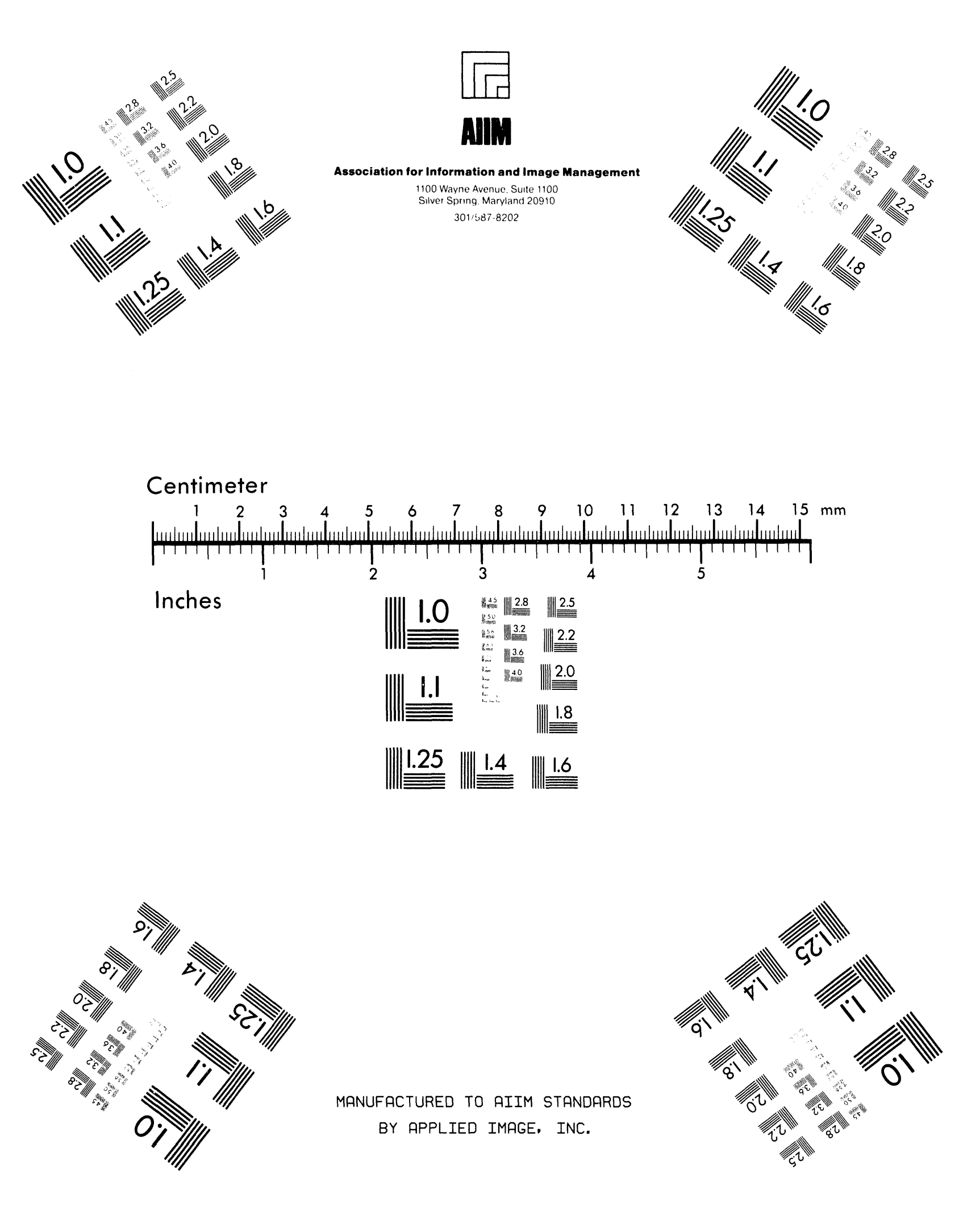
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SYSTEM ADMINISTRATOR'S GUIDE TO CDPS

Version 1.0

B. T. Didier
M. H. Portwood

May 1994

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1 Introduction

The Common Mapping Standard (CMS) Data Production System (CDPS) produces and distributes CMS data in compliance with the *Common Mapping Standard Interface Control Document, Revision 2.2* (see Section 1.3). Historically, tactical mission planning systems have been the primary client of CMS data.

CDPS is composed of two subsystems, the CMS Preprocessing Subsystem (CPS) and the CMS Distribution Subsystem (CDS). CPS is used to manage source data and produce CMS data from source data. CDS is used to read CPS-produced data from magnetic disks or 8-mm tapes, maintain an archive of that data, and generate theater databases according to the user's specification.

1.1 About This CDPS System Administrator's Guide

This *System Administrator's Guide to CDPS* is intended for those responsible for setting up and maintaining the hardware and software of a CDPS installation. This guide assists the system administrator in performing typical administrative functions. It is not intended to replace the *Ultrix Documentation Set* that should be available for a CDPS installation. The *Ultrix Documentation Set* will be required to provide details on referenced Ultrix commands as well as procedures for performing Ultrix maintenance functions.[a]

There are six major sections in this guide. This section introduces the system administrator to CDPS and describes the assumptions that are made by this guide. Section 2 describes the CDPS platform configuration. Section 3 describes the platform preparation that is required to install the CDPS software. Section 4 describes the CPS software and its installation procedures. Section 5 describes the CDS software and its installation procedures. Section 6 describes various operation and maintenance procedures.

Four appendices are also provided. Appendix A contains a list of used acronyms. Appendix B provides a terse description of common Ultrix commands that are used in administrative functions. Appendix C provides sample CPS and CDS configuration files. Appendix D provides a required list and a recommended list of Ultrix software subsets for installation on a CDPS platform.

Two special features of this administrator's guide are how-to boxes and hint boxes. How-to boxes are step-by-step instructions for most operations described in the guide. They are outlined with a double border. Hint boxes provide helpful hints and information on administrative commands or procedures. Hints are italicized inside an outlined box.

(a) Ultrix, DEC, DECstation, and ThinWire are trademarks of Digital Equipment Corporation.

1.2 Assumptions Made By This Administrator's Guide

Several assumptions are made by this guide relating to the condition of the targeted CDPS platforms, the computer knowledge of the administrator, and the reference resources available to the administrator. These assumptions are provided in the following subsections.

1.2.1 Assumptions About Platforms

The following assumptions are made about the targeted CDPS platforms:

- The required system software (see Section 2.2) is installed and each platform can boot to multi-user mode, displaying the console login prompt. If the required system software is not loaded on a platform, refer to the installation instructions accompanying the system software and perform the installation. Use Appendix D as a guideline for installing the system software.

- The required memory and SCSI extender (see Section 2.1) are installed and the Ultrix kernel configured and rebuilt to recognize the additional memory and SCSI extender. Refer to the Ultrix documentation when configuring and modifying the Ultrix kernel.

- The platforms are configured for a thin-wire ethernet network and communications are established between the two platforms via this network.

1.2.2 Assumptions About the System Administrator

The following assumptions are made about the computer knowledge of the CDPS system administrator:

- The administrator is familiar with the X/Motif windowing environment and is comfortable in maneuvering and interacting with this environment.

- The administrator is familiar with an editor available on the targeted platforms.

- The administrator is familiar with basic Unix (Ultrix) commands, e.g., **ls, pwd, cd, cat, man, rm**.

- The administrator can locate and refer to reference documentation that covers material that is out of the scope of this guide, e.g., kernel building, network setup.

- The administrator knows how to set SCSI addresses of peripherals and connect and disconnect these peripherals from a SCSI chain.

- The administrator has the password for the root login account. Many administrator operations require root access.

1.2.3 Reference Resources

It is assumed the administrator has at a minimum the *Ultrix Documentation Set* available as reference material. Included in this assumption is that the online manual pages are installed on the

CDPS platforms. The CPS and CDS *User's Guides* can be used to provide an abbreviated introduction to the X/Motif windowing environment. If a more thorough introduction is required, the administrator should consult the *X Window System User's Guide, OSF/Motif Edition* (Quercia and O'Reilly 1992; see Section 1.3 below).

1.3 References

CMS Distribution Subsystem User's Guide. 1993. Pacific Northwest Laboratory, Richland, Washington.

CMS Preprocessing Subsystem User's Guide. 1993. Pacific Northwest Laboratory, Richland, Washington.

Digital Equipment Corporation. 1990. *DECStation 5000/200 Hardware Operator's Guide*. Digital Equipment Corporation, Maynard, Massachusetts.

Digital Equipment Corporation. 1990. *Ultrix Documentation Set. General Information, Volumes 1-3B. System and Network Management, Volumes 1-7*. Digital Equipment Corporation, Maynard, Massachusetts.

Quercia, V., and T. O'Reilly. 1992. *The Definitive Guides to the X Window System, Volume Three, X Window System User's Guide, OSF/Motif Edition*. O'Reilly & Associates, Inc., Sebastopol, California.

U.S. Air Force. 1993. *Common Mapping Standard (CMS) Data Production System (CDPS) Computer Resources Life Cycle Management Plan (CRLCMP)*. (DRAFT).

U.S. Air Force. 1993. *The Common Mapping Standard Interface Control Document, ESD-82155046A004, Revision 2.2*. ESC/YVD, Hanscom Air Force Base, Massachusetts.

2 CDPS Platform Configuration

This section describes configuration requirements for CDPS hardware and software and the configuration of system parameters.

2.1 CDPS Hardware Configuration

2.1.1 CPS Hardware Configuration

The standard CPS system hardware configuration includes the following:

- DECstation 5000/Model 200 workstation, including mouse and keyboard
- 19-inch color monitor, resolution 1024 x 864
- 1 SCSI extender, providing a system capacity of 14 SCSI devices
- 48 MB of RAM (minimum)
- 4 one-gigabyte magnetic disk drives
- 1 two-gigabyte magnetic disk drive
- 6 CD-ROM drives
- 2 8-mm tape drives [EXABYTE(a) Model 8200 or equivalent]

A recommended minimal CPS system hardware configuration (a single SCSI chain is required) includes the following:

- DECstation 5000/Model 200 workstation, including mouse and keyboard
- 19-inch color monitor, resolution 1024 x 864
- 48 MB of RAM (minimum)
- 2 one-gigabyte magnetic disk drives
- 1 two-gigabyte magnetic disk drive
- 2 CD-ROM drives
- 2 8-mm tape drives (EXABYTE Model 8200 or equivalent)

2.1.2 CDS Hardware Configuration

The standard CDS system hardware configuration includes the following:

- DECstation 5000/Model 200 workstation, including mouse and keyboard
- 19-inch color monitor, resolution 1024 x 864
- 1 SCSI extender, providing a system capacity of 14 SCSI devices
- 48 MB of RAM
- 3 one-gigabyte magnetic disk drives
- 2 two-gigabyte magnetic disk drives
- 7 erasable optical disk (EOD) drives
- 2 8-mm tape drives (EXABYTE Model 8200 or equivalent)

(a) EXABYTE is a trademark of EXABYTE Corporation.

A recommended minimal CDS system hardware configuration (a single SCSI chain is required) includes the following:

- DECstation 5000/Model 200 workstation, including mouse and keyboard
- 19-inch color monitor, resolution 1024 x 864
- 24 MB of RAM (minimum)
- 2 one-gigabyte magnetic disk drives
- 1 two-gigabyte magnetic disk drive
- 3 EOD drives
- 1 8-mm tape drive (EXABYTE Model 8200 or equivalent)

2.2 CDPS System Software

Both the CPS and the CDS software were developed to operate under the following system software:

- Ultrix 4.2
- Digital Equipment Corporation (DEC) distribution of the X Window System version 11, revision 4
- DEC distribution of Motif version 1.1

The Ultrix version of your system can be verified during the boot sequence or by using the **uerf -R** command and looking for a **OS EVENT TYPE** of **SYSTEM STARTUP**. The CPS and CDS software report the X protocol version and revision number as well as the motif version in their execution window during software initialization. This provides a method to verify the version numbers of these software packages. If installation of system software is required, refer to Appendix D which provides a required list and a recommended list of Ultrix software subsets. The list of Ultrix subsets that are installed can be verified with the **setld -i** command

2.3 Configurable System Parameters

This section discusses configuring memory, swap space, communication techniques, and time zone settings.

2.3.1 Memory

The DECstation 5000/Model 2XX (200, 240, 260) workstation operating under Ultrix 4.2 will efficiently utilize only 8 MB of memory unless the following four lines appear at the bottom of file **/etc/rc.local**:

```
dbx -k /vmunix /dev/mem<<EOF
assign lotsfree=768
q
EOF
```

The value **lotsfree** represents the amount of memory installed on the machine that is utilized by the Ultrix kernel. The value of **lotsfree** is increased by 128 units for every 8 MB of memory installed on the machine. In the example above, the machine has 48 MB of memory installed; therefore, **lotsfree** is assigned 768 (48/8 = 6, and 6*128 = 768).

