should be used for either a Diskless Node installation or a Local Server installation.

Caution: It is recommended that YOU be the only user logged onto the machine while loading this software.

Before this installation is attempted, make sure you have already installed the ES/os 2.3, and ES/PEX Server 2.3 tapes on the Serving machine. (See installation instructions for these particular tapes.

General Notes

Diskless Node and Local Server machines have very similar installation procedures. For the Local Server installation, an SCPU prefix will appear at all user prompts in the instructions that follow.

Diskless Node Notes

The Diskless Node tape should be installed on an ESV that will be the Serving machine for other ESV Diskless Workstations. This Serving machine should already have had the ES/os 2.3 and ES/PEX Server 2.3 tapes and any other software options installed prior to attempting this install.

Local Server Machine Notes

The Diskless Node tape should be installed on the SCPU (which is the "Serving" CPU). This Serving CPU should already have had the ES/os 2.3 and ES/PEX Server 2.3 tapes and any other software options installed prior to attempting this install.

Disk Space Requirements

The files on tapes used require approximately 400 Mbytes of disk space. This is due to the fact that the ES/os 2.3 tape and the ES/PEX Server 2.3 tapes are installed again during this procedure (but in a different location on the disk).

Items needed for a Diskless Node/Local Server Installation:

- Diskless Node 2.3 tape
- ES/os 2.3tape
- ES/PEX Server 2.3 tape

Before beginning this installation you should know 1) the size of RAM on the GCPU, and 2) the internet address to assign for the GCPU.

In the following procedure, system output is shown in `typewriter normal` font, and user responses are shown in **`typewriter bold`** font. All user responses should be typed as shown and entered with a carriage return **`<CR>`**.

Installation Begins Here

1) Login as **root**.
2) Insert the Diskless Node 2.3 tape into the ESV Serving machine or the Local Server machine.
3) Type **cd /**

```
# sync; sync
# telinit 0
#
INIT: New run level: 0

Miniroot shutdown

E&S CPU Board MIPS Monitor Version 5.00 MIPS OPT Mon Feb 18 15:00:28 MST
1991
Copyright 1988, MIPS Computer Systems Inc., All Rights Reserved
Memory size: 33554432 (0x2000000) bytes
Icache size: 65536 (0x10000) bytes
Dcache size: 65536 (0x10000) bytes
>> boot -f dkis(,,8)sash
138896+27152+175024 entry: 0xa0480000
MIPS Standalone shell Version 5.00 MIPS OPT Mon Feb 18 10:49:00 MST 1991
sash>> boot -f dkis()/unix initarg=s
869264+103616+894624 entry: 0x80021000
CPU: MIPS R3000 Processor Chip Revision: 3.0
FPU: MIPS R3010 VLSI Floating Point Chip Revision: 4.0

ES/os Release 2.2 ESV Version R_100
Total real memory = 33554432
Available memory = 31170560
abminit: ARS/HIC not present.
arsinit: ARS/HIC not present.
installing VME vector: addr 0x8007FB1C ipl 1, vec 0x1 unit 0
Root fstype ffs
Available memory = 62386176

Checking root file system () if necessary.

INIT: SINGLE USER MODE
TERM: (esconsole) <CR>
# fsck.ffs /dev/usr
** /dev/usr
** Last Mounted on /usr
```

```
** Phase 1 - Check Blocks and sizes
** Phase 2 - Check Pathnames
** Phase 3 - Check Connectivity
** Phase 4 - Check Reference Counts
** Phase 5 - Check Cyl Group
6201 files, 109993 used, 431042 free (1946 frags, 53637 blocks, 0.4% frag)
```

4) Type the following:

```
# mount -a
# mkdir -p /usr/diskless/dl_root
# /usr/pkg/bin/inst

Software package installation

Install package relative to where [/]? /usr/diskless/dl_root

Please mount the (first, if multiple tapes) distribution tape, then press
return... <CR>
Rewinding the tape...
Verifying tape id... ok

Extracting packaging information tree... umips-diskless2.2

Installation Information:

Packages will be read in from the local Q24 tape device.
Machine type: m120-x

Is the information above correct? (y n) [y]? y

========== checking subpackages ==========

The following subpackages may be installed:

droot -- Diskless root files
dusr -- Diskless usr files
dvar -- Diskless var files

========== selecting subpackages ==========

You may select all of the above subpackages by answering "y" to the
following question. If you answer "n" then you will be asked to select the
optional subpackages you would like to have installed.
```

```
Install ALL subpackages (y n) [n]? y
========== setting system clock/calendar ==========
The current value of the clock is: Tue Jun 25 12:23:32 PDT 1991
Is the clock correct (y n) [y]? y

========== verifying single-user mode ==========

The system is in a single-user run level.

========== preserving local files ==========

No preserve list or findmods list for droot- preserve not executed.
No preserve list or findmods list for dusr- preserve not executed.
No preserve list or findmods list for dvar- preserve not executed.

========== verifying disk space ==========

Do you want to check for space (please do so unless you really understand
the consequences) (y n) [y]? y

The system will now be checked to verify that there is enough disk space
with the current configuration to successfully install the package (and any
selected optional subpackages). For large packages (especially operating
system packages), this can be time consuming...

There is enough space.

========== stripping old links ==========

Stripping links for subpackage droot...
Stripping links for subpackage dusr...
Stripping links for subpackage dvar...

========== extracting files from subpackage archives ==========

rewinding the tape...
Verifying tape id... ok
Forward spacing the tape...

Loading subpackage: droot...
Forward spacing the tape...
Loading subpackage: dusr...
Forward spacing the tape...
Loading subpackage: dvar...
```

```
Forward spacing the tape...
rewinding the tape...

========== running comply ==========

running first comply pass...
running second comply pass...
There were no comply messages from the second pass.

========== doing uncompress Tue Jun 25 12:25:31 PDT 1991 ==========

========== cleaning up old versions ==========

An attempt will now be made to clean up any files left over from previous
versions of the software which has just been installed.

Searching for old versions to remove...

========== restoring preserved user files ==========

No preserve list or findmods list for droot- no files restored.
No preserve list or findmods list for dusr- no files restored.
No preserve list or findmods list for dvar- no files restored.

========== running conversion scripts ==========

========== droot.conversion Tue Jun 25 12:25:41 PDT 1991 ==========

Diskless Conversion...


Filesystem Type kbytes use avail %use Mounted on
/dev/usr ffs 483820 300583 183237 62% /usr

Kbytes free on the server disk: 183237

WARNING! When asked whether or not you want to perform the space check
please answer "yes"

Press [RETURN] to continue: <CR>
```

You should now install ES/os. Put the ES/os tape 1 in the drive.

```
Software package installation
```

```
Please mount the (first, if multiple tapes) distribution tape, then press
return... <CR>
Rewinding the tape...
Verifying tape id... ok

Extracting packaging information tree... ESos2.2

========== checking subpackages ==========

The following subpackages may be installed:

root -- ES/os Standard Root Filesystem
usr -- ES/os Standard /usr Filesystem
usr_help -- ES/os Standard /usr help facilities
usr_dvlp -- ES/os Standard /usr Development files (header files &
libraries)
usr_terms -- ES/os Standard /usr Miscellaneous Terminal descriptions
cmplrs -- MIPS-C Compiler
cmplrs-bsd43 -- MIPS-C 4.3 BSD Include Files and Libraries
man -- ES/os Utilities and Administration Manual Pages
man_misc -- ES/os SPP Manual Pages
bsd43 -- ES/os 4.3 BSD Utilities
bsd43_troff -- ES/os 4.3 BSD Troff Utilities and Libraries
bsd43_dvlp -- ES/os 4.3 BSD Include Files and Libraries
reconfig -- Kernel Binary Reconfiguration Components
emacs -- emacs
posix -- ES/os POSIX P1003.1 Include Files, Commands and Libraries
uucp -- UUCP
sccs -- SCCS
news_readers -- News Readers
games -- Games
mh -- mh

========== selecting subpackages ==========

You may select all of the above subpackages by answering "y" to the
following question. If you answer "n" then you will be asked to
select the optional subpackages you would like to have installed.

Install ALL subpackages (y n) [n]? n -> See Configuration Information -
page 4-2

When asked if you want to install a subpackage, please answer with one of
the following:
```

```
 y - Yes, you want to install the subpackage
 n - No, you do NOT want to install the subpackage
 l - List the contents of the subpackage and ask me again
Subpackage root will be installed
Subpackage m120-1 will be installed
Subpackage usr will be installed

Install subpackage usr_help (l y n) [n]? n
Install subpackage usr_dvlp (l y n) [n]? n
Install subpackage usr_terms (l y n) [n]? n
Install subpackage cmplrs (l y n) [n]? y
Install subpackage cmplrs-bsd43 (l y n) [n]? n
Install subpackage man (l y n) [n]? y
Install subpackage bsd43 (l y n) [n]? y
Install subpackage bsd43_troff (l y n) [n]? n
Install subpackage bsd43_dvlp (l y n) [n]? n
Install subpackage reconfig (l y n) [n]? n
Install subpackage emacs (l y n) [n]? n
Install subpackage posix (l y n) [n]? n
Install subpackage uucp (l y n) [n]? n
Install subpackage sccs (l y n) [n]? n
Install subpackage news_readers (l y n) [n]? n
Install subpackage games (l y n) [n]? n
Install subpackage mh (l y n) [n]? n

Selected subpackages:
 root m120-1 usr cmplrs man bsd43
Is this what you want (y n) [y]? y

========== preserving local files ==========

Running preserve -s for subpackage root... 0 files preserved.
No preserve list or findmods list for m120-3- preserve not executed.
Running preserve -s for subpackage usr... 0 files preserved.
No preserve list or findmods list for cmplrs- preserve not executed.
No preserve list or findmods list for man- preserve not executed.
No preserve list or findmods list for bsd43- preserve not executed

========== verifying disk space ==========

Do you want to check for space (please do so unless you really understand
the consequences) (y n) [y]? y
```

```
The system will now be checked to verify that there is enough disk space
with the current configuration to successfully install the package (and any
selected optional subpackages). For large packages (especially operating
system packages), this can be time consuming...
There is enough space.

========== stripping old links ==========

Stripping links for subpackage root...
Stripping links for subpackage usr...
Stripping links for subpackage cmplrs...
Stripping links for subpackage man...
Stripping links for subpackage bsd43...

========== extracting files from subpackage archives ==========

rewinding the tape...
Verifying tape id... ok
Forward spacing the tape...

Loading subpackage: root...
Forward spacing the tape...
Forward spacing the tape...
Loading subpackage: usr...
Forward spacing the tape...
Loading subpackage: cmplrs...
Forward spacing the tape...
Loading subpackage: man...
Forward spacing the tape...
Loading subpackage: bsd43...
Forward spacing the tape...
rewinding the tape...

========== running comply ==========

running first comply pass...
running second comply pass...

There were no comply messages...
========== doing uncompress Tue Jun 25 13:59:02 PDT 1991 ==========

uncompress usr/bin/acctcom.Z
uncompress usr/bin/admin.Z
uncompress usr/bin/at.Z
.
```

```
. (Uncompresses Occur Here...)
.
uncompress usr/new/mh/vmh.Z
uncompress usr/new/mh/whatnow.Z
uncompress usr/new/mh/whom.Z

========== cleaning up old versions ==========

An attempt will now be made to clean up any files left over from previous
versions of the software which has just been installed.

Searching for old versions to remove...

Type "y" to any Clean up prompts.

========== restoring preserved user files ==========

Running preserve -r for subpackage root...
Running preserve -r for subpackage usr...
No preserve list or findmods list for cmplrs- no files restored.
No preserve list or findmods list for man- no files restored.
No preserve list or findmods list for bsd43- no files restored.

========== running conversion scripts ==========

========== root.fstab Tue Jun 25 14:09:56 PDT 1991 ==========

========== cleaning up ==========

Remove install tools (y n) [n]? y

========== installation complete ==========

Are you going to use ES/PEX Server 2.3 on any of the clients? (y n) [y]? y

You should now install ES/PEX Server 2.3. Put the ES/PEX Server tape in the
drive. <CR>


Software package installation

Please mount the (first, if multiple tapes) distribution tape, then press
return... <CR>
rewinding the tape...
```

```
Verifying tape id... ok

Extracting packaging information tree... pexs2.3
========== checking subpackages ==========

The following subpackages may be installed:

executables_s -- PEX 2.3 Executable Release
library_s -- PEX 2.3 Library Release
pexs-man -- PEX 2.3 Man Page Release
fstest       -- fstest Release
xclients_s -- PEX 2.3 XClients Release
pexs-man-unformat -- Unformatted Man Page Release
demo_s       -- Demo_s Release
contrib_s -- X Contributed clients

========== selecting subpackages ==========

You may select all of the above subpackages by answering "y" to the
following question. If you answer "n" then you will be asked to select the
optional subpackages you would like to have installed.

Install ALL subpackages (y n) [n]? --> See Configuration Information

========== setting system clock/calendar ==========

The current value of the clock is: Fri Mar 22 16:37:04 MST 1991
Is the clock correct (y n) [y]? y

========== verifying single-user mode ==========

This system is not presently in a single-user run level. Installation of a
package can fail if performed at this run level. We recommend that the
system be brought to a single user run level (using "init S") prior to
performing the installation.

Are you absolutely sure you wish to continue (y n) [n]? y

========== preserving local files ==========

Running preserve -s for subpackage executables_s... 2 files preserved.
No preserve list or findmods list for library_s- preserve not executed.
No preserve list or findmods list for pexs-man- preserve not executed.
No preserve list or findmods list for fstest- preserve not executed.
No preserve list or findmods list for xclients_s- preserve not executed.
```

```
No preserve list or findmods list for pexs-man-unformat- preserve not
executed.
No preserve list or findmods list for demo_s- preserve not executed.
No preserve list or findmods list for contrib_s- preserve not executed.

========== verifying disk space ==========

Do you want to check for space (please do so unless you really understand
the consequences) (y n) [y]? y

The system will now be checked to verify that there is enough disk space
with the current configuration to successfully install the package (and any
selected optional subpackages). For large packages (especially operating
system packages), this can be time consuming...

There is enough space.

========== stripping old links ==========

Stripping links for subpackage executables_s...
Stripping links for subpackage library_s...
Stripping links for subpackage pexs-man...
Stripping links for subpackage fstest...
Stripping links for subpackage xclients_s...
Stripping links for subpackage pexs-man-unformat...
Stripping links for subpackage demo_s...
Stripping links for subpackage contrib_s...

========== extracting files from subpackage archives ==========

rewinding the tape...
Verifying tape id... ok
Forward spacing the tape...

Loading subpackage: executables_s...
Forward spacing the tape...
Loading subpackage: library_s...
Forward spacing the tape...
Loading subpackage: pexs-man...
Forward spacing the tape...
Loading subpackage: fstest...
Forward spacing the tape...
Loading subpackage: xclients_s...
Forward spacing the tape...
Loading subpackage: pexs-man-unformat...
```

```
Forward spacing the tape...
Loading subpackage: demo_s...
Forward spacing the tape...
Loading subpackage: contrib_s...
Forward spacing the tape...
rewinding the tape...

========== running comply ==========

running first comply pass...
running second comply pass...
There were no comply messages from the second pass.

========== cleaning up old versions ==========

An attempt will now be made to clean up any files left over from previous
versions of the software which has just been installed.

Searching for old versions to remove...

NOTE: These messages appear if you have a previous version
 of ES/PEX Server installed on your system.

Clean up pexs.executables_s 2.2 (y n) [n]? y
Clean up pexs.library_s 2.2 (y n) [n]? y
Clean up pexs.pexs-man 2.2 (y n) [n]? y
Clean up pexs.fstest 2.2 (y n) [n]? y

There are no longer any boms present for any subpackages from
//usr/pkg/lib/pexs2.2 version 2.2. This probably indicates that no
subpackages installed from this package are still present on the system.

Remove the packaging information tree for this package (y n) [y]? y

========== restoring preserved user files ==========

Running preserve -r for subpackage executables_s...
No preserve list or findmods list for library_s- no files restored.
No preserve list or findmods list for pexs-man- no files restored.
No preserve list or findmods list for fstest- no files restored.
No preserve list or findmods list for xclients_s- no files restored.
No preserve list or findmods list for pexs-man-unformat- no files restored.
No preserve list or findmods list for demo_s- no files restored.
No preserve list or findmods list for contrib_s- no files restored.
```

```
========== running conversion scripts ==========

========== pexs-man.conversion Tue Jun 25 15:09:45 PDT 1991 ==========

Manpage Conversion...

x_man exists
P_man exists

Done.

========== cleaning up ==========

Remove install tools (y n) [n]? y

========== doing uncompress Tue Jun 25 15:09:02 PDT 1991 ==========

========== installation complete ==========

Fixing up all the directories and links...
mv: posix: No such file or directory
rmdir: usr/new/lib/emacs/lock: Directory does not exist
ln: Symbolic link ../../../../var/lib/emacs/lock to usr/new/lib/emacs/
lock: No such file or directory
Doing comply for ES/os 2.2 files and directories...

Comply Pass 1... done.
Comply Pass 2... done.

Doing comply for ES/PEX 2.3 files and directories...

Comply Pass 1... done.
Comply Pass 2... done.

No comply errors.

Building diskless database directory and files...
Done.

========== cleaning up ==========

Remove install tools (y n) [n]? y

========== installation complete ==========
```

```
# cd /usr/disklessDB
# ./client.setup

MIPS diskless client installation

Operation (add clone modify move del) [add]? add

Is this client a 25Mhz CPU? (y n) [y]? n
New Client Machine Name? []? toddler (for example only)

Is this client the gcpu of an LS system (y n) [n]? y
Enter toddler's inet address [130.187.100.xx]? 130.187.100.50
Adding toddler to /etc/hosts.
Mode (master slave client none) [none]? none

Note: Your swap space size should be twice the physical memory of the
Client.

Swap Space Size [32M]? 32M
Client Root Directory [/usr/diskless/clients/toddler]? <CR>
Client Swap File Directory [/usr/diskless/clients/toddler]? <CR>
Client Dump File Directory [/usr/diskless/clients/toddler]? <CR>
Read Only usr Directory [/usr/diskless/dl_usr]? <CR>

Building environment for toddler.
Copying root directory... done.
Copying var directory... done.
Creating swap file... done.
Building devices... done.
Copying /etc/hosts for toddler
Creating etc/fstab for toddler
Creating etc/local_hostname for toddler
Adding toddler to /etc/bootparams
Adding toddler to /usr/etc/exports

Running /usr/etc/exportfs...
exported /usr/diskless/dl_usr
exported /usr/diskless/clients/toddler
done.
Creating link in /tftpboot for toddler

Starting /etc/rpc.bootparamd... done.
```

```
# sync; sync
# telinit 0

>> auto (follow normal boot procedure at this point)

Autoboot: waiting to load lcs()tftboot/gcpu (CTRL-C to abort, RETURN to
expedite) <CR>
```