The amount of memory physically installed on the machine can be verified during the boot sequence when two values will be given. One is labeled **real mem** and the other is labeled **avail mem**. The **real mem** value should be used for verification and truncated to the nearest multiple of 8 MB. For example, during a boot sequence, the following values print on the screen:

```
real mem = 50331648
avail mem = 42258432
```

This represents a physical memory installation of 48 MB. Verification of installed physical memory can also be performed after the system boot by using the **uerf** command with the **-R** option and looking for an **OS EVENT TYPE** of **SYSTEM STARTUP**. Under the **MESSAGE** heading these same two lines will be listed. The following command shows the syntax for using the **uerf** command:

```
uerf -R | more
```

2.3.2 Swap Space

The recommended amount of swap space for an Ultrix workstation is two or three times the amount of real memory installed on the workstation. For a system operating with 48 MB of memory, the amount of required swap space ranges from 96 MB to 144 MB.

The primarily swap partition is found on the b partition of the boot disk. On CDPS systems this is typically **/dev/rz0b**. For a DEC 1-GB rz57 disk drive, the default swap partition provides approximately 92 MB of swap space.

The amount of swap space configured on a CPS or CDS system can be verified with the **pstat -s** command. This command provides the total swap space as well as the amount used and the amount wasted. The amount wasted is the amount of swap space lost due to fragmentation of the swap space. The output from the **pstat -s** command is

```
153592k swap configured
20876k reserved virtual address space
        244k used (160k text, 0k smem)
        153348k free, 0k wasted, 0k missing
avail: 4791*32k 36*1k
```

There are a number of reasons that favor at least a factor of three when configuring the swap space size. First, swap space becomes fragmented during operation of the system. Currently, the only way to reclaim fragmented swap space under Ultrix is to reboot the system. Having a larger swap space will defer the symptoms of a system suffering from fragmented swap space. Second, typically both CPS and CDS have a lot of disk space available, a secondary swap partition will not significantly reduce this capacity. Third, making the swap space large initially allows adding memory later without requiring the swap space to be reconfigured. Changing the swap space later will

To add swap space:

1 - Identify the disk drive to be used in configuring additional swap space. Determine desired size of the additional swap partition, and determine existing partitions that will be modified. Remember, a swap partition is typically assigned to the b partition of a disk drive. More importantly, the swap partition cannot be the first partition on a disk, unless it is the only partition.

2 - Perform backups of all mounted partitions on the disk drive that will host the additional swap partition.

3 - Unmount mounted disk partitions of the target disk drive using the **umount** command.

4 - Modify the disk partition table for the target disk using the **chpt** command.

5 - Create Ultrix file systems on all modified partitions that will be mounted using the **newfs** command.

6 - Create mount point directories for all modified partitions that will be mounted using the **mkdir** command.

7 - Add/delete entries in the **/etc/fstab** file for all modified partitions.

8 - Add an entry declaring a secondary swap partition in the kernel configuration file **/sys/conf/mips/*hostname***, where *hostname* is the name of the system.

9 - Make an entry declaring the secondary swap partition in the **/etc/fstab** file. This entry should be of the form: **/dev/rz?b::sw:0:0:::** where ? represents the SCSI address of the selected disk drive.

10 - Rebuild the Ultrix kernel. Make a copy of the existing kernel (**/vmunix**) and copy the new kernel into the / directory. The location of the new kernel will be provided during the build.

11 - Shut down and reboot the machine. If the machine fails to reboot to multi-user mode, then reboot to single-user mode and restore the old kernel. Make necessary corrections, rebuild, and try the new kernel again.

12 - Log in and verify with the **df** command that the mounted file systems are of appropriate number and size.

13 - Using the **pstat** command with the **-s** option, verify that the configured swap space is the anticipated size. If the size did not change from prior value, verify that **swapon** is invoked in the system script **/etc/rc**.

14 - Restore to the proper directories the backups that were previously made.

require backup and restore operations on all disk partitions modified to create the additional swap space. The backup and restore operations are required to prevent the loss of data from the modified partitions.

The sequence of steps necessary to add swap space to a system is given below. (Fully detailed instructions are not provided since the *Ultrix Documentation Set* should be consulted when reconfiguring swap space and rebuilding the Ultrix kernel.)

2.3.3 Communications Parameters

Both CPS and CDS use semaphores, message queues, and sockets for interprocess communications. Each of these communications techniques can be configured by modifying system parameters and rebuilding the Ultrix kernel. However, the default setting of these system parameters is adequate for the operation of CPS and CDS and modification of these values is necessary only if they were previously altered. Providing instructions to correctly modify system communication parameters is beyond the scope of this manual.

2.3.4 Time Zone

The CPS and CDS system clocks should be set to report the correct local time. The preferred method of setting the system clock is to modify the time zone value in the kernel configuration file and to rebuild the kernel. Refer to the *Ultrix Documentation Set* for more information regarding performing this change to the Ultrix kernel. There are other methods to set the correct local time but they rely on time zone files to be present or environment variables to be defined. If one of these methods is chosen, then it is recommended to use the time zone file.

To set local time via the time zone file:

1 - Login as root

2 - Change directory to **/etc/zoneinfo**

3 - Find the correct file for your geographic location. The file will be either in the **/etc/zoneinfo** directory or in one of its subdirectories, e.g., ***US/Pacific***.

4 - Make a hardlink to this located file with the following command: **ln *pathname-of-located-file* localtime**, e.g., **ln US/Pacific localtime**

The correct local time should now be reported.

If more information is required to successfully set the local time with this method, then consult the *Ultrix Documentation Set.*

3 Platform Preparation for CDPS Install

This section covers the preparation for CDPS installation, including peripheral and network connections, and the creation of device files, disk partitions, file systems, and file system mount points. It also covers procedures for preparing file systems (Ultrix and network), mounting file systems, creating accounts, and setting directory and device permissions.

3.1 Peripheral Connections

Roll-around racks are available for installing the CPS and CDS peripherals. If installation of the peripherals into the roll-around racks is required, then refer to the CDPS *Computer Resources Life Cycle Management Plan* (CRLCMP), which describes peripheral locations and SCSI addresses for each peripheral. A schematic depicting the peripheral configuration of both CPS and CDS is provided in Figure 3.1.

Verification of the peripherals connected to a system can be performed at the boot prompt using the **cnfg** command. The boot prompt appears as the following prompt: >>. To see the peripherals currently recognized on a SCSI chain, use the **cnfg** command followed by the module number of the SCSI chain. Using the **cnfg** command without a module number shows a listing of the modules. Typically, the SCSI module numbers are 1 and 5 for a DECStation 5000/200. To see the peripherals on module 1, type **cnfg 1**. If not all peripherals are being recognized by the system on a particular SCSI module, then issue an **init** command for that SCSI module, e.g., **init 1**. This re-initializes all devices on that SCSI module. If all peripherals still do not show up after issuing another **cnfg** command, then either a conflict exists in SCSI addresses, the SCSI cabling is not correct, or the device is malfunctioning. If a partial list of peripherals is given for a SCSI chain, then the problem probably exists with either the last device in the list or with the next device that should appear in the list. For more information on the commands available at the boot prompt, see the *DECStation 5000/200 Hardware Operator's Guide.*

Hint About Troubleshooting SCSI Connections:

> *Verify that the cabling is not prematurely terminated at the last device referenced in the list of recognized devices.*
>
> *Verify that the SCSI address for the next device that should appear in the list does not conflict with the SCSI address of a device already listed.*
>
> *Recognized devices can be turned off and the* ***init*** *and* ***cnfg*** *commands re-issued to determine which devices conflict.*

Verification of the connected peripherals can also be performed during the boot sequence or at the Ultrix command prompt. During the boot sequence, the list of peripherals recognized by the system on a particular SCSI chain is printed. This same list can be seen at the Ultrix command prompt by issuing the **uerf** command with the **-R** option and looking for an **OS EVENT TYPE**

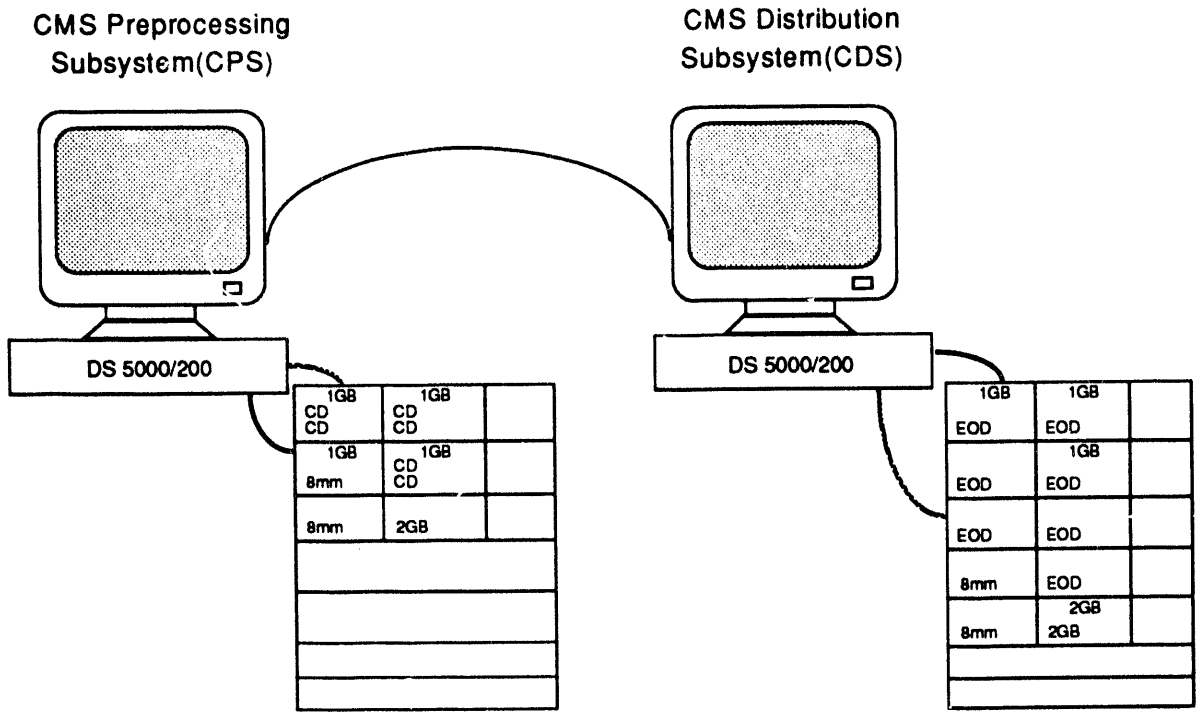

Figure 3.1. CMS Data Production System (CDPS)

of **SYSTEM STARTUP.** Under the **MESSAGE** heading, the list of recognized peripherals on each SCSI chain will be given. Unfortunately, there are no commands available at the Ultrix command prompt level that allow unrecognized peripherals to become recognized by the system. If the list of peripherals does not agree with the physical number of peripherals attached to the SCSI chain, then the system must be shut down and the **cnfg** and **init** commands used at the boot prompt for further investigation and troubleshooting.

3.2 Network Connections

The two DECStation platforms should be configured for a thin-wire ethernet network connection. To establish the connection between the two systems, make the appropriate entries in the **/etc/hosts** and **/etc/rc.local** files on both systems. As an example, relevant excerpts from the files used for the ESC CDPS installation are provided below:

From /etc/hosts file

```
:
129.53.18.231    goofy
129.53.18.230    mickey
:
```

The first value is an Internet address. If the systems are to be connected to the Internet, a valid address must be obtained from your network administrator. The second value is the official host name.

From /etc/rc.local file

```
:
/bin/hostname goofy
/bin/hostid 8153b20c
/bin/domainname hanscom.af.mil
/etc/ifconfig ln0 `/bin/hostname` broadcast 129.53.255.255 netmask 255.255.0.0 copyall
:
:
```

For further information on network connections, refer to the *Ultrix Documentation Set.*

3.3 Creating Device Files

System special device files must be created for each peripheral attached to the system. System special device files are created with the **MAKEDEV** command. For both CPS and CDS there are two types of special device files that must be created: special files for random access devices (CD-ROM, EOD, magnetic disk) and special files for sequential tape devices.

The format of the **MAKEDEV** command is

/dev/MAKEDEV *device_name?*

where *device_name* is **rz** for random access devices or **tz** for sequential tape devices and *?* is the SCSI address of the device.

Hint About File Names of Special Device Files:

For random access devices, the SCSI address becomes part of the file name for all special files for that device, e.g., an EOD located at SCSI address 6 can be accessed with ***/dev/rrz6c*** *and* ***/dev/rz6c****. Tape devices do not incorporate the SCSI address into the file names for its special files. Instead, special files for tape devices are assigned a unique number, starting at 0, and this number is incremented for each set of special files created for tape devices. The administrator has to keep track of the association between the SCSI address of a tape drive and the system special files created for a tape drive. If the SCSI address of a tape device is changed, then the associated system special files need to be deleted and then re-created with the new SCSI address.*

After the creation of a special device file for an EOD device, the permissions must be changed to allow CDS proper access to the device. Changing permissions is performed with the **chmod** command. The following commands are used to properly change the permissions for an EOD device that is assigned SCSI address 6:

```
chmod 0777 /dev/rz6*
chmod 0777 /dev/rrz6*
```

After the creation of a special device file for a CD-ROM device, the permissions must be changed to allow CPS proper access to the device. The following commands are used to properly change the permissions for a CD-ROM device that is assigned SCSI address 6:

```
chmod 0666 /dev/rz6*
chmod 0666 /dev/rrz6*
```

It is crucial to the operation of the system that the permissions for all CD-ROM and EOD special device files are set to the values provided in the above commands.

Refer to Sections 4.3 and 5.3 to see the list of device files that are required for standard CPS and standard CDS installations, respectively.

3.4 Creating Disk Partitions

Magnetic disk drives are shipped preformatted; therefore, a default partition table already exists on the magnetic disk. This partition table may not be adequate for the boot disk or a disk used to host secondary swap space.

Table 3-1 shows the default partition for a DEC rz57 1-GB magnetic disk.

Table 3-1. Default Participation for 1-GB Disk

Partition	Bottom	Top	Size	Overlap
a	0	32767	32768	c
b	32768	217087	184320	c
c	0	1954049	1954050	a,b,d,e,f,g,h
d	831488	1130495	299008	c,h
e	1130496	1429503	299008	c,h
f	1429504	1954049	524546	c,h
g	217088	831487	614400	c
h	831488	1954049	1122562	c,d,e,f

The first column is the partition identifier, the next three columns are the starting sector, the ending sector, and the size of the partition in sectors, respectively. To roughly compute the size of the partition in bytes, multiply the value in the size column by 512. The last column identifies other partitions that have sectors in common (overlap) with this partition. This overlap of sectors between various partitions is provided to allow a system administrator the option of which partitions to use. Overlap cannot exist between the partitions actually used from a disk. Typically, there are three non-overlapping default partition schemes that are provided:

- partitions a, b, g, and h - typically used on a boot disk
- partition c - the full disk on a single partition
- partitions a, b, d, e, f, and g.

The following partition table shows the partition sizes used for a CDPS boot disk.

Table 3-2. Partition Sizes for CDPS Boot Disk

Partition	Bottom	Top	Size	Overlap
a	0	65535	65536	c
b	65536	249855	184320	c
c	0	1954049	1954050	a,b,d,e,f,g,h
d	0	0	0	a,c,e,f
e	0	0	0	a,c,d,f
f	0	0	0	a,c,d,e
g	249856	1075391	825536	c
h	1075392	1954049	878658	c,d,e,f

Table 3-3 shows a 1-GB disk that is used to provide secondary swap. Notice the use of the **a** partition to allow the use of the full disk, excluding the swap area, as a single partition. The **a** partition must be used since the **b** partition (swap area) cannot be the first partition on a disk.

Table 3-3. Partition of 1-GB Disk Used for Secondary Swap

Partition	Bottom	Top	Size	Overlap
a	0	1831169	1831170	c,d,e,f,g,h
b	1831170	1954049	122880	c,f,h
c	0	1954049	1954050	a,b,d,e,f,g,h
d	0	0	0	a,c,d,e,f,g,h
e	0	0	0	a,c,d,e,f,g,h
f	0	0	0	a,c,d,e,f,g,h
g	0	0	0	a,c,d,e,f,g,h
h	0	0	0	a,c,d,e,f,g,h

Table 3-4 shows the mapping of SCSI devices and partitions to mounted file systems for a standard CPS installation and Table 3-5 shows similar partition mapping for a standard CDS installation.

Table 3-4. SCSI Devices and Partitions Mapped to Mounted File Systems for Standard CPS Installation

/dev/rz0a	/
/dev/rz0b	swap
/dev/rz0g	/usr
/dev/rz0h	/user0
/dev/rz1c	/user1
/dev/rz8a	/user2
/dev/rz8b	secondary swap
/dev/rz9c	/user3
/dev/rz10c	/user4

Table 3-5. SCSI Devices and Partitions Mapped to Mounted File Systems for Standard CDS Installation

/dev/rz0a	/
/dev/rz0b	swap
/dev/rz0g	/usr
/dev/rz0h	/user0
/dev/rz1c	/user1
/dev/rz2c	/user2
/dev/rz8c	/user3
/dev/rz9c	/user4

To modify an existing partition table on a disk or to put a partition table on an unformatted magnetic disk, use the **chpt** command. Errors can be easily made when determining the desired sectors and partition sizes to use in the **chpt** command. Always double-check a modified partition table with the following two rules in mind:

- Assign all sectors to a partition that will be used by the system. Otherwise, the disk will not be fully utilized.
- Verify that there are no sectors assigned to more than one partition that will be used by the system. This could result in the mysterious loss of user files or corruption of user files.

The **chpt** command needs to be used only if default partitions are not satisfactory. Partition table modifications should only be necessary for the secondary swap partition on CPS. The boot disk should already have the appropriate partition sizes. Remember to back up all file systems on a disk before changing the disk's partition table. The backups will need to be used to restore the files to the file system. Refer to the *Ultrix Documentation Set* for more information on the **chpt** command and its options.

3.5 Creating File Systems

Before a partition can be used by the system, an Ultrix file system must be written to the partition. This is required for all partitions listed in Section 3.4 except for swap partitions. Writing an Ultrix file system onto a partition is performed with the **newfs** command.

The following is an example use of the command to place an Ultrix file system on the **a** partition of the magnetic drive located at SCSI address 8:

newfs -vn /dev/rrz8a rz57

The **rz57** value tells the **newfs** command to use the disk geometry information of a DEC rz57 disk drive when creating the Ultrix file system. This is typically the correct value to use; however, for non-DEC equipment, the disk drive manufacturer should be consulted to verify the value.

The use of the **newfs** command is only necessary for partitions on new disk drives or for partitions that were just created or modified. It should not be used on active file systems on your CDPS systems. Its use will destroy the existing contents of a file system. For more information on **newfs,** refer to the *Ultrix Documentation Set.*

3.6 Creating File System Mount Points

The next step in making a file system usable by the system is to create a directory that will be the file system's mount point. For example, /, **/usr**, and **/user0** are mount points for the **/dev/rz0a, /dev/rz0g,** and **/dev/rz0h** file systems, respectively. Directories must be created for mount points for both local Ultrix file systems (UFS) and network file systems (NFS). Directories must also be created to export a file system so that it is accessible as an NFS.

Directories can be created with the **mkdir** command. The following is an example use of the **mkdir** command to create the **/user1** directory:

mkdir /user1

A standard configuration of both the CPS and CDS platforms is assumed in the details provided below concerning required directories.

For both the CPS and CDS platforms, the following four directories should be created for use as UFS mount points: **/user1, /user2, /user3, and /user4.**

For a CDS platform, the following five directories should be created for NFS mount points: **/user1/cdps /user2/cdps /user3/cdps /user4/cdps /user1/transfer/scc_xfer.** The **/user1/transfer/pdc_xfer** directory must also be created on CDS for exporting a file system to CPS.

Note: Before creating a directory for use as an NFS mount point, the underlying UFS must first be mounted (see Sections 3.7 and 3.8). For example, the file system on the /dev/rz1c disk partition should be mounted on /user1 before the NFS directory /user1/cdps can be properly created.

For a CPS platform, the **/user1/transfer/pdc_xfer** directory must be created for an NFS mount point. The following five directories must be created on CPS to export a file system to CDS: **/user1/cdps /user2/cdps /user3/cdps /user4/cdps /user1/transfer/scc_xfer**

The ownership, group identification (id), and permissions should be set for all NFS and exported file systems on both platforms. Table 3-6 shows the correct settings for each platform.

Table 3-6. Settings for File System Owner, Group, and Permissions

Directory	Owner	Group id	Permissions
For CPS platform:			
/user1/cdps	cps	cdps	rwxrwxr-x
/user2/cdps	cps	cdps	rwxrwxr-x
/user3/cdps	cps	cdps	rwxrwxr-x
/user4/cdps	cps	cdps	rwxrwxr-x
/user1/transfer/scc_xfer	cps	cdps	rwxrwxr-x
/user1/transfer/pdc_xfer	cps	cdps	rwxrwxr-x
For CDS platform:			
/user1/cdps	cds	cdps	rwxrwxr-x
/user2/cdps	cds	cdps	rwxrwxr-x
/user3/cdps	cds	cdps	rwxrwxr-x
/user4/cdps	cds	cdps	rwxrwxr-x
/user1/transfer/scc_xfer	cds	cdps	rwxrwxr-x
/user1/transfer/pdc_xfer	cds	cdps	rwxrwxr-x

3.7 File System Preparation

3.7.1 Ultrix File System Preparation

The UFSs described in Section 3.6 must have entries in the **/etc/fstab** file to be automatically mounted during a system boot. Table 3-7 provides the required UFS entries in the **/etc/fstab** file for both the CPS and CDS systems.

3.7.2 Network File System Preparation

CDPS uses NFSs to facilitate the transfer of data files between the two platforms. System files on both platforms must be modified to properly configure an NFS:

- A system that is making a directory tree available as a file system to other systems must export the directory tree with an entry in the **/etc/exports** file.
- A system that wants to access a remote directory tree as a file system should mount that directory tree with an entry in the **/etc/fstab** file.

Table 3-7. Ultrix File System Entries for Automatic Mounting at System Boot

CPS **/etc/fstab** file UFS entries:

```
/dev/rz0a:/:rw:1:1:ufs::
/dev/rz0g:/usr:rw:1:2:ufs::
/dev/rz0h:/user0:rw:1:2:ufs::
/dev/rz1c:/user1:rw:1:2:ufs::
/dev/rz8a:/user2:rw:1:2:ufs::
/dev/rz9c:/user3:rw:1:2:ufs::
/dev/rz10c:/user4:rw:1:2:ufs::
```

CDS **/etc/fstab** file UFS entries:

```
/dev/rz0a:/:rw:1:1:ufs::
/dev/rz0g:/usr:rw:1:2:ufs::
/dev/rz0h:/user0:rw:1:2:ufs::
/dev/rz1c:/user1:rw:1:2:ufs::
/dev/rz2c:/user2:rw:1:2:ufs::
/dev/rz8c:/user3:rw:1:2:ufs::
/dev/rz9c:/user4:rw:1:2:ufs::
```

Note: Limiting access to an exported directory tree can be accomplished with the entry made in the /etc/exports file. For more information, refer to the listings of the /etc/exports files provided below and the Ultrix Documentation Set regarding special files.

In a standard configuration, CPS must export five directory trees to CDS for use as NFSs. CDS must export a single directory tree to CPS for use as an NFS. The following is a listing of a **/etc/exports** file from a CPS system, followed by the **/etc/exports** file from a CDS system. In this example, "mickey" is the hostname for CPS and "goofy" is the hostname for CDS.

CPS **/etc/exports** file:

```
/user1/cdps goofy
/user2/cdps goofy
/user3/cdps goofy
/user4/cdps goofy
/user1/transfer/scc_xfer goofy
```

CDS **/etc/exports** file:

```
/user1/transfer/pdc_xfer mickey
```

To use these exported directories as file systems, the CPS **/etc/fstab** and CDS **/etc/fstab** files must be modified to include corresponding entries. The following is a complete listing of the **/etc/fstab** files for both the CPS and CDS systems using the same hostnames as above.

CPS **/etc/fstab** file:

```
/dev/rz0a:/:rw:1:1:ufs::
/dev/rz0g:/usr:rw:1:2:ufs::
/dev/rz0h:/user0:rw:1:2:ufs::
/dev/rz1c:/user1:rw:1:2:ufs::
/dev/rz8a:/user2:rw:1:2:ufs::
/dev/rz8b::sw:0:0:::
/dev/rz9c:/user3:rw:1:2:ufs::
/dev/rz10c:/user4:rw:1:2:ufs::
/user1/transfer/pdc_xfer@goofy:/user1/transfer/pdc_xfer:rw:0:0:nfs:bg,soft,nosuid
```

CDS **/etc/fstab** file:

```
/dev/rz0a:/:rw:1:1:ufs::
/dev/rz0g:/usr:rw:1:2:ufs::
/dev/rz0h:/user0:rw:1:2:ufs::
/dev/rz1c:/user1:rw:1:2:ufs::
/dev/rz2c:/user2:rw:1:2:ufs::
/dev/rz8c:/user3:rw:1:2:ufs::
/dev/rz9c:/user4:rw:1:2:ufs::
/user1/cdps@mickey:/user1/cdps:rw:0:0:nfs:bg,soft,nosuid
/user2/cdps@mickey:/user2/cdps:rw:0:0:nfs:bg,soft,nosuid
/user3/cdps@mickey:/user3/cdps:rw:0:0:nfs:bg,soft,nosuid
/user4/cdps@mickey:/user4/cdps:rw:0:0:nfs:bg,soft,nosuid
/user1/transfer/scc_xfer@mickey:/user1/transfer/scc_xfer:rw:0:0:nfs:bg,soft,nosuid
```

For information regarding the format of the **/etc/fstab** file and additional options available for NFS file systems, refer to the *Ultrix Documentation Set* on special files.