For Local Server systems, you will need to boot the second CPU the same as above.

```
Installation is now complete.
```

Kodak Printer 2.2 Tape Installation

In the following procedure, system output is shown in `typewriter normal` font, and user responses are shown in **`typewriter bold`** font. All user responses should be typed as shown and entered with a carriage return **<CR>**.

Installation Procedure Begins Here

Caution: It is recommended that YOU be the only user logged onto the machine while loading this software.

1) Insert Kodak Printer 2.2 tape into the drive.
2) If you are at the **xdm** login window box, type **ALT-F4**.
3) Login as **root**.
4) Type **cd /**
5) Type **/usr/pkg/bin/inst**

```
Software package installation

Install package relative to where [/]? <CR>

Please mount the (first, if multiple tapes) distribution tape, then press
return... <CR>
Rewinding the tape...
Verifying tape id... ok

Extracting packaging information tree... kodak2.2

Installation Information:

Packages will be read in from the local Q24 tape drive.
Machine type: m120-1

Is the information above correct? (y n) [y]? y

========== checking subpackages ==========

The following subpackages may be installed:

kodak        -- Kodak 2.2 Release

========== selecting subpackages ==========

You may select all of the above subpackages by answering "y" to the
following question. If you answer "n" then you will be asked to select the
optional subpackages you would like to have installed.
```

```
Install ALL subpackages (y n) [n]? y

========== setting system clock/calendar ==========

The current value of the clock is: Wed Apr 10 13:25:26 MDT 1991
Is the clock correct (y n) [y]? y

========== verifying single-user mode ==========

This system is not presently in a single-user run level. Installation of a
package can fail if performed at this run level. We recommend that the
system be brought to a single user run level (using "init S") prior to
performing the installation.

Are you absolutely sure you wish to continue (y n) [n]? y

========== preserving local files ==========

No preserve list or findmods list for kodak- preserve not executed.

========== verifying disk space ==========

Do you want to check for space (please do so unless you really understand
the consequences) (y n) [y]? y

The system will now be checked to verify that there is enough disk space
with the current configuration to successfully install the package (and any
selected optional subpackages). For large packages (especially operating
system packages), this can be time consuming...

There is enough space.

========== stripping old links ==========

Stripping links for subpackage kodak...

========== extracting files from subpackage archives ==========

rewinding the tape...
Verifying tape id... ok
Forward spacing the tape...
Loading subpackage: kodak...
Forward spacing the tape...
rewinding the tape...
```

```
========== running comply ==========

running first comply pass...
running second comply pass...
There were no comply messages from the second pass.

========== doing uncompress Wed Apr 10 13:26:20 MDT 1991 ==========

========== cleaning up old versions ==========

An attempt will now be made to clean up any files left over from previous
versions of the software which has just been installed.

Searching for old versions to remove...

========== restoring preserved user files ==========

No preserve list or findmods list for kodak- no files restored.

========== cleaning up ==========

Remove install tools (y n) [n]? y

========== installation complete ==========
```

To configure the SCSI printer device for the Kodak Printer, type the following while logged in as **root**:

```
mknod /dev/scsi/printer c 16 80; chmod 666 /dev/scsi/printer

Installation is complete
```

Visix Looking Glass 2.1 Tape Installation

In the following procedure, system output is shown in `typewriter normal` font, and user responses are shown in **`typewriter bold`** font. All user responses should be typed as shown and entered with a carriage return **<CR>**.

Note: Looking Glass is not supported on Local Server systems.

1) Insert Visix Looking Glass 2.1 tape into the drive.

2) Login as **root**.

3) Type **`/usr/pkg/bin/inst`**

```
Software package installation

Install package relative to where [/]? <CR>

Please mount the (first, if multiple tapes) distribution tape, then press
return... <CR>
Rewinding the tape...
Verifying tape id... ok

Extracting packaging information tree... lookglass2.1

Installation Information:

Packages will be read in from the local Q24 tape drive.
Machine type: m120-2

Is the information above correct? (y n) [y]? y

========== checking subpackages ==========

The following subpackages may be installed:

lookglass    -- Visix Looking Glass 2.1

========== selecting subpackages ==========

You may select all of the above subpackages by answering "y" to the
following question. If you answer "n" then you will be asked to select the
optional subpackages you would like to have installed.

Install ALL subpackages (y n) [n]? y

========== setting system clock/calendar ==========
```

```
The current value of the clock is: Fri Sep 13 11:03:08 MDT 1991
Is the clock correct (y n) [y]? y

========== verifying single-user mode ==========

This system is not presently in a single-user run level. Installation of a
package can fail if performed at this run level. We recommend that the
system be brought to a single user run level (using "init S") prior to
performing the installation.

Are you absolutely sure you wish to continue (y n) [n]? y

========== preserving local files ==========

No preserve list or findmods list for lookglass- preserve not executed.

========== verifying disk space ==========

Do you want to check for space (please do so unless you really understand
the consequences) (y n) [y]? y

The system will now be checked to verify that there is enough disk space
with the current configuration to successfully install the package (and any
selected optional subpackages). For large packages (especially operating
system packages), this can be time consuming...

There is enough space.

========== stripping old links ==========

Stripping links for subpackage lookglass...

========== extracting files from subpackage archives ==========

rewinding the tape...
Verifying tape id... ok
Forward spacing the tape...

Loading subpackage: lookglass...
Forward spacing the tape...
rewinding the tape...

========== running comply ==========
```

```
running first comply pass...
running second comply pass...
There were no comply messages from the second pass.
========== doing uncompress Fri Sep 13 11:06:21 MDT 1991 ==========

========== cleaning up old versions ==========

An attempt will now be made to clean up any files left over from previous
versions of the software which has just been installed.

Searching for old versions to remove...

========== restoring preserved user files ==========

No preserve list or findmods list for lookglass- no files restored.

========== cleaning up ==========

Remove install tools (y n) [n]? y

========== installation complete ==========
```

Run the Installation Shell Script

1) Type **cd /usr/visix/install**

2) Type **./lg_install**

```
Looking Glass (C) Copyright 1988-1991, Visix Software Inc.

You can choose the standard installation or the custom installation. The
standard installation procedure links the proper Looking Glass file into
the standard system directories (/etc and /usr/bin).

The custom installation procedure allows you to specify where files are to
be linked, and allows you to handle non-standard systems.

If you are not sure which to do, try the standard installation. If you plan
to install Looking Glass on only one machine and have other machines access
it over the network, you will probably want to use the custom installation
to a unique directory location.

Do you want to perform the standard installation procedure? [y/n/q] y

Logging application directories to /etc/visix.apps...

Creating executable shell script files...
```

```
lg (shell script)
lg_pause (shell script)
lg_convert (shell script)
fss (shell script)
build_db (shell script)
db_build (shell script)
db_remove (shell script)
assigndef (shell script)
ftc (shell script)
vice (shell script)
icon_merge (shell script)
icon_convert (shell script)
vls (shell script)
vls_add (shell script)
vls_del (shell script)
vls_where (shell script)

Linking 'English_United.States_ISO.8859.1' version files...

Assigning access permissions for data files...
lg.hlp
help_images.vr
lg_icons.vr
look.vr
icons.sym
LG_rulebase
exclude.lgdb
Makefile
records.sym
ftdefs.h
records.sym
class.ftc
data.ftc
dev.ftc
gen.ftc
prog.ftc
ftdefs.loc.h
class.loc.ftc
data.loc.ftc
dev.loc.ftc
gen.loc.ftc
prog.loc.ftc
helpwins.vr
colors
```

```
system.vr
vuistrs.vr
lang_time
lang_specs
vice.vr
vice.hlp

Duplicating data files...

Installation complete.
```

Activate the License Keys

1) At the system prompt, enter:

```
/usr/bin/vls_add
```

```
creating new data file '/usr/visix/vls/default/vls.data'
enter license number to add:<enter 1st number here>
enter license number to add:<enter 2nd number here>
enter license number to add:<CR>
database file '/usr/visix/vls/default/vls.data' updated ...
run 'vls -l' to check validity of license numbers
```

2) Once the program has exited, verify that the keys were entered correctly by entering:

```
vls -l
```

3) Check the list of license keys. Make sure that the anticipated number of users and CPUs are able to run Looking Glass. If the numbers were entered correctly, go to next procedure.