3.8 Mounting File Systems

All of the entries in the system **/etc/fstab** file will automatically be mounted by the system during its boot procedure. The **mount** command can be used to mount file systems if the system is already booted. To mount file systems that are entered in the **/etc/fstab** file, use the command **mount -a**. This command rescans the **/etc/fstab** file, and attempts to mount all entries in the file. File systems can also be mounted interactively with the **mount** command. The syntax of the mount command is **mount** disk-partition mount-point, e.g., **mount /dev/rzlc /user1**. Refer to the *Ultrix Documentation Set* for more information regarding the **mount** command.

> ***Note: If the mount point directory does not exist, then the mount command will fail. Also, if the mount point directory is your current working directory, then the mount command will fail.***

3.9 Creating CDPS Accounts

CPS and CDS user accounts must be created to complete the required system preparation. Two commands must be used to correctly set up a login account for a new user.

> ***Note: Both a CPS user account and a CDS user account will be created on both systems.***

The CPS and CDS user accounts need to be set up so that they belong to the same group identifier.

To add a group identifier for the CPS and CDS users, use the **addgroup** command. This command will first prompt for the group identifier (name); the required response is **cdps**. It will then prompt for a group number; the required group number is **99**. Using this value will assure compatibility with the other CDPS installations.

> ***Note: If the CDPS group number (99) is not used at all installation sites, permission problems may occur when accessing the processed data archive. If permission problems occur when accessing processed frames, the group identifier and the permissions should be checked and set appropriately. All frames in the processed data archive should have permission of 664 and belong to the CDPS group.***

To add the user accounts, use the **adduser** command. The **adduser** command should be run once to add the CPS user account and then again to add the CDS user account. The **adduser** command prompts for the items listed in Table 3-8. Required responses for these prompts and any additional comments are also provided in Table 3-8.

Table 3-8. Adduser Prompts and Required Responses

Prompt	Response	Comments
Login name:	*cps* or *cds*	Required
user id:		(see Table 3-9)
fullname:	*CPS user account*	Suggested
login group:	*cdps*	Required
other groups:		(usually none)
parent directory:	*/user0/users*	Suggested
login shell	*/bin/csh*	Required
password		

Note: The use of lower case letters is intentional for all values provided.

Unique CPS and CDS user identifiers have been assigned for each CDPS installation. Table 3-9 provides the identifiers assigned to each site.

Table 3-9. User Identifiers for Sites

Installation	Username	Identifier
ESC	cds	19999
ESC	cps	29999
PACAF	cds	19998
PACAF	cps	29998
USAFE	cds	19997
USAFE	cps	29997
ACC	cds	19996
ACC	cps	29996
ESC/ACC 2	cds	19995
ESC/ACC 2	cps	29995

The same user identifier must be used for the CPS account on both the CPS and CDS workstations. The same is true for the CDS account.

To allow easy identification of frames received from a different installation site, make entries in the **/etc/passwd** file for all identifiers listed in table. Unique usernames must be given to each identifier.

3.10 Directory Permissions

For a CPS platform, the permissions on the directory **/usr/tmp** must be modified to allow temporary files to be created and removed by the CPS software. Use the following command to properly set the permissions for this directory: **chmod 777 /usr/tmp.**

> ***Note: Typically, /usr/tmp is a softlink to /usr/var/tmp. However, changing the permissions using the target /usr/tmp has the desired effect.***

3.11 Miscellaneous Considerations

3.11.1 newfs Command

By default, when a UFS is created, the system will reserve 10% of the available disk space per file system for performing file system management functions. For large disk drives, 10% is a large amount of space. The **newfs** command with the **-m** option can be used to control the percentage of disk space reserved from normal use. To gain more usable space for a partition, this amount can be reduced from 10%. It is advisable not to use a value lower than 5% and not to alter the percentage for any file systems on the boot disk.

3.11.2 Secondary Swap

When increasing the amount of swap space on a CDPS system, it is advisable to add a second swap partition instead of increasing the size of the primary swap partition. The reason for this is that the **/user0** file system would need to be reduced in size to increase the primary swap partition. Such a reduction is not desirable because of the databases that CPS and CDS create on their respective **/user0** file systems. The current partition table for the boot disk provides acceptable space for the storage of these databases on the **/user0** file system. Altering the partition table may eventually cause the systems to exceed the storage capacity of the **/user0** file system. A secondary swap partition should be configured to be located on the **b** partition of the first disk (also the first SCSI address) on the second SCSI chain, i.e., **/dev/rz8b**. This will optimize the use of a second swap partition.

3.11.3 Clock Synchronization

It is recommended to keep the CPS and CDS machine clocks synchronized for consistent time stamping. There are automatic tools available to do this, namely **ntpd** and **timed**. However, the setup of these tools is beyond the scope of this guide. Refer to the *Ultrix Documentation Set* if you want to set up automatic time synchronization of your machines.

4 CPS Software

Sections 4 and 5 describe the CPS and CDS software, respectively. Each section covers the suite of executables and execution tree, the required directories and device files, procedures for initial installation and for upgrades, and descriptions of the system configuration files.

4.1 Standard Executable Suite

The standard suite of CPS executables is listed with a brief description in Table 4-1.

Table 4-1. CPS Executables

CPS Executables	Description
cps	CPS executive process
scov	Source coverage management process
tsk	Task management process
pre	Pre-processing process
diop	Device input/output process
route_man	Message routing process
sock_man	Socket manager process
dtt	Degraded mode tape transfer process
burp	Backup and restore utility process

4.2 Standard Execution Tree

The CPS software executes from a directory location that must be referenced by the environment variable **CPS_EXE_HOME**. The standard suite of executables as well as the standard directory structure provided below must reside in the **CPS_EXE_HOME** directory. This is a full description of the **CPS_EXE_HOME** directory tree contents. Several directories will be empty on the distribution tape. These directories will be populated with files as the system is operated. A listing of the files contained on a CPS distribution tape can be found in the CPS version description document that is provided with the distribution tape.

config	Top-level directory for system configuration information and CMS frame specifications
product_line	Subdirectory for CMS product lines
mssii	Subdirectory for mssii products
1000000_frame	CMS frame specification for 1:1000000 scale products
100000_frame	CMS frame specifications for 1:100000 scale products
2000000_frame	CMS frame specification for 1:2000000 scale products
250000_frame	CMS frame specification for 1:250000 scale products
5000000_frame	CMS frame specification for 1:5000000 scale products
500000_frame	CMS frame specification for 1:500000 scale products

50000_frame	CMS frame specification for 1:50000 scale products
*product*_frame	CMS frame specification for *product*, where *product* is **adri**, **dted**, or **adri5**
sys_config	System configuration file
sys_config.dist	Distribution configuration file (not required)
coverage_archive	Top-level directory for the imported CDS processed coverage catalog database
product.cdsdb	CDS processed coverage catalog database file, where *product* is **adri**, **adri5**, **dted**, **gnc**, **jga**, **jnc**, **lfc**, **onc**, **tcm**, **tlm**, or **tpc**
product.cdsdb_frame	CDS processed coverage catalog index file for frame numbers, where *product* is the same as above
product.cdsdb_media_loc	CDS processed coverage catalog index file for media locators, where *product* is the same as above
cps_login	Top-level directory for distributed environment initialization files
.Xdefaults	User-level default settings for X windows
.cshrc	Read at beginning of execution by each shell
.login	Read only by login shell after **.cshrc** has been read
.mwmrc	Default settings for the motif window manager
default.DECterm	Default settings for DECterm windows
etc	Top-level directory for miscellaneous items
cps_canned_msgs	CPS canned messages file
dbu_config	Configuration file for database utilities
dfa	Default area file
product.wwmcdb	CDS world-wide media cell database, where *product* is **adri**, **adri5**, **dted**, **gnc**, **jga**, **jnc**, **lfc**, **onc**, **tcm**, **tlm**, or **tpc**
world.map	World vector map
media_log	Top-level directory for the CPS media log database
media_log_dir	Media log directory file, contains references to all detailed media log entries
product.mle	Detailed media log entries, where *product* is **adri**, **adri5**, **dted**, **gnc**, **jga**, **jnc**, **lfc**, **onc**, **tcm**, **tlm**, or **tpc**
mlu-queue	File used to implement a queue of records to be added/modified
scc	Top-level directory for the CPS source coverage catalog database
product.cpsdb	CPS source coverage catalog database file, where *product* is **adri**, **adri5**, **dted**, **gnc**, **jga**, **jnc**, **lfc**, **onc**, **tcm**, **tlm**, or **tpc**
product.cpsdb_idkey	CPS source coverage catalog index file for unique retrieval, where *product* is the same as above
product.cpsdb_medialoc	CPS source coverage catalog index file for media locators, where *product* is the same as above
product.cpsdb_replacekey	CPS source coverage catalog index file for replacement keys, where *product* is the same as above
task_log	Top-level directory for all CPS tasks
task_log_dir	Task log directory file, contains references to all tasks
taskid.task	Task description file, where *taskid* is the product identifier followed by the task number, e.g., **jnc_12.task**
tmp	Top-level directory for temporary files
tools	Top-level directory for shell scripts and utility programs
_flush	Flushes all CPS communications mechanisms

_run	Invoked on login, performs appropriate cleanup before CPS invocation and after CPS termination
_wipe	Removes all CPS processes
back tape	Offline utility to duplicate tapes
nkill	Kills a process by name

4.3 Required Directories and Device Files

There are several directories and device files that must be created for a CPS system to be operational. These were described in Section 3. Each directory and device file created during platform preparation must be entered into the CPS configuration file to be used by the CPS software.

For completeness, the directories and device files that must be created for a star dard CPS configuration are provided in Table 4-2 (below), along with required ownership and permissions.

Table 4-2. CPS Configuration Directories and Device Files

Directory/Device Files	Owner	Group	Permissions
/user1/cdps	cps	cdps	rwxrwxr-x
/user2/cdps	cps	cdps	rwxrwxr-x
/user3/cdps	cps	cdps	rwxrwxr-x
/user4/cdps	cps	cdps	rwxrwxr-x
/user1/transfer/scc_xfer	cps	cdps	rwxrwxr-x
/user1/transfer/pdc_xfer	cps	cdps	rwxrwxr-x
/dev/rz2c & /dev/rrz2			rw-rw-rw-
/dev/rz3c & /dev/rrz3c			rw-rw-rw-
/dev/rz4c & /dev/rrz4c			rw-rw-rw-
/dev/rz5c & /dev/rrz5c			rw-rw-rw-
/dev/rz11c & /dev/rrz11c			rw-rw-rw-
/dev/rz12c & /dev/rrz12c			rw-rw-rw-
/dev/rmt0h			
/dev/rmt1h			

4.4 CPS Initial Software Installation Procedure

1 - Login as **root** on the CPS workstation.

2 - Create a directory for the CPS execution tree. The standard location for this directory is **/user0/users**, the standard name is **cps_exe.** The pathname, **/user0/users/cps_exe**, must be used when declaring the **CPS_EXE_HOME** environment variable.

3 - Change directory ownership by typing:
chown cps cps_exe

4 - Change directory group by typing:
chgrp cdps cps_exe

5 - Change directory permissions by typing:
chmod 0775 cps_exe

6 - Change directory to the **cps_exe** directory.

7 - Insert the CPS installation tape into the **/dev/rmt0h** tape drive.

8 - Extract the executables from the tape using the **tar -xv0** command. All files will be distributed to the proper directory locations.

9 - Copy the system configuration file from the distributed copy by typing the following command:
cp config/sys_config.dist config/sys_config

10 - Force ownership to be **cps** and group to be **cdps** for all installed files by entering the following commands:
chown -R cps *
chgrp -R cdps *

11 - Type the following sequence of commands to set the correct file permissions:
chmod 775
chmod -R 664 config/*
chmod 775 config/product_line
chmod 775 config/product_line/mssii
chmod 664 cps_login/* cps_login/.Xdefaults cps_login/.mwmrc
chmod 775 cps_login/.cshrc cps_login/.login
chmod 664 etc/*
chmod 775 tools/*

12 - Change login to **cps** by typing **su cps** and entering the CPS account password at the prompt.

13 - Type the following commands to distribute login and X resource files:
cp -f cps_login/* /user0/users/cps/
cp -f cps_login/.* /user0/users/cps/

14 - Verify that the environment variable definition of **CPS_EXE_HOME** in the **.cshrc** file (copied in step 13, above) is correct.