   If NOT, you will need to delete the incorrect key(s). Do this by typing the following:

```
vls_del
```

   Enter the mistyped key and press **<CR>**, then exit the script with another **<CR>**.

Authorize License Server Host Machines

This step is only necessary if you intend to run Looking Glass and the License Server on different machines.

1) Type **cd /usr/visix/vls/default**
2) Edit the file **vls.hosts** using a text editor (*i.e.*, **emacs**, **-nw**, or **vi**).
3) Add as the first line of the file the hostname of the system which is running the Visix License Server.
4) Save the file **vls.hosts** with the above changes.
5) Log out of **root**.

Starting Looking Glass for the First Time

1) Login to your user account while in the root screen (blue screen).
2) Add the following lines to your **.Xdefaults** file in your home directory using a text editor of choice (*i.e.*, **emacs**, **-nw**, or **vi**):

```
----- Under the Mwm defaults -----

Mwm*clientAutoPlace: False
Mwm*positionIsFrame: False
```

3) Start the X Server (*i.e.*, **xinit**, **startesvx**, **xdm**)
4) Run the following script while in your home directory logged on as you, by typing:

```
/usr/bin/newLGuser.sh <your username>
===== Installing <your username>
===== Finished with <your username>
```

This script sets up a default factory environment for Looking Glass to use.

> **Caution:** If your system is running "Yellow Pages," you will need to copy a file as follows before typing the commands in steps 5 and 6.
> a) Type `cd /etc`
> b) Type `cp vis.conf.lookglass vis.conf`
> Failure to do this will cause Looking Glass to appear to hang when you type `lg &`

5) Type `vls`
6) Type `lg &`

The software will start with initial preset defaults (*i.e.*, colors, window placement, *etc.*). Any changes you make to these settings during your session will be saved automatically in the **/lg** file in your home directory. Refer to the tutorial for information on changing these defaults.

Automatic Startup of Looking Glass

If you would like Looking Glass to startup at login every time, add the following lines to both your **.xsession** and **.xinitrc** files located in your home directory:*

```
vls
lg &
```

* If these files don't exist in your home directory, you may copy sample **.xsession** and **.xinitrc** files (as well as others) from the directory **/usr/src/samples**. Type `ls -a` to see these files. These files already have the new Looking Glass commands inserted.

A. Documentation Corrections

Note the following corrections to the ESV documentation with the 2.3 Release. Change pages are found after this appendix.

ESV Workstation User's Manual

"3. Getting Started"

The following sample files in **/usr/src/samples** have been updated and minor errors corrected. If you are using any of these files, you may want to replace your working copy with the updated version.

.cshrc
.emacs
.mwmrc
.login
.Xdefaults
.xinitrc
.xsession

"7. Customer Support"

The phone number for the Eastern Field Service Region Manager has been corrected. Replace the appropriate page in the "Customer Support" chapter with the change page provided.

ESV Workstation Reference Manual

"1. ES/PEX"

The **GSE** manual page has been updated to reflect the 2.3 Release functionality. Replace the existing **GSE** manual pages in your documentation with this new version. A manual page has been added for the **ESCAPE -8** function.

Also two **gdp3_id**s have been added to the **GDP3** function. Replace the manual page with the updated version provided.

ESV Workstation Applications and Options

"Helpful Hints"

Helpful hints have been added. Replace the "Helpful Hints" chapter in your documentation with these new pages.

"Application Notes"

Application note 7 has been revised. Replace the existing copy in your documentation with these new pages.

"Stereo User's Manual"

Chapter 2 of the "Stereo User's Manual" has been corrected. Replace your existing chapter 2 with these new pages. If you do not have the stereo option, these pages may be discarded.

"Spaceball User's Manual"

In appendix A, page A-1 of the "Spaceball User's Manual," the installation instructions are incorrect. The following are the corrected instructions.

1) Include the following path in the ***PSX_PATH*** environment variable: **/usr/lib/psx/demo**.

2) Set the environment variable ***PSX_SPACEBALL***. For example:

```
setenv PSX_SPACEBALL /dev/tty#
```

where **#** is the tty port to which the Spaceball is connected.

3) Run ES/PSX.

4) Put the keyboard into command mode by pressing the left mouse button when the cursor is in the "keyboard mode" portion of the **psx** menu.

5) At the **@@** prompt, load the example program by entering the following:

```
send 'gencar.300' to <1>readascii;
send 'sbdemo.300' to <1>readascii;
```

6) After the example program has been loaded, information boxes, notes, and a wire-frame car model will be displayed on the monitor.

7) Spaceball can now be used to control rotations, translations, color hue and saturation, zeroing Spaceball, and resetting the monitor.

8) To end the example program, enter the following at the **@@** prompt:

```
init;
```

Note: Spaceball can be left in a state where it is continuously sending data. Disable it by disconnecting the RS-232-C cable or the power cable.

ES/PSX Document Set, Volume 3

"4. Helpful Hints"

Starting ES/PSX on a Local Server Machine

ES/PSX does not start on a Local Server machine's Graphics CPU (GCPU) if the GCPU's Ethernet interface is not connected to a network and the hostname (**/etc/local_hostname**) is not the same as the client name. The client name for the GCPU is normally **gcpu**. But, the hostname must be set to something other than **gcpu** to give the Ethernet interface a different name than the lcs interface.

ES/PSX fails to start with a message stating that X is not running if the hostname indicates a non-active interface. You may choose not to use the Ethernet interface on the GCPU of a Local Server machine because you have another Ethernet on the server CPU that is likely to be the one connected if you have only one connection for the Local Server machine.

Therefore, if you do not wish to use the Ethernet interface on the GCPU, you can manually set the hostname to **gcpu** prior to starting ES/PSX with the following command. You must be superuser to issue this command.

```
hostname gcpu
```

Q: What is your policy regarding third-party hardware installed in an ESV Workstation?

Customers who install third-party hardware in a ESV Workstation should do everything they can to assure themselves that a system problem is not the fault of the third-party hardware. If a Field Service Engineer makes a site visit, and it is determined that the problem is with the third-party hardware, the customer will be billed for the expenses associated with the visit.

Evans & Sutherland Field Service Organization

Corporate Headquarters, Salt Lake City, Utah	801-582-5847
Dispatch Hot Line	800-582-4375
Gordon Scott, Director of Field Service	801-582-5847
Maurice Smith, Technical Support Manager	801-582-5847
John Wallace, Eastern Field Service Region Manager	513-836-6338
Jim Blatz, Western Field Service Region Manager	916-448-0355

Who to Call

- For normal Field Service business, call the Dispatch Hot Line.
- To schedule an installation, call the Dispatch Hot Line.
- For pricing information, call your local Sales Representative or Corporate Headquarters.
- If you feel you are not being well served, call any person listed above.

Dispatch Hot Line

800-582-4375

Ppoint3 is defined in **phigs.h** as:

```
typedef struct {
        Pfloat    x;        /* x coordinate*/
        Pfloat    y;        /* y coordinate */
        Pfloat    z;        /* z coordinate */
} Ppoint3;
```

gdp3_id An integer specifying the **GDP** to be performed. The following **GDP**s are defined for the ESV Workstation:

PES_GDP_SPHERE
PES_GDP_SPHERE_RADIUS
PES_GDP_SPHERE_COLR
PES_GDP_SPHERE_RADIUS_COLR
PES_GDP_CYLINDER
PES_GDP_CYLINDER_RADIUS
PES_GDP_CYLINDER_COLR
PES_GDP_CYLINDER_RADIUS_COLR
PES_GDP_CIRCLE3
PES_GDP_ARC3

gdp_data A pointer to a **Pgdp_data** union containing the information needed to perform the function specified by ***gdp3_id***.

Pgdp_data is defined in **phigs.h** as:

```
typedef union {

        struct {
        Pint      unused;
        } gdp_r1;
        Pdata     unsupp;     /* unsupported GDP data record */
                              /* implementation dependent */
} Pgdp_data;
```

The ***unsupp*** field in the **Pgse_data** structure is of type **Pdata** which is defined in **phigs.h**:

```
typedef struct {
        size_t    size;       /* size of data */
        char      *data;      /* pointer to individual GDP data */
} Pdata;
```

FORTRAN Input Parameters

N Number of points specified in the **GDP 3**.

PXA, ***PXY***, ***PXZ*** Real arrays containing the *x*, *y*, and *z* components of the point list.

PRIMID Integer specifying the **GDP 3** to be created. The values defined in **esgdp77.h** are as follows:

-1001	***PESGDPSPHERE***	Sphere
-1002	***PESGDPSPHERERADIUS***	Sphere with radius
-1003	**PESGDPSPHERECOLR**	Sphere with color
-1004	**PESGDPSPHERERADIUSCOLR**	Sphere with radius and color
-1005	***PESGDPCYLINDER***	Cylinder
-1006	***PESGDPCYLINDERRADIUS***	Cylinder with radius
-1007	***PESGDPCYLINDERCOLR***	Cylinder with color
-1008	***PESGDPCYLINDERRADIUSCOLR***	Cylinder with radius and color
-1009	***PESGDPPOINTLIST3***	Reserved, do not use
-1010	***PESGDPCIRCLE3***	Circle
-1011	***PESGDPARC3***	Arc

LDR Dimension of ***DATAREC***. This value is returned by the call to **PPREC** to pack ***DATAREC***.

DATAREC Packed data record with **GDP 3** data.

Description

GDP creates an implementation-dependent drawing primitive. On the ESV Series Workstations the following **GDP**s are available:

- Spheres with inherited colour and radius. **(PES_GDP_SPHERE)**
- Spheres with specified radius and inherited colour. **(PES_GDP_SPHERE_RADIUS)**
- Spheres with specified colour and inherited radius. **(PES_GDP_SPHERE_COLR)**
- Spheres with specified radius and colour. **(PES_GDP_SPHERE_RADIUS_COLR)**
- Cylinders with inherited colour and radius. **(PES_GDP_CYLINDER)**
- Cylinders with specified radius and inherited colour. **(PES_GDP_CYLINDER_RADIUS)**
- Cylinders with specified colour and inherited radius. **(PES_GDP_CYLINDER_COLR)**

GENERALIZED STRUCTURE ELEMENT

Name

GENERALIZED STRUCTURE ELEMENT (GSE) - create a **GSE**

C Syntax

void
pgse (*id, gse*)

Pint	***id*;**	**GSE** identifier
Pgse_data	***gse*;**	**GSE** data record

FORTRAN Syntax

SUBROUTINE PGSE(*gseid, ldr, datarec*)

INTEGER	***GSEID***	**GSE** identifier
INTEGER	***LDR***	dimension of data record array
CHARACTER*80	***DATAREC(LDR)***	data record

Required PHIGS Operating States

(PHOP, *, STOP, *)

C Input Parameters

id The identifier of the generalized structure element to insert. Recognized identifiers defined in **esgdp.h** are as follows:

PES_GSE_SPHERE_RADIUS
PES_GSE_SPHERE_DIVISIONS
PES_GSE_CYLINDER_RADIUS
PES_GSE_CYLINDER_DIVISIONS
PES_GSE_STEREO_VIEW_INDICES
PES_GSE_FILLAREA_TOLERANCE
PES_GSE_FRONT_BACK_DISTINGUISH
PES_GSE_POLYLINE_QUALITY
PES_GSE_LINEPATTERN_MASK
PES_GSE_EDGEPATTERN_MASK
PES_GSE_INFORMATION
PES_GSE_TRANSPARENCY
PES_GSE_HIGHLIGHT_MODE
PES_GSE_HIGHLIGHT_COLR

gse A pointer to a **Pgse_data** union containing the information needed to perform the function specified by ***id***. **Pgse_data** is defined in **phigs.h** as follows:

```
typedef union {
struct {
   Pint     unused;
   } gse_r1;
   Pdata    unsupp;          /* Unsupported GSE data */
} Pgse_data;
```

The ***unsupp*** field in the **Pgse_data** structure is of type **Pdata** which is defined in **phigs.h**.

```
typedef struct {
   size_t     size;      /* size of data */
   char       *data;     /* pointer to individual GSE data */
} Pdata;
```

FORTRAN Input Parameters

GSEID Integer specifying the **GDP 3** to be created. The values defined in **esgdp77.h** are as follows:

-1001	***PESGSESPHERERADIUS***	Sphere radius
-1002	***PESGSESPHEREDIVISIONS***	Sphere divisions
-1003	***PESGSECYLINDERRADIUS***	Cylinder radius
-1004	***PESGSECYLINDERDIVISIONS***	Cylinder divisions
-1005	***PESGSESTEREOVIEWINDICES***	Stereo indices
-1006	***PESGSEFILLAREATOLERANCE***	Fill area tolerance
-1007	***PESGSEFRONTBACKDISTINGUISH***	Front/back distinguishing
-1008	***PESGSEPOLYLINEQUALITY***	Line quality
-1009	***PESGSELINEPATTERNMASK***	Line pattern mask
-1010	***PESGSEEDGEPATTERNMASK***	Edge pattern mask
-1011	***PESGSEINFORMATION***	Information
-1012	***PESGSETRANSPARENCY***	Transparency
-1013	***PESGSEHIGHLIGHTMODE***	Highlighting mode
-1014	***PESGSEHIGHLIGHTCOLR***	Highlighting colour

LDR Dimension of ***DATAREC***. This value is returned by the call to **PPREC** to pack ***DATAREC***.