15 - Change the current directory to **config** and edit the **sys_config** file to make necessary modifications and supply all mandatory values. Use the information provided in Section 3 (on platform preparation) and Section 4.6 (on the system configuration file) as guidelines for performing the necessary editing.

16 - Exit the **cps** login, returning to the superuser login.

17 - Verify that all steps required in platform preparation were properly performed, including
- verifying that the permissions on all CD-ROM devices specified in the configuration file are set to 0666
- verifying that all directories, e.g., **/user1/transfer/pdc_xfer,** specified in the configuration file are created, have correct ownership, group identification, and permissions
- verifying that the list of NFS directories specified in the configuration file agree in number and order with the NFS directories listed in the CDS system configuration file and verifying that they appear in the **/etc/exports** file
- verifying that all entries in **/etc/fstab** have been made for local and NFS file systems.

18 - Use the **mount -a** command to mount file systems added to the **/etc/fstab** file. Verify availability of file systems with the **df** command.

19 - Logout from root and login as **cps**.

If errors are detected in the configuration file during system startup, error messages will be displayed. Logout and then login as **root**. Correct the problems listed in the error messages in the configuration file.

4.5 CPS Upgrade Software Installation Procedure

An upgrade installation of the CPS software follows the same procedure as the initial installation except that some setup and all the platform preparation verification steps can be skipped if the system has been operational. A backup should always be performed of the complete **CPS_EXE_HOME** tree before performing an upgrade installation. For completeness, the steps necessary to perform an update are provided below. Consult the latest CPS version description document for any special installation instructions.

1 - Login as **root** on the CPS workstation.

2 - Change directory to the **CPS_EXE_HOME** directory.

3 - Perform a backup of the **CPS_EXE_HOME** directory tree. If the **/dev/rmt0h** tape drive is used for the backup, then the proper command would be **tar -cv0** .

4 - Insert the CPS installation tape into the **/dev/rmt0h** tape drive.

5 - Extract the executables from the tape, using the **tar -xv0** command. All files will be distributed to the proper directory locations.

6 - Force ownership to be **cps** and group to be **cdps** for all installed files by entering the following commands:
chown -R cps *
chgrp -R cdps *

7 - Type the following sequence of commands to set the correct file permissions:
chmod 775 *
chmod -R 664 config/*
chmod 775 config/product_line
chmod 775 config/product_line/mssii
chmod 664 cps_login/* cps_login/.Xdefaults cps_login/.mwmrc
chmod 775 cps_login/.cshrc cps_login/.login
chmod 664 etc/*
chmod 775 tools/*

8 - Type the following commands to distribute login and X resource files. Copies of your current files should be made before performing these commands to allow comparisons if unexpected problems occur after the install.
cp -f cps_login/* /user0/users/cps/
cp -f cps_login/.* /user0/users/cps/

9 - Verify that the environment variable definition of **CPS_EXE_HOME** in the **.cshrc** file (copied in step 8, above) is correct.

10 - Logout from root and login as **cps**.

If errors are detected in the configuration file during system startup, then error messages will be displayed. Logout and login as **root**. Correct the problems listed in the error messages in the configuration file.

4.6 CPS System Configuration File Description

The configuration file contains information that allows the CPS administrator to specify the configuration of the system that is being used to run CPS. Each CPS and CDS installation has its own configuration file. Upon startup, the CPS software reads the configuration file to properly access devices, directories, and other information that can vary among CPS installations.

The file name for the configuration file is **sys_config**. It is located in the **config** sub-directory under the CPS executable home directory. In the standard CPS configuration, this file is located in the **/user0/users/cps_exe/config** directory.

Hint About Editing in CPS Configuration Files:

> *Because the configuration file is a text file, it may be edited with any text editor. The file contains a list of keywords (in all upper-case letters) with associated information provided by the administrator. Keywords must be spelled correctly and must be followed by a colon, and then followed by the administrator-supplied data. In some cases, a specific number of entries must follow the keyword (these are identified below).*
>
> *A '#' character in the first column of any line indicates that the line is a comment and will be ignored by the CPS software.*

The remainder of this section lists and describes the acceptable keywords used by CPS. The values used in all examples are for a CPS system with a standard configuration. A sample CPS configuration file for a standard configuration is provided in Appendix C.

The following is a list of acceptable keywords used by CPS:

CDPS_SITE_IDENTIFIER: One value should be supplied. This value is an alphanumeric string of up to eight characters containing the CPS site identifier code.

CDPS_CLASSIFICATION: One value should be supplied. This value is an alphanumeric string of up to eight characters containing the CPS site classification code. Only **NO_CLASS** should be used.

CDS_ETHERNET_ADDRESS: One value should be supplied. This value is an alphanumeric string specifying the ethernet address of the CDS system. Example: **130.20.68.199**

CDROM_DEVICES: Multiple values may be supplied. These values are alphanumeric strings listing the device special files associated with the CD-ROM drives attached to the system. Example: **/dev/rz5c**

8MM_TAPE_DEVICES: Multiple values may be supplied. These values are alphanumeric strings listing the device special files associated with the 8-mm tape drives attached to the system. Example: **/dev/rmt0h**

NFS_DIRECTORIES: Multiple values may be supplied. NFS directories are used as a work area and as temporary storage of CMS frame files during preprocessing. There should be one entry per available scratch magnetic disk drive. In the standard configuration there will be four NFS directories, named

/user1/cdps **/user2/cdps**
/user3/cdps **/user4/cdps**

> ***Note: It is crucial for proper CDPS operation that the number and order of NFS_DIRECTORIES entries is identical for both the CPS and CDS configuration files.***

SCC_TRANSFER_PATH: One value should be supplied. In the standard configuration this directory is located at **/user1/transfer/scc_xfer**

PDC_TRANSFER_PATH: One value should be supplied. In the standard configuration this directory is located at **/user1/transfer/pdc_xfer**

5 CDS Software

This section describes the suite of executables for CDS and contains the standard execution tree, required directories and device files, procedures for initial installation and upgrade, and a description of the configuration file. Section 4 contains similar information for the CPS software.

5.1 Standard Executable Suite

The standard suite of CDS executables are listed below with a brief description:

Table 5-1. CDS Executables

CDS Executables	Description
Mount	set-uid program for mounting Ultrix Filesystem EODs
Umount	set-uid program for unmounting Ultrix Filesystem EODs
build_tdb	Build theater database process
cds	CDS executive process
cds_admin	CDS administrative tools process
cds_dm	CDS disk monitor process
cds_dtt	CDS degraded mode tape transfer process
cds_mkdmt	CDSs make degraded mode tape process
cds_route_man	Message routing process
cds_socket_man	Socket manager process
cds_utils	CDS system utilities
display_cdsdata	Display CDS coverage data process
dump_tape	Dump degraded mode tape process
load_tape	Load degraded mode tape process
maintain_po	Manage production orders process
om_writer	IFS output media writer process
rep_tdb	Replicate theater database media process
rmpd	Receive and manage processed data process
rmpd_copy	Process for writing to processed data archive
tdb_copy	Process for reading from processed data archive
tdb_tar	Process for creating theater database for output tapes

5.2 Standard Execution Tree

The CDS software executes from a directory location that must be referenced by the environment variable CDS_EXE_HOME. The standard suite of executables given above as well as the standard directory structure provided below must reside in the CDS_EXE_HOME directory. The following listing is a full description of the CDS_EXE_HOME directory tree contents. Several directories will be empty on the distribution tape. These directories will be populated with files as

the system is operated. A listing of the files contained on a CDS distribution tape can be found in the CDS version description document that is provided with the tape.

cds_login	Top-level directory for distributed environment initialization files
.Xdefaults	User-level default settings for X windows
.cshrc	Read at beginning of execution by each shell
.login	Read only by login shell after .cshrc has been read
.mwmrc	Default settings for the motif window manager
default.DECterm	Default settings for DECterm windows
config	Top-level directory for system configuration information
sys_config	System configuration file
sys_config.dist	Distribution configuration file (not required)
coverage_archive	Top-level directory for the CDS processed coverage catalog database
product.cdsdb	CDS processed coverage catalog database file, where *product* is **adri, adri5, dted, gnc, jga, jnc, lfc, onc, tcm, tlm**, or **tpc**
product.cdsdb_frame	CDS processed coverage catalog index file for frame numbers, where *product* is the same as above
product.cdsdb_media_loc	CDS processed coverage catalog index file for media locators, where *product* is the same as above
etc	Top-level directory for miscellaneous items
cds.color_table	CDS color table definitions
dbu_config	Configuration file for database utilities
dfa	Default area file
media_label.file	Output media label file
media_label_dist	Directory for distribution of installation site-specific media label files
media_label.file.acc	Distributed media label file for Air Combat Command installation
media_label.file.esc	Distributed media label file for Electronic Systems Center installation
media_label.file.esc2	Distributed media label file for Electronic Systems Center installation 2
media_label.file.pacaf	Distributed media label file for Pacific Air Forces installation
media_label.file.usafe	Distributed media label file for U.S. Air Forces in Europe installation
mount?	Mount point directories for use in CDS operation, where ? is in the range of 0-9
product.wwmcdb	CDS world-wide media cell database files, where *product* is **adri, adri5, dted, gnc, jga, jnc, lfc, onc, tcm, tlm**, or **tpc**
world.map	World vector map
wwmcdb_dist	Directory for distribution version of the world-wide media cell database
product.wwmcdb	Distribution version of CDS world-wide media cell database files, where *product* is **adri, adri5, dted, gnc, jga, jnc, lfc, onc, tcm, tlm**, or **tpc**
execution_log	Top-level directory for execution log files created from build theater database
exec_log_dir	Execution log directory file, containing references to all detailed execution log entries
tdb_name.time	Execution log files, where *tdb_name* is an operator-supplied theater database name and *time* is a numeric time stamp
media_log	Top-level directory for the CDS media log database
media_log_dir	Media log directory file, containing references to all detailed media log entries

product_media_id	Detailed media log entries, where *product* is **ADRI, ADRI5, DTED, GNC, JGA, JNC, LFC, ONC, TCM, TLM,** or **TPC**; *media* is **EOD** or **8MM**; and *id* is an alphanumeric identifier dependent on the *media* value. For **8MM**, the *id* is strictly a numeric value. For **EOD**, the numeric value is appended with an underscore and a side designator value ranging from **A-H**. Here are two sample values: **ADRI_8MM_00515** and **ADRI_EOD_00459_C**.
production_order	Top-level directory for CDS production orders
po_dir_file	Production order directory file, containing references to all production order files
po_files	Production order files
scc	Top-level directory for the imported CPS source coverage catalog database
product.cpsdb	CPS source coverage catalog database file, where *product* is **adri, adri5, dted, gnc, jga, jnc, lfc, onc, tcm, tlm,** or **tpc**
product.cpsdb_idkey	CPS source coverage catalog index file for unique retrieval, where *product* is the same as above
product.cpsdb_medialoc	CPS source coverage catalog index file for media locators, where *product* is the same as above
product.cpsdb_replacekey	CPS source coverage catalog index file for replacement keys, where *product* is the same as above
tmp	Top-level directory for temporary files
tools	Top-level directory for integrated and offline shell scripts and utility programs
_eod_format	Offline shell script to perform low-level format of an EOD media side
_eod_fsck	Integrated or offline script to perform a file system check of EOD media with Ultrix file systems
_eod_init	Integrated or offline script to initialize an EOD medium with an Ultrix file system
_flush	Flushes all CDS communications mechanisms (integrated)
_run	Invoked on login, performs appropriate cleanup before CDS invocation and after CDS termination (integrated)
_wipe	Removes all CDS processes (integrated)
get_ifs_theater	Offline utility, retrieves an entire theater database directory tree from an ifs EOD media side and copies it to magnetic disk
idir	Offline utility, performs a directory listing of the contents of an ifs EOD media side
ifs_repair	Offline utility, used to add CMS frame files to an IFS output medium. Also creates a new **toc.dat** file and writes it to the IFS output medium.
mychown	Integrated set-uid utility program to properly perform permission changes of directories on newly initialized media. Called by **_eod_init**
nkill	Integrated utility program that kills a process by name
read_toc	Offline utility, reads a binary **toc.dat** file on magnetic disk and outputs the ASCII equivalent

verify_ifs	Offline utility, compares the contents of the **toc.dat** file found on an ifs theater database EOD media side with the contents of the ifs directory tree and reports any discrepancies
transfer_log	Top-level directory for all CDS transfers
transfer_log_dir	Transfer log directory file, containing references to all transfer description files
transferid.task	Transfer description file, where *transferid* is composed of the product identifier, an "_" and the transfer number, e.g., **jnc_12.task**

5.3 Required Directories and Device Files

There are several directories and device files that must be created for a CDS system to be operational. Most of these were described in Section 3. In addition, there is a set of directories that must be created that were not previously described. These are the scratch directories that are required for routine CDS operations.