DATAREC Packed data record with **GDP 3** data.

Description

GSE creates an implementation-dependent structure element. On the ESV Series Workstations a **GSE** element may be used to do the following:

- Set the radius of spheres.
  (PES_GSE_SPHERE_RADIUS)
- Set the precision used to render spheres.
  (PES_GSE_SPHERE_DIVISIONS)
- Set the radius of cylinders.
  (PES_GSE_CYLINDER_RADIUS)
- Set the precision used to render cylinders.
  (PES_GSE_CYLINDER_DIVISIONS)
- Set the left and right-eye view indices for stereo.
  (PES_GSE_STEREO_VIEW_INDICES)
- Set the offset distance that separates polylines and fillareas that lie in the same plane.
  (PES_GSE_FILLAREA_TOLERANCE)
- Set the offset value that separates fillarea front and back faces.
  (PES_GSE_FRONT_BACK_DISTINGUISH)
- Set the polyline quality as jaggy or smooth.
  (PES_GSE_POLYLINE_QUALITY)
- Set the line pattern mask.
  (PES_GSE_LINEPATTERN_MASK)
- Set the edge pattern mask.
  (PES_GSE_EDGEPATTERN_MASK)
- Establish a traversal information ID elementor matrix information element.
  (PES_GSE_INFORMATION)
- Set the surface transparency attribute.
  (PES_GSE_TRANSPARENCY)
- Set the highlighting mode.
  (PES_GSE_HIGHLIGHT_MODE)
- Set the highlighting colour.
  (PES_GSE_HIGHLIGHT_COLR)

Execution

If the current edit mode is insert, then **GSE** is inserted into the currently open structure after the element currently pointed to by the element pointer. If the edit mode is replace, then **GSE** replaces the element pointed to by the element

pointer. In either case, the element pointer is updated to point to the new element.

Individual GSEs

Each individual **GSE** is provided its own structure type to hold the data unique to it. The structure should be pointed at by the ***data*** field in the **Pdata** structure described above. Following is a description of each **GSE** and its associated data types and definitions. All of these structures are defined in **esgdp.h**.

Sphere Radius

The Sphere Radius **GSE** establishes the radii of all spheres that do not have radius data as part of the sphere **GDP** element. The radius should be placed in the ***radius*** field of the following structure.

C Structure

```
typedef struct {
    Pfloat      radius;     /* default radius for spheres */
} Pgse_sphere_radius_data;
```

FORTRAN

Format of data to **PPREC** for Sphere Radius.

PESGSESPHERERADIUS

IL	**0**
RL	**1**
RA	**(1)** Radius
SL	**0**

Sphere Divisions

The Sphere Divisions **GSE** establishes the precision with which spheres are drawn. Spheres are drawn with ***div*** number of latitude lines and a corresponding number of longitude lines. The number of divisions should be placed in the ***div*** field of the following structure.

C Structure

```
typedef struct {
    Pint        div;        /* number of lat. and long. divisions */
} Pgse_sphere_div_data;
```

FORTRAN

Format of data to **PPREC** for Sphere Divisions.

PESGSESPHEREDIVISIONS

IL	**1**
IA	**(1)** Number of divisions
RL	**0**
SL	**0**

Cylinder Radius

The Cylinder Radius **GSE** establishes the radii of all cylinders that do not have radius data as part of the cylinder structure element. The radius should be placed in the ***radius*** field of the following structure.

C Structure

```
typedef struct {
    Pfloat      radius;     /* default radius for cylinders */
} Pgse_cyl_radius_data;
```

FORTRAN

Format of data to **PPREC** for Cylinder Radius.

PESGSECYLINDERRADIUS

IL	**0**
RL	**1**
RA	**(1)** Radius
SL	**0**

Cylinder Divisions

The Cylinder Divisions **GSE** establishes the number of sides (2****div*** + 1) that the cylinder is broken into for rendering. A number less than 0 defaults to a reasonable value. The number of divisions should be placed in the ***div*** field of the following structure.

C Structure

```
typedef struct {
    Pint        div;        /* number of lat. and long. divisions */
} Pgse_cyl_div_data;
```

FORTRAN

Format of data to **PPREC** for Cylinder Divisions.

PESGSECYLINDERDIVISIONS

IL	**1**
IA	**(1)** Number of divisions
RL	**0**
SL	**0**

Stereo View Indices

The Stereo View Indices **GSE** provides a more general version of the PHIGS **SET_VIEW_INDICES** structure element, and can be used in place of the **SET_VIEW_INDICES** structure element. This element stores three view table indices: a ***mono*** view index that is used by the structure walker if the structure is being displayed on a regular monoscopic screen; and ***left*** and ***right*** view indices that are used by the structure walker if the structure is being displayed on a stereo screen.

C Structure

```
typedef struct {
    Pint    mono;
    Pint    left;
    Pint    right;
} Pgse_stereo_view_indices;
```

FORTRAN

Format of data to **PPREC** for Stereo View Indices.

PESGSESTEREOVIEWINDICES

IL	**3**
IA	**(1)** Non-stereo view index **(2)** Left eye view index **(3)** Right eye view index
RL	**0**
SL	**0**

Polylines Over Fillarea Tolerance

This **GSE** is used to make polylines appear in front of fillareas when they may lie on the same plane as the fillarea. All polylines and fillarea edges are moved slightly forward relative to the fillarea interior. This **GSE** defines how far forward they are moved. By setting a ***tolerance*** of 0.0, applications forbid polylines from being moved. The tolerance value should be a value between -1.0 and 1.0. Lines are moved in NPC space in front of fillareas. The default is .003.

C Structure

```
typedef struct {
    Pfloat      tolerance;
} Pgse_fillarea_tolerance;
```

FORTRAN

Format of data to **PPREC** for Fillarea Tolerance.

PESGSEFILLAREATOLERANCE

IL	**0**
RL	**1**
RA	**(1)** Tolerance
SL	**0**

Fillarea Front/Back Face Distinguish

To avoid ambiguity where the front and back fillareas of a surface meet (that is, along the silhouette), back fillareas are moved slightly backwards relative to front fillareas. This **GSE** defines how far back to move back fillareas. The ***distinguish*** field below is an integer that is subtracted to the back face z values before sending them to the z-buffer for testing. A value of 2 (the default) is typically sufficient for all back faces. A value of 0 disables any distinguishing between front and back fillareas.

C Structure

```
typedef struct {
    Pint        distinguish;
} Pgse_front_back_distinguish;
```

The polyline over fillarea ***tolerance*** is a float while the front/back face ***distinguish*** is an integer because ***tolerance*** needs to vary depending on the model and may be quite large, while a small constant value is sufficient for ***distinguish***.

FORTRAN

Format of data to **PPREC** for Fillarea Front/Back Face Distinguish.

PESGSEFRONTBACKDISTINGUISH

IL	**0**
RL	**1**
RA	**(1)** Front/back face distinguish
SL	**0**

Polyline Quality

The Polyline Quality **GSE** provides a structure element that enables or disables the anti-aliasing of polylines. If the **PSMOOTH** identifier is used in the ***flag*** field of the following structure, polylines are anti-aliased. If the **PJAGGY** identifier is used, polylines are not anti-aliased.

C Structure

```
typedef enum {
    PSMOOTH,
    PJAGGY
} Pgse_polyline_quality_flag;

typedef struct {
    Pgse_polyline_quality_flag      flag;
} Pgse_polyline_quality;
```

FORTRAN

Format of data to PPREC for Polyline Quality.

PESGSEPOLYLINEQUALITY

IL	**0**
RL	**1**
RA	**(1)** Line quality
SL	**0**

Line Pattern Mask

This **GSE** sets the polyline type to a pattern other than the predefined polyline types. If the polyline type set by a call to the **SET_LINETYPE** function is set to **PES_PLINE_MASK** (defined in **esgdp.h**) the line pattern is taken as defined by this **GSE**. The ***length*** field of the following structure is the number of bits in the pattern, from 1 to 32. Each bit in the pattern represents one pixel: if a bit is set to 1, the corresponding pixel is drawn; if the bit is 0, drawing is suppressed. The bits in the pattern begin with the least significant bit.

C Structure

```
typedef struct {
    Pint        length;        /* must be from 1 to 32 */
    Plong       pattern;
} Pgse_linepattern_mask;
```

FORTRAN

Format of data to **PPREC** for Line Pattern Mask.

PESGSELINEPATTERNMASK

IL	**1**
IA	**(1)** Pattern length
RL	**1**
RA	**(1)** Pattern
SL	**0**

Edge Pattern Mask

This **GSE** sets the fillarea edge type to a pattern other than the predefined edge types. If the edge type set by a call to the **SET_EDGETYPE** function is set to **PES_PLINE_MASK** (defined in **esgdp.h**) the edge pattern is taken as defined by this **GSE**.The ***length*** field of the following structure is the number of bits in the pattern, from 1 to 32. Each bit in the pattern represents one pixel: if a bit is set to 1, the corresponding pixel is drawn; if the bit is 0, drawing is suppressed. The bits in the pattern begin with the least significant bit.

C Structure

```
typedef struct {
    Pint        length;        /* must be from 1 to 32 */
    Plong       pattern;
} Pgse_edgepattern_mask;
```

FORTRAN

Format of data to **PPREC** for Edge Pattern Mask.

PESGSEEDGEPATTERNMASK

IL	**1**
IA	**(1)** Pattern length
RL	**1**
RA	**(1)** Pattern
SL	**0**

Traversal Information

The Traversal Information **GSE** provides a special structure element that is only looked at by the structure walker if a special information traversal has been requested (see the X extension routine **XGetTraversalInfo**). When this **GSE** is traversed, the structure walker buffers either a matrix which is the composite local and global matrices, or a user defined ID. If the ***type*** field in the following structure is set to **PES_INFORMATION_MATRIX**, the composite matrix is buffered and returned to the application. If the ***type*** field is set to **PES_INFORMATION_ID**, the integer placed in the ***id*** field below is buffered and returned to the application. This functionality has been provided to aid molecular modeling applications doing distance monitoring and energy calculations. It could also be used in a number of other settings, such as collision detection.

C Structure

```
typedef enum {
    PES_INFORMATION_MATRIX,
    PES_INFORMATION_ID
} Pes_information_type;

typedef struct {
    Pes_information_type  type;
     union {
    Pint        unused;
    Pint        id;
     } rec;
} Pgse_information_data;
```

FORTRAN

Format of data to **PPREC** for Traversal Information.

PESGSEINFORMATION

If information type is ***id***:

IL	**2**
IA	**(1)** Information type
	(2) Information id
RL	**0**
SL	**0**

If information type is not ***id***:

IL	**1**
IA	**(1)** Information type
RL	**0**
SL	**0**

Transparency

This **GSE** sets the ***transparent*** attribute for surfaces. The attribute is a floating point number from 0.0 to 1.0. A value of 1.0 is the most transparent (almost clear). A value of 0.0 turns the transparency functionality off. The ***data*** field of the **Pdata** structure should point to the following structure.

C Structure

```
typedef struct _Pgse_transparency {
    Pfloat      transparent;  /* Ranges from 0.0 to 1.0 */
} Pgse_transparency;
```

FORTRAN

Format of data to **PPREC** for Transparency.

PESGSETRANSPARENCY

IL	**0**
RL	**1**
RA	**(1)** Transparency
SL	**0**

Highlighting and Blinking

PES_GSE_HIGHLIGHT_MODE sets the highlighting mode for primitives. The highlighting mode can be colour or blinking; the default is colour.

Highlighting is one of the conditional operations that is supported with name sets. (The other conditional operations are picking and invisibility.)

If the ***mode*** field is set to **PES_HIGHLIGHT_COLR** then the highlight colour (set by the highlight colour **GSE**) is used to highlight polyline, marker, and text primitives. These are the only primitives affected by the colour highlight mode.

If the ***mode*** is set to **PES_HIGHLIGHT_BLINKING** then blinking is used to highlight all primitives. For blinking to be enabled the workstation must be set blinkable. This is done by calling an escape routine after the workstation has been opened. The **PUESC_WS_BLINK** escape is the one that enables blinking capability for the workstation. See the **ESCAPE-8** manual page for more information. The ***data*** field of the **Pdata** structure should point to the following structure.

C Structure

```
typedef struct {
    Pes_highlight_mode  mode;
} Pgse_highlight_mode;
typedef enum {
    PES_HIGHLIGHT_COLR,
    PES_HIGHLIGHT_BLINKING
} Pes_highlight_mode;
```

FORTRAN

Format of data to PPREC for Highlight Mode.

PESGSEHIGHLIGHTMODE

IL	**1**	
IA	**(1)**	Mode 0=colour 1=blinking
RL	**0**	
SL	**0**	

PES_GSE_HIGHLIGHT_COLR sets the highlighting colour. If the highlighting mode is set to colour then the specified ***colr*** is used to highlight polyline, marker, and text primitives. The default highlighting colour is white. The ***data*** field of the **Pdata** structure should point to the following structure.

C Structure

```
typedef struct {
    Pgcolr  colr;
} Pgse_highlight_colr;
```

FORTRAN

Format of data to PPREC for Highlight Colour.

PESGSEHIGHLIGHTCOLR

IL	**1** or **2**
IA	**(1)** Colour type **(2)** Colour index if type=0
RL	**0** if colour type =0 **3** if colour type <>0
RA	**(1)** Red **(2)** Green **(3)** Blue
SL	**0**

Errors

Ignoring function, function requires state (PHOP, *, STOP, *)

ESCAPE -8

Name

ESCAPE -8 - enables a workstation to blink primitives for highlighting and sets the blink rate

C Syntax

```
void
pescape ( func_id, in, store, out )
Pint                 func_id;      escape function identifier
Pescape_in_data      *in;          input data for the function
Pstore               store;        not used
Pescape_out_data     *out;         output data
```

Required PHIGS Operating States

(PHOP,WSOP,*, *)

Purpose

ESCAPE -8 enables a workstation to blink primitives for highlighting. This call must be made to allow a workstation to support blinking as a highlighting mode. The blink rate is set with the ***on_duration*** and ***off_duration*** parameters. The blink rate for a workstation may be changed using this escape by just calling it with the new blink rates.

Once a 3D picture has been displayed, if **ESCAPE -8** is called the picture will disappear. To get the picture back, redraw all structures or update the workstation.

C Input Parameters

func_id The function identifier for this escape is **PUESC_WS_BLINK**, which is defined in **phigs.h** to be -8.

in A pointer to a **Pescape_in_data** union, which contains the **escape_in_u8** member used by this escape function. This member is defined in **phigs.h** as follows:

```
struct {
   Pint     ws_id;          /* workstation id */
   Pint     on_duration;
   Pint     off_duration;
} escape_in_u8;             /* workstation blink */
```

ws_id Indicates the workstation which is to support blinking.

on_duration Indicates the number of vertical retraces for which the primitive is visible.

off_duration Indicates the number of vertical retraces for which the primitive is not visible.

store Not used in this escape function.

FORTRAN Input Parameters

PUESCWSBLINK

IL	**3**
IA	**(1)** Workstation id **(2)** On duration **(3)** Off duration
RL	**0**
SL	**0**

C Output Parameters

out Returns an error if the window is not able to support blinking. This member is defined in **phigs.h** as follows:

```
struct {
   Pint     err_ind;
} escape_out_u8;        /* workstation blink */
```

FORTRAN Output Parameters

PUESCWSBLINK

IL	**1**
IA	**(1)** Error indicator
RL	**0**
SL	**0**

Errors

Ignoring function, function requires state (PHOP, WSOP, *, *)
Ignoring function, the specified workstation is not open

See Also

ESCAPE (3P)

GSE (3P)

Table of Contents

1. System Helpful Hints

xdm login manager

Starting xdm

Starting with the 2.2 Release, the **xdm** login manager should be started by means of the **xdm** login account. The **xdm** login is set up so that any user can start **xdm** if it is not running. The **xdm** login handler process is started by logging in from the ESV console with the login

```
username: xdm
password:
```

This login starts the X server and places the **xdm** display manager in control of all subsequent logins from the ESV display screen. The initial **xdm** login is automatically terminated by the system at this point.

This process should be used once when the system is booted and any time when the X server has been terminated, such as by an ALT-F4 to the login window or an X server crash.

This method of starting **xdm** cannot be made an automatic part of the booting process because it requires a login shell. It must be done after completion of the boot. This represents a change from previous software releases (2.0 Release and lower). The advantage of running the **xdm** process within a login shell is better reliability when the X server terminates abnormally (hangs or crashes). Specifically, there is less chance for corruption of system files such as **rgb.dir**.

Administrative tips

Starting with the 2.2 Release, making **/etc/init.d/login-handler** a soft link to the file **/etc/init.d/xdm-login** results in a message being printed on the console at the end of the boot instructing the user to:

```
Login as xdm to start the X server
```

The **xdm** username login requires the following entry in the **/etc/passwd** file:

xdm::98:1:Xdm starter login:/usr/admin:/usr/bin/X11/xdmshell

If the **xdm** username login is not working, check this entry. Some earlier versions of software used a different specification.

If security concerns require setting a password on the **xdm** login, you can login as root and use the **/bin/passwd** command to set one for **xdm**:

```
passwd xdm
```

Note: **xdm** must not be running when you do this, and you cannot **su xdm** to set the password.

The 2.3 Release also provides a utility script that the system administrator can use to stop and/or start the **xdm** process for administrative purposes. When the **root** user is logged in, this script can be executed to stop or restart **xdm** and the X server as follows:

```
/etc/init.d/xdm-start stop
```

or

```
/etc/init.d/xdm-start start; logout
```

System administrators should note that if this script is run to start **xdm** without including "`; logout`" on the same command line, the **root** will remain logged in on the console; and if **xdm** is later killed, there will be an active **root** login.

This utility script also requires the presence of a login shell and cannot be run during the booting process. System administrators requiring that **xdm** start as part of the booting process (not recommended due to the reliability issue previously mentioned) need to set up system scripts to return to previous release methods. Call Software Support if you must do this.

When **xdm** is running, it creates a log file **/usr/tmp/xdm-errors**. This file grows each time an **xdm** login session is started or stopped, or an error occurs. It can safely be removed only by rebooting the system. If your system is not rebooted frequently for other reasons, you should reboot periodically to clear this log file.

Porting from BSD-derived systems

ES/os compiles programs under System V or BSD depending on the following:

- The setting of the ***PATH*** variable in your environment,
- Use of the **-systype** option to the compile command.

In order to successfully compile programs for BSD functionality, you must do one of two things:

1) Use the compile time switch **-systype bsd43** which prepends **/bsd43** to the path for include files and libraries:

```
% cc -systype bsd43 -g -o sample sample.c
```

2) Place **/bsd43/bin** before **/bin** in the ***PATH*** variable in your **.cshrc**, **.profile**, or **.login** file. When you compile, your system goes to the **/bsd43** command directory and uses the BSD **cc** command which contains the switch **-systype bsd43**.

If you want to compile a program for System V functionality and you have placed **/bsd43** in your path prior to **/bin**, you must use the **-systype sysv** switch, as in:

```
% cc -systype sysv -g -o sample sample.c
```

The default compile time switch for **/bin/cc** is **-systype sysv** and the default compile time switch for **/bsd43/bin/cc** is **-systype bsd43**.

Path

The path is a list of directories. It traces a sequential route through the file structure which the system follows to locate a particular command or executable program. The first occurrence of a command found along the path is executed.

BSD extensions

The ESV Workstation is UNIX System V with BSD extensions. Commands on the ESV Workstation default to System V commands, unless the directory specification **/bsd43/bin** is placed in the path. Placing **/bsd43/bin** properly in the path allows the operating system to execute the BSD extension commands.

Because some System V commands have the same name as BSD extensions, the position of **/bsd43/bin** in the path determines which is executed.

C shell and BSD extensions

The default path is determined at login by the system. An example of the default path for the csh is set as follows:

```
set path = (~/bin /usr/net /bsd43/bin /usr/ucb /usr/bin
/bin /usr/new /usr/bin/X11)
```

Generally, everything in this path except the home directory specification is necessary for the proper functioning of your account on the ESV Workstation.

The command **env** shows what is in your current path.

Users of the C shell will probably prefer to use the BSD extensions. Many of these extensions have more options than corresponding System V commands.

The directory **/bsd43/bin** should appear before **/usr/bin** in the path.

You can set the path from the command line. Note that setting the path on the command line is temporary: the effect of variables set on the command line is cancelled by logging out. Use the command **set path** to put in a new command directory at the front of the command line in the C shell.

```
set path = (newcommanddir $path)
```

To put a new command directory at the end of the current path enter

```
set path = ($path newcommanddir)
```

Bourne shell and BSD extensions

The default path for the Bourne shell is as follows:

```
PATH=$HOME/bin:/usr/net:/usr/bin:/bin:/usr/ucb:/usr/new:
/usr/bin/X11:/bsd43
```

Users of the Bourne shell may not want the operating system to default to the BSD extensions when duplicate command names exist. As long as the **/usr/bin** appears before **/bsd43/bin** in the path, the operating system defaults to System V commands.

You can set the path from the command line. Note that setting the path on the command line is temporary: the effect of variables set on the command line is cancelled by logging out. Use the command **PATH** to put in a new command directory at the front of the command line in the Bourne shell.

```
PATH=newcommanddir:$PATH;export PATH
```

To put a new command directory at the end of the current path enter

```
PATH=$PATH:newcommanddir;export PATH
```

Notes

- If you login as **root**, you get System V by default.
- For additional information, refer to the "ES/os Considerations" section in the "Porting Guide" chapter of the *ESV Workstation User's Manual [2.0]*.

Linking libraries

The ESV's X, PEX, and Motif libraries are compiled and linked using UNIX Berkeley (BSD) 4.3. Any applications linking to these libraries must also be compiled and linked using BSD 4.3 with the **-systype bsd43** option to the compiler.

The ESV 2.0 software release changes some of the libraries to which programs must be linked. If you have programs that include PHIGS graphics and Motif, and are written to the new PEX binding specifications the following is the recommended linking order:

```
-lXm -lXt -lPEXapi -lXEandSext -lXinput -lXpick -lXext -lX11 -lsysv -lm
```

where:

`-lXm` is the Motif library.

`-lXt` is the Xtoolkit.

`-lPEXapi` is the PEX library.

`-lXEandSext` is the Evans & Sutherland extensions.

`-lXinput` is the X input extensions.

`-lXpick` is the X picking extensions.

`-lXext` is the X extensions.

`-lX11` is X11R4.

`-lsysv` is a subset of the System V library.

`-lm` is the math library.

If your programs are written to the ES/os 1.3 PEX binding, the following is the recommended linking order:

```
-lXm -lXt -lPEXapi1.3 -lPEXapi -lXEandSext -lXinput -lXpick -lXext \
     -lX11 -lsysv -lm
```

where:

`-lPEXapi1.3` is a thin layer translation of the old 1.3 PEX binding to the new 2.0 PEX binding.

include file declarations

The **include** header files required for a Motif, PEX program should be declared in the program source code using the following formats:

```
#include <X11/Xlib.h>
#include <X11/Intrinsics.h>
#include <Xm/Xm.h>
#include <X11/extensions/XInput.h>
#include <X11/extensions/XPick.h>
#include <X11/extensions/Xext.h>
#include <X11/phigs/phigs.h> etc.
```

Sample makefile

The following is a sample **makefile** showing compilation and linking for ESV programs using Motif and PEX.

```
#
# Optional include files can be listed as:
#

BitMapINCL = /bsd43/usr/include/X11/bitmaps
INCLFLAGS = -I$(BitMapINCL)

#
# Flags:
# DFLAGS are optional depending on use of #ifdef in source
# code.The -g in LDFLAGS can be changed to -O if debugging is
# not required. The CC_ENVIRON is needed to increase the size
# of internal compiler tables.
#
```

```
DFLAGS = -DPHIGS_PEX_API -DPEX
LDFLAGS = -systype bsd43 -g
CC_ENVIRON = -Wf,-XNp8400 -Wf,-XNd9000

CFLAGS = $(LDFLAGS) $(CC_ENVIRON) $(DFLAGS) $(INCLFLAGS)

#
# Libraries
#

MOTIFLIBS = -lXm -lXt
PEXLIBS = -lPEXapi -lsysv
XINPUTLIB = -lXinput
XPICKLIB = -lXpick
XEXTLIB = -lXext
XESLIB = -lEandSext
XLIB = -lX11

#
# Be sure that $(XLIB) follows any others that you use.
#
LIBS = $(MOTIFLIBS) $(PEXLIBS) $(XINPUTLIB) $(XPICKLIB) \
        $(XEXTLIB) $(XESLIB) $(XLIB)

#
# Object files
#

MOTIF_PEX_OBJS = sample.o

#
# Compilation and ld instructions. The following order is
# important. $(LIBS) must be last. Note: the $(CC) causes the
# CFLAGS to be used on compilation.

sampleprog:   $(MOTIF_PEX_OBJS)
              $(CC) -o $@ $(LDFLAGS) $(MOTIF_PEX_OBJS) $(LIBS)
```

man -k command

The command **man -k** uses a special database file to look up its information. This database file doesn't exist automatically for all manual pages. If you want to use **man -k** for all manual pages (including PEX, Motif, *etc.*) you have to build the database by running **/usr/lib/makewhatis**. After installing a package with manual pages, you should enter **`/usr/lib/makewhatis`** while logged in as **root**. This remakes the database to include the new manual pages.

UNIX sockets

The UNIX domain sockets should be used whenever possible because they can be up to 57% faster than Ethernet sockets for certain applications. Specify UNIX domain sockets by setting the ***DISPLAY*** environment variable to **unix:0.0.** The client must be running on the same ESV as the server.

Unlock keyboard on CTRL-ALT-BREAK

Sometimes, the key sequence CTRL-ALT-BREAK locks up the keyboard. This happens when the keyboard is connected to the RDC and you use CTRL-ALT-BREAK to exit the X server. (Note that this is intended as an emergency exit from a hung server, and should not be used on a regular basis.) The symptoms are that all three LEDs remain lit, and the keyboard will not respond to any further typing.

To unlock the keyboard, cycle the power on the RDC. This leaves the keys in a state where the CAPS LOCK key is actually the CONTROL key, and the DELETE key emits garbage and back-quotes. Restart the X Server to restore the keyboard to its proper operation.

Script programming

Make sure you never have `if(...)` in your script. Always have a space after each "if," as in `if ($?TERM == 1)`.

Password protection for single-user boot

The **init** and **su** executables have been modified for 2.3 to allow password protection for the single user boot.

If the file **/etc/single.passreq** exists, you must type in the root password before being allowed into single user mode.

Note: The only way to fix a corrupted **passwd** file when this mode is enabled is to boot the miniroot from tape and mount the root filesystem to do repairs.

xtitle

The client **xtitle** has been added in the 2.2 Release. This utility can change the title of an **xterm** window, its icon, or both. The new string may be any valid string of characters. Special characters *, ?, /, [,] must be escaped. If the string contains blanks, the entire expression must be placed in quotes (" ").