For a standard configuration there will be four scratch directories. Table 5-2 provides the names, ownership, group id, and permissions for these directories.

Table 5-2. Scratch Directories and Settings for CDS File System

Name	Owner	Group	Permissions
/user1/cds/tmp	cds	cdps	rwxrwxr-x
/user2/cds/tmp	cds	cdps	rwxrwxr-x
/user3/cds/tmp	cds	cdps	rwxrwxr-x
/user4/cds/tmp	cds	cdps	rwxrwxr-x

Each directory and device file created in Section 3 and the scratch directories described in Section 5.3 (above) must be entered into the CDS configuration file to be used by the CDS software.

For completeness, the list of directories and device files that must be created for a standard CDS configuration is provided in Table 5-3 below, along with required ownership and permissions.

Table 5-3. CDS Configuration Directories and Device Files

Directory/Device File	Owner	Group	Permissions
/user1/cdps	cds	cdps	rwxrwxr-x
/user2/cdps	cds	cdps	rwxrwxr-x
/user3/cdps	cds	cdps	rwxrwxr-x
/user4/cdps	cds	cdps	rwxrwxr-x
/user1/transfer/scc_xfer	cds	cdps	rwxrwxr-x
/user1/transfer/pdc_xfer	cds	cdps	rwxrwxr-x
/dev/rz3c & /dev/rrz3c			rwxrwxrwx
/dev/rz4c & /dev/rrz4c			rwxrwxrwx
/dev/rz5c & /dev/rrz5c			rwxrwxrwx
/dev/rz6c & /dev/rrz6c			rwxrwxrwx
/dev/rz10c & /dev/rrz10c			rwxrwxrwx
/dev/rz11c & /dev/rrz11c			rwxrwxrwx
/dev/rz12c & /dev/rrz12c			rwxrwxrwx
/dev/rmt0h			
/dev/rmt1h			

5.4 CDS Initial Software Installation Procedure

1 - Login as **root** on the CDS workstation.

2 - Create a directory for the CDS execution tree. The standard location for this directory is **/user0/users**, and the standard name is **cds_exe.** The pathname **/user0/users/cds_exe**, must be used when declaring the **CDS_EXE_HOME** environment variable.

3 - Change directory ownership by typing:
chown cds cds_exe

4 - Change directory group by typing:
chgrp cdps cds_exe

5 - Change directory permissions by typing:
chmod 0775 cds_exe

6 - Change directory to the **cds_exe** directory.

7 - Insert the CDS installation tape into the **/dev/rmt0h** tape drive.

8 - Extract the executables from the tape using the **tar -xv0** command. All files will be distributed to the proper directory locations.

9 - Copy the system configuration file from the distributed copy by typing the following command:
cp config/sys_config.dist config/sys_config

10 - Copy the world-wide media cell database from the distributed copy by typing the following command:
cp etc/wwmcdb_dist/* etc

11 - Copy the correct media label file for your installation from the distribution copy by performing the following steps:
ls etc/media_label_dist
Identify the file containing your site identifier (or abbreviation of):
cp etc/media_label_dist/media_label.file.*site_id* etc/media_label.file
where ***site_id*** represents your site identifier.

12 - Force ownership to be **cds** and group to be **cdps** for all installed files by entering the following commands:
chown -R cds *
chgrp -R cdps *

13 - Type the following sequence of commands to set the correct file permissions:

```
chmod 775 *
chmod 664 cds_login/* cds_login/.Xdefaults cds_login/.mwmrc
chmod 775 cds_login/.cshrc cds_login/.login
chmod -R 664 etc/*
chmod 777 etc/mount*
chmod 775 etc/wwmcdb_dist
chmod 775 etc/media_label_dist
chmod 775 tools/* tools/.*
```

14 - Type the following sequence of commands to set the correct ownership and file permissions:

```
chown root Mount Umount
chmod 4775 Mount Umount
chown root tools/_eod_fsck
chown root tools/_eod_init
chown root tools/_eod_format
chown root tools/mychown
chmod 4775 tools/_eod_fsck
chmod 4775 tools/_eod_init
chmod 4775 tools/_eod_format
chmod 4775 tools/mychown
```

15 - Change login to **cds** by typing **su cds** and entering the CDS account password at the prompt.

16 - Type the following commands to distribute login and X resource files.

```
cp -f cds_login/* /user0/users/cds/
cp -f cds_login/.* /user0/users/cds/
```

17 - Verify that the environment variable definition of **CDS_EXE_HOME** in the **.cshrc** file (copied in step 16, above) is correct.

18 - Change the current directory to **config** and edit the **sys_config** file to make necessary modifications and supply all mandatory values. Use the information provided in Section 3 (on platform preparation) and Section 5.6 (on the system configuration file) as guidelines for performing the necessary editing.

19 - Exit the **cds** login, returning to the superuser login.

20 - Verify that all steps required in platform preparation were properly performed, including:
- verifying that the permissions on all EOD devices specified in the configuration file are set to 0777
- verifying that all directories, e.g., **/user1/transfer/pdr_xfer,** specified in the configuration file are created, have correct ownership, group identification, and permissions
- verifying that the list of NFS directories specified in the configuration file agrees in number and order with the NFS directories listed in the CPS system configuration file

- verifying that all entries in **/etc/fstab** have been made for local and NFS file systems.

21 - Use the **mount -a** command to mount file systems added to the **/etc/fstab** file. Verify availability of file systems with the **df** command.

22 - Logout from root, and then login as **cds**.

If errors are detected in the configuration file during system startup, then error messages will be displayed. Logout and login as **root**. Correct the problems listed in the error messages in the configuration file.

5.5 CDS Upgrade Software Installation Procedure

An update installation of the CDS software follows the same procedure as the initial installation, except that some setup and all the platform preparation verification steps can be skipped if the system has been operational. A backup should always be performed of the complete **CDS_EXE_HOME** tree before performing an upgrade installation. For completeness, the steps necessary to perform an update are provided below. Consult the latest CDS version description document for any special installation instructions.

1 - Login as **root** on the CDS workstation

2 - Change directory to the **CDS_EXE_HOME** directory.

3 - Perform a backup of the **CDS_EXE_HOME** directory tree. If the **/dev/rmt0h** tape drive is used for the backup then the proper command would be **tar -cv0.**

4 - Insert the CDS installation tape into the **/dev/rmt0h** tape drive.

5 - Extract the executables from tape using the **tar -xv0** command. All files will be distributed to the proper directory locations.

6 - Force ownership to be **cds** and group to be **cdps** for all installed files by entering the following commands:
chown -R cds *
chgrp -R cdps *

7 - Type the following sequence of commands to set the correct file permissions:

```
chmod 775 *
chmod 664 cds_login/* cds_login/.Xdefaults cds_login/.mwmrc
chmod 775 cds_login/.cshrc cds_login/.login
chmod -R 664 etc/*
chmod 777 etc/mount*
chmod 775 etc/wwmcdb_dist
chmod 775 etc/media_label_dist
chmod 775 tools/* tools/.*
```

8 - Type the following sequence of commands to set the correct ownership and special file permissions:

```
chown root Mount Umount
chmod 4775 Mount Umount
chown root tools/_eod_fsck
chown root tools/_eod_init
chown root tools/_eod_format
chown root tools/mychown
chmod 4775 tools/_eod_fsck
chmod 4775 tools/_eod_init
chmod 4775 tools/_eod_format
chmod 4775 tools/mychown
```

9 - Type the following commands to distribute login and X resource files.

```
cp -f cds_login/* /user0/users/cds/
cp -f cds_login/.* /user0/users/cds/
```

10 - Verify that the environment variable definition of **CDS_EXE_HOME** in the **.cshrc** file (copied in the step above) is correct.

11 - Logout from **root** and login as **cds**.

If errors are detected in the configuration file during system startup, then error messages will be displayed. Logout, and login as **root**. Correct the problems identified in the system error messages in the configuration file.

5.6 CDS System Configuration File Description

The configuration file contains information that allows the CDS administrator to specify the configuration of the system that is being used to run CDS. Each CPS and CDS installation has its own configuration file. Upon startup, the CDS software reads the configuration file to properly access devices, directories, and other information that can vary between CDS installations.

The file name for the configuration file is **sys_config**. It is located in the **config** subdirectory under the CDS executable home directory. In the standard CDS configuration, this file is located in the **/user0/users/cds_exe/config** directory.

Hint About Editing in CDS Configuration Files:

> *Because the configuration file is a text file, it may be edited with any text editor. The file contains a list of keywords (in all upper case letters) with associated information provided by the administrator. Keywords must be spelled correctly and must be followed by a colon, and then followed by the administrator-supplied data. In some cases, a specific number of entries must follow the keyword (these are identified below).*
>
> *A '#' character in the first column of any line indicates that the line is a comment and will be ignored by the CDS software.*

The remainder of this section lists and describes the acceptable keywords used by CDS. The values used in all examples are for a CDS system with a standard configuration. A sample CDS configuration file for a standard configuration is provided in Appendix C.

The following is a list of acceptable keywords used by CDS:

CDPS_SITE_IDENTIFIER: One value should be supplied. This value is an alpha-numeric string of up to eight characters containing the CDS site identifier code.

CDPS_CLASSIFICATION: One value should be supplied. This value is an alpha-numeric string of up to eight characters containing the CDS site classification code. Only **NO_CLASS** should be used.

CDS_ETHERNET_ADDRESS: One value should be supplied. This value is an alpha-numeric string specifying the ethernet address of the CDS system. Example: **130.20.68.199**

8MM_TAPE_DEVICES: Multiple values may be supplied. These values are alpha-numeric strings listing the device special files associated with the 8-mm tape drives attached to the system.
Example: **/dev/rmt0h**

NFS_DIRECTORIES: Multiple values may be supplied. NFS directories are used as a storage area of CMS frame files until they are archived. In the standard configuration, there will be four NFS directories:

/user1/cdps **/user2/cdps**
/user3/cdps **/user4/cdps**

> ***Note: It is crucial for proper CDPS operation that the number and order of NFS_DIRECTORIES entries are identical to that specified in the CPS configuration file.***

SCC_TRANSFER_PATH: One value should be supplied. In the standard configuration, this directory is located at **/user1/transfer/scc_xfer**

PDC_TRANSFER_PATH: One value should be supplied. In the standard configuration, this directory is located at **/user1/transfer/pdc_xfer**

EOD_DEVICES: Multiple values may be supplied. These values are alphanumeric strings listing the device special files associated with the EOD drives attached to the system. Example: **/dev/rz10c**

SCRATCH_DIRECTORIES: Multiple values may be supplied. Scratch directories are used for temporary storage of CMS frame files during CDS operations. There should be one entry per available scratch storage disk. In the standard configuration, there will be four scratch directories:
/user1/cds/tmp **/user2/cds/tmp**
/user3/cds/tmp **/user4/cds/tmp**

TAPE_TRANSFER_DIRECTORY: One value should be supplied. This directory should be placed on the 2-GB magnetic disk. This directory is used for some tape operations. In the standard configuration, there will be one tape transfer directory: **/user4/cds/tmp**.

STAGED_DATA_DIRECTORY: One value should be supplied. This directory is used to hold CMS frames that have been placed on the magnetic disk to speed theater database creation (currently not available). In the standard configuration, there will be one staged data directory: **/user0/users/cds_exe/tmp**.

6 System Maintenance

Routine maintenance of the CPS and CDS systems must be performed to provide reliable operation. This section is divided into several subsections. Each subsection provides a maintenance operation that should be routinely performed.

6.1 Magnetic Disk Space

The system administrator should monitor the magnetic disk space of both systems to ensure that adequate space is available for routine operations.

The amount of free disk space on either a CPS or CDS system should be checked while the system is inactive. The **df** command provides a percentage of disk space used per mounted file system. On an idle CPS system, each file system associated with the directories used for the preprocessing of frames should have a value close to 0% used. On an idle CDS system, each file system associated with the directories used for scratch space should also have a value close to 0% used. Cleanup of the directories used by the system occurs during CDPS operation. However, cleanup may not occur after a system failure. A periodic restart of the system is recommended since a thorough cleanup of the directories can be safely performed during startup of CDPS.

Extraneous files can be added to the system by any user of the system. This has no impact upon the system unless the files consume a significant amount of disk space, thus limiting the size of the tasks that the CDPS software can perform. The system administrator must monitor the extraneous files added to a CDPS system and remove them when they affect the system.