System V include files

When compiling using the System V environment, problems may arise when you need to use X because the **include** files for X were written for the BSD environment. The **include** files used for the System V environment (**/usr/include/X11/***, for example) do not have the compilation flag, **SYSV**, defined, nor does the compiler force this flag to be defined. Consequently, you get compiler errors complaining about missing **include** files, such as **time.h** or **strings.h**.

The recommended method to deal with this problem is to use the **-D** compilation flag to define **SYSV** to the compilation environment. For example

```
/bin/cc-systype sysv -DSYSV test.c
```

You may also force the definition by inserting `#define SYSV` as the first line of your program.

A second method for overcoming this problem is to use the BSD includes which are provided with the System V environment. For example

```
/bin/cc -systype sysv -I/usr/include/bsd test.c -lbsd
```

RTS/CTS serial line protocol

Changes have been made to the driver that allow this feature to work. However, modem control lines are used to control modems, not printers.

For printers, you can use **/dev/ttym0** or **/dev/ttym3**. These are special in that their minor number is greater than 128 which tells the driver that they are talking for the modem. By using these device names the CTS/RTS flow control mode is automatically enabled. However when you use these devices the driver expects a modem, thus the device must assert CD (Carrier Detect) before the driver allows things to continue. Printers may use CTS/RTS for flow control, but they generally do not use CD. You need a special cable that always asserts the CD line.

Printer accounting

The necessary elements needed to enable printer accounting are as follows:

- An `af` entry is required in **/etc/printcap**.
- An `if` entry is required in **/etc/printcap**.

The MIPS supplied printer filter is located in the **/bsd43/usr/lib/lpr/filters/lpf** file. In order to work, the **/etc/printcap** entry should include each of the following:

```
:if=/bsd43/usr/lib/lpr/filters/lpf:\
:af=/usr/adm/lpacct:\
```

The accounting file name is user defined, but unless you want to write your own filter, use the `if` entry as above.

ES/Dnet and NIS(YP)

ES/Dnet may cause NIS binding problems. If an ESV is running ES/Dnet and NIS, there may be problems with address resolution on the network. If ES/Dnet is stopped and restarted, there is a period of time (up to 30 minutes) before addresses are resolved. Removing the Ethernet addresses of ESVs running ES/Dnet from the server's ethers files and from the YP ethers maps may reduce the problem. If you are using YP, you may need to do an **arp -d *ESV name*** on the YP servers after rebooting the ESV or restarting ES/Dnet.

A diskless node machine can run either YP or ES/Dnet but not both.

G0 libraries

The G0 libraries are a set of PEX libraries that match the system's libraries in every way except that they were compiled with the compiler option **`-G 0`**. As a result, for each and every library on the system, there is a corresponding library which has **_G0** affixed after the library's base name, and before the **.a** suffix. These libraries must be loaded if you are using Ada. If you want to use the G0 libraries, you must load the **cdrs_library_1** subpackage which is located on the PEX library tape.

The way the MIPS architecture defines an object makes these libraries necessary. In most architectures, an object file contains three sections: the text, data, and stack (**bss**) sections. In the MIPS architecture, the data and stack sections are further broken down into small data (**sdata**), and a small stack (**sbss**) sections. These smaller sections are used to store data for the object. By default, pieces of data which are 8 bytes or less in size are stored in the **sdata** and **sbss** areas. This allows for faster access using the global pointer register (**$gp**) and a 16 bit offset. The 16 bit offset limits the total size of the **sdata** and **sbss** areas to 64 K. If the object grows past this 64 K limit, you

can lower the threshold of the size of data which is eligible for these small data areas by using the **_G #** compiler option. The default for **#** is 8, meaning 8 bytes. By setting the threshold smaller, only smaller data items may go into the global area. It is possible to have so many small data items that you still break through the 64 K limit.

If this happens, you may either rewrite the object to be smaller, or turn off the global area. To turn off the global area, you must use the compiler option **-G 0**. This insures that no data items are put into the global area. As a result, the compiler reuses the global pointer register for other purposes. This means that all objects which are to be combined with the large non-global area object must also not use the global pointer register. Hence, the need for the **_G0** libraries.

Mixing global area objects and non-global area objects is not recommended as results are unpredictable. Mixing these objects results in the link editor warning regarding possible **$gp** relocation errors.

BSD ps command

The BSD version of the **ps** command is included in the 2.0 release. The options to the two commands are not the same. For example, if you were previously using **ps -ef** to get a full listing, the BSD equivalent is **ps -aux**. If your path defaults to the BSD commands, you can still access the System V version of **ps** command as **/bin/ps**.

Setting socket buffer length size

Using **setsockopt(fd, SOL_SOCKET, SO_SNDBUF, ...)** can kill network I/O performance if the buffer size is less than the system default of 4096. It took 7 1/2 hours to move 16Mb with 1/4M packets of 64 bytes each when the kernel buffer size was set down to 256 bytes. Use the default kernel buffer size.

2. ES/PSX Helpful Hints

screen_oriented text

The purpose of ES/PSX **screen_oriented** text is to rotate the character string so as to make it readable, while maintaining the other attributes (*i.e.*, size and position) of its relationship to the object being annotated. This means that such text, while always appearing right-side-up, changes size as the associated object is moved toward or away from the user in a perspective view. (It does not, however, change size as the associated object is simply scaled in modeling space.)

The above is in contrast to **screen_oriented/fixed** text, whose size is permanently fixed to the value specified in the applicable **CHARACTER SCALE** or **TEXT SIZE** commands.

screen_oriented/fixed text is designed to appear the same size as **screen_oriented** text would be when placed a distance equal to one-half the viewport width from the eye for a 90-degree **FIELD_OF_VIEW** angle. For a **FIELD_OF_VIEW** angle less than 90 degrees, if it is desired to have a string of **screen_oriented** text appear the same size when at screen depth as a corresponding **screen_oriented/fixed** string, the **CHARACTER SCALE** value should be multiplied by the cotangent of one-half the **FIELD_OF_VIEW** angle. For example, for a **FIELD_OF_VIEW** angle of 30 degrees, multiply the desired **CHARACTER SCALE** argument by 3.7321, which is the cotangent of 15 degrees.

TE colors

The color of the ES/PSX terminal emulator characters and cursor can be modified by the following command, which can be included in the **site.dat** file.

```
Send v3d(r,g,b) to <1>tecolor0;
```

Note that ***r,g,b*** are integers specifying the red, green and blue components of the color desired (blue = 0, red=120, green=240).

The color can also be modified while running ES/PSX by typing the following commands from command mode:

```
Configure a;
Send v3d(r,g,b) to <1>tecolor0;
Finish Configuration;
```

ES/PSX and ES/PEX Libraries

The ES/PSX and ES/PEX libraries provided in the 2.0 Release were all compiled using the **bsd43** libraries. Modules that are to be linked with these libraries should also be compiled as **bsd43** modules by using the **-systype bsd43** option in the compile command. If you want to use specific System V routines in your programs, you should do so with caution and with explicit knowledge as to which libraries are used to resolve external references.

malloc failures

Sometimes when attempting to **malloc** a chunk of memory, the **malloc** call returns a NULL pointer, as if it cannot **malloc** the space even though **vsar** shows plenty of swap space. This occurs because **vsar** shows memory that is not currently being used, not necessarily that which is free and available.

In one case, we attempted to **malloc** a 4*1280*1024 chunk of memory. We had **vsar** running which showed more that 40 Mbytes of swap available (although free memory had been nearly exhausted). The **malloc** call returned a NULL pointer.

3. ES/PEX Helpful Hints

z-buffering objects in depth

There is an inherent conflict with *z*-buffering as objects approach each other in depth. Polygon edges are at the same *z* value as the corresponding polygons. The system moves the edges forward to make them appear in front of the corresponding polygons. This can make them appear in front of other polygons.

Anti-aliased line anomalies

Turning on **HLHSR** mode for anti-aliased lines, may result in a decrease in picture quality. The problem is especially evident near the joins of segments of curves. If you are only dealing with lines, don't turn on the **HLHSR** mode. If you are mixing lines and polygons, and always want your lines to show up, turn off the **HLHSR** ID when drawing lines.

Lines over polygons

When drawing lines and polygons, there are some anti-aliasing anomalies when the lines are drawn over polygons. You will see fringes that are the background color, and the lines look jagged. Refer to the description of **SET HLHSR MODE** in the *ES/PHIGS Reference Manual [2.0]* for ways to avoid this.

Non-*z*-buffered polygons

It is impossible to predict which of two or more non-z-buffered, overlapping polygons will appear on the screen. It is also possible that parts of several polygons may appear in stripes.

Always *z*-buffer polygons by turning on the **HLHSR** mode.

Inquiry routines

After executing a function to open something like PHIGS, a PHIGS workstation, or a structure, programmers should call inquiry routines to make sure that the intended action occurred. Making sure that a request succeeded is the application's responsibility.

EVALUATE VIEW MAPPING MATRIX 3

If the projection reference point (PRP) in the **EVALUATE VIEW MAPPING MATRIX 3** function is set on the *front plane*, all values of z are the same upon transformation. This causes polygon priority to be lost and halts depth cueing. If the z-value is constant for all items, there can be no visibility resolution, so polygons interleave with other polygons, and lines pop in and out.

FILL AREA SET

A **FILL AREA SET** can be clipped in z such that degenerate edges are introduced into the polygon description. This causes some pixels to "leak through" the two degenerate edges that are introduced. Programmers should reduce the number of **FILL AREA SET**s with holes in order to separate polygons.

Controlling line quality with hidden-surface removal

There are inherent problems drawing anti-aliased lines with hidden-surface removal. The ESV minimizes these as much as possible, and following these guidelines will help produce the best possible pictures.

Disable hidden-surface removal (by setting either the **HLHSR** mode or **HLHSR** ID to off) when drawing lines over the picture background. With hidden-surface removal disabled, lines blend properly where they cross, even when many lines converge (although in this case, there may be a color shift towards a saturated color). Disabling hidden-surface removal when drawing lines over an object causes the line's color to wash into the color of the object. If the background is not black, it can cause fringing of the background color on the sides of lines.

Enable hidden-surface removal (by setting both the **HLHSR** mode and **HLHSR** ID to on) when drawing only polygons, or when drawing lines over a non-constant background, or when drawing polygons and lines freely intermixed on the screen or in the structure. While there may be some fringing on the sides of lines with hidden-surface removal enabled, there will be no color shift as lines appear over other objects. Drawing the lines after drawing the polygons reduces the fringing.

It can also be advantageous to change the **HLHSR** ID during traversal when the **HLHSR** mode is on, enabling or disabling hidden-surface removal for different parts of the image. For example, a guideline grid of lines may appear generally over the background and behind the polygons. In this case, a good picture may be obtained by turning the **HLHSR** mode on, then drawing the grid with the **HLHSR** ID off and the object with the **HLHSR** ID on. Drawing the grid first produces a different effect than drawing the object first.

Intensity values near 0

Because of the limits of the ESV DACs, colors near 0 in intensity vary dramatically in appearance. For example, a triangle with intensity 0 at one vertex and 1 at the other two vertices appears as two bands, one black and the other colored. This happens when any of the red, green, or blue components of color reaches the bottom of the intensity range, regardless of the values of the other components. To avoid these problems, avoid using colors near 0 in intensity. This problem frequently happens when depth cueing to black or when shading without any ambient light; therefore, these should be avoided.

Clipping indicators

Images are always clipped to the view volume. The clipping indicators control whether to clip to the clip bounds within the viewing space. This is self-evident in the *x*- and *y*-dimensions where the image cannot extend beyond the limits of the window. Because of limits on number ranges, this must also be so in the *z*-dimension. Images cannot extend indefinitely in the *z*-direction, but are always clipped at the front and back planes. The clipping indicators only control whether to clip to a sub-range defined by the clipping minimum and maximum.

Lines and polygon edges over solid polygons

Because they share the same *z*-values, lines drawn on the surface of a polygon or polygon edges drawn with solid polygons conflict with the polygon interiors. To increase their likelihood to appear, lines and polygon edges are moved forward in the image. For best results, keep the clipping planes as close to the object as possible. There is a GSE, **Fill_Area_Tolerance** that allows the user to control the distance of edges to polygons.

WAIT and ASAP workstation deferral modes

ES/PEX supports two different workstation deferral modes.

- **WAIT**
- **ASAP**

Under **WAIT** deferral mode, any PEX routines that can change the visible state of the display (modifying table entries, editing a posted structure, *etc.*) are not reflected until the application calls either **UPDATE WORKSTATION** or **REDRAW ALL STRUCTURES**.

Under **ASAP** deferral mode, any PEX routines that can change the visible state of the display cause an immediate traversal of all posted structures.

ASAP mode should be used with caution as it can result in many more traversals than are necessary. If you are building a large structure network, or

doing a lot of structure editing, the system finishes the work more quickly if it is not continually traversing. The following code fragment demonstrates this.

```
psetdisplayupdatest(ws, PWAIT, PNIVE);
/* ... initialize color table, view reps, create structures ... */
psetdisplayupdatest(ws, PASAP, PUQUM); /* change to ASAP mode */
/* ... generate primitives from simulation, etc. ... */
psetdisplayupdatest(ws, PWAIT, PNIVE); /* change back to WAIT mode */
```

The default workstation deferral mode is **ASAP**.

Expose event for ES/PEX windows

When selecting expose events on PEX windows, either through the mechanism provided by Xlib or the X toolkit (Xt), you should examine the count field in the event before causing a structure traversal for the window.

The X server sends expose events as contiguous groups in the event stream, each with a count field indicating how many more expose events are in the group. This is done because a single exposure action, such as cycling a group of windows via a window manager, can cause multiple regions of a single window to be exposed. Each action that generates such a set of regions will generate a set of contiguous expose events in the event stream.

Since PEX (3D) windows are double-buffered, a portion of the window cannot be redrawn without causing a buffer swap. Therefore, as you take events off the event queue, you should examine the count field in the expose event. This count is zero for the last expose event in its contiguous group. At this point, the application can cause a structure traversal and update its window.

Implementing this method can eliminate many unnecessary structure traversals and improve performance when interacting with window managers and other X clients.

Round-trip requests to X server

Calling a PHIGS routine that returns information about structures to the caller (*e.g.*, current element pointer value or structure element content) requires a round-trip to the server through network connections.

The current element pointer value can be maintained by the client while building a structure; *i.e.*, the client may know how many structure elements it has inserted into the currently open structure. Maintaining this information in the client program can result in performance increases since the time required for obtaining the current element pointer value can be expensive for a very large structure. Obtaining this value typically requires a linear traversal of the structure from the beginning until the current element is reached.

Client-side optimizations that result in fewer round-trip messages are the smart thing to do.

Resizing ES/PEX windows

X and PHIGS have slightly different ideas about the dynamics of a display surface. Under X, display windows can be resized by the user or another program, and the client receives a **ConfigureNotify** event. Under PHIGS, the usable portion of a window is determined by the workstation transformation matrix.

The workstation transformation matrix is controlled by **SET WORKSTATION VIEWPORT**, **SET WORKSTATION VIEWPORT 3**, **SET WORKSTATION WINDOW**, and **SET WORKSTATION WINDOW 3**. Using the 2D versions of the routines, you can examine your new window size from the **ConfigureNotify** event and adjust the size of your PHIGS display surface accordingly.

PHIGS specifies that when a workstation is opened, it uses the largest square in the upper-left portion of the workstation, unless the workstation transformation is explicitly changed. The workstation window and viewport, which together define the workstation transformation, must be set to the same aspect ratio when they are changed.

When a PEX window is resized, the client application has several choices to make regarding the workstation transformation. It can render the entire NPC space to any square portion of the window's new size, preserving aspect ratio. Another option is to limit the portion of NPC space shown in the resized window, making the window a "porthole" into NPC space. This requires a considerable amount of programming.

The following code fragment is an example of resizing the PHIGS display surface to be the largest (centered) square in the resized window:

```
XNextEvent(&event);
if (event.type == ConfigureNotify)
            {
            Plimit viewport;
            int width, height;

            width = event.xconfigure.width;
            height = event.xconfigure.height;
if (height > width)/* window is taller than wide */
            {
            viewport.xmin = 0;
            viewport.xmax = width-1; /* use entire width */
            viewport.ymin = (height-width)/2;
            viewport.ymax = viewport.ymin + width-1;
            /* center vertically */
            }
else        /* window is wider than tall */
            {
            viewport.ymin = 0;
            viewport.ymax = height-1; /* use entire height */
            viewport.xmin = (width-height)/2;
            viewport.xmax = viewport.xmin + height-1;
            /* center horizontally */
            }
            psetwsviewport(ws, &viewport);
            predrawallstruct(ws, PALWAYS);
            }
else /* other events */
            ...
```

Remember that device coordinate space is in pixels and relative to the origin of the X window. Also, X coordinate structures have a *y*-axis that increases down the screen, while the PHIGS *y*-axis increases up the screen.

Pick highlighting

When the prepick control is set to **highlight picked commands**, the color of markers within the boundary of the pick box is changed. Optionally, the color changes for markers in the same node as the one within the pick box. When this happens, markers within the node that preceded the one picked have already been drawn. Their color is a combination of the highlight color and their normal color.

Size limitations on structure elements

Since structure elements are communicated to the central structure store via the connection to the X server(s), structure elements are limited in size by the request buffer size of the server. The request buffer size can be found from the **xdpyinfo(1)** command. Currently, the buffer size is 64 K long words, or 256 Kbytes.

For polygon (**FILL AREA, FILL AREA SET**, *etc.*) structure elements, there is a further restriction of no more than 128 vertices (64 if the primitive includes colors or normals, 42 if the element includes colors and normals for each vertex) per element. This limitation is imposed by the size of the processing buffer in the DSPs.

Optimization of structure element size

When writing PHIGS/PEX clients, it is important to remember that the ESV Workstation contains between 4 and 44 DSPs that render the set of posted structures. Splitting large structure elements into a group of smaller, equivalent structure elements can improve rendering performance. The overhead for an extra element on a low-end system is negligible and results in approximately the same rendering time. However, on a high-end system, the result is a greater degree of data parallelism. This means more efficient use of the DSPs and higher rendering throughput. This throughput is limited by communication speeds and other basic architectural trade-offs, but a performance gain can be usually achieved by splitting large structure elements into smaller ones.

For optimum performance, a match must be obtained between the size of rendering primitives within a structure, their relationship to one another and the number of output primitives in the structure. A structure that contains a high ratio of execution (via **EXECUTE STRUCTURE**) to drawing (via output primitives, *i.e.*, lines, polygons) can cause excessive overhead on the host CPU in structure traversal. Conversely, a structure with a high drawing to execution ratio (*i.e.*, flat) can consume large amounts of host structure memory and may be adversely effected by system paging. The best approach is to attempt to balance these effects.

Some output primitives are broken up by the system to increase available parallelism in rendering these primitives. Since the rendering pipeline of the ESV consists of parallel processors combining their results into the frame buffer, performance gains can also be achieved by judiciously adjusting the size and number of output primitives. For increased performance, the following guidelines should be followed, keeping in mind they are only guidelines, not guarantees.

Text

Text functions include **TEXT**, **TEXT 3**, **ANNOTATION TEXT RELATIVE**, and **ANNOTATION TEXT RELATIVE 3**. Longer character strings perform better than short character strings. Single character strings used as markers are less efficient than marker elements.

Polygons

Polygonal structure element functions include **FILL AREA**, **FILL AREA 3**, **FILL AREA SET**, **FILL AREA SET 3**, **FILL AREA 3 WITH DATA**, and **FILL AREA SET 3 WITH DATA**. Polygonal structure elements with less than 14 vertices require less complicated processing during scan conversion. Processing of convex primitives is optimized.

Quadrilateral mesh and triangle strip

Quadrilateral mesh and triangle strip functions include **QUADRILATERAL MESH 3 WITH DATA** and **TRIANGLE STRIP 3 WITH DATA**, and they have unique performance characteristics. For optimum performance, a match must be obtained between the number of meshes and their size. A few small meshes that can be rendered in parallel will be faster than a single large mesh, since the primitive level is the lowest level at which parallelism is applied.

The system breaks up meshes and strips that are larger than 500 words. This overhead can be avoided if the primitives are kept below 500 words. This translates into the following guidelines (these numbers are derived from the packet sizes defined in the PEX V4.0 Protocol Encoding document). There are about four words of header for each of these primitives, and the remaining space is left for vertices and optional vertex data. That leaves 496 words for this data:

- 165 vertices with no colors and no normals
- 82 vertices with colors or normals
- 55 vertices with colors and normals

These numbers calculated by dividing 496 by 3, 6, and 9, respectively.

pfillareaset3

pfillareaset3 does not draw the polygon if the length of one of the sides is below a certain value. The side in question in the example below is the length between <vertex 4> and <vertex 5>.

Example code:

```
ploss()
{
/* Define polyline cube vectors */
    Ppointlst3  side;
    static Ppoint3  points[]=
   {{  0.8768756, 0.1534203, 0.0} , { 0.8772517, 0.1693954, 0.0} ,
   {  0.8563184, 0.1754968, 0.0} , { 0.8558692, 0.1591864, 0.0} ,
    {   0.8559113, 0.1589217, 0.0}};

   side.number = 5;
   side.points = points;

   popenstruct(FILLBOX);
     psetintstyle(PSOLID);
      psetintcolourind(7);
      pfillareaset3(1, &side);
   pclosestruct();
   popenstruct(DISPLAY_STRUCT);
      psetviewind(VIEW);
      pexecutestruct(FILLBOX);
   pclosestruct();

   ppoststruct(WS, DISPLAY_STRUCT, 1);

   pupdatews(WS,PPERFORM);

}
```

PHIGS requires the first three vertices to determine front or back facing. If the first three vertices are colinear, then use the next point. But the colinearity test depends on the precision. If the tolerance is too low (the present case), it mislabels polygons. If the tolerance is too high, it may miss pertinent data (for example, presume all the sides of the above polygon were as short as the offending vertex). So, do not define the first two sides of a polygon to be abnormally short.

Multiple connections to the same X server

There are certain situations that can cause multiple connections to the same X server when using both X and ES/PEX calls. These situations can cause undesirable visual effects.

- If you are using **XOpenDisplay** to get a **Display ***, that pointer should be used in a **popen_xphigs** call in order to prevent multiple connections. If **XOpenDisplay** is used, **popen_phigs** should not be used to open PHIGS.
- If you are using **XOpenDisplay** and opening workstations of type **phigs_ws_type_x_tool**, and if a value is specified for connection ID, the value should be the same as the value given to **XOpenDisplay** for connection to that display.

Correct usage example

```
Display  *display;
Pxphigs_info   xinfo;

display = XOpenDisplay("");

xinfo.display = display;
popen_xphigs(PDEF_ERR_FILE, PDEF_MEM_SIZE,
      PXPHIGS_INFO_DISPLAY, &xinfo);

popen_ws(1, "", phigs_ws_type_x_tool);
```

or

```
popen_phigs(PDEF_ERR_FILE, PDEF_MEM_SIZE);

popen_ws(1, NULL, phigs_ws_type_x_tool);
```

Incorrect usage example

```
Display  *display;
Pconnid_x_drawable  xdraw;
Window  win;

display = XOpenDisplay("");

popen_phigs(PDEF_ERR_FILE, PDEF_MEM_SIZE);

win = XCreateSimpleWindow(...);
xdraw.display = display;
xdraw.drawable_id = (XID)win;

popen_ws(1, &xdraw, phigs_ws_type_x_drawable);
```

Faster PHIGS text

Text performance can be improved by setting the text path to **PTP_RIGHT**, the horizontal alignment to **PAH_NORMAL**, the vertical alignment to **PAV_NORMAL**, and the text spacing to a non-negative value. If these criteria are met, text speed is improved.

editres

The **editres** client message protocol provides the capability to allow one client to perform an **XtSetValues/XtGetValues** operation on another client's widget tree. This is the fundamental mechanism behind the program **editres**, which allows interactive editing of an application's resources while the application is executing. See the manual page on **editres(1)** for more details.

Developers wishing to take advantage of the **EditRes** client message protocol need to make sure that the **editres** protocol message handler is initialized and that the **editres** message event handler is added to their application. The Athena widget set's **VendorShell** widget does this when it is initialized. This makes the **editres** protocol available to all applications based on the Athena widget set. For applications using the **VendorShell** in the Motif widget set, the application should call the following procedure:

```
XtAddEventHandler(topLevel, (EventMask) 0, TRUE,
  _EditResCheckMessages, NULL);
```

where ***topLevel*** is the widget ID returned by **XtAppInitialize**.

The application will need to be linked with the Xmu library, which contains the **editres** client message protocol handling routines.

Facet normals

If facet normals are not specified, they are calculated from the last vertices instead of from the first vertices.

Specular and light concentration

The ESV Workstation uses the specular concentration surface property and spot light concentration values differently from many other graphics devices. Other devices use these values as exponents in the lighting equation, raising a value to a power. As a result, large values (60 or more) are needed to create a tight highlight. The ESV Workstation treats these values like the other coefficients in the surface property. A value of 0 gives highlights with minimum concentration, and a value of 1 gives maximum concentration. A useful equation to convert values from another system to the value used by ESV Workstation is **ESV concentration = log(concentration) ÷ log(256)**.

Error logging

If **xdm** error logging is activated and **xdm** runs for a long period of time, the disk space may fill up and the server crash. The **rgb.dat** file can be corrupted by such a crash. To prevent this, the **xdmerror** log file in the 2.2 Release has been set to the default value **/dev/null**.

If you want the errors to go to a **log** file, you have to log in as **root** and edit the **/usr/lib/X11/xdm** file by changing the line

```
DisplayManager.errorLogFile:    /dev/null
```

to

```
DisplayManager.errorLogFile:    /usr/tmp/xdm-errors
```

Multiscreen selection

The default **.mwmrc** file which is supplied with the ESV system in **/usr/lib/X11/system.mwmrc** allows screen selection to be done using one of the mouse keys.

A possible alternative is to use keyboard keys to select screens. The following could be added to your local **.mwmrc** file to accomplish this. Note that this was written for six screens but could be modified according to the number of screens the X server is started with.

```
# .mwmrc -- mwm configuration file
#
# key binding descriptions
#
Keys DefaultKeyBindings
{
Ctrl Shift<Key>F1 root|icon|window !"screen 0"
Ctrl Shift<Key>F2 root|icon|window !"screen 1"
Ctrl Shift<Key>F3 root|icon|window !"screen 2"
Ctrl Shift<Key>F4 root|icon|window !"screen 3"
Ctrl Shift<Key>F5 root|icon|window !"screen 4"
Ctrl Shift<Key>F6 root|icon|window !"screen 5"
}
```

Polyline set slowdown

The DSPs need large polylines (about 15-30 coordinates minimum per polyline) in order to work efficiently and reach the maximum line drawing performance.