The root (/) file system, the **/usr** file system and **/var** file system (**/var** may be a directory included in the **/usr** file system) should also be routinely monitored for disk space capacity. The CPS uses the directory **/usr/tmp** when temporary files are created. Again, these files are typically removed during normal operation, but a periodic system restart is recommended to perform a complete cleanup of this directory. The root file system and the **/var** file system are not used for the storage of CDPS files, but if either of these file systems becomes full, it will severely impact the system. Ultrix routinely creates files in **/var** and may also add **core** files to / if Ultrix experiences a crash. The following system files are recommended to be periodically removed:

/core
/var/adm/crash/*
/var/adm/X0msgs
/var/adm/lpd-errs
/var/adm/shutdownlog
/var/adm/sulog
/var/adm/syserr/*
/var/adm/wtmp

The files in **/var/adm/syserr** can be viewed with the **uerf** command, and it is recommended to view these files prior to removal. If the file **/var/adm/wtmp** is removed, then the logging of performed logins will be turned off. If a login log is desired, then recreate the **wtmp** file after removing it with the **touch** command.

6.2 CDPS Databases

Certain databases created during the operation of CDPS are not essential and can be safely removed and allowed to start over. You may want to do this if the database has grown too large to be easily viewed and the historical content is not deemed important.

For CPS, there is only one database that can be restarted without impacting system operation: the task log database. An interface is provided within CPS to remove single task log history records. However, if you want to start over with an empty task log, then this can be performed with the command:

```
rm $CPS_EXE_HOME/task_log/*
```

For CDS, there are three databases that can be restarted without impacting system operation: the execution log, the defined production orders, and the transfer log. For each of these databases, an interface is provided within CDS to remove a single record. However, if you want to start over for one of these databases, then the appropriate command from below should be used:

```
rm $CDS_EXE_HOME/execution_log/*
rm $CDS_EXE_HOME/production_order/*
rm $CDS_EXE_HOME/transfer_log/*
```

6.3 Periodic System Reboot

The CPS and CDS platforms should be periodically rebooted to reclaim fragmented swap space. This is the only method available under Ultrix to reclaim swap space that is lost due to fragmentation. To see the amount of swap space lost, use the **/etc/pstat -s** command and look for the amount of space reported as wasted. These values are reported in K-bytes so be sure to interpret the value correctly. If rebooting is not routinely performed, the system may operate more slowly and occasionally may become hung up.

6.4 Backups

The CPS and CDS software provide a utility to perform backups and restorations of the CPS/CDS system critical files. This saves all critical databases in the execution tree; however, it does not save the distributed executables. If required, the executable files would need to be restored from the distribution tape.

Backups of other disk partitions (e.g., / or **/usr**) are not performed by the CDPS software. These backups, if desired, can be performed from the command line using your favorite utility. It is recommended that the dump utility be used to perform backups of the Ultrix operating system. Refer to the *Ultrix Documentation Set* for information on the dump utility. If a backup of the operating system is not made and the boot disk is inadvertently lost, then a re-install of the operating system will be required along with a complete re-install of the CPS or CDS.

6.5 ADRI Tape Duplication

Eight-millimeter tapes with ADRI distribution data can be duplicated using the **back_tape** utility that is included in the CPS distribution. The **back_tape** utility is only intended to work with ADRI source distribution tapes. To invoke the utility use the following command:

$CPS_EXE_HOME/tools/back_tape ***from_drive to_drive***

where *from_drive* is the source tape drive (e.g., **/dev/rmt0h**) and *to_drive* is the destination tape drive (e.g., **/dev/rmt1h**).

6.6 Erasable Optical Disk Maintenance

6.6.1 Required Optical Disk Media

The CDPS software was designed to use 650-MB capacity EOD media with 512 bytes per sector. This is the only capacity that will be fully utilized by the CDPS. This capacity of media must be used for distribution of theater databases. Although higher capacity media can be used for the CDS archive, its compatibility is not guaranteed. In addition, the extra capacity will not be utilized by CDS.

6.6.2 Erasable Optical Disk Media Formatting

The EOD media must contain an ISO 10089 compliant low-level format to be interchangeable among different EOD drives. Some vendors offer pre-initialized EOD media, but experience has shown that some formats are more compatible than others. If a medium requires a low-level format, this can be performed with any Tahiti II or Tahiti IIm EOD drive connected to your CDS platform. Use the following command to perform the format:

$CDS_EXE_HOME/tools/_eod_format ***eod_device_name***

where *eod-device-name* is of the form **rz3c**.

Warning:

If this utility is used, be certain that it is only used for EOD media. Do not inadvertently or otherwise specify a magnetic hard drive partition. The results will be unpredictable.

Note: A Tahiti I cannot be used to format an EOD medium since its format is not ISO 10089 compliant.

6.6.3 Ultrix File System Creation on Erasable Optical Disk Media

The EOD medium requires an Ultrix file system to be created before it can be used for archiving CMS frames. Note that this is not required for EOD media used for theater database distribution. Because of special ownership and permission requirements, this procedure should be performed with the CDS tool **_eod_init**. This is available as an integrated administrative tool (see *CDS User's Guide*), but it can also be used offline. To invoke this utility offline, use the following command:

$CDS_EXE_HOME/tools/_eod_init ***eod_device_name***

where *eod_device_name* is of the form **rz3c.**

> **Warning:**
>
> **If this utility is used offline, be certain that it is only used for EOD media. Do not inadvertently or otherwise specify a magnetic hard drive partition. The results will be unpredictable.**

6.6.4 File System Checks on Erasable Optical Disk Media

Like all Unix (Ultrix) file systems, the file systems on the EOD media should be periodically verified with the system utility **fsck**. Sometimes, a file system check will be required before it can be mounted. At other times, a mount will succeed but a file system check will be advised. In either case, a file system check should be performed. An integrated CDS tool is provided to perform file system checks and can be found in the administrative tools menu (see *CDS User's Guide*). This tool can also be run offline or the command **fsck** can be used directly. To invoke the CDS tool, use the following command:

$CDS_EXE_HOME/tools/_eod_fsck *eod_device_name*

where *eod_device_name* is of the form **rz3c**.

In most cases, encountered problems can be fixed. Eventually, however, a file or an entire directory will be lost, or the entire medium may become unusable. New utilities are being added to CDPS to help discover CMS frame files that have disappeared. If entire directories are lost and are not in the **lost+found** directory, then this medium should be reformatted and CPS used to reprocess all of the frames. If the directory is in **lost+found**, then an **mv** command can be used to restore the directory tree. If a medium becomes completely unusable, then it should either be properly disposed of or reformatted and used again. If unreadable sectors are reported during the file system check, refer to Section 6.6.5 to see what procedures can be performed.

6.6.5 Other Maintenance of Erasable Optical Disk Media

Maintenance of EOD media also involves cleaning and taking care of bad media blocks.

6.6.5.1 Media Cleaning

Cleaning kits are available for EOD media and are recommended for use. The effectiveness of the media cleaning kits is unknown, but using the cleaning kit has not resulted in the loss of a medium.

Also recommended is using the protective covers of the EOD media if the media will not be used for prolonged periods of time.

6.6.5.2 Bad EOD Media Blocks

Occasionally, EOD media blocks will be reported as unreadable. This may be presented as a CMS frame file that reports an I/O error during a copy operation. Some of these blocks may be reported during a file system check. Others will only be detected by running the utility **rzdisk**. The **rzdisk** utility can be used to scan all blocks on a medium. It will report blocks it cannot read. These reported blocks have apparently degraded, and it is uncertain why. If such a block was written to again, it is very likely that the write would complete successfully and subsequent reads from this block would also be successful. Eventually, however, the block would degrade and would again be unreadable. Therefore, it is best to map these reported blocks out to the spare block area. This is also done with the **rzdisk** command. Before sparing out these blocks, any affected CMS frame files need to be identified. This is the sequence of commands and interpretations required to perform the following procedure:

Note: If a significant number of sectors are reported as bad, then the medium should be reformatted, instead of performing this procedure.

1 - Type in **rzdisk -s 0 -1 /dev/rrz?c** - This scans for all bad blocks, where ? is the SCSI address.

2 - For each block identified as bad in the above command, issue the following command:

icheck -b *block number* **/dev/rrz?c**

where ? is the SCSI address. This maps bad blocks to **inodes**.

3 - For each **inode** identified as containing a bad block in the above command, issue the following command:

ncheck -i *inode* **/der/rrz?c**

where ? is the SCSI address. This maps **inodes** to filenames.

4 - This procedure so far has provided a list of filenames that will need to be removed (and reprocessed) once the bad blocks are spared out. To spare out the bad blocks identified in step 1, use this command for each bad block:

Appendix A

Acronyms

Appendix A

Acronyms

Acronym	Definition
ACC	Air Combat Command
ADRG	ARC Digitized Raster Graphics
ADRI5	ARC Digital Raster Imagery (5 meters)
ADRI	ARC Digital Raster Imagery (10 meters)
ARC	Equal Arc-second Raster Chart/Map
CDPS	CMS Data Production System
CDROM	CD-ROM, Compact Disk Read-Only Memory
CDS	CMS Distribution Subsystem
CMS	Common Mapping Standard
CPS	CMS Preprocessing Subsystem
CRLCMP	Computer Resources Life Cycle Management Plan
DEC	Digital Equipment Corporation
DTED	Digital Terrain Elevation Data
EOD	Erasable Optical Disk
ESC	Electronic Systems Center
GNC	Global Navigation Chart
ICD	Interface Control Document
IFS	Independent File System
ISO	International Organization for Standardization
JNC	Jet Navigation Chart
JGA	Joint Operations Graphics - Air

LFC	Low Flying Chart
MSS IIA	Mission Support System IIA
NFS	Network File System
ONC	Operational Navigation Chart
OSF	Open Software Foundation
PACAF	Pacific Air Forces
SCSI	Small Computer System Interconnect
TCM	Topographic Line Map (1:100000)
TLM	Topographic Line Map (1:50000)
TPC	Tactical Pilotage Chart
UFS	Ultrix File System
USAFE	U.S. Air Forces in Europe

Appendix B

Common Commands

Appendix B

Common Commands

_flush (CDPS utility) - Flushes all CPS or CDS communications mechanisms. Use may be required if system is abnormally terminated.

Usage: **_flush CDS | CPS**

_run (CDPS utility) - Invoked on login, performs cleanup, invokes CDS or CPS, performs cleanup after termination.

Usage: **_run CDS | CPS**

_wipe (CDPS utility) - Removes all CPS or CDS processes. Use may be required if system is abnormally terminated.

Usage: **_wipe CDS | CPS**

chgrp (Ultrix) - Used to change group identifiers for specified files.
chmod (Ultrix) - Used to change permissions for specified files.
chown (Ultrix) - Used to change ownership for specified files. Must be superuser.
chpt (Ultrix) - Used to change or view disk partition information.
cnfg (console mode) - Used to investigate peripherals reporting on a SCSI chain. See the *Hardware Operators Guide* for more information.
df (Ultrix) - Displays information on mounted file systems.
fsck (Ultrix) - Performs a file system check/repair for a specified file system.
icheck -b (Ultrix) - Used to map bad block numbers to **inode** numbers.
init (console mode) - Used to re-initialize SCSI peripherals. See the *Hardware Operators Guide* for more information.
kill (Ultrix) - Used to kill a process.
mkdir (Ultrix) - Used to make directories.
mount (Ultrix) - Used to mount UFSs and NFSs.
ncheck -i (Ultrix) - Used to map an **inode** number to a filename.
newfs (Ultrix) - Creates an Ultrix file system on the specified disk partition.
nkill (CDPS utility) - Performs a kill for the named process. This performs a pattern match and can kill a group of processes if a common pattern exists in the names of the processes.
printenv (console mode) - Used to investigate settings defined at the console level. See the *Hardware Operators Guide* for more information.
ps (Ultrix) - Displays information about processes contained in the system process table.
pstat (Ultrix) - Displays system information.
rzdisk (Ultrix) - Used to format a disk, scan for bad blocks, and remap bad blocks.
uerf (Ultrix) - Displays the system error log file.
umount (Ultrix) - Unmounts mounted file systems.
MAKEDEV (Ultrix) - Creates device special files.