GDP Spheres

If you use **PPERSPECTIVE** with **GDP** spheres, the hidden surface removal is effectively turned off even though **HLHSR ID** and mode are set.

PHIGS monitor and reusing memory

When executing a PHIGS program with the PHIGS monitor running, the memory allocated for the initial **OPEN WORKSTATION** call per server is not reused after that workstation is closed. If your application contains multiple **OPEN** and **CLOSE WORKSTATION** calls without leaving at least one connection to the server open, you could run out of memory.

To work around this, leave at least one workstation open on each server until the end of your program.

Solid polylines that appear dashed

When the Linetype is solid, and a polyline is drawn, in some cases the line appears to be dashed. Use multiple traversals to avoid this: one traversal for solid objects and one for the lines.

PHIGS monitor memory

If you are using the PHIGS monitor, you are not able to **malloc** more than approximately 3 Mbytes of memory.

AN7. External SCSI Cables and Terminators

Overview

This application note describes the available external SCSI cables and terminators and the pertinent SCSI operating parameters.

SCSI devices use two types of connectors:

- male / female, 50-pin, "alternative-2," or "Alt2"
  (also called the "Amp Champ" or the "Centronics" type)
- male / female, 50-pin, D

Each external SCSI device requires an external SCSI cable which must be purchased separately. The specific cable needed depends on the device being purchased, the device(s) already present on the external SCSI bus, and plans for adding additional devices in the future. The last device on the external SCSI bus requires a terminator which must be purchased separately.

Operating Parameters

A total of eight SCSI devices, including the CPU, can be connected to the SCSI bus. For example, four devices can be connected via external cables if the ESV has one tape drive and two disk drives installed inside the cabinet.

There is an input and output connector provided on each external SCSI device. The input connector accommodates the cable from the host or previous device. The output connector is provided to allow for daisy chain configurations to the next device or the placement of a SCSI bus terminator. A terminator must be attached to the last device in the daisy chain.

The total length of the external cables cannot exceed 10 feet. This limitation includes SCSI cables that are often found inside external SCSI equipment such as disk-drive enclosures. Failure to properly install a terminator, the presence of more than one external terminator, or the use of cable exceeding 10 feet, may cause a system crash.

Cables

It is recommended that only the cables listed in the following table be used with SCSI devices in order to avoid impedance discontinuity and EMI problems.

	E&S P/N (2 ft)	E&S P/N (4 ft)	E&S P/N (6 ft)	Cable Connectors
1	423203-002	423203-004	423203-006	male, 50-pin, Alt2 / male, 50-pin, D
2	401013-002	401013-004	401013-006	male, 50-pin, Alt2 / male, 50-pin, Alt2
3	401010-002	401010-004	401010-006	male, 50-pin, D / male, 50-pin, D
4	401012-002	401012-004	401012-006	male, 50-pin, Alt2 / female, 50-pin, D
5	401011-002	401011-004	401011-006	male, 50-pin, D / female, 50-pin, D

In most cases, cable 1 is the correct cable to purchase for use with the first SCSI device connected to the ESV. Cable 2 is usually the correct cable to purchase when subsequent external SCSI devices are added to the system. Cable 1 is typically used in the 6 foot length, and cable 2 is typically used in the 2 foot length. However, any combination of cable lengths can be used, as long as the total does not exceed 10 feet.

Cables 3, 4, and 5 are used with the DS2000 Data Shuttle or other devices that have unusual connectors. Cable 3 can be used to connect the ESV Workstation to the DS2000 Data Shuttle. Cable 4 can be used to daisy chain devices with a Centronics connector to the DS2000 Data Shuttle. Cable 5 can be used to daisy chain DS2000 Data Shuttles to each other.

Terminators

E&S P/N	Terminator Connectors	Notes
401258-050	male, 50-pin, Alt2	most external SCSI devices use this terminator
401272-050	male, 50-pin, D	ESV uses this terminator, and it must be attached to the ESV I/O panel if no external SCSI devices are present
401294-050	female, 50-pin, D	used with the DS2000 Data Shuttle

2. PHIGS Stereo Implementation

The ESV Workstation provides a method for creating stereo images through PHIGS. This method includes two separate "screens" in the X server, one for monoscopic applications and one for stereoscopic applications. Stereo screens are established with command line switches at the time the X server is started (See the man pages for **Xesv**, **XGetScreenInfo**, **XScreenWarpByCursor**, **XWarpToScreen**, and **csm**.)

The stereo application is responsible for setting up the stereoscopic fields in the view table and for opening the X connection to the stereo screen. Everything else is handled by the X server.

Note: If you are using the **mwm** window manager, you must use the **-multiscreen** option on the command line when you start **mwm**.

Interface Overview

The ESV Workstation contains a special screen in the X server to support stereoscopic applications. The stereo application must open a window somewhere in the "stereo screen" (**host:0.*x***) where ***x*** is the screen number of a stereo screen.

The stereo screen is 512 pixels high. If PHIGS graphics are displayed in this window, the system traverses the graphics structure twice to display both stereoscopic fields.

Using the PHIGS Viewing Model for Stereo

The stereo application must create the left-eye and right-eye stereoscopic fields in the PHIGS view table. These views are used by the system during traversal. To tell the system which stereoscopic field should be used for each eye, a PHIGS **GSE** is provided, which is an extension of the **SET_VIEW_INDEX** element. Rather than indicating a single index in the **GSE**, the application indicates three indices: one for left-eye, one for right-eye, and one for monoscopic viewing.

The left-eye and right-eye views are established in the View Reference Coordinate (VRC) system in VRC coordinates, as shown in figure 2-1. Left and right are established by shifting the Projection Reference Point (PRP) off the VRC z-axis in the x-direction. Note that the viewing frustum is created by passing planes through the PRP and the corners of the viewing window (which is a rectangle on the viewing plane).

The closer the PRP is to the viewing plane, the more severe the perspective angle. The view window rectangle is specified by the **window** field in the **Pview_map3** structure that is passed to **peval_view_map_matrix3**.

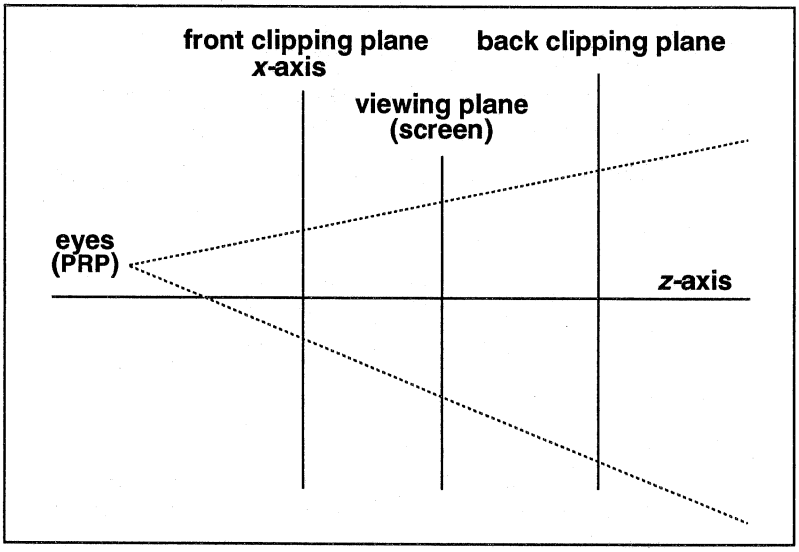

Figure 2-1. View reference coordinate system

- The viewing plane coincides with the surface of the monitor screen, and the viewing window corresponds to the X window on the screen in which the graphics are displayed. The following parameters should be carefully selected to create the best stereo image:
- PRP *z*-value (the distance between eyes and the monitor screen),
- The size of the X window in which the 3D object is drawn,
- PRP *x*-value (the interocular separation).

In the beginning of the example program in "Appendix B," you see a constant, **INCHES_TO_VRC**, which allows you to map physical inches to VRC distances. It is critical that real inches are correctly converted to units of VRC space, so that the stereoscopic fields are correctly calculated.

```
/* Stereo params in physical inches */
#define EYE_TO_SCREEN   36.0
/* Distance between eyes and the monitor screen */
#define WINDOW_SIZE     9.0
/* Size of the X window in which the 3D object is drawn */
#define VIEW_RATIO      (EYE_TO_SCREEN / WINDOW_SIZE)
```

```
/* Stereo params in VRC units */
#define VRC_WINDOW_SIZE 4.0
/* Size of VRC window; xmax-xmin */
#define INCHES_TO_VRC    (VRC_WINDOW_SIZE / WINDOW_SIZE)
#define VRC_PRP          (EYE_TO_SCREEN * INCHES_TO_VRC)
#define HALF_OCCULAR     (1.25 * INCHES_TO_VRC)
```

Stereo Setup Procedure

1. Create a stereo screen when starting the X server

First, create a stereo screen to hold stereo applications. This is done by using special command line options when the X server is started. There are two options you need to use; the **-nscreens *MxN*** option that creates an array of size ***M*** by ***N*** available screens, and the **-stereoscr *n*** option that indicates which of the screens are stereo screens. For example, if you start the X server directly, you could use

```
% Xesv -nscreens 2x1 -stereoscr 1
```

This creates two screens numbered 0 and 1. Screen number 1 is a stereo screen.

Or, if you start the X server with a call to **xinit**, the command is

```
% xinit -- -nscreens 2x1 -stereoscr 1
```

Many workstations use the **xdm** display manager. In this environment the command line options for the server are set in the **/usr/lib/X11/xdm/Xservers** file. There are many ways this can be done. (See the **xdm** man page for more details.) For example,

```
unix:0.0 local /usr/bin/X11/Xesv -nscreens 2x1 -stereoscr 1
```

2. Start a window manager that supports multiple screens

If you are using the **mwm** window manager, start it using the **-multiscreen** command line option.

```
% mwm -multiscreen &
```

This command should appear in your **.xsession** file if you are using **xdm,** or in your **.xinitrc** file if you are using **xinit**. See the **mwm** man page for more details.

3. Start a screen manager to allow you to switch screens

You will probably want to start up a multiscreen manager client that allows you to switch between the regular screen and the stereo screen if your application doesn't make use of **XScreenWarpByCursor**. (See the **XScreenWarpByCursor** man page for more details.). A simple screen manager is provided with the ESV 2.0 software, called **csm**. (See the **csm** man page for

more details.) You may also want to put the following command in your **.xsession** or **.xinitrc** file:

```
% csm &
```

4. Open a connection to the stereo screen

The application must first open a connection to the stereo screen. This is done by opening screen **host:0.*x***., where ***x*** is the screen number of a stereo screen. To find out which screens are stereo screens, make a call to the X extensions function **XGetScreensInfo**. The display pointer that is returned with the connection is then used when creating the window that will hold the PHIGS workstation graphics.

```
/* Open the stereo screen for stereo windows. */
    stereoDisplayString = XDisplayString(dpy);
    strptr = rindex(stereoDisplayString, ':');
    XGetScreensInfo(dpy, &screen_info);
    numscreens = screen_info->numofscreens;
    for (i=0; i<numscreens; i++)
    {
if (screen_info->screens[i].screentype == xStereoScreen)
{
      sprintf( (strptr + 1), "0.%d", i);
}
    }

if (!(sdpy = XOpenDisplay(stereoDisplayString) ))
{
      perror("Cannot open display for Stereo screen\n");
      exit(-1);
}
```

5. Open a window on the stereo screen

Do this by creating the window with the stereo screen's display pointer.

6. Open a PHIGS workstation for the stereo window

For example,

```
conn.drawable_id = stereo_win;
popen_ws(stereo_wks, (Pconnid *)
   (&conn),phigs_ws_type_x_drawable);
```

7. Set up the left-eye and right-eye views

Set up the PRPs (one for each eye) in conjunction with the viewing plane. The position of the viewing plane corresponds to the monitor screen. The *z* value of the PRP is the *z*-coordinate of the PRP in VRC space. This distance should

directly correspond to the physical distance of your eyes from the screen. The application should translate physical distances into distances in VRC units. Create the left-eye and right-eye viewing matrices and put one each in the view tables of the left-eye and right-eye workstations.

```
/* left eye view */
mapping.proj_ref_point.x = -1.0 * half_occular_dist;
peval_view_map_matrix3(&mapping, &err,
                       view_rep.map_matrix);
pset_view_rep3(stereo_wks, left_view_index, &view_rep);

/* right eye view */
mapping.proj_ref_point.x = half_occular_dist;
peval_view_map_matrix3(&mapping, &err,
                       view_rep.map_matrix);
pset_view_rep3(stereo_wks, right_view_index, &view_rep);
```

8. Put the GSE stereo view index element into the structure

Put the **GSE** stereo view index element into the 3D structure that points to the stereo viewing matrices created in step 4.

```
Pgse_stereo_view_indices    stereo_view;
Pgse_data                   gse_struct;

popen_struct(structure);
pset_view_ind(stereo_view_index);
gse_struct.unsupp.size = sizeof (stereo_view);
gse_struct.unsupp.data = (char*)&stereo_view;
stereo_view.mono = mono_view_index;
stereo_view_left = left_view_index;
stereo_view_right = right_view_index;
Pgse(PES_GSE_STEREO_VIEW_INDICES,&gse_struct);
```

9. Post the structure to the stereo workstation

Post the structure to the stereo workstation to view the 3D object.

```
ppost_struct(stereo_wks, structure, 0.0);
```