Appendix C

Examples of Standard Configuration Files

Appendix C

Examples of Standard Configuration Files

C.1 Standard CPS Configuration File

```
#####################################################################
#                    CPS Configuration File
#
# The CPS Configuration File allows the CPS software to operate
# on workstations with different configurations.  The file is
# read by the CPS software when it is started.  The file provides
# specific information relating to devices, disk directories,
# network connections, etc.
# Any line that begins with the '#' character is treated as a comment
# and is ignored by the software.
# The CPS software searches this file for certain capitalized keywords
# followed by a variable number of user supplied values.  The keywords
# must be spelled correctly.  In this file, each keyword is preceded
# by a comment section that gives: the keyword, how it is used by the
# software, a range, and a sample value.
# The CPS software attempts to verify all user supplied data when
# the software is started.  If errors are encountered during startup
# messages will be displayed to indicate which values are in error.
#
#####################################################################
# Keyword:
#                                CDROM_DEVICES:
#
# Usage:
#                                Specifies the device special files for the Compact Disk -
#                                Read Only Drives(CD-ROM).  The device special files must
#                                be created by the CDPS System Manager.
#
# Range:
#                                Supply zero to eight values.
#
# Sample Value:
#                                /dev/rz11c
#
CDROM_DEVICES:
/dev/rz2c
/dev/rz3c
/dev/rz4c
/dev/rz5c
/dev/rz11c
/dev/rz12c
#####################################################################
# Keyword:
#                                8MM_TAPE_DEVICES:
#
```

```
# Usage:
#                               Specifies the device special files for the Eight-mm
#                               tape drives. The device special files must be created by the
#                               CDPS System Manager.
#
# Range:
#                               Supply zero to eight values.
#
# Sample Value:
#                               /dev/rmt0h
#
8MM_TAPE_DEVICES:
/dev/rmt0h
/dev/rmt1h
#########################################################################
# Keyword:
#                               4MM_TAPE_DEVICES:
#
# Usage:
#                               Specifies the device special files for the Four-mm
#                               tape drives. The device special files must be created by the
#                               CDPS System Manager.
#
# Range:
#                               Supply zero to eight values.
#
# Sample Value:
#                               /dev/rmt0h
#
4MM_TAPE_DEVICES:
#########################################################################
# Keyword:
#                               CDS_ETHERNET_ADDRESS:
#
# Usage:
#                               Specifies the ethernet address of the CDS system. This value
#                               is assigned by the CDPS System or Network Manager.
#
# Range:
#                               Supply one and only one value.
#
# Sample Value:
#                               129.83.178.93
#
CDS_ETHERNET_ADDRESS:
130.20.74.65
#########################################################################
# Keyword:
#                               CDPS_SITE_IDENTIFIER:
#
```

```
# Usage:
#                               Identifies the CDPS Site.  This value is stored in CMS frames
#                               that are pre-processed and theater databases that are created
#                               to identify the source of the frames/theater databases.
#
# Range:
#                               The CMS ICD allows the following values for CDPS_SITE_IDENTIFIER:
#                               ACC,PACAF, USAFE, ESC, ROME, PNL.  Supply one and only one value.
#
# Sample Value:
#                               USAFE
#
CDPS_SITE_IDENTIFIER:
PNL
########################################################################
# Keyword:
#                               CDPS_CLASSIFICATION:
#
# Usage:
#                               The CDPS_CLASSIFICATION is informational only, reasonable
#                               values are: NO_CLASS,U,C,S,T.
#
# Range:
#                               Supply one and only one value.
#
# Sample Value:
#
CDPS_CLASSIFICATION:
NO_CLASS
########################################################################
# Keyword:
#                               NFS_DIRECTORIES:
#
# Usage:
#                               NFS_DIRECTORIES are directories that are accessible by both CPS
#                               and CDS.  Pre-processed frames are transferred via these
#                               directories.  The System Manager must make sure that the
#                               CDS and CPS entries exactly correspond.  There should be
#                               only one NFS directory per physical magnetic disk.
#
# Range:
#                               Supply one to ten values.
#
# Sample Value:
#                               /user1/cdps
#
NFS_DIRECTORIES:
/user1/cdps
/user2/cdps
/user3/cdps
/user4/cdps
########################################################################
# Keyword:
#                               SCC_TRANSFER_PATH:
#
```

```
# Usage:
#                               This directory is used to transfer the CPS Source Coverage
#                               Catalog(SCC) to CDS.
#
# Range:
#                               Supply one and only one value.
#
# Sample Value:
#                               /user1/transfer/scc_xcfer
#
SCC_TRANSFER_PATH:
/user1/transfer/scc_xfer
#####################################################################
# Keyword:
#                               PDC_TRANSFER_PATH:
#
# Usage:
#                               This directory is used to transfer the CDS Processed Data
#                               Catalog(PDC) to CPS.
#
# Range:
#                               Supply one and only one value.
#
# Sample Value:
#                               /user1/transfer/pdc_xcfer
#
PDC_TRANSFER_PATH:
/user1/transfer/pdc_xfer
```

C.2 Standard CDS Configuration File

```
#####################################################################
#                   CDS Configuration File
#
# The CDS Configuration File allows the CDS software to operate
# on workstations with different configurations. The file is
# read by the CDS software when it is started. The file provides
# specific information relating to devices, disk directories,
# network connections, etc.
# Any line that begins with the '#' character is treated as a comment
# and is ignored by the software.
# The CDS software searches this file for certain capitalized keywords
# followed by a variable number of user supplied values. The keywords
# must be spelled correctly. In this file, each keyword is preceded
# by a comment section that gives: the keyword, how it is used by the
# software, a range, and a sample value.
# The CDS software attempts to verify all user supplied data when
# the software is started. If errors are encountered during startup
# messages will be displayed to indicate which values are in error.
#
#####################################################################
# Keyword:
#                               EOD_DEVICES:
#
```

```
# Usage:
#                               Specifies the device special files for the Erasable Optical
#                               DISK(EOD) drives. The device special files must be created
#                               by the CDPS System Manager.
#
# Range:
#                               Supply zero to fourteen values.
#
# Sample Value:
#                               /dev/rz11c
#
EOD_DEVICES:
/dev/rz3c
/dev/rz4c
/dev/rz5c
/dev/rz6c
/dev/rz10c
/dev/rz11c
/dev/rz12c
#########################################################################
# Keyword:
#                               8MM_TAPE_DEVICES:
#
# Usage:
#                               Specifies the device special files for the Eight-mm
#                               tape drives. The device special files must be created by the
#                               CDPS System Manager.
#
# Range:
#                               Supply zero to five values.
#
# Sample Value:
#                               /dev/rmt0h
#
8MM_TAPE_DEVICES:
/dev/rmt0h
/dev/rmt1h
#########################################################################
# Keyword:
#                               4MM_TAPE_DEVICES:
#
# Usage:
#                               Specifies the device special files for the Four-mm
#                               tape drives. The device special files must be created by the
#                               CDPS System Manager.
#
# Range:
#                               Supply zero to five values.
#
# Sample Value:
#                               /dev/rmt2h
#
4MM_TAPE_DEVICES:
#########################################################################
```

```
# Keyword:
#                               CDS_ETHERNET_ADDRESS:
#
# Usage:
#                               Specifies the ethernet address of the CDS system.  This value
#                               is assigned by the CDPS System or Network Manager.
#
# Range:
#                               Supply one and only one value.
#
# Sample Value:
#                               129.83.178.93
#
CDS_ETHERNET_ADDRESS:
130.20.74.65
#########################################################################
# Keyword:
#                               CDPS_SITE_IDENTIFIER:
#
# Usage:
#                               Identifies the CDPS Site.  This value is stored in CMS frames
#                               that are pre-processed and theater databases that are created
#                               to identify the source of the frames/theater databases.
#
# Range:
#                               The CMS ICD allows the following values for CDPS_SITE_IDENTIFIER:
#                               ACC, PACAF, USAFE, ESC, ROME, PNL.  Supply one and only one value.
#
# Sample Value:
#                               USAFE
#
CDPS_SITE_IDENTIFIER:
PNL
#########################################################################
# Keyword:
#                               CDPS_CLASSIFICATION:
#
# Usage:
#                               The CDPS_CLASSIFICATION is informational only, reasonable
#                               values are: NO_CLASS,U,C,S,T.
#
# Range:
#                               Supply one and only one value.
#
# Sample Value:
#
CDPS_CLASSIFICATION:
NO_CLASS
#########################################################################
# Keyword:
#                               SCRATCH_DIRECTORIES:
#
```

```
# Usage:
#                               SCRATCH_DIRECTORIES are directories that will be used
#                               during CDS I/O intensive operations.
#                               There should be only one scratch directory per physical magnetic disk.
#
# Range:
#                               Supply one to ten values.
#
# Sample Value:
#                               /user1/cds/tmp
#
SCRATCH_DIRECTORIES:
/user1/cds/tmp
/user2/cds/tmp
/user3/cds/tmp
/user4/cds/tmp
#########################################################################
# Keyword:
#                               NFS_DIRECTORIES:
#
# Usage:
#                               NFS_DIRECTORIES are directories that are accessible by both CPS
#                               and CDS.  Pre-processed frames are transferred via these
#                               directories.  The System Manager must make sure that the
#                               CDS and CPS entries exactly correspond.
#
# Range:
#                               Supply one to ten values.
#
# Sample Value:
#                               /user1/cdps
#
NFS_DIRECTORIES:
/user1/cdps
/user2/cdps
/user3/cdps
/user4/cdps
#########################################################################
# Keyword:
#                               STAGED_DATA_DIRECTORY:
#
# Usage:
#                               This directory is used to store frequently used CMS frames
#                               on the magnetic disk, for fast access by build theater database.
#                               Currently not utilized by the system.
#
# Range:
#                               Supply one and only one value.
#
# Sample Value:
#                               /user1/cds/tmp
#
STAGED_DATA_DIRECTORY:
/user1/cds/tmp
#########################################################################
```

```
# Keyword:
#                               TAPE_TRANSFER_DIRECTORY:
#
# Usage:
#                               TAPE_TRANSFER_DIRECTORY should be a directory on a
#                               large (2+ GigaByte) capacity disk.  This is used as a
#                               default for some tape operations.
#
# Range:
#                               Supply one and only one value.
#
# Sample Value:
#                               /user4/cds/tmp
#
TAPE_TRANSFER_DIRECTORY:
/user4/cds/tmp
#########################################################################
# Keyword:
#                               SCC_TRANSFER_PATH:
#
# Usage:
#                               This directory is used to transfer the CPS Source Coverage
#                               Catalog(SCC) to CDS.
#
# Range:
#                               Supply one and only one value.
#
# Sample Value:
#                               /user1/transfer/scc_xcfer
#
SCC_TRANSFER_PATH:
/user1/transfer/scc_xfer
#########################################################################
# Keyword:
#                               PDC_TRANSFER_PATH:
#
# Usage:
#                               This directory is used to transfer the CDS Processed Data
#                               Catalog(PDC) to CPS.
#
# Range:
#                               Supply one and only one value.
#
# Sample Value:
#                               /user1/transfer/pdc_xcfer
#
PDC_TRANSFER_PATH:
/user1/transfer/pdc_xfer
```

Appendix D

Ultrix Software Subsets

Appendix D

Ultrix Software Subsets

This appendix provides a list of mandatory and recommended Ultrix 4.2 software subsets for installation on CDPS platforms.

Mandatory Subsets	Description
DXMMWM11	DECwindows OSF/Motif Window Mgr
UDTAFM420	Adobe Font Metric Files
UDTBASE420	Base System
UDTBASE421	Base System UPGRADE
UDTBIN420	Kernel Configuration Files
UDTBIN421	Kernel Config Files UPGRADE
UDTCOMM420	Communications Utilities
UDTCOMM421	Communications Util. UPGRADE
UDTDCMT420	Doc. Preparation for Ref. Pages
UDTDCMTEXT420	Doc. Preparation Extensions
UDTINET420	TCP/IP Networking Utilities
UDTINET421	TCP/IP Networking Util UPGRADE
UDTMAN420	Ref. Pages for Sys. Admin. & Users
UDTMAN421	Ref Pages Admin/Users UPGRADE
UDTNFS420	Network File System Utilities
UDTNFS421	Network File Sys Util UPGRADE
UDTPRINT420	Printer Support Environment
UDTPRINT421	Printer Support Env. UPGRADE
UDTUMAIL420	Extended (Berkeley) Mailer
UDWFONT15420	X11/DECwindows 100dpi Fonts
UDWFONT15421	X11/DECwndws 100dpi Fnts UPGRADE
UDWFONT420	X11/DECwindows 75dpi Fonts
UDWMAN420	UWS Runtime Reference Pages
UDWSER420	X11/DECwindows Servers
UDWSER421	X11/DECwindows Servers UPGRADE
UDWX11420	X11/DECwindows User Environment
UDWX11421	X11/DECwindows User Env. UPGRADE
UDXBASE420	Base Extension
UDXUNMIT420	Unsupported X11 Components

Recommended Subsets	Description
DXMMAN110	DECwindows OSF/Motif Man Pages
DXMMRM110	DECwindows OSF/Motif Resource Mgr
DXMX11110	DECwindows OSF/Motif Intrinsics
DXMXM110	DECwindows OSF/Motif Widgets
UDTEXER420	System Exerciser Package
UDTMANPGMR420	Reference Pages for Programers
UDTMANPGMR421	Ref Pages for Prog UPGRADE
UDTPGMR420	Software Development Utilities
UDTPGMR421	Software Dev. Utilities UPGRADE
UDTSMSCAMP420	Sys. Config. Mgmt. Program (SCAMP)
UDWDECW420	Additional DECwindows Applications
UDWMANPGMR420	UWS Development Reference Pages
UDWXDEV420	Worksystem Development Environment
UDWXDEV421	Worksystem Devmt. Env. UPGRADE
UDXUNMAN420	Unsupported X11 Reference Pages

